Iowa Climate Statement 2019: Dangerous Heat Events Will Be More Frequent and Severe

Our atmosphere and Earth’s surface are warming at an unprecedented rate. Globally, the five warmest years on record were each of the last five years, and extreme weather disasters are increasing in frequency and severity (1).

In the Midwest states, we have seen changes in the form of dramatic variability in rainfall, higher humidity, and warmer nights. The excessive moisture and cloud cover have so far thwarted substantial increases in daytime highs and heat waves that other regions have experienced (2). New projections indicate that this will change, with daytime high temperatures rising as moisture patterns adjust over time (3). The current greenhouse gas emissions growth rate is projected to raise the annual number of days above 90°F in Iowa from 23 to 67 by mid-century (3).

A good way to assess heat waves is to look at the average maximum daily temperatures over the hottest five-day period in a year. Over recent decades (1976-2005), that temperature has been about 92°F. By mid-century (2036-2065) the 5-day maximum temperatures are projected to be about 98°F, or 6°F hotter (3). Perhaps even more concerning, one out of every 10 years is projected to have a 5-day period with peak temperatures averaging 105°F (3).

Heat is the leading cause of weather-related deaths in the U.S. (4). People who work outdoors, such as building and road construction workers, military personnel and agricultural workers, are particularly at risk of heat-related illnesses such as heat exhaustion, heat cramps or in severe cases, heat stroke (5-7). Workers with increased risk of heat-related illnesses include those who are overweight, have underlying heart disease or high blood pressure, or those who are over 65 years of age (4).

But it is not just workers who are affected. Many homes, particularly in low-income neighborhoods, are not equipped with air-conditioning and elderly residents may be reluctant to open doors and windows due to fear of intrusion. Thus, these residents are subject to extreme indoor conditions that induce heat stroke and potentially death. Expanding urban heat islands and an increased aging population magnify this problem (4-5, 7).

Animals are also at risk. Iowa’s agricultural census includes 23 million hogs, 4 million cattle and 79 million poultry (8). With most of these animals housed in concentrated numbers, there are concerns of animal death, widespread productivity loses and negative economic impacts on animal production. Heat may degrade animal health due to physiological disturbances and a weakened immune system, making them more susceptible to infections and death (9). Further, heat stress slows animal weight gain so more energy and resources are required to offset production efficiency losses (10). Pets kept outdoors or in homes without climate control will be similarly affected, and pets left in vehicles will succumb to the heat more rapidly. Dogs and cats may also be impacted by vector-borne diseases, as the territorial ranges of ticks and mosquitoes expand under conditions associated with climate change (11).

Adaptations to increasing heat waves will require expanded disaster preparedness, increased energy utilization to cool residences and livestock facilities, and curtailment of outdoor work during times of extreme heat. Iowans need to recognize the warning signs for heat-related illnesses and understand who is most vulnerable as we prepare for more frequent and extreme heat events (12).

July 2019 was the hottest month ever in 140 years of record-keeping, according to the World Meteorological Association (13-14). Only by dramatic reductions in greenhouse gas emissions within the next 10 to 15 years will these effects be lessened (15).

Signed by -

Gene Takle,
Emeritus Professor of Agronomy
Iowa State University

Jerald Schnoor
Co-Director
Center for Global and Regional Environmental Research
University of Iowa

Peter S. Thorne
Professor and Head
Occupational & Environmental Health, Director, Environmental Health Sciences Research Center, College of Public Health, University of Iowa

David Courard-Hauri
Professor of Environmental Science and Sustainability
Drake University

Brett Ramirez
Assistant Professor
Department of Agricultural and Biosystems Engineering
Iowa State University

David M. Cwiertny
Professor
Department of Civil and Environmental Engineering, Director, Center for Health Effects of Environmental Contamination
University of Iowa

September 2019
Iowa Climate Statement 2019: Dangerous Heat Events Will Be More Frequent and Severe

