



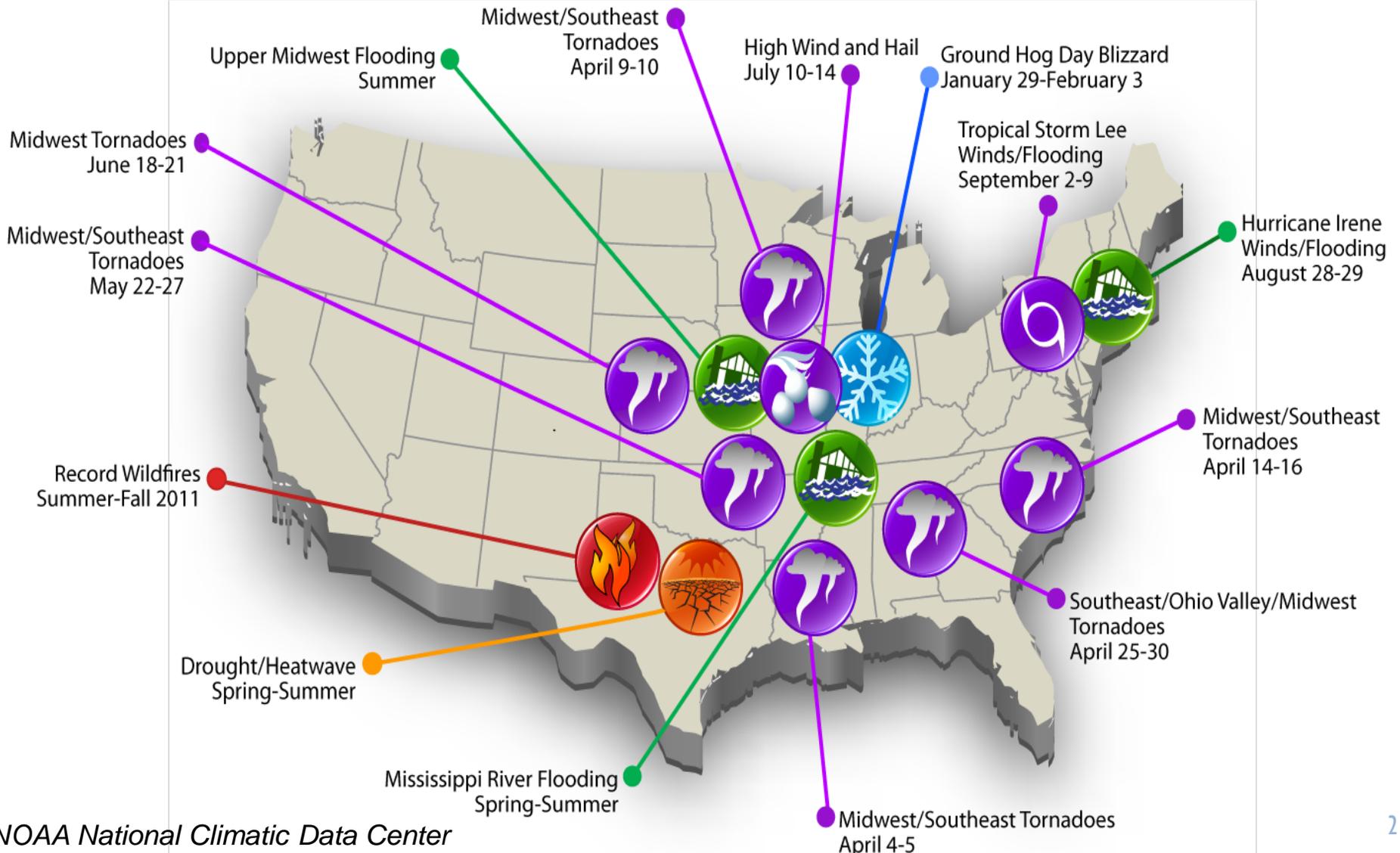
THE EMERGING LANDSCAPE OF U.S. CLIMATE CHANGE ADAPTATION SCIENCE AND POLICY

LAURA PETES

Ecosystem Science Advisor
NOAA Climate Program Office

Extreme Events

(14 >\$1B events in 2011; >\$55B total)

