National Integrated Drought Information System (NIDIS)

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NIDIS VISION and GOALS

"A dynamic and accessible drought information system that provides users with the ability to determine the potential impacts of drought and the associated risks they bring, and the decision support tools needed to better prepare for and mitigate the effects of drought."

Public Law 109-430 (Signed by the President December 2006)

(www.drought.gov)

NIDIS VISION and GOALS

"If we don't get NIDIS right, we can't get a national Climate Service right."

Kelly Redmond, Oct. 7, 2009

6th Drought Monitor Forum
Austin, Tx

Outline

- Upper Colorado River Basin Pilot Activities
- Southeast US Pilot Activities
- Non-Pilot Activities
- The next NIDIS Pilot

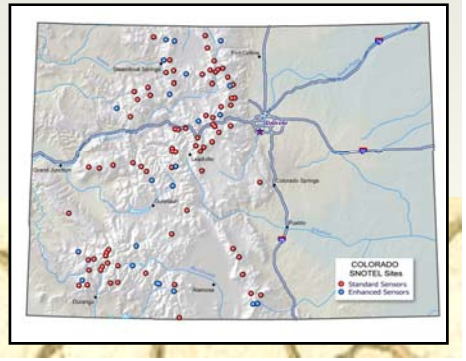
Pilot Implementation
Upper Colorado River Basin:
Scoping Workshop

- Assessment of gaps in present monitoring and forecasting systems within the basin
- Assimilation of existing drought-related indicators, triggers and trends into one accessible location
- Promote interaction (existing websites, datasets) with the US Drought Portal to begin developing a Colorado Basin Drought Portal and information clearinghouse
- Begin efforts to develop an Upper Colorado basin-specific drought monitor

Pilot Implementation
Upper Colorado River Basin:

Monitoring Gaps Analysis

- Existing drought monitoring practices: Where are we today?
  - Indicators & Triggers for decision makers
- Gaps in our understanding of drought: Past, present and future
  - Are we making good use of what measurements we already have?
- Gaps in current observational networks (e.g., stream gages, wx obs, SNOTEL, soil moisture, reservoir levels)
  - What is the status of these networks?
- Gaps in analytical products and tools
  - "Where does the snow go?" → Sublimation & soil moisture products
- Gaps in knowledge of water use



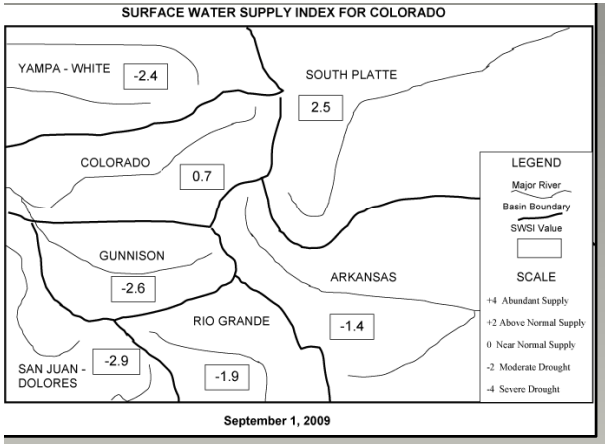
Pilot Implementation
Upper Colorado River Basin:

Nolan Doesken, the CO State Climatologist, is a key to the pilot's success!

Pilot Implementation Upper Colorado River Basin:

Gaps and Concerns

- Relate managed flow to estimated native flow
- More snowpack measurements, including above tree line
- Revisit the Surface Water Supply Index (SWSI) in Colorado
- Geographical gaps in measurement networks (stream gages, snowpack), e.g., Rocky Mtn Nat Park
- Continuation of measurements at stations with long-term records
- Some decision makers need additional forecast points added to the river forecast center's forecast
- Concern about the timing of calls on the river
- Historical context – How do current measurements fit in with past measurements?
- A better understanding of water demand
- Water supply predictions with proven skill 2 years in advance



Pilot Implementation Upper Colorado River Basin:

Indices and Triggers - Drought Index Workshop

- The Surface Water Supply Index (SWSI) currently used in Colorado is due for an update/upgrade
  - More statistical rigor
  - Address discontinuities between seasons (due to the switch between streamflow and snowpack in the calculations)
  - Create a more customizable drought index product
    - e.g., user can choose the basin, the reservoirs and time period for the calculations
  - Coordination with Natural Resources Conservation Service, Colorado Water Conservation Board, Utah State/CUAHSI

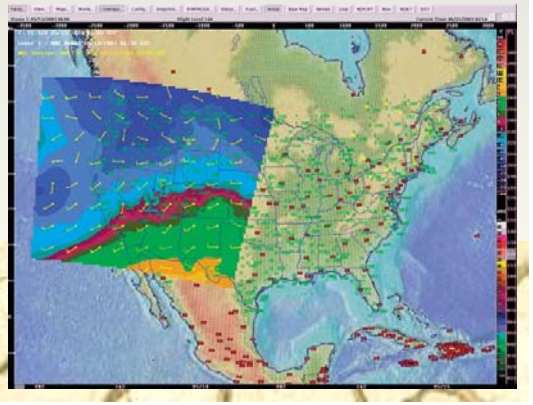
Pilot Implementation
Upper Colorado River Basin:
Water Demand

