Coastal Resilience: The Environment, Infrastructure, and Human Systems

Climate Change and Coastal Systems - Preparing Coastal Systems for Climate Change

Paul Wagner
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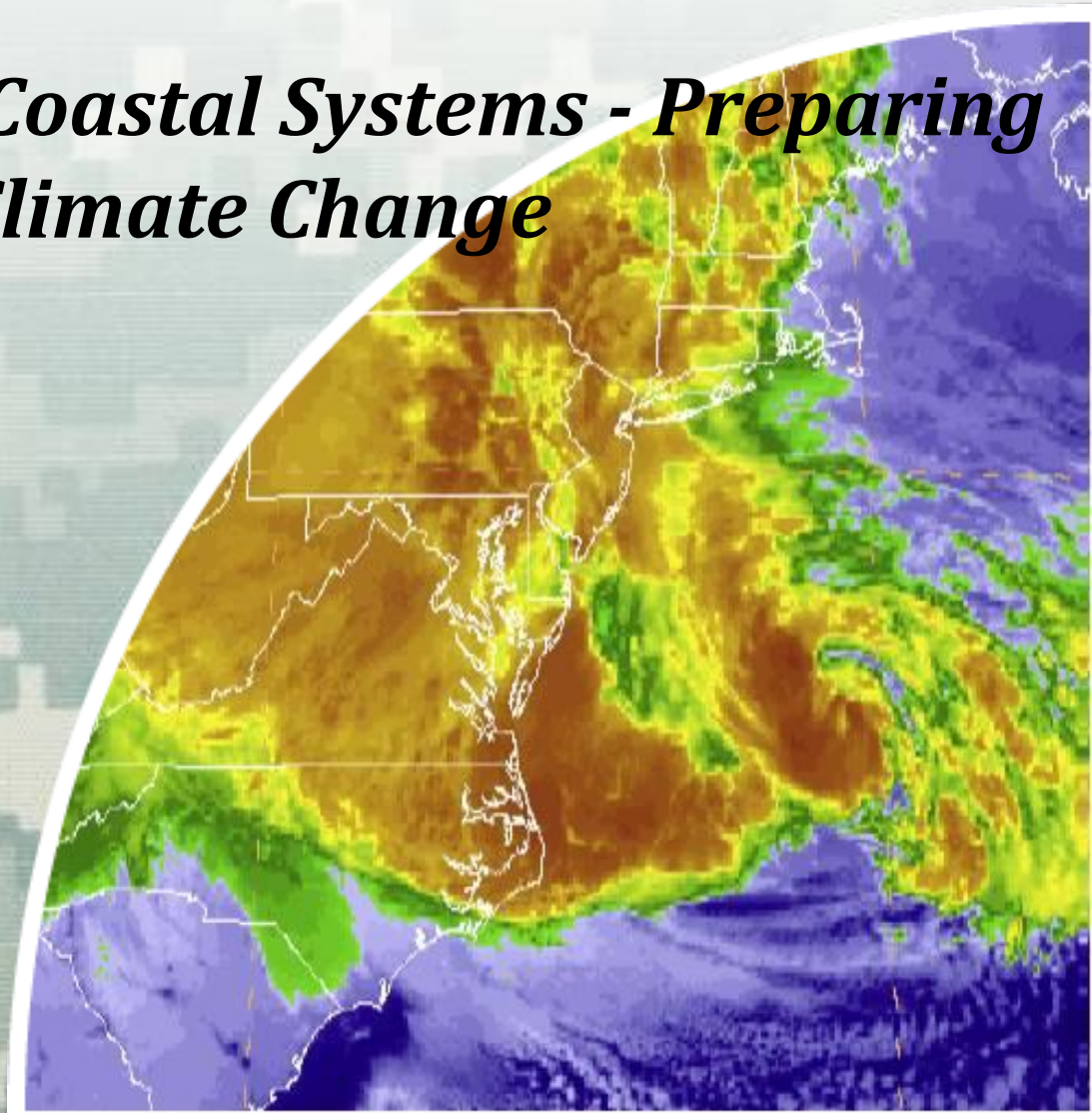

US Army Corps of Engineers
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Overview

- Context
- Recent EO efforts related to climate resilience
- Recent Federal programmatic efforts that promote adaptation/resilience
- Necessary considerations
- Coastal actions

Overview

Lexicon

- ‘‘preparedness’’ means actions taken to plan, organize, equip, train, and exercise to build, apply, and sustain the capabilities necessary to prevent, protect against, ameliorate the effects of, respond to, and recover from climate change related damages to life, health, property, livelihoods, ecosystems, and national security;
- ‘‘adaptation’’ means adjustment in natural or human systems in anticipation of or response to a changing environment in a way that effectively uses beneficial opportunities or reduces negative effects;
- **‘‘resilience’’** means the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.

