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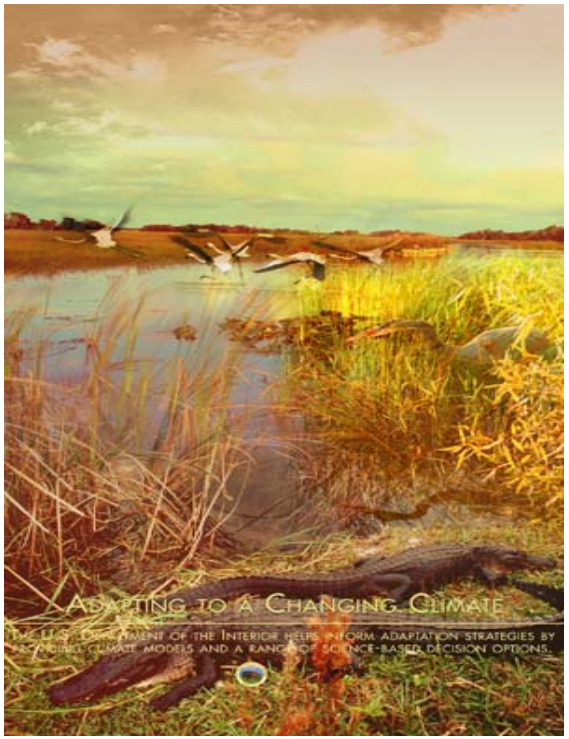
USGS NCCWSC & DOI Climate Science Centers

Doug Beard, Director
National Climate Change & Wildlife Science Center

Conservation Leadership Forum
Shepardstown, WV
November 3, 2010



U.S. Department of the Interior
U.S. Geological Survey

National Climate Change & Wildlife Science Center

- **Mission**

  Provide **natural resource managers** with the **tools and information** they need **to develop and execute management strategies** that address the impacts of climate change on **fish, wildlife, and their habitats**

- **Focus on climate change <u>adaption & impacts</u>**

  "Adjustment in natural or human systems in response to actual or expected climatic change effects, to moderate harm or exploit beneficial opportunities"

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Secretarial Order 3289

Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources ***(9/14/09)***

… the United States Geological Survey (USGS) has been developing regional science centers … currently known as "regional hubs" of the National Climate Change and Wildlife Science Center…

The Climate Change & Energy Response Council will work with USGS and other Department bureaus to rename these regional science centers as Regional Climate Science Centers and broaden their mandate …

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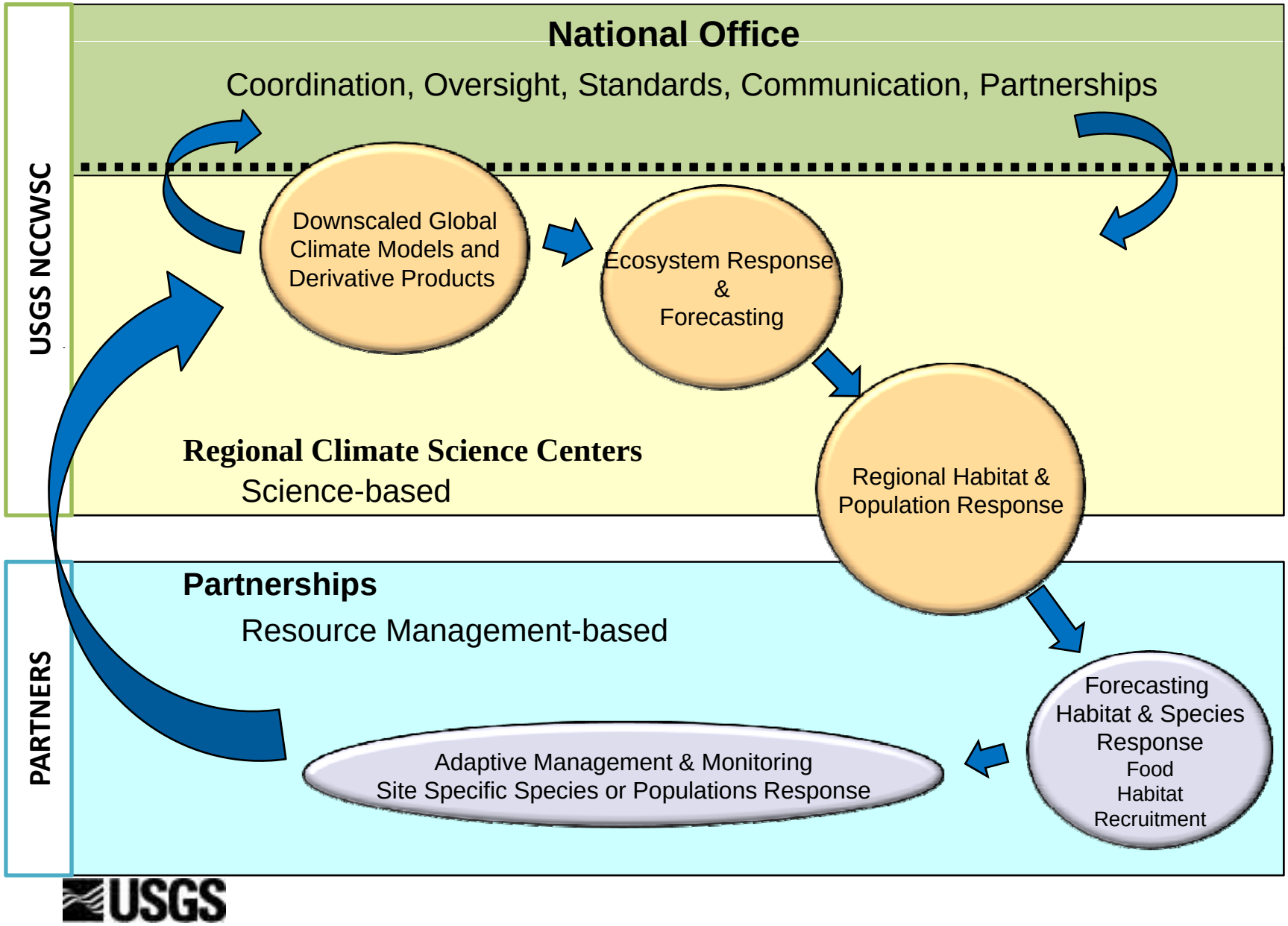
NCCWSC Science-Management Interface



