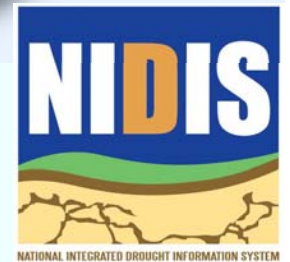
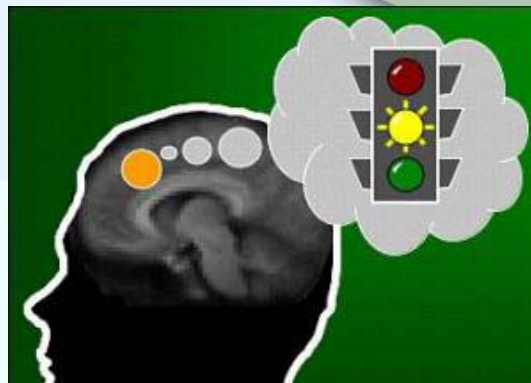
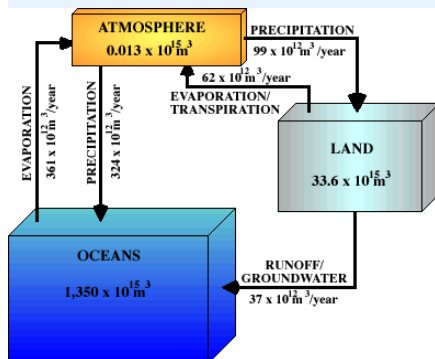


The National Integrated Drought Information System

Roger S. Pulwarty PhD (NOAA)

J. Verdin (USGS), M. Hayes (NDMC)
M. Brusberg (USDA), T. Iseman (WGA),
C. Hennig (DoI), R. Olsen (USACE)
The NIDIS Implementation Team
www.drought.gov



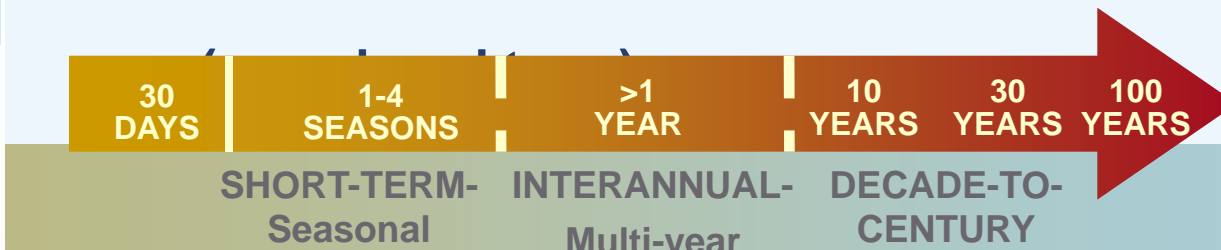
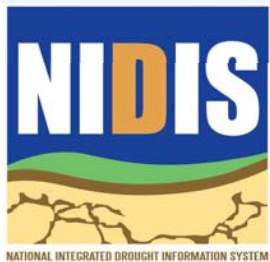
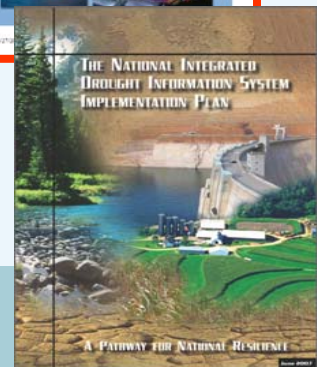
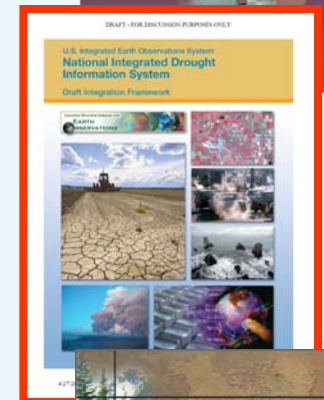
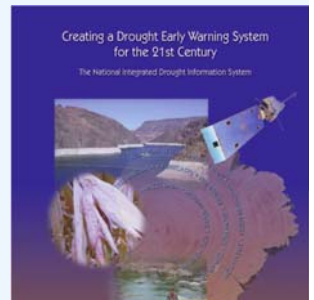


National Integrated Drought Information System

“No systematic collection and analysis of social, environmental, and economic data focused on the impacts of drought within the United States exists today” Western Governors Association 2004

The NIDIS Act of 2006 (Public Law 109-430)

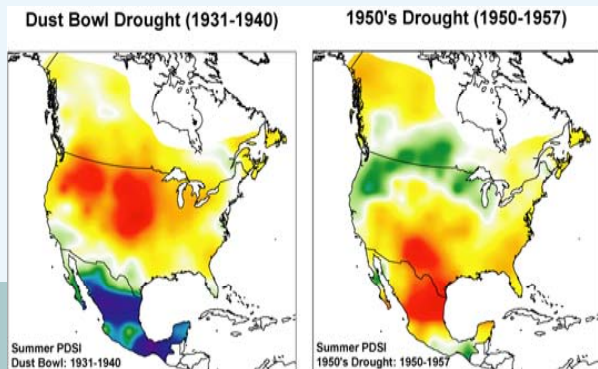
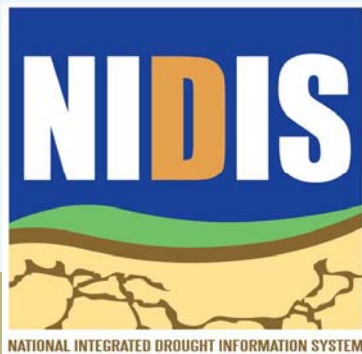
“Enable the Nation to move from a reactive to a more proactive approach to managing drought risks and impacts”





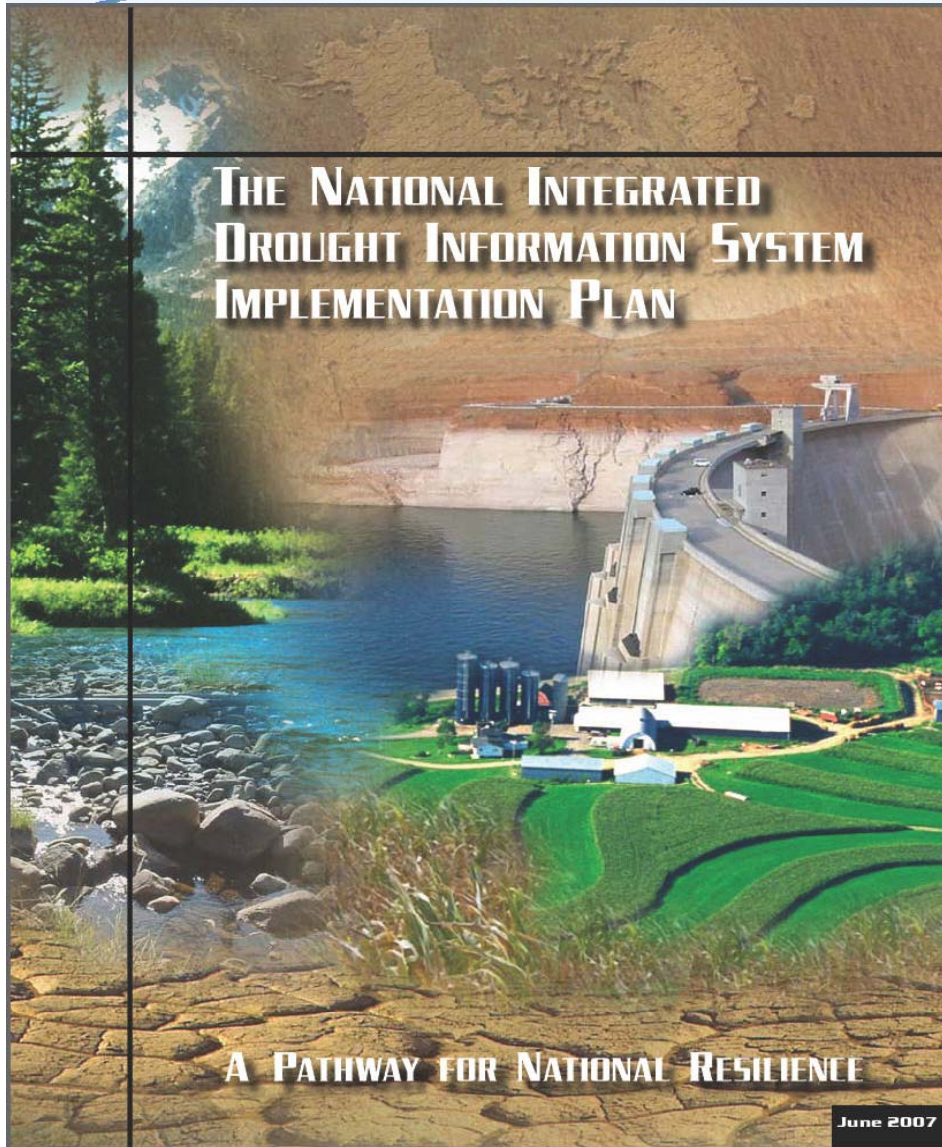
NIDIS has three general tasks under Public Law 109-430, 2006

- (I) Provide an effective drought early warning system that:
 - (a) collects and integrates key indicators of drought and the severity of drought conditions and impacts; and (b) produces timely information that reflect local, regional, and State differences in drought conditions;
- (II) Coordinate and integrate as practicable, Federal research in support of a drought early warning system;
- (III) Build upon existing forecasting and assessment programs and partnerships