Executive Order 13653 — *Preparing the United States for the Impacts of Climate Change*

Projected Climate Impacts

- Warming Temperatures
- Heat Waves
- Changes in Heavy Precipitation
- Drought
- Sea Level Rise
- Hurricanes

Vulnerable Now and in the Future

- 39% of the nation's total population that lived in Coastal Shoreline Counties in 2010 (less than 10% of the total land area excluding Alaska).
- 446 persons/mi^2 - Average population density of the Coastal Shoreline Counties (excluding Alaska). Density in U.S. as a whole averages 105 persons/mi^2.
- 82% of the Virginia coastline considered at high or very high risk to sea level rise (1597 miles).
- 34.8M- Increase in U.S. Coastal Shoreline County population from 1970 to 2010 (or a 39% increase).
- $527B in assets insured by the NFIP in the coastal floodplain in 2011.
- $6.6T contribution to GDP from Coastal Shoreline Counties, just under half of U.S. GDP in 2011.
- # 3 Global GDP rank in 2011 (behind the U.S. and China) of the Coastal Shoreline Counties, if considered an individual country.

37 persons/mi^2 - Expected increase in U.S. Coastal Shoreline County population density from 2010–2020. Expected increase for entire U.S. is 11 persons/mi^2.

From: NOAA's State of the Coast

What is Vulnerable?