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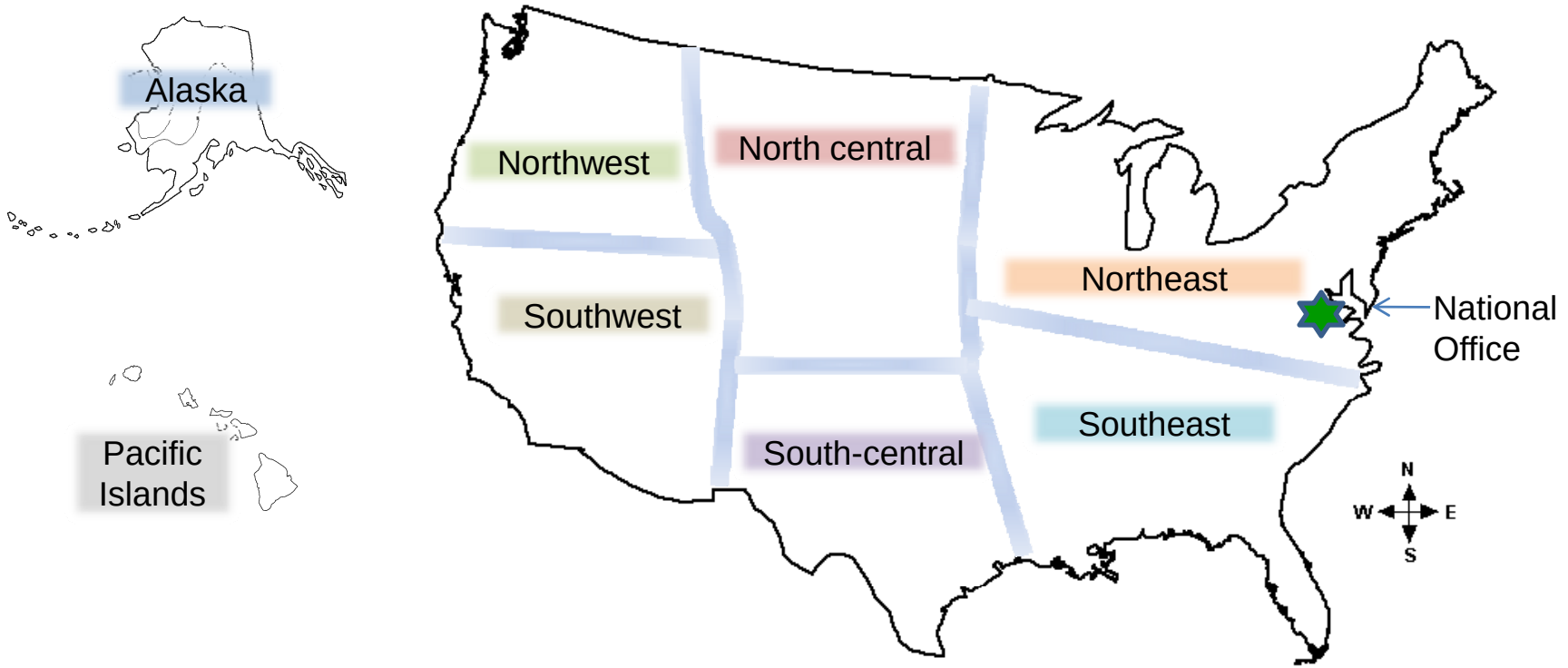
NCCWSC National & Regional Organization



"Fuzzy Boundaries"

