the people. the places. the stories. the life.

THE IOWAN

BOB DORR: IOWA'S FAVORITE BLUESMAN

page 46

11 PLACES TO MAKE A SUMMER SPLASH

page 10

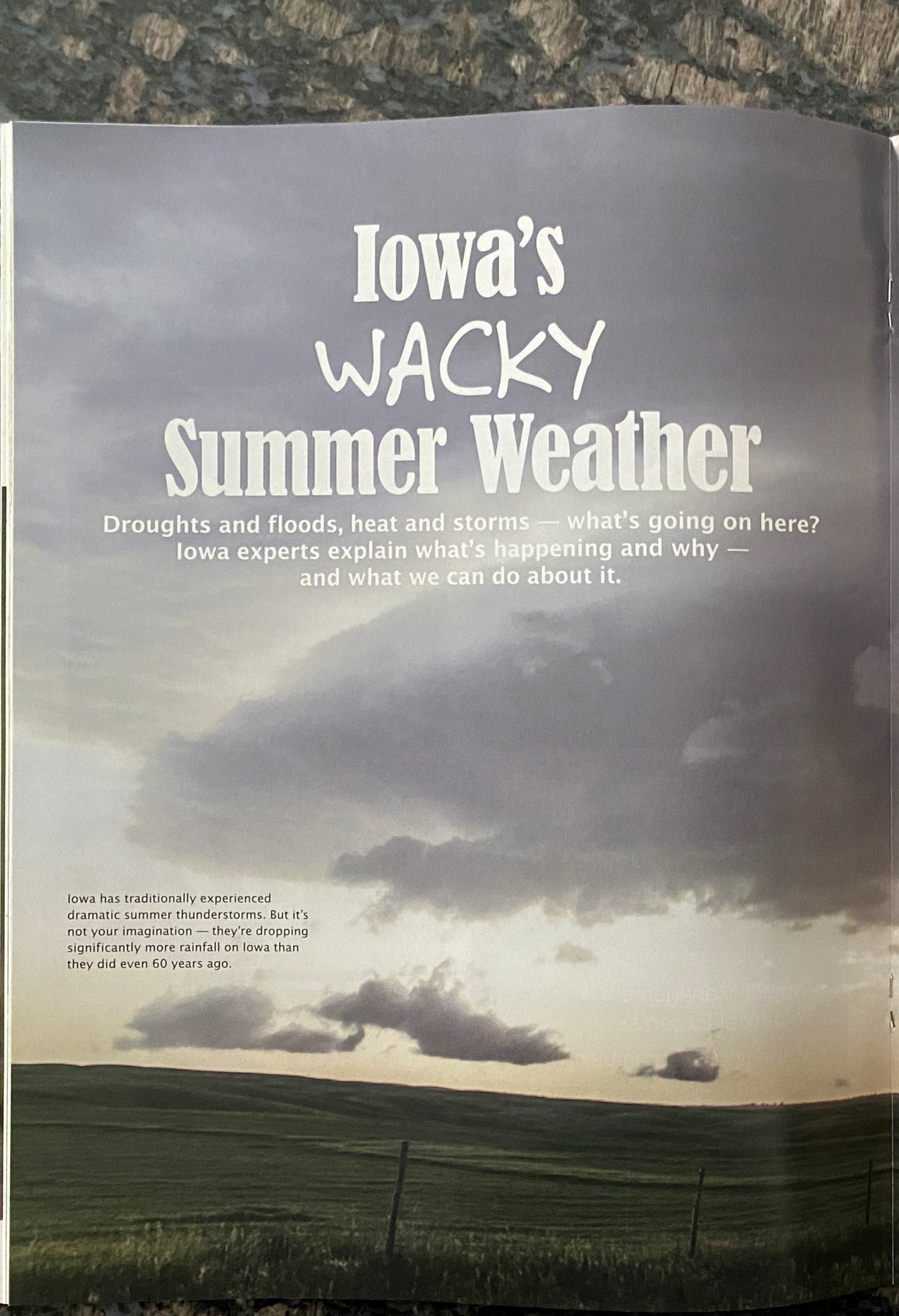
WHY THE WACKY WEATHER?

page 38

JULY/AUG 2015 • $4.95
07>
17463
0 300319 0
DISPLAY UNTIL 8/31
iowan.com

Iowa's WACKY Summer Weather

Droughts and floods, heat and storms — what's going on here? Iowa experts explain what's happening and why — and what we can do about it.



Iowa has traditionally experienced dramatic summer thunderstorms. But it's not your imagination — they're dropping significantly more rainfall on Iowa than they did even 60 years ago.

