Why does the NCA exist?

- The Global Change Research Act established the US Global Change Research Program to coordinate global change research across the federal government.

Global Change Research Act (1990) Mandate:
“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.”
Why does the NCA exist?

- The National Climate Assessment is one of the requirements of the Global Change Research Act

**GCRA (1990), Section 106:**

- **not less frequently than every 4 years**, the Council... shall prepare... an assessment which —
  - integrates, evaluates, and interprets the findings of the Program (USGCRP) and discusses the scientific uncertainties associated with such findings;
  - analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; and
  - analyzes current trends in global change, both human- induced and natural, and projects major trends for the subsequent 25 to 100 years.
The NCA 2014

Inclusive
300 authors (academic, private, federal)
60 member Federal Advisory Committee
13 USGCRP agencies, plus a Technical Support Unit

Public engagement
Listening sessions around the country
Request for information, input reports

Future focus on sustained assessment
Intermediate products planned as well as quadrennial reports
The NCA 2014, continued

New topics covered
- Oceans, Coasts, Urban, Rural, Land use
- Cross-sector links like Energy/Water/Land

New format (http://nca2014.globalchange.gov)
- Digital products and interactive website
- Highlights, GCIS, traceable accounts

Extensive Review
- National Academy of Sciences, agencies, public review, responses to all comments

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globalchange.gov
U.S. Global Change Research Program

NC STATE UNIVERSITY
Ice Loss from the Two Polar Ice Sheets

The 2000 Assessment

The 2014 Assessment

unknown
Muir Glacier Decline
Observed and Projected Global Sea Level Rise

The 2000 Assessment

The 2014 Assessment
Goals of the NCA

• A sustained process for informing an integrated research program

• A scientific foundation for decision support, including scenarios and other tools at multiple scales

• **Evaluation** of the implications of alternative adaptation and mitigation options

• **Community building** within regions and sectors that can lead to enhanced resilience
Outcomes of the NCA

• Ongoing, relevant, highly credible analysis of scientific understanding of climate change impacts, risk, and vulnerability

• Enhanced timely access to Assessment-related data from multiple sources useful for decision making

• National indicators of change and the capacity to respond

• Risk framing
Where does the data come from?

• **Observations**: a description of historical climate trends
  - Temperature and precipitation
  - Examples include: Cooperative Observer Network (COOP), Global Historical Climatology Network (GHCN)

• **Climate projections**: simulated future climate conditions based on different emissions scenarios
  - Metrics such as number of hot days, number of warm nights, number of heavy precipitation days
  - Examples include: Coupled Model Intercomparison Project (CMIP3/CMIP5)
Outline for Third NCA Report

• Climate Change and the American People
• Overview and Report Findings
• Our Changing Climate
• Sectors & Sectoral Cross-cuts
• Regions & Biogeographical Cross-cuts
• Responses
• Appendices
Sectors

- Water Resources
- Energy Supply and Use
- Transportation
- Agriculture
- Forests
- Ecosystems and Biodiversity
- Human Health
Sectoral Cross-Cuts

• Water, Energy, and Land Use
• Urban Systems, Infrastructure, and Vulnerability
• Impacts of Climate Change on Tribal, Indigenous, and Native Lands and Resources
• Land Use and Land Cover Change
• Rural Communities, Agriculture, and Development
• Biogeochemical Cycles
Regions & Biogeographical Cross-Cuts

Oceans and Marine Resources

Hawaii and Pacific Islands

Coasts

Northwest

Great Plains

Midwest

Southeast and Caribbean

Washington, DC
Responses

- Decision Support
- Mitigation
- Adaptation
- Research Needs
- Sustained Assessment
Appendices

• Process
• Information Quality
• Climate Science Supplement
• Frequently Asked Questions
• Scenarios and Models
• Future Assessment Topics
Climate change, once considered an issue for a distant future, has moved firmly into the present.
A Sampling of results from the NCA3 Report
REPORT FINDING 1

GLOBAL CLIMATE IS CHANGING AND THIS IS APPARENT ACROSS THE US IN A WIDE RANGE OF OBSERVATIONS.