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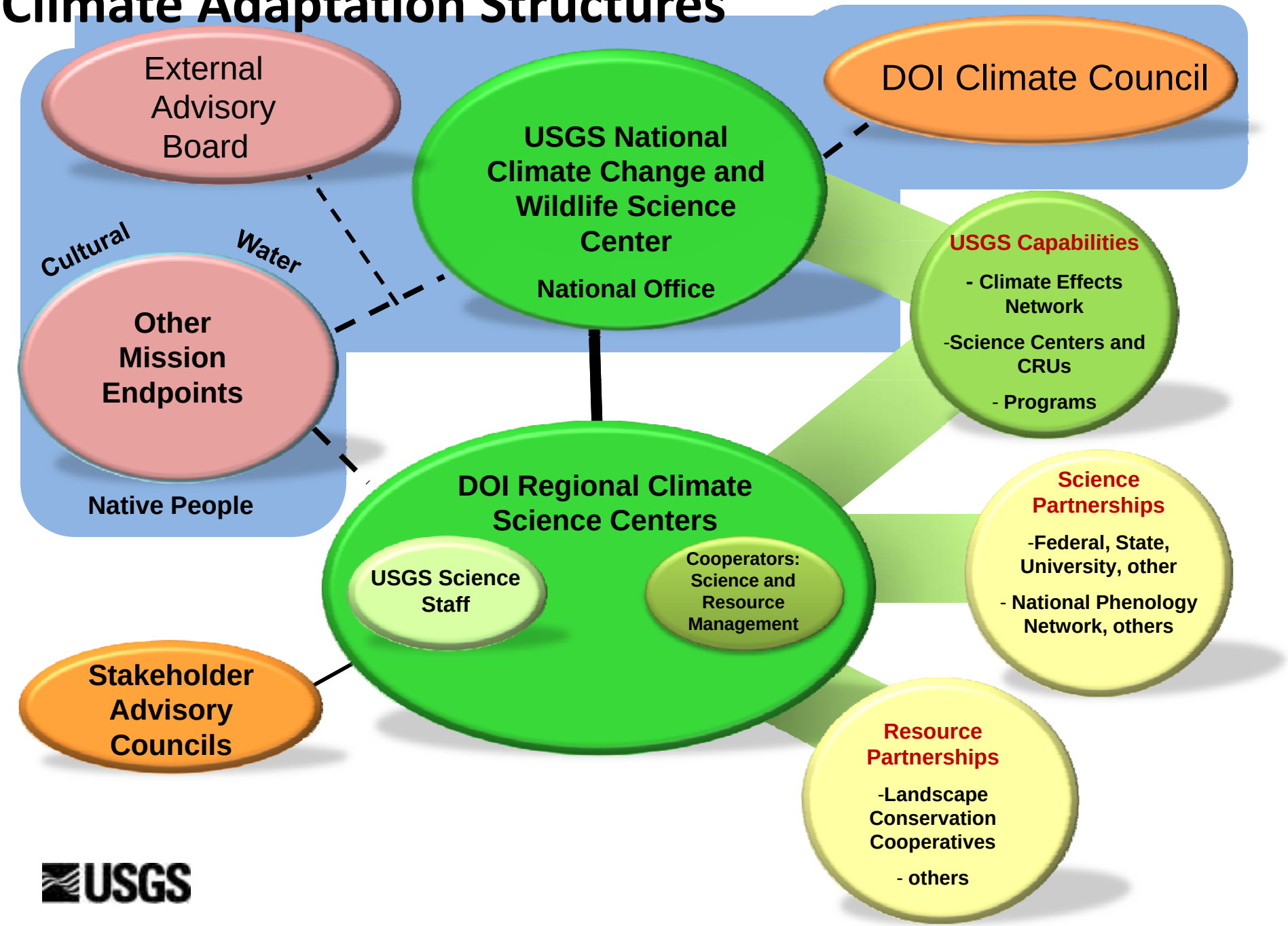
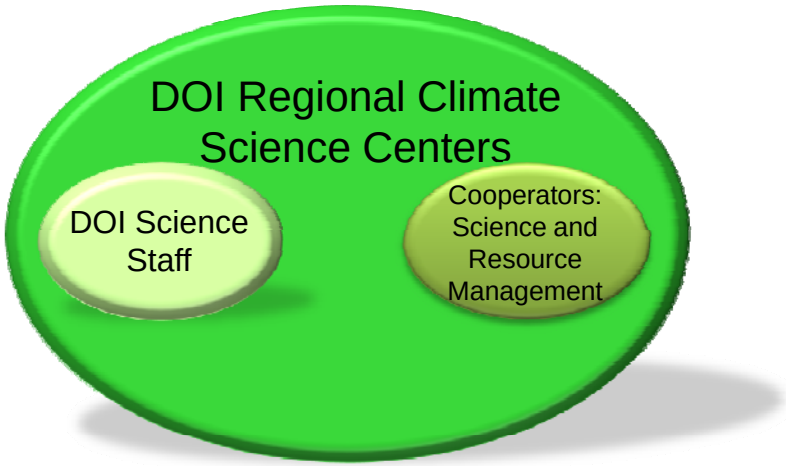
Climate Adaptation Structures



Establishing DOI Regional CSCs

- 2010 CSC's
  - AK CSC – Univ. of Alaska - Fairbanks
  - NW CSC – Univ. of Washington, Oregon State Univ. and Univ. of Idaho
  - SE CSC – N.C. State University



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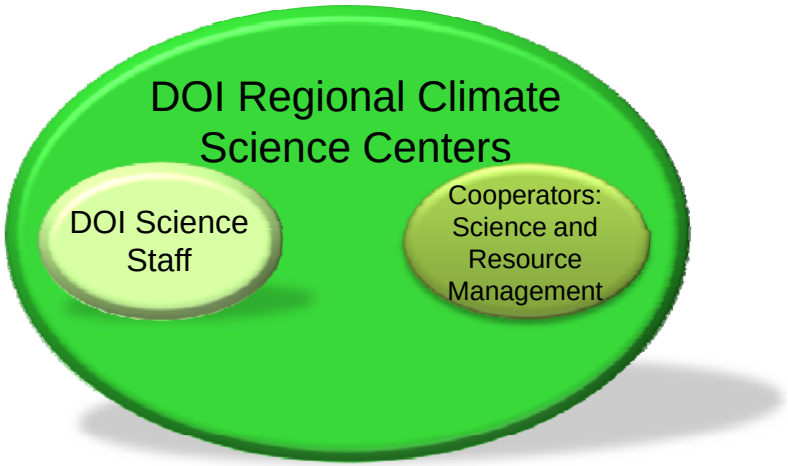
Establishing DOI Regional CSCs

- 2011 CSC's
  - SW CSC – Univ. of Arizona, lead consortium
  - NC CSC – Colorado State Univ., lead consortium



