

Climate Extremes and Your Health

Jesse E. Bell, PhD

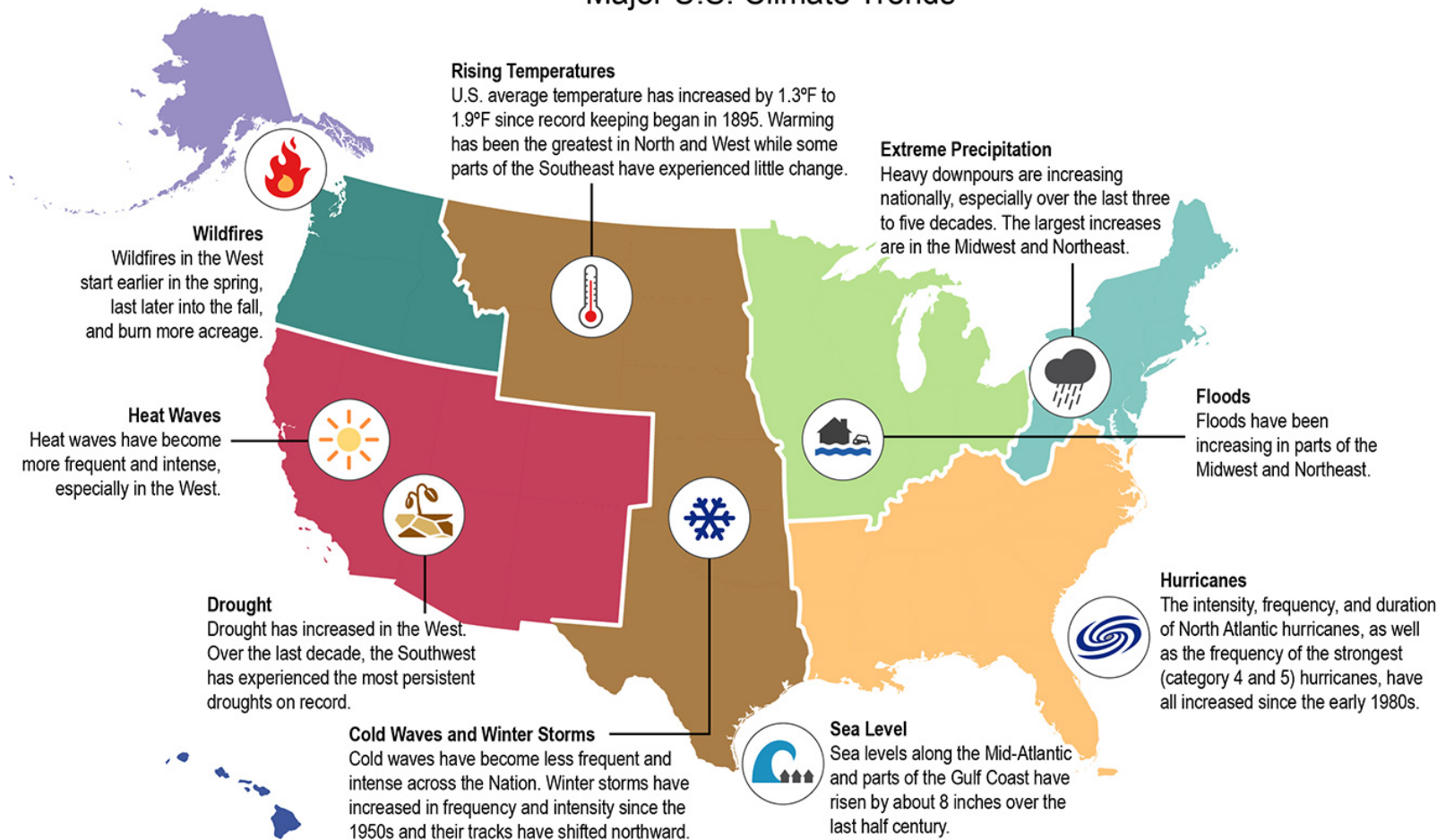
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WaterforFood
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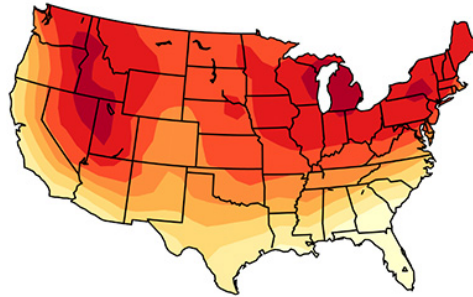


Major U.S. Climate Trends

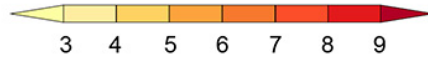


Projected Changes in the Hottest/Coldest and Wettest/Driest Day of the Year

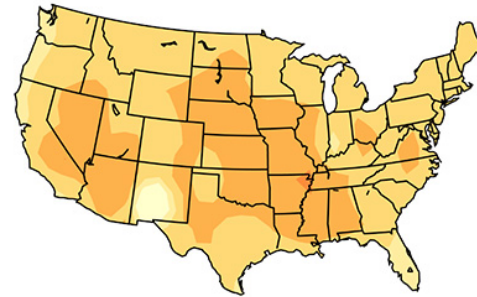
Coldest Night of Year



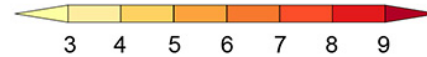
Temperature Change (°F)



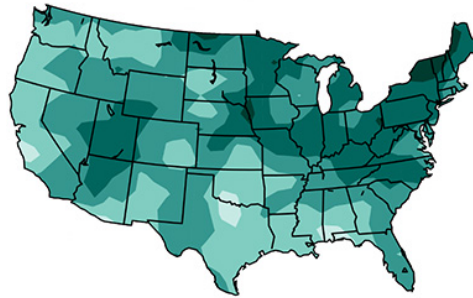
Hottest Day of Year



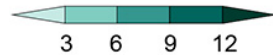
Temperature Change (°F)



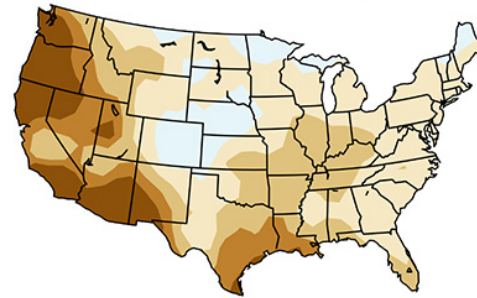
Wettest Day of Year



Precipitation Change (%)