Matt Abbott
Biology Professor
Des Moines Area Community College
Mahdi Al-Kaisi
Professor
Soil Management and Environment
Iowa State University
Lee-Ann H. Allen
Professor
Inflammation Program
Department of Internal Medicine and Department of Microbiology and Immunology
University of Iowa
Karin Allenspach
Professor of Translational Health and Small Animal Medicine, Department of Veterinary Clinical Sciences
Iowa State University
Jonathan Andelson
Professor of Anthropology
Department of Anthropology
Director, Center for Prairie Studies
Grinnell College
Craig A. Anderson
Distinguished Professor
Department of Psychology
Iowa State University
John Anderson
Associate Professor of Supply Chain Management
John Deere Endowed Faculty Fellow
University of Northern Iowa
Marc P. Armstrong
Professor and Collegiate Fellow
Department of Geographical and Sustainability Sciences
University of Iowa
Mark Aronson
Faculty Emeritus
Department of Biology
Scott Community College
Rajeev Arora
Professor
Horticulture
Iowa State University
Vladimir P. Badovinac
Associate Professor
Departments of Pathology and Microbiology & Immunology, Roy J. and Lucille A. Carver College of Medicine
University of Iowa
Mark Baechtel
Lecturer and Director of Forensic Activities, Editor, Rootstalk: A Prairie Journal of Culture, Science and the Arts
Grinnell College
Richard G. Baker
Professor Emeritus
Department of Earth and Environmental Sciences
University of Iowa
Jennifer Barr
Scientific Editor and Writing Consultant
College of Medicine
University of Iowa
Paul E. Bartelt
Professor and Chair
Department of Biology
Waldorf University
Philip W. Becraft
Professor and Associate Chair Genetics, Development & Cell Biology Department
Iowa State University
Russ Benedict
Professor of Biology
Department of Biology
Director of Prairies for Agriculture Project Central College
David Bennett
Professor
Department of Geographical and Sustainability Sciences
The University of Iowa
Peter Berendzen
Professor
Department of Biology
University of Northern Iowa
Bryson Bergerud
Biology and Microbiology Instructor Science Department
Iowa Central Community College
E. Arthur Bettis III
Professor Emeritus
Department of Earth and Environmental Sciences
University of Iowa
Ryan Bezy
Associate Professor of Biology Chair, Department of Natural & Applied Sciences
Mount Mercy University
Diane Birt
Distinguished Professor
Food Science and Human Nutrition College of Agricultural and Life Sciences and College of Human Sciences
Iowa State University
Gail A. Bishop
Professor of Microbiology & Internal Medicine, Holden Chair of Cancer Biology Director, Center for Immunology & Immune-Based Diseases, Roy J. and Lucille A. Carver College of Medicine
University of Iowa
Andrea Bixler
Professor
Department of Biology
Clarke University
Amy Blair
Associate Professor and Chair Department of Biology
Saint Ambrose University
Robert Blount
Assistant Professor
Division of Pulmonary and Critical Care Medicine
Department of Internal Medicine
University of Iowa
Brian Bristow
Biology Professor
Iowa Lakes Community College
Garry R. Buettner
Professor
Free Radical and Radiation Biology Department of Radiation Oncology College of Medicine
University of Iowa
Aaron Bunker
Associate Professor
Department of Natural and Mathematical Sciences
Morningside College
E. Arthur Bettis III
Professor Emeritus
Department of Earth and Environmental Sciences
University of Iowa
David G. Campbell
Henry R. Luce Professor in Nations & the Global Environment
Professor of Biology
Grinnell College
Greg Carmichael
Co-Director
Center for Global and Regional Environmental Research
University of Iowa
Ryan Carnahan
Associate Professor of Epidemiology
Department of Epidemiology
College of Public Health
University of Iowa

Endorser affiliations are for identification purposes only and do not reflect the views of their academic institutions. September 2019
Iowa Climate Statement 2019: Dangerous Heat Events Will Be More Frequent and Severe

Endorser affiliations are for identification purposes only and do not reflect the views of their academic institutions.
Iowa Climate Statement 2019: Dangerous Heat Events Will Be More Frequent and Severe

Steven Hall
Assistant Professor
Department of Ecology, Evolution, and Organismal Biology
Iowa State University

Thomas C. Harrington
Professor of Plant Pathology
Department of Plant Pathology and Microbiology
Iowa State University

Emily Heaton
Associate Professor
Biomass Crop Production
Department of Agronomy
Iowa State University

Ted Heindel
Bergles Professor of Thermal Science
Department of Mechanical Engineering
Iowa State University

John R. Helms
Assistant Professor of Chemistry
Department of Natural and Mathematical Sciences
Morningside College

Steve Hendrix
Professor Emeritus
Department of Biology
University of Iowa

Brian Hornbuckle
Professor
Department of Agronomy
Iowa State University

Keri C. Hornbuckle
Professor, Department of Civil & Environmental Engineering
Director, Iowa Superfund Research Program, College of Engineering
University of Iowa