PHOTO BY BRENNAN JONTZ — IOWA STORM CHASING NETWORK

You know what they say about Iowa weather: If you don't like it, wait a minute.

That line has seemed less amusing and more prophetic in the past few decades as catastrophic floods and record droughts have ravaged the state — sometimes in the same season.

But is Iowa's weather really getting more volatile? Are there any underlying trends? We decided to try to find out.

Elwynn explains

First we talked to Elwynn Taylor, an agricultural meteorologist, professor, and Iowa State University Extension climatologist. Taylor has studied and interpreted Iowa's weather and climate for decades. He's earned a fistful of awards for his work — and has the status of a weather oracle among Iowa's farmers. He's also very good at explaining something as complicated as climate in plain, commonsense English. Here's what he had to say.

We Iowans may pay more attention to weather than folks in other places, given how intensively farmed our state is. "Weather is the single most important uncontrollable factor that affects our agriculture production,"

> **"We have about 20 percent more average annual precipitation than we had in 1900."**
> ***— climatologist Elwynn Taylor***

Taylor says. "The impacts can be managed, but we can't manage the weather." But we sure can forecast it and talk about it. And extremes that can make or break fortunes overnight make for the best conversations.

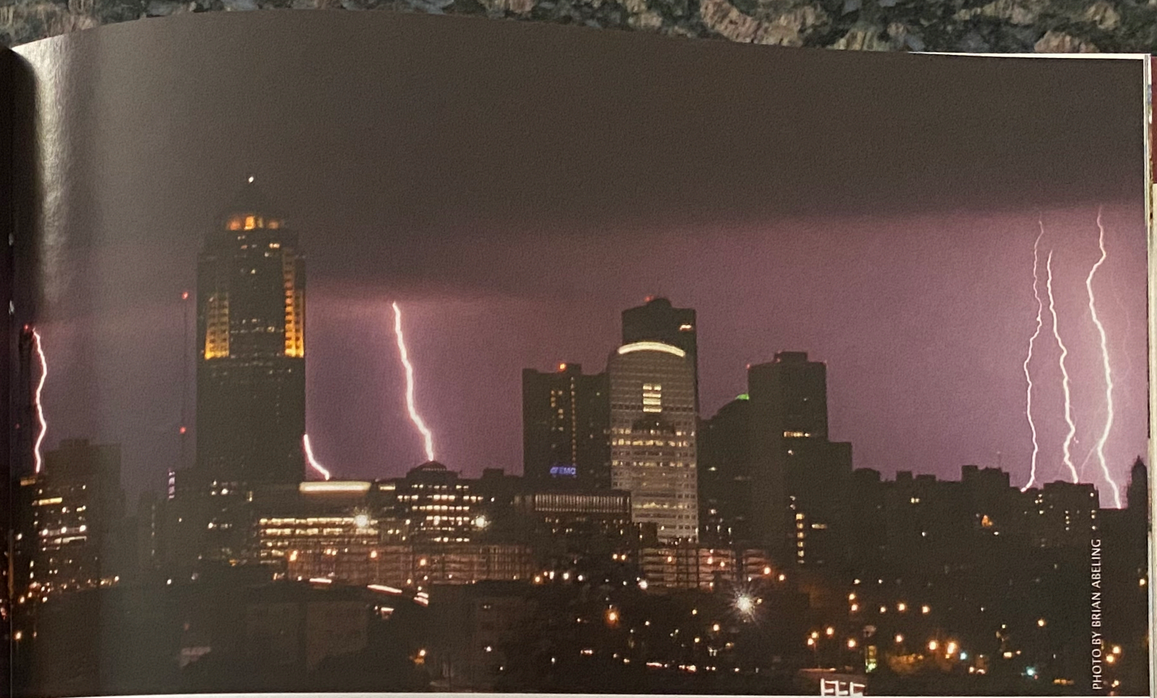


PHOTO BY BRIAN ABELING

Storms affect Iowa's cities as dramatically as they do its farmland. Just ask residents of Ames, Cedar Rapids, Des Moines *(above)*, and Iowa City — just a few urban centers that have experienced flooding in recent years.

Iowa is where two huge weather systems meet. "We're at about the place where the effects from Canada meet the influence of the Gulf of Mexico during the summer. Eighty percent of the moisture that falls in Iowa originates from a flow of warm, moist air from the Gulf. When it meets a disturbance coming either from the Rocky Mountains or from Canada, this often results in precipitation. June, July, and August are usually months of highest moisture."

