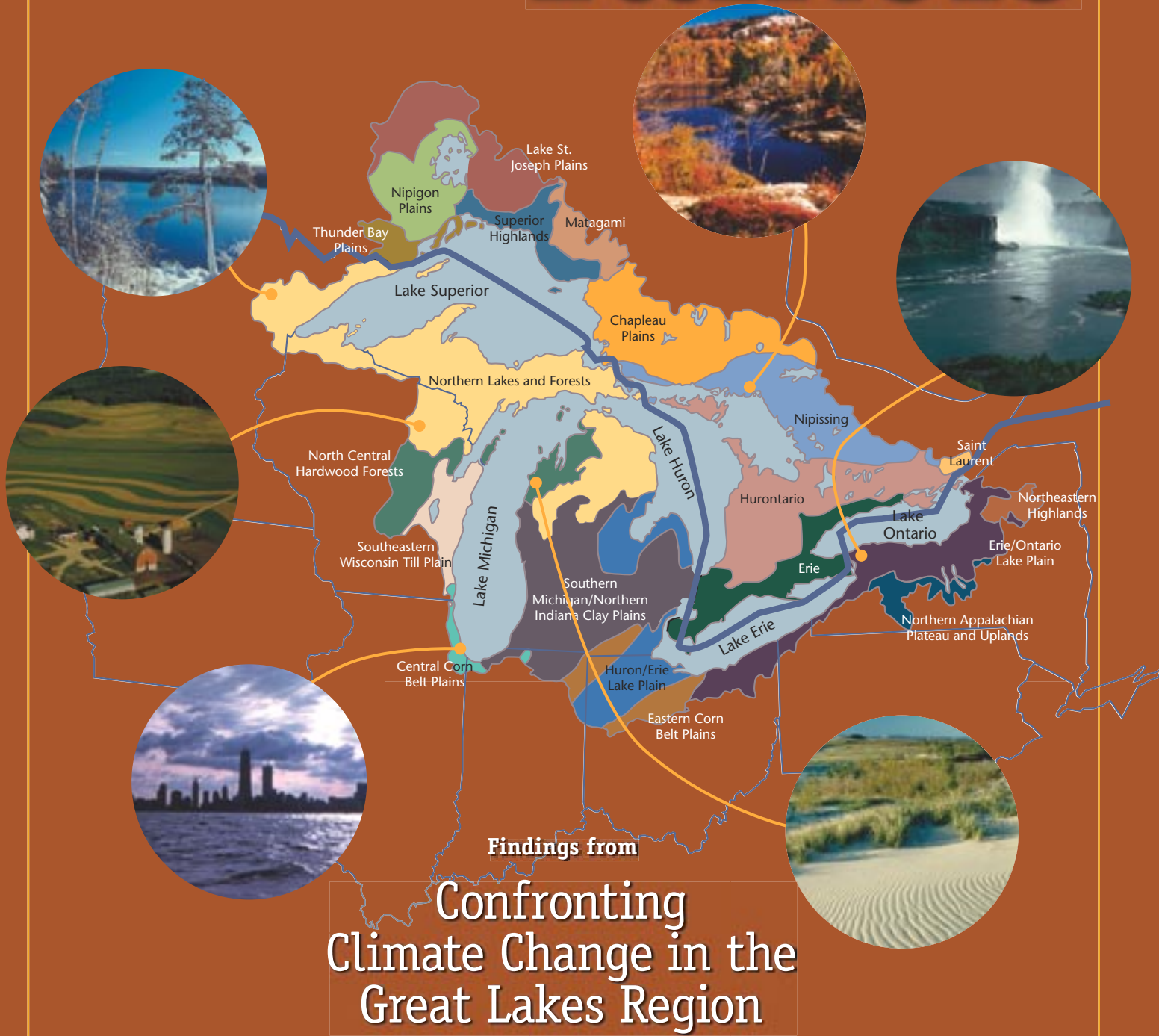


Illinois



Impacts on Illinois Communities
and Ecosystems

Climate Change in the Land of Lincoln

Illinois is known for its hot and humid summers, its gentle landscape, and its rich soils, all of which contribute to enormous agricultural productivity. Illinois is home to 12.6 million people and one of the country's largest and most vibrant cities, Chicago, on the shores of Lake Michigan. This summary highlights the potential impact of climate change on Illinois' economy, people, and the places they love.