NIDIS Components



1. NIDIS Office

2. U.S. Drought Portal

3. Climate Test Beds/Drought

- ✧ Integrating data and forecasts

4. Coping with Drought-Grants-Impacts assessment and decision support research (RISAs, Universities, NGO)

5. NIDIS Early Warning Information Systems

- ✧ Design, Prototyping, Implementation
(multi-agency, multi-state, RCCs, State Climatologists)





Drought and Water Resources: Federal Partnerships



Monitoring & Forecasting



Drought and Flood Impacts Assessments and Scenarios



NIDIS-Early Warning Information in support of Adaptation

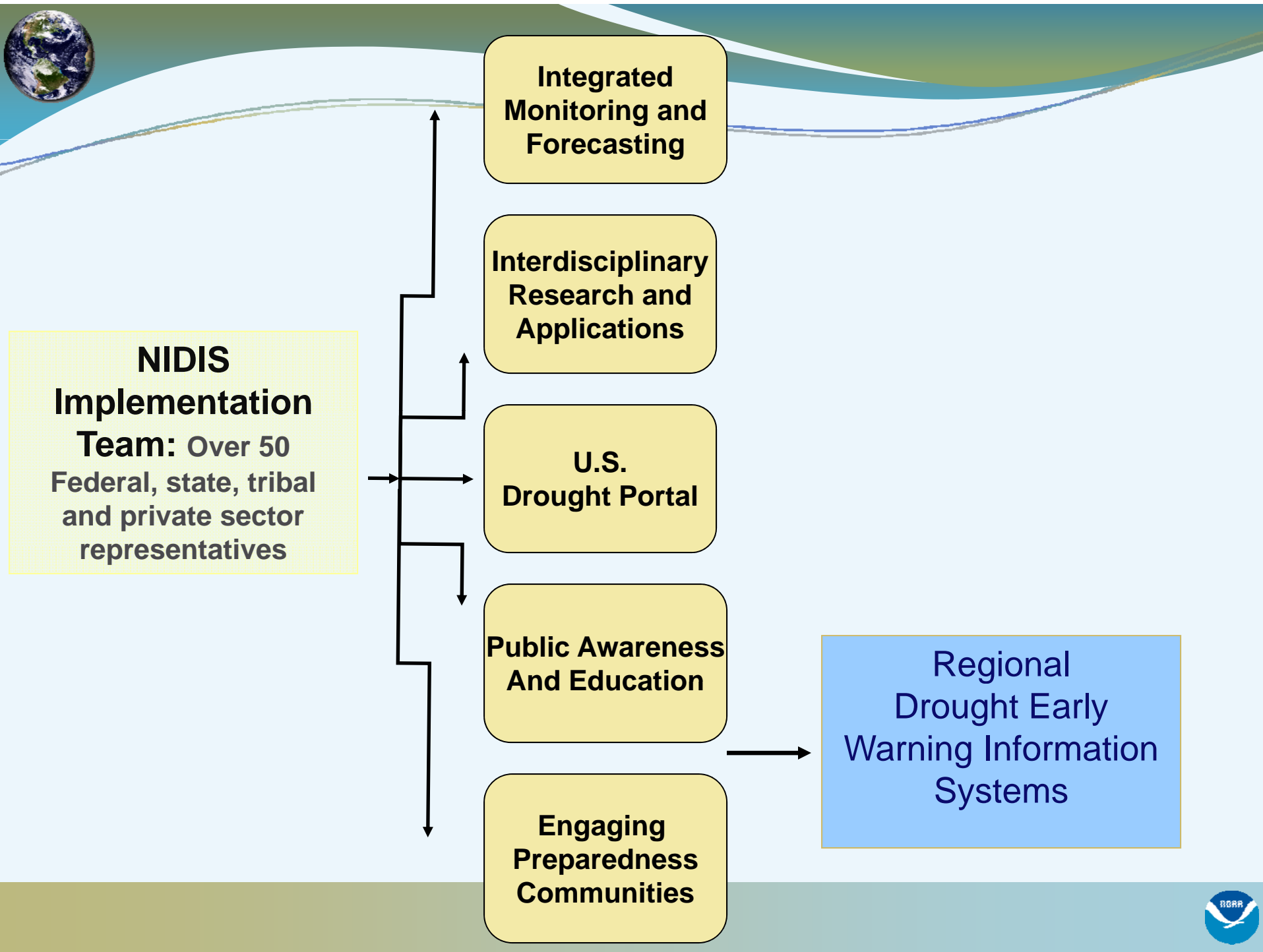


Communication and Outreach



Engaging Preparedness & Adaptation







The NIDIS U.S. Drought Portal (www.drought.gov)

NIDIS National Integrated Drought Information System
U.S. Drought Portal
www.drought.gov

HOME WHAT IS NIDIS? CURRENT DROUGHT FORECASTING IMPACTS PLANNING EDUCATION

Recovery

Area Drought Information

Select State... Go
 Select Region... Go

Maps & Tools

- Map Viewer - **updated!**
- GIS Resources
- Geodata Portal
- Drought Monitor - Graphics
- Data Visualizations

Events & Announcements

- NADM Workshop - April 19-23, 2010
- Scoping workshop ACE Basin - Lake Blackshear, GA - December 2009
- Map Viewer now includes US Drought Outlook - **New!**
- CRN Soil Data - **New!**
- Drought Monitor Forum - Austin 2009
- Drought Index Evaluation Workshop - Boulder, CO - August 2009
- ESA Millenium Conf - November 2009

[View Archive](#) | [Portal Release Notes](#)

Drought In The News

- Big Calif. snowpack no panacea for water users - [Sacramento Bee](#)
- Save your runoff -- create a rain garden - [sacbee.com](#)
- After surviving drought, farmers now say land is too wet | [Houston & Texas News | Chron.com - Houston Chronicle](#)
- 2000s warmest decade on record, government reports | [aic.com](#)
- Calif. storms leave Sierra snowpack shrunken - [Sacramento Bee](#)

Featured Products

Where are Drought Conditions Now? [Affecting Me?](#) [Will the Drought Continue?](#)

U.S. Drought Monitor January 26, 2010
 V067 7 a.m. EST

Drought Conditions

% Area for U.S., including AK, HI & PR (As of 1.26.2010)
 Info Source: National Drought Mitigation Center

Drought Classification	% Area
None	0.13%
D0	1.27%
D1	6.35%
D2	22.05%
D3	70.24%

Drought Information Statements

Click on a highlighted area to view the current NWS Drought Information Statement or Click Here to select from a list

Featured Application

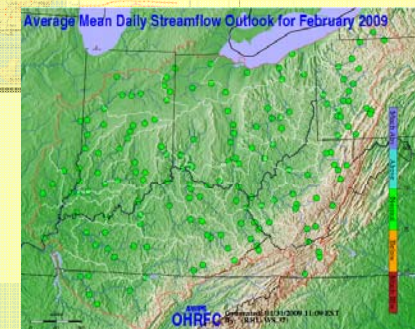
A New Drought Monitoring Tool:
 US Climate Reference Network Soil Moisture Observations

Key Clearinghouse Functions: Credible, Accessible, Timely Information on

Where are drought conditions now?
 Does this event look like other events?
 How is the drought affecting me?
 Will the drought continue?
 Where can I go for help?

Portlet example: NWS River Forecast Center

Ohio River
 Water Resources
 Outlook-
 Ecosystem recovery





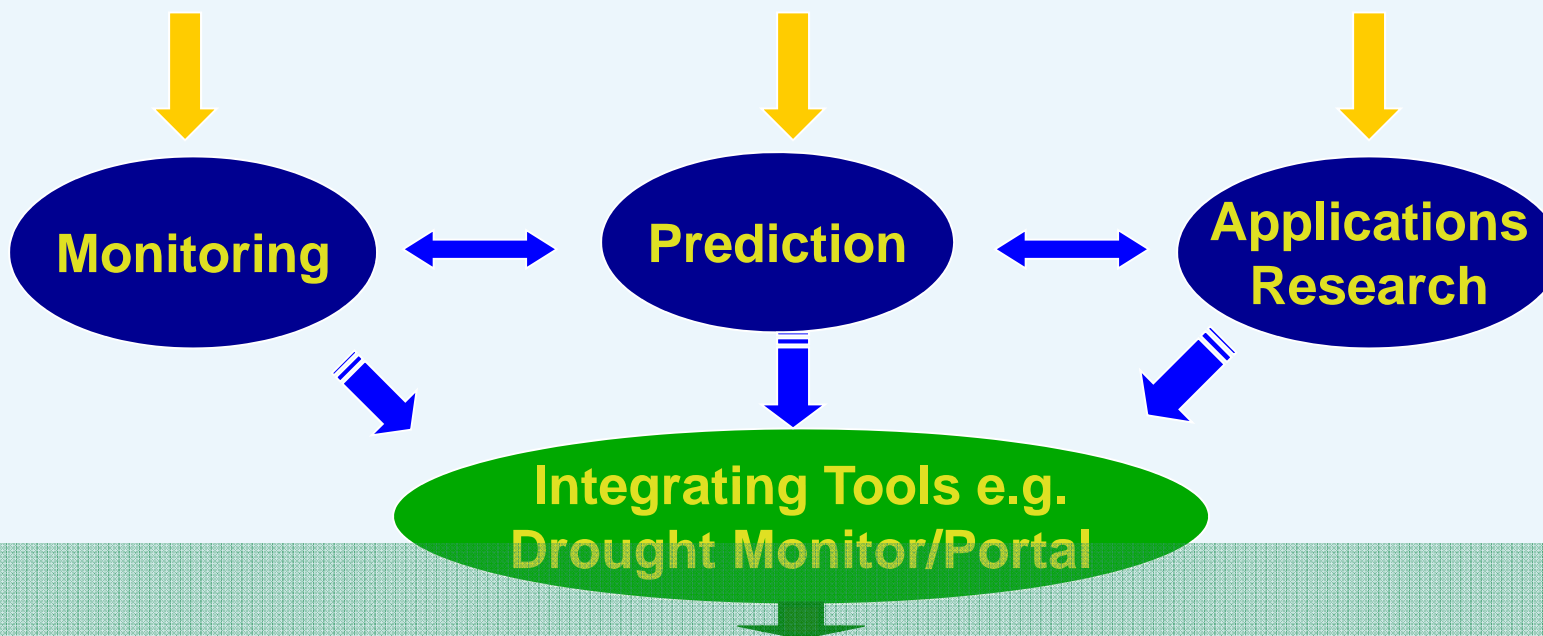
National Level

NIDIS Knowledge Assessments (selected)