Annual Longest Dry Spell

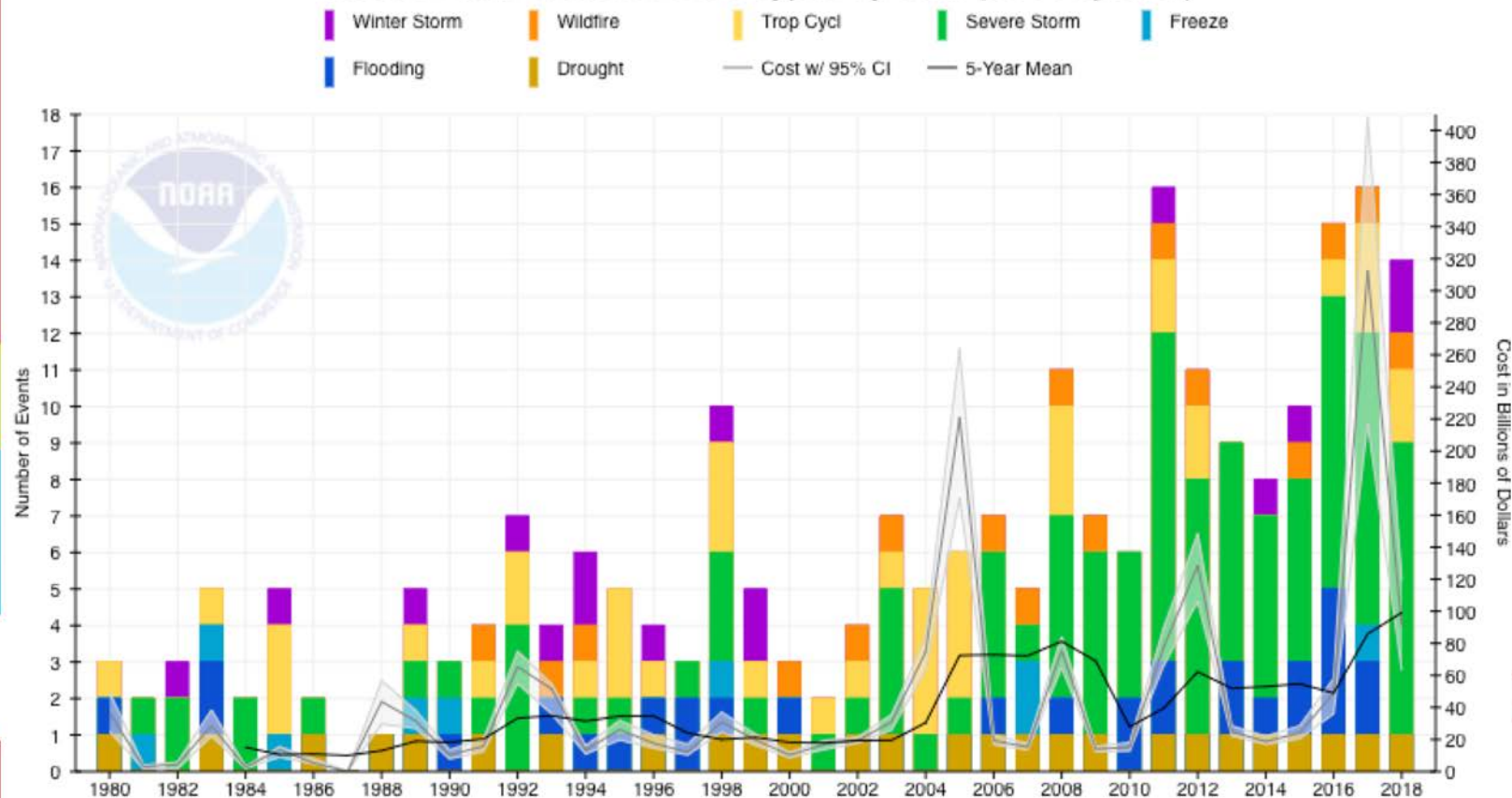


Change in Number of Days

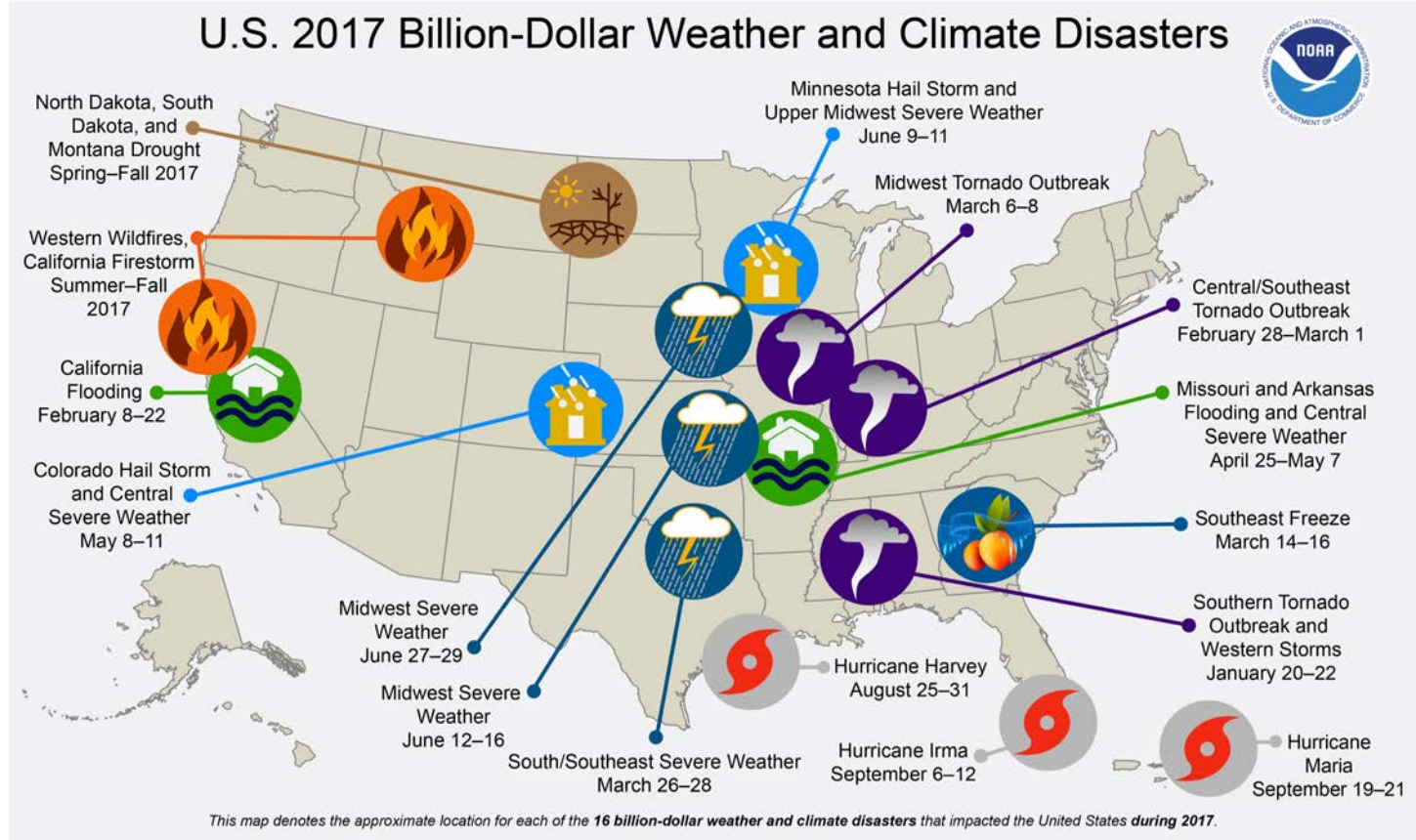


Billion-Dollar Disasters are Increasing

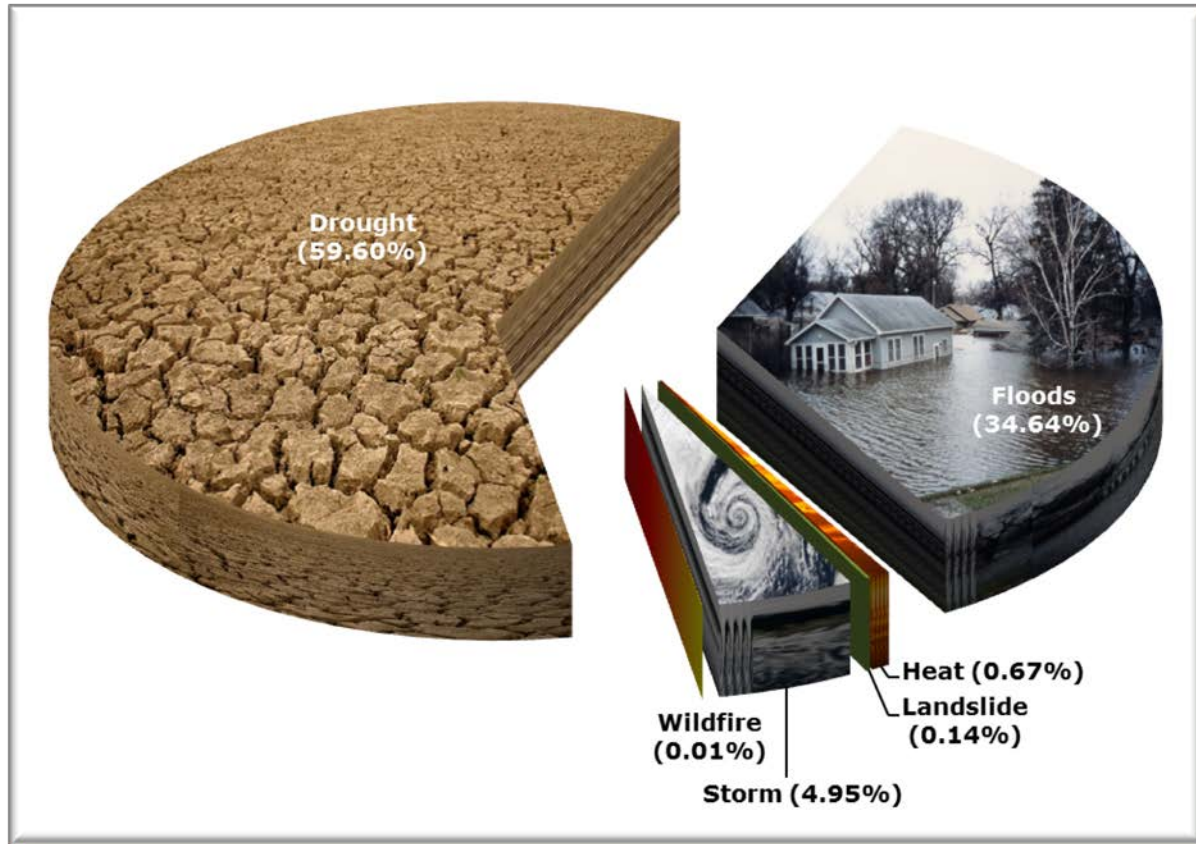
Billion-Dollar Disaster Event Types by Year (CPI-Adjusted)



Total Cost = \$306 Billion; Deaths = 3,278



Percentage of disaster-deaths worldwide according to each category of climate-related hazard, (1900-2013)

