

National Integrated Drought Information System - NIDIS

A Pathway for National Resilience

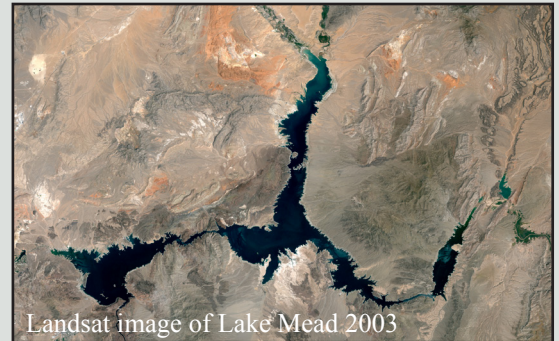
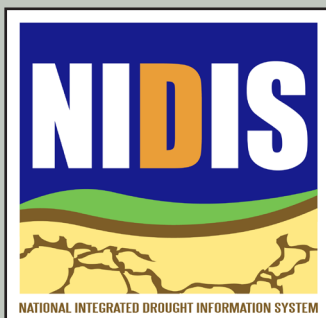
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Upper Colorado River Basin Pilot

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...

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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.

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Upper Colorado River Basin Pilot

The Upper Colorado River Basin Pilot was successfully launched in October 2008

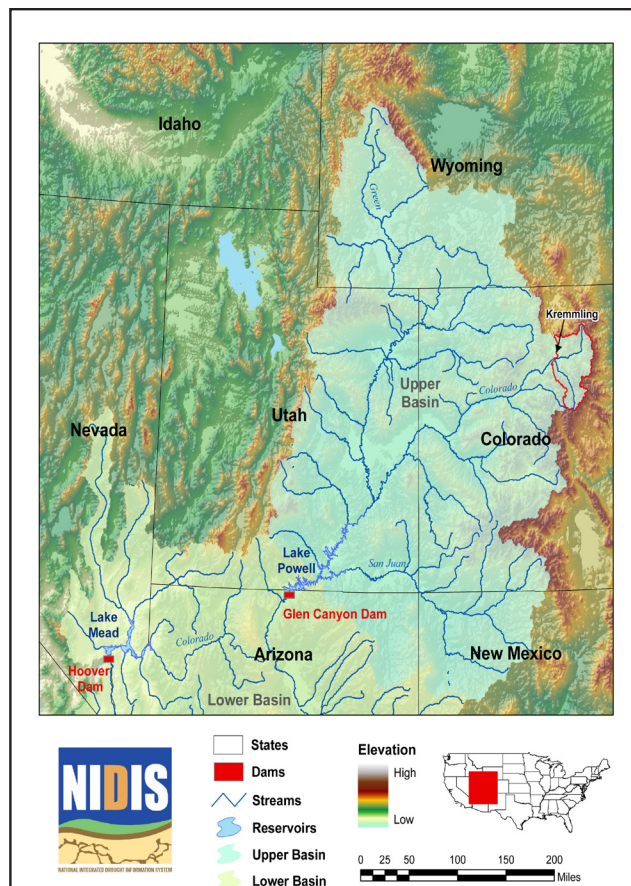
Upper Colorado River Basin Scoping Workshop

1-2 October, 2008, NOAA David Skaggs Research Center, Boulder, Colorado

For more information: http://www.drought.gov/portal/server.pt/community/drought.gov/co_pilot_workshop

Fifty-six people representing twenty-two different state, local and federal agencies gathered in October of last year to discuss the design and implementation of a drought early warning information system for the Upper Colorado River Basin (UCRB). The southern boundary of the UCRB is near Lake Powell, but since reservoir operations at Lakes Powell and Mead are coordinated, the pilot includes the river main stem down to Lake Mead. The first day of the meeting focused on the Upper Colorado River basin as a whole, with an emphasis on Lakes Powell and Mead. The second day focused on the UCRB above Kremmling, CO, the initial focus area of the pilot, and the Colorado-Big Thompson project in particular.

