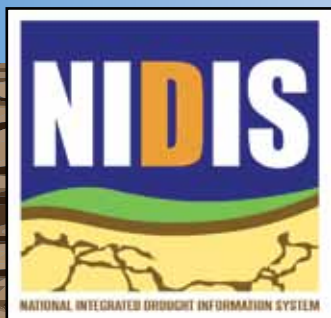


# NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

A Pathway for National Resilience



Winter 2012

[www.drought.gov](http://www.drought.gov)

Volume 3 Issue 1

## Drought in 2012

As the United States experienced large areas of moderate to exceptional drought throughout the year, the National Integrated Drought Information System (NIDIS) provided a variety of drought-related services to stakeholders across the nation. In this issue of the *NIDIS Newsletter* we will update you on NIDIS activities throughout the year 2012.

*Lisa S. Darby and Roger S. Pulwarty, NIDIS Program*

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## The National Integrated Drought Information System

The National Integrated Drought Information System Act of 2006 (NIDIS Act PL 109-430) prescribes an interagency approach, led by NOAA, for the development and coordination of drought risk information to support proactive decision-making. The NIDIS goal as stated in the Act is to “Enable the Nation to move from a reactive to a more proactive approach to managing drought risks and impacts.” NIDIS was developed in partnership with the Western Governors Association, but is national in scope. NIDIS has three general tasks under its authorization: (I) Provide an effective drought early warning system that: (a) collects and integrates information on the key indicators of drought and drought severity; and (b) provides timely information that reflect state and regional differences in drought conditions; (II) Coordinate Federal research in support of a drought early warning system; and, (III) Build upon existing forecasting and assessment programs and partnerships.

# Drought Research and Monitoring Program Is Focus of Congressional Hearing

By Randy Showstack, Staff Writer for EOS

With more than 70% of the United States currently classified as being anywhere from abnormally dry to experiencing exceptional drought—according to the U.S. Drought Monitor, a consensus product of U.S. federal and academic scientists—witnesses at a 25 July U.S. House of Representatives committee hearing expressed concern about the impact of the drought and voiced strong support for reauthorizing the National Integrated Drought Information System (NIDIS).

Republican and Democratic members of the House Science, Space, and Technology Committee also expressed their support for NIDIS, which is part of the National Oceanic and Atmospheric Administration's (NOAA) Climate Program Office and is currently authorized through 2012. However, members of Congress expressed differing perspectives about the potential relationship between climate change and extreme events such as drought.

NIDIS is authorized to provide an effective drought early warning system, coordinate and integrate federal research in support of an early warning system, and build on existing forecasting and assessment programs and partnerships. The currently proposed reauthorization language would largely support the continuation of NIDIS while also requiring the undersecretary of the U.S. Department of Commerce to provide Congress with a report analyzing NIDIS implementation among other measures.

Committee Chair Ralph Hall (R-Tex.) noted that droughts have been frequent and recurring events in the United States and that the current drought is negatively affecting important crops. "There are some, of course, who would attribute this year's drought to climate change," Hall said. "However, the Congressional Research Service tell[s] us that 'drought has afflicted portions of North America for thousands of years' and 'history suggests that severe and extended droughts are inevitable and part of natural climate cycles.' In any event, debating the causes of drought



Witnesses, from left to right: Dr. Roger S. Pulwarty, Director, National Integrated Drought Information System, National Oceanic and Atmospheric Administration, The Honorable Gregory A. Ballard, Mayor, City of Indianapolis, Mr. J.D. Strong, Executive Director, Oklahoma Water Resources Board, Dr. James Famiglietti, Professor and Director, Earth System Science, University of California, Irvine, and Ms. Patricia Langenfelder, President, Maryland Farm Bureau

H.R. 6489: National Integrated Drought Information System Reauthorization Act of 2012

To view the full testimony, visit the Committee on Science, Space, and Technology web site:

<http://science.house.gov/hearing/full-committee-hearing-drought-forecasting-monitoring-and-decision-making-review-national>

is not in front of us today," he said. "The real question is, What can be done to provide better and timelier information to help enable federal, state, and local governments and individual citizens to better deal with droughts' impacts and how to afford better forecasting and quicker reactions by government entities?"

In contrast, ranking committee member Eddie Bernice Johnson (D-Tex.) noted that "we cannot have a comprehensive approach to drought research and mitigation without exploring the potential linkages with a changing global climate. While I will be the first to urge caution [about] jumping to conclusions about the present-day impacts of a warming planet, I know that climatologists around the world are coming to a much better understanding of this complex relationship.

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“We should leave the science to the scientists,” she said. “To play politics and categorically deny the linkage between climate change and extreme weather is both irrational and irresponsible. Policy makers at every level have a duty to protect public welfare. And ignoring the realities of climate change simply leaves us less informed and ill prepared for catastrophic events such as droughts and floods.”

Johnson added that she is “a bit baffled” by the bipartisan support for NIDIS and said that Republicans “have otherwise been relentless [during] this Congress in trying to undermine or outright kill every other climate-related product, service, or research program.”

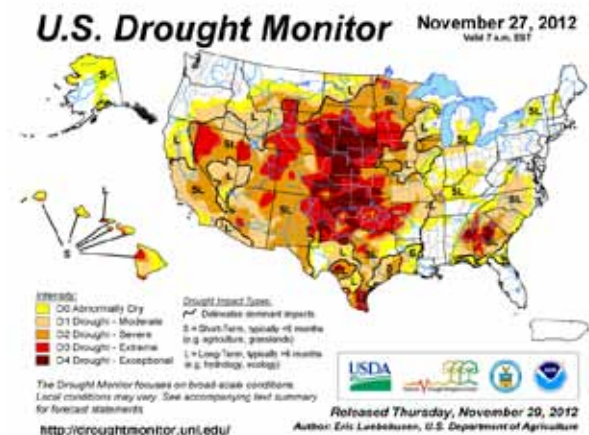
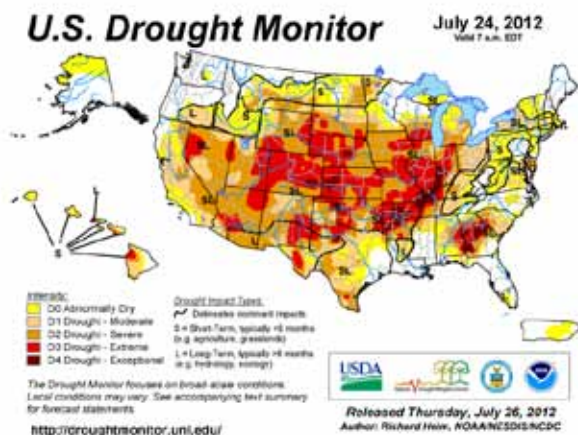
NIDIS program director Roger Pulwarty testified that NOAA supports several NIDIS initiatives, including providing grants to assess drought impacts on agriculture, ecosystems, and water resources; conducting research to improve predictions and links between climate forecasts and streamflow projections for particular basins; and maintaining the U.S. Drought Portal and the Regional Drought Early Warning Information Systems. Pulwarty pointed to a number of ways that reauthorization could help NIDIS, including improving the understanding and predictability of droughts across many time scales and improving the collaboration among scientists and managers to increase awareness and effectiveness of observational networks, monitoring, and prediction.