We don't know that weather is getting more extreme. This clash of titanic weather systems has historically taken place here. It may seem like there are more extreme weather events such as tornadoes, says Taylor, but that may be because we're better at finding them. Doppler radar, for instance, can visualize a forming tornado to viewers statewide — and smartphones that can capture and share funnel cloud videos instantly are everywhere. "We're better at observing now," says Taylor. "If we look at the number of tornadoes *per person watching*, reported by a person, not a radar, it works out about the same" as historical norms. "We really can't see a 100-year change," he says.

We've been worried about human-caused climate change for more than a century. "Well before 1900, people were convinced that the climate was changing and people were having a big effect on causing it, either by removing the forests or changing the nature of the vegetation from the prairie to cropland." There is some basis for this: "We're staying green longer, putting a lot of water in the air from soybeans and corn later in the year than the native prairie did." That higher humidity can make late-season heat waves more stressful.

Precipitation is up significantly. Some aspects of Iowa's climate may be debatable, but there's one hard fact that's unambiguous and well documented: "We have about 20 percent more average annual precipitation than we had in 1900 — and we have almost twice as many *days* of precipitation," says Taylor. Half that gain has come since 1950. That makes it harder to cure alfalfa and hay because three sequential dry days are harder to come by. But that's the least of the problems.

Flooding is up dramatically. That's because an increase in flooding is disproportional to an increase in precipitation. Think about it this way: If your cup is half full, you can add another half cup before it runs over. But if your cup is already full, a few more drops can cause it to overflow. So it is with Iowa's streams and rivers.

A 20 percent increase in precipitation produces a six-fold increase in flooding.

A full cup, for Iowa, is 25 inches of moisture. "If the precipitation for the year is 25 inches and it is well distributed through the season, we get optimal plant growth and the plants can use all that 25 inches of water," Taylor says. "But if we get 26 inches of water, that's more than the plants can use. And the 10 percent increase in precipitation we have experienced since 1950 has doubled the average annual flow of Iowa's streams and small rivers," he adds. "With double the water going down the streams, it's over the banks six times as often as it used to be." So a 20 percent increase in precipitation produces a six-fold increase in flooding.

That's also why "100-year floods" are happening so frequently now. It's all math, says Taylor: "A 100-year flood doesn't mean once in a hundred years specifically; it means a one percent chance of water that deep in the river in a given year. So it could happen two years in a row. A one-in-a-hundred chance over 1,000 years averages out to about a flood every hundred years. However, now that the streams are over the banks six times as often because of the 10 percent increase in precipitation since 1950, you can divide 6 into 100 and you get a so-called "100-year flood" about every 17 years. So when we have a serious flood and you say, 'That was a 100-year flood that damaged our city. Should we rebuild on the floodplain or on top of the hill?' Well, it depends: Do you want to redo it again in 17 years?"

Summer storms may or may not be getting more extreme. But average precipitation is up, and flooding is way up, in ways we can track with mathematical precision.

Taking Iowa's temperature

That affects not only Iowa's agriculture but Iowans' health as well. Last October dozens of highly respected Iowa health, environmental, horticultural, biological, agricultural, and life scientists released Iowa Climate Statement 2014: Impacts on the Health of Iowans. It outlines the effects of the heavier rains, the increased flooding, and the longer growing season on Iowa's health. Among the results:

Heat stress: Higher humidities and increased nighttime temperatures make it harder to recover from daytime heat stress.

Poor water quality: Repeated heavy rains cause increased exposures to toxic chemicals and raw sewage spread by flood waters.

More algal blooms: Higher water temperatures and decreased mixing have combined with high nutrient levels to create harmful algal blooms that make water undrinkable and unswimmable, as evidenced by more-frequent beach closures at Iowa lakes.

Increased respiratory and cardiovascular illness: Warmer temperatures and higher carbon dioxide levels in the air cause plants to produce more pollen, and pollen with a higher allergen content. A longer growing season extends the period of exposure to allergens, and new allergenic plants moving northward into Iowa are magnifying the range of exposures.

PHOTO BY BRIAN ABELING

Iowa is first in the nation in wind power. Turbines such as these near Blairsburg are an investment in renewable energy that can help moderate the effects of a changing climate — and provide jobs and economic growth.

Respiratory problems such as childhood asthma have increased dramatically since the 1980s. In many cases, this is related to increased exposures to flood molds and to higher indoor moisture, as well as to lung-damaging ozone and fine particulate matter made worse by higher heat in urban areas. Heat stress and exposure to air pollutants also increase the risk of heart attack and stroke, especially in aging adults.