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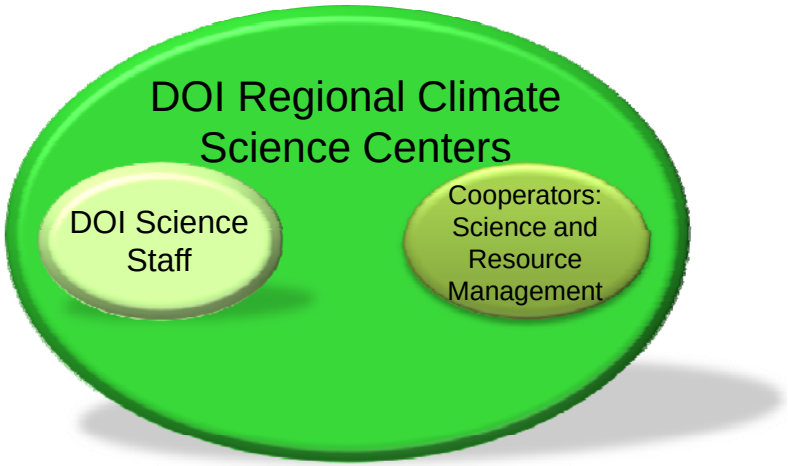
Establishing DOI Regional CSCs

- 2012 CSC's
  - NE, SC and Pacific Islands – to be advertised in February 2011.



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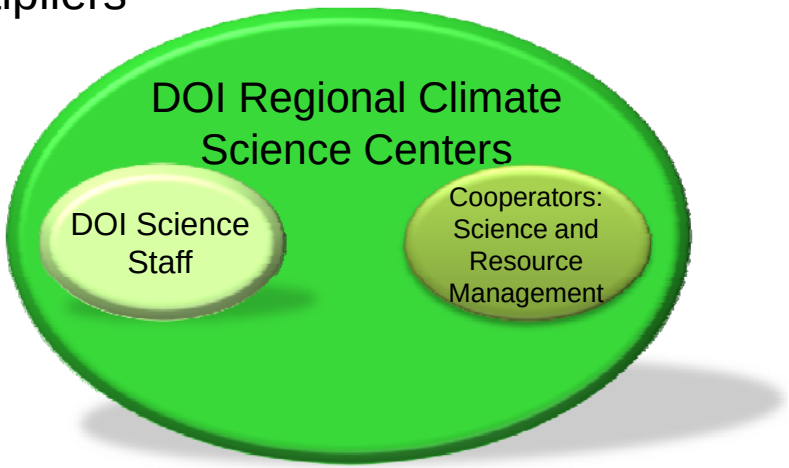
USGS NCCWSC Component of DOI Regional CSCs

- Initial / Core Staffing (USGS NCCWSC) – Director/Coordinator, Ecologists, Modelers, Climate Scientists, Population Biologists, etc.
- Annual DOI/USGS funding ~$4 million
  - ~$1.5 M = DOI staff and operations (space/facilities, etc.)
  - Remainder = science funding through university, USGS, other partners
  - Partnerships – in-kind and monetary multipliers



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NCCWSC Science Priorities

- Assessments of current climate change information
- Understand climate from natural effects on plants/animals
- Synthesize forecasting of adaptation to climate change
- Quantify species and habitat vulnerability
- Develop clearinghouse & network capacity for data
- Develop management tools

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NCCWSC 2009 Research

- **SE Regional Pilot ($1.7 Million)**

- **Research Emphases ($5.2 Million)**

  –Fisheries & Fish Habitat - $1.8 Million
  –Arctic & Arctic Species - $0.8 Million
  –Estuaries & Coasts - $0.7 Million
  –Avian Conservation - $0.5 Million
  –Wildlife & Terrestrial Species - $1.4 Million

- **Partnerships ($1.4 Million)**
  – Climate Monitoring (NASA, FWS, NSF, Smithsonian, NPS)
  – Landscape Conservation Cooperatives

