

United States Global Change Research Program (USGCRP): Thirteen Agencies, One Vision

Thomas Armstrong, PhD

Executive Director, USGCRP

White House Office of Science and Technology Policy
Washington, DC

Thomas_R_Armstrong@ostp.eop.gov

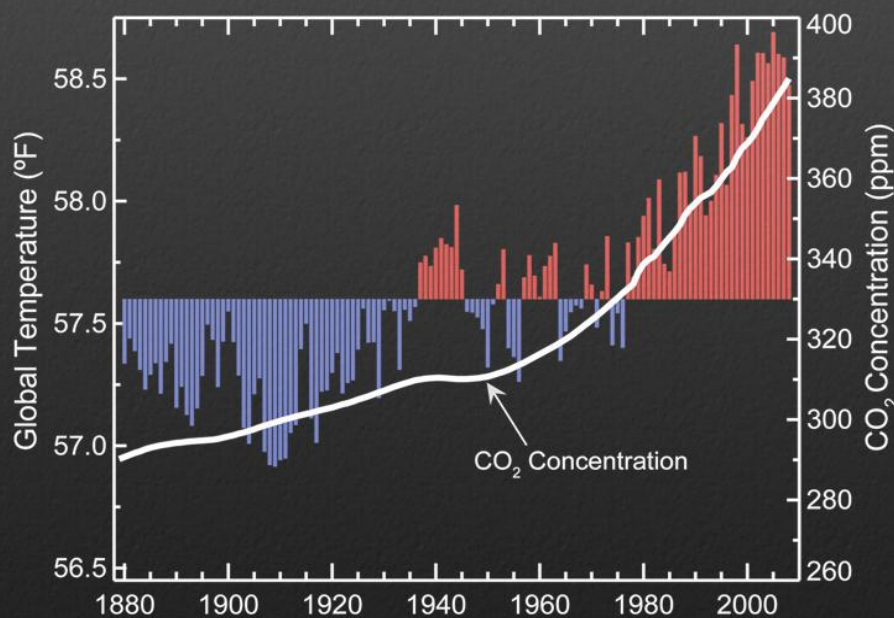


United States
Global Change
Research Program

www.globalchange.gov

The Climate is Already Changing

Scientific consensus shows that the Earth's climate is changing due to increased concentrations of greenhouse gases in the atmosphere



- Global average temperature and carbon dioxide concentrations have risen substantially since 1880
- Most of the warming in the past 50 years has been over land and in the Northern Hemisphere
- Year-round average temperatures in the U.S. have already risen 2°F over the past 50 years



Climate Change is Already Affecting Society

- Economy
- Communities
- Energy production/supply
- Human health
- Water availability
- Food production
- National security
- Tribal cultures
- Biodiversity
- Ecosystem services that people depend on for clean water, coastal protection, food protection, food production, and recreation



...and will challenge agency missions and operations



History of USGCRP

- USGCRP began as a U.S. Presidential Initiative in 1989
- The initiative was mandated by Congress in the Global Change Research Act (GCRA) of 1990 (P.L. 101 – 606)

*“To provide for development and coordination of a comprehensive and integrated United States Research Program which will assist the Nation and the world to **understand, assess, predict, and respond** to human-induced and natural processes of global change.”*

USGCRP and Global Change Science

The Program:

- **Coordinates** Federal research to better understand and prepare the nation for global change
- **Prioritizes and supports** cutting edge scientific work in global change
- **Assesses** the state of scientific knowledge and the Nation's readiness to respond to global change
- **Communicates** research findings to inform, educate, and engage the global community

USGCRP Agencies and Departments:

-  Department of Agriculture
-  Department of Commerce
-  Department of Defense
-  Department of Energy
-  Department of Health and Human Services
-  Department of the Interior
-  Department of State
-  Department of Transportation
-  Environmental Protection Agency
-  National Aeronautics and Space Administration
-  National Science Foundation
-  Smithsonian Institution
-  United States Agency for International Development



THE NATIONAL GLOBAL CHANGE RESEARCH PLAN 2012-2021

A STRATEGIC PLAN FOR THE U.S. GLOBAL CHANGE RESEARCH PROGRAM



The Obama Administration released a 10-year strategic plan for research related to global change, identifying priorities that will help state and local governments, businesses, and communities prepare for anticipated changes in the global environment, including climate change, in the decades ahead.