A wide range of topics and time scales were covered in the presentations, from bark beetle issues in Colorado and beyond to the paleoclimatology of the Colorado River to high-elevation measurement issues. Forecast products with valid times ranging from days to years were also addressed. Discussion time was built into the busy agenda allowing attendees to determine the most critical ways in which to begin the pilot. Three areas were identified as sound starting points for the pilot: (1) Perform a monitoring gaps assessment; (2) Inventory and evaluate existing drought indicators and triggers; and (3) Develop a basin-focused drought monitor as part of the drought portal (www.drought.gov). For more information on this meeting contact Roger Pulwarty (roger.pulwarty@noaa.gov), Jim Verdin (verdin@usgs.gov) or Lisa Darby (lisa.darby@noaa.gov). Attendee information, meeting notes and presentations can be found at the web site listed above.



Map of the Upper Colorado River Basin (shaded in light blue). The locations of Kremmling, CO, Lake Mead and Lake Powell are shown.

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

Nolan Doesken, Colorado state climatologist based at the Colorado State University (CSU), has taken on several projects that are key to the success of the UCRB Pilot. Nolan's vast knowledge of Colorado climate, paired with his considerable knowledge of stakeholder groups around the state, is allowing him to evaluate facts and perceptions about drought in the UCRB. Through interviews with water managers and decision makers, Nolan is compiling information about drought indicators and triggers. The next step will be to determine how this information can effectively be incorporated into an UCRB drought monitor-type product. Nolan's interviews include gathering information about user groups, critical thresholds in determining when a drought begins and ends, data sources and what climate information products are being used. These activities are also valuable to the state of Colorado's current task of updating the Colorado state drought

plan. Nolan's status as president of the American Association of State Climatologists is a great help in engaging his counterparts in Utah and Wyoming.

We are pleased to announce that Nolan now has help in his NIDIS work with the addition of Rebecca Smith, a Ph.D. student at CSU, to his staff.

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

Olga Wilhelmi, project scientist at the National Center for Atmospheric Research (NCAR) will lead the effort to assess water demand in the UCRB above Kremmling, CO. The goal is to provide information that is useful for managing current drought risks and for adapting to changing climate by filling the gaps in knowledge about variations in water demand patterns in the UCRB. This includes the documentation of the effects of the administration of water rights during periods of shortage through the system of senior calls, as well as existing adaptive practices such as transfers and exchanges of water rights. This information will help identify potential vulnerabilities in water management during severe or sustained droughts for more targeted drought preparedness and early warning. The project has two phases. Phase 1 activities include an UCRB water demand data assessment and inventory, the development of a comprehensive database of past and present water demand, and identifying spatial, temporal and qualitative data gaps. Phase 2 activities include selecting a case study for in-depth analysis of spatio-temporal patterns in water demand by geographic location and by sector. With the goal to assess and monitor potential vulnerabilities due to competitive water demand and water shortages in the basin, the project team will develop a Geographic Information Systems (GIS) database that supports topological relationships among water users and their respective sources of water supply, including transfers and exchanges.

Monitoring Gaps Assessment Workshop

10 December, 2008, NOAA David Skaggs Research Center, Boulder, Colorado

For more information: http://www.drought.gov/portal/server.pt/community/drought.gov/monitoring_gaps_workshop

A subset of participants from the Upper Colorado River Basin (UCRB) Scoping Workshop met in December 2008 to discuss measurement gaps in the UCRB. Agencies represented at this meeting included the Colorado Water Conservation Board (CWCB), state climatologists from Colorado and Utah, U.S. Department of Agriculture/National Resources Conservation Service, Desert Research Institute/Western Regional Climate Center, National Weather Service, state of Wyoming, U.S. Geological

Survey and the National Center for Atmospheric Research (see the web site for more information regarding attendees and for a meeting summary). Participants discussed drought indicators and triggers and stream gage gap assessment activities in Wyoming, reviewed current monitoring networks in the UCRB and devised a plan for an initial gaps assessment.

Key points that came out of the meeting included questions such as "Are we making the best use of the measurements we already have?" Besides networks gaps, other types of gaps were discussed such as issues regarding data availability. The main outcome of the meeting was the decision to create a report about measurement gaps in the UCRB to present to the NIDIS Executive Council. The major sections of the report will include a summary of existing drought monitoring practices, gaps in our understanding of drought, gaps in observational networks, gaps in analytical products and tools, and the assessment of ways to better analyze gaps in drought monitoring. For more information on this meeting contact Jim Verdin (verdin@usgs.gov) or Lisa Darby (lisa.darby@noaa.gov).