Analysis of the UCRB water demand (Wilhelmi; NCAR):

Characteristics, spatial patterns & assessment of potential vulnerabilities

- Phase 1:
  - UCRB water demand data assessment
  - Conduct data inventory and develop a comprehensive database of past and present water demand
  - Identify spatial, temporal and qualitative data gaps

- Phase 2:
  - Choose an appropriate case study area
  - Using GIS, classify water consumption per sector, types of uses, etc.
  - Analyze spatial and temporal patterns in water demand
  - Identify consumption patterns by sector
  - Identify potential vulnerabilities due to competitive water demand



Pilot Implementation
Upper Colorado River Basin:
Year Two Actions

Use what we've learned in Year One to initiate the Colorado Basin Drought Monitor

- Establish network for ongoing briefings on impacts and projections across climate timescales (UCRB Drought Monitor) – beginning in the 2010 water year
- Develop decision support tools for demand projections and review of triggering criteria
- Feedback into Colorado Basin Drought Monitor and Portal development

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

Pilot Implementation Southeast US

- Southeast United States Pilot
  - Planning workshop – July 2009
  - Apalachicola-Chattahoochee-Flint (ACF) Basin planning workshop – Sep 2009

Bluffs on the Apalachicola River (from the Northwest Florida Water Management District's web site)

Pilot Implementation
Southeast US Pilot:
First steps - Planning workshop

- State Climatologists, RISAs, Climate Centers, Army Corps of Engineers, EPA, NDMC, NOAA, Fish & Wildlife
  - Review of drought activities in the SE
  - Discussions regarding interdisciplinary research, integrated monitoring & forecasting, and engaging preparedness

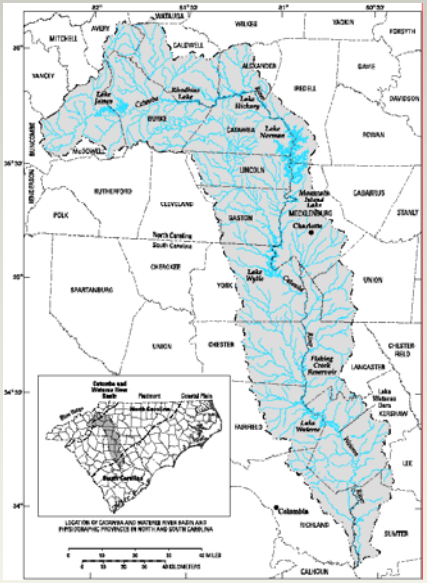
Addressed these key questions…

What would an early warning system for the southeast US look like?
Who should participate in the pilot implementation?
What key geographical areas & critical issues should we focus on?

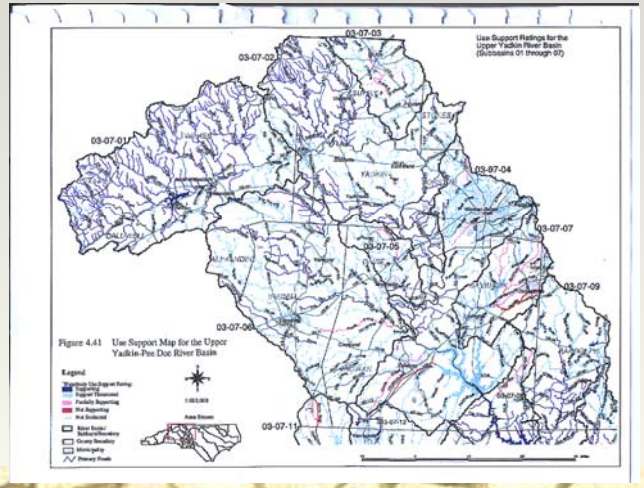
Pilot Implementation
Southeast US Pilot:
First steps

Apalachicola-Chattahoochee-Flint (ACF) Basin
(Georgia, Florida, Alabama)
Years 1-3

Catawba-Wateree
(N & S Carolina)
Years 1-3



Yadkin-Pee Dee
(N Carolina)
Years 2-3



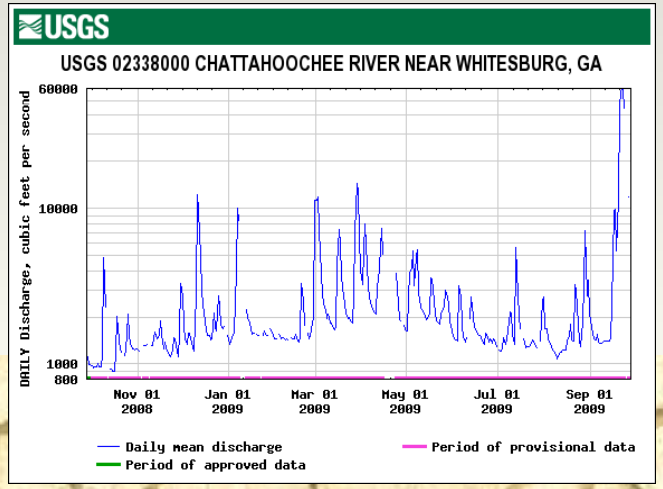
Pilot Implementation Southeast US:

ACF Basin planning workshop – Sep 2009

- Key ACF Basin stakeholders brought together by the state climatologists for the 3 basin states
- Begin planning the ACF Basin Scoping Workshop (early December 2009)
  - Identify additional stakeholders

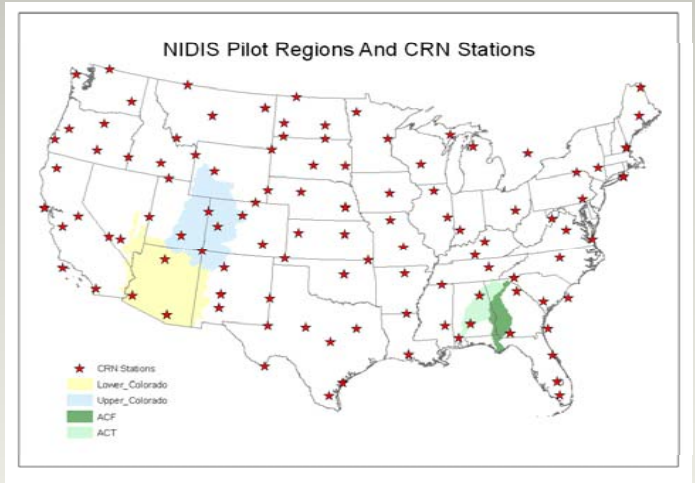
60000 cfs

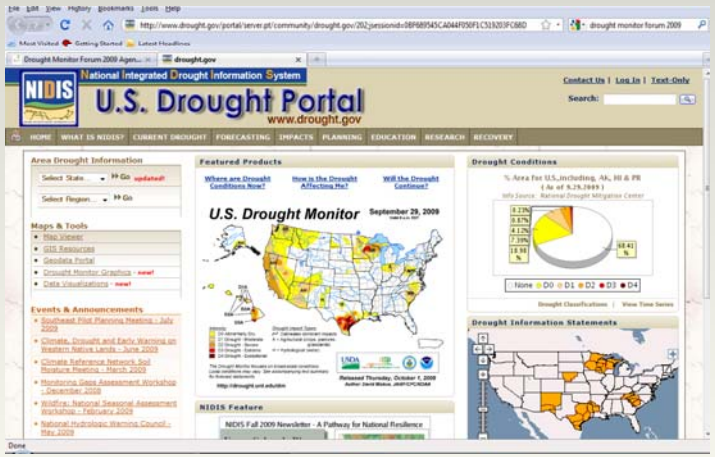
10000 cfs



Other NIDIS activities over the past year

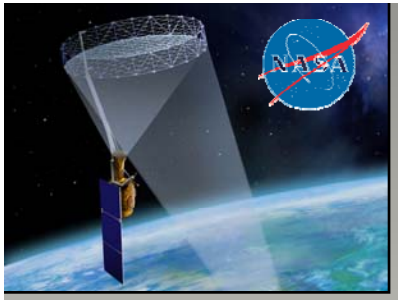
- CRN Soil Moisture Workshop – March 2009
  - Mike Palecki's talk
- Drought Portal updates
  - Mike Brewer's talk





