

# Department of the Interior Responses to Climate Change

NWQMC Meeting  
July 14-15, 2010



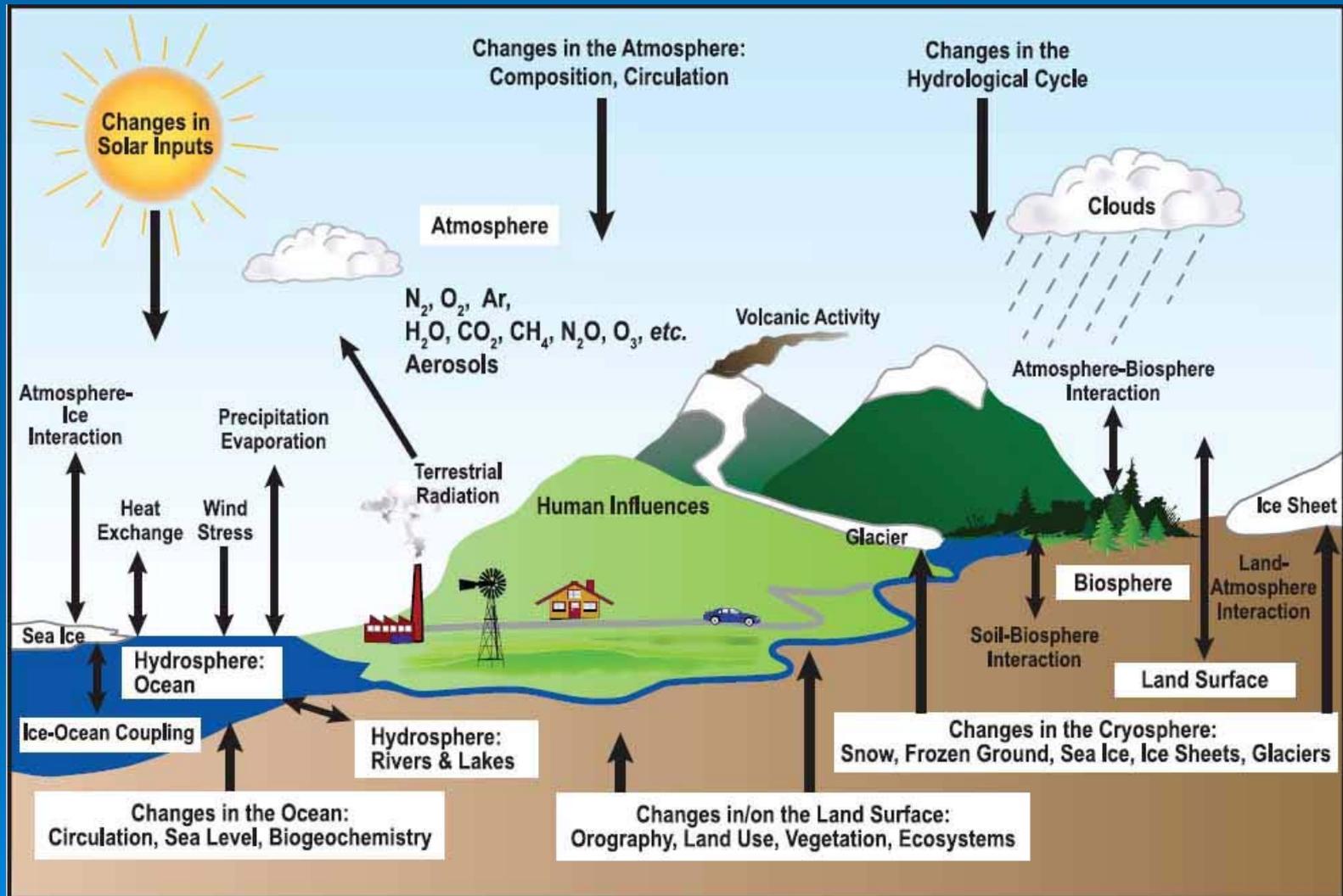
# Issues Driving Climate Effects Science

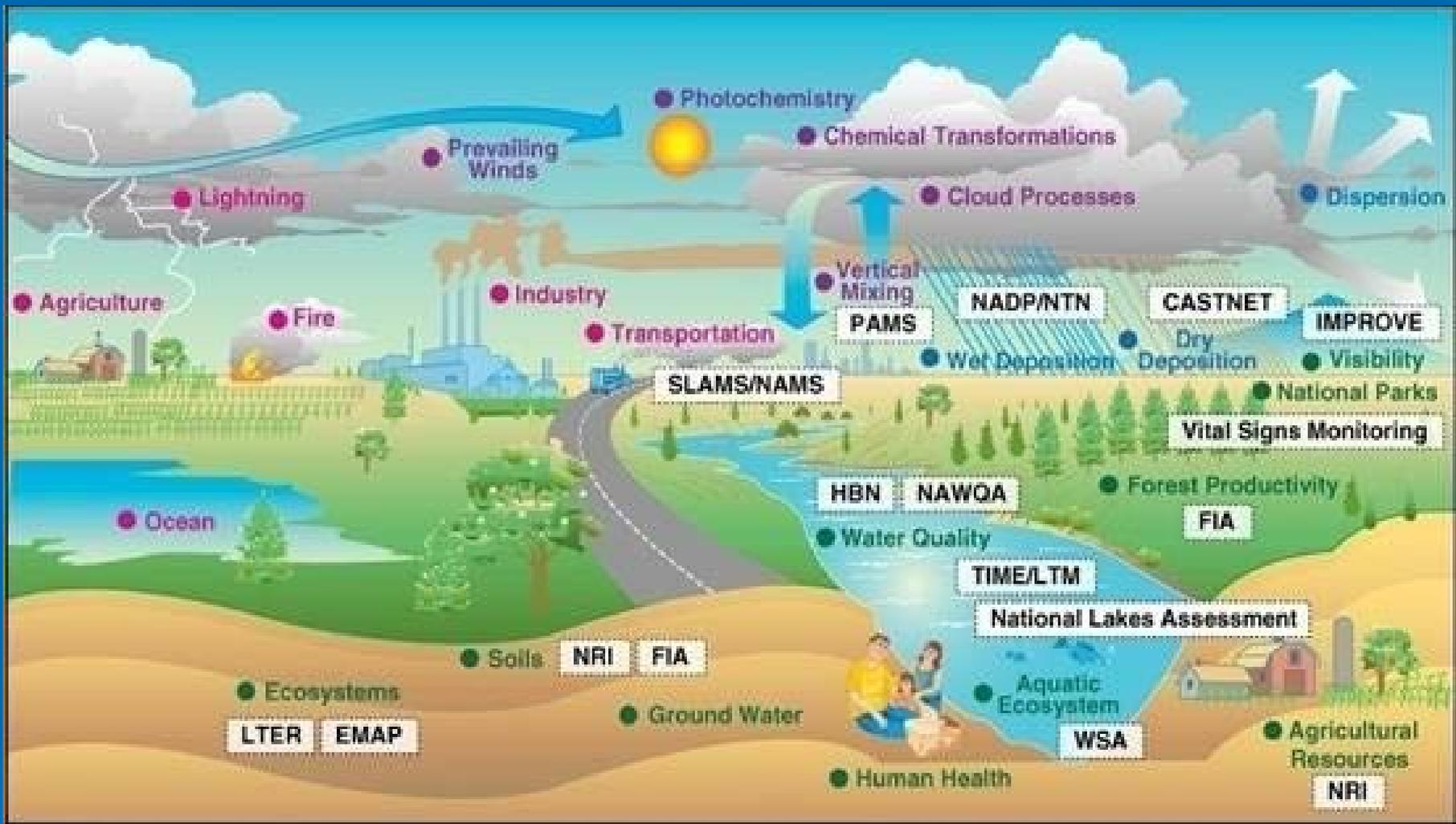
- Climate change will not impact a single resource at a time. We must understand whole-systems and feedback responses
- Climate change will be a superimposed stress on already stressed systems, so we have to understand combined effects
- To anticipate change, we must focus on system resilience and thresholds. So, to understand or forecast a local condition we need to study regional/national/even global gradients.
- To verify our models and adaptation responses, we need interdisciplinary research and observation at the full range of spatial and temporal scales.
- We need answers yesterday

# The Climate Effects Science Dilemma

- ❖ Without whole system datasets, adaptation strategies will be incomplete or wrong. However,.....
- ❖ The chances of building new capacity for data collection and analysis from “scratch” are low
- ❖ Valuable historical records are available but scattered, so system-level observation is poor and funding uncertain.
- ❖ By the time we see a climate disturbance signal in a specific species or a new data collection site, that species or site is likely in jeopardy.
- ❖ So, how do we provide the information needed in the shortest period of time?