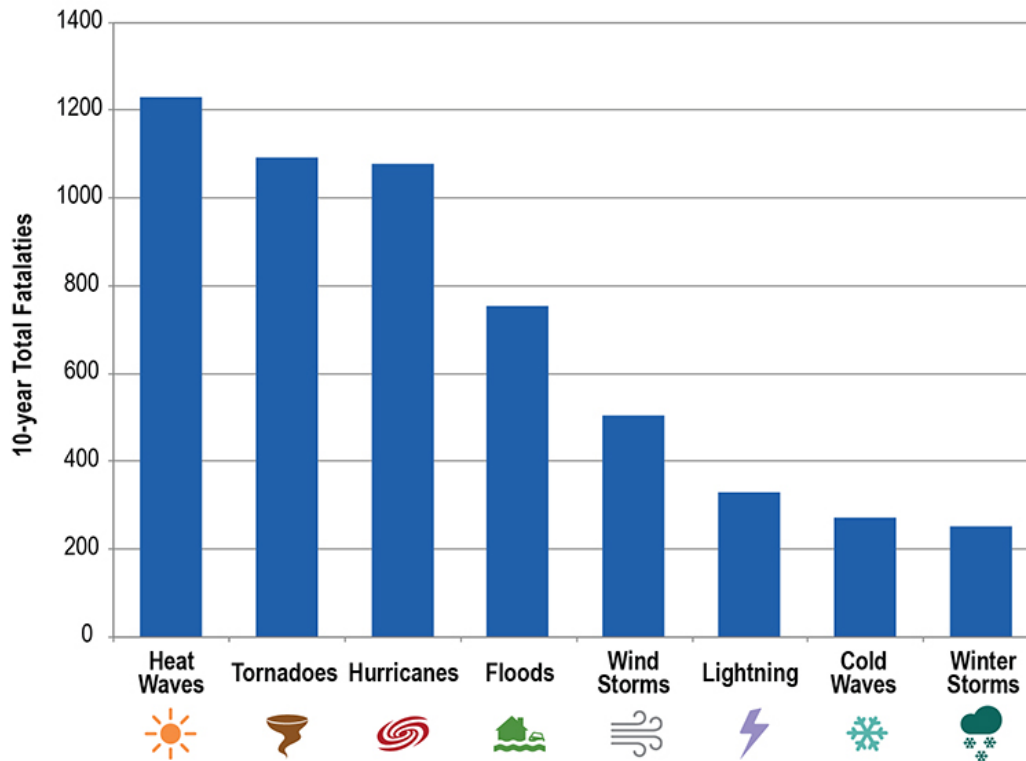


Source: Adapted from EM-DAT: The OFDA/CRED International Database, Belgium 2012
Keim, ME Extreme Weather Events: the role of public health



Drought Impacts

Estimated Deaths and Billion Dollar Losses
from Extreme Events in the U.S., 2004–2013



Billion Dollar Losses
from Disasters
(2004–2013)