Other NIDIS activities over the past year

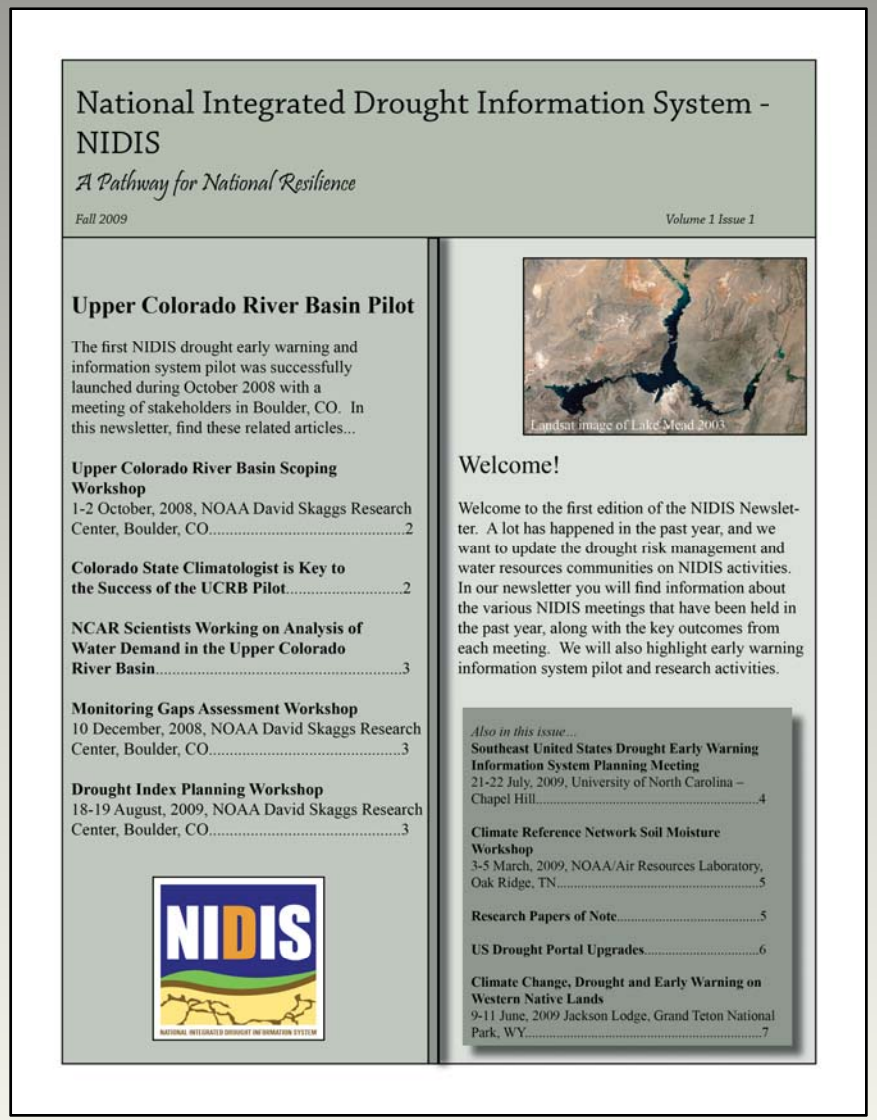
- Climate Change, Drought and Early Warning on Western Native Lands
  - More data needed from the Colorado Plateau
  - Improve remote sensing datasets and drought monitoring on Tribal lands
  - Expand streamflow monitoring on Tribal lands
  - Formal integration of traditional knowledge and Western data collection methods
  - Development of a Tribal drought index (help w/drought relief and mitigation)
  - Water supply assessment on Tribal lands
  - Adjudication and solidification of water rights on Tribal lands
  - Host educational workshops for Tribal members



Other NIDIS activities over the past year

- Soil Moisture Active and Passive (SMAP) Mission (Launch 2013-2014)
  - Soil Moisture on Earth Grid at 10 km with 24 hr latency
  - Surface and Root Zone Soil Moisture on Earth Grid at 10 km with 7 day latency
- Identification of Potential Early Adopters in the Context of NIDIS
  - A new remote sensing input to USDM
  - Modelers to consider assimilation of SMAP data
    - e.g., Land surface modeling for SE Pilot by NOAA/CPC and Princeton

NIDIS Newsletter



National Integrated Drought Information System - NIDIS

A Pathway for National Resilience

Fall 2009 *Volume 1 Issue 1*

Upper Colorado River Basin Pilot

The first NIDIS drought early warning and information system pilot was successfully launched during October 2008 with a meeting of stakeholders in Boulder, CO. In this newsletter, find these related articles...

Upper Colorado River Basin Scoping Workshop
1-2 October, 2008, NOAA David Skaggs Research Center, Boulder, CO....2

Colorado State Climatologist is Key to the Success of the UCRB Pilot....2

NCAR Scientists Working on Analysis of Water Demand in the Upper Colorado River Basin....3

Monitoring Gaps Assessment Workshop
10 December, 2008, NOAA David Skaggs Research Center, Boulder, CO....3

Drought Index Planning Workshop
18-19 August, 2009, NOAA David Skaggs Research Center, Boulder, CO....3

Landsat image of Lake Mead 2003

Welcome!

Welcome to the first edition of the NIDIS Newsletter. A lot has happened in the past year, and we want to update the drought risk management and water resources communities on NIDIS activities. In our newsletter you will find information about the various NIDIS meetings that have been held in the past year, along with the key outcomes from each meeting. We will also highlight early warning information system pilot and research activities.

Also in this issue...

Southeast United States Drought Early Warning Information System Planning Meeting
21-22 July, 2009, University of North Carolina – Chapel Hill....4

Climate Reference Network Soil Moisture Workshop
3-5 March, 2009, NOAA/Air Resources Laboratory, Oak Ridge, TN....5

Research Papers of Note....5

US Drought Portal Upgrades....6

Climate Change, Drought and Early Warning on Western Native Lands
9-11 June, 2009 Jackson Lodge, Grand Teton National Park, WY....7

To subscribe or contribute content, send an email to:

lisa.darby@noaa.gov

PDF posted on the portal: www.drought.gov

Pilot Implementation
California Pilot

(Pending FY10 Appropriations)

Coming soon…

Planning will begin in FY10

- Identify stakeholders
- Planning meetings
- Scoping workshops

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NIDIS

NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

Pilot Implementation
Upper Colorado River Basin:
Water Supply Forecasting

- Use objective Climate Forecast System (CFS) output to improve seasonal Ensemble Streamflow Predictions (ESP)
  - Will daily CFS forecasts improve the ESP?
  - Will dynamical downscaling of the daily CFS forecasts improve the ESP?
- Introduce time-varying potential evapotranspiration into ESP water supply forecasts
- Is it possible to extract a new set of low-flow forecasts from the ESP?