- **Remote Sensing Contributions to Drought Monitoring, February, 2008, Boulder-** NOAA, USGS, NASA, USDA, universities, state climatologists, state-local drought officials
- **National Status of Drought Early Warning Systems, June 2008, Kansas City-** NOAA, USGS, USAID, USDA, USACE, NASA, tribes, universities, state government, water managers
- **Drought, Climate change and Early Warning on Western Tribal Lands June 2009-** Columbia, Colorado, Rio Grande, Missouri Basin tribes
 - 2010 Four Corners regions
- **WGA/WSWC Workshops on developing constituencies for NIDIS (Oct 2009, April 2010, September 2010-Washington DC**

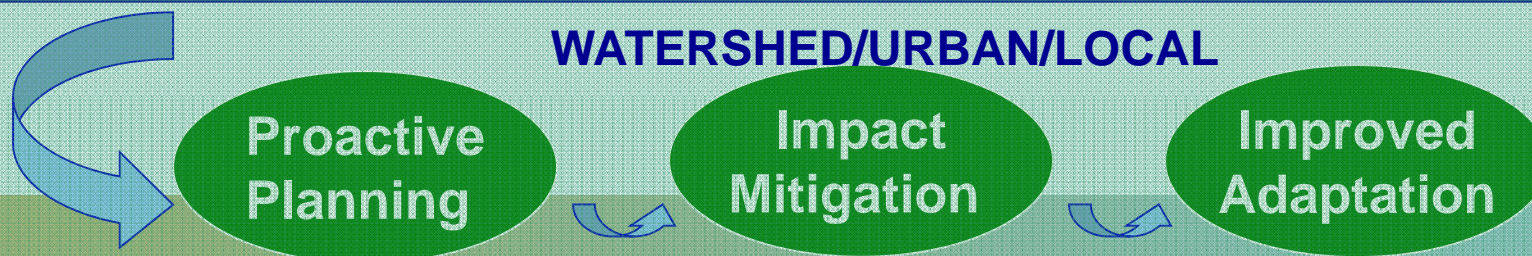
NIDIS REGIONAL INFORMATION MANAGEMENT MODEL

Coordinating existing federal, state, and local drought-related data and decision support activities (e.g., within watersheds and states)



Identifying and transferring indicators, decision support tools and innovative strategies for drought risk assessment, communication and preparedness

WATERSHED/URBAN/LOCAL

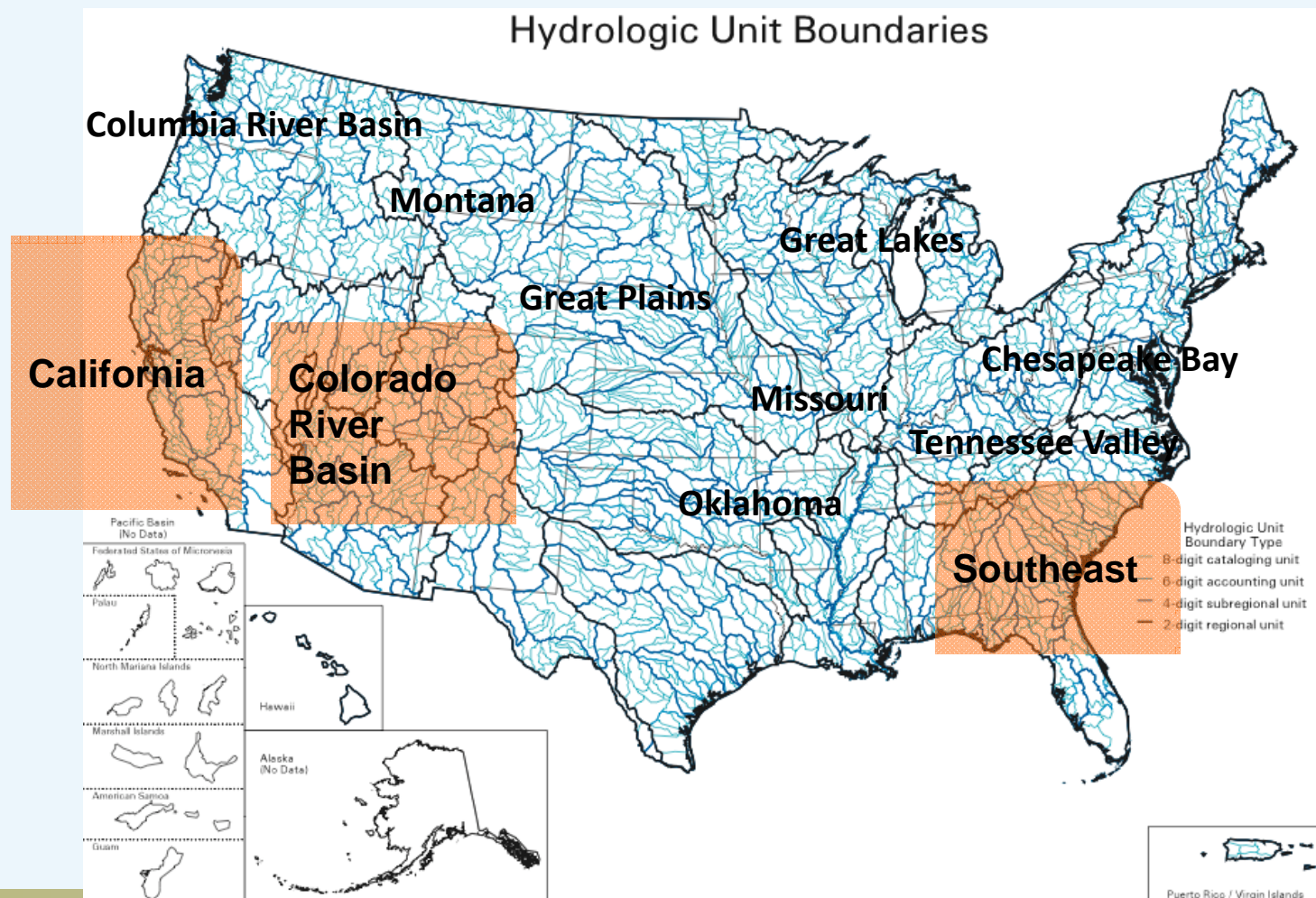




Regional Drought Early Warning Systems

Highlighted-first round prototypes;

Non-highlighted-second round Regional DEWS





Regional DEWS Implementation: Upper Colorado River Basin

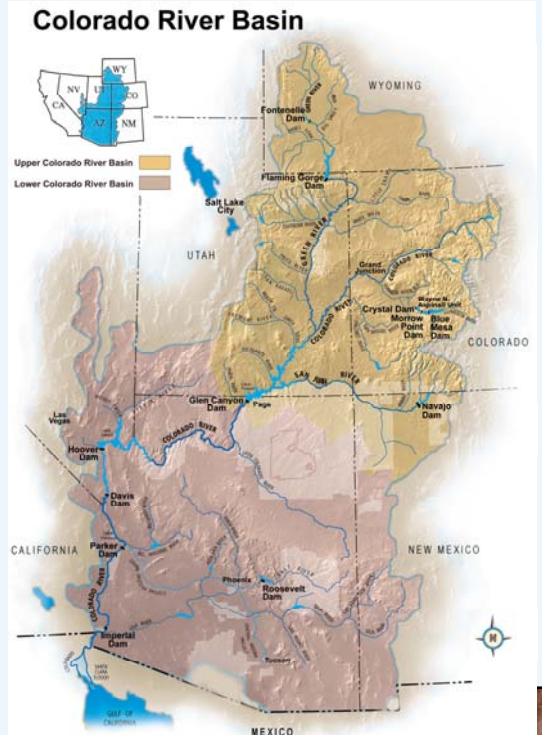
Categories of drought information users & analysis

Upper Basin down to Lake Mead

- Coordinated reservoir operations: Low flow shortage triggering criteria (Powell/Mead)

Sub-basin

- Inter- and Intra-basin transfers; Front range urban-agriculture-Changing water demand during drought
- Ecosystem health/services including recreation and tourism impacts





Regional and Watershed Levels

Applications and Decision Support Research in support of NIDIS

- Adaptation Policies For Urban Water Resource Management-Short-Term Drought Responses And Long-Term Planning
- Socioeconomic Assessments to Build Community Resilience in Mitigating Drought
- Climate Information System to Enhance Drought Preparedness by Underserved Farmers
- Ensemble Hydrologic Forecasts
- Drought Index Evaluation and Implementation in a Geospatial Framework Linked to Hydrologic Data Web Services