In testimony before the committee, James Famiglietti, director of the Center for Hydrologic Modeling at the University of California, Irvine, called drought “an insidious and patient killer of food and fuel crops, of livestock, of other flora and fauna, and of humans.” He said that current investments in drought forecasting, monitoring, and planning tools are far too small to help make progress toward mitigating drought impacts.

Famiglietti said the \$13.5 million authorization included in the draft reauthorization legislation would be sufficient if NIDIS were to play only a coordinating role in dealing with drought. However, he said that “a factor of 10 increase will be required” to make significant advances in more realistic hydrological simulation modeling, fill in fundamental knowledge gaps of Earth’s water environment at the surface and shallow subsurface, and meet other critical needs. “Water is on a trajectory to rival energy in its importance, yet the investment in observations, models, and exploration of the subsurface pales in comparison,” he noted.

Also supporting reauthorization was Patricia Langenfelder, president of the Maryland Farm Bureau. She said that NIDIS has become “an invaluable tool” within the agricultural community and that the data about rainfall, soil moisture, and other indicators “provide a comprehensive view of drought conditions as they develop, allowing those affected—including farmers and ranchers—to more adequately plan for and respond to a drought’s impacts.” J. D. Strong, executive director of the Oklahoma Water Resources Board, testified that while long-term predictions of climate and its variability over decades would be great, “as a practical matter, what we are more interested in at this moment is can we get to a year forecast of drought that will be something we can take to the bank?”

He added that the nation’s cyclical way of dealing with droughts needs to change. “Our society often falls into what we call the ‘hydro-illogical cycle,’” Strong said. “That is, we ignore drought until the situation is dire, lament the impacts, justifiably call for help, and clamor for emergency funding. But invariably it rains, at which point we forget there was ever a problem and go back to business as usual. We must break this cycle.”



The U.S. Drought Monitor for the week of the NIDIS Reauthorization hearing (left) vs. a recent U.S. Drought Monitor (right). Overall, the country has not seen much improvement in drought conditions since the hearing. (<http://www.droughtmonitor.unl.edu/monitor.html>)



## NIDIS Pilot in California Addresses Complexities of Drought

By Anne Steinemann, Scripps Institution of Oceanography

Drought in California is complex, with diverse types of drought, climates, vulnerabilities, impacts, supplies and demands, and information needs. Further, droughts in California often depend on more than just local precipitation. The challenge is to develop useful and meaningful drought monitoring and prediction products and to effectively characterize and communicate drought information to a range of decision-makers, water users, and the public.

To meet this challenge, the California NIDIS Pilot is developing and demonstrating a variety of drought information resources and strategies, working closely with agencies, industries, institutions, tribes, and other major stakeholders. The Pilot, which commenced last year, is implemented through four sub-pilots, or “Pilot Activities,” which explore important phenomena of drought: (1) **Southern California**—complexities of urban droughts in a well-plumbed system, heavily reliant on imported water; (2) **Russian River**—hydrologic extremes with droughts draining reservoirs and precipitation events filling reservoirs; (3) **Central Valley**—remote sensing to assess the extent of fallowed land; and (4) **Klamath Basin**—integrated hydroclimate information system in a complex water environment.

To date, the California Pilot has held eight meetings across the state, engaged more than one hundred stakeholders, and identified drought information uses, needs, partners, and concrete ways that the NIDIS could help decision-makers to reduce drought impacts. Participants have expressed a high degree of enthusiasm for NIDIS, and the value of the types of early warning information that the NIDIS Pilot could provide.

For instance, in the **Southern California** Pilot Activity, a working group is focused on the design and development of an experimental drought monitoring product that would be relevant and useful to water agencies and users in the region, which is characterized by heavily engineered, regulated, imported, as well as unmanaged water supplies. This product would include not only indicators of climate and hydrometeorology, but also regulatory, economic, water supply, water demand, water quality, external, local, and impact-based information. It would also offer “one-stop shopping,” bringing together a range of indicators, all in one place, separated but possible to combine, in statistically comparable terms (such as percentiles), with options to customize the type, format, and scale of the indicators. Water agency managers expressed a high desire and need for this type

of drought information product, which could assist with their drought analyses and communications to the public. This product could also offer a user-centered alternative to traditional products, such as the U.S. Drought Monitor, which may not adequately represent drought conditions in regions of California. Ultimately, this product could be transferred and implemented in other areas of the country, offering an innovative and versatile approach to assess, forecast, and communicate drought conditions.

The **Russian River** Pilot Activity has only just begun, but has identified the concept of extremes as the key factor that will guide the decisions regarding drought preparation, education, and resource management. Because the region relies on two major reservoirs for water supply and is obligated to maintain environmental flows for fisheries, drought is defined by the reservoir in the upper watershed, Lake Mendocino. The region is comprised of numerous and varied stakeholders and a large part of a successful NIDIS implementation will involve defining indicators and triggers, early warning criteria, and community involvement and education.