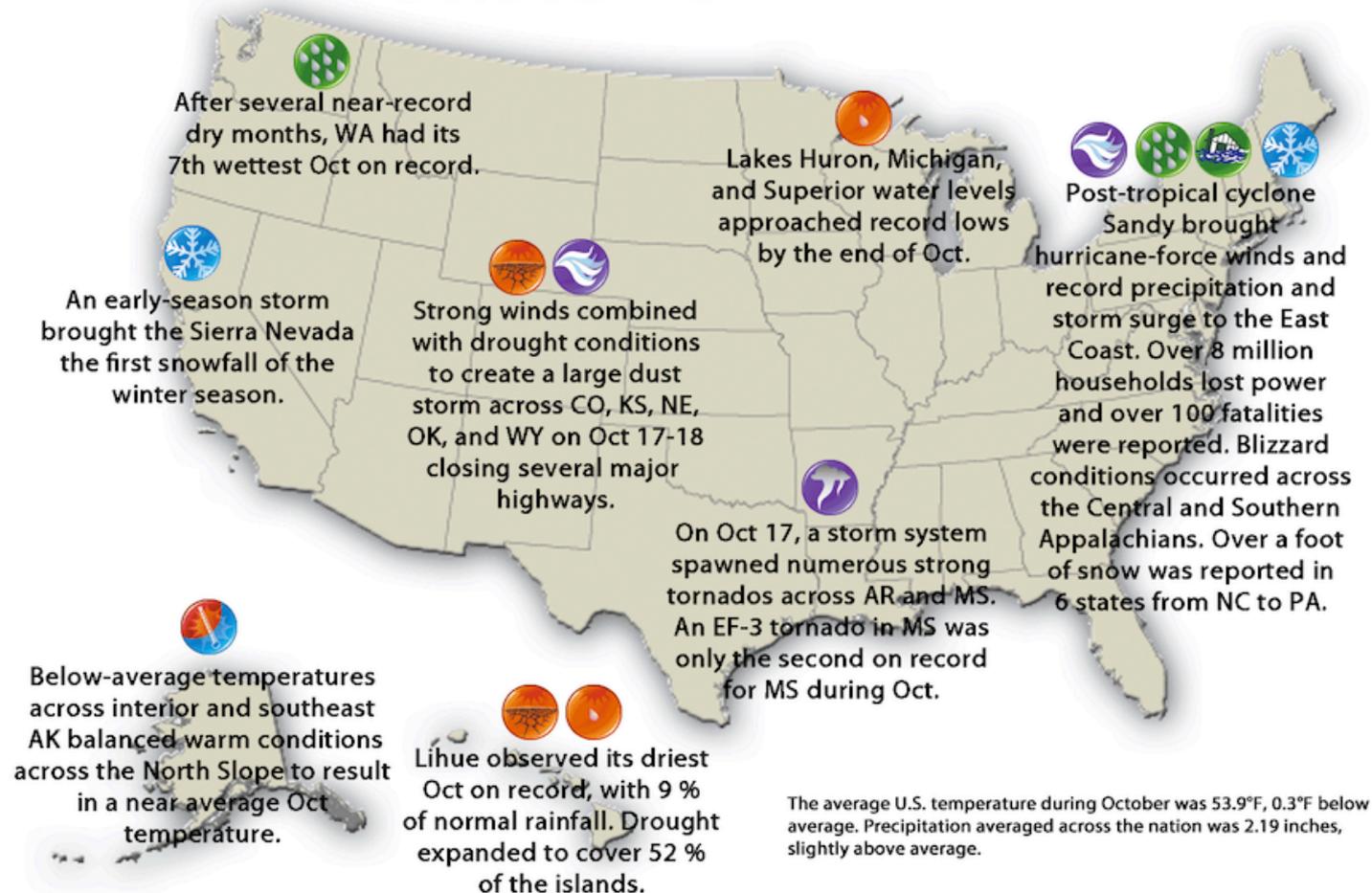


Recent Extreme Events

Significant Events for October 2012



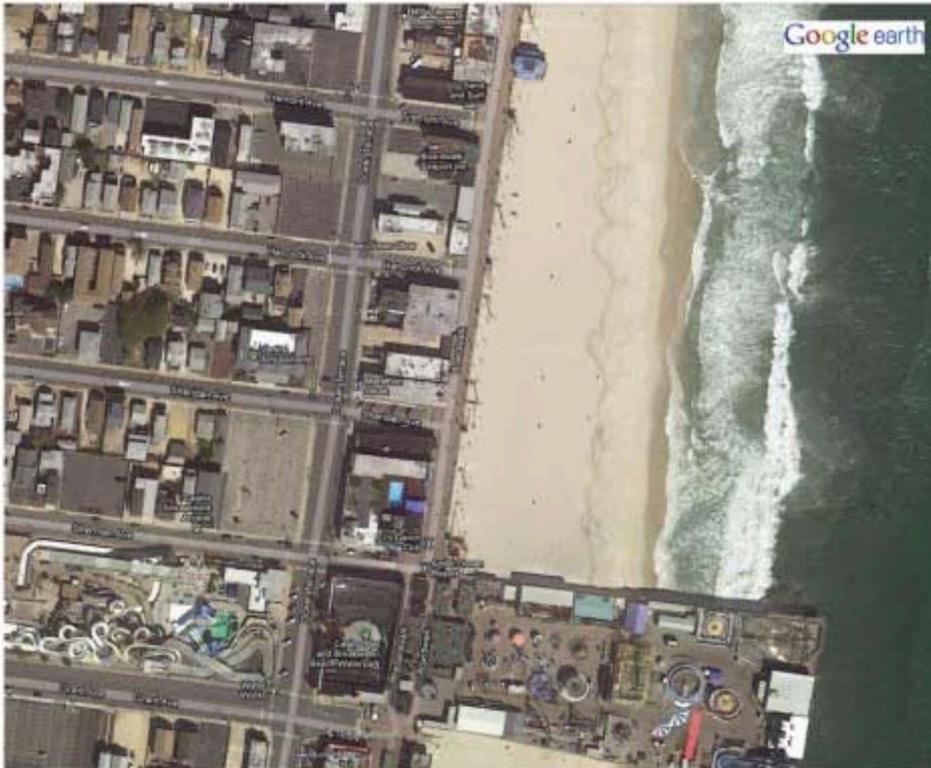
NOAA's
National Climatic Data Center



Hurricane Sandy

BEFORE

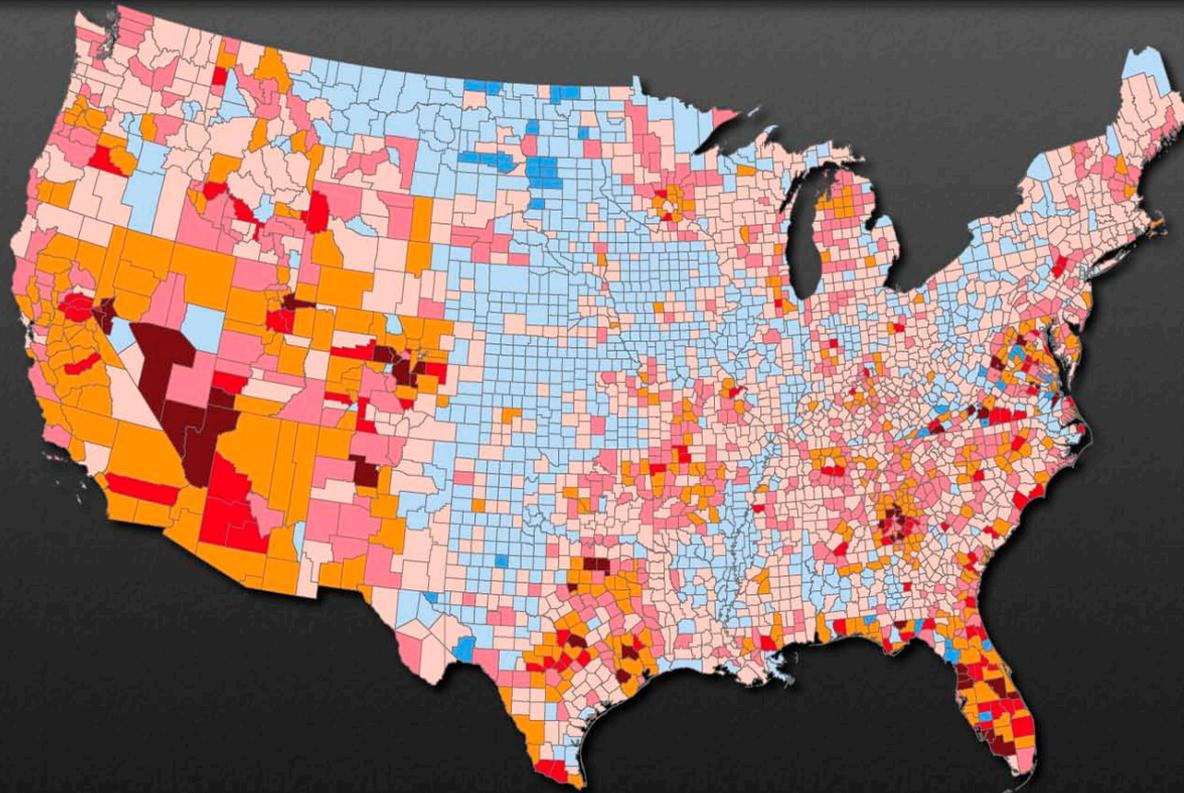
AFTER



Seaside Heights, NJ boardwalk and pier area

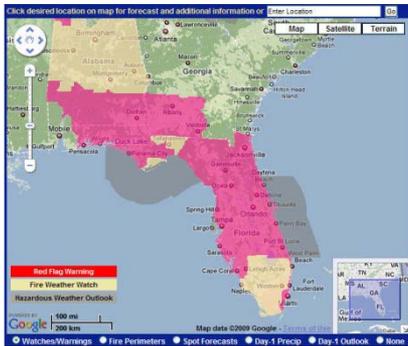
Non-Climatic Factors Exacerbate Vulnerability

Change in Population 1970 to 2008



< -50% **-49 - -1%** **0 - 49%** **50 - 99%** **100 - 249%** **250 - 499%** **> 500%**

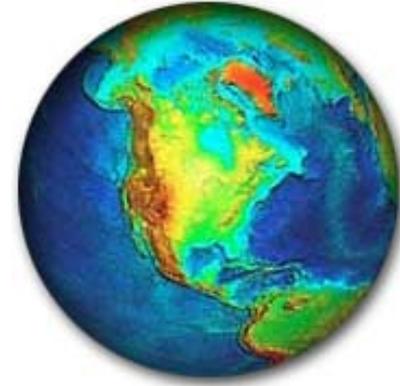
Role of the Federal Government in Advancing Adaptation



- Providing best-available science, information, tools, services
- Developing transferable guidance and “climate-smart” policies
- Serving as a leader (i.e. “walking the talk”)
- Supporting partnerships across scales