Drought information and Resource Management: optimizing risk reduction

Hydropower Decision Calendars

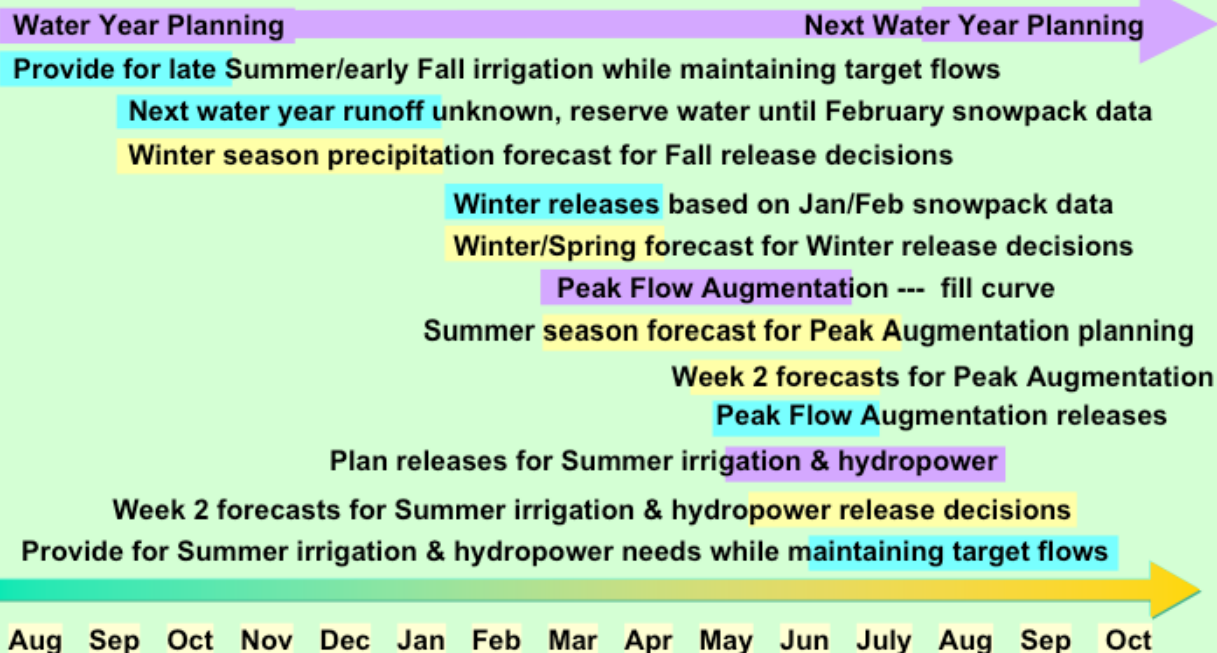
Municipal & Industrial Decision Calendars

Aquatic Ecosystems Decision Calendars

Outdoor Recreation Decision Calendars

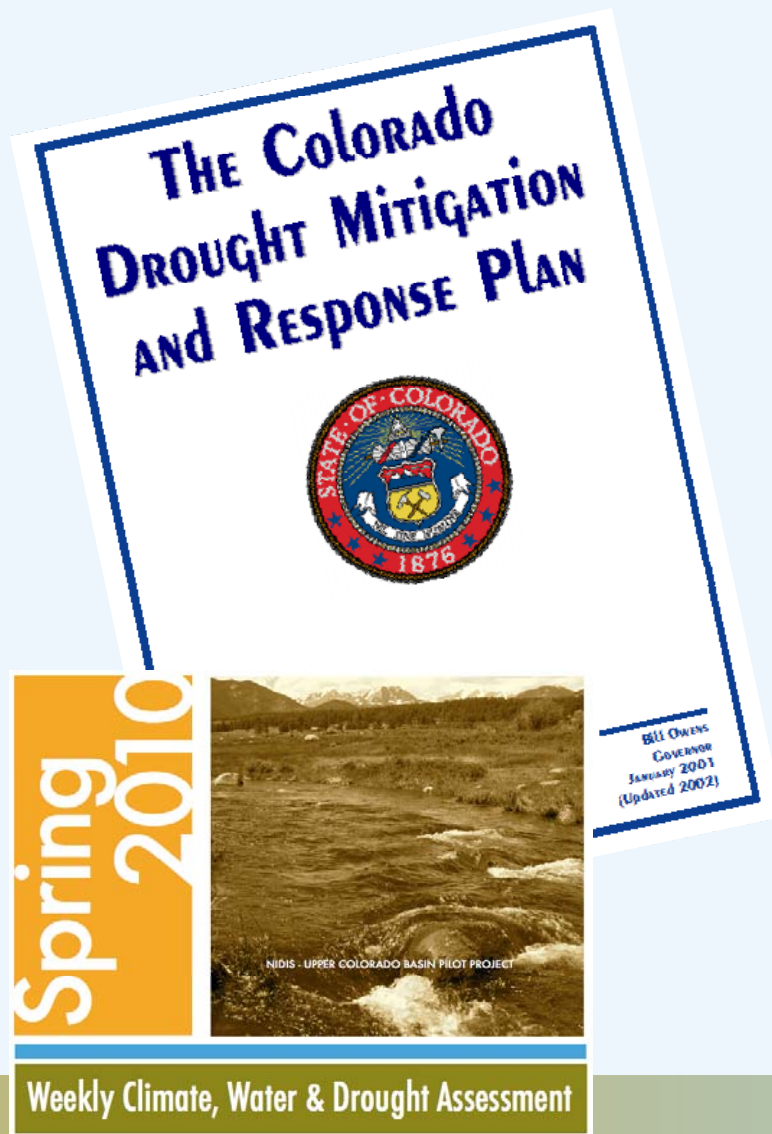
Agriculture Production Decision Calendars

Reservoir Management Decision Calendar





Coordination with State Water Conservation Board

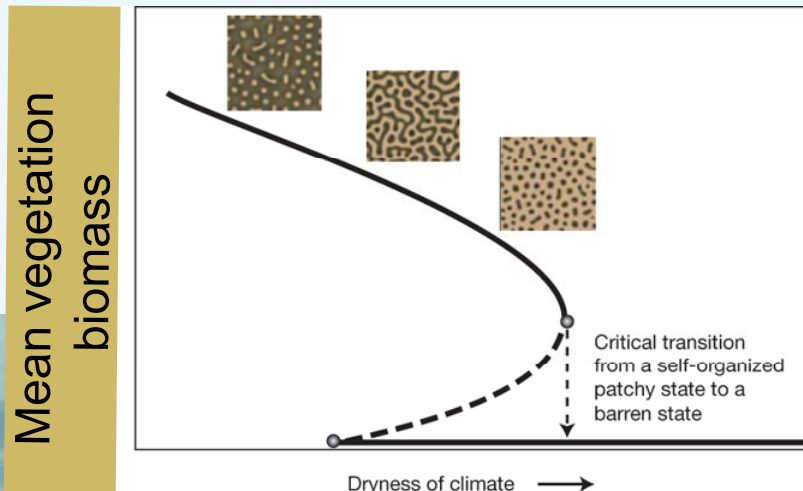


Revision of the Plans to meet drought requirements of the State Natural Hazard Mitigation Plan, as well as FEMA and EMAP

NIDIS

- Development of indices that incorporate current surface water conditions and a forecast component
 - Evaluate trigger points and the responses that they activate
- Weekly Early warning Webinars





Mean vegetation biomass

Dryness of climate

(Nature, 2009)



ACF Corps Dam Watersheds

This map illustrates the ACF Corps Dam Watersheds across Alabama, Georgia, and Florida. The map is color-coded and annotated to show the following categories:

- Water supply:** Indicated by a purple oval in the northern region, encompassing the Lake Sidney Lanier and Buford Dam watershed.
- Energy:** Indicated by a blue oval in the central region, encompassing the West Point Lake and Dam, Langdale Dam, Riverview Dam, Bartlett's Ferry Dam, Goat Rock Dam, Oliver Dam, North Highlands Dam, City Mills Dam, Eagle & Phoenix Dam, and Walter F. George Lake and Dam.
- Agriculture:** Indicated by a green oval in the eastern region, encompassing the Blackshear Dam and Flint River Dam.
- Near-shore impacts:** Indicated by a pink oval in the southern region, encompassing the Lake Seminole and Jim Woodruff Dam watershed.

The map also shows major cities (Birmingham, Macon, Columbus, Albany, Tallahassee, Dothan, Apalachicola), rivers (Chattahoochee, Flint, Apalachicola), and state boundaries. A legend identifies Corps Lake and Dam Projects (solid lines) and dams owned by other entities (dashed lines). The scale is 1:600,000.