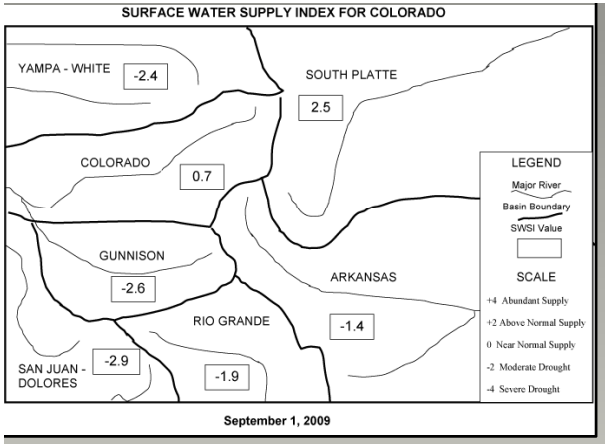
Pilot Implementation
Upper Colorado River Basin:
Year Two Actions

- Prototyping: Given better data and information coordination, would responses have been improved for past events? Assess:
- Value of improved information using past conditions
- Responses for projections / scenarios (decadal, climate change)
- Feedback on priorities (e.g. data gaps) to Executive Council

NIDIS Objectives

Create a drought early warning ***information*** system

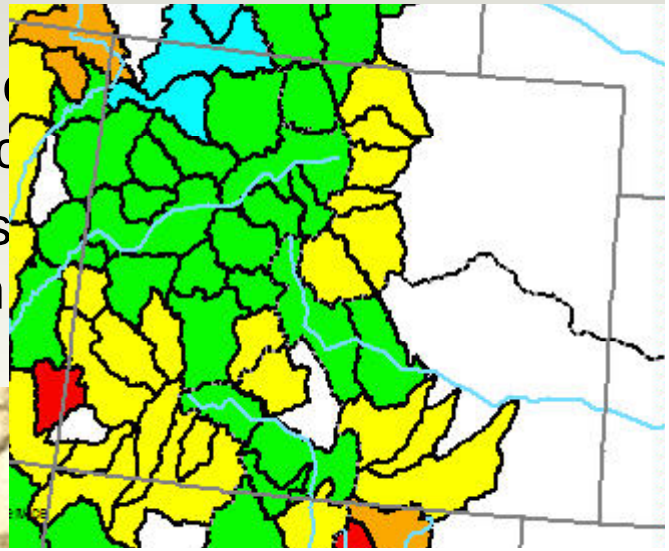
- ***Coordinate*** *national drought monitoring and forecasting systems*
- *Provide an* ***interactive drought information clearinghouse*** *and delivery system for products and services—including an internet portal and standardized products (databases, forecasts, Geographic Information Systems (GIS), maps, etc)*
- *Design mechanisms for* ***improving and incorporating*** *information to support coordinated preparedness and planning*