Growing Demand for Climate Information

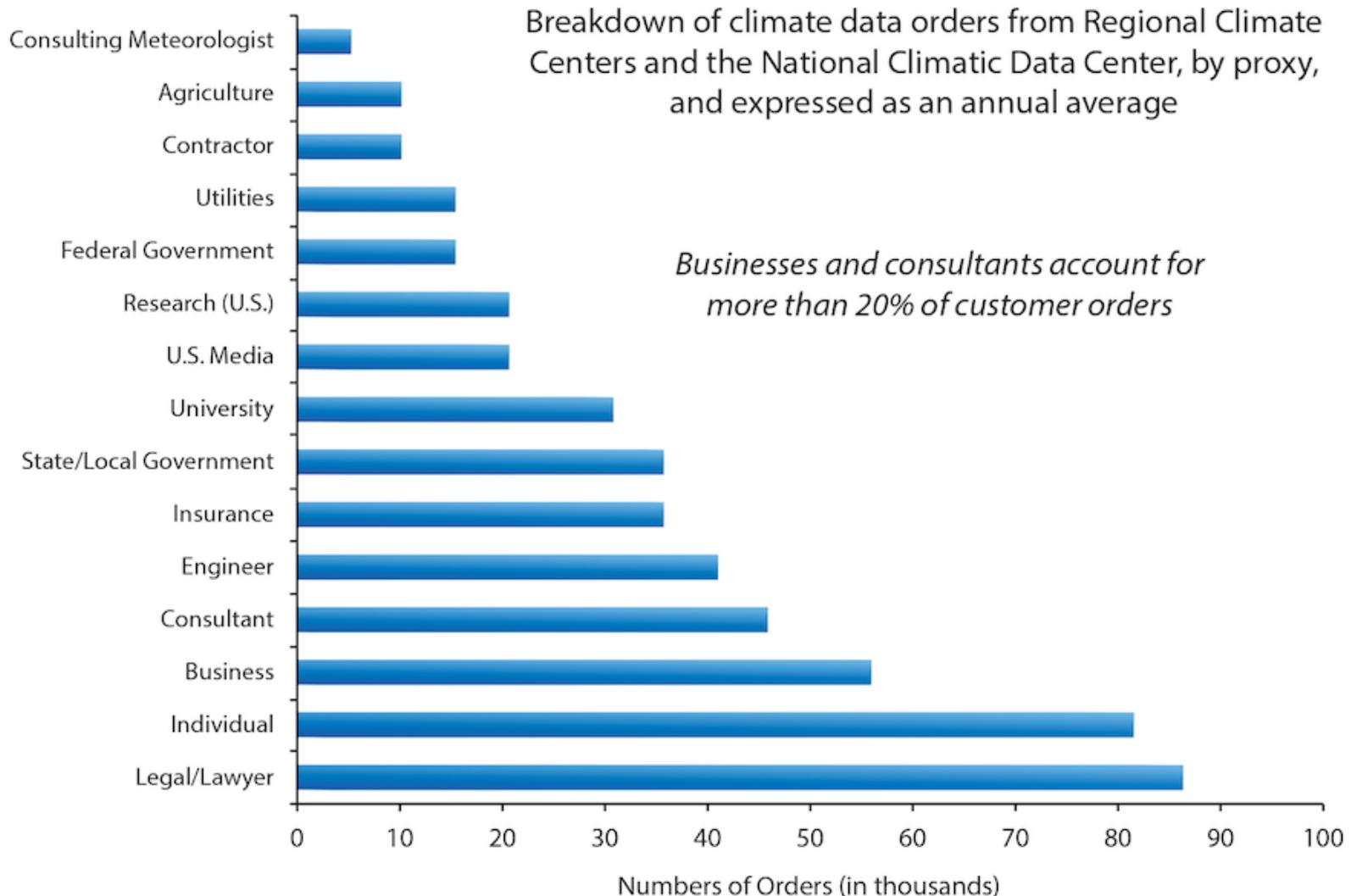
NOAA works with a diversity of sectors to provide timely climate science, tools, and services that inform their daily decisions.



EXPLOSION OF DEMAND!

- FY2012: new record (1.911 petabytes) for total data downloaded by customers from NOAA's National Climatic Data Center; 40x increase from FY2005
- Visit rates to climate.gov increased by 62.5% from FY11 to FY12

Who is Asking for Climate Information?



What Information Do People Want?



What is going to happen?

Current and projected impacts at decision-relevant scales

What is at risk?

Identification of vulnerabilities (e.g. infrastructure, ecosystems)

What can we do?

Assistance with evaluating and prioritizing adaptation options

Coastal Inundation



NOAA Coastal Services Center
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