Scientists are now convinced that human activity, primarily burning fossil fuels to produce electricity and drive our cars, is changing our climate. These activities emit gases, principally carbon dioxide (CO₂), that blanket the planet and trap heat. Already, we are seeing signs of climate change throughout the Great Lakes region: average annual temperatures are increasing; severe rainstorms have become more frequent; winters are getting shorter; and the duration of lake ice cover is decreasing.

Climate Projections

The latest, most reliable projections of future climate change combine 100 years of historical data for Illinois with the most up-to-date general circulation models of the Earth's climate system. In general, Illinois' climate will grow considerably warmer and probably drier over this century, especially in summer.

- **Temperature.** By the end of the 21st century, temperatures are projected to rise 7–13°F in winter and 9–18°F in summer. This dramatic warming is roughly the same as the warming since the last ice age. Overall, extreme heat will be more common and the growing season could be 3–6 weeks longer.

- **Precipitation.** While annual average precipitation may not change much, the state may grow drier overall because rainfall cannot compensate for the drying effects of a warmer climate, especially in the summer. Seasonal precipitation in the state is likely to change, increasing in winter by 10–25%

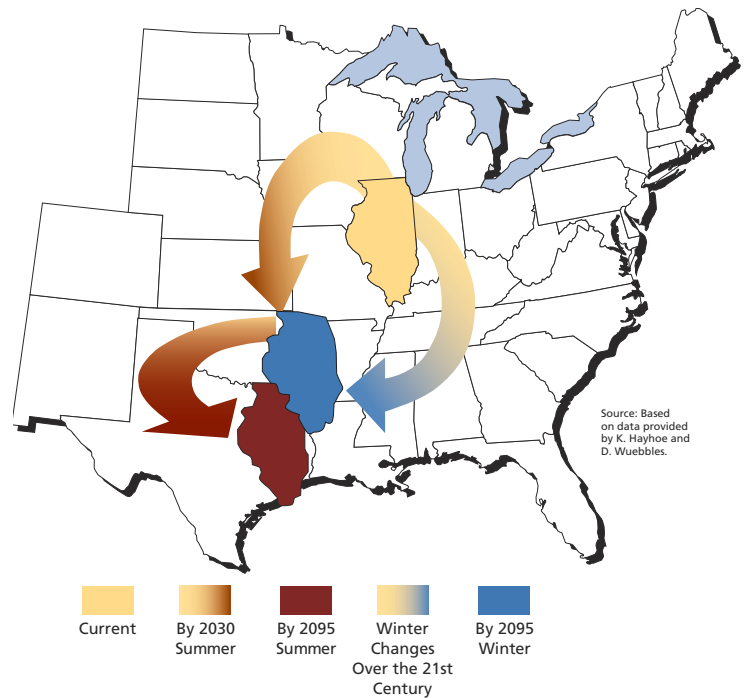
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and decreasing in summer by 5–20%. Thus, Illinois may well see drier soils and perhaps more droughts.

- **Extreme events.** The frequency of heavy rainstorms, both 24-hour and multiday, will continue to increase, and could be 50–150% higher than today.

How the Climate Will Feel

These changes will dramatically affect how the climate feels to us. By 2030, Illinois summers may resemble those of Oklahoma or Arkansas in terms of average temperature and rainfall. By the end of the century, Illinois' summer climate will generally resemble that of current east Texas. Winters will also change, albeit less drastically. By century's end, they may be warmer and drier, much like current-day Oklahoma.



Potential Impacts from Climate Change

Water Supply and Pollution

Illinois depends heavily on groundwater, on fresh water from inland lakes and Lake Michigan, and on rainfall for agriculture, drinking, and industrial uses. As the state's fast-growing population burgeons to at least 13.5 million by 2025, projected changes in rainfall, evaporation, and groundwater recharge rates will affect all freshwater users.

- Reduced summer water levels are likely to diminish the recharge of groundwater, cause small streams to dry up, and reduce the area of wetlands, resulting in poorer water quality and less habitat for wildlife.

- Lake levels are expected to decline in both inland lakes and Lake Michigan.