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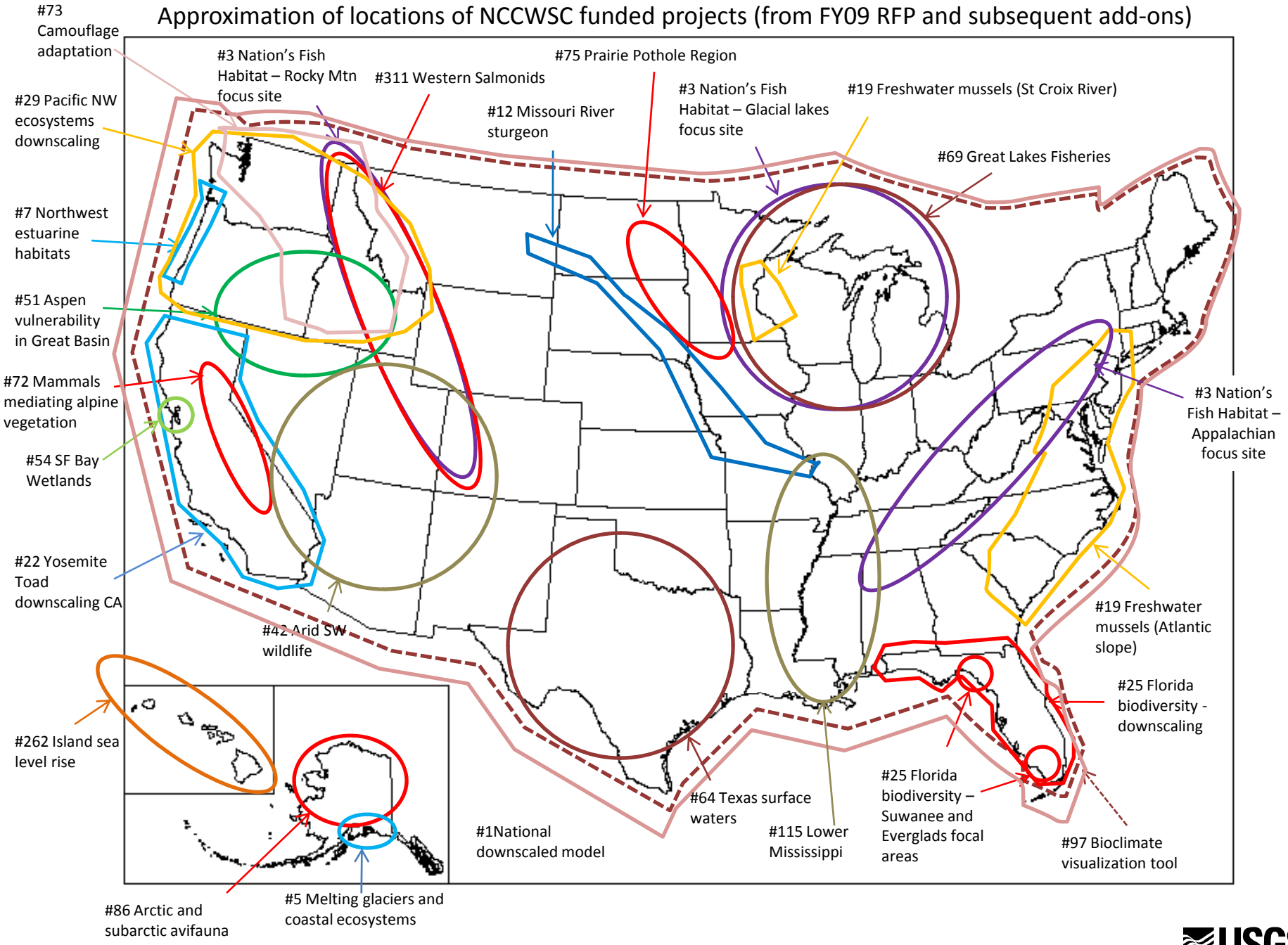
Approximation of locations of NCCWSC funded projects (from FY09 RFP and subsequent add-ons)



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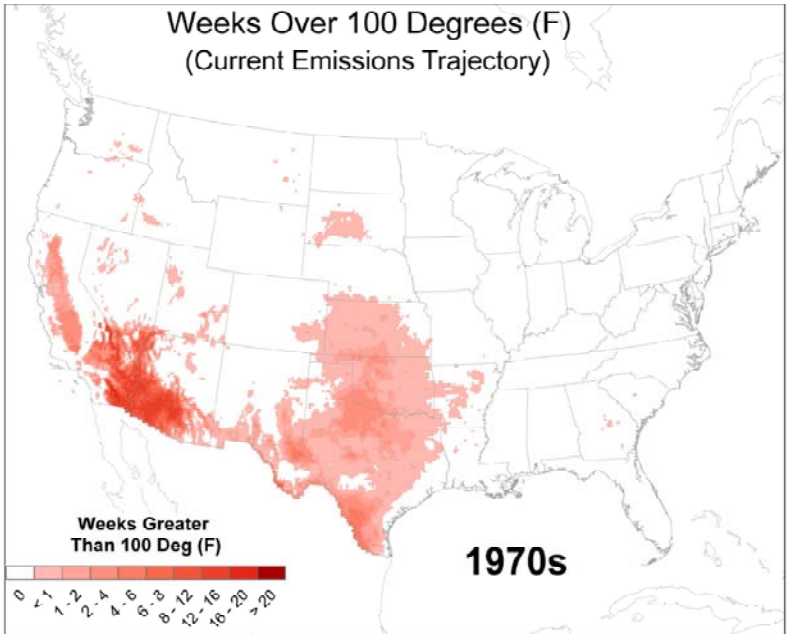
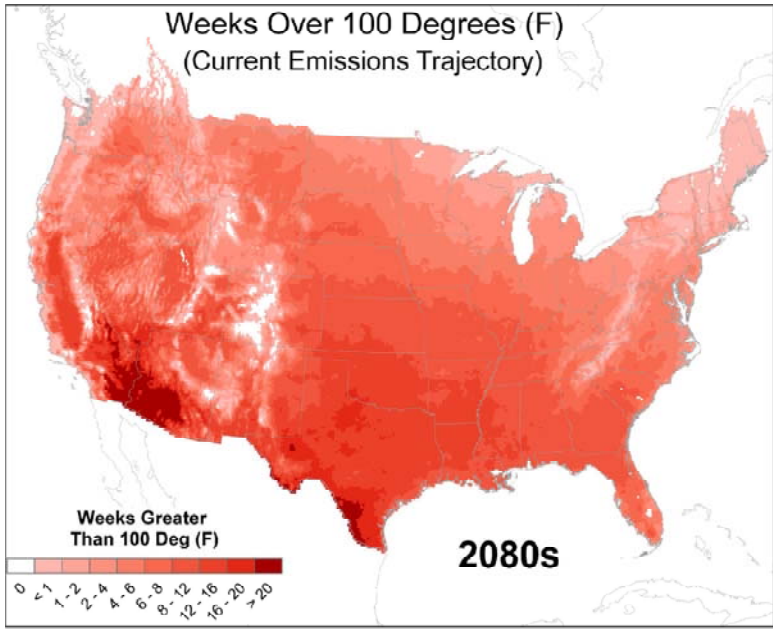
SE Regional Assessment – An Integrated Approach