Life and Property


Aviation


Maritime


Space Operations


Forests


Emergency Management


Commerce


Ports


Energy


Hydropower


Reservoir Control

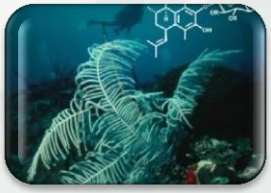

Infrastructure


Construction


Agriculture

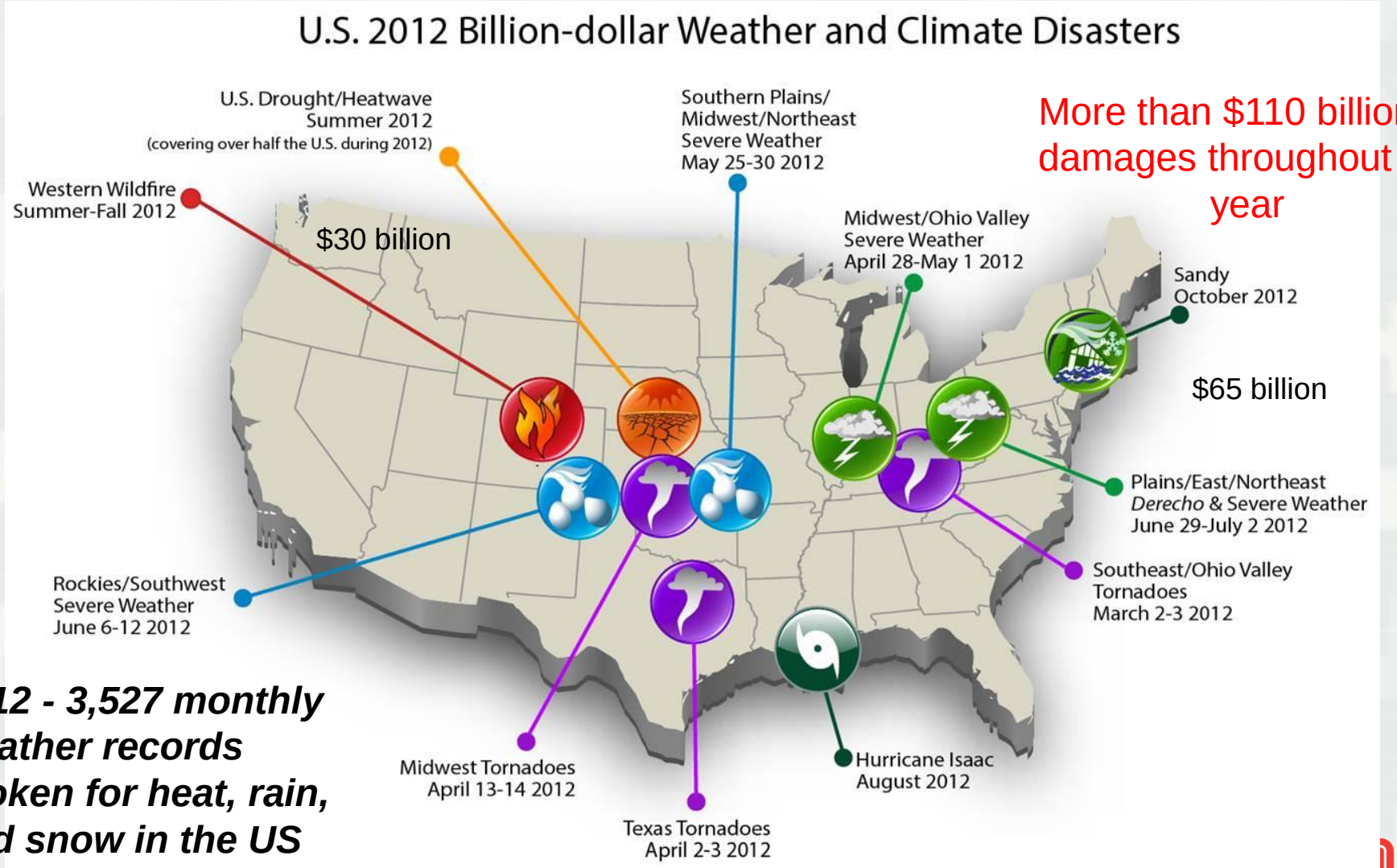

Recreation


Ecosystems


Health


Environment

2012 Events



More than $110 billion in damages throughout the year

2012 - 3,527 monthly weather records broken for heat, rain, and snow in the US

Source: NCDC 2012

The Need to Adapt and Become Resilient

- More variable weather patterns
- Extreme heat
- Intense storms
- Flooding
- Social and economic concerns

What is the Federal governmental role in climate change resilience?

- Manage climate risks to Federal services, operations, assets, and missions
- Coordinate and support efforts; funding; provide climate science & services to help communities make better decisions that reduce risks to people & property.

Potential inundation of Charleston, SC with 0.5 meter of sea level rise.

CAP and EO 13653

- Climate Action Plan – 3 Pillars: Cut Carbon Pollution, Lead International Efforts, Prepare the U.S. for the Impacts of Climate Change
- EO 13653 “Preparing the United States for the Impacts of Climate Change” takes a step on implementing one of the three "pillars" of The Climate Action Plan.

E.O. 13653

- Modernizing Federal Programs to Support Climate Resilient Investment
- Managing Lands and Waters for Climate Preparedness and Resilience
- Providing Information, Data, and Tools for Climate Preparedness and Resilience
- Federal agencies are to "…develop, implement, and update comprehensive plans that integrate consideration of climate change into agency operations and overall mission objectives"

Establishes:

- Interagency Council on Climate Preparedness and Resilience
- State, Local, and and Tribal Leaders Task Force on Climate Preparedness and Resilience

Federal Agency Adaptation Plans

- Address strategies to ensure that policies, programs and operations consider climate change
- Identify and characterize risks and vulnerabilities
- Call out actions/programs in-place or underway to address those risks
- Demonstrate coordination at all levels
- Specific planning requirements called out in Executive Order
- “Final” plans due to Council on Environmental Quality by June 30, 2014