THE GLOBAL WARMING OF THE PAST 50 YEARS IS PRIMARILY DUE TO HUMAN ACTIVITIES, PREDOMINANTLY THE BURNING OF FOSSIL FUELS.
Ten Indicators of a Warming World

- Air Temperature Near Surface (Troposphere)
- Water Vapor
- Temperature Over Oceans
- Sea Surface Temperature
- Sea Ice
- Sea Level
- Ocean Heat Content
- Temperature Over Land
- Glaciers and Ice Sheets
- Snow Cover
Our Changing Climate

Observed U.S. Temperature Change

Observed Ocean Warming

Arctic Sea Ice Cover Reaches Record Low

September 14, 1984

September 13, 2012
Some extreme weather and climate events have increased in recent decades, and new and stronger evidence confirms that some of these increases are related to human activities.
Extreme Weather

Observed Change in Very Heavy Precipitation

U.S. Drought Monitor

August 26, 2014
(Released Thursday, Aug. 29, 2014)
Valid 8 a.m. EDT

Author: David Simonet
Western Regional Climate Center

http://droughtmonitor.unl.edu/

Trends in Flood Magnitude

Coast-to-Coast 100-degree Days in 2011
REPORT FINDING 3

HUMAN-INDUCED CLIMATE CHANGE IS PROJECTED TO CONTINUE, AND IT WILL ACCELERATE SIGNIFICANTLY IF EMISSIONS OF HEAT-TRAPPING GASES CONTINUE TO INCREASE.
Projected Change in Precipitation

Continued Emissions Increases (RCP 8.5)

Winter

Spring

Summer

Fall

Precipitation Change (%)

-30 -20 -10 0 10 20 30
PAST CHANGES IN GLOBAL SEA LEVEL

Sea Level Change (feet)

Year

Proxy Records

Tide Gauge Data

Satellite Data

1 ft

0.66 ft

4 ft

6.6 ft
Separating Human and Natural Influences on Climate

- Observations
- Natural and Human Factors
- Natural Factors Only

Global Temperature Change (°F)

Year

1900 1920 1940 1960 1980 2000
REPORT FINDING 8

CLIMATE DISRUPTIONS TO AGRICULTURE HAVE BEEN INCREASING AND ARE PROJECTED TO BECOME MORE SEVERE OVER THIS CENTURY.

Crop Yields Decline under Higher Temperatures

- **Corn**

  - Change in Yield (tons per hectare) vs. Change in maximum temperature (°F)

- **Soybean**

  - Change in Yield (tons per hectare) vs. Change in maximum temperature (°F)
REPORT FINDING 12

PLANNING FOR ADAPTATION AND MITIGATION IS BECOMING MORE WIDESPREAD BUT CURRENT IMPLEMENTATION EFFORTS ARE INSUFFICIENT TO AVOID INCREASINGLY NEGATIVE SOCIAL, ENVIRONMENTAL, AND ECONOMIC CONSEQUENCES.
Widespread Impacts

**Agriculture**

- Projected Changes in Key Climate Variables Affecting Agricultural Productivity

**Human Health**

- Projected Changes in Tick Habitat

**Infrastructure**

- Water Supplies Projected to Decline

- Water Supply Sustainability Risk Index (2050)
Widespread Impacts

Indigenous Peoples

Urban Areas

Rural Communities
Widespread Impacts

Forests

Ecosystems

Oceans

Biogeochemical Cycles

Many Factors Combine to Affect Biogeochemical Cycles

Building Loss by Fires at California Wildland-Urban Interfaces

Coral Bleaching
Global climate is projected to continue to change over this century and beyond, but there is still time to act to limit the amount of change and the extent of damaging impacts.
Interactive Tools
(these graphics are hyperlinked)
Interactive Tools
(these graphics are hyperlinked)

Figure 28.4: Adaptation Activity

Visualizations developed for the National Climate Assessment

In support of USGCRP’s Third National Climate Assessment, NASA produced the visualizations below of 21st century climate scenarios for the United States.

- Temperature side-by-side comparisons + supporting info
- Precipitation side-by-side comparisons + supporting info
Downloadable Resources
(main graphics are hyperlinked)

Third National Climate Assessment
Downloads & Materials

Explore the Third National Climate Assessment and Highlights on the web or download the report and handouts below.

- Download the full Third National Climate Assessment report (warning: the file is very large)
- Download the Highlights of the Third National Climate Assessment (warning: the file is very large)
- Download the Highlights of the Third National Climate Assessment Report (smaller file)
- Request print copies of the Overview and Highlights of the Third National Climate Assessment (click the link, then click Add to Cart and follow instructions in the green box at the top of the page)
- Download graphics and presentations by chapter

Handouts and Materials
Overview and Report Findings
- Overview Brochure
- Report Findings Brochure

Climate Trends and Regional Impacts
Teaching Resources
(These graphics are hyperlinked)

- Ten regional support pages
- Resources by chapter key message
  - Guiding questions
  - Key figures
  - Other resources
  - Lesson plans
  - Videos & visualizations
- General resources
Keep Exploring!

http://nca2014.globalchange.gov

#NCA2014

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