6 ft SLR

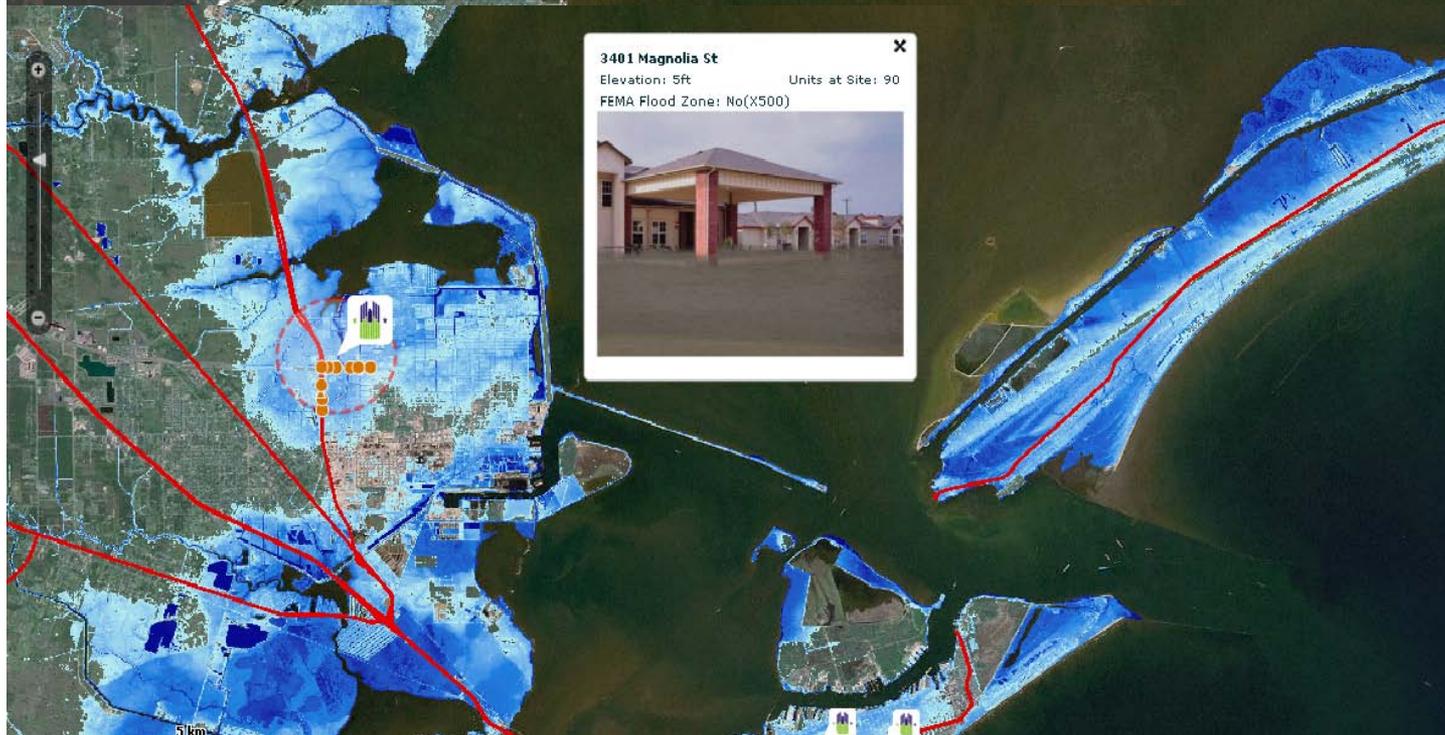


2 feet deep
at site

\$1.18B Total Losses
Since 1960

\$950M From Hurricanes
and Tropical Storms

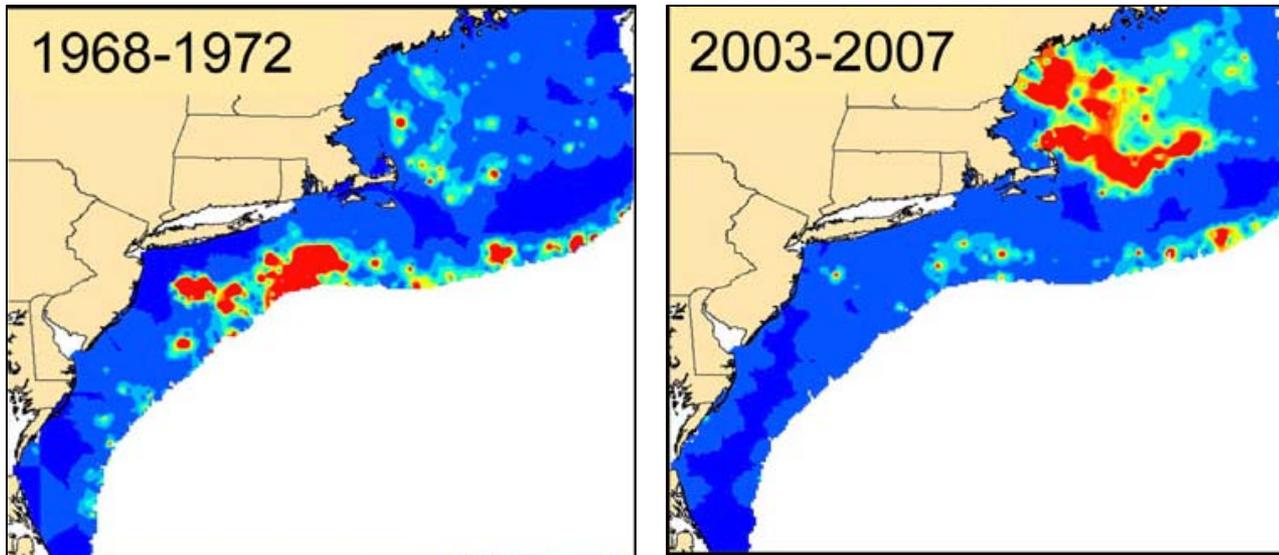
18% Chance of
Hurricane Strike



<http://www.csc.noaa.gov/digitalcoast/tools/slviewer>

Impacts to Marine Resources

RED HAKE



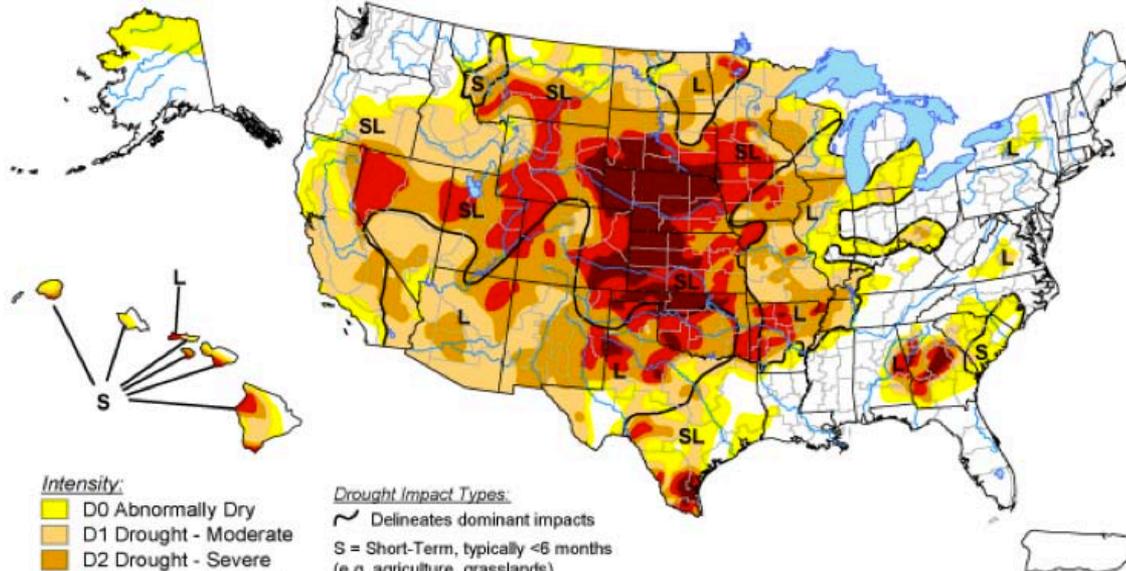
- Large-scale temperature increase and changes in oceanic circulation
- 24 of 36 stocks exhibited changes from 1968-2007, moving northward (1.6 km yr^{-1}) and/or deeper (0.25 m yr^{-1})
- “Winners” (e.g. summer flounder) and “losers” (e.g. Atlantic cod)

Drought

U.S. Drought Monitor

October 30, 2012

Valid 7 a.m. EDT



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://droughtmonitor.unl.edu/>

Drought Impact Types:

- ~ Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)



Released Thursday, November 1, 2012

Author: Michael Brewer/L. Love-Brotak, NOAA/NESDIS/NCDC

Averages 36,000 unique hits each month; reached nearly 180,000 (!) for Aug. 2012