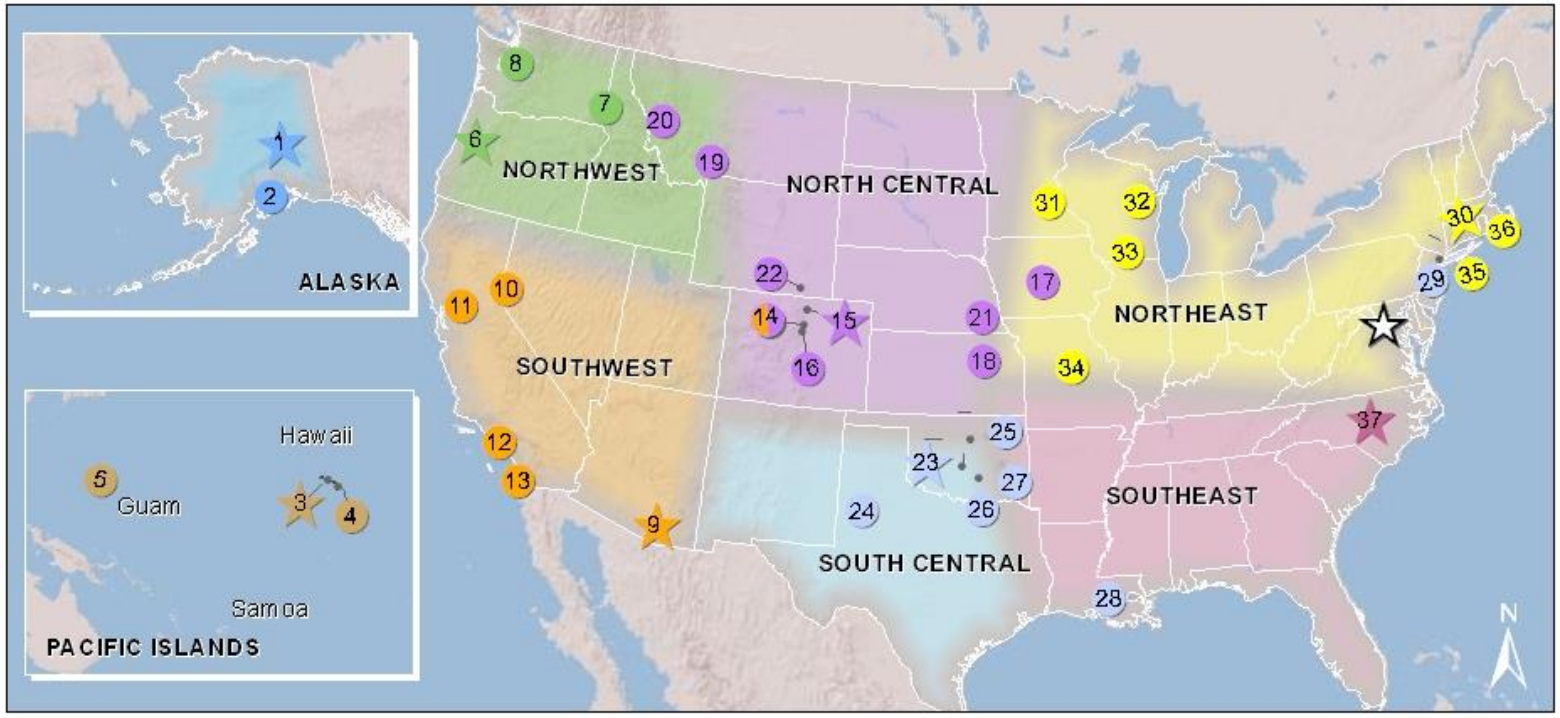
Federal Programs Working Toward Adaptation and Resilience

DOI Climate Science Centers

Mission

- Provide natural resource managers with the Scientific tools and information they need to develop and execute management strategies that address climate change impacts on natural and cultural resources
- Focus on climate change adaption & impacts in context of other actions/stresses, etc.

DOI Climate Science Centers



Base from ESRI, 2009, Albers Equal Area Conic Projection, North American Datum of 1983

EXPLANATION

National Climate Change and Wildlife Science Center

CSC Lead Institutions

Northwest CSC
6. Oregon State University
7. University of Idaho
8. University of Washington

North Central CSC
14. University of Colorado
15. Colorado State University
16. Colorado School of Mines

Northeast CSC
30. University of Massachusetts Amherst
31. University of Minnesota
32. College of Menominee Nation

Landscape Conservation Cooperatives

What are they?