“Human actions are altering the atmosphere, the land, and our oceans, placing new pressures on the Earth’s ecosystems and threatening the health and economic welfare of our Nation and the world...”

“...High-quality and well-coordinated research is essential if we are to better understand and predict future changes, develop strategies to minimize our vulnerabilities, and adapt to changes that can’t be avoided.”

Tom Armstrong, Executive Director of the USGCRP
White House Office of Science and Technology Policy



USGCRP Vision and Mission

Vision - “A nation, globally engaged and guided by science, meeting the challenges of climate and global change.”

Mission - “To build a knowledge base that informs human responses to climate and global change through coordinated and integrated federal programs of research, education, communication, and decision support.”



USGCRP Decadal Strategic Plan

Advances fundamental, use-inspired research to address the present and future challenges of climate and global change

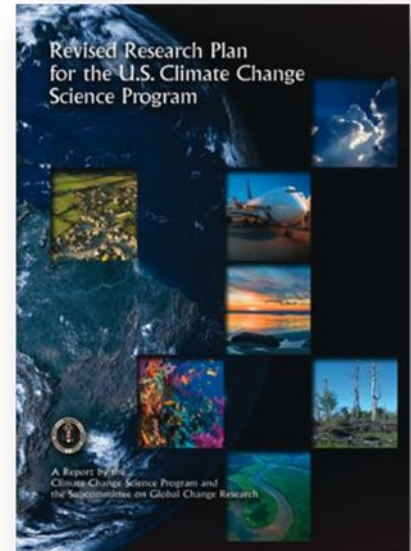
Provides:

- Direction for USGCRP for the next ten years
- Guidance for an integrated “end-to-end” program
- Links the Program’s vision and mission to its goals and outcomes

Speaks to various global change stakeholders

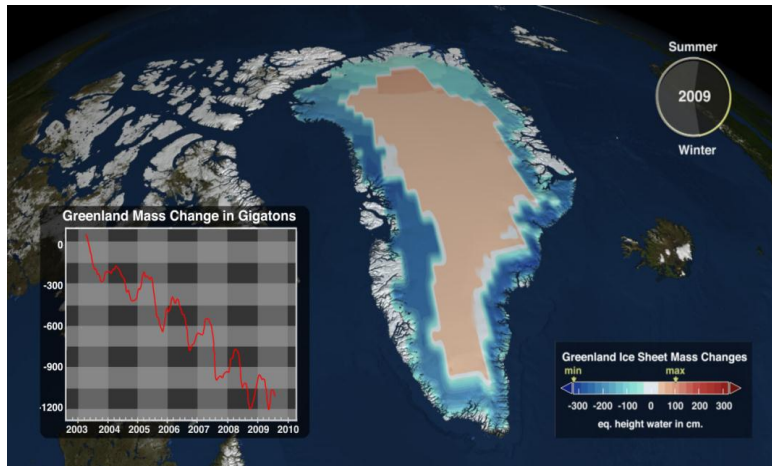
Emphasizes:

- Human-natural systems
- End-to-end science: from basic research to decision support/adaptive management

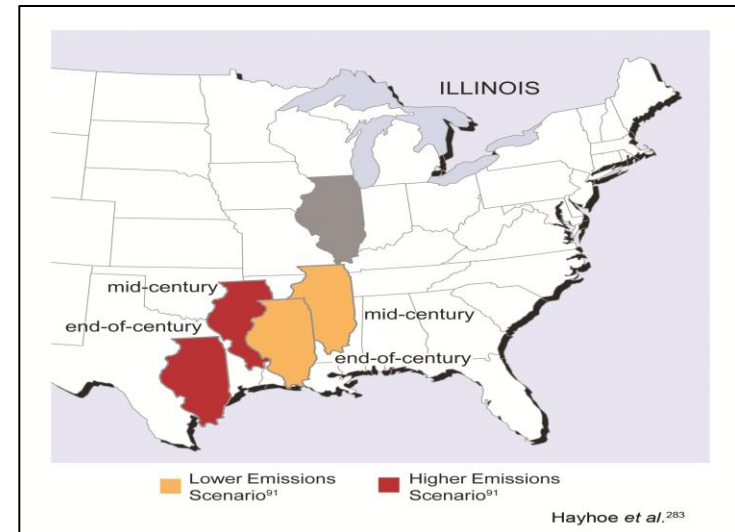


Goal One: *Advance Science*

Goal Language: *Advance scientific knowledge of the integrated natural and human components of the Earth system.*