\$392 Billion
Hurricanes



\$78 Billion
Heat Waves/Droughts



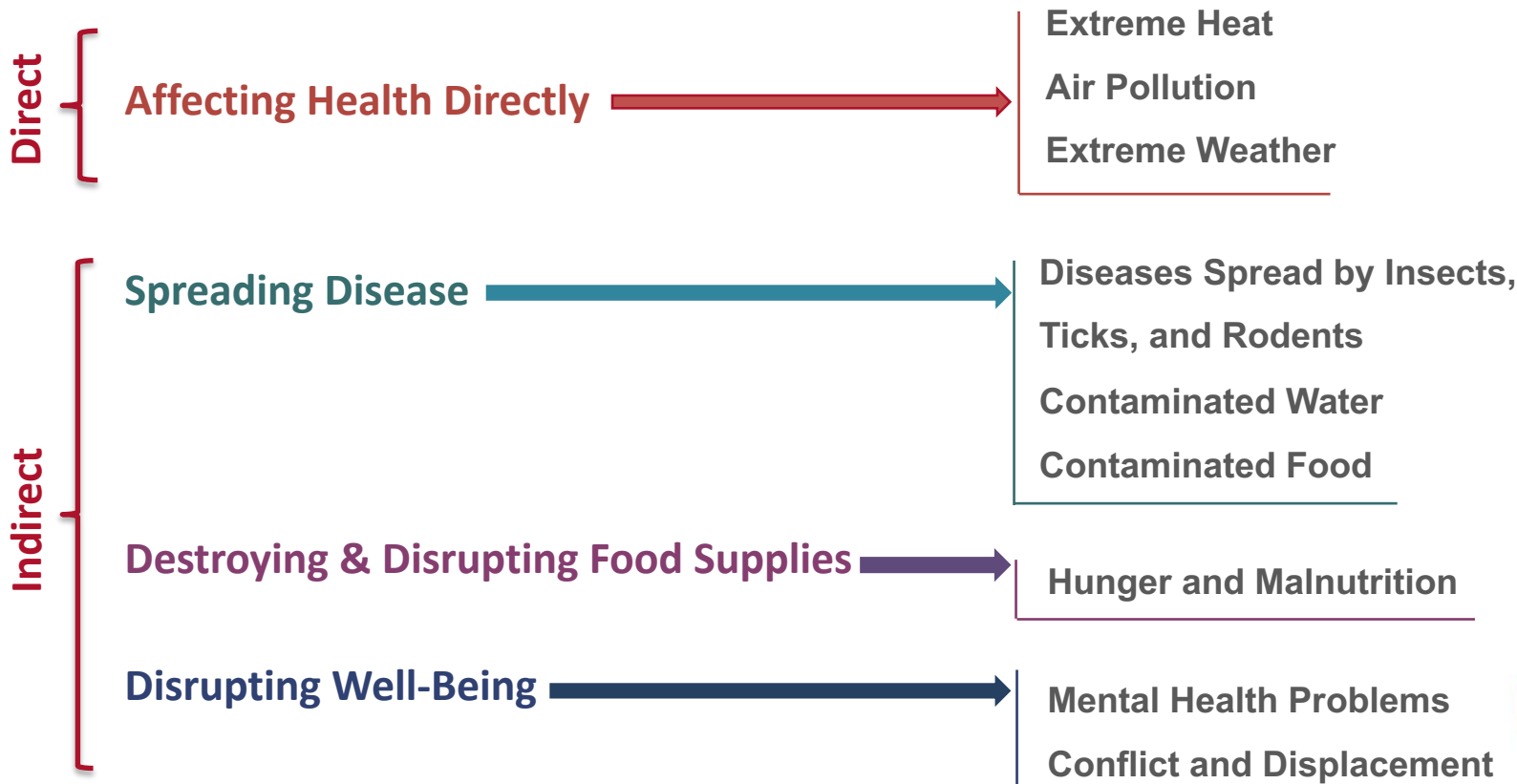
\$46 Billion
Tornadoes/Severe Storms



\$30 Billion
Flooding/Severe Storms



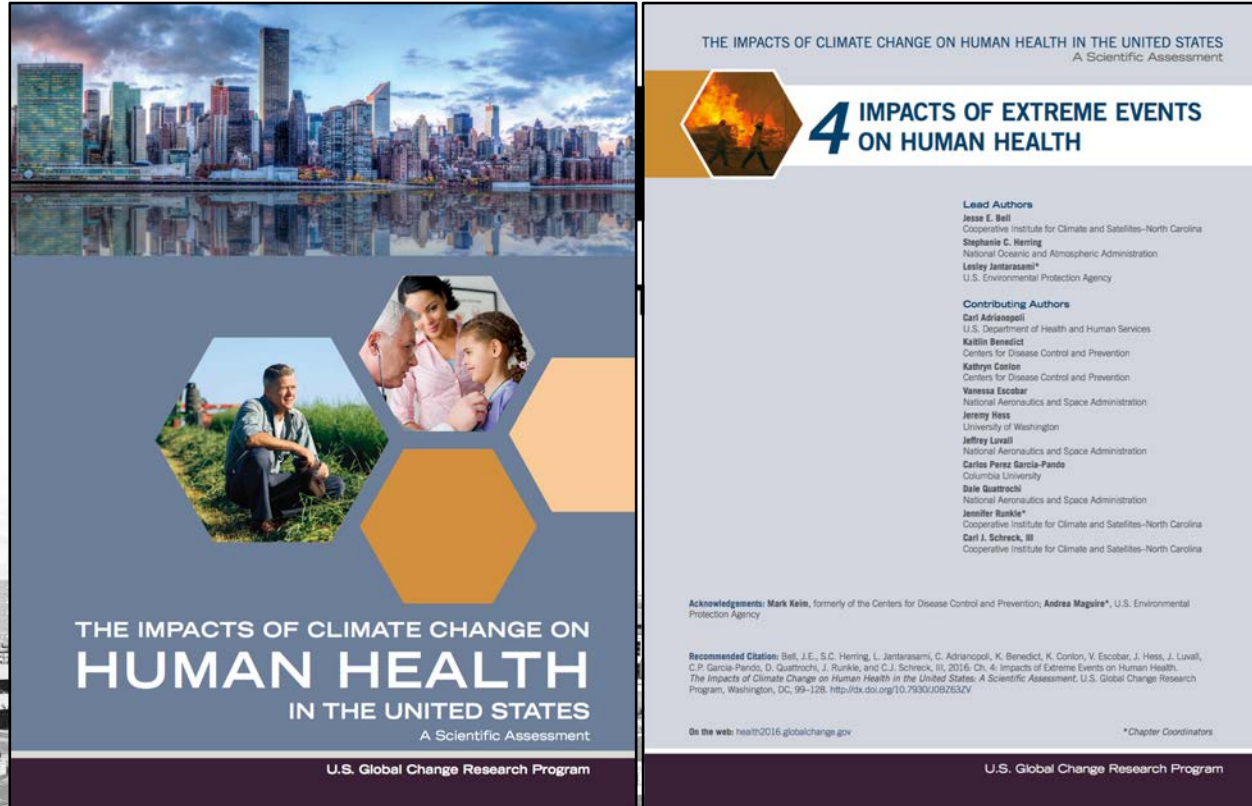
Climate is Affecting Your Health



Climate Change and Health



health2016.globalchange.gov



Executive Summary

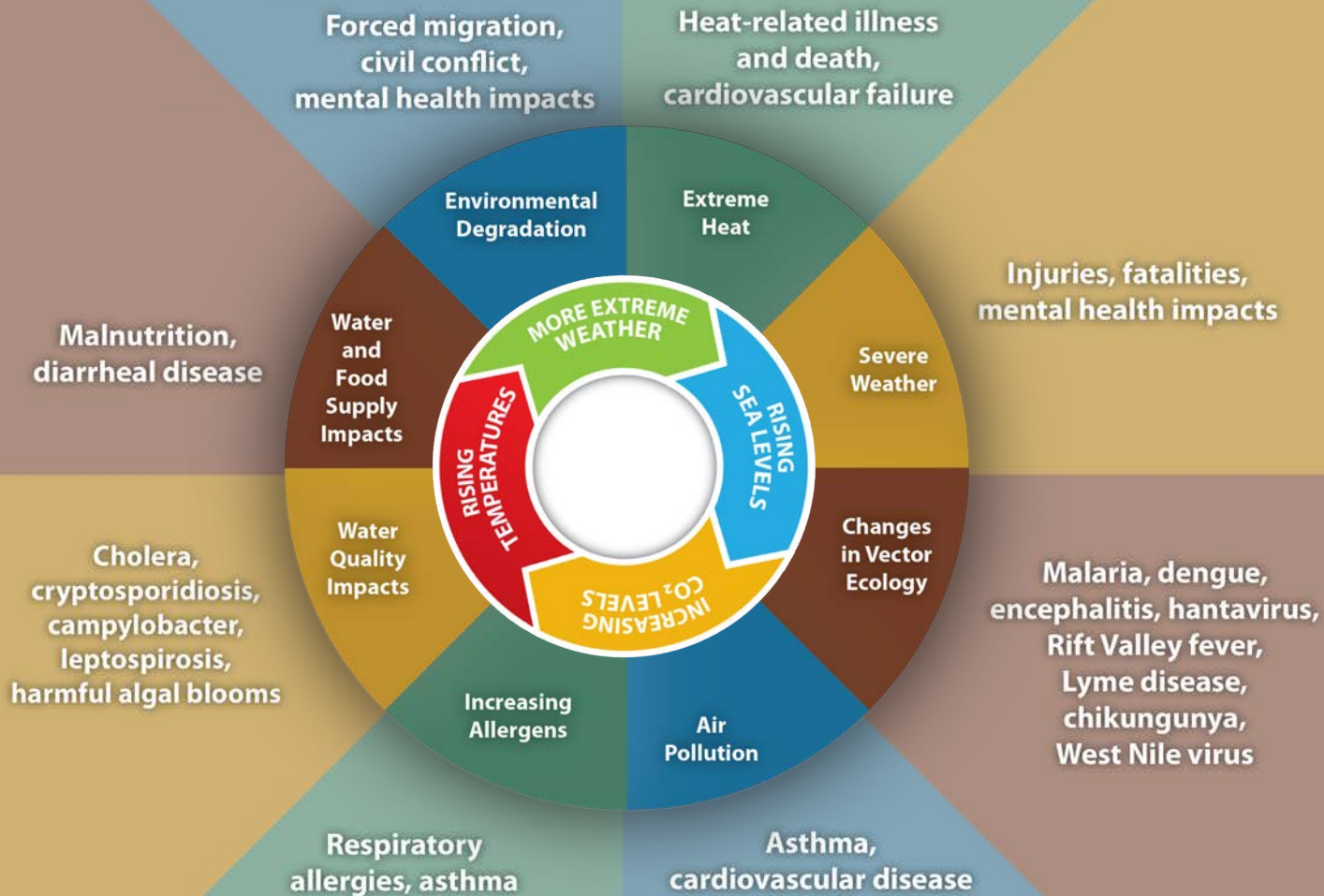
Climate change is a significant threat to the health of the American people.