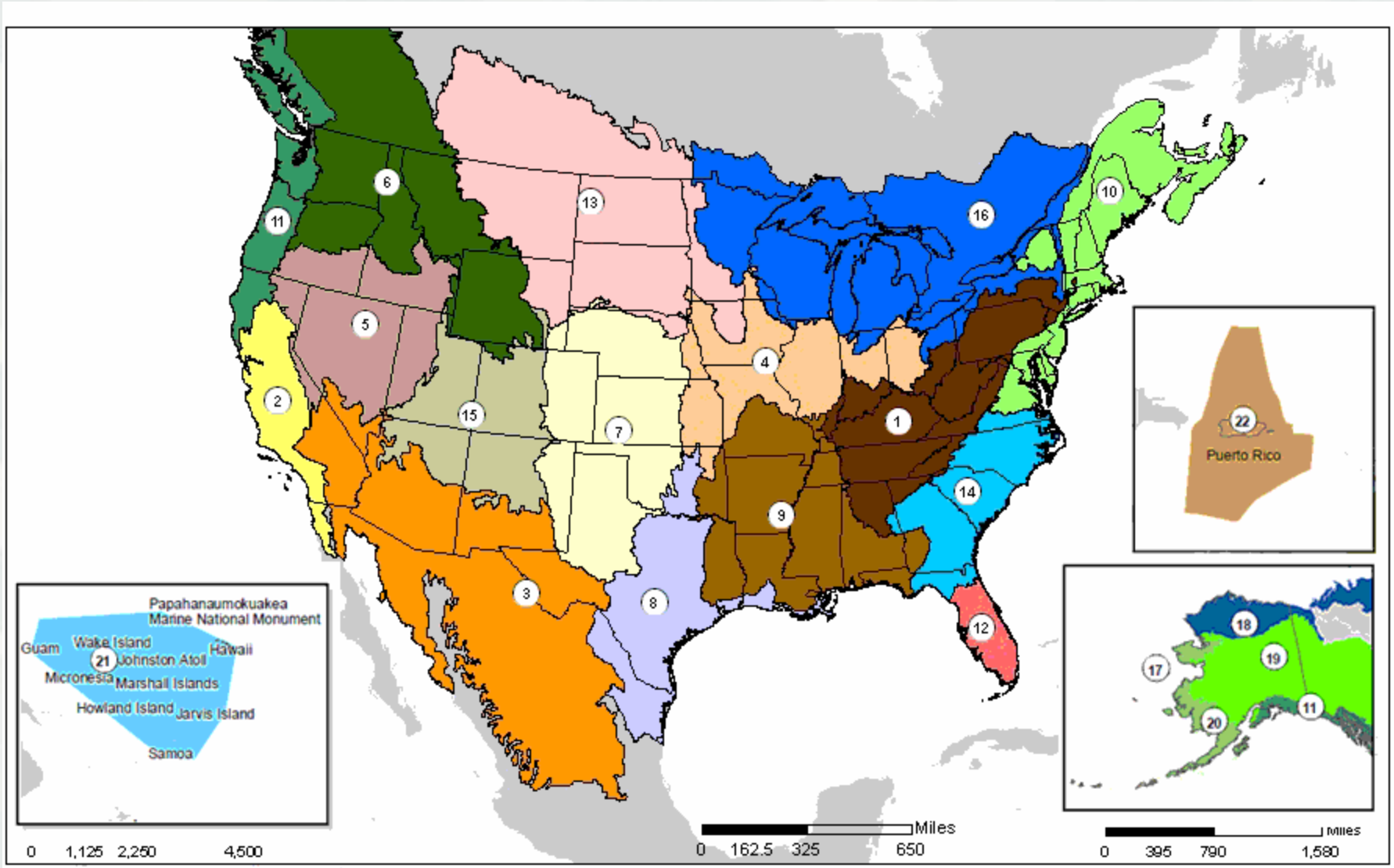
Applied conservation science partnerships. Partners include federal and state agencies, Tribes, conservation organizations, and universities within a geographically defined area

Fundamental units of planning and adaptive science that inform conservation actions on the ground

A national and international network of land, water, wildlife and cultural resource managers and interested public and private organizations

From R. O'Malley - USGS

Landscape Conservation Cooperatives



How do CSCs and LCCs Relate?