<http://drought.gov>

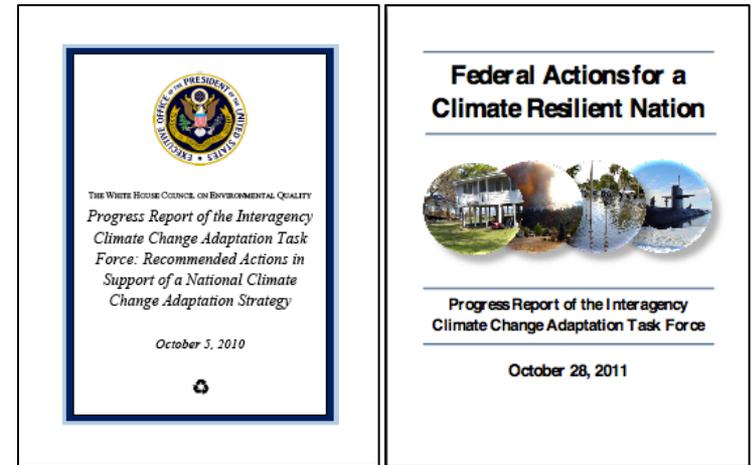
National Adaptation Science and Policy Efforts

- Interagency Climate Change Adaptation Task Force
- U.S. Global Change Research Program Adaptation Science
- National Climate Assessment
- National Ocean Policy
- National Fish, Wildlife, and Plants Climate Adaptation Strategy

Interagency Climate Change Adaptation Task Force

Created in 2009 (under Executive Order 13514) to advance Federal leadership on climate adaptation

- >20 agencies involved
- Initiated set of Workgroups
- Developed recommendations, guiding principles, 2010 and 2011 progress reports



Importance:

- All Federal agencies now required to develop and implement climate adaptation plans

Ecosystem-Based Adaptation

“Adaptation should, where relevant, take into account strategies to increase ecosystem resilience and protect critical ecosystem services on which humans depend to reduce vulnerability of human and natural systems to climate change.”