Climate change threatens human health and well-being in the United States. The U.S. Global Change Research Program (USGCRP) Climate and Health Assessment has been developed to enhance understanding and inform decisions about this growing threat. This scientific assessment, called for under the President's Climate Action Plan, is a major report of the sustained National Climate Assessment (NCA) process. The report responds to the 1990 Congressional mandate to assist the Nation in understanding, assessing, predicting, and responding to human-induced and natural processes of global change. The agencies of the USGCRP identified human health impacts as a high-priority topic for scientific assessment.

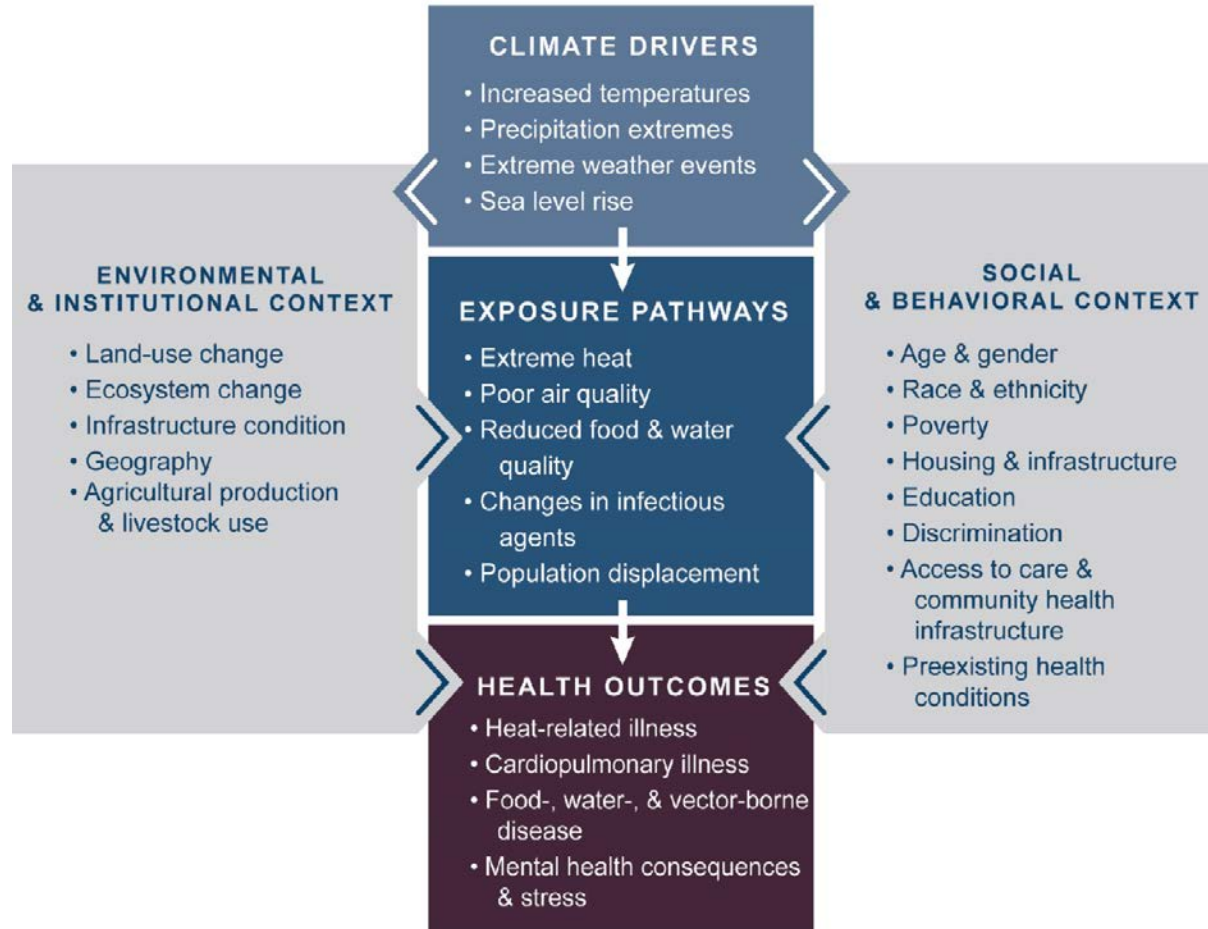
The purpose of this assessment is to provide a comprehensive, evidence-based, and, where possible, quantitative estimation of observed and projected climate change related health impacts in the United States. The USGCRP Climate and Health Assessment has been developed to inform public health officials, urban and disaster response planners, decision makers, and other stakeholders within and outside of government who are interested in better understanding the risks climate change presents to human health.

Every American is vulnerable to the health impacts associated with climate change