U.S. Geological Survey Stream Gage

Drought Index Planning Workshop

18-19 August, 2009, NOAA David Skaggs Research Center, Boulder, Colorado

NIDIS partnered with the Colorado Water Conservation Board (CWCB) to host a planning workshop for a new project entitled "Drought Index Evaluation and Implementation in a Geospatial Framework Linked to Hydrologic Data Web Services," sponsored by the National Oceanic and Atmospheric Administration's Transition of Research Applications to Climate Services program. The purpose of the meeting was to draw up a work plan for reviewing the conceptual basis of the Surface Water Supply Index (SWSI), and developing more modern and flexible access to drought index data that builds on recent achievements in geographic information infrastructure and web services. This

initial meeting focused on the UCRB. Participating organizations included U.S. Geological Survey, Northern Colorado Water Conservancy District, Natural Resources Conservation Service, Colorado State University, University of Colorado, Utah State University, Western Regional Climate Center, and the National Drought Mitigation Center, as well as municipal water providers for Denver, Boulder, Aurora and Colorado Springs.

The SWSI was originally developed in the 1980s for use as a composite water supply indicator for specific basins in Colorado, Utah, and Wyoming. Calculated using reservoir storage, precipitation, snow pack and stream flow data for seven basins in Colorado, many see the need for potential changes in the reservoir data used, implementation for a larger number of smaller basins, and more frequent and timely updates.

The Drought Response Plan of the State of Colorado makes explicit reference to the SWSI and the surpassing of specific values to trigger the activation of sectoral drought task forces. The Plan is under revision to meet Federal Emergency Management Agency standards, including a re-examination of the SWSI and its implementation. This project will provide more customizable access to targeted water supply information in the state of Colorado. In addition, this prototype could be applied to other water basins in the western U.S. For more information on this meeting contact Jim Verdin (verdin@usgs.gov), Chad McNutt (chad.mcnutt@noaa.gov) or Lisa Darby (lisa.darby@noaa.gov).



Jim Verdin and Don Campbell of the USGS during a break at the drought index meeting. (Photo by Barb DeLuisi.)

**Coming soon....NIDIS
Pilot in California**

Southeast United States Pilot

With the successful launch of the Upper Colorado River Basin Pilot, the NIDIS Program Office has turned its attention to the Southeast U.S.

Southeast United States Drought Early Warning Information System Planning Meeting

21-22 July, 2009, University of North Carolina – Chapel Hill

For more information: http://www.drought.gov/portal/server.pt/community/drought.gov/202/southeast_pilot_planning_meeting

Drought in the Southeast U.S. in recent years has caused concern among decision makers at all levels of government and industry about regional water supplies. Numerous law suits, against a backdrop of lower precipitation amounts and a limited amount of water storage, have created tension among user groups, including municipalities, the fishing industry in the Gulf of Mexico, and hydropower companies. Expanding upon a NIDIS meeting held in Peachtree City, GA in 2008, representatives from several federal agencies, universities and research centers, as well as state climatologists, met in Chapel Hill, N.C. to assess which river basins in the southeast should be included in the next NIDIS pilot.



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

After an overview of regional drought activities and several discussion sessions, the group decided to focus on the Apalachicola-Chattahoochee-Flint (ACF), Catawba-Wataree, and Yadkin-Pee Dee basins, using a three-year phased approach. Work will begin immediately on the ACF pilot in September 2009 with a small planning meeting of key stakeholders in the ACF and the work will continue in the basin for 3 years. Meanwhile, during the first year a pilot will be developed and implemented in the Catawba-Wataree basin, where there is already a good start on collaborative water management. Lessons learned in the Catawba-Wataree basin will then be transferred to the Yadkin-Pee Dee basin in years 2 and 3, where there is some overlap among the key stakeholders. An ACF scoping workshop similar to the UCRB Scoping Workshop will be held in Fall 2009, most likely in Asheville, N.C. Early in 2010 there will be a scoping workshop for the Catawba-Wataree basin pilot. For more information on this meeting contact Roger Pulwarty (roger.pulwarty@noaa.gov), Chad McNutt (chad.mcnutt@noaa.gov) or Lisa Darby (lisa.darby@noaa.gov), or visit the web link listed above.