This image shows the change in mass of the Greenland Ice Sheet over the period April 2003–July 2009 as measured by GRACE. Credit: *NASA Goddard Space Flight Center/Science Visualization Studio. Blue Marble data are courtesy of Reto Stockli: NASA/GFSC*



Model projections of summer average temperature and precipitation changes in Illinois for mid-century (2040–2059), and end-of-century (2080–2099), indicate that summers in this state are expected to feel progressively more like summers currently experienced in states south and west. Illinois is projected to get considerably warmer and have less summer precipitation. Credit: *Global Climate Change Impacts in the U.S., USGCRP 2009.*

Goal Two: Inform Decisions

Goal Language: *Provide the scientific basis to inform and enable timely decisions on adaptation and mitigation.*



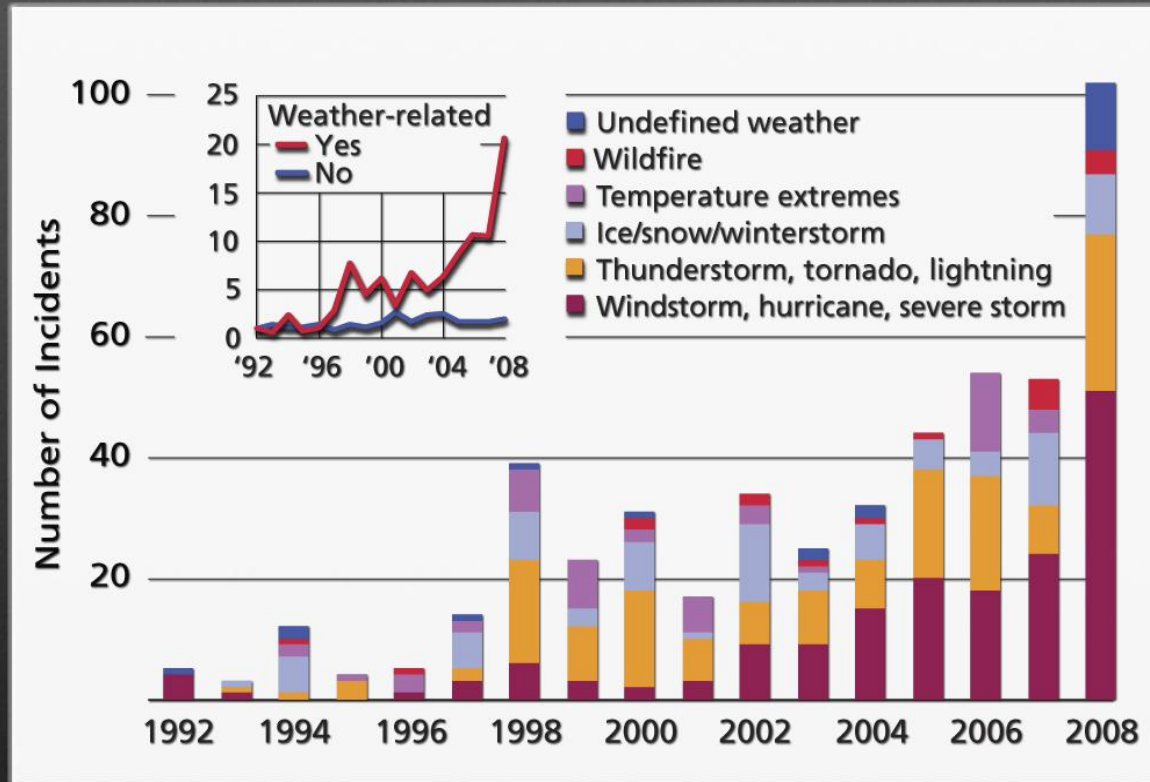
Researchers are studying decision making under uncertainty and risk taking (e.g. Why people choose to live in wildfire zones?). Even after seeing images like this one where a wildfire tore through a scenic California neighborhood in 2007, some people will continue to choose to live in high risk areas. Credit: *Andrea Booher (FEMA)*