# To understand climate effects, we need to understand whole systems and feedbacks



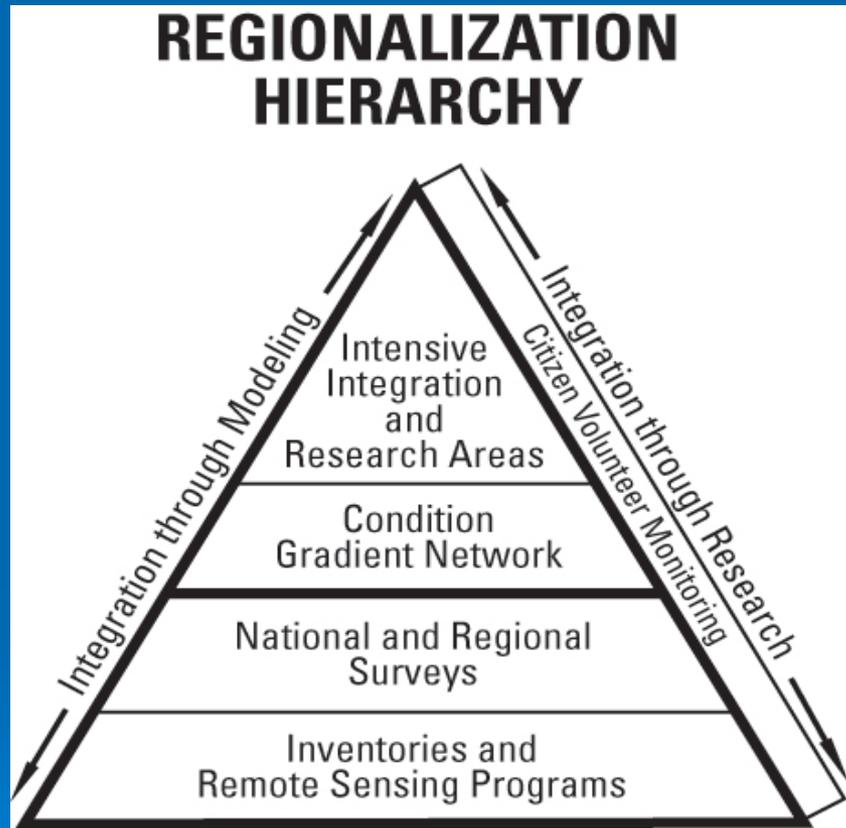
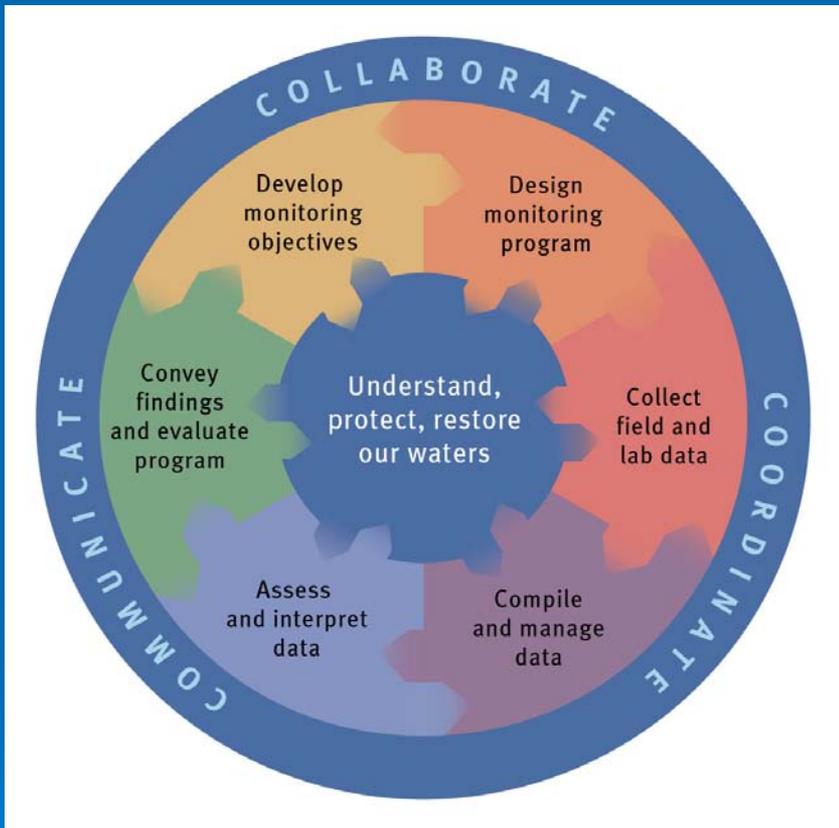


● Sources  
 ● Transport / Transformation  
 ● Removal  
 ● Effects  
 Monitoring Program

We have models to guide us:

# NWQMC

# CENR



# Secretarial Order 3289

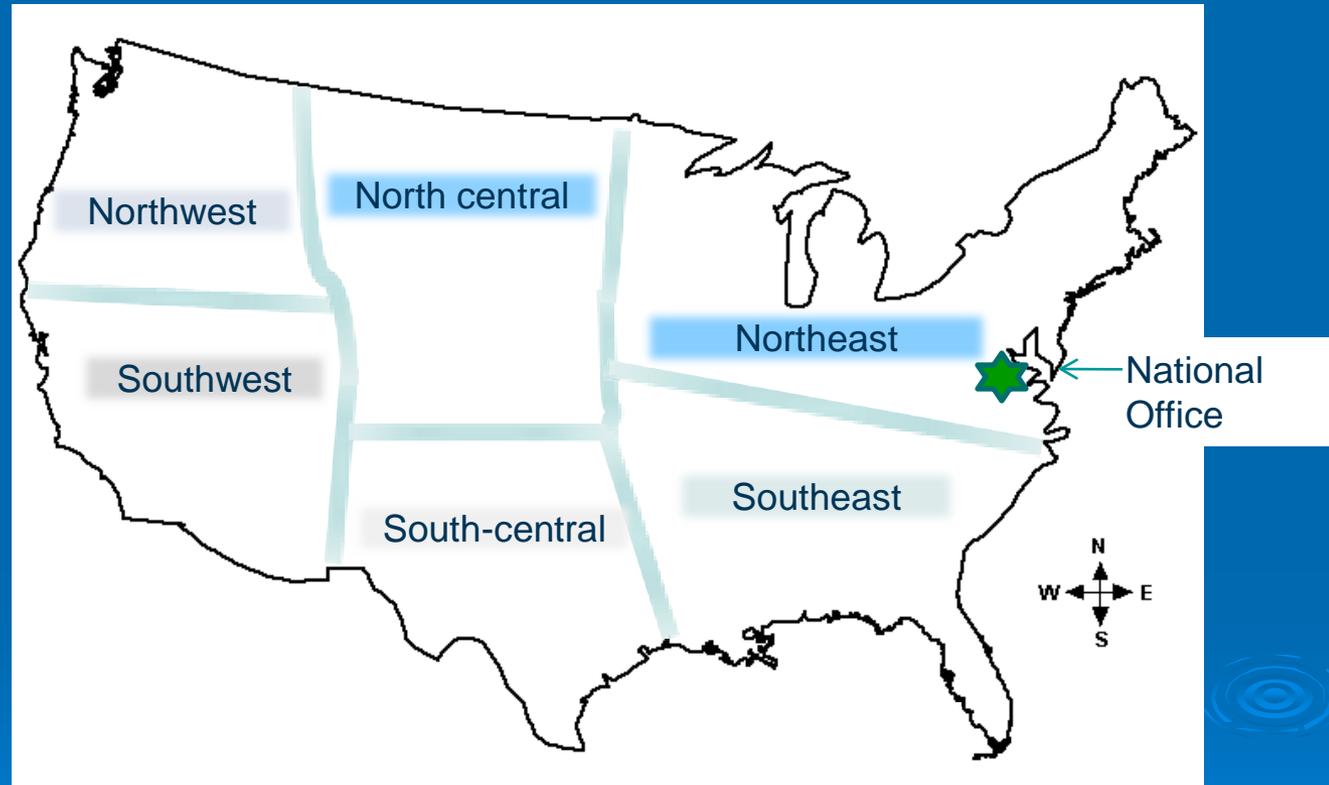
Addressing the Impacts of Climate Change on America's  
Water, Land, and Other Natural and Cultural Resources

(9/14/09)

**The Climate Change & Energy  
Response Council will work  
with USGS and other  
Department bureaus to  
rename the ..(Wildlife)...  
regional science centers as  
Regional Climate Science  
Centers and broaden their  
mandate ...**

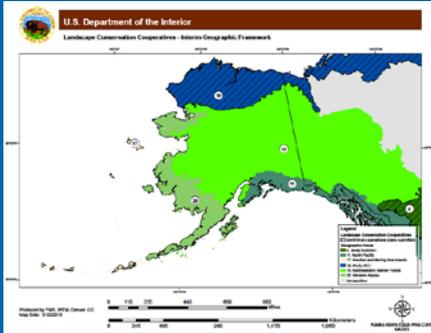


# Climate Science Centers (CSCs) National & Regional Organization



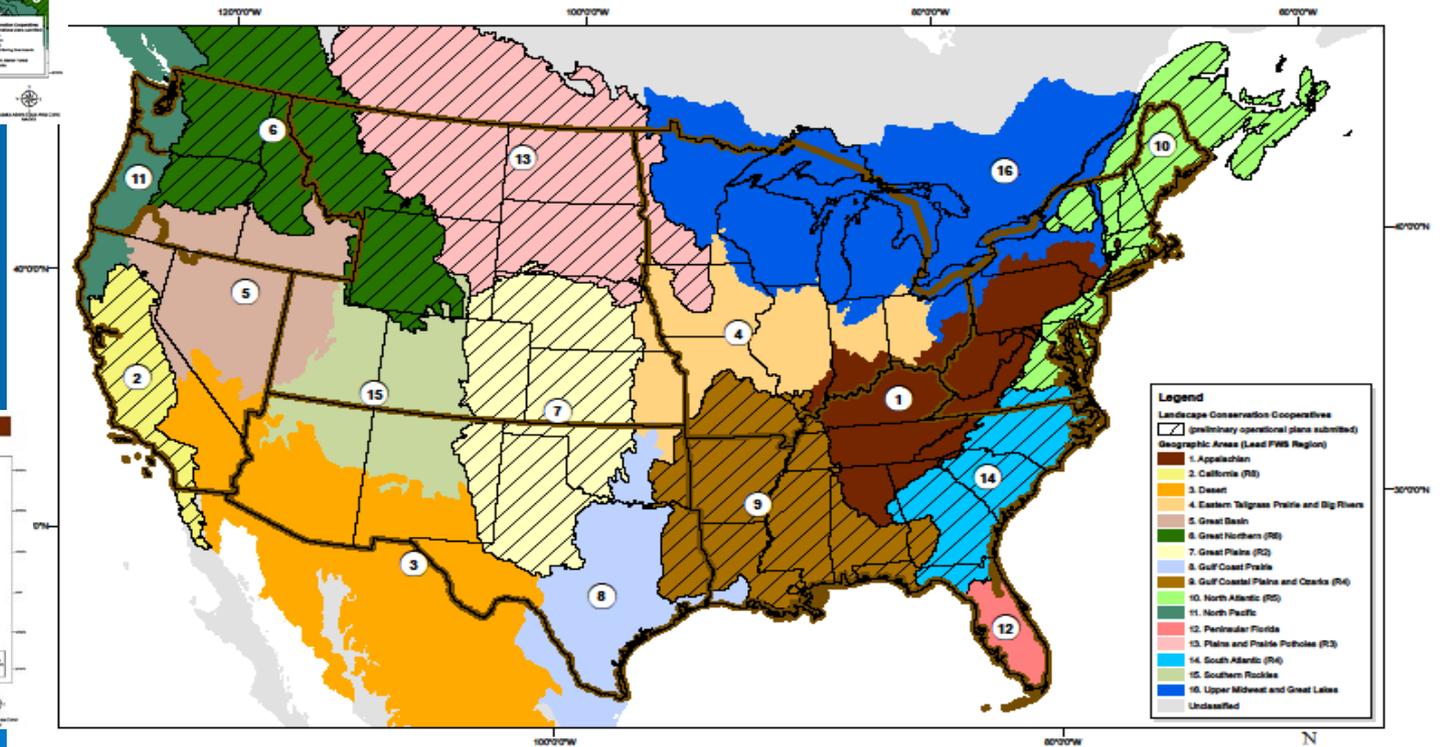
“Fuzzy Boundaries”