Using Global Downscaled Temperature and Precipitation

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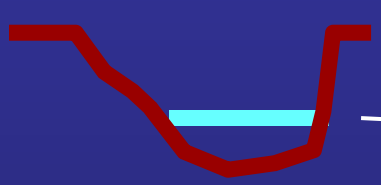
Ecological response models: occupancy of stream segments
(empirical multi-state multi-season occupancy models)

Geomorphic channel type (habitat template)



Discharge

Probability a species *persists, reproduces, or colonizes*
In a given year depends on:

- **Species traits**
- **Channel type and stream size**
- **Location in the drainage network (connectivity)**
- **The seasonal flow regime in that year**

Jim Peterson,
GA CRU

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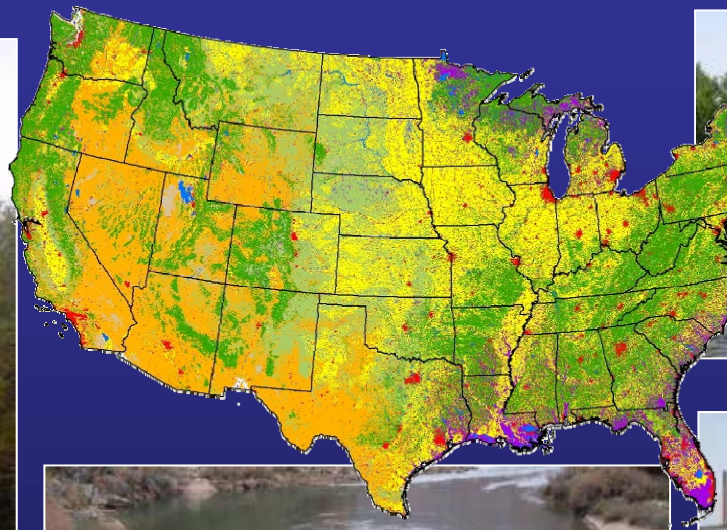
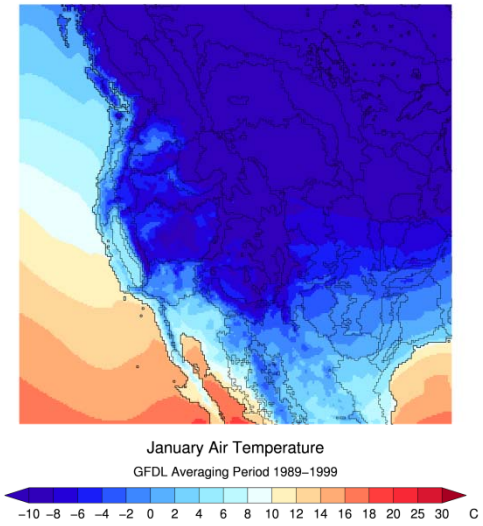
Managing the Nation's fish habitat at multiple spatial scales in a rapidly changing climate



Craig Paukert, Joanne Whittier, Julian Olden, Steve Hostetler, Jeff Kershner, Don Pereira, Lucinda Johnson, Pete Jacobson, Dana Infante, Lizhu Wang, Gary Whelan, Tyler Wagner and Paola Fereira

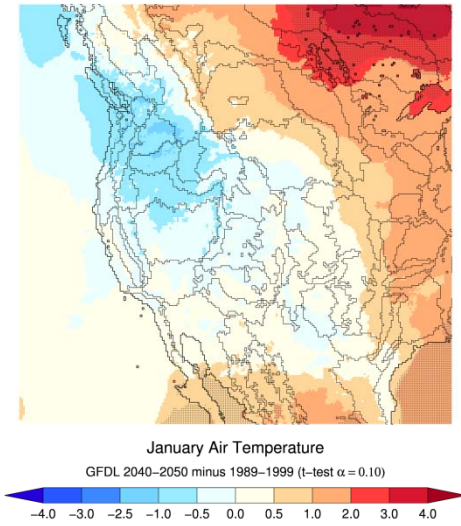
Air Temperature



January Air Temperature

GFDL Averaging Period 1989–1999

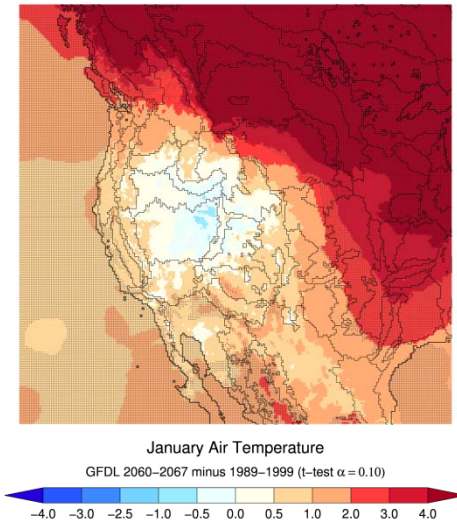
−10 −8 −6 −4 −2 0 2 4 6 8 10 12 14 16 18 20 25 30 C



January Air Temperature

GFDL 2040–2050 minus 1989–1999 (t–test $\alpha = 0.10$)