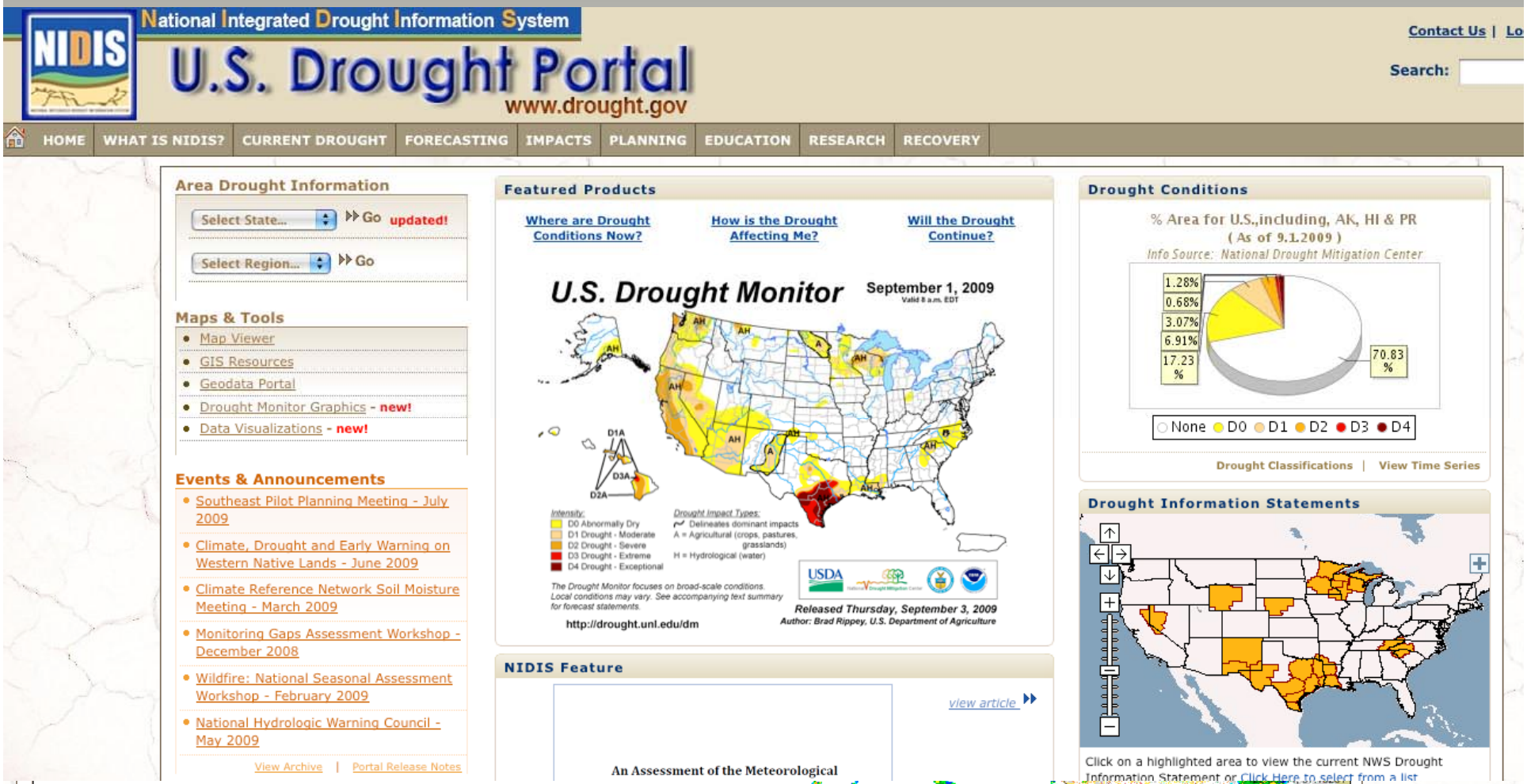
Pilot Implementation Upper Colorado River Basin:

Indices and Triggers - Drought Index Workshop

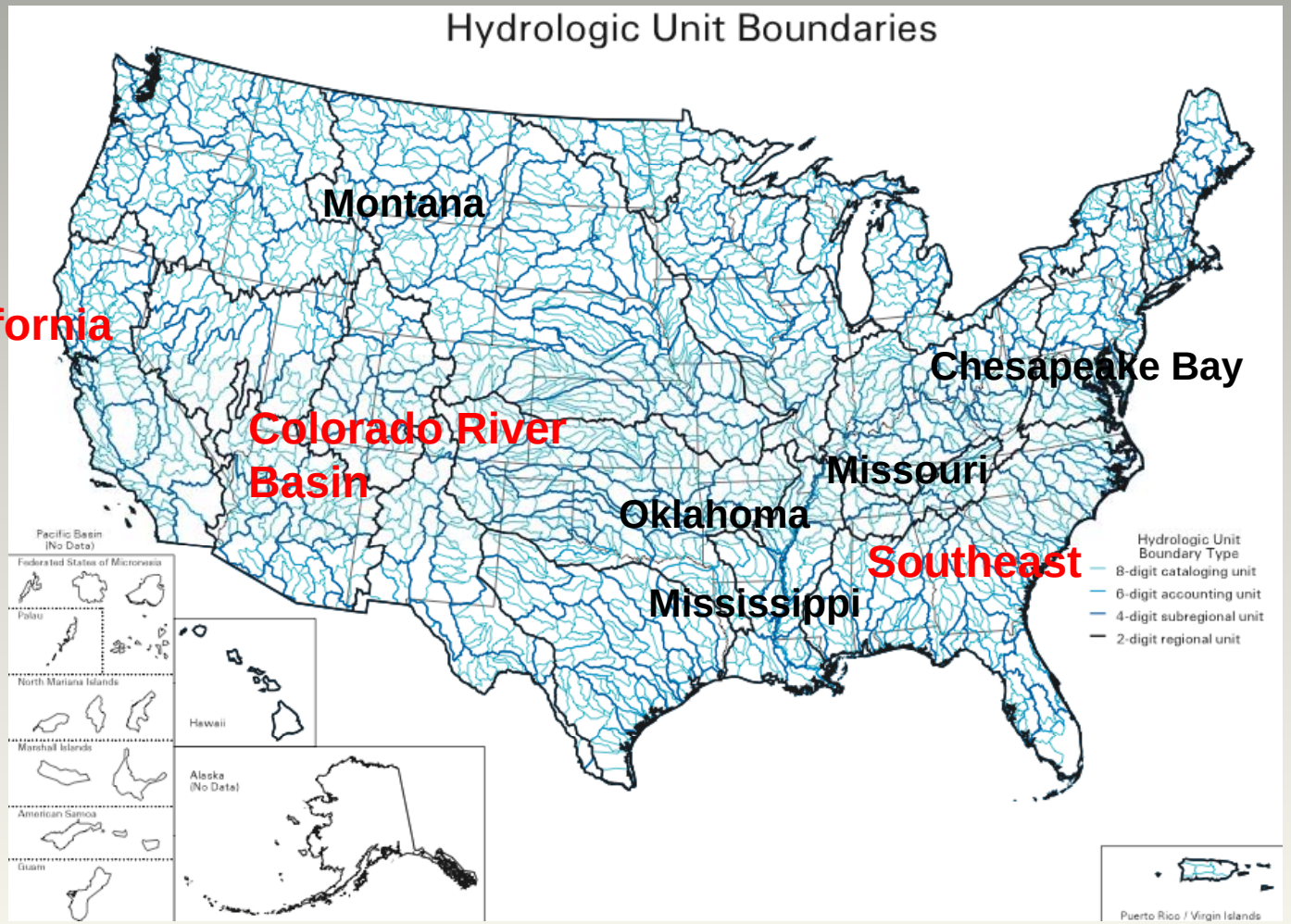
- The Surface Water Supply Index (SWSI) currently used in Colorado is due for an update/upgrade
  - Create a more customizable drought index product
    - e.g., user can choose the basin, the reservoirs and time period for the calculations
  - More statistical rigor
  - Address continuities between seasons (du
    between streamflow and snowpack in the c
  - Coordination with Natural Resources Cons
    Colorado Water Conservation Board, Utah