# DOI Landscape Conservation Cooperatives



U.S. Department of the Interior

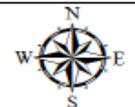
Landscape Conservation Cooperatives - Interim Geographic Framework



Produced by FWS, IRTM, Denver, CO  
Map Date: 01222010

0 175 350 700 1,050 1,400 Miles

0 400 800 1,600 2,400 3,200 Kilometers



Albers Equal Area Conic  
NAD83



Integrating status and trends observations is the key to understanding.



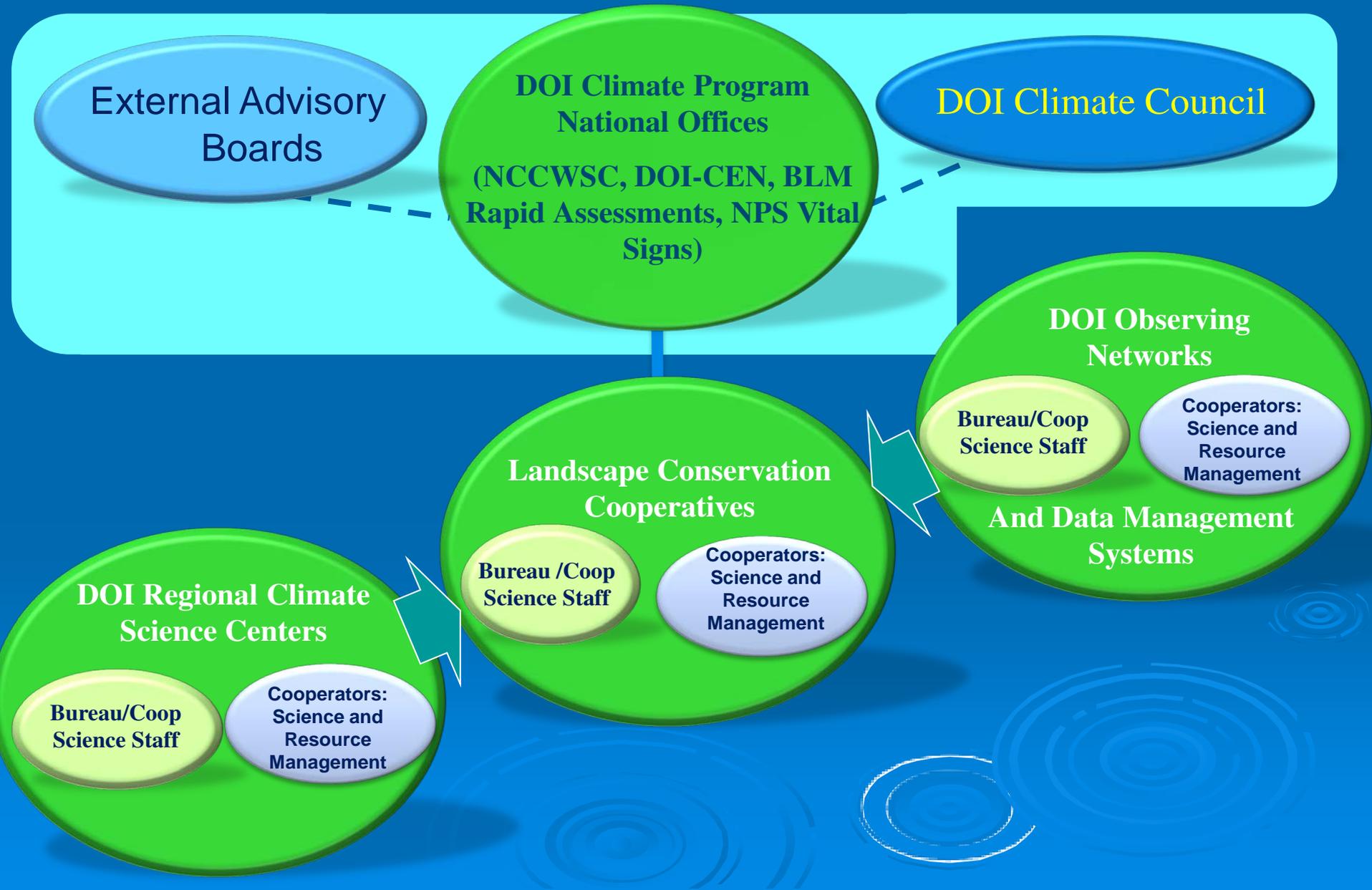


# Climate Change Science Impacts & Data Integration

## Workgroup Goals:

- Improve national and global climate impacts status and trends monitoring for assessments and adaptation or mitigation decisions.
- Make DOI data collection comprehensive, integrated, standardized, and accessible
- Integrate capabilities to provide essential data to other federal and state agencies, universities, Tribes and private landowners
- Incorporate Traditional Ecological Knowledge and Citizen Science Databases
- Integrate this effort in to broader Data.gov effort

# The DOI Climate Strategy



# USGS Global Change Programs: Structure

*Framework for Integrating &  
Leveraging:  
“A Network of Networks”*

Climate Effects Network (CEN)

*Applied Research in Support  
of CEN and other activities*

Global Change Research &  
Development (R&D)

*Decision Support Science for  
Management and Policy*

Applications and Decision Support

*Focused Decision Support  
for Fish and Wildlife*

National Climate Change and  
Wildlife Science Center

*Topical Assessments*

Geological Carbon Sequestration

Biological Carbon Sequestration

# USGS and Global Change R&D: *Summary*



- **History of climate change science research and long-term monitoring**



- **Monitoring assets- from ice cores to stream gages to Landsat**



- **Multi-disciplinary capabilities and scientific expertise across the landscape**

- **Capability to assess prehistoric, historic and current climate effects**



- **Ability to integrate multiple types of information for effective decision-making**

# Science Applications and Decision Support

- Partners in forming Landscape Conservation Cooperatives across the country
- Focus on application tools and services
- Emphasis on assessing uncertainty in climate and climate impact forecasts
- Ensuring that USGS Science reaches the end user in a form that is useable.



# 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**

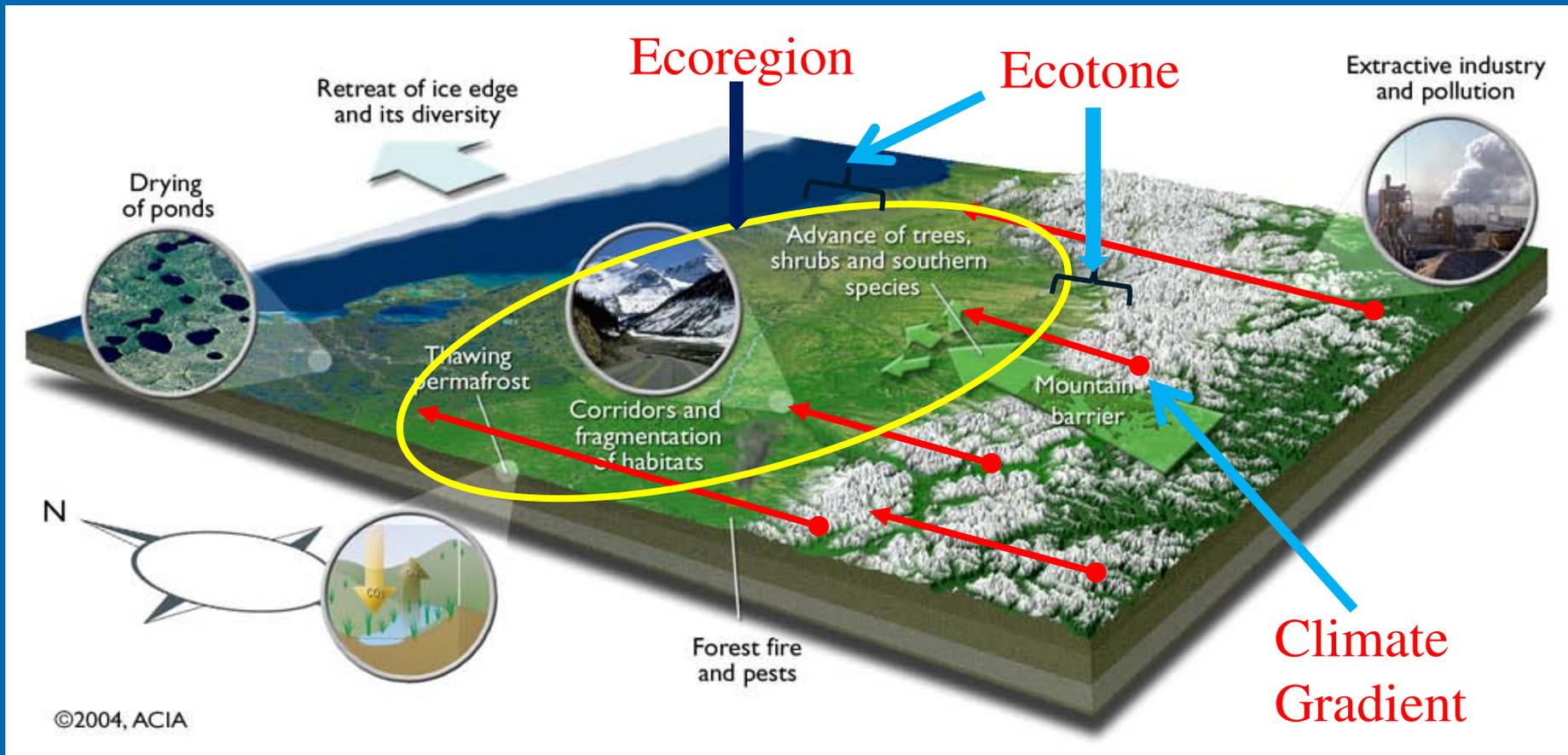
## ➤ Focus on climate change adaption & impacts