Ming-Chen Hsu
Professor
Mechanical Engineering
Iowa State University

Mohammad Iqbal
Professor
Department of Earth and Environmental Sciences
University of Northern Iowa

Erin Irish
Associate Professor of Biology
University of Iowa

Laura L. Jackson
Director, Tallgrass Prairie Center
Professor of Biology
Department of Biology
University of Northern Iowa

Robert R. Klepper
Professor Emeritus of Chemistry
Iowa Lakes Community College

Julia Klesney-Tait
Associate Professor of Medicine
Department of Internal Medicine
Carver College of Medicine
University of Iowa

Joel N Kline
Professor
Department of Medicine, Roy J. and Lucille A. Carver College of Medicine,
University of Iowa

Owen Kolstad
Professor of Practice
Mechanical Engineering Department
Iowa State University

Witold Krajewski
Director, Iowa Flood Center,
Rose & Joseph Summers Chair in Water Resources Engineering
University of Iowa

Frederick Kirschenmann
Distinguished Fellow
Leopold Center for Sustainable Agriculture
Iowa State University

Dr. Michael LaGier
Associate Professor of Biology
Grand View University

Dennis Lavrov
Associate Professor
Department of Ecology, Evolution, and Organismal Biology
Iowa State University

Hans-Joachim Lehmler
Professor
Occupational and Environmental Health
University of Iowa

Peter Levi
Assistant Professor
Department of Environmental Science and Sustainability
Drake University

Louis Licht
Adjunct Professor
Department of Civil & Environmental Engineering
University of Iowa

Matt Liebman
Professor of Agronomy
H.A. Wallace Endowed Chair for Sustainable Agriculture
Iowa State University

Endorser affiliations are for identification purposes only and do not reflect the views of their academic institutions.  September 2019
Iowa Climate Statement 2019: Dangerous Heat Events Will Be More Frequent and Severe

Marc Linderman
Associate Professor
Department of Geographical and Sustainability Sciences
University of Iowa

Gabriele Ludewig
Professor, Department of Occupational & Environmental Health, DGS, Interdisciplinary Graduate Program in Human Toxicology
University of Iowa

Charles F. Lynch
Professor
Department of Epidemiology
College of Public Health
University of Iowa

J. Elizabeth Maas
Assistant Professor
Math/Science Department
Kirkwood Community College

Mark T. Madsen
Professor Emeritus
Department of Radiology
University of Iowa

Amy Madsen-Smith
Biology Department
Clinton Community College

Sunil Malapati
Professor of Biochemistry
Clarke University

Ashutosh K. Mangalam
Assistant Professor
Department of Pathology
University of Iowa

Sara E. Mason
Associate Professor
Department of Chemistry
University of Iowa

Dave May
Professor
Department of Geography
University of Northern Iowa

Paul Mayes
Professor of Biology Emeritus
Eastern Iowa Community College

Katherine McCarville
Delano Professor of Science
Professor of Geosciences
Upper Iowa University

Paul B. McCray
Professor and Executive Vice Chair
Department Pediatrics
Pappajohn Biomedical Institute
Carver College of Medicine
University of Iowa

David McCullough
Professor of Biology, Co-coordinator
Environmental Science and Studies
Director, Center for Integrative and Interdisciplinary Studies
Wartburg College

Julie Meachen
Associate Professor
Anatomy Department
Des Moines University

Paulina Mena
Associate Professor of Biology
Central College

James Merchant
Professor Emeritus
Occupational and Environmental Health, College of Public Health
University of Iowa

Laura C. Merrick
Assistant Teaching Professor
Department of Agronomy
Iowa State University

Chris Minion
Professor
Veterinary Microbiology
Iowa State University

Kenneth J. Moore
Charles F. Curtiss Distinguished Professor and Pioneer Hi-Bred Professor
Department of Agronomy
Iowa State University

Rasika Mudalige-Jayawickrama
Professor of Plant Biology
Department of Natural and Applied Sciences
University of Dubuque

Marian Muste
Research Engineer and Adjunct Professor
IIHR-Hydroscience & Engineering
University of Iowa

Connie Mutel
Senior Science Writer (retired)
IIHR-Hydroscience & Engineering
University of Iowa

Robert Mutel
Professor of Astronomy
Department of Physics and Astronomy
University of Iowa

Ajay Nair
Associate Professor and Vegetable Extension Specialist
Department of Horticulture
Iowa State University