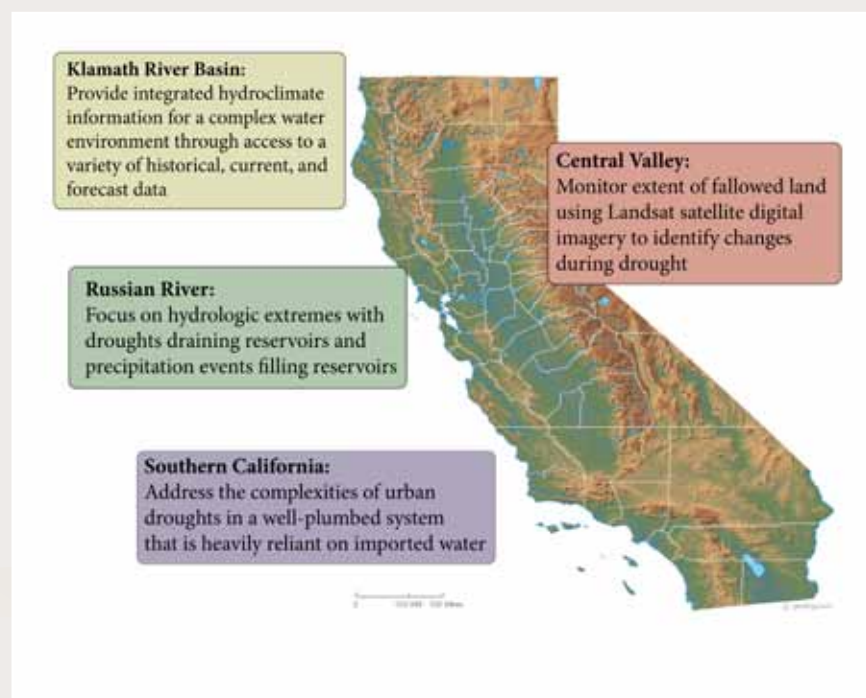
The **Central Valley** Pilot Activity is developing a fallowed land monitoring capability for the Central Valley of California, a rich agricultural region. Monthly county tabulations, maps, and GIS files are derived from automated processing of Landsat digital satellite imagery. Data from the Landsat archive are processed for historical context. Such a capability will identify the extent of changes in fallowed acreage due to water shortage during drought. Shortage of water for irrigation and

crop production is a principal impact of drought in the Central Valley, and this Pilot Activity will provide a source of timely, objective information on the extent of fallowed acreage to guide decision making, such as for local water transfers, county drought disaster designations, or state emergency proclamations.

The **Klamath Basin** has a great diversity of economic, cultural, hydrologic, biological, and climatic settings in a two-state region connected from upper to lower elevations by salmon. An initial approach under development is to provide access to a variety of physical measurements through a single tool that provides access to historical, current, and future information. These will include point data and areal averages. The Klamath Basin Pilot Activity will also link to ongoing NOAA efforts to assess the content, usability, and actual use of such tools in a range of decisions made by different parties in the basin. Meetings will be held in the basin, and drought webinars are planned for this winter.

The next phases of the California Pilot will pursue the development of these information products and resources, their implementation and evaluation with stakeholders, and their extension and applicability to other areas. Importantly, longer term and larger scale, this Pilot is expected to generate, transfer, and institutionalize new resources that can be useful to the rest of the nation.

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## Planning Begins for the New Coastal Carolinas Drought Early Warning Pilot

By Amanda Brennan, CISA

NIDIS and the Carolinas Integrated Sciences and Assessments (CISA), a NOAA-funded Regional Integrated Sciences and Assessments (RISA) program, are partnering to develop and support a Carolinas Drought Early Warning System pilot program. This project will focus on the unique coastal ecosystems in North and South Carolina. In the Carolinas, drought effects on environmental resources, particularly in coastal areas, are not as well-understood, or as well-integrated into existing drought planning and response processes, as other impacts and resources (e.g., agriculture, surface water supplies). Key concerns related to drought and coastal ecosystems focus on impacts to water quality and quantity, habitats, species, and estuarine processes. Drought contributes to increased salinity and saltwater intrusion, reduced flushing and assimilation of pollutants, and overall water quality changes. Ecosystem impact concerns center on habitat loss or conversion and consequent effects on recruitment, distribution and migration patterns as well as on primary and secondary production. Saltwater intrusion, low stream flows, and low water levels contribute to impacts and are attributed to both drought and human actions (e.g., changes in dam releases due to drought).

A scoping workshop was held in Wilmington, NC on July 31 – August 1, 2012, in order to generate potential pilot project ideas for the NIDIS Carolinas regional drought early warning system (RDEWS). Stakeholders from federal

and state agencies, NGOs, academia, and the private sector came together to identify important issues of concern for the coastal region and to establish and refine priorities for pilot projects. The workshop began with a series of presentations to introduce the participants to NIDIS and provide background information regarding drought in the Carolinas. Presentations included:

- Lisa Darby (NIDIS): “What is a Drought Early Warning System”
- Kirsten Lackstrom (CISA): “Drought and Coastal Ecosystems – Previous Work by CISA”
- Ed Christopher (USFWS, Pocosin Lakes National Wildlife Refuge): “Public Lands and Drought”
- Paul Conrads (USGS, South Carolina Water Science Center): “Salinity Intrusion – Integrating Riverine and Coastal Forces”
- Geoff Scott (NOAA, Center for Coastal Environmental Health and Biomolecular Research): “Ecological and Human Health Threats Related to Drought in Coastal Systems”
- Ryan Boyles (NC State Climatologist) and Hope Mizzell (SC State Climatologist): “Drought in the Carolinas”

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*NIDIS Carolinas DEWS pilot project ideas were generated in small group discussions centered on key topics of concern for coastal ecosystems.*





Pilot ideas were generated out of small group discussions centered on topics of importance regarding Carolina coastal ecosystems. Some of these topics included public health risks, impacts and management strategies for coastal lands, water and drought management, and drought early warning metrics and tools. Four pilot projects were selected by workshop participants to move forward and steering committees for each pilot were formed. The projects include (1) evaluation of drought indicators and indices, (2) a seafood safety forecast, (3) a drought forecasting communications program, and (4) a project to improve drought impacts reporting. Steering committees are currently working to refine the project plans and engage potential partners.

Stakeholders at the Wilmington workshop used a series of selection criteria and metrics for success in choosing priority projects. These included the potential to build partnerships, projects with a regional focus, projects which could use and benefit from existing resources, and projects with an ability to be transferred to other areas where such programs are needed. Each project will be geared towards addressing the needs of stakeholders in the coastal ecosystems of the Carolinas, with the intent that they could be replicated in other coastal areas throughout the US.

For more information on the NIDIS Carolinas pilot project, including presentations from the Wilmington scoping workshop and a copy of the full workshop report, visit: <http://www.drought.gov/drought/regional-programs/coastalcarolinas/meetings>.