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



# Carbon Sequestration in Ecosystems is “Rate Limited” and is “Asynchronous” (Due 10/11)

This is a “new” ecosystem with “new” and unknown arrangements between the air, forest, soil, water, and species,



# Observing and Data Integration: A Critical Need

We will need data sharing, management, assessment, and access at an unprecedented scale.

# How do we organize data across the planet?

## **PROBLEM:**

It is not possible to assess the complex changes, interactions, and feedbacks caused by climate change at every specific location where resource managers need us to be, or by separate discipline- or agency - specific initiatives.

## **THE NECESSARY ASSUMPTIONS:**

The dominant processes controlling ecosystem function are similar and transferable; ecosystem condition is highly variable, but can be mapped.

**KEY: Systematically linked research and monitoring**



# What is the Climate Effects Network?

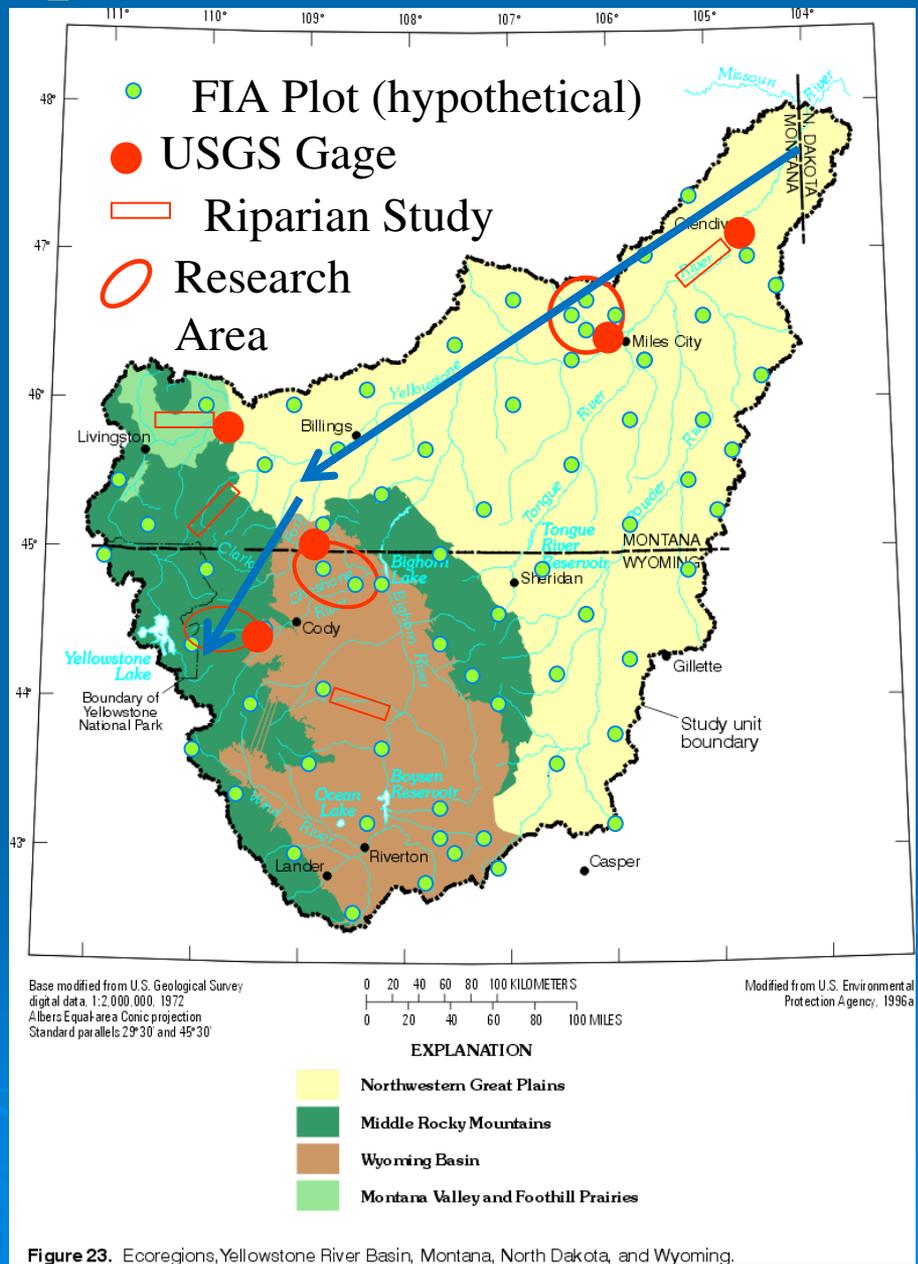
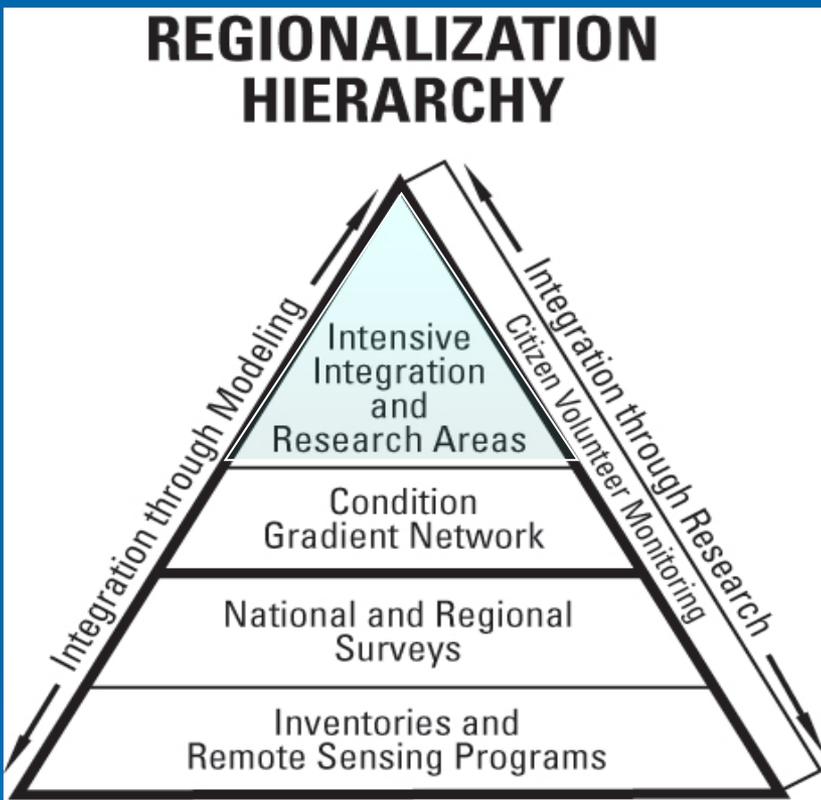
**Network Vision Statement:** “To provide *earth-system information* for understanding, *tracking, and forecasting* the effects of climate change on ecosystems, natural resources, and society; and to empower and *assess adaptation or mitigation responses* to those changes in the most cost effective, timely, and scientifically-rigorous manner possible.”



# Steps Involved in Network Implementation

1. Determine specific issues/decisions by focal topic/region (with stakeholders)
2. Determine types of data initially needed to address those issues/decisions
3. Compile data that is already being collected and organize existing capabilities
4. Complete an issue assessment and gap analysis for each issue.
5. Integrate services and enhance existing programs to fill gaps.
6. Ensure results are linked to applications for decision support, and maintain management services.