Every year hundreds of adult female endangered green sea turtles migrate to the beaches of the French Frigate Shoals to lay their eggs. Female sea turtles can live for over 50 years and throughout their mature lives return to the same nesting grounds they were born at to lay their egg clutches. The French Frigate Shoals are amongst the many northwestern Hawaiian Islands that could be inundated by rising sea levels and thus affect green sea turtle reproduction. Credit: *NOAA*

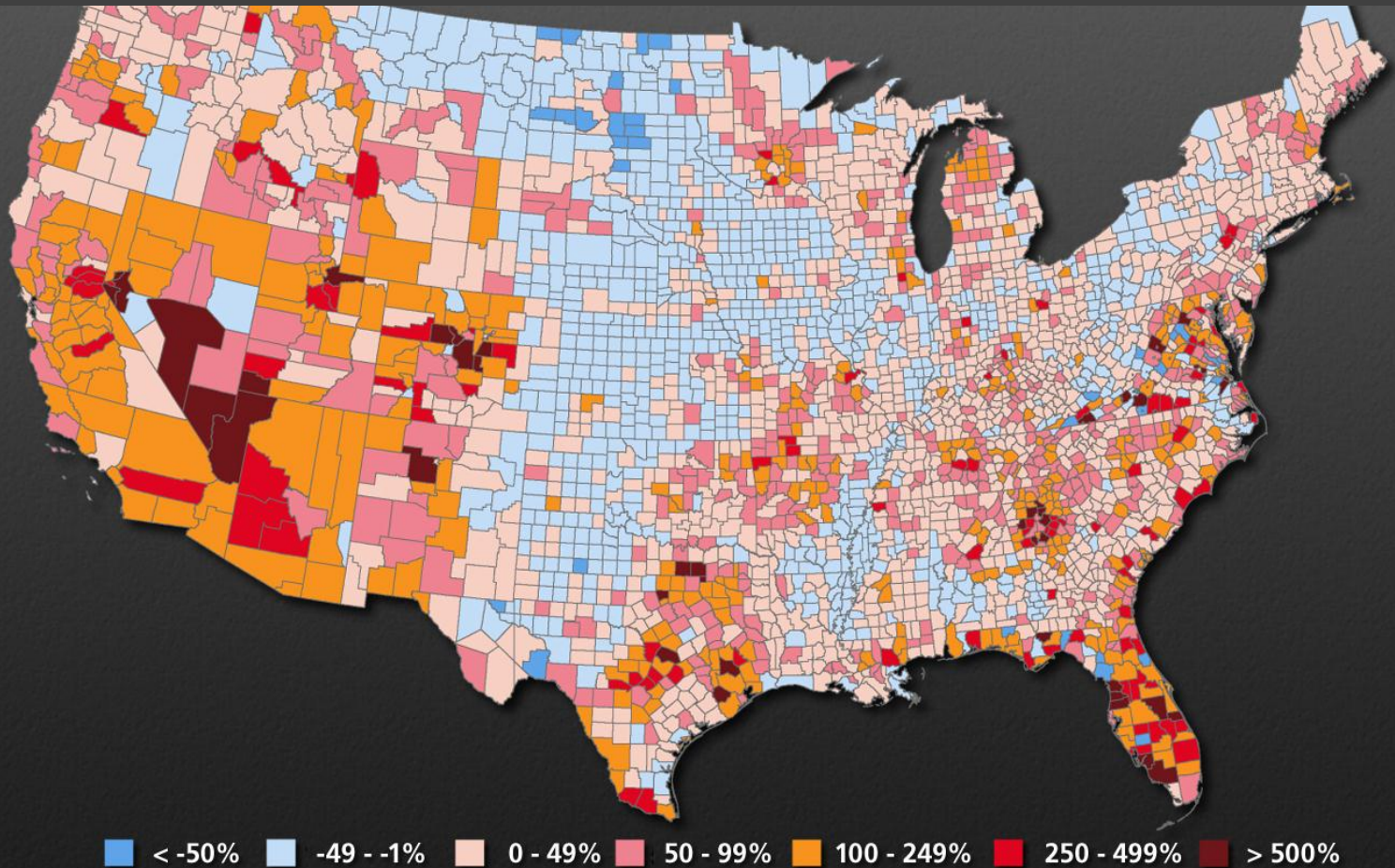


Significant Weather-Related U.S. Electric Grid Disturbances



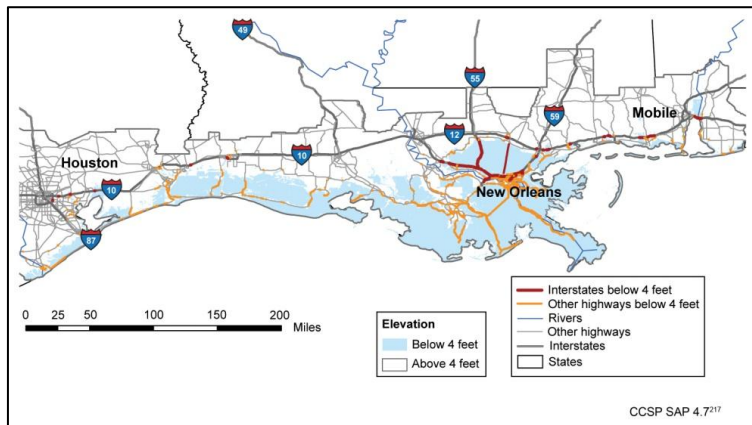
Climate change will interact with existing social & environmental stresses

Changes in population, 1970 to 2008

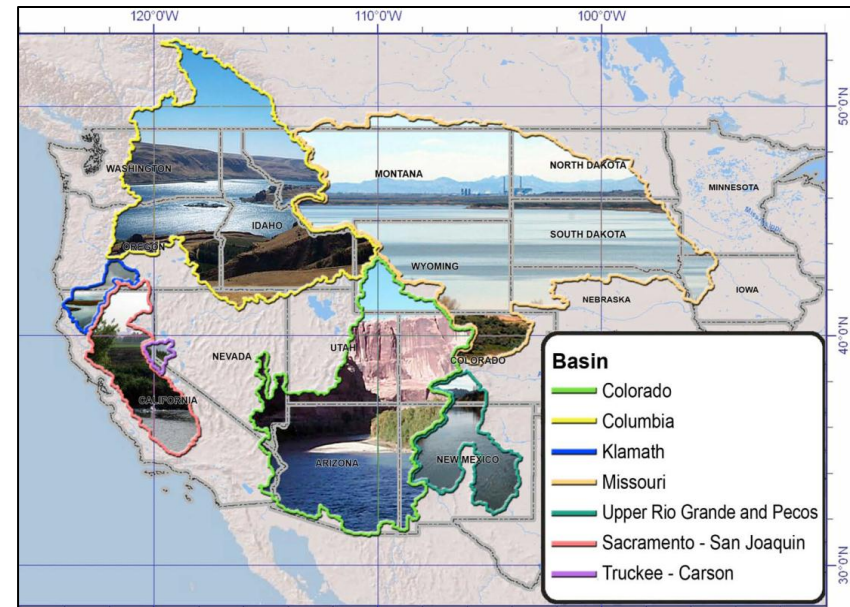


Goal Three: Sustained Assessments

Goal Language: *Build sustained assessment capacity that improves the nation's ability to understand, anticipate, and respond to global and climate change impacts and vulnerabilities*