Other Meetings

Climate Reference Network Soil Moisture Workshop

3-5 March, 2009, NOAA/Air Resources Laboratory, Oak Ridge, TN

For more information: http://www.drought.gov/portal/server.pt/community/drought_gov/202/nidis_and_crn_soil_moisture_workshop

A workshop on reference soil moisture and temperature monitoring using the Climate Reference Network (CRN) was held at Oak Ridge National Laboratory in March. The purpose of the meeting was to assess current activities and develop recommendations for soil moisture and temperature monitoring consistent with the observational principles followed by the U.S. CRN (see NRC, Adequacy of Climate Observing Systems, 1999). The workshop coordinators also sought input on a list of high-priority products to be developed from this information in support of NIDIS and other national programs. The U.S. CRN network will provide national monitoring with evenly distributed sampling. It will complement the existing U.S. Department of Agriculture/National Water and Climate Center Soil Climate Analysis Network (SCAN) by providing soil moisture and soil temperature measurements in all of the states not supported by SCAN, while adding additional soil moisture measuring capacity in 70 locations

in the central and western U.S., areas of the country particularly vulnerable to drought.

Critical input was received at the meeting regarding:

- Soil probe installation
- Metadata
- Data sampling
- Installation priorities and campaigns
- Testbeds
- Quality assurance and quality control (QA/QC)
- Meeting the needs of the remote sensing and modeling communities

In the months since the meeting, installation has begun. Roughly 30 CRN sites are currently outfitted with the soil moisture/soil temperature sensors. The remainder of the sites will be deployed over the next few years. Once QA/QC is finalized, data from these sensors will be available through the U.S. Drought Portal (<http://www.drought.gov>) as well as through the CRN site (<http://www.ncdc.noaa.gov/crn>). More information about the meeting can be found at the web site listed above.



Climate Reference Network station in Wyoming. (Photo courtesy of the CRN.)

Research Papers of Note

Hoerling, M., D. Lettenmaier, D. Cayan, B. Udall, 2009: Reconciling projections of Colorado River streamflow. *Southwest Hydrol.*, **8**.

Gangopadhyay, S., B. L. Harding, B. Rajagopalan, J. J. Lukas, and T. J. Fulp, 2009: A nonparametric approach for paleohydrologic reconstruction of annual streamflow ensembles. *Water Resour. Res.*, **45**, W06417, doi:10.1029/2008WR007201.

US Drought Portal

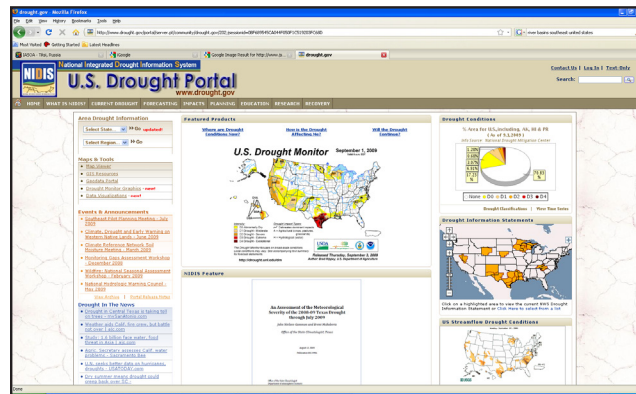
Upgrades to the U.S. Drought Portal

The public face of the U.S. Drought Portal (<http://www.drought.gov>) has been revamped over the year based on user feedback. Improvements were made in many areas of the Portal including:

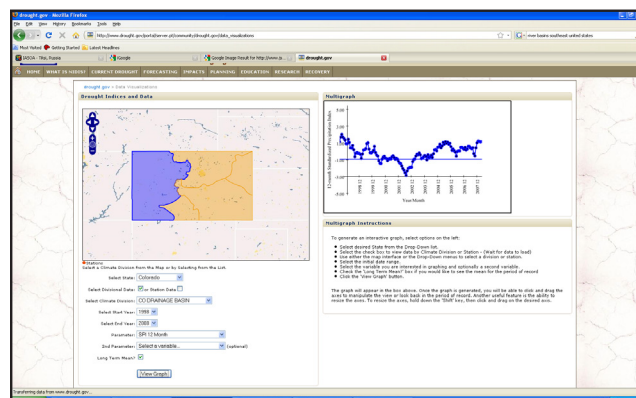
- A new section related to relief and recovery resources was added. This section primarily provides information on where to go within the government to get assistance if you have been hard hit by drought.
- Navigation was changed, moving from drop-down menus to persistent navigation to allow users to more readily find the information they desire.
- State drought information has been expanded. In addition to being able to find drought conditions and data for a state, links to partners providing services, such as the State Climatologists and the Department of Agriculture Extension Service, has been included.
- A web mapping service was developed providing access to local Drought Information Statements issued by the National Weather Service. These statements include a summary of conditions as well as local impacts of the drought.
- The map viewer continues to evolve. Currently there are over 40 pieces of graphical information available through the map viewer.
- A new data access tool was released to provide time series depictions of drought at the climate division and the station levels. Additional sources of data are being added to the tool.
- Drought in the News is now available through an RSS feed.
- Additional sources of educational information were incorporated.