Carolinas Coastal Ecosystems Pilot Contacts:  
Kirstin Dow, CISA, [DOWK@mailbox.sc.edu](mailto:DOWK@mailbox.sc.edu)  
Kirsten Lackstrom, CISA, [LACKSTRO@mailbox.sc.edu](mailto:LACKSTRO@mailbox.sc.edu)  
Amanda Brennan, CISA, [abrennan@sc.edu](mailto:abrennan@sc.edu)  
Lisa Darby, NOAA/NIDIS, [lisa.darby@noaa.gov](mailto:lisa.darby@noaa.gov)

***For more information on the Carolinas Coastal Ecosystems Pilot Projects, see the table on the following page.***



*Stakeholders from federal and state agencies, NGOs, academia, and the private sector came together in Wilmington, NC this summer to develop ideas for pilot projects for the NIDIS Carolinas Drought Early Warning Information System.*



*Prior to the scoping workshop, CISA assessed existing research related to the topic of drought and coastal ecosystems. The final report is available at [http://www.cisa.sc.edu/PDFs/2012\\_Drought\\_and\\_Coastal\\_Ecosystems-State%20of%20Knowledge\\_FINAL\\_2012.04.16.pdf](http://www.cisa.sc.edu/PDFs/2012_Drought_and_Coastal_Ecosystems-State%20of%20Knowledge_FINAL_2012.04.16.pdf)*

## **The Impact of Drought on Coastal Ecosystems in the Carolinas**

State of Knowledge Report January 2012

## NIDIS Carolinas Drought Early Warning Pilot Projects

Title	Background Information	Goals
Evaluation of Drought Indicators and Indices	Many of the commonly used drought indices were not developed with the unique characteristics of coastal ecosystems in mind. Predicting the onset, intensification and recovery of a drought could be improved with more knowledge of drought indicators and indices in coastal ecosystems. The goals developed by workshop participants for this particular pilot project will be to:	<ul style="list-style-type: none"> <li>• Determine which current drought indicators and indices are appropriate for assessing drought in coastal ecosystems</li> <li>• Investigate the benefits and feasibility of creating a drought index based on real-time salinity data</li> </ul>
Seafood Safety Forecast	During drought, freshwater flows are reduced and water temperatures rise. Impacts of these changes include increases in concentrations of pollutants, increases in salinity, changes in pH, increases in harmful algal blooms (HABs), increases in shellfish predator populations, increases in Vibrio bacteria and Cyanobacteria. All of these changes, and others not listed here, can have harmful effects on seafood. The Seafood Safety Forecast pilot project would aim to :	<ul style="list-style-type: none"> <li>• Provide an early warning system for commercial, recreational and subsistence fishermen who harvest drought-sensitive seafood in both fresh and salt waters in the coastal regions of the Carolinas</li> </ul>
Drought Forecasting Communications	Numerous drought, hydrometeorological and climate products are available to stakeholders in the Carolinas. However, stakeholders may not be aware of all products which are available, may not have the products they need to make decisions (i.e., the regional or temporal scale may not be adequate), or may not know the best way to tailor the products to their region or situation. This pilot project idea was designed by workshop participants to:	<ul style="list-style-type: none"> <li>• Introduce stakeholders to current products used for drought forecasting</li> <li>• Determine what additional drought forecasting products stakeholders need and what time scales are of most interest to them</li> <li>• Determine the best way to deal with uncertainty resulting from forecast data, including how uncertainty is conveyed to stakeholders</li> <li>• Determine the best ways to relay information about drought forecast tools</li> </ul>
Drought Impacts Reporting	Participants identified many possible benefits of improving drought impact reporting to include improving drought monitoring, building stakeholder awareness and engagement, building linkages between drought indicators and impacts, and addressing the need to improve understanding of the economic benefits of preparedness activities related to the NIDIS pilot, and mitigation and planning strategies. The overarching goals suggested by participants for this project will be to:	<ul style="list-style-type: none"> <li>• Assess ways in which drought impacts might be monitored through stakeholder engagement and citizen science</li> <li>• Investigate ways to improve the communication of coastal ecosystem drought impacts</li> </ul>



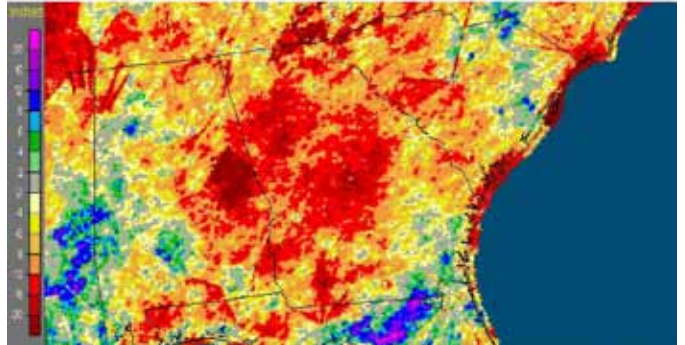
# Apalachicola-Chattahoochee-Flint

## Drought Assessment Webinars Keep Stakeholders Updated on Drought Conditions

By Lisa Darby and Chad McNutt, NOAA/NIDIS

According to the U.S. Drought Monitor, severe (D3) to extreme (D4) drought in Georgia and Alabama has maintained its approximate geographical extent for the last three months while much of the surrounding area remained relatively drought-free. In late November and early December, however, drought conditions across the Southeast U.S. significantly deteriorated with the expansion of abnormally dry (D0) and moderate drought (D1) designations.

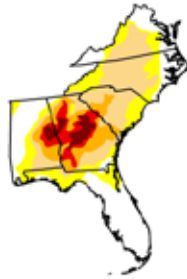
Georgia: Current Year to Date Departure from Normal Precipitation  
Valid at 12/4/2012 12:00 UTC - Created 12/4/12 21:46 UTC



Year-to-date departure from normal precipitation

### U.S. Drought Monitor Southeast November 27, 2012 Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0/D1	D2/D3	D4	D5	D6
Current	31.74	68.26	46.71	19.13	8.87	3.43
Last Week (11/20/2012) (see)	42.82	57.18	30.79	11.21	8.05	3.43
2 Months Ago (09/26/2012) (see)	61.25	38.75	21.42	12.09	8.88	3.48
Start of Calendar Year (12/27/2011) (see)	40.38	59.62	43.06	28.82	18.71	0.00
Start of Water Year (09/26/2011) (see)	66.49	33.51	17.18	11.90	8.53	3.52
One Year Ago (11/27/2011) (see)	40.37	59.63	47.50	34.31	23.86	0.00



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

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

<http://droughtmonitor.unl.edu>



U.S. Drought Monitor for the Southeast U.S.

Rainfall over the area for the last year has been well-below normal. The previous 24 months has been the driest on record for the southern part of the ACF.

The NIDIS drought early warning and information system pilot in the Apalachicola-Chattahoochee-Flint (ACF) River Basin has been holding drought assessment webinars every two weeks for well over a year. These webinars inform stakeholders about current and anticipated conditions for the ACF Basin. They are led by Keith Ingram of the Southeast Climate Consortium (SECC) and include regular contributions from the NOAA/NWS/Southeast River Forecast Center, the USGS Georgia Water Science Center, the U.S. Army Corps of Engineers/Mobile District, and the Florida State Climatologist.