- LCCs are the “primary partners” for CSCs
  - ► Their management-driven science needs are critical drivers of CSC science
- LCCs are represented on CSC Stakeholder Advisory Committee (SAC), and CSCs are on LCC Steering Committees
- CSC – SAC merges individual LCC and agency priorities into a regional agenda
- CSC scientists will work directly with LCC and other management partners as the science is conducted

From R. O’Malley - USGS

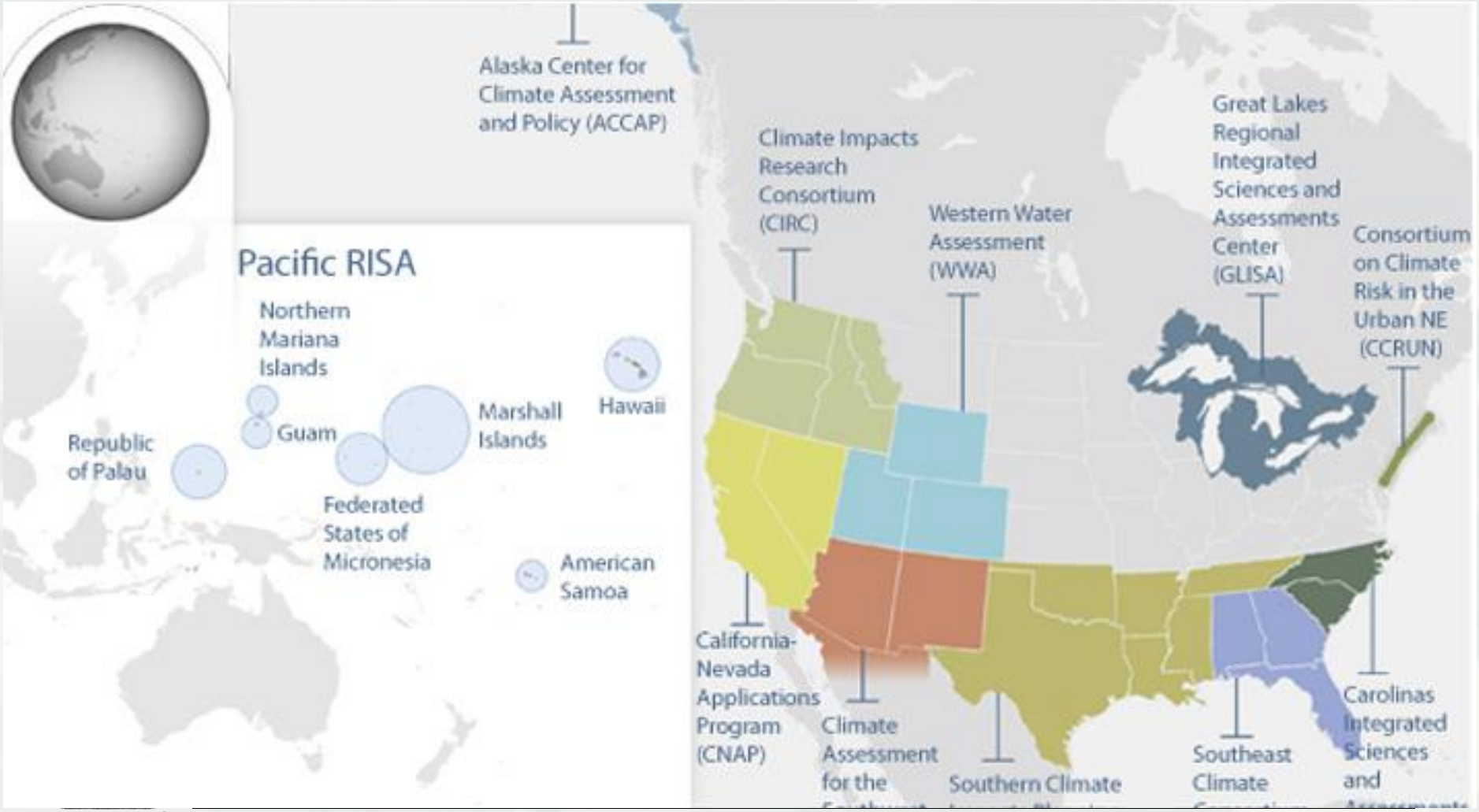
Regional Integrated Sciences and Assessments Program

NOAA's Regional Integrated Sciences and Assessments (RISA) program supports research teams that help expand and build the nation's capacity to prepare for and adapt to climate variability and change. Central to the RISA approach are commitments to process, partnership, and trust building. RISA teams work with public and private user communities to:

- advance understanding of policy, planning and management contexts;
- develop knowledge on impacts, vulnerabilities, and response options through interdisciplinary research and participatory processes;
- innovate products and tools to enhance the use of science in decision making; and
- test diverse governance structures for managing scientific research.