U.S. Global Change Research Program (USGCRP) Adaptation Science

Created to ensure that the Federal science enterprise informs adaptation decisions at a range of scales for a diversity of users

- USGCRP (created in 1990 by Global Change Research Act): consortium of 13 Federal agencies that support climate science
- Adaptation Science began as a Workgroup under Task Force; conducted listening sessions with decision makers
- Developing adaptation research agenda for Federal agencies

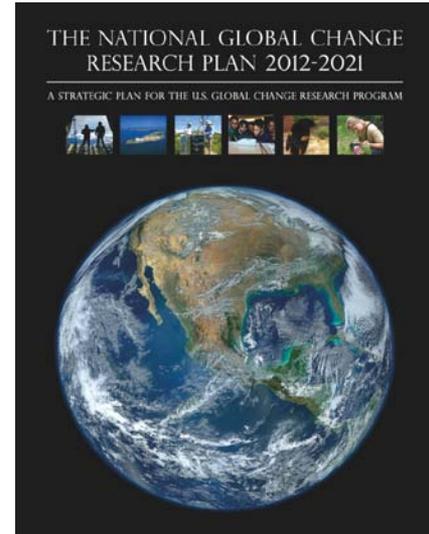
Importance:

- Increased emphasis and prioritization on science (including social, behavioral, economic) in support of societal decisions

U.S. Global Change Research Program (USGCRP) Adaptation Science

New decadal research plan includes major emphasis on improving “the deployment and accessibility of science to inform adaptation decisions.”

- Assess and address decision maker needs and science requirements
- Identify and communicate relevant information
- Develop new information exchange approaches
- Support public and private sector responses to global change



National Climate Assessment (NCA)

Synthesis and assessment of current and anticipated climate change impacts across U.S. regions and sectors; required by Congress every 4 years



- New chapters this year: Oceans, Tribal, Rural, Adaptation, Mitigation, Decision Support, etc.
- Extensive engagement of scientists and stakeholders
- Draft Assessment chapters will be released for public review in Dec. 2012

Importance:

- Highly influential status report on regional and sectoral climate impacts, vulnerabilities, and adaptation for decision makers

<http://www.globalchange.gov/what-we-do/assessment>

NCA Technical Inputs

Oceans and Marine Resources in a Changing Climate



Technical Input to National Climate Assessment



EPA
United States Environmental Protection Agency

WPA/668-11/08/09 | January 2012 | www.epa.gov

Vulnerability Assessments in Support of the Climate Ready Estuaries Program: A Novel Approach Using Expert Judgment

Volume I
Results for the San Francisco Estuary Partnership



Past and Projected Trends in Climate and Sea Level for South Florida



Environmental Systems Modeling
Technical Report
July 2011



Stories of Change:
Coastal Louisiana Tribal Communities' Experiences of a Transforming Environment



Grand Bayou Village
Grand Oulou/Dulac Band of the Biloxi-Chitimacha Confederation of Muskogean
Ile de Jean Charles Band of the Biloxi-Chitimacha Confederation of Muskogean
Ponchartraine-Cham Indian Tribe
January 22-27, 2012