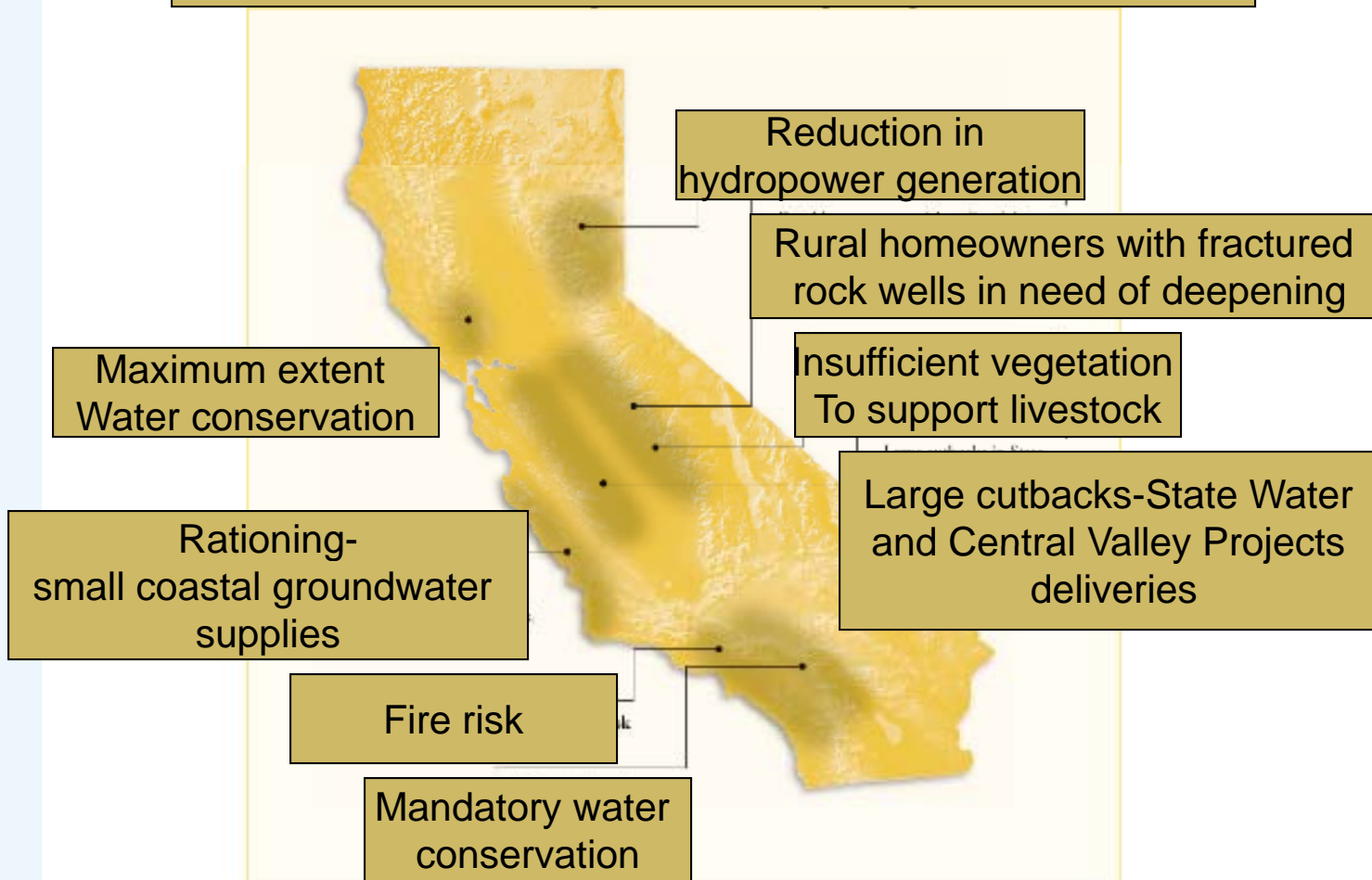
A map of the Southeastern United States, specifically focusing on Alabama, Georgia, and Florida. The map is divided into two main colored regions: a yellow region labeled 'ACT BASIN' and a green region labeled 'ACF BASIN'. The ACT BASIN is located in the western part of Alabama and includes features like the Coosa River, Lake Allatoona, Lake Lanier, and several other lakes. The ACF BASIN is located in the eastern part of Alabama and Georgia, including the Chattahoochee River, Lake Seminole, and the Walter F. George Reservoir. Major cities like Birmingham, Atlanta, Columbus, and Tallahassee are marked. The map also shows the borders of Tennessee, North Carolina, South Carolina, and Florida, as well as the Gulf of Mexico and the Apalachicola River.

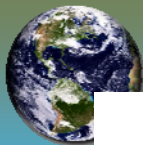
Apalachicola- Chattahoochee-Flint Basin





California-Potential Impacts of continued drought





North American Drought Monitor

May 31, 2010

Released: Friday, June 11, 2010






<http://www.ncdc.noaa.gov/nadm.html>

Analysts:


Canada - Trevor Hadwen
Dwayne Chobanik
Mexico - Valentina Davydova
Adelina Albanil
Elvia Delgado
Reynaldo Pascual
Fernando Romero
U.S.A. - Brad Rippey*
Brian Fuchs

(* Responsible for collecting analysts' input & assembling the NA-DM map)

Intensity:

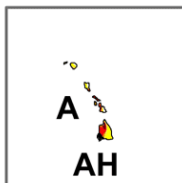
-  D0 Abnormally Dry
-  D1 Drought - Moderate
-  D2 Drought - Severe
-  D3 Drought - Extreme
-  D4 Drought - Exceptional

Drought Impact Types:

 Delineates dominant impacts

A = Agriculture

H = Hydrological (Water)

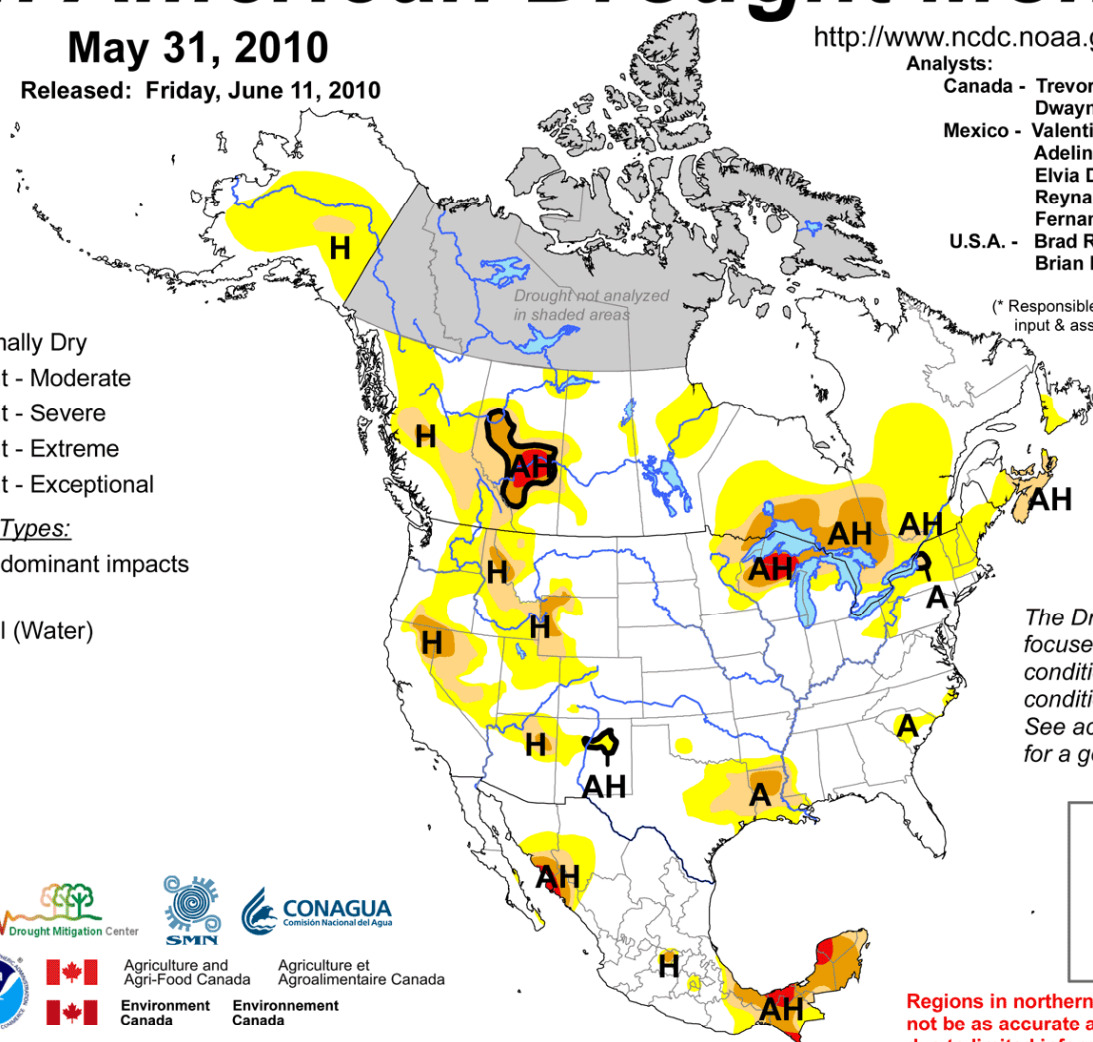


Agriculture and
Agri-Food Canada

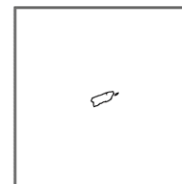
Agriculture et
Agroalimentaire Canada

Environment
Canada

Environnement
Canada



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



Regions in northern Canada may not be as accurate as other regions due to limited information.