To receive announcements for the ACF Basin Drought Assessment webinars, including information on how to participate, contact Carsen Ott ([carsen.ott@noaa.gov](mailto:carsen.ott@noaa.gov)) and request that your name be added to the ACF webinar list. PowerPoint presentations from previous webinars can be found at the ACF Basin pilot web page: <http://www.drought.gov/drought/regional-programs/acfrb/acfrb-home>.

## Additional Drought Assessment Webinars

### Southern Plains

Held on the 2nd and 4th Thursdays of each month at 11:00 am CT  
Please register here <http://www.southernclimate.org/> to receive login details.

### Upper Colorado River Basin

Every Tuesday at 10 am MT  
To register, please visit: [http://ccc.atmos.colostate.edu/drought\\_webinar\\_registration.php](http://ccc.atmos.colostate.edu/drought_webinar_registration.php).

### Midwest and Great Plains Drought Update Webinar

The third Thursday of every month at 1pm CT  
Information and the registration page can be found at this web site: <http://mrcc.isws.illinois.edu/webinars.htm>.

Current information for these webinars can be found at: <http://www.drought.gov/drought/content/regional-programs/regional-drought-webinars>.

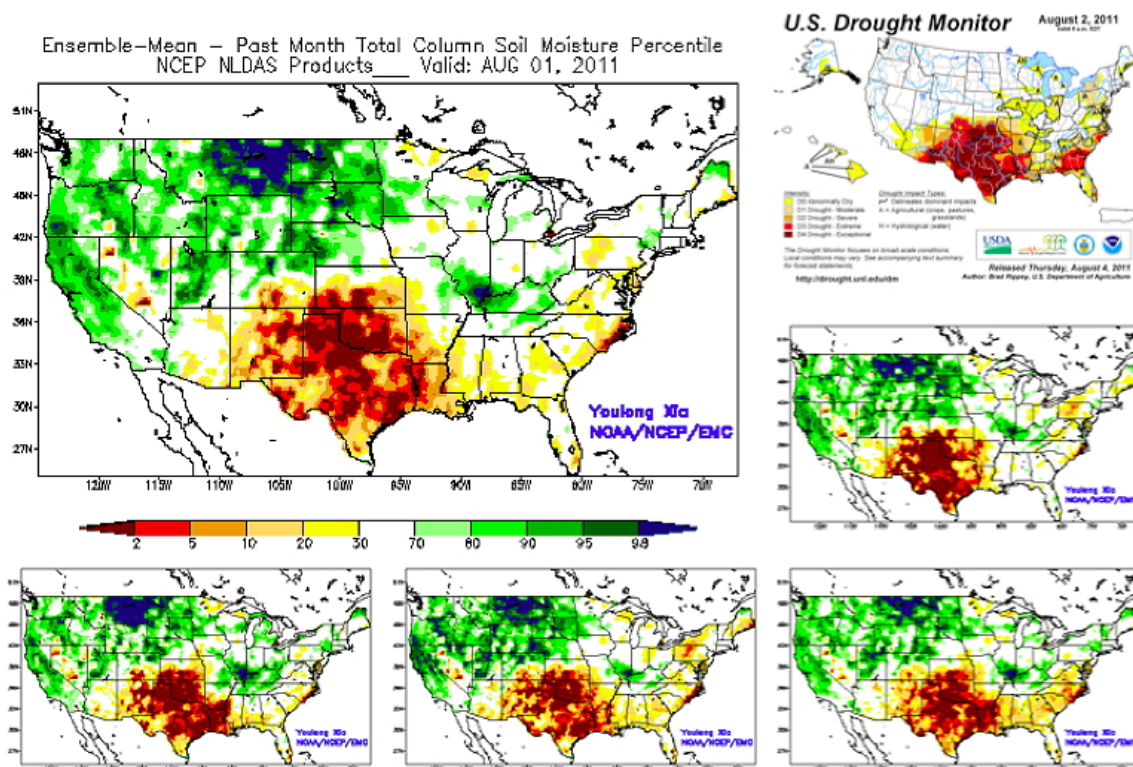
## The NOAA Drought Task Force

Annarita Mariotti and Dan Barrie, NOAA Climate Program Office and  
Siegfried Schubert, NASA

The National Oceanic and Atmospheric Administration's (NOAA's) Drought Task Force aims to achieve significant advances in the ability to understand, monitor and predict drought over North America. The group is an initiative of NOAA's Climate Program Office Modeling, Analysis, Predictions and Projections (MAPP) program in partnership with NIDIS, intended to help advance official national drought products and the development of monitoring and forecasting systems in support of NIDIS. The Task Force brings together leading MAPP-funded drought scientists from multiple academic and federal institutions, including NOAA's research laboratories and centers, in a concerted research effort that builds-off individual MAPP research projects. These span the wide spectrum of drought research

needed to make fundamental advances, from those that aim at the basic understanding of drought mechanisms to those that aim at testing new drought monitoring and prediction tools for operational and service purposes as part of the Climate Test Bed. The Drought Task Force provides focus and coordination to MAPP drought research activities, and facilitates synergies with other national and international drought research efforts, including those by the Global Drought Information System (more information about the NOAA Drought Task Force can be found at <http://www.drought.gov/drought/content/resources/drought-related-research>).

The Drought Task Force met October 25-26, 2012 in Fort Collins, Colorado to summarize work status after one year of activities and



The August 1, 2011 NLDAS Drought monitor ensemble mean total column soil moisture percentiles (upper left) along with (clockwise from upper right) the [U.S. Drought Monitor](#), NLDAS/VIC, NLDAS/SAC, NLDAS/Noah, and NLDAS/Mosaic. Note that the NLDAS soil moisture percentiles are currently used to provide additional guidance to the U.S. Drought Monitor. Courtesy of Drought Task Force investigators.

develop future plans (Drought Task Force duration is October 2011 – September 2014). Highlights of past and planned Drought Task Force work are provided below.

As part of its Year One efforts, the Task Force has developed a drought test-bed framework that individual research groups can use to test and evaluate methods and ideas. Central to this is a focus on three high profile North American droughts (1998-2004 western US drought, 2006-2007 SE US drought, 2011- 2012 Tex-Mex drought) to facilitate collaboration among projects, the definition of metrics to assess the quality of monitoring and prediction products, and the development of an experimental drought monitoring and prediction system that incorporates and assesses recent advances.