- Pressure to increase water extraction from the Great Lakes will grow, exacerbating an already contentious debate in the region.

- Development and climate change will degrade the natural flood-absorbing capacities of wetlands and floodplains, resulting in increased erosion and additional water pollution from nutrients, pesticides, and other contaminants.

- Increased flooding will worsen soil erosion and runoff of agricultural wastes into the water supply—already a chief source for chemical contamination of ground and surface waters.

- The water supply, as well as public beaches, will likely be at risk from the spread of parasitic and pathogenic microorganisms.

Agriculture

Illinois ranks first nationwide in soybean production, second in corn, and fourth in hogs, and also ranks within the top ten states for winter wheat, oats, and grain sorghum. There are likely to be some positive impacts for agriculture resulting

from a warmer climate, although current evidence suggests that the negative consequences could outweigh the positive. In general, however, regional development, technological advances, and market fluctuations have as much influence on farmers as the climate.

Overall, optimal weather conditions are expected to shift northward and eastward in the region, potentially disadvantaging the more southerly and westerly states like Illinois. Climate variability will likely pose greater risk for smaller farms and thus may reinforce the trend toward increasing farm size and industrialization of agriculture in the region. These changes will affect local farming communities, and, in turn, change the character of rural landscapes across the state.

- Increased atmospheric CO₂ and nitrogen as well as a longer growing season could boost yields of some crops, such as soybeans and wheat.

- Shifts in climate may bring moderate increases in corn yield in some northern areas but significant decreases in southern and western Illinois.

- Extreme events such as severe storms and floods during planting and harvest seasons are likely to depress productivity. Similarly, hotter and drier conditions and potentially more frequent droughts during the main growing season also disrupt production and may require irrigation of currently rain-fed crops.

- Higher ozone concentrations may counter positive impacts of a warmer climate for farming. In particular, ozone damage is expected to cause losses in soybean yields and horticultural crops.

- Increased soil erosion and runoff of agricultural wastes are likely if the frequency of flooding increases, raising farmers' costs to maintain soil fertility.

- Warmer winters and longer freeze-free periods, as well as shifts in temperature and rainfall, combine to create more favorable conditions for a number of pests. A northward shift in the range of the bean leaf beetle, which eats soybeans, is already under way. Extended growing seasons are likely to allow the northward expansion of some pests with multiple generations per year, such as the European corn borer.

- Warmer summer temperatures suppress appetite and decrease weight gain in livestock; warmer winters and less snow cover likely will reduce the quantity and quality of spring forage, and thus, milk quality.

Human Health

Climate projections suggest that extreme heat periods are likely to become more common, as will severe storm events. Illinois, and Chicago in particular, has experienced a stark preview of this future scenario during the past 15 years with a severe drought in 1988, Mississippi River flooding in 1993, a 1995 heat wave, a severe rainstorm in Chicago in 1996, a 1996 heat wave, a 1999 windstorm in Bloomington, another Mississippi River flooding in 2002, and numerous tornadoes and severe storms. Events such as these are likely to become more common in a warmer climate.

- Health risks from winter cold-related morbidity or mortality will decrease, while summer heat-related morbidity or mortality is likely to increase. Chicago experienced a deadly heat wave in 1996 that killed more than 700 people. The number of days above 90°F in Chicago is projected to double or even triple, with years later in the century experiencing 40 or more hot days. Of even greater concern is the projected increase in extreme heat days (exceeding 97°F). By 2080–2100, Illinois could see more than 25 such days annually, which will require improved warning systems and preparation to avoid severe health impacts.

- Higher temperatures and more electricity generation for air conditioning increase the formation of ground-level ozone, likely exacerbating asthma and other respiratory diseases.

- Climate-related risks to the Illinois' water supply include potential increases in nitrate pollution, pesticide residues, and other toxins stored in lake and river sediments.

- Some waterborne infectious diseases such as *cryptosporidiosis* or *giardiasis* may become more frequent or widespread if extreme rainstorms occur more often.

- The occurrence of many infectious diseases is strongly seasonal, suggesting that climate plays a role in influencing transmission. Some diseases carried by insects such as Lyme disease (ticks) or, more recently, West Nile encephalitis (mosquitoes) have expanded across the region. While this spread is attributed largely to land-use changes, future changes in rainfall or temperatures could encourage greater reproduction or survival of the disease-carrying insects.