Drought and water resources:

Engaging communities, resources managers in a changing climate

(RISAs, RCCs, State Climatologists Climate Forecasting Test-Beds,
→NIDIS)



Climate information needs and usability:

Entry points for proactive Planning-triggers and indicators

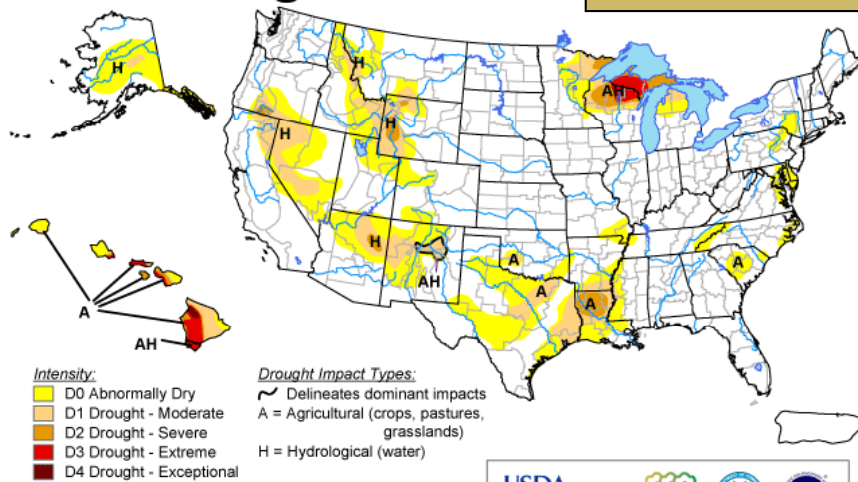


Enabling adaptation:

Best available drought risk & water supply information Input to drought planning, preparedness and adaptation

U.S. Drought Monitor

June 22, 2010



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

<http://drought.unl.edu/dm>



Released Thursday, June 24, 2010

Author: Laura Edwards, Western Regional Climate Center

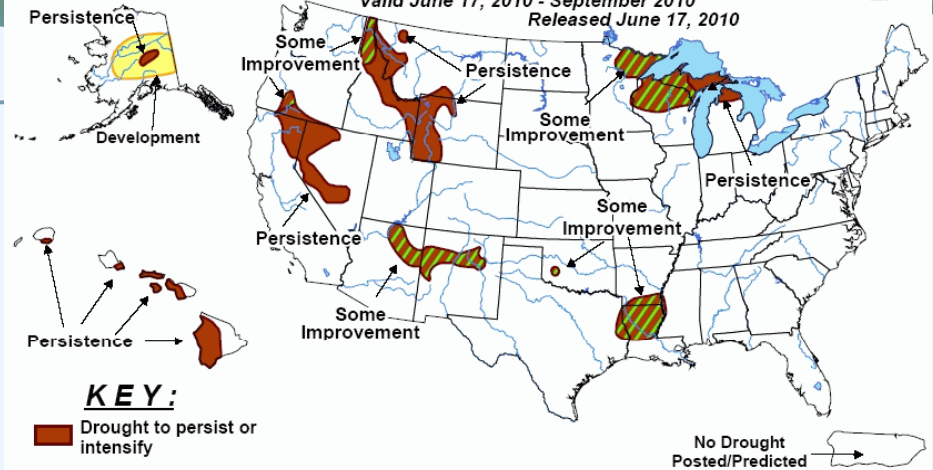


U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid June 17, 2010 - September 2010

Released June 17, 2010



June-September 2010

areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

Seven drought declarations as of June 17, 2010

Northeast

- reduction in extent of dry conditions

Southern Plains/Gulf

- DFW-driest May-June since 1899, heat

Upper Midwest

- Severe to no-drought gradient, fire potential

Mississippi River Valley

- heat, dry along the AK-MI border

Mid-Atlantic

- developing in Baltimore-DC area

The West

- **Lake Powell-65% capacity, early runoff, PNW/CA fire potential, SW-Four corners drought continues**

Hawaii

- Persistent drought, water quality issues

Alaska

- Fire risk

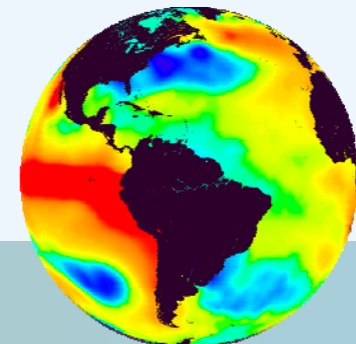
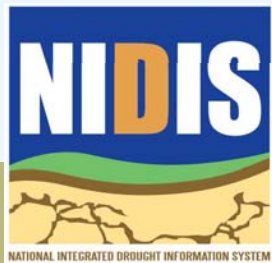
Conditions are favorable for a transition to La Niña conditions during June – August 2010





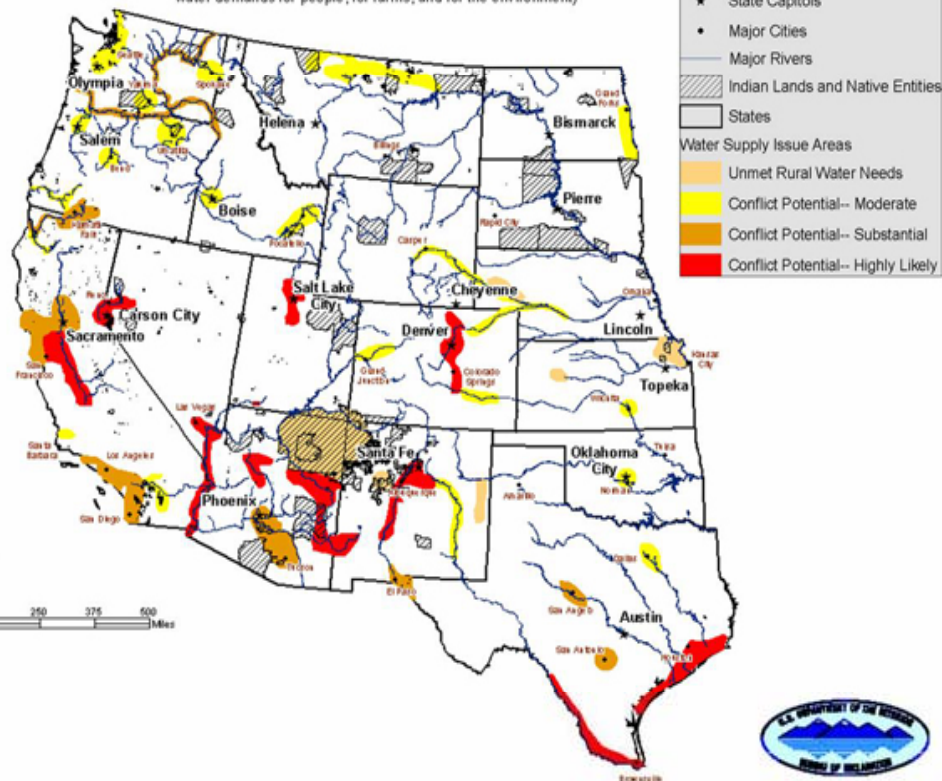
“We would cite the National Integrated Drought Information System (NIDIS) as one example of how federal agencies can work together and with statesNIDIS is not perfect yet– but it demonstrates key elements of how....to deliver actionable information to end users and decisionmakers”

Western Governors letter to CEQ-Response to CEQ
Adaptation Interim Report May 21, 2010



Potential Water Supply Crises by 2025

(Areas where existing supplies are not adequate to meet water demands for people, for farms, and for the environment)



THANK YOU



BACKUP SLIDES

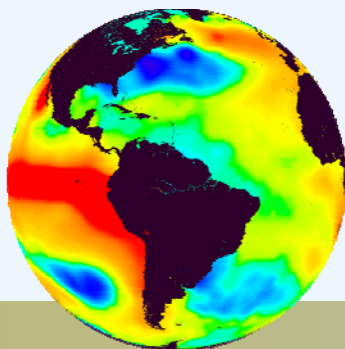


NIDIS as prototype: Informing climate services development



“If we don’t get NIDIS right, we can’t get a national climate service right”

Kelly Redmond, Western Regional Climate Center



6th Drought Monitor Forum
Austin, Tx Oct. 7-8, 2009



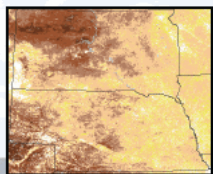


Vegetation Drought Response Index (VegDRI)

- ✓ Hybrid Drought Index that Integrates:
 - Satellite-based observations of vegetation conditions
 - Climate-based drought index data
 - Biophysical characteristics of the environment

1. Historical Database Development

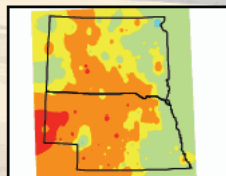
Satellite Data



Data Input Variables

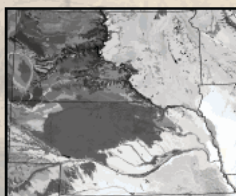
- 1) Percent Annual Seasonal Greenness (PASG)
- 2) Start of Season Anomaly (SOSA)

Climate Data



- 1) Palmer Drought Severity Index (PDSI)
- 2) Standardized Precip. Index (SPI)

Biophysical Data



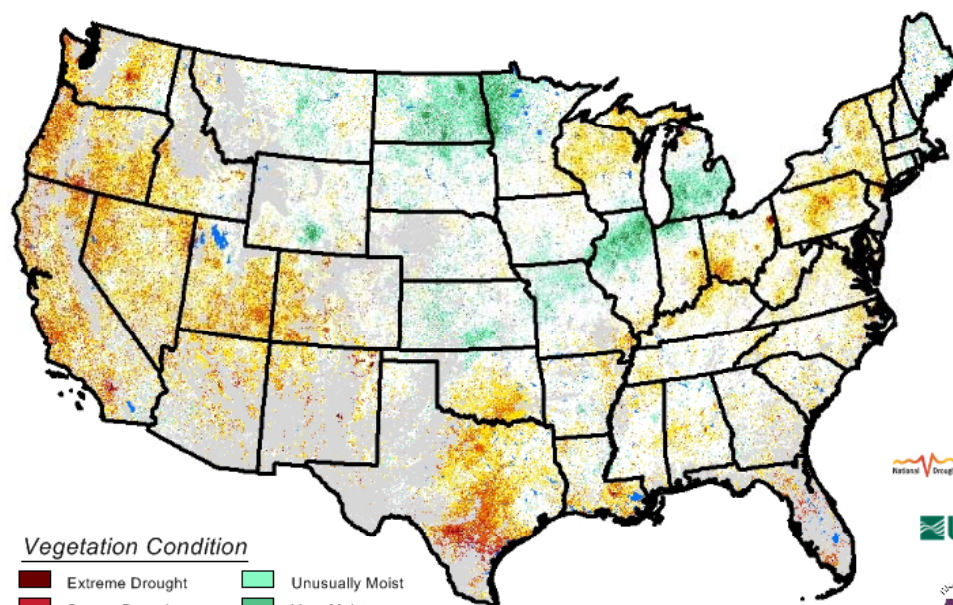
- 1) land use/ cover type
- 2) soil available water capacity (STATSGO)
- 3) ecoregion type
- 4) irrigation status
- 5) elevation