Three working groups were formed to address the three major aspects of the test-bed:

**WGI - Metrics:** To define and apply metrics to evaluate advances in drought monitoring and prediction.

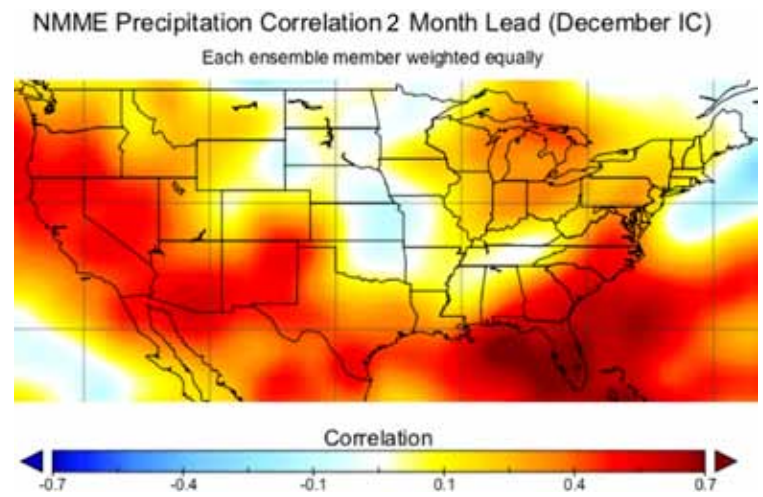
**WGII - Case Studies:** To analyze drought case studies integrating all aspects of drought research.

**WGIII - Experimental System:** To incorporate research advances in an experimental drought monitoring and prediction system and assess improvements.

In the coming year, the Drought Task Force plans to build on the foundation of collaboration established in Year One by continuing to press the overarching goal of evaluating drought science, and by concentrating efforts in several specific areas. High-level goals include:

- (1) Improving our understanding of the nature of drought, its manifestations and causes, and improving narrative communication thereof.
- (2) Quantifying current monitoring and prediction capabilities, and particularly improvements attributable to the Drought Task Force projects.
- (3) Identifying and investigating areas that offer the most promise for improving operational capabilities, and strengthening the drought research to operations connection with active linkages, in preparation for Year Three.

In order to achieve the above goals, the Task Force activities will be organized around specific themes consisting of 1) drought relevant science issues, 2) drought narratives, and 3) research to operational capabilities (RtC, for short). These themes recognize the multiple and important roles the Drought Task Force can play to advance drought science and service



*Analysis by MAPP PI Ben Kirtman and Johnna Infanti showing the NMME 2-month forecast precipitation correlations using a December initial condition. Note the highest correlations along the coasts and in the Tex-Mex region.*

capabilities. Specifically, stimulating progress on basic drought scientific issues, addressing on-going North American drought to facilitate discussions on causes and possible future droughts and develop narrative explanations thereof; and, building on the metrics and infrastructure developed by the Task Force during Year One, assessing progress in drought monitoring and prediction, with an eye towards advancing operational/service capabilities. The planned “narrative” activities will focus on the analysis of recent past droughts (twice a year for previous 6 months) and provide a venue to discuss research results regarding manifestations and scientific explanations of the droughts. A research perspective on the outlook of future droughts (upcoming 6 months) will also be considered. Instead, the “RtC” activities will focus primarily on the three historical test-bed droughts selected by the WG-Case Studies and the application of the metrics agreed upon by the WG-Metrics to provide a benchmark against which to test new operational and service capabilities.

To date, the Drought Task Force has proposed a Journal of Hydrometeorology special collection entitled “Advances in Drought Monitoring and Prediction” which will include over 20 research papers from individual Task Force members as well as a number of collective papers. The Drought Task Force “narrative” activities will result in an Annual Drought Report describing and explaining, from a research perspective, the droughts observed during each past year. The findings from the RtC activities will instead be summarized in an RtC Report, a sort of living document assessing progress in capabilities which will be regularly updated.



## The NIDIS Engaging Preparedness Communities Working Group: Working Together to Manage Drought Risks

By Deborah Bathke, National Drought Mitigation Center

Drought is a complex problem that typically goes beyond the capacity, resources, and jurisdiction of any single person, program, organization, political boundary, or sector. Thus, by nature, monitoring, planning for, and reducing drought risk must be a collaborative process. However in a series of workshops, the National Integrated Drought Information System (NIDIS) Implementation Team discovered that this was not the case. State, tribal, and municipal participants often felt isolated in dealing with drought-related issues. Many critical “lessons learned” did not get disseminated, and the participants were amazed to find that others had dealt with very similar issues and could have benefited from their knowledge and experience. Furthermore, no single entity has responsibility for drought planning, so decisions related to drought preparations and policy are in fact an ad hoc mix of federal, state, tribal and local policies that address water, drought, land use and food security.

To address these shortcomings, the NIDIS Implementation Team created the Engaging Preparedness Communities (EPC) technical working group. As its name implies, the purpose of this group is to provide active engagement among communities on preparing for and responding to drought events. For the purposes of the EPC team, a community is more than a geographic location. It also refers to the community of practice – the researchers, information brokers, and stakeholders in various sectors who are responsible for managing drought-

related risks.

As part of this effort, the National Drought Mitigation Center (NDMC) has partnered with the NIDIS Program Office for the development and leadership of the EPC working group. Since its inception, this working group has engaged a diverse group of drought professionals and stakeholders from across the United States in a variety of activities aimed at facilitating communication, identifying lessons learned, and exploring drought planning strategies. Key activities from the EPC working group include:

- (1) Web engagement forums, which introduced drought professionals and identified common, but critical planning needs such as developing methods for integrating planning efforts; planning under uncertainty; leveraging resources for risk management; evaluating, assessing, and updating drought plans; and implementing plans and planning information.
- (2) A national workshop titled, *Building a Sustainable Network of Drought Communities*, which provided important face-to-face interaction for planners and scientists, identified ways to strengthen human networks centered on drought preparedness, and served as a forum for the sharing of strategies and lessons learned. Presentations and results from this workshop are online: <http://drought.unl.edu/NewsOutreach/Outreach/Workshops/BuildingaSustainableNetwork,Chicago.aspx>.
- (3) The Invitational Drought Tournament, conducted in collaboration with Agriculture and Agri-Food Canada and AMEC, which

*Joe Hoffman, Interstate Commission of the Potomac River Basin, Mike Brewer, NOAA, National Climatic Data Center, and Mario Chapa, Texas Division of Emergency Management, discuss drought planning (photo courtesy of NDMC).*



allowed individuals and institutions in decision-making roles to use gaming as a means of getting people to work together on drought planning and preparedness exercises.

The next step for the EPC team is to work more actively with municipalities, states, regional offices, tribes, and other organizations to develop a drought coordinator network around the nation. Many drought coordinators are identified in the NDMC's drought planning database: <http://drought.unl.edu/Planning/PlanningInfobyState.aspx>. A functioning network, the drought coordinators would help NIDIS reach critical user groups and stakeholders and would serve as a communication focal point for interacting with the public, policy makers, the media, other drought coordinators, and

key stakeholder groups. We anticipate that this network of professional drought planners would help elicit and circulate information on best practices related to drought monitoring and early warning, drought impacts, drought response, and drought mitigation. The network would also help integrate drought planning from the federal through the state, regional, tribal and local levels, and would inform efforts to establish a drought policy that is consistent across agencies and programs. Organizing a network of drought planners will provide energy and momentum for drought planning, which will protect our nation's people, economy and natural resources from the growing risk of climate extremes.