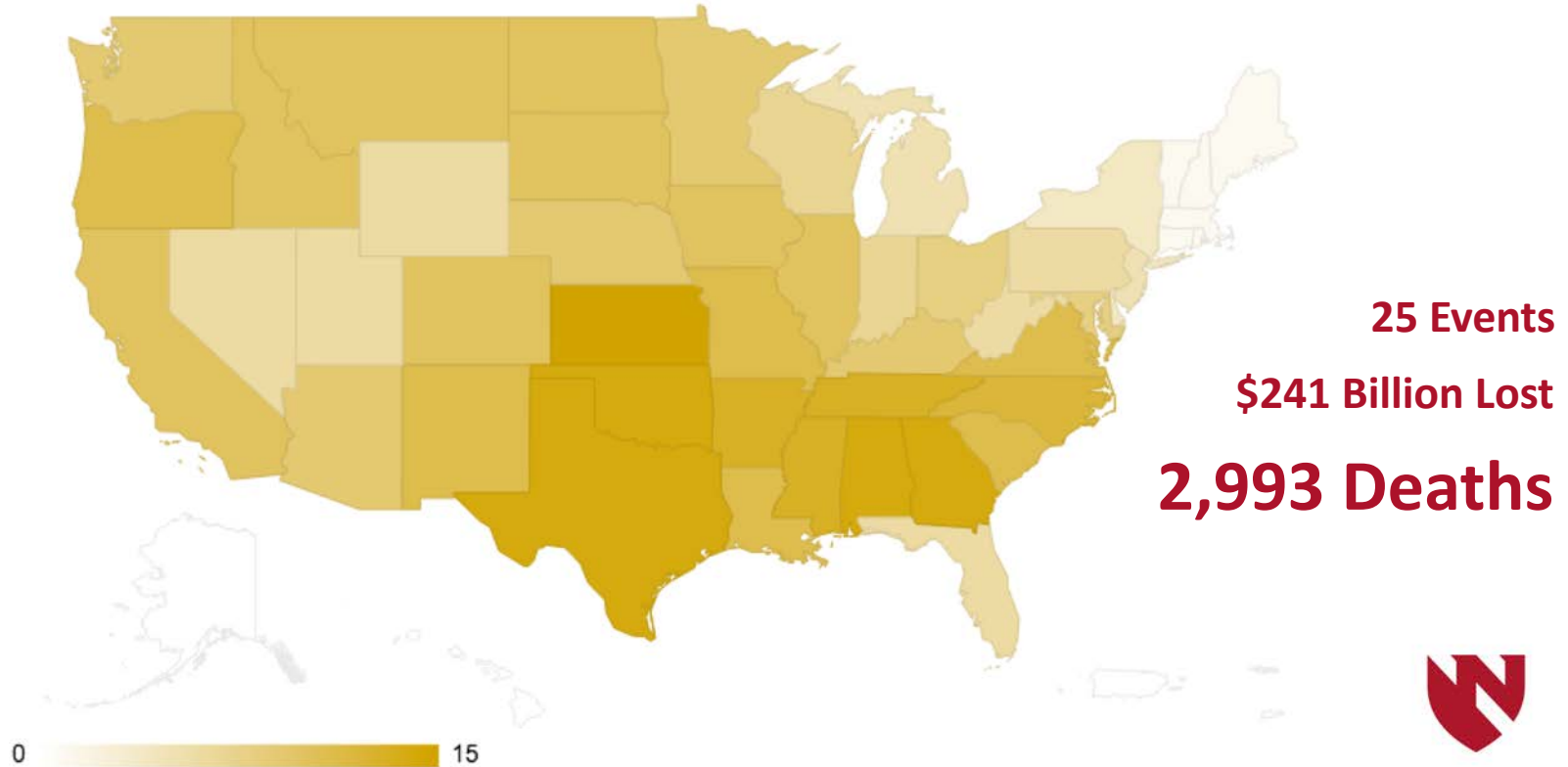


Climate Change and Health





1980-2018* NOAA Billion-Dollar Drought Disasters (CPI-Adjusted)



Complex Pathways: Mental Health



Local

Kansas farmer on alarming suicide rate: 'Nothing gets farmers more down than a drought'

By: Emily Younger

Posted: May 21, 2018 09:34 PM CDT
Updated: May 21, 2018 11:34 PM CDT



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nsw act

Farmer's recovery from depression which led to two suicide attempts shows cost of drought at family level

STEVE Germon left a suicide note on the porch and set about putting down calves he couldn't feed before turning the gun on himself. Then a ute screamed towards him, his 17-year-old daughter at the wheel.