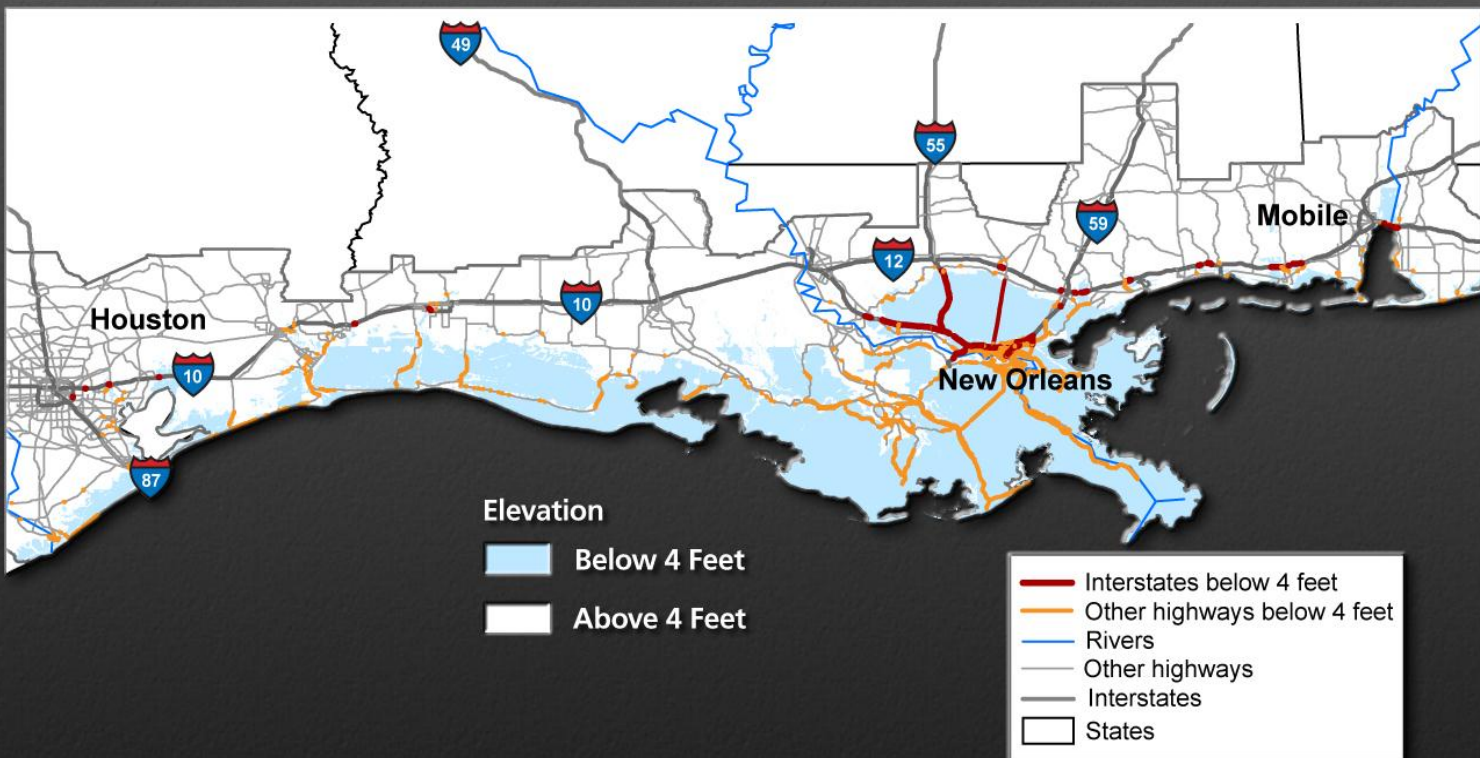


Within 50 to 100 years, 2,400 miles of major roadway are projected to be inundated by sea-level rise in the Gulf region. The map shows roadways at risk in the event of a sea-level rise of about 4 feet, within the range of projections for this region under medium- and high-emissions scenarios. In total, 24 percent of interstate highway miles and 28 percent of secondary road miles in the Gulf Coast region area at elevations below 4 feet. Credit: CCSP SAP 4.7.



Declining volumes of water basins could affect large areas in the western United States through reduced water supplies. Credit: *Department of Interior/Bureau of Reclamation, The SECURE Water Act Report from April 2011*)

Gulf Coast Roads at Risk from Sea-Level Rise

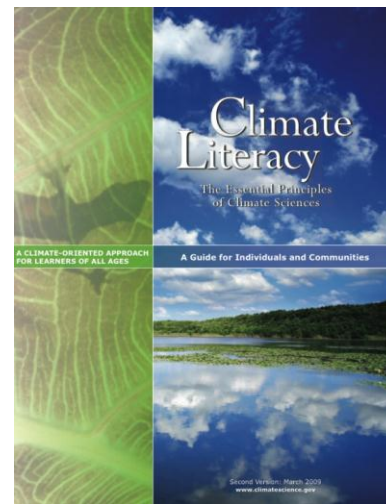


Goal Four: Communicate and Educate

Goal Language: *Advance communications and education to broaden public understanding of climate and global change, and empower the workforce of the future.*