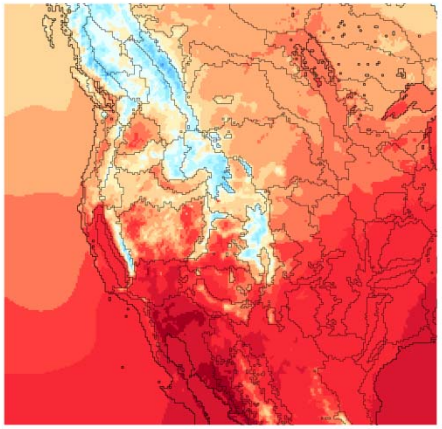
−4.0 −3.0 −2.5 −1.0 −0.5 0.0 0.5 1.0 2.0 3.0 4.0 °C



January Air Temperature

GFDL 2060–2067 minus 1989–1999 (t–test $\alpha = 0.10$)

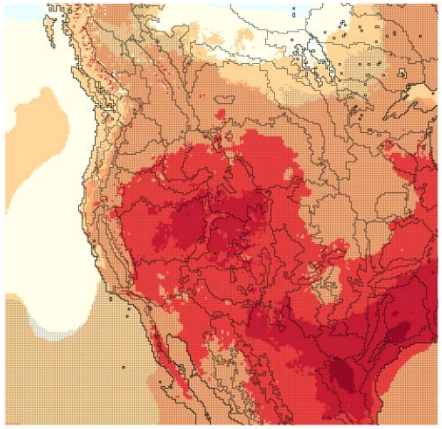
−4.0 −3.0 −2.5 −1.0 −0.5 0.0 0.5 1.0 2.0 3.0 4.0 °C



July Air Temperature

GFDL Averaging Period 1989–1999

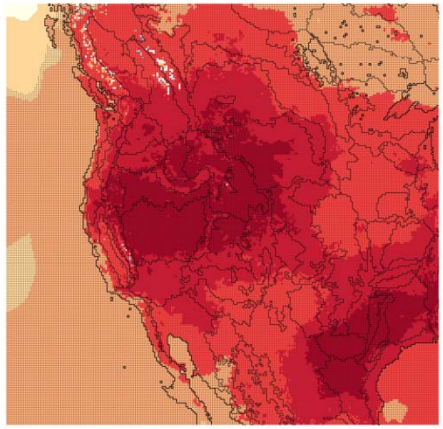
−10 −8 −6 −4 −2 0 2 4 6 8 10 12 14 16 18 20 25 30 C



July Air Temperature

GFDL 2040–2050 minus 1989–1999 (t–test $\alpha = 0.10$)

−4.0 −3.0 −2.5 −1.0 −0.5 0.0 0.5 1.0 2.0 3.0 4.0 °C



July Air Temperature

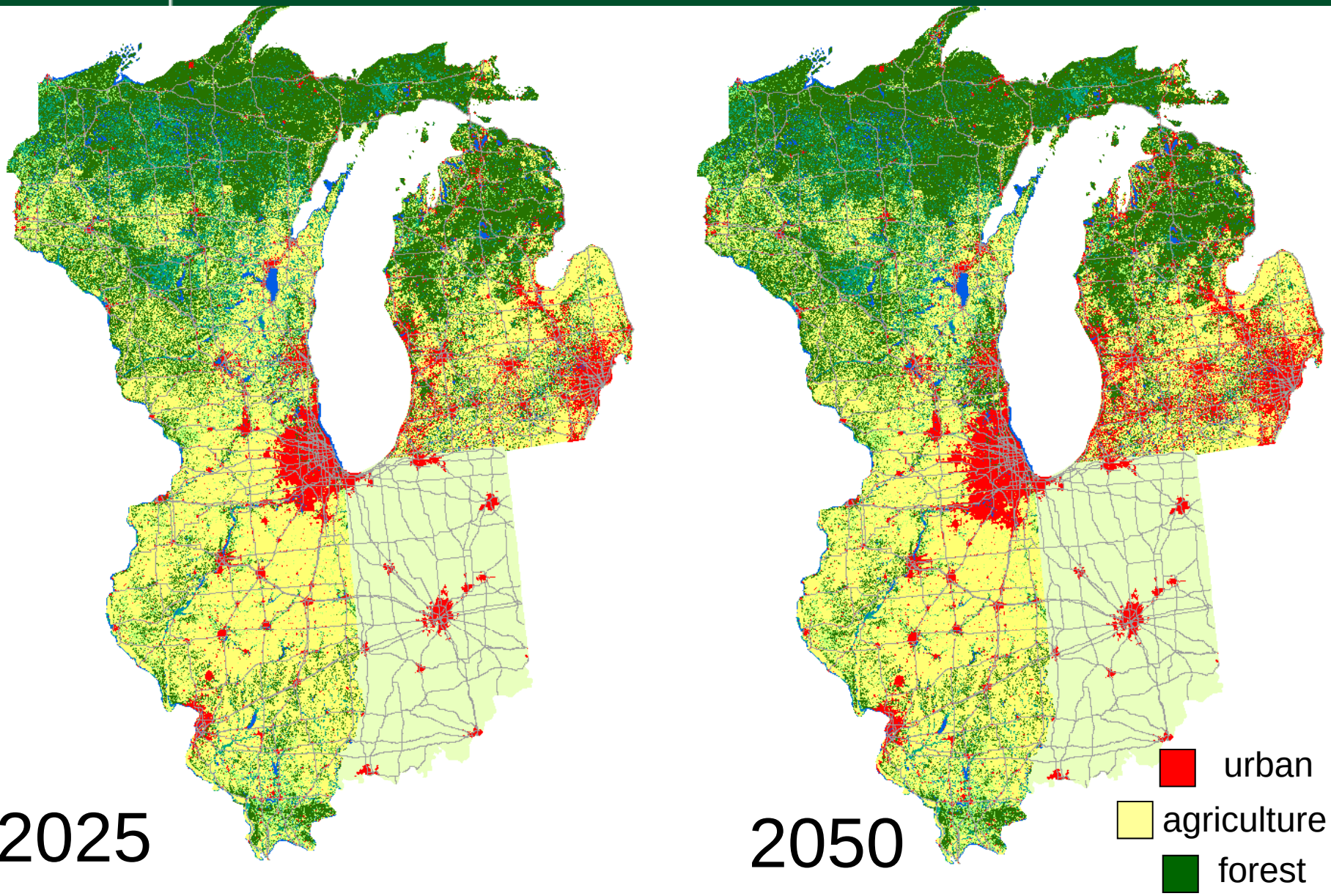
GFDL 2060–2067 minus 1989–1999 (t–test $\alpha = 0.10$)