NOAA

NOAA Regional Integrated Sciences and Assessment



	CSC	RISA	LCC
Agenda-setting	Locally driven priorities	Locally driven priorities	Locally driven priorities
Focal domain	Natural/cultural resources – consistent nationally with regional detail	Specific focal areas (water, agriculture, natural resources)	Natural / cultural resources – regionally defined
Climate centrality	Climate nexus	Climate +	Broad range
Primary partners	State and federal	State and local	State and federal
Science / applications role	Translational science	Full coverage of research-to-applications continuum	Science application to resource management
	Project impacts / support adaptation	☐ Project impacts / support adaptation ☐ Understand research to applications continuum	Support adaptation
Composition	Federal + university (+ partners)	University (+ partners)	Federal (+ partners)

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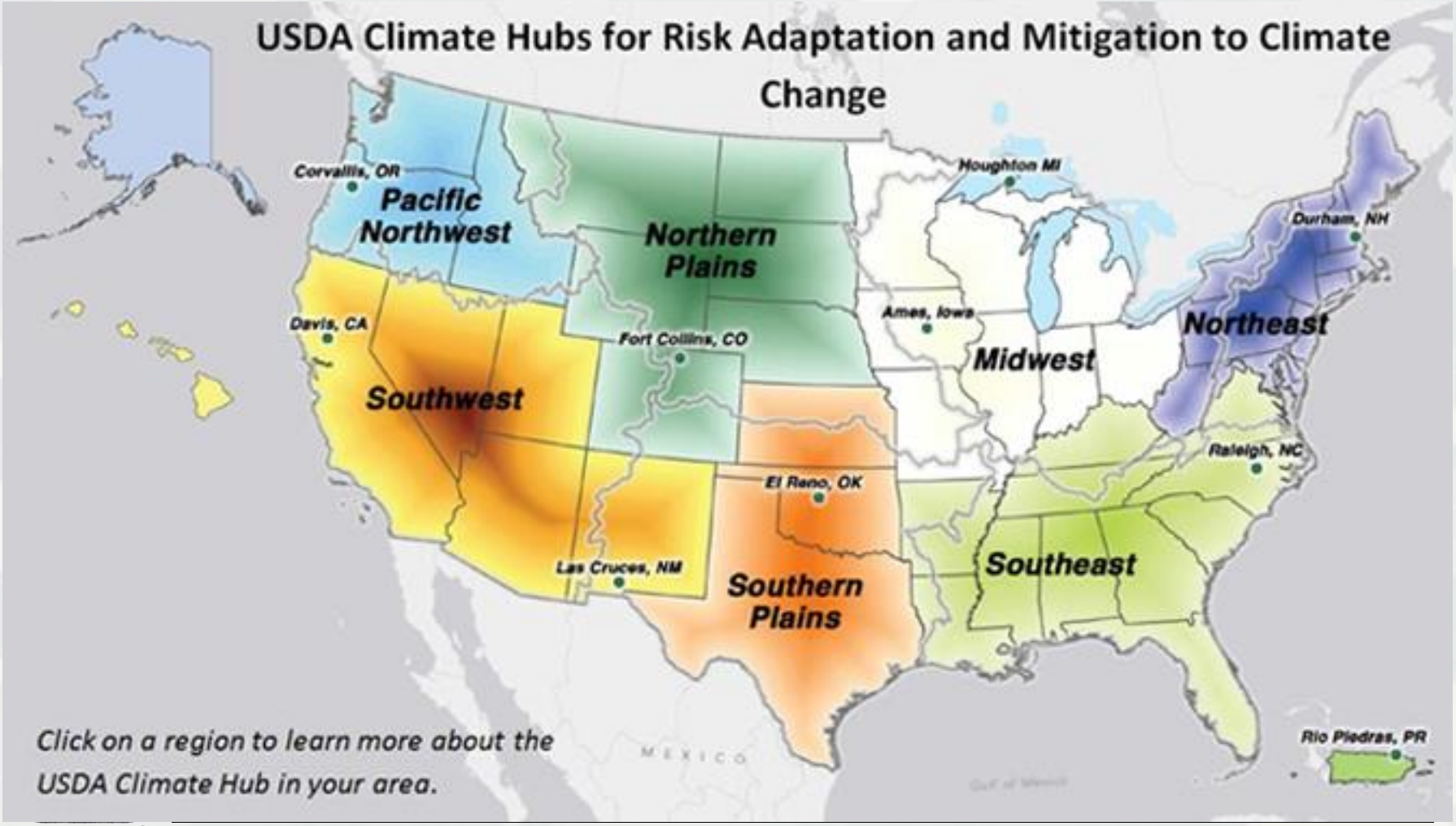
Modified from R. O'Malley - USGS