JACK MORPHET

The Sunday Telegraph JULY 1, 2018 1:00AM

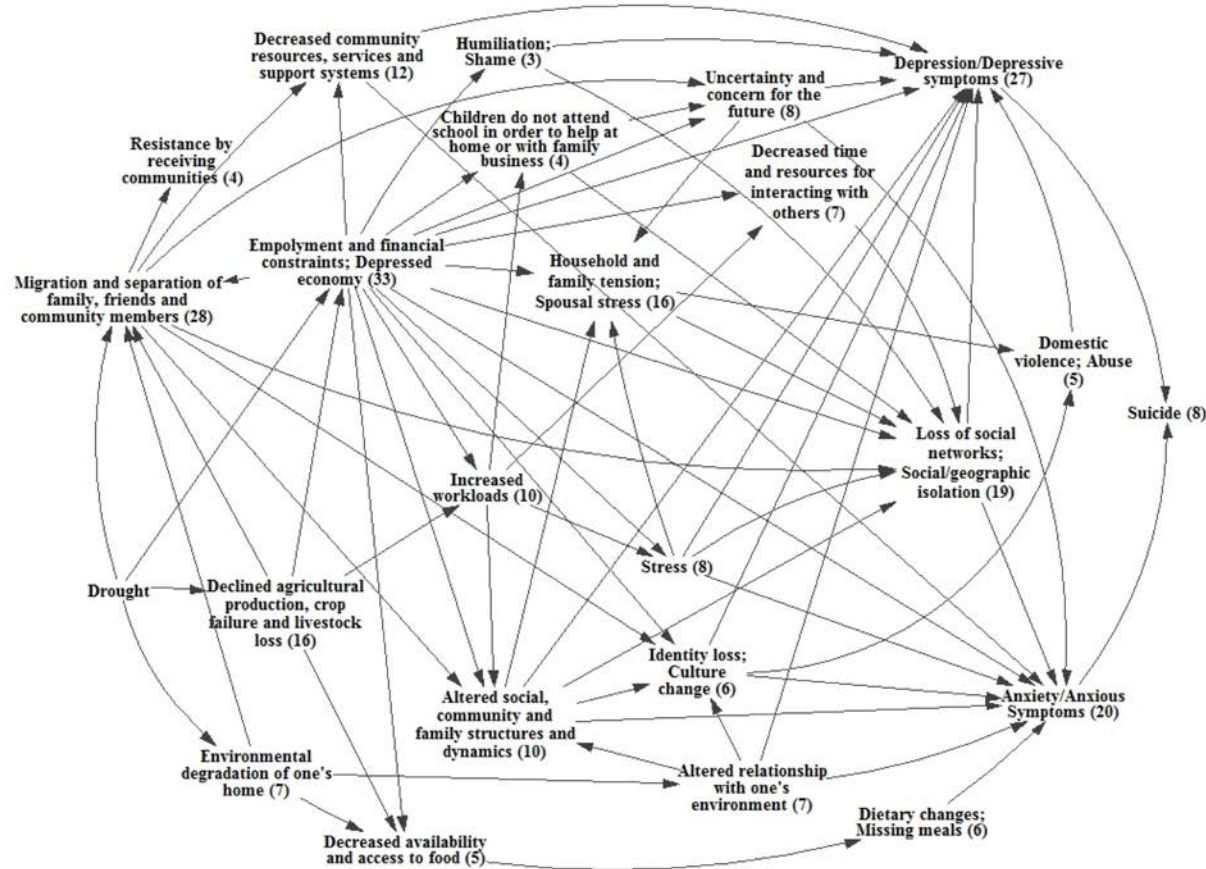


NSW stricken by severe drought

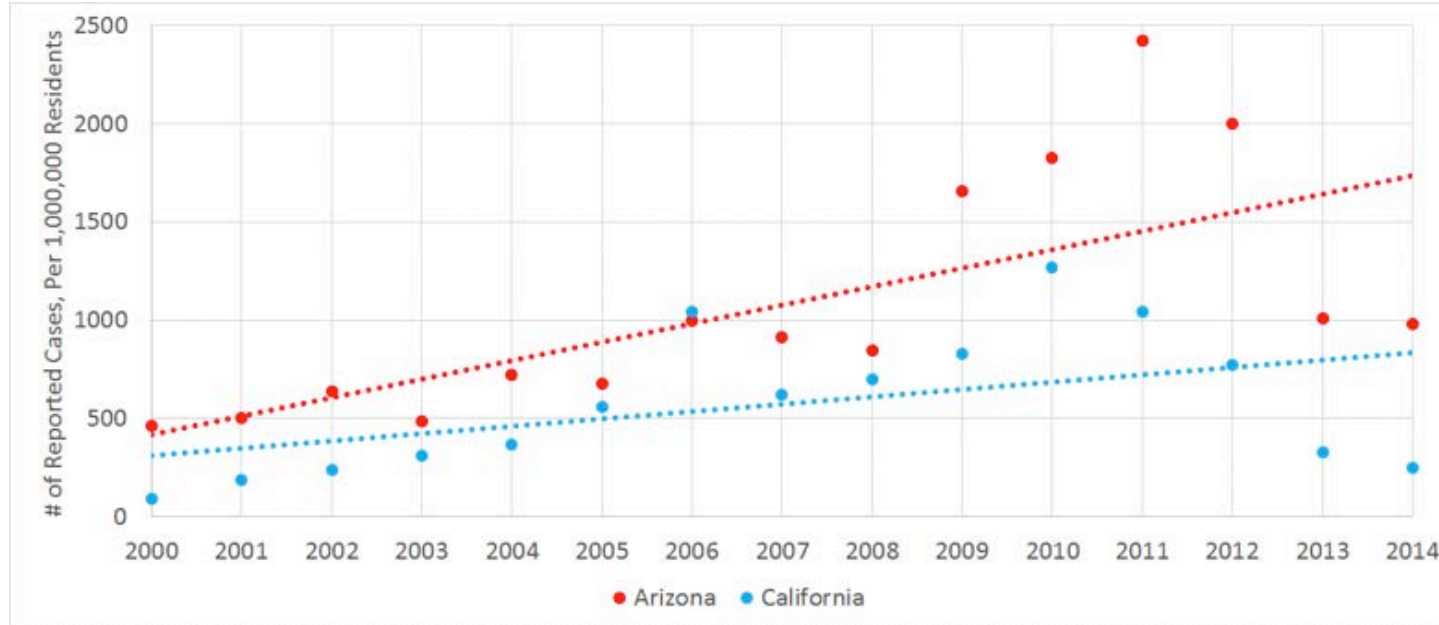
DAIRY farmer Steve Germon knows what it's like to be on the brink of suicide. He has been there twice in the past three years.

...at saved him in 2015, but those lonely moments last year

Causal Process Diagram



Increasing Incidence of Valley fever



Shriber, J., Conlon, K. C., Benedict, K., McCotter, O. Z., & Bell, J. E. (2017). Assessment of Vulnerability to Coccidioidomycosis in Arizona and California. *International Journal of Environmental Research and Public Health*, 14(7), 680.



Valley Fever



#1 in Limnology/Water Resources Research
#1 in Paleontology/Paleoceanography



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Research Article

Relating Coccidioidomycosis (Valley Fever) Incidence to Soil Moisture Conditions

E.J. Coopersmith¹, J. E. Bell, K. Benedict, J. Shriver, O. McCotter, M.H. Cosh

Accepted manuscript online: 6 March 2017 Full publication history

DOI: 10.1002/2016GH000033 View/save citation

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Abstract

Coccidioidomycosis (also called Valley fever) is caused by a soil-borne fungus, *Coccidioides* spp., in arid regions of the southwestern United States. Though some who develop infections from this fungus remain asymptomatic, others develop respiratory disease as a consequence. Less commonly, severe illness and death can occur when the infection spreads to other regions of the body. Previous analyses have attempted to connect the incidence of coccidioidomycosis to broadly-available climatic measurements, such as precipitation or temperature. However, with the limited availability of long-term, *in-situ* soil moisture datasets, it has not been feasible to perform a direct analysis of the relationships between soil moisture levels and coccidioidomycosis incidence on a larger temporal and spatial scale. Utilizing *in situ* soil moisture gauges throughout the southwest from the U.S. Climate Reference Network (USCRN) and a model with which to extend those estimates, this work connects periods of higher and lower soil moisture in Arizona and California between 2002 and 2014 to the reported incidence of coccidioidomycosis. The results indicate that in both states, coccidioidomycosis incidence is related to soil moisture levels from previous summers and falls. Stated differently, a higher number of coccidioidomycosis cases are likely to be reported if previous bands of months have been atypically wet or dry, depending on the location. This article is protected by copyright. All rights reserved.

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NATIONAL DROUGHT & PUBLIC HEALTH SUMMIT

June 17-19, 2019 | Atlanta, GA

Thank you to our Summit Planning Partners:

Centers for Disease Control and Prevention (CDC)
National Integrated Heat Health Information System (NIHHIS)
Environmental Protection Agency (EPA)
Natural Resources Defense Council (NRDC)
UNL National Drought Mitigation Center (NDMC)



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Closing thoughts

- Climate Change is a Significant Health Threat
- All people are vulnerable... some more than others
- Costs are Increasing
- Multiple relationships between climate and health
- Lots to be gained by combining expertise
- Multiple opportunities to address this issue

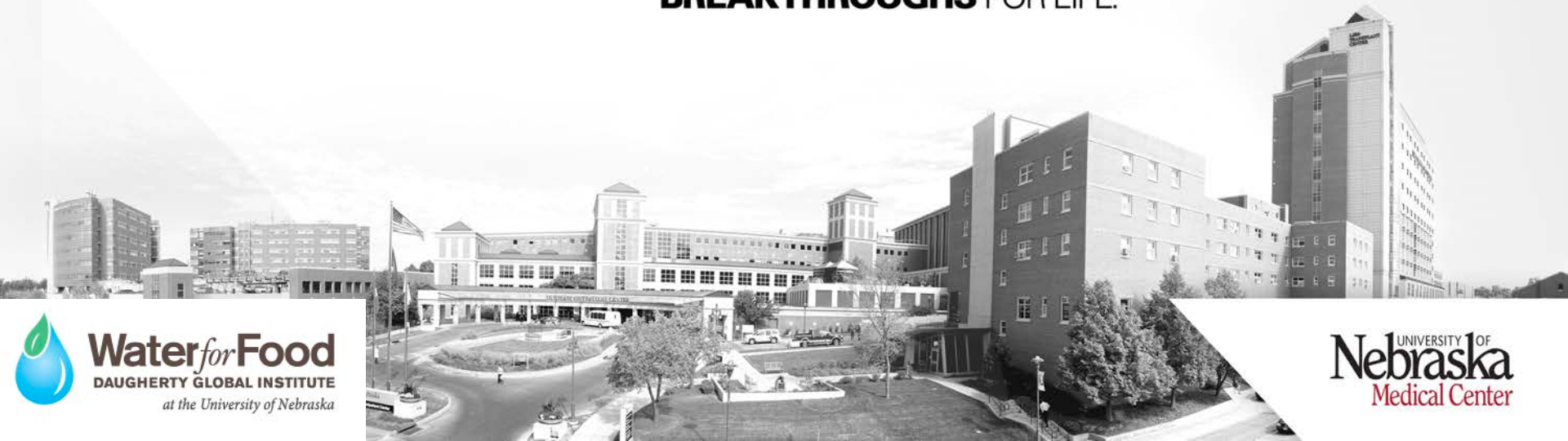


the difference between the fields on either side of dairy farmer Tom Sarcello is water. (Tomas Ovalle / For The Times)



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Twitter: [@JesseEugeneBell](https://twitter.com/JesseEugeneBell)



Future Needs:



- Still much to be learned about drought and public health
 - What do public health departments need?
 - Who else should be at the table?
- Research is needed in many different areas:
 - Analysis of surveillance data
 - Improved environmental monitoring
 - Role of public health departments
 - Economic impact of drought on public health
 - Lessons learned and best practices