# The Watershed as a Landscape Frame of Reference



# Watersheds: a common frame of reference

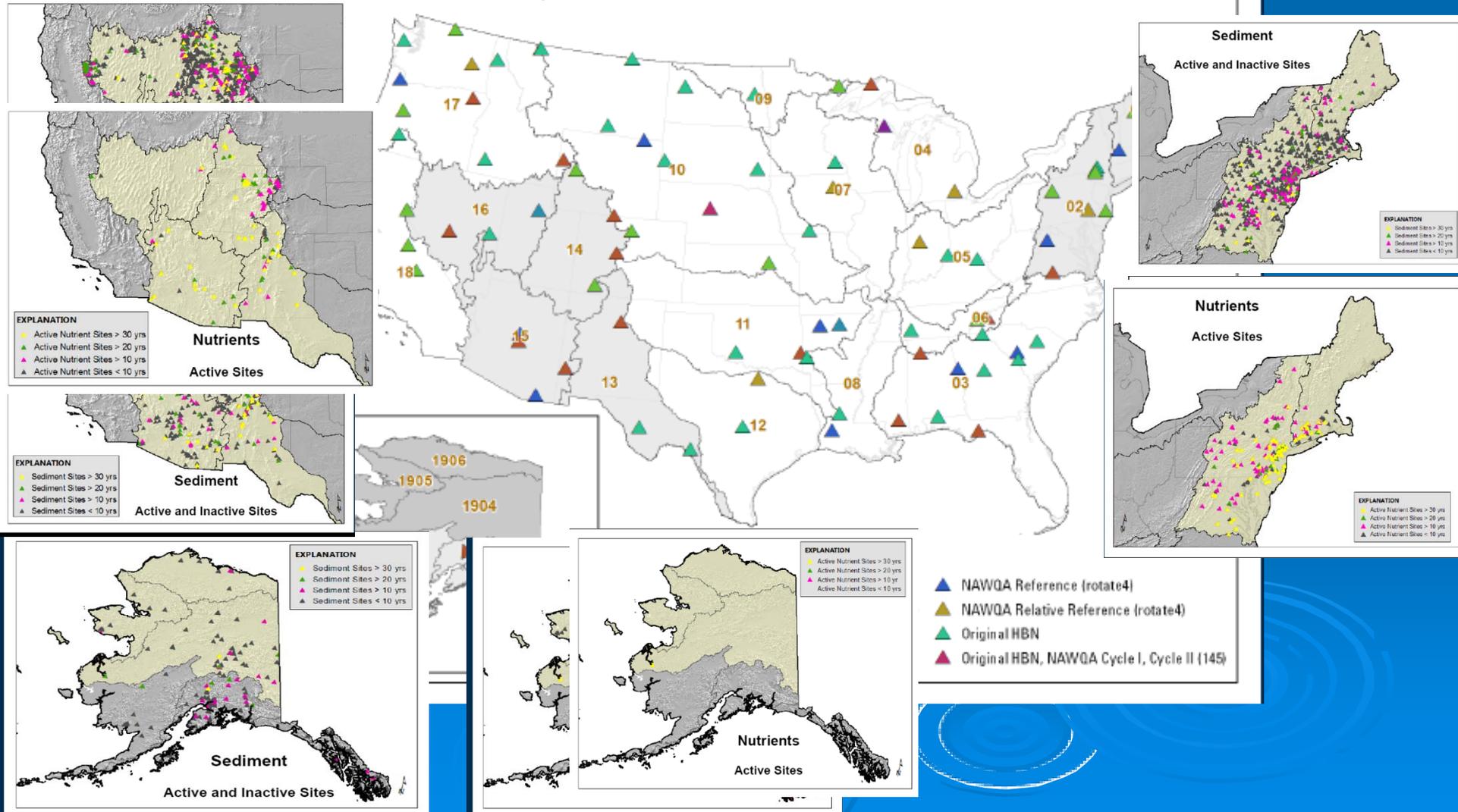
## Partnerships with WaterSMART, NEON, NPN...



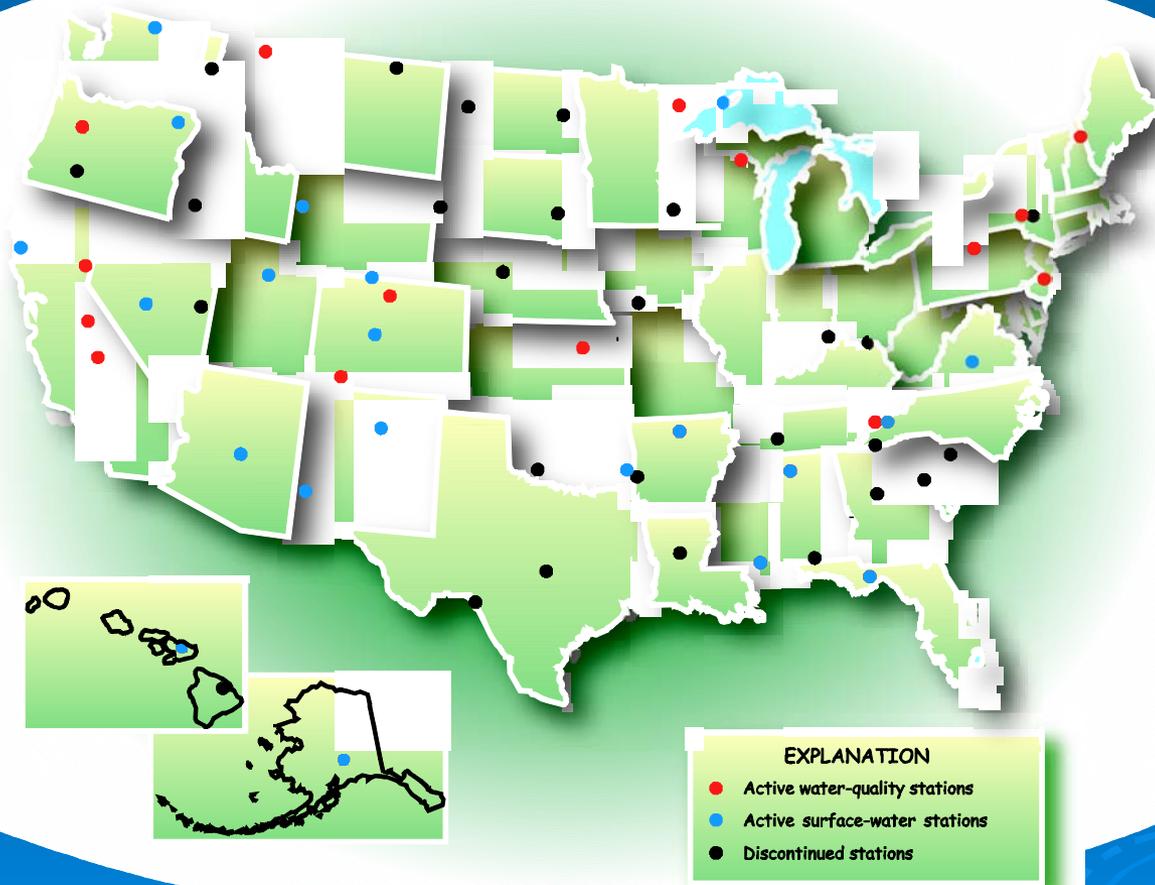
- Yukon Pilot
- Establish the partnerships
- Establish common data management
- Regional science plans and assessments
- Watershed and climate gradient structure
- Building a large watershed and gradient at a time