Coastal Impacts, Adaptation and Vulnerabilities

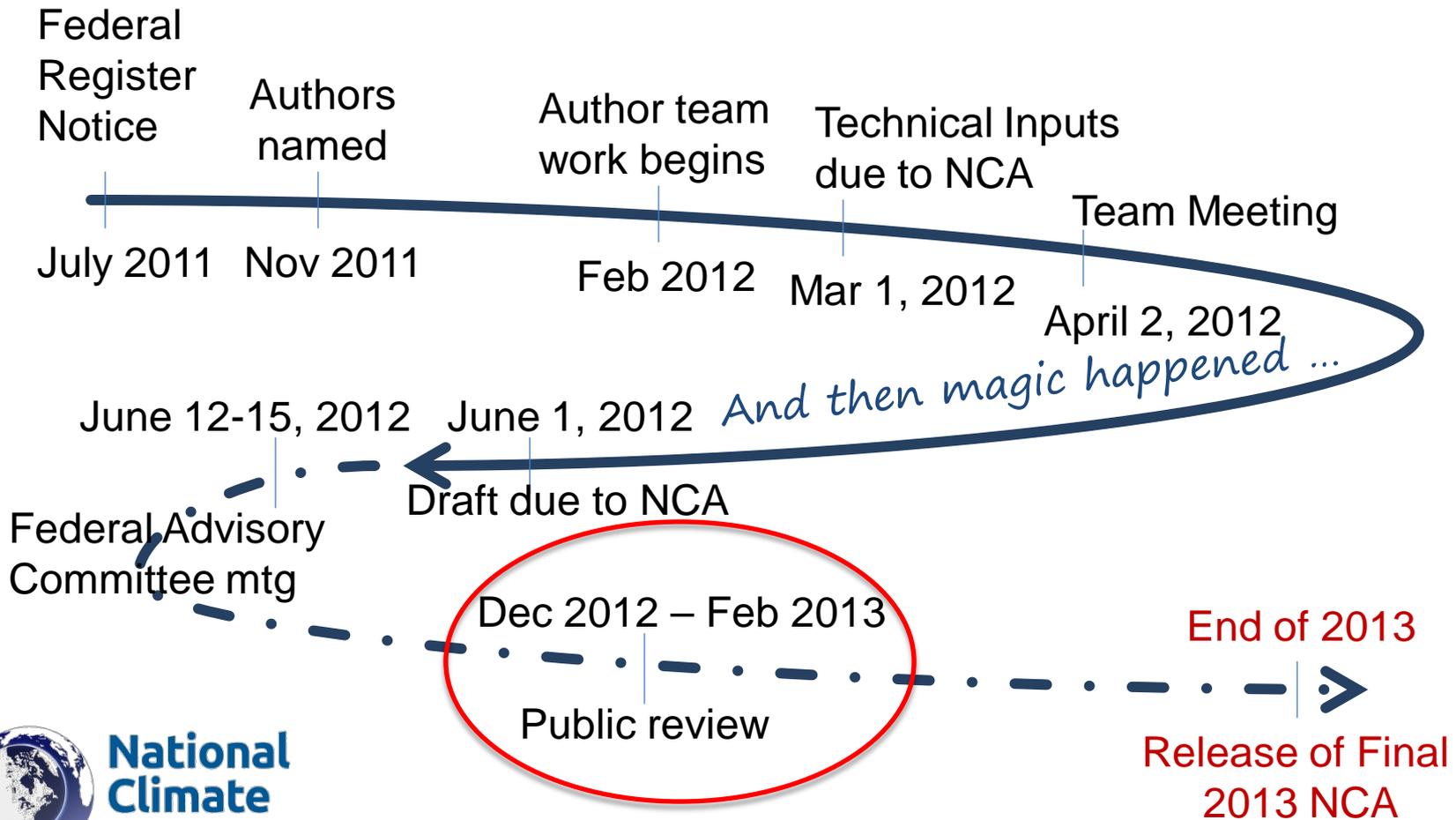


A Technical Input to the 2013 National Climate Assessment



<http://www.globalchange.gov/what-we-do/assessment>

NCA Coastal Chapter: Development and Timeline



NCA Coastal Chapter: Scientific Advances Since Previous NCA

- Interactions between human and natural systems
- Value of coastal ecosystem services
- Evidence of ecological tipping points
- Predictive capability for shoreline change
- Integration of storm surge modeling and wave impacts
- Infrastructure impacts
- Economic impacts of climate change and of adaptation costs
- Governance challenges in coastal adaptation
- Public awareness of (and attitudes toward) coastal adaptation measures; progress and barriers to adaptation action



NCA Coastal Chapter: Questions We're Asking

- How will the critical infrastructure (“lifelines”) in the immediate coastal zone be impacted by climate change?
- Will people experience the risks from climate change equally, and do they have equal opportunities/capacities to respond?
- How will climate change impact the coastal economic engine, and what do these disruptions mean for the rest of the U.S.?
- How will natural systems be affected by climate change, and how will these changes impact the human systems that depend on them?
- What’s the status of U.S. coastal adaptation to date?

NCA Coastal Chapter: The Answers?



... forthcoming in December 2012

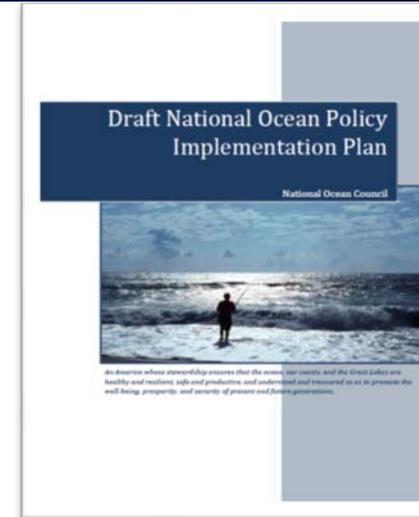
National Ocean Policy

Created by Executive Order 13547 in July 2010 to enhance stewardship of U.S. coasts, oceans, Great Lakes

- Priorities include “Resiliency and Adaptation to Climate Change and Ocean Acidification”
- Implementation plan to be released in Nov./Dec. 2012

Importance:

- Enhanced coordination and prioritization of science and policy across >15 agencies with coastal/ocean responsibilities



National Ocean Policy Climate Change Actions (Draft)

1. Strengthen and integrate observations (sentinel sites)
2. Determine the impacts of climate change on coastal/ocean ecological, economic, and social systems
3. Provide critical projections at decision-relevant scales
4. Assess the vulnerability of coastal and ocean environments and communities to climate change and ocean acidification
5. Develop and provide information, training, guidance, tools, and support for adaptation practitioners
6. Design, implement, and evaluate adaptation strategies

National Fish, Wildlife, & Plants Climate Adaptation Strategy

Requested in 2009 Department of the Interior Appropriations Conference Report

- National, not just Federal (i.e. includes state and tribal participants as well)
- Identifying actions to reduce climate impacts on natural resources
- Strategy to be released in Nov./Dec. 2012

Importance:

- Provides framework for enhancing cross-governmental coordination on ecosystem adaptation

<http://www.whitehouse.gov/administration/eop/oceans/policy>



Many, many actions outside of the Federal Government!



Philadelphia: Green City, Clean Water



Chicago Climate Action Plan



San Francisco Bay Plan amended to account for sea level rise

A Critical Juncture



The impacts of climate change are already being felt across the U.S. and will continue into the future

Actions taken now will determine future resilience of our societies, economies, and ecosystems

Reasons for Hope



- Advances in innovative, science-based solutions
- Momentum on climate adaptation is building at all levels. . . but are actions occurring rapidly enough?
- Positive societal “tipping points” can occur



"The Gardener of Hope," Sculpture by Jason deCaires Taylor

THANK YOU!

Laura.Petes@noaa.gov