−4.0 −3.0 −2.5 −1.0 −0.5 0.0 0.5 1.0 2.0 3.0 4.0 °C

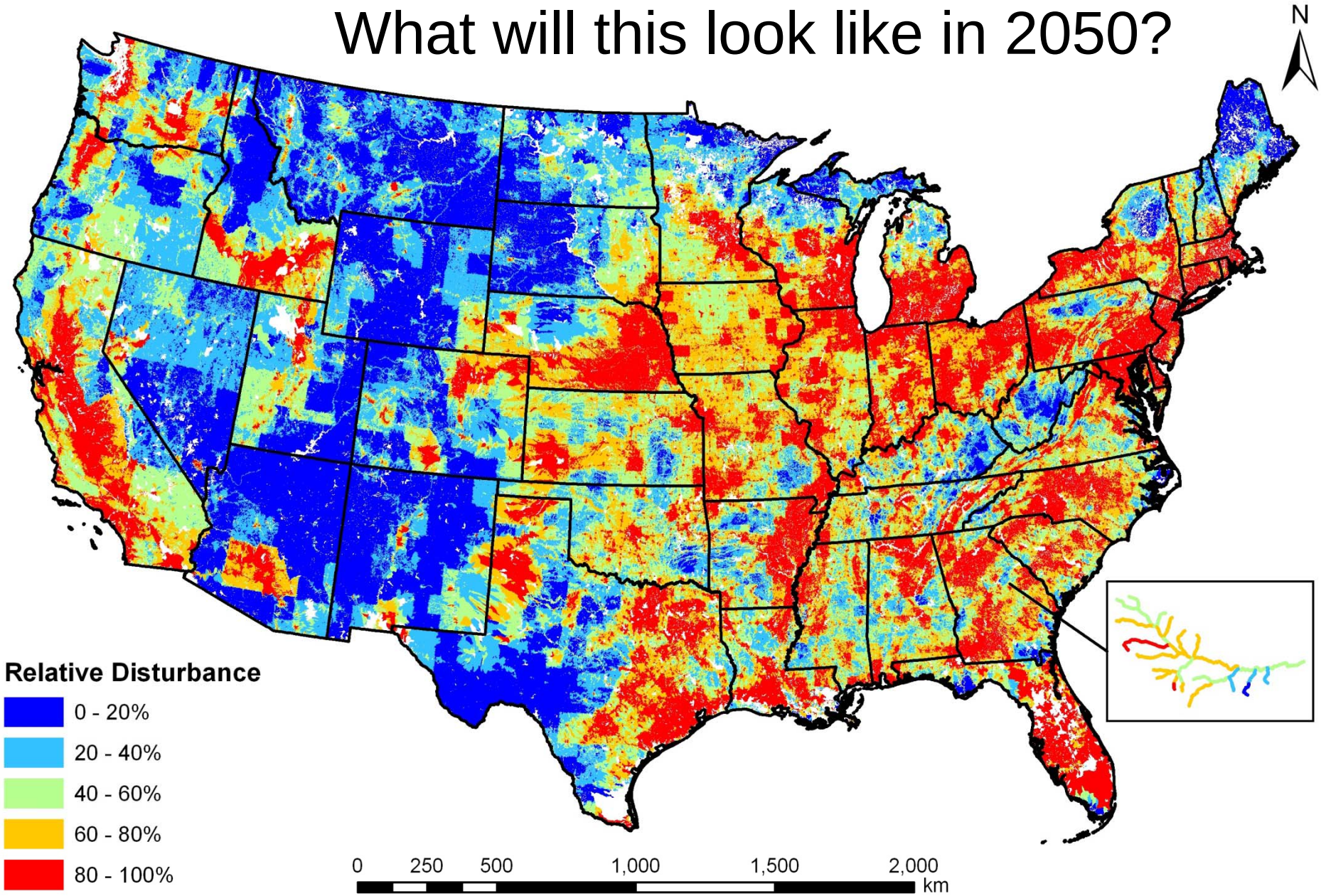
PURDUE UNIVERSITY

Discovery Park

Center for the Environment



What will this look like in 2050?



Performance Goals and the NCCWSC

- **Goal**

  By the end of 2012, for 50 percent of the nation, the Department will identify resources that are particularly vulnerable to climate change, and implement coordinated adaptation response actions.

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Performance Goals and the NCCWSC

Measures

1. Vulnerability Assessments.

2. Adaptation Strategy.

3. Data Collection and Integration

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DOI Climate Science Centers

A New Paradigm

- Linking Physical, Biological, and Social Science
- Scenario/Forecasts of Future Possibilities
- Link Research, Modeling, Synthesis, and Monitoring in a Landscape/System Perspective
- Science Collaboration/Resource Management Collaboration
- Stakeholders set priorities/Provide Review & Feedback
- Share Data and Information

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