# Compile and understand what we have: Water Quality Metadata Analysis- Jeff Deacon

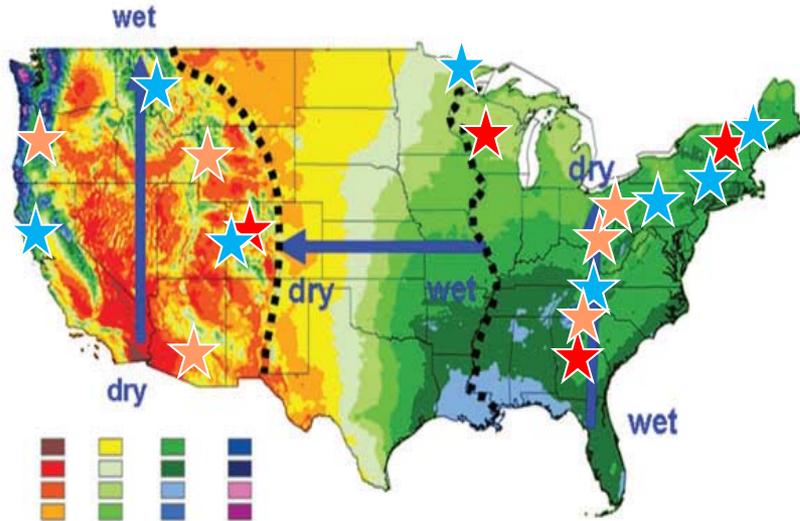
## NAWQA and HBN Reference Sites



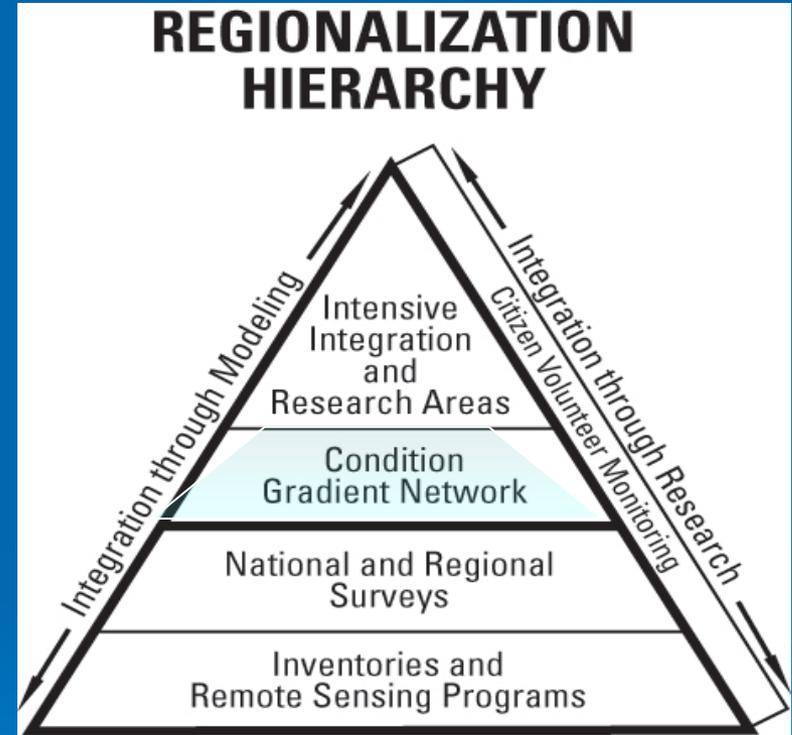
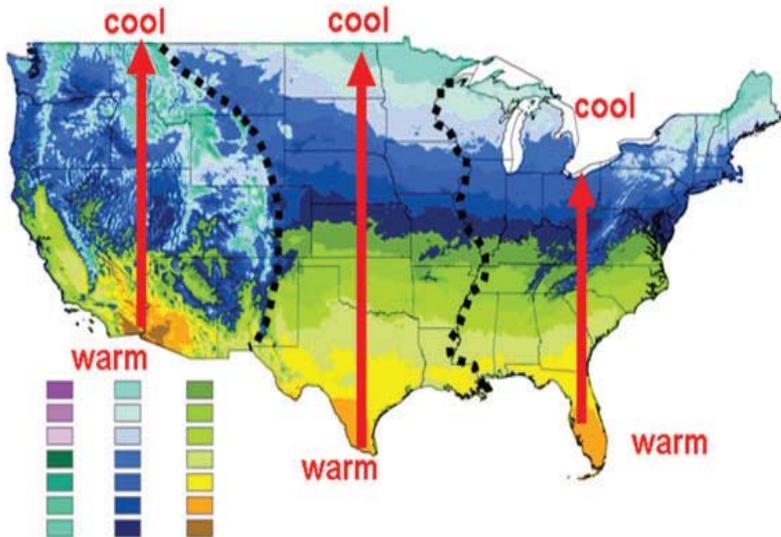
# Protect and enhance endangered programs with critical long-term datasets



# Build Climate Effects Gradients

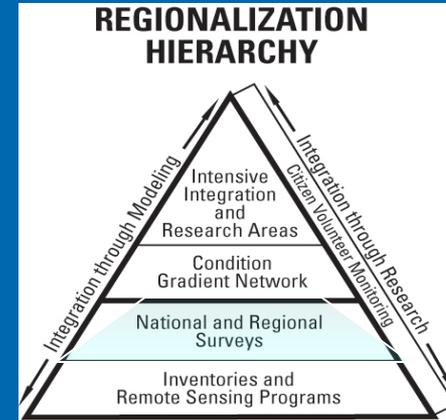


WEBB Site ★  
HBN Site ★  
FS/ARS Site ★



Change will happen first at ecosystem boundaries (ecotones)

# Surveys Proposed in FY09-10

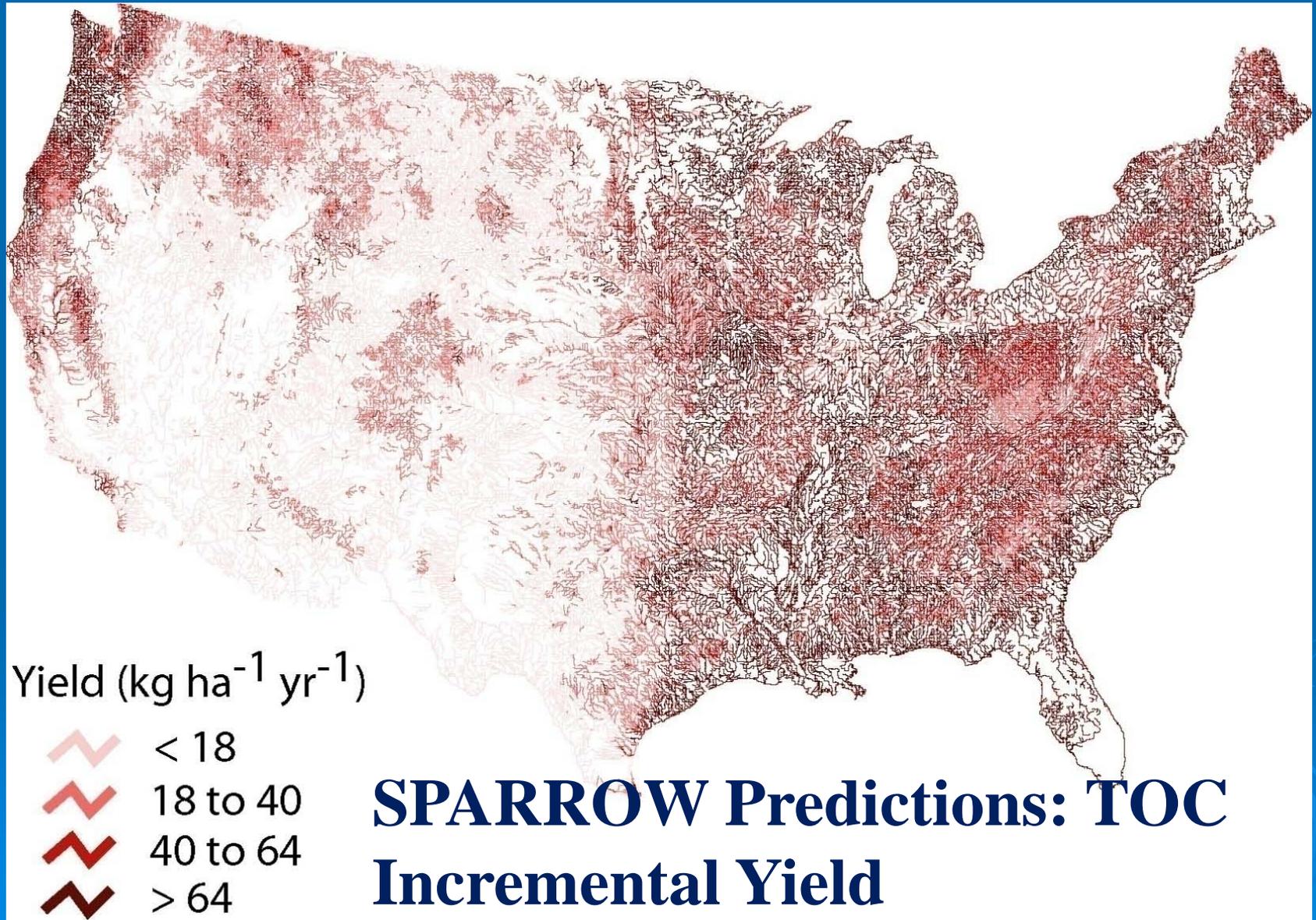


## Proposed Regional Survey Datasets

- Vegetation Type (FIA)
- Vegetation Health (FHM)
- Soil chemistry
- Wildlife census
- Surficial Geology
- Water quality
- Forest Fragmentation (FIA)
- Precipitation and air temperature network (NWS)
- Active layer thickness (north)

- ★ CORE study areas (proposed)
- Survey points (hypothetical)

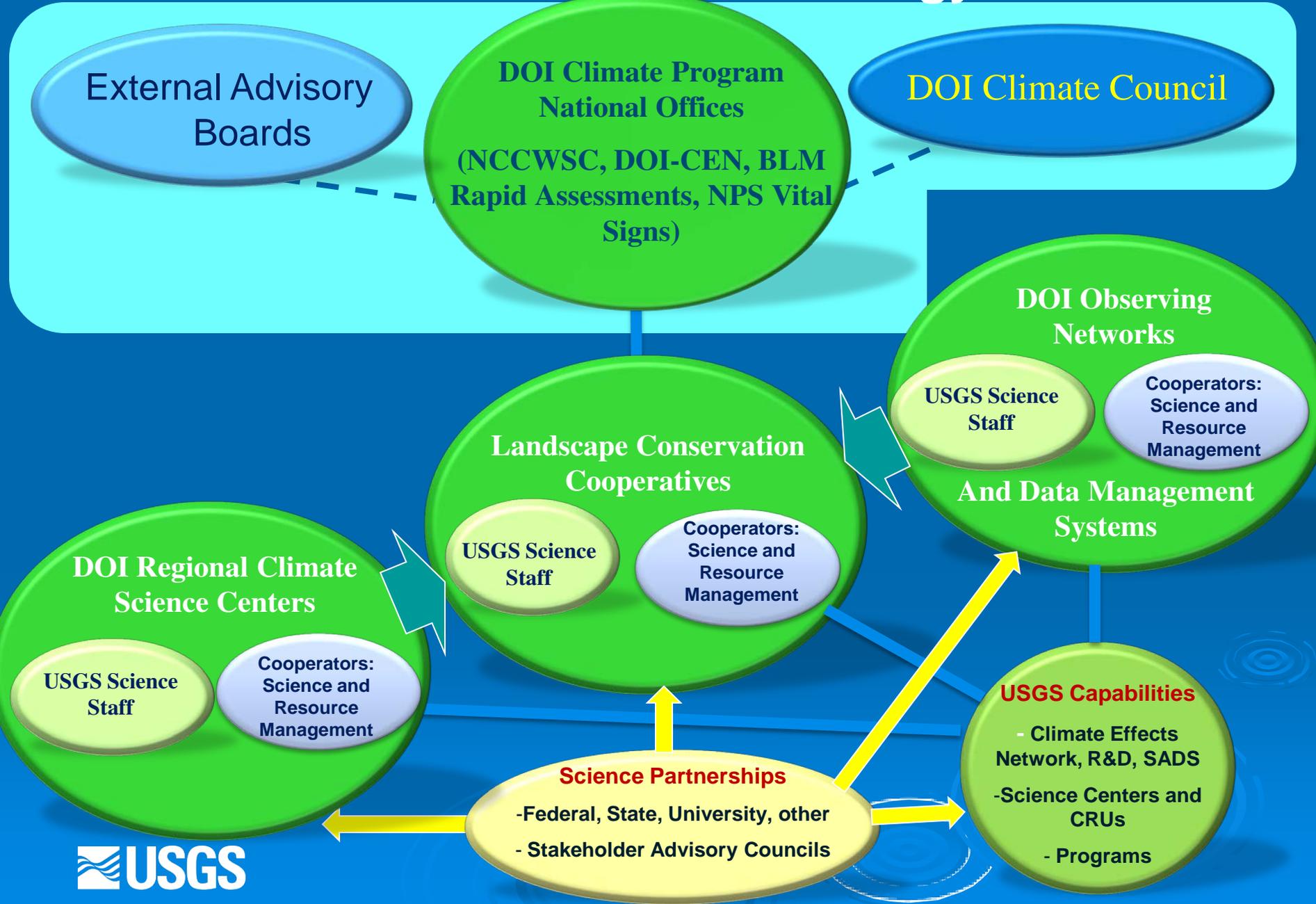
# Support common modeling platforms



# Climate Effects Network Support Services

- ❖ Leadership to keep the collaboration functioning
- ❖ Data management and dissemination portal systems
- ❖ Common protocol development or data comparability screening\*\*
- ❖ Adaptation and mitigation verification strategies
- ❖ Communication and outreach