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Property and Infrastructure

Cities and other heavily developed areas are particularly vulnerable to the risks of climate extremes, incurring direct economic losses or requiring costly adaptations.

- More frequent extreme weather events such as storms and floods, exacerbated by stream channeling and more paved surfaces, result in greater property damage, place heavier burdens on emergency management, increase cleanup and rebuilding costs, and exact a financial toll on businesses and homeowners.

- Storms, and flooding in particular, will require changes in infrastructure. Municipalities in Illinois will have to upgrade water-related infrastructure including levees, sewer pipes, and



Courtesy of the University of Minnesota

wastewater treatment plants in anticipation of more frequent extreme downpours.

- Lower lake levels have costly implications for shipping on Lake Michigan, requiring more frequent dredging of channels and harbors and adjusting docks, water intake pipes, and other infrastructure. On the other hand, a longer ice-free season will extend the shipping season.

Recreation and Tourism

Illinois is home to numerous rivers, streams, wetlands, and lakes. Foremost, of course, Lake Michigan that draw anglers, boaters, birders, and crowds of beach visitors each year. Because many Illinois residents also go north to summer cottages and vacation destinations, climate change will impact their leisure activities at home and up north.

- Anglers on Lake Michigan and inland lakes will be affected by range shifts, loss of habitat, and increases or declines of their preferred catch. For example, the range of warm-water fish such as smallmouth bass or bluegill is likely to expand northward, while cold-water species such as lake trout and brown trout, and even some cool-water fish such as northern pike and walleye, may disappear from southern parts of the region.

- Lower water levels coupled with warmer water temperatures may accelerate the accumulation of mercury and other contaminants in the aquatic food chain and ultimately in fish.

- Earlier spring runoff, more intense flooding, and lower summer water levels generally spell growing challenges for Illinois wetlands and the species that depend on them. Already, development and agriculture have significantly reduced wetland habitat. Loss of habitat or food resources for migratory birds, shore-

birds, and waterfowl will affect Illinois' birdwatching and hunting industries.

- The summer recreation season is likely to expand as temperatures warm further, but extreme heat, extreme storms, elevated ozone levels, and possible increases in risk from insect- and waterborne diseases will affect beachgoers and boaters and may involve some restrictions and require behavioral adjustments by tourists and local outdoor enthusiasts.



Peter J. Schultz

Climate Change Solutions

Illinois residents, business leaders, and public policymakers can help reduce the potential impacts from climate change by pursuing three necessary and complementary strategies:

- **Reducing heat-trapping gas emissions** will help curb the threat from a changing climate. This can be achieved, for example, by increasing energy efficiency in buildings, switching to renewable energy sources such as wind and bioenergy, increasing the fuel economy of the vehicles we drive, and investing in light rail and other forms of public transportation. Illinois has the technical potential, for example, to produce 83% of its electricity needs from wind and 35% from bioenergy.

- **Minimizing pressures on the environment** by improving air quality, protecting the quality and supply of water resources, protecting habitat, and limiting sprawl through more effective urban and rural planning.

- **Preparing for those impacts from global warming that cannot be avoided** through better planning and emergency preparedness, adaptations in agriculture, strengthening public health response and warning systems, and adjusting flood control infrastructure based on projected precipitation trends.

With foresight, planning, and a commitment to responsible management, Illinois can lead the region in designing effective climate solutions. It is only fitting that the Land of Lincoln be an exemplary steward of its rich environment and resources in the face of climate change.

Severe storms and floods during planting and harvest seasons are likely to depress productivity.



This fact sheet is based on the findings of *Confronting Climate Change in the Great Lakes Region*, a report published in April 2003 by the Union of Concerned Scientists and the Ecological Society of America. The report was written by regional experts under the leadership of George Kling (University of Michigan). Experts from Illinois included Michelle Wander, Donald Wuebbles, both from the University of Illinois at Urbana-Champaign, and Scott Robinson (Illinois Natural History Survey).

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The full report is available from UCS at www.ucsusa.org/greatlakes or call (617) 547-5552.