Implementation at the National Level
U.S. Drought Portal

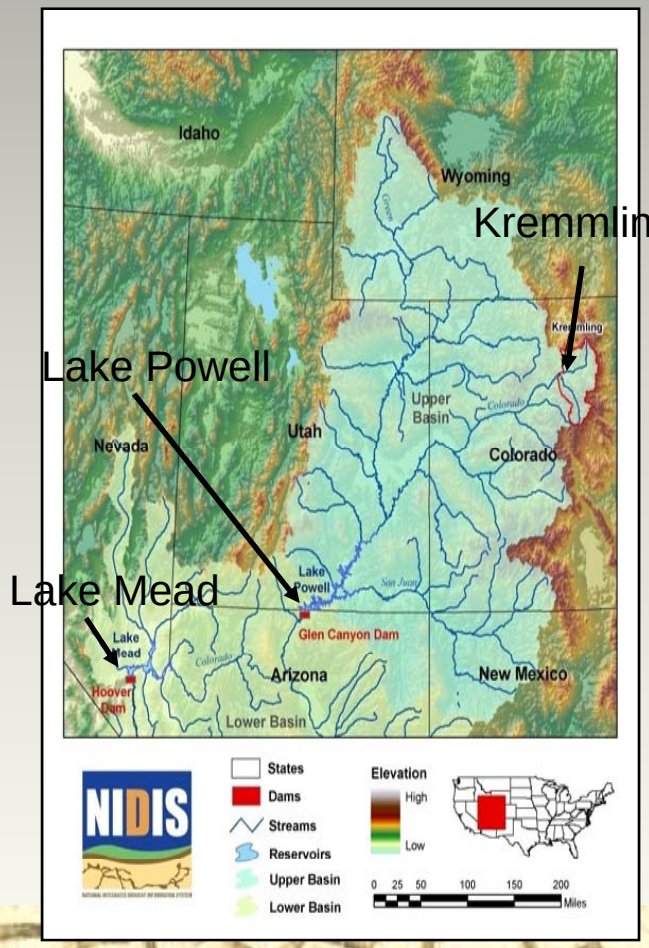


NIDIS Early Warning Systems Pilots – Selected by Drought-type and analysis units



Pilot Implementation
Upper Colorado River Basin:
Federal Planning Meeting: Salt Lake City UT, May 2008

- **Federal Participants**
  - NOAA, NWS, WR, ESRL; USGS GCMRC & WY WSC; USBR; USACE; NPS; USFS
- **Three categories of drought information users &**
- **Two scales of analysis**
  - Large reservoir operations and triggers (full basin scale)
  - Water supply managers with a stake in trans-basin diversions (sub-basin scale, Colorado River above Kremmling CO)
  - Ecosystem health and services, including recreation and tourism (sub-basin scale, Colorado River above Kremmling CO)



Pilot Implementation
Upper Colorado River Basin:
Scoping Workshop, Boulder CO, October 2008