# USGS Role In The DOI Climate Strategy



# What could we do together?

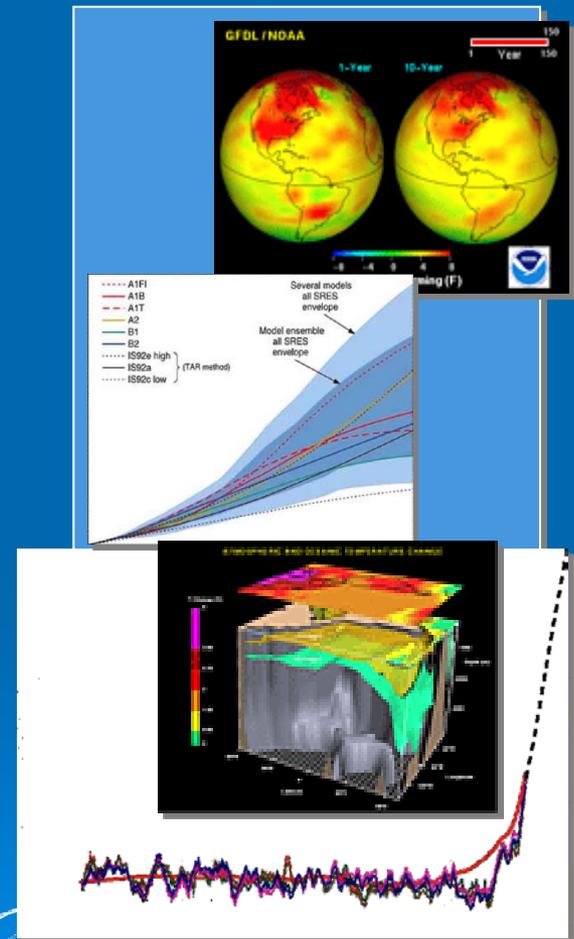
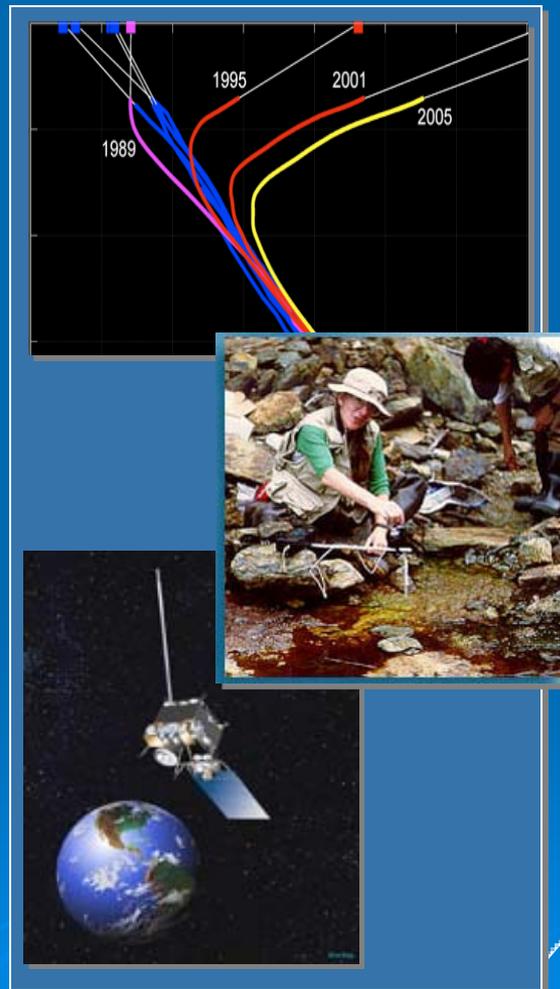
- Partner in development of the watershed- surface water data linkages
- Advise CEN from the NWQMC experience (e.g. in methods comparison and standards development)
- Partner with USGS in the development of reference watersheds that link landscape change status and trends observing to trends in surface waters.