High school students attending a “Science Careers in Search of Women” conference. Credit: *NSF image.*



In partnership with scientific and educational organizations, USGCRP developed *Climate Literacy: The Essential Principles of Climate Science* (2009). The publication has been and continues to be used as a valuable resource for teachers, students, and community leaders, as a topic for discussion within local communities, and as a guide for the development of informal learning resources and science curriculum content standards around the county.

Climate Change Impacts Are Not Distributed Evenly

For example...



Western drought, CA Dept. of Water Resources



Midwestern flooding, NRCS

- Drought frequency has increased in the Southeast and much of the West
- Heavy precipitation has increased most in the Midwest and Northeast

International Partnerships



- **Recognize** the strategic benefits of collaborating with international partners
- **Coordinate** U.S. activities with other nations and international organizations on global change research projects and activities
- **Promote** international cooperation and access to scientific data and information
- **Participate** in international global change research by developing nations
- **Leverage** existing and future scientific capabilities



The “New” National Climate Assessment

Goal

- Enhance the ability of the United States to anticipate, mitigate, and adapt to changes in the global environment.

Vision

- Advance an inclusive, broad-based, and sustained process for assessing and communicating scientific knowledge of the impacts, risks, and vulnerabilities associated with a changing global climate in support of decision-making across the United States.