State/Local

- 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

Federal

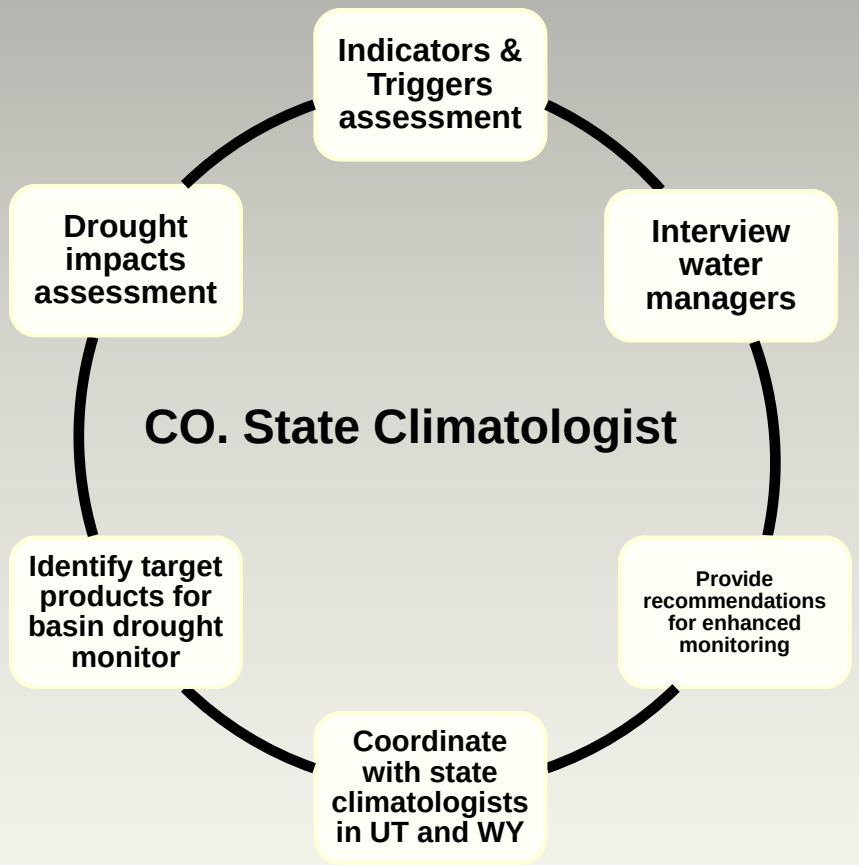
- National Center for Atmospheric Research (NCAR)
- National Drought Mitigation Center (NDMC)
- USDA: Natural Resources Conservation Service
- USFS: Region 2
- USBR: Eastern Colorado Area Office, Great Plains Region, Office of Policy and Programs, Research and Development
- USGS: Colorado Water Science Center, Central Region, Grand Canyon Monitoring and Research Center
- NOAA: ESRL, NCEP, NCDC, NWS

Pilot Implementation
Upper Colorado River Basin:
Year One Actions

- Perform a monitoring networks gap analysis for the UCRB
  - Point of departure - Western States Watershed Study Water Data Report by Federal Agencies for WSWC (July 2008)
  - Report authors meeting in Boulder CO, December 2008 (NWS CRBRFC; USDA NRCS; State Climatologists for UT, WY and CO; Wyoming State Engineer; WRCC; USGS WY WSC; CWCB; NIDIS Program Office)
  - Report outline developed February 2009; some draft sections completed
  - Completion targeted for October 2009
- Design approach for the UCRB Drought Monitor
  - NOT a downscaling of the USDM, but a custom activity of those in the basin
  - Establishment of design criteria offers State Climatologists a key role

Pilot Implementation
Upper Colorado River Basin:

Nolan Doesken, the CO State Climatologist, is a key to the pilot's success!



Pilot Implementation
Upper Colorado River Basin:
Interdisciplinary Research and Applications

Reconciling Projections of 21st Century Colorado River Stream Flow

- Recent research: mid-century reductions in flow from +5 -45%
- Need for examining the wide range of predictions, to better meet information needs of planners and decision makers
- Four cooperating RISAs: WWA, CAP, CLIMAS, and CIG
- Year 2, progress so far includes: downscaling GCM precipitation and temperature, analyses of runoff elasticity and sensitivity, examination of high elevation feedback, stakeholder workshop (Las Vegas, November 2008)

Pilot Implementation
Upper Colorado River Basin:
Interdisciplinary Research and Applications – Recent published results

"…one initial critical finding is that meaningful predictions for the southwestern United States need to account for the highly variable topography and associated changes in climate and hydrology of the Rockies..."

Hoerling et al., 2009, Southwest Hydrology

"…the models show similar sensitivity of streamflow to precipitation changes, with a 2:1 ratio of percent change in flow to percent change in precipitation using historic data. Hence, a 10 percent reduction in precipitation would result in a 20 percent decline in runoff in the Upper Colorado."

Implementation at the National Level Interdisciplinary Research and Applications

NIDIS Knowledge and Service Assessment Workshops

- "Climate Drought and Early Warning on Western Native Lands" (June, 2009, Jackson Hole, WY)
- "Remote Sensing Contributions to Drought Monitoring", February 6-7, 2008, Boulder
  - NOAA, USGS, NASA, USDA, universities, state climatologists, state-local drought officials
- "Reconciling Projections of Future Colorado River Stream Flow", Sept 2007 La Jolla/November 2008 Las Vegas/February 2009 Seattle
  - NOAA, USGS, CIG, WWA, etc
- "National Status of Drought Early Warning Systems", June 17-19, 2008, Kansas City
  - NOAA, USGS, USAID, USDA, USACE, NASA, tribes, universities, state government, water managers