USDA Climate Hubs

- Deliver information to farmers, ranchers, forest landowners to help adapt to climate change and weather variability. Build capacity within USDA to provide information and guidance on technologies and risk management practices at regional and local scales.

USDA Climate Hubs



Who do you go to for climate resilience?

- It depends
  - Sector
  - Scale
  - Geography
  - Question or interest

- Increasing integration and collaboration is making it easier

Necessary considerations - implementing resilience and adaptation

- Limited funding
- Difficulty in anticipating climate-related changes at local scales
- Policy and legal impediments
- Assumptions of “goodness”
- Jeffersonian-Hamiltonian-Jacksonian-Madisonian forms of government
- Public priorities

Pew Research: Americans' priorities in 2013

Priority Items	2009	2012	2013		4-yr
1.Strengthening economy	85%	86%	86%	△	+1
2.Improving job situation	82%	82%	79%		-3
3.Reducing budget deficit	53%	69%	72%		+19
4.Defending against terrorism	76%	69%	71%		-5
5.Making Social Security sound	63%	68%	70%		+7
6.Improving education	61%	65%	70%		+9
7.Making Medicare financially sound	60%	61%	65%		+5
8.Reducing health care costs	59%	60%	63%		+4
9.Helping the poor and needy	50%	52%	57%		+7
10.Reducing crime	46%	48%	55%		+9
11.Reforming tax system	--	--	52%		--
12.Protecting the environment	41%	43%	52%		+11
13.Dealing with the energy problem	60%	52%	45%		-15
14.Reducing influence of lobbyists	36%	40%	44%		+8
15.Strengthening the military	44%	39%	41%		-3
16.Dealing with moral breakdown	45%	44%	40%		-5
17.Dealing with illegal immigration	41%	39%	39%		-2
18.Strengthening gun laws	--	--	37%		--
19.Dealing with global trade	31%	38%	31%		0
20.Improving infrastructure	--	30%	30%		--
21.Dealing with global warming	30%	25%	28%		-2

Opportunities to ‘connect the dots’

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Despite the challenges, action can be taken

- Restoring natural storm surge buffers; incorporate climate change into coastal habitat restoration plans
- Build or replace seawalls and other structures that protect cities from erosion and storms
- Modifying building codes to enable structures to withstand higher water levels
- Improve insurance programs
- Expand setbacks and implement other land-use management (e.g. rolling easements), that enable wetlands and beaches to migrate inland

From EPA, NWF, and others

Despite the challenges, action can be taken

- Upgrade and redesigning infrastructure (e.g. bridges, roads, culverts and stormwater systems)
- Evaluate drinking water supplies with respect to climate change
- Map coastal hazards and developing emergency response plans with regard to sea level rise
- Nature Based Infrastructure and ecosystem services
- Avoid maladaptation

From EPA, NWF, and others

This Morning

- Risk-Based Adaptation for Estuaries
- Opportunities for Building Climate Resilient Communities through Redevelopment.
- Offshore Carbon Capture and Storage in the Gulf of Mexico.
- USDOE's National Risk Assessment Partnership: Quantifying the Behavior of Engineered-Natural Systems for CO_2 Storage

Some Parting Thoughts

- There is a federal role – but how does it relate to State, local, tribal?
- What does a successful national response look like and how does it come about?
- Planning versus action?