## Upper Colorado River Basin

### Upper Colorado River Basin Drought Early Warning System

By Veva Deheza, CIRES/NOAA/NIDIS and  
Wendy Ryan, Colorado Climate Center

Central to the implementation plan for the National Integrated Drought Information System (NIDIS) is the development of effective drought early warning systems. The first of those systems, the Upper Colorado River Basin (UCRB) Pilot, was initiated in the fall of 2008. Four years later, it is the nation's first operational regional drought early warning system (DEWS).

The UCRB DEWS encompasses the upper part of the basin in Wyoming, Colorado and Utah. Since 2008, the UCRB Pilot has prototyped various approaches for developing early warning information for proactive drought risk reduction. The pilot has (1) demonstrated risk reduction strategies using drought monitoring and prediction information in partnership with users and federal, state, regional, and local agencies; (2) created opportunities to improve education and communication of drought information, and awareness; and (3) initiated activities to develop drought impacts assessments and reporting. To date, the UCRB DEWS has succeeded in enhancing local, state, and regional expertise and capabilities and has addressed stakeholder needs by building better partnerships.

One of the most valuable accomplishments of the UCRB System is the process it has created to greatly enhance and improve the U.S. Drought Monitor in this region. The DEWS has established a successful framework of

climate, water and drought assessments that have enabled local "expertise" to inform the U.S. Drought Monitor and improve the depiction of drought conditions in the region. The assessments are conducted as weekly webinars and include information on basin precipitation and snowpack, streamflow updates and forecasts, temperature and soil moisture data, reservoir storage, water demand, long-range outlooks for upcoming conditions, and drought impact data. Robust collaboration in these webinars by federal, state, and local experts has resulted in more localized drought designations in the region, and better informed drought response decision-making.

Another sign of the UCRB Pilot transitioning to an operational DEWS is the recent hiring of NIDIS's first Regional Drought Information Coordinator. Veva Deheza joined the NIDIS Program Office in August 2012 to coordinate the ongoing drought early warning activities within the UCRB. She serves as a "node" in a national network dedicated to dissemination and communication of drought information to impact groups, monitoring committees, drought task forces, governors, congressional delegation, etc., and serves as the focal point between NIDIS and the drought preparedness community.

Drought will continue to be a natural occurrence in the Upper Colorado River Basin, and NIDIS, through its UCRB DEWS, will continue to provide accurate information and data to inform response decisions and actions, and will continue to adapt decision support services to assist the drought preparedness community.

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## Results from the NIDIS Stakeholder Survey

By Tonya Haigh, National Drought Mitigation Center

### Background

The National Integrated Drought Information System (NIDIS) is an interagency, multi-partner effort to improve the nation's capacity for management of drought-related risks through provision of best-available information and tools for monitoring, forecasting, impact assessment, preparedness and mitigation. The NIDIS program office requested an evaluation of established Drought Early Warning Systems (DEWS) Pilot projects, the drought.gov portal, and other programming, in early 2012. The evaluation, led by the National Drought Mitigation Center (NDMC), will document the process and assess the outcomes of NIDIS implementation to date. The first stage was a survey of NIDIS stakeholders in July 2012.

### July 2012 NIDIS Stakeholder Survey

The NDMC surveyed NIDIS contacts in the Apalachicola-Chattahoochee-Flint River basin (ACFRB), Upper Colorado River basin (UCRB), and Southern Plains, as well as lists of NIDIS Engaging Preparedness Communities (EPC) participants and others who have participated in NIDIS activities. Survey response rate was approximately 20%. Respondents had fairly high levels of experience with drought monitoring and early warning systems. Ninety-two percent of respondents made drought-related decisions in some capacity, including state (32%) or regional (33%), individual (29%) and community (26%) levels.

### US Drought Portal (drought.gov)

The US Drought Portal was released in 2007 as a way to assimilate and quality control drought data, models, risk information, and impacts, and to create a point of entry for archiving and disseminating data. We asked survey-takers about their use of the NIDIS portal and found:

83% of respondents (n=105) had used drought.gov to find information on current drought severity and 76% had used it to find information on emerging or anticipated drought conditions. Fewer (46%) had used drought.gov to find information on current or past impacts of drought. Users found information on drought.gov to be timely, appropriate in scale, and useful.

Respondents (n=102) had also used drought.gov to find information on drought research or education (49%); events, announcements or news related to drought (45%); drought planning or policy (40%); and drought response, assistance, or recovery (32%). 85% found it to be useful.

### Drought Early Warning Activities

The NIDIS DEWS pilots were launched to explore and demonstrate a variety of early warning and drought risk reduction strategies that incorporate drought monitoring and prediction information in partnership with users and federal, state, regional, tribal and local agencies. As part of the DEWS efforts, drought assessment webinar series were launched in the UCRB and the ACFRB, and drought/climate outlook forums were conducted in the ACFRB and in the developing drought region in the Southern Plains. This survey found that knowledge and ability to use information increased as a result.

Of those who had participated in at least one webinar or climate outlook forum (n=88), 81% said their understanding of where to find drought and water supply information had increased; 76% said their understanding of how to use available drought and water supply information had increased; 75% said their interest in using drought and water supply information to make decisions had increased; 74% said their interactions and exchange of information with other basin stakeholders had increased; and 68% said their ability to incorporate drought and water supply information into decisions they made had increased.



## What did people do with NIDIS Information?

We found that the impact of NIDIS information is multiplied through information sharing, communication, and information repackaging.

Of 100 respondents, 78% said they had shared information with another person; 65% had incorporated information into a presentation or publication; 48% had generated information using a specific product or resource found on the portal; and 21% had incorporated information into a research objective.

Communication and collaboration also appeared to increase as a result of NIDIS, with 64% saying they had communicated with, and 45% saying they had collaborated with, drought professionals across disciplines/sectors/regions.