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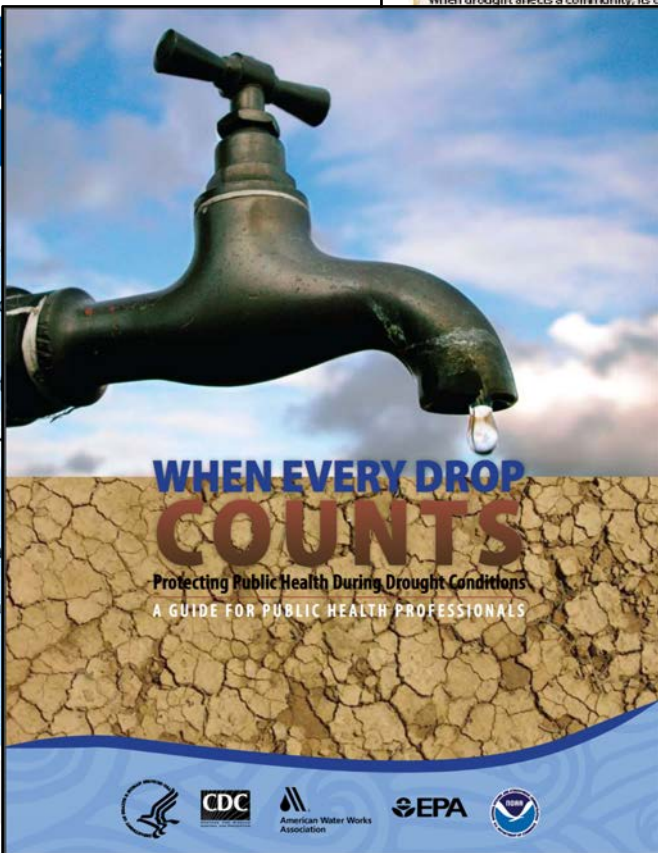


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DROUGHT AND PUBLIC HEALTH IN THE U.S.

Why drought matters

When drought affects a community, its devastating consequences can include decreased food and water security, increased risk of wildfires, and complex, and costly, economic and environmental impacts.



National drought, 2005–2015

Did not experience extreme or exceptional drought.

Experienced extreme drought.

Experienced exceptional drought.

Experienced extreme and exceptional drought.

Public health

Plants, animals, and the environment that drought can do:



Count and sustain diseases. Mosquitoes like virus can areas when s of water edging grounds. Dry soil increase the risk s lung infection gus in the soil.



Intensify wild and dust storm thus increasing the number of particulates in air. This can worsen asthma and other heart and lung diseases.

Preparedness can help reduce the health impacts of drought. The National Center for Environmental Health's (NCEH's) current drought preparedness system (NIDIS) to identify ways to better understand health effects.

PREPARING FOR THE HEALTH EFFECTS OF DROUGHT

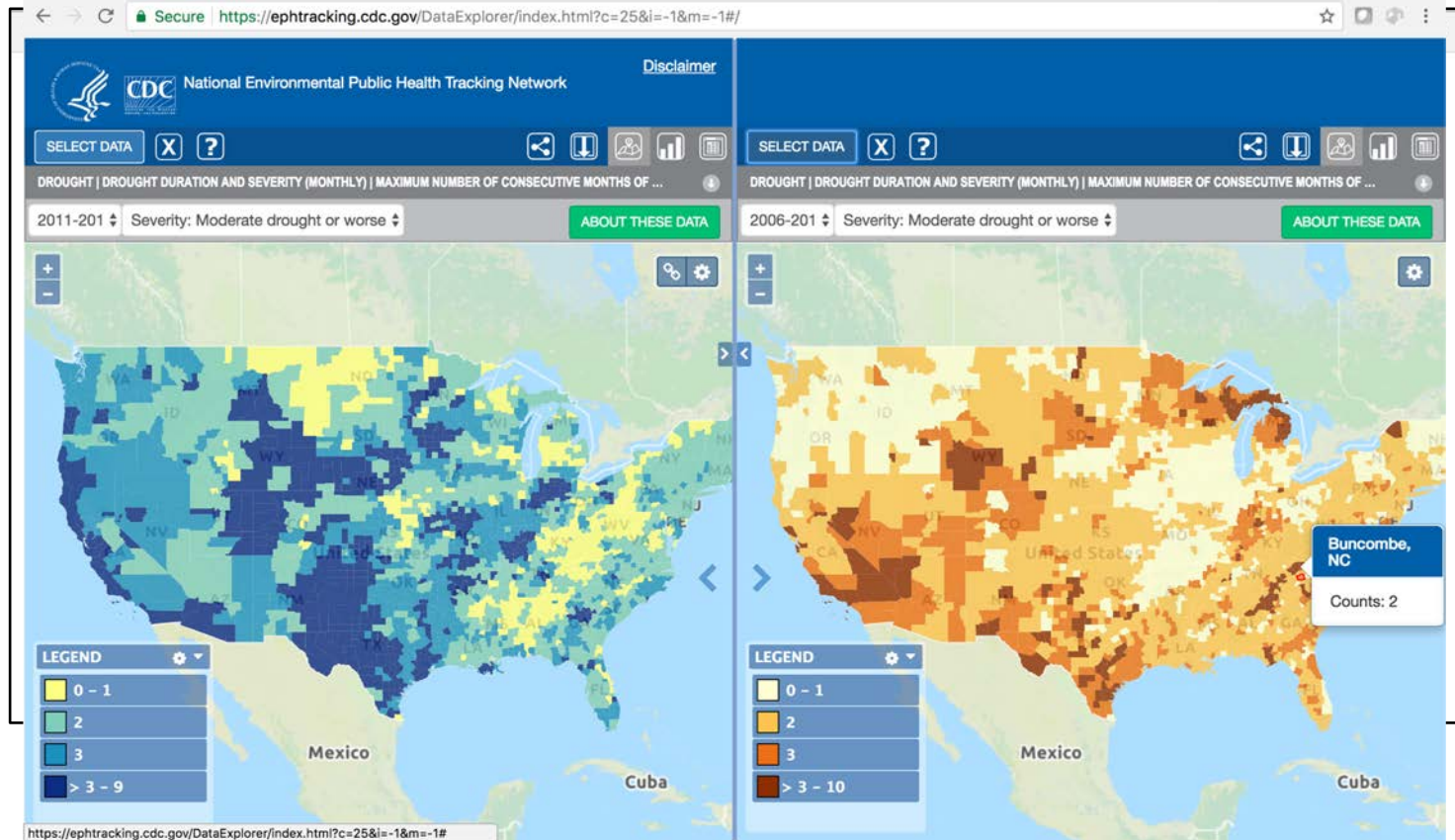
A RESOURCE GUIDE
FOR PUBLIC HEALTH PROFESSIONALS



Centers for Disease
Control and Prevention
National Center for
Environmental Health

- the at-risk populations living within the affected area, and

Drought Data on CDC's National Environmental Public Health Tracking Network



Determinants of Vulnerability

EXPOSURE

Exposure is contact between a person and one or more biological, psychosocial, chemical, or physical stressor, including stressors affected by drought and climate variability.

SENSITIVITY

Sensitivity is the degree to which people or communities are affected, either adversely or beneficially, by drought and climate variability.

ADAPTIVE CAPACITY

Adaptive capacity is the ability of communities, institutions, or people to adjust to potential hazards, to take advantage of opportunities, or to respond to consequences.

VULNERABILITY of Human Health to Drought

HEALTH IMPACTS

Injury, acute and chronic illness (including mental health and stress-related illness), and death