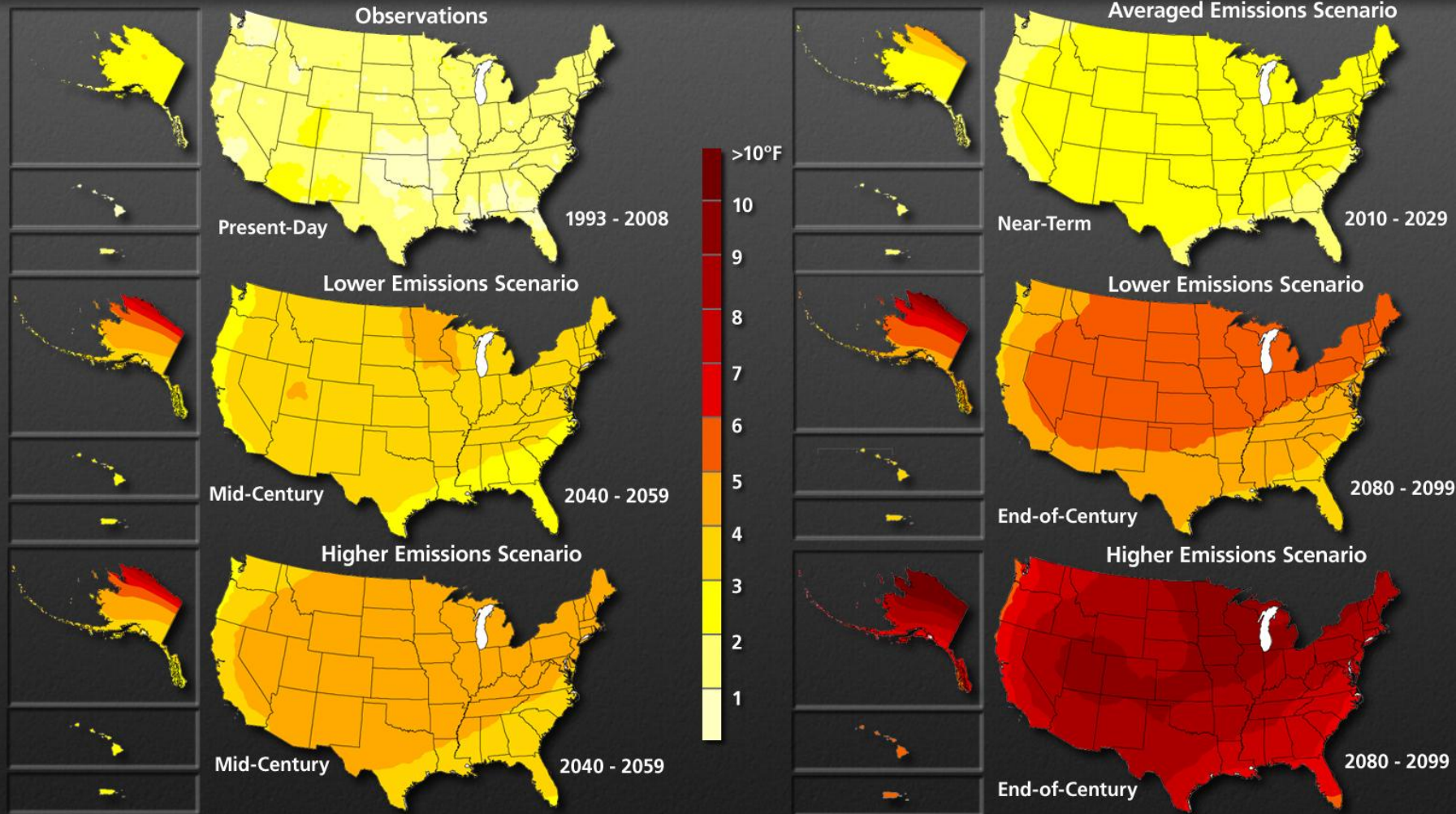


What is New About the NCA?

- **Sustainable process** with multiple products over time
- New topics, **cross-sectoral studies**
- Consistent national matrix of **indicators**
- Central coordination, multiple **partners**
- Regional and sectoral **networks** building assessment **capacity**
- Recognizes **international context**
- Engagement and communications focus
- Web-based data and **tools for decision support**
- Process workshops to establish **methodologies**

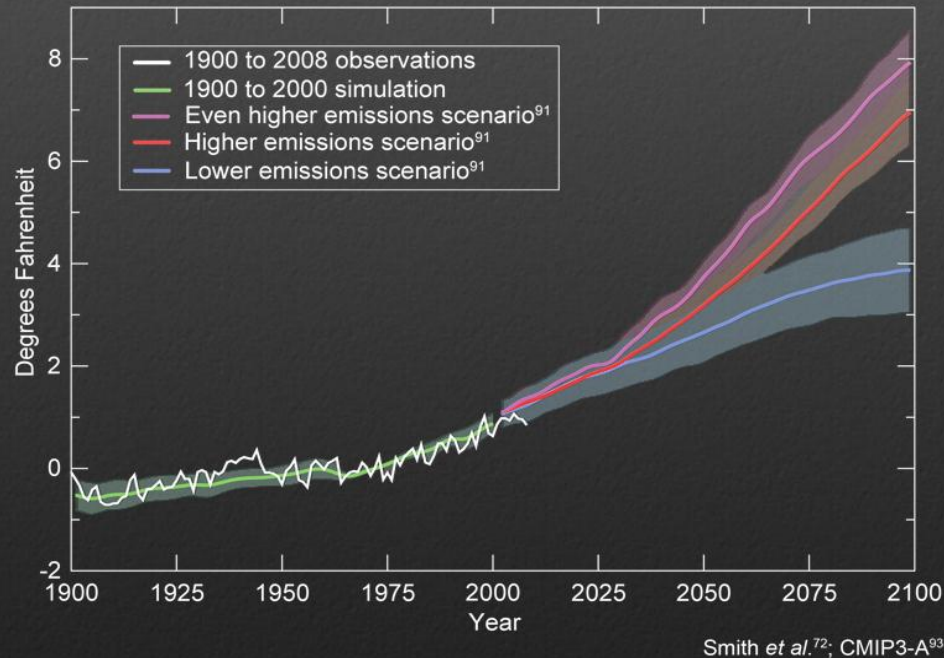


Observed and Projected Average Change °F from 1961 - 1979 Baseline



Future Climate Change

The future depends largely on choices people make now



- Actions to reduce greenhouse gas emissions will help limit future warming
- Even with strong emissions reductions, people will continue to feel the effects of climate change
- Adaptation and mitigation are inextricably linked