(Source: Wardlow, 2008)

http://drought.unl.edu/vegdiri/VegDRI_Main.htm

Vegetation Drought Response Index Complete

May 4, 2009

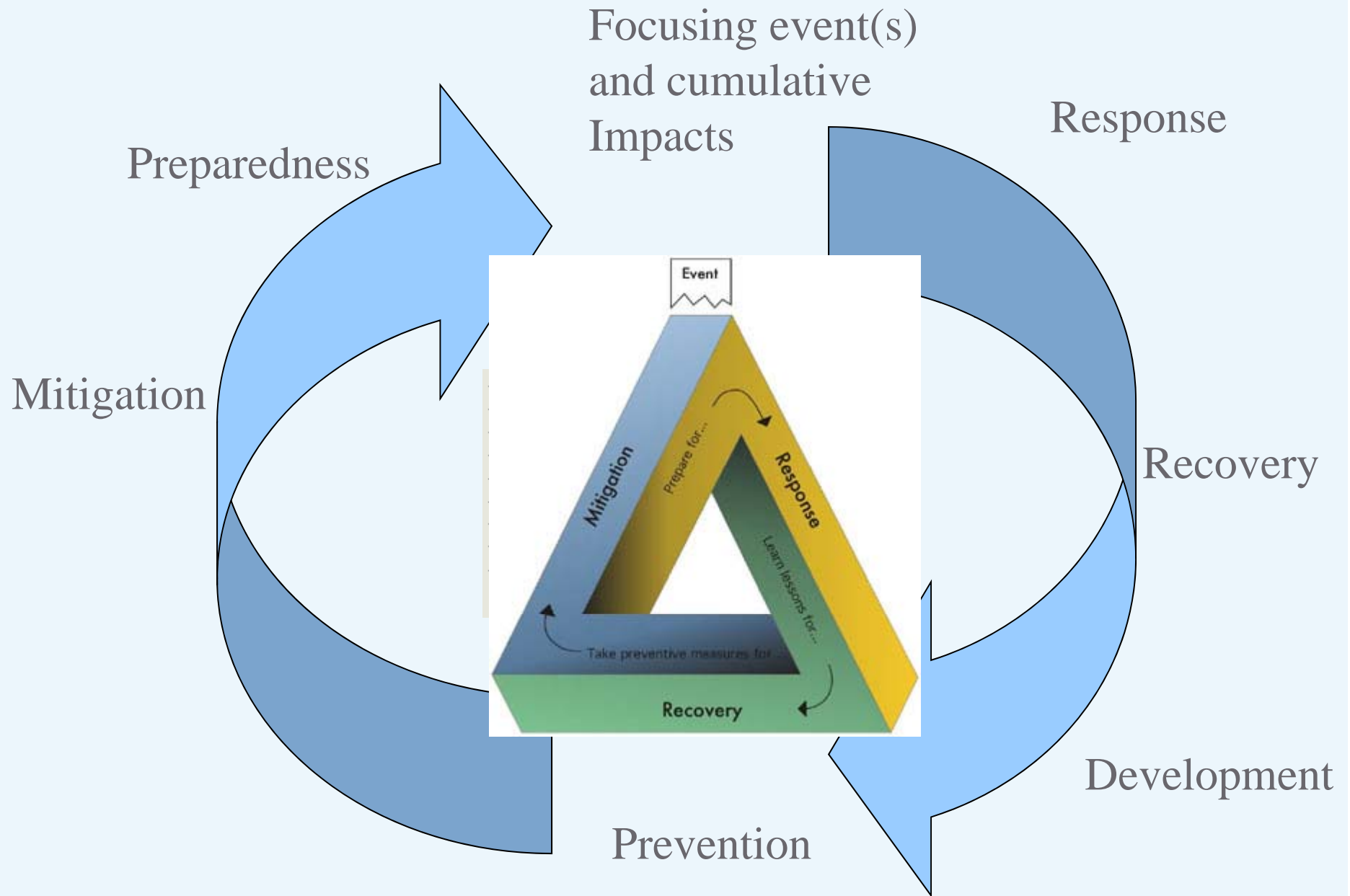


Vegetation Condition

- | | |
|------------------|-----------------|
| Extreme Drought | Unusually Moist |
| Severe Drought | Very Moist |
| Moderate Drought | Extremely Moist |
| Pre-Drought | Out of Season |
| Near Normal | Water |



Event to event..Hyogo Framework..issue attention cycle





Implementation

Upper Colorado River Basin:

Existing mandates, decision cycles, and organizational capacities to guide implementation of the pilot

- Colorado Division of Water Resources (CDWR)
- Colorado State Climatologist
- Colorado River Water Conservation District (CRWCD)
- Colorado Water Conservation Board (CWCB)
- CU – Western Water Assessment, CIRES, and CADSWES
- Denver Water Board
- Northern Colorado Water Conservancy District (NCWCD)
- Wyoming State Engineer
- Wyoming State Climatologist
- Utah State Climatologist
- Desert Research Institute/WRCC
- National Center for Atmospheric Research (NCAR)
- National Drought Mitigation Center (NDMC)
- USDA: Natural Resources Conservation Service
- USFS: Region 2
- USBR: Eastern Colorado Area Office, Great Plains Region, Office of Policy and Programs, Research and Development
- USGS: Colorado Water Science Center, Central Region, Grand Canyon Monitoring and Research Center
- NOAA: Earth System Research Laboratory, National Centers for Environmental Prediction, National Climatic Data Center, National Weather Service

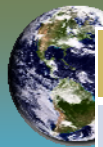




Drought and Water Resources Services

Mission: Implement a dynamic, accessible, authoritative drought information system

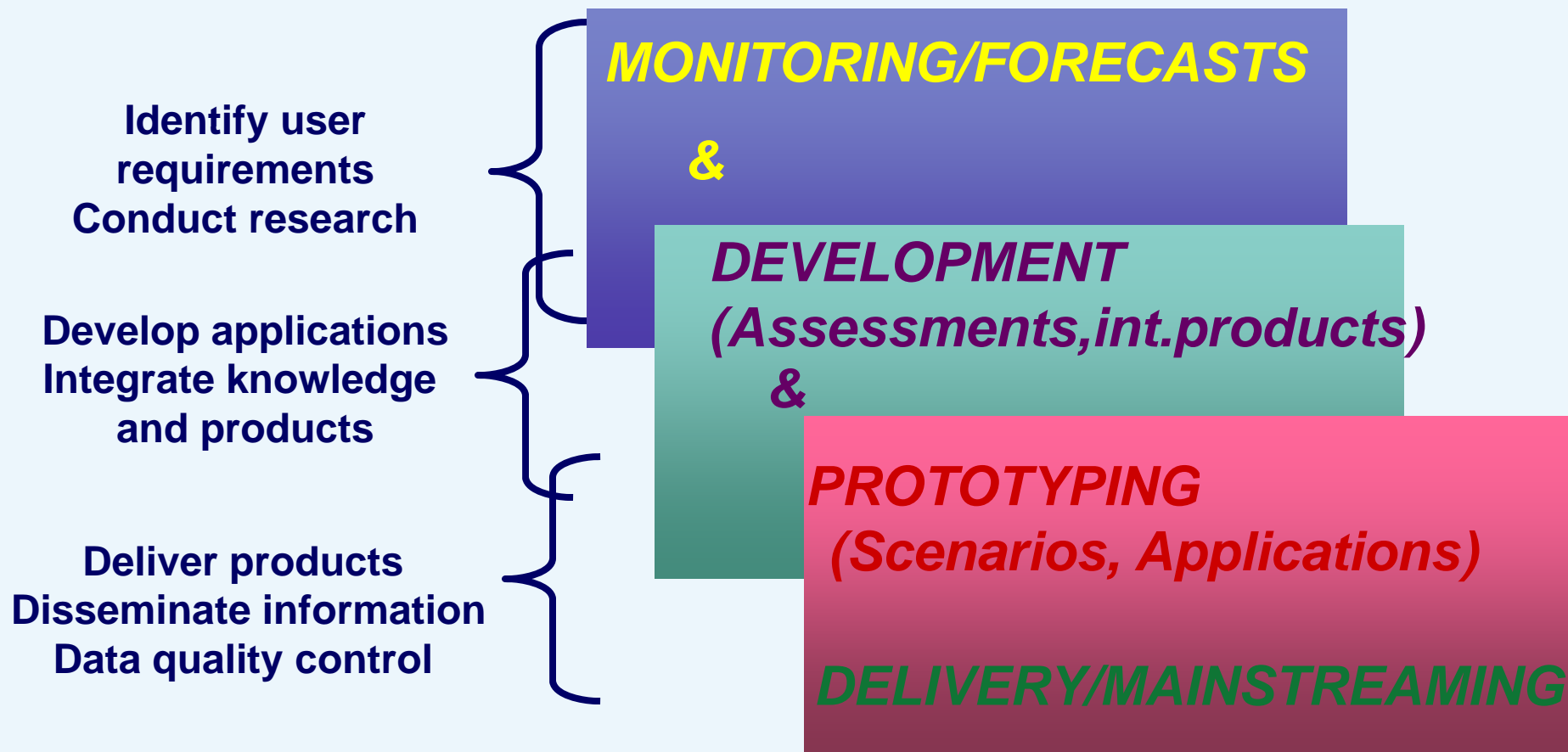
NOAA Produces:	With Our Partners:	Used By:
Monitoring and Forecasting		
U.S. Drought Monitor	USDA, National Drought Mitigation Center	USDA, state and local governments
U.S. Soil Moisture Monitoring	DOE, USDA (NRCS)	USDA, agricultural producers
Normalized Difference Vegetation Index	USGS, NASA	USAID (FEWS NET)
Crop Moisture Index	USDA	USDA, agricultural producers
Ensemble Water Supply Forecasts	USDA	USBR, USACE, state water management agencies, local district water managers
Soil Moisture Anomaly Forecast	USDA (NRCS)	USDA, agricultural producers