In addition to the public site, many communities have been developed in the secure section of the Portal. These focus primarily on the NIDIS pilot projects as well as providing a venue for continued interaction following NIDIS-sponsored meetings.

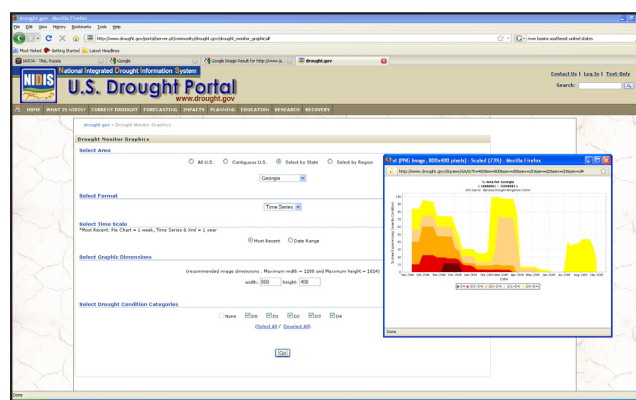
Be on the lookout for additional changes to the Portal during the coming year. Many of these will focus on making data and information more readily available and easier to understand. Feel free to provide feedback any time by using the "Contact Us" link in the Portal.



Home page of the drought portal, www.drought.gov.



Create a time series of drought or precipitation parameters at the climate division or station level (under the "Data Visualization" link). In this example, 12-month Standardized Precipitation Index for western Colorado for the years 1998 - 2008.



Plot drought condition categories for a state, over time (under the "Data Visualization" link). In this example, drought categories for the state of Georgia over the last year.

Drought on Western Native Lands

Climate Change, Drought and Early Warning on Western Native Lands

9-11 June, 2009 Jackson Lodge, Grand Teton National Park, WY

For more information: http://www.drought.gov/portal/server.pt/community/drought.gov/tribal_workshop

Water scarcity and stresses on natural resources, such as warming streams and changes to the hydrologic cycle, plus tensions between tribal and nontribal interests regarding regional water resources, could provide significant challenges to tribal entities in the western U.S. as climate changes. A number of tribal lessons are available to address climate change and tribes have great physical and cultural resources that can help the U.S. deal with climate risks through renewable energy development and wilderness protection in the face of climate change.

In an effort to begin a dialogue among Native communities and organizations and federal agencies involved in the protection and management of natural resources, NIDIS, along with Sinte Gleska University, Haskell College and the Indigenous Waters Network, organized a workshop. In attendance were fifty-six people representing numerous agencies, including several tribes, intertribal groups covering various regions of the west and southeast U.S., law firms, colleges, research centers and several federal agencies (see the web site above for a full listing of attendees and their affiliations). Discussion topics included information needs for adaptation to climate change; wildlife, ecosystems and rangelands; energy resources; cultural resources; opportunities for collaboration; and maintaining trust responsibilities.

Priority actions from this meeting include:

- The establishment of an intertribal community on the drought portal (www.drought.gov)
- Establish a National Oceanic and Atmospheric Administration (NOAA)/tribal liaison or tribal office within NOAA
- Tribal communities need sustained support for climate change adaptation
- Integrate tribal ecological knowledge in the understanding and adaptation to climate change impacts

For more information on this meeting, contact Roger Pulwarty (roger.pulwarty@noaa.gov) or Doug Kluck (doug.kluck@noaa.gov).



Roger Pulwarty addressing the Western Native Lands meeting (photo courtesy of Mark Svoboda).

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