William M. Nauseef
Director, Inflammation Program
Professor of Medicine, Professor of Microbiology and Immunology
Roy J. and Lucille A. Carver College of Medicine
University of Iowa

Ted Neal
Clinical Associate Professor of Science Education, Department of Teaching and Learning, College of Education
University of Iowa

Maurine Neiman
Associate Professor
Departments of Biology and GWSS
University of Iowa

Marit Nilsen-Hamilton
Professor, Roy J. Carver Department of Biochemistry, Biophysics and Molecular Biology
Iowa State University

Fred Ochs
Professor of Chemistry and Earth Science
Kirkwood Community College

Marisa Olson King
Department of Biology
Grand View University

Patrick T. O'Shaughnessy
Professor and Associate Head for Student Affairs and Curriculum Director, Heartland Center for Occupational Health and Safety, Department of Occupational & Environmental Health
University of Iowa

David Osterberg
Professor Emeritus
College of Public Health
University of Iowa

Ulrike Passe
Associate Professor of Architecture
Director, Center for Building Energy Research
Iowa State University

James L. Pease
Associate Professor Emeritus
Natural Resource Ecology and Management
Iowa State University

Reuben J. Peters
Professor
Department of Biochemistry, Biophysics & Molecular Biology
Iowa State University

Christine Petersen
Associate Professor
Department of Epidemiology
College of Public Health
University of Iowa

Endorser affiliations are for identification purposes only and do not reflect the views of their academic institutions.
Iowa Climate Statement 2019: Dangerous Heat Events Will Be More Frequent and Severe

Charles Stanier
Professor, Chemical and Biochemical Engineering
IIHR Hydroscience and Engineering
University of Iowa

Elizabeth A. Stone
Associate Professor
Department of Chemistry
University of Iowa

Monica R. Storm
Associate Professor
Anatomy & Physiology
Biological & Chemical Sciences Department
Iowa Western Community College

Jim Stroh
Professor, Biology and Chemistry Department.
Morningside College

Laura Stunz
Associate Research Scientist (retired)
Department of Microbiology
University of Iowa

Robert C. Summerfelt
Professor Emeritus
Department of Natural Resource Ecology and Management
Iowa State University

Keith S. Summerville
Deputy Provost
Levitt Distinguished Professor of Environmental Science
Drake University

David A. Swenson
Associate Scientist
Department of Economics
Iowa State University

Elwynn Taylor
Climatologist Emeritus
Iowa State University Extension
Iowa State University

Jessica Thistle
Professor of Biology
Des Moines Area Community College

Elizabeth E. Trimmer
Professor of Chemistry
Chemistry Department
Grinnell College

H. S. Udaykumar
Professor of Mechanical Engineering, Interim Associate Dean for Graduate Programs and Research, College of Engineering
University of Iowa

Richard L. Valentine
Professor Emeritus
Department of Civil and Environmental Engineering
University of Iowa

Channon Visscher
Associate Professor of Chemistry & Planetary Sciences
Dordt University

Kristina Walkup
Professor of Biology
Des Moines Area Community College

Emily O. Walsh
Professor of Geology
Geology Department
Cornell College

Michael H. Walter
Associate Professor
Biology
University of Northern Iowa

Alan D. Wanamaker Jr.
Associate Professor
Department of Geological and Atmospheric Sciences
Iowa State University

Anna J. Waterman
Associate Professor of Biology
Department of Natural and Applied Sciences
Mount Mercy University

Larry Weber
Edwin B. Green Chair in Hydraulics College of Engineering
University of Iowa

Paul Weih
Associate Professor of Biology & Environmental Studies
Biology Department
Central College

Ai Wen
Assistant Professor
Biology Department
University of Northern Iowa

Jerrold Weiss
Professor
Departments of Internal Medicine and Microbiology & Immunology
University of Iowa

Brian J. Wilsey
Professor
Department of Ecology, Evolution and Organismal Biology
Iowa State University

Sally L. Wilson
Professor
Biology
Iowa Valley Community College

Sam Wormley
Associate Scientist Emeritus
AmesLab/IPRT/CNDE
Iowa State University

Lee Wymore
Professor of Biology, Program Director
Department of Science and Math
Indian Hills Community College

Catherine Zeman
Professor
Environmental Health Division
University of Northern Iowa

Endorser affiliations are for identification purposes only and do not reflect the views of their academic institutions.