New infectious diseases: New species of mosquitos and ticks in Iowa are capable of transmitting diseases such as dengue fever and ehrlichiosis. Increasing temperatures, more rainfall, and longer summers allow these mosquitos and ticks to live longer and expand their range.

Increased stress and violence: Stress caused by climate-related moves and job loss due to flood or drought is well established. And research since the 1980s has associated higher temperatures with increased aggression and violence.

The way forward

The scientists who signed the climate statement recommend lowering greenhouse gas emissions through energy efficiency and clean renewable energy. They say these steps both reduce air pollution and produce jobs. They also recommend heart-healthy activities such as walking or bicycling to work to decrease greenhouse gas emissions. Finally, they urge adopting strong climate-change policies, which they say will play a vital role in diminishing human suffering and illness now and for generations to come.

In fact, a study by the Risky Business Project, The Economic Risks of Climate Change in the United States, predicts that without a dramatically strong and fast-growing investment in the above activities, Iowa and the Midwest will see big changes by the end of the century. Those changes will make the havoc of recent floods seem miniscule. They include extreme heat, decreased crop yields, higher electricity demand and related higher energy costs, and a continued increase in the effects mentioned in 2014's climate statement.

What Iowa is doing

Iowa is working to meet those challenges. The state has several accomplishments to be proud of:

Iowa is first in wind farming. Iowa ranks first in the nation in the percentage of our energy that we produce from wind. More than 4,000 turbines in more than 100 wind farms generate 25 percent of Iowa's electrical power and reduce greenhouse gas emissions by as much as taking more than 1.5 million cars off the road. The Iowa wind industry also employs more than 6,000 people and has the support of 85% of Iowans — more support than any other power source (for more information: iowawindenergy.com).

Iowa ranks near the top in agricultural conservation. According to the United States Department of Agriculture, Iowa ranks near the top in conservation program enrollments — including first in the nation for the number of contracts in the Conservation Reserve Program (CRP) that removes sensitive land from agricultural production and plants species that improve environmental health and quality. Other conservation programs are similarly popular here, including the Conservation Stewardship Program (Iowa ranks third), the Environmental Quality Incentives Program (fourth), the Grassland Reserve Program (fifth), and the Wetlands Reserve Program (ninth).

"Farmers are professional adaptors. And they respond to the challenge of adapting to difficulty."
—J. Gordon Arbuckle

Iowa's cities are greening. A few examples: Dubuque was recently named a Climate Action Champion by the White House. That city aims to reduce greenhouse gas emissions to 50 percent below 2003 levels by 2030 and was also commended for its flood mitigation.

Charles City installed permeable pavement in a 16-block neighborhood to reduce and filter runoff. The $39 million project was the largest of its kind in the state — and perhaps in the nation. The repaved streets can now handle a 3-inch rainfall without sending water into storm sewers.

Des Moines and other Iowa cities have seen a return to living in city centers in urban lofts — a practice that's measurably reduced commutes in the capitol city and can reduce suburban sprawl that further contributes to runoff.

We have a pragmatic and resilient outlook. J. Gordon Arbuckle, an associate sociology professor at Iowa State University, surveyed 1,200 farmers in an Iowa Farm and Rural Life Poll about their views on climate change. There was some disagreement on the causes of climate change, but virtually all those surveyed — 96.4 percent — agreed it was occurring. That he found encouraging. "Farmers are professional adaptors," he told *Scientific American* magazine. "And they respond to the challenge of adapting to difficulty."

The rest of us can perhaps follow their lead, reach deep into our pioneering roots, and do the same. I

THINKSTOCK ®

WHAT ABOUT WINTER?

So summers are getting increasingly long, hot, and wet. What about winters?

Fortunately or unfortunately, says climatologist Elwynn Taylor, "winter has little to do with how the summer turns out."

And, says Taylor, all that talk about how much harsher winters were decades ago is true. "I don't know how many times I told my children, 'Quit complaining about the winter! You should have seen it when I was a kid,'" says Taylor. "'I'd tell them, 'Don't "Aw, Dad" me — I have data!'"

According to that data, "There's about a 60-year cycle on harshness of winters," Taylor says. "We had a harsh series of winters mostly in the '50s and early '60s. Then we got to the '90s and had mild winters. Now we're back to harsher winters. During the next 15 to 20 years, we have to expect winters to be more on the order of the '50s."

So if you like waterskiing AND cross-country skiing, chances are you're about to experience the best of both worlds.