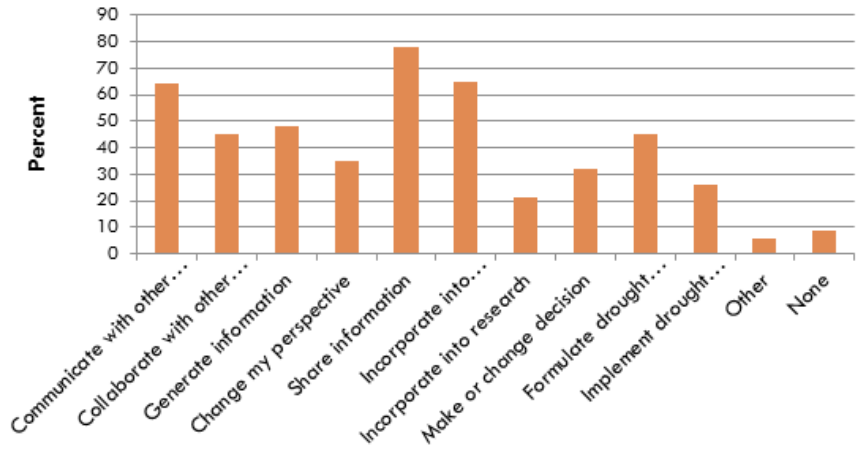
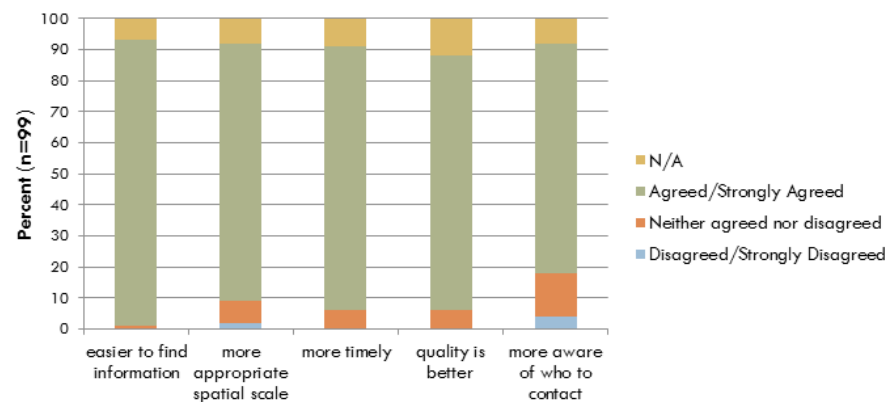
Decision-making was also impacted. Thirty-two percent said they had made, confirmed, or changed a decision, and 35% had changed their perspective on an issue as a result of NIDIS information. In addition, 45% had helped to formulate (and 26% had helped implement) a drought-related strategy, plan, program, or initiative.

Sectors impacted by drought-related decision-making included water supply/quality (56%), farming (24%), society and public health (22%), livestock production (19%), recreation and tourism (17%), plants and fish/wildlife (17%), fire (15%), and energy (12%).

## How did Drought Preparedness change?

We found an overall increase in perceived drought preparedness, compared to earlier drought periods such as 2002.

Of 99 respondents, 92% agreed that it is easier to find the drought information they need now; 85% agreed that drought information is more available when they need it; 83% agreed that drought information is available at a more appropriate spatial scale now; 82% agreed that the quality of drought information they use in making decisions has gotten better; and 74% agreed that they were more aware of who to contact with regard to drought preparedness now.



92% of respondents said that the amount of drought information available to them increased; 86% said coordination of drought-related efforts in their area increased; 85% of respondents said interest in drought preparedness in their area increased; 82% of respondents said their ability to incorporate drought-related information into decision-making increased; and 78% said efforts to develop drought preparedness and/or response strategies in their area increased.

# NOAA-WGA Quarterly Regional Climate Impacts and Outlook Assessment

By Robert S. Webb and Roger S. Pulwarty, NOAA/NIDIS and

James Verdin, USGS/NIDIS

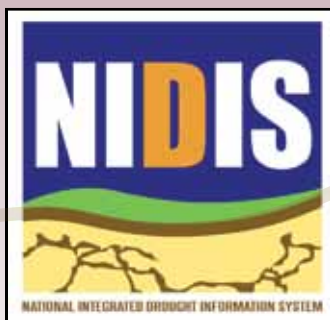
As part of the launch of the National Oceanic and Atmospheric Administration-Western Governors' Association (NOAA-WGA) memorandum of understanding (MOU) implementation, the NOAA Earth System Research Laboratory, Physical Sciences Division, worked with the WGA, NIDIS and many other regional partners to develop a western region outlook and information sheet. This new assessment highlights ongoing impacts, research and monitoring products and near-term climate outlooks relevant for drought, floods and wildfire risk. NOAA's Assistant Secretary of Commerce for Environmental Observation & Prediction and Deputy Administrator, Dr. Kathy Sullivan, presented the prototype two-page 'Western Region Quarterly Climate Impacts and Outlook' to the governors at the Western Governors' Association Annual Meeting in Cle Elum, WA, on June 11, 2012. The response of the western governors was very positive across the board, especially regarding the improved information accessibility and usability with leads to other activities on the ground.

*"Information contained in the Outlook is an excellent resource for our on-the-ground folks who have to be prepared for that all-too uncontrollable factor: weather," said Governor Gary Herbert (Utah), WGA Chairman. "This document indicates that our state should prepare for continued drought impacts, especially for the farmers and ranchers who will continue to see a scarcity of rain through the end of the year."*

Drawing on experiences of the World Meteorological Organization (WMO) in producing Regional Climate

Outlook Forum products such as the Caribbean Climate Outlook Forum (CARICOF), the NOAA-WGA Quarterly Regional Climate Impacts and Outlooks information sheet combine maps, projections and other monitoring and forecast products, as well as highlights of significant impacts, to succinctly inform decision makers regarding recent, current and likely future climate conditions. They include the most current U.S. Drought Monitor detailing the degree of severity of regional drought, maps showing the regional departures from the average temperature and precipitation for the previous season, and maps illustrating seasonal impacts such as the extent of major wildfires or information drawn from USGS Water Watch, the Department of Interior National Water Census and the WaterSMART Clearinghouse.

Building on the prototype for the NOAA-WGA Western US Quarterly Regional Climate Impacts and Outlook, similar information sheets are now produced to provide geographic coverage for the entire nation. In these other regions, NOAA's Regional Climate Service Directors are working in close partnership with NIDIS, Regional Climate Centers, Regional Integrated Sciences and Assessments programs, state climatologists and many other partners to produce regional summaries of climate impacts and outlooks to inform federal agencies, states, tribes, the private sector and the general public in their respective region. The content of regional reports will continuously evolve to ensure that they meet the region-specific information needed for policy, planning and decision making. For more information and access to current and previous Quarterly Regional Climate Impacts and Outlook information sheets, go to [www.drought.gov/drought/content/resources/reports](http://www.drought.gov/drought/content/resources/reports).



[www.drought.gov](http://www.drought.gov)

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