NOAA Produces	With Our Partners:	Used By:
Products Informing Risk Assessment and Management		
Reconciling projections of future Colorado River stream flow in a changing climate	USBR, USGS, University of Washington, University of Colorado, University of Arizona, University of California-San Diego	USBR, state and local water providers, reservoir managers, Water Conservancy Districts
USGS Circular 1331: Climate Change and Water Resources Management: A Federal Perspective	USGS, USBR, USACE	USBR, USACE, Water Utilities
Climate Change in Colorado: A Synthesis to Support Water Resources Management and Adaptation	Colorado Water Conservation Board, University of Colorado, Western Water Assessment RISA	Colorado water planners, State Climatologists
Managing Threatened and Endangered Salmon in Low Water Conditions	USBR, CA Department of Fish and Game, CA Department of Water Resources, University of California Davis, Humboldt State University	NMFS, CA Department of Fish and Game, CA Department of Water Resources, Pacific Fisheries Management Council
Assessing Drought Indicators and Triggers	USGS, USDA (NRCS), Colorado Water Conservation Board, Colorado State University, Utah State University, University of Wyoming	USGS, USDA, USBR, water planners/providers, reservoir managers, State Climatologists



The “Services” Challenge



Relative status of information

STATIC.....EMERGENT/DYNAMIC



Regional Drought Early Warning System Upper Colorado River Basin

Given better data and information coordination, would responses have been improved for past events?

Assess:

1. Value of improved information using past conditions
2. Responses for projections/ scenarios(decadal, climate change)
3. Feedback on priorities (e.g. data gaps) to Interagency Executive Council



Connecting geospatial and temporal water resources data

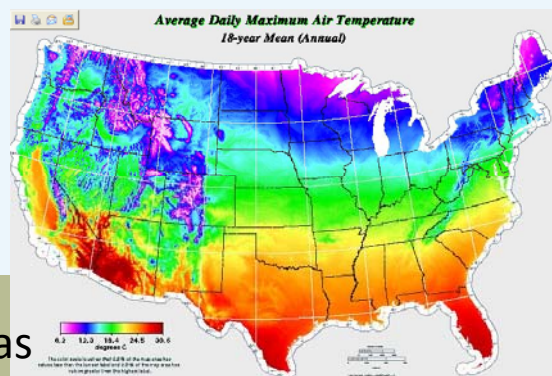
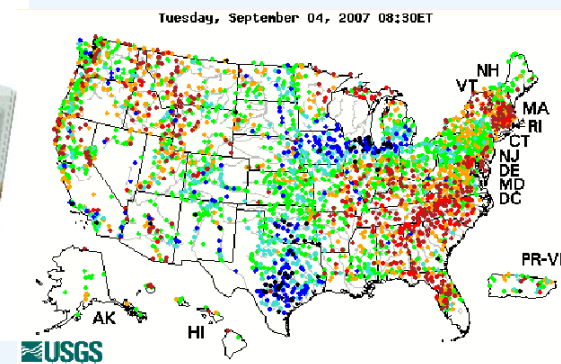
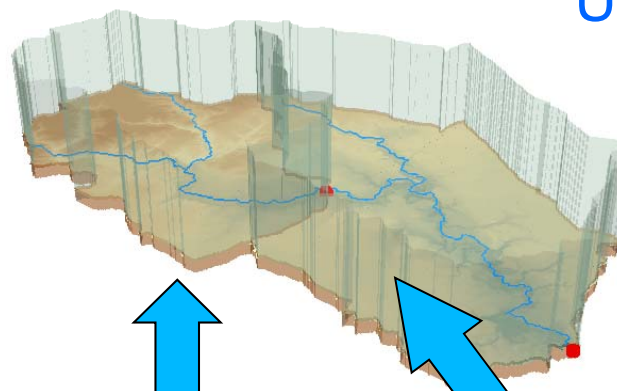
Digital Watershed

USGS NWIS Streamflow

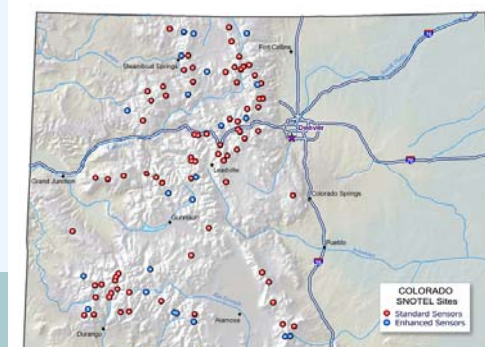


NHDPlus

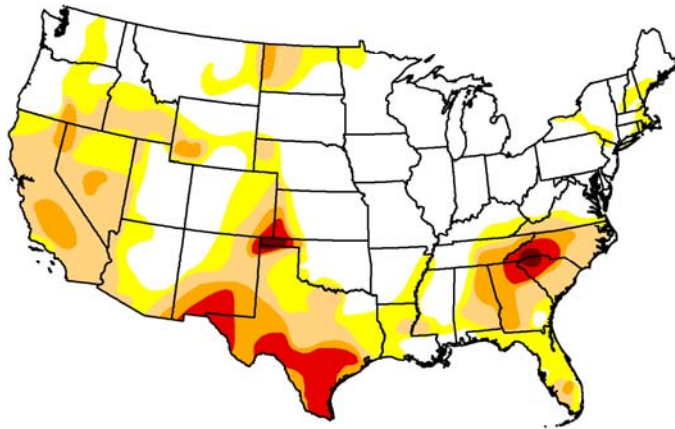
NOAA NCDC
and ASOS



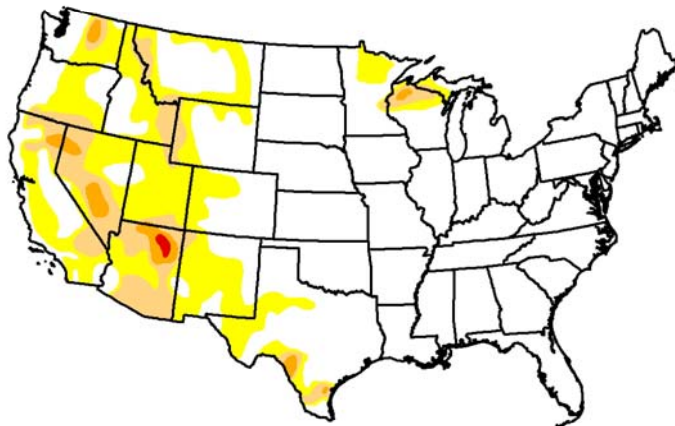
NRCS
Snotel



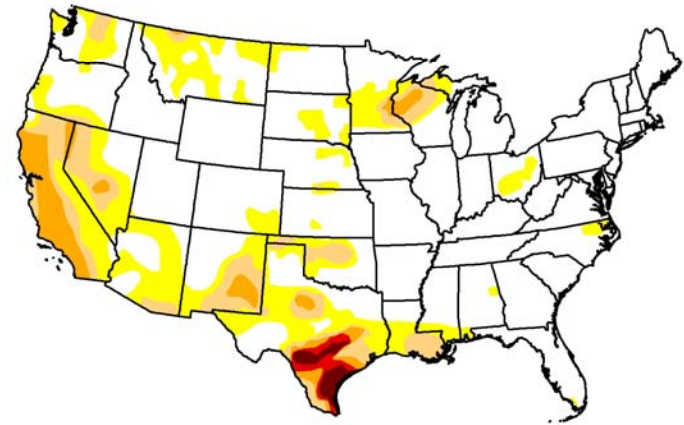
David Maidment, U Texas



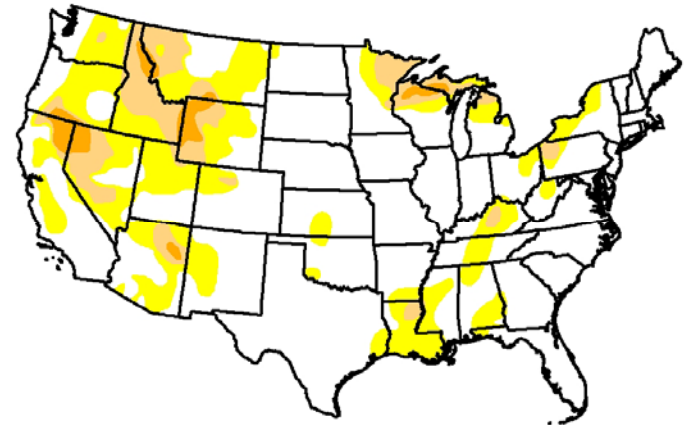
June 24, 2008



January 25, 2010



June 23, 2009



20 April 20, 2010



NIDIS Governance: Executive Council

NIDIS Program Office

**NIDIS Implementation Team: Over 50
Federal, state, tribal and private sector
representatives**

REGIONAL
NIDIS Technical Working Groups

**Public Awareness
And Education**

**Engaging
Preparedness
Communities**

**Integrated
Monitoring and
Forecasting**

**Interdisciplinary
Research and
Applications**

**U.S.
Drought Portal**

Integrated Drought Information Systems

Drought Early Warning System Design-Information clearinghouse, Pilots, and Implementation