# USGS Global Change Programs:

*Past*

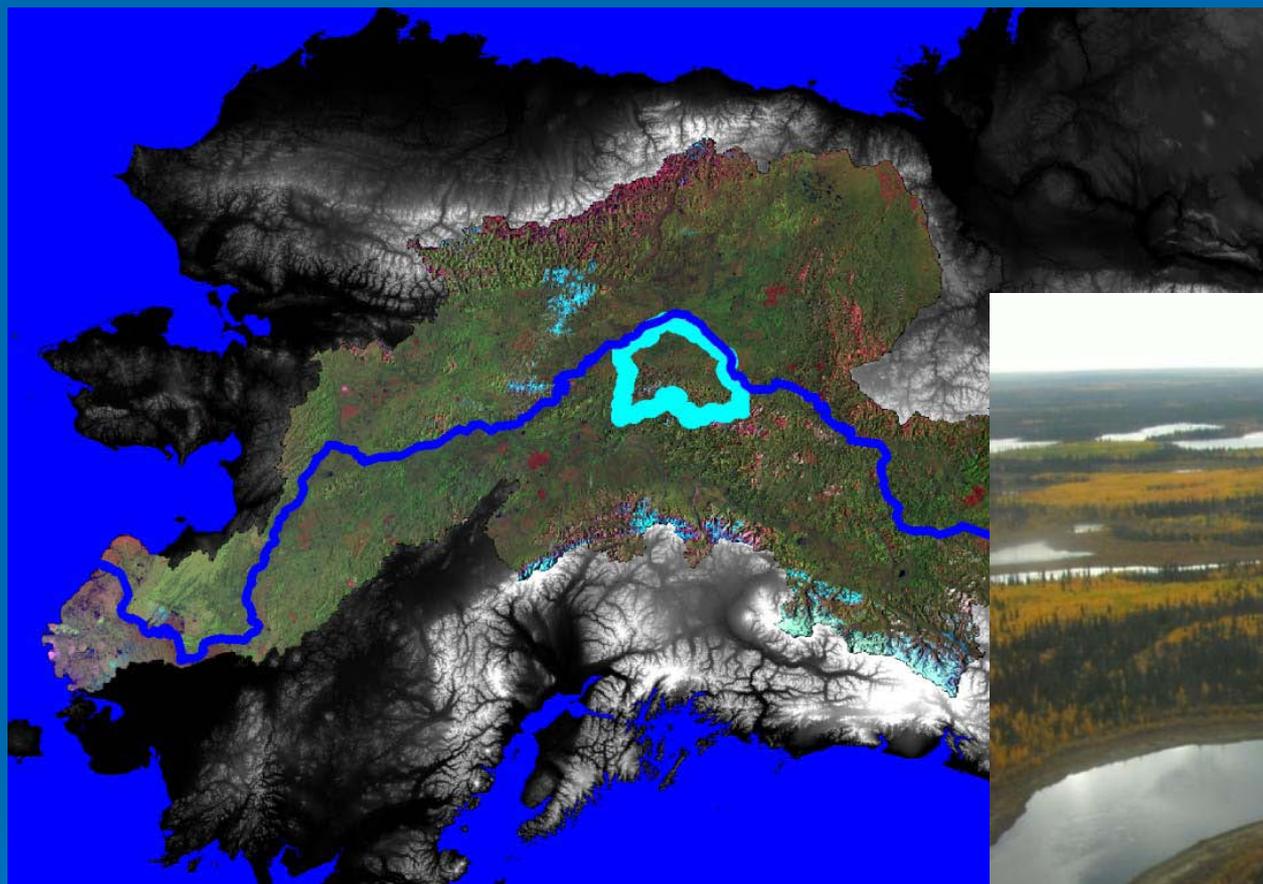
*Present*

*Future*





# Yukon River Basin CEN Pilot

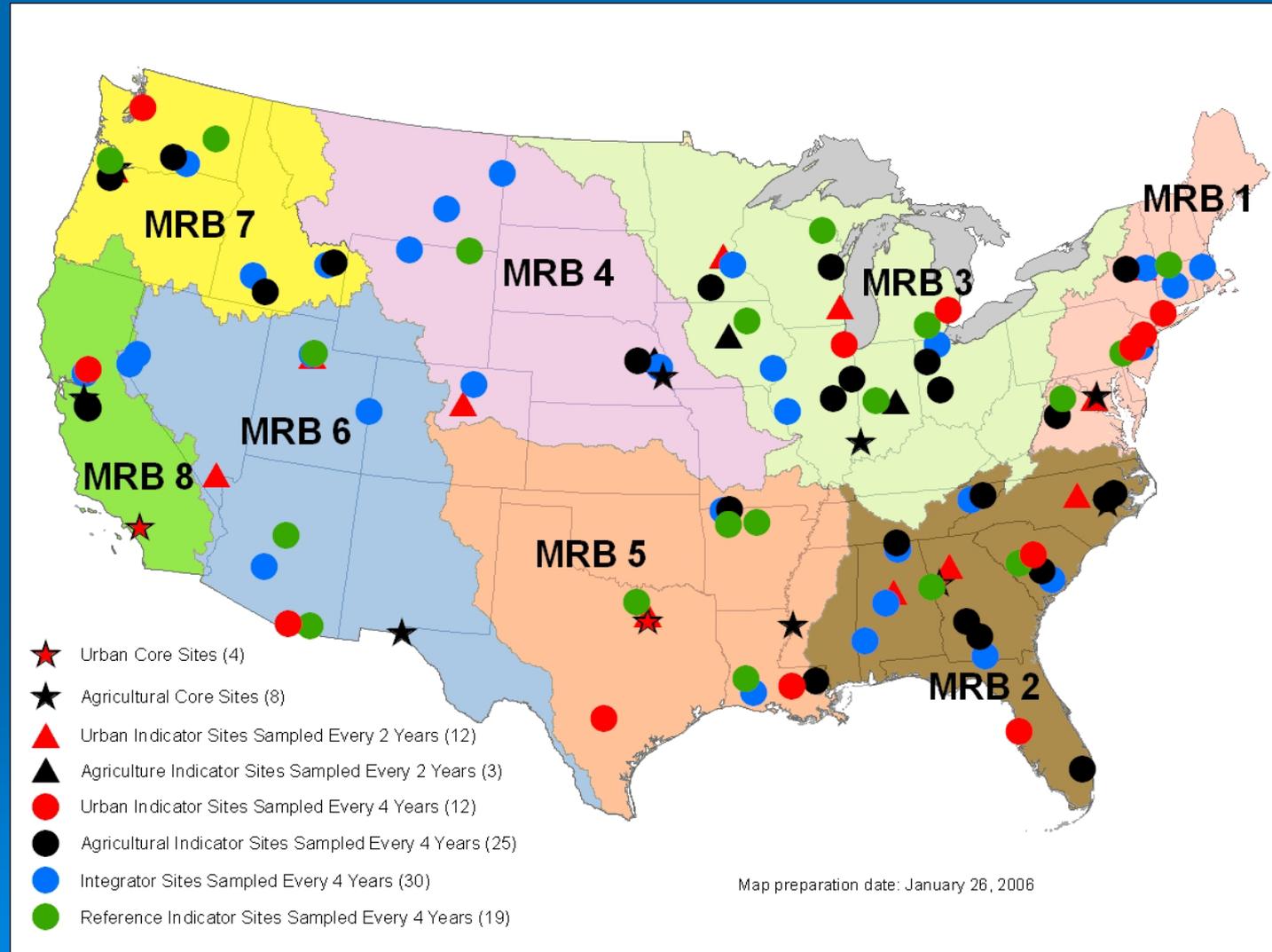


Started small  
(within budget)  
Planned Inter-  
disciplinary Design

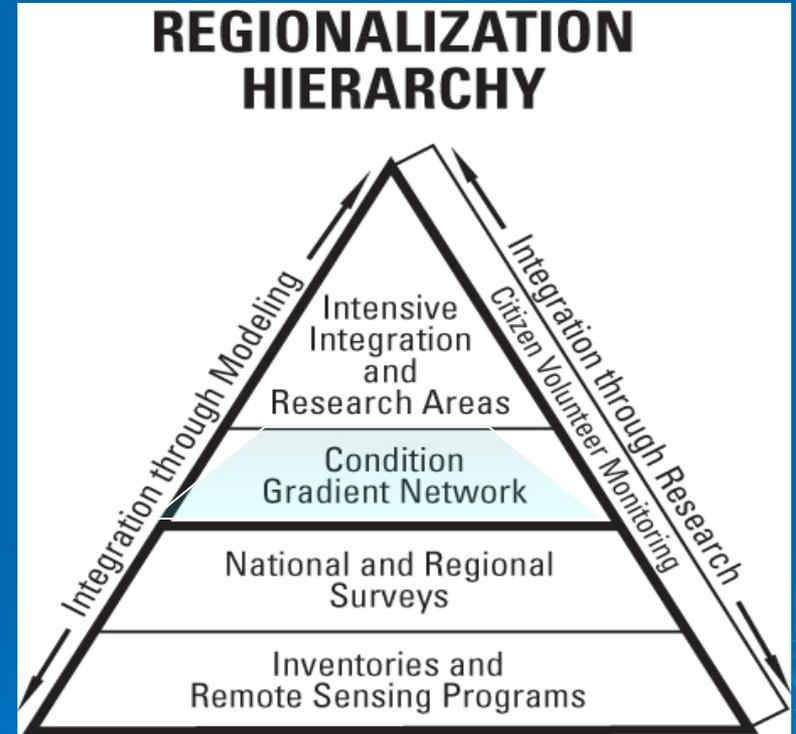
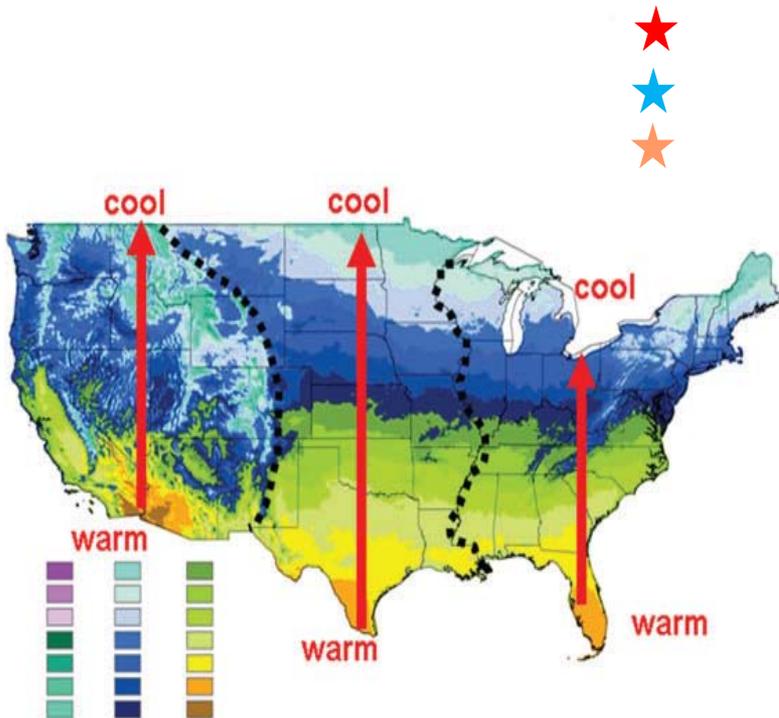
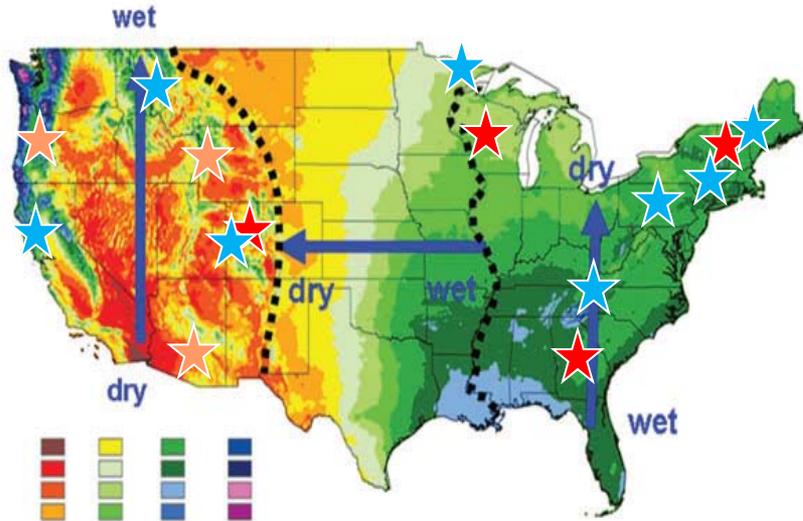
(“Small” in this case is the size of  
the Delaware River Basin)



# Supplement existing long-term record sites to enhance climate effects detection

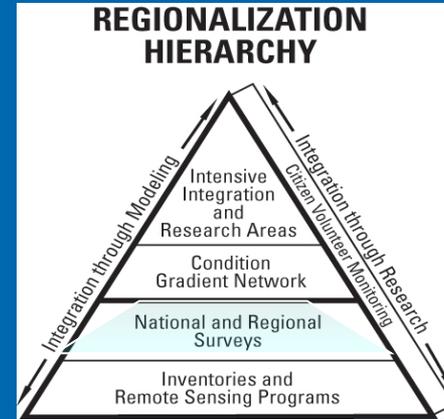


# Build Climate Effects Gradients



Change will happen first at ecosystem boundaries (ecotones)

# Contribute to National Condition Surveys



## Proposed Regional Survey Datasets

- Vegetation Type (FIA)
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- Soil chemistry
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- ★ CEN initial areas (proposed)
- ◊ Survey points (hypothetical)

# Proposed Strategy in Monitoring Design and Implementation

- ❖ Aim to link all scales of monitoring
- ❖ Determine reference from comparison to the population
- ❖ Leverage existing data and infrastructure
- ❖ Integrate water and climate change monitoring with understanding of watershed change (e.g. land use)

# Encourage Collaborative Research:

## New Water Use Initiative

### Flows Needs for Wildlife and Habitat

- Classify the streams across the nation for their hydro-ecological type
- Systematically examine the ecological affects of hydrologic alteration
- Develop flow alteration – ecological response relationships



# Co-Locate New Data Collection



In-situ DOC probes and sediment monitoring for C flux to the coastal ocean