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Winter 2010

DroughtScape- Winter 2010

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Winter 2010

USDM Forum Highlights

The biennial U.S. Drought Monitor Forum is a chance for stakeholders and scientists to refine the weekly drought map. Read highlights from the October forum on pages 10 and 11.

Research Shows Birds Vulnerable to Drought



© Bruce Rosenstiel

Brian Wardlow, GIScience program area leader at the NDMC, was part of a research team that detailed the effects of drought on various bird populations. They found migratory birds to be at greatest risk. Read more on page 12.

NDMC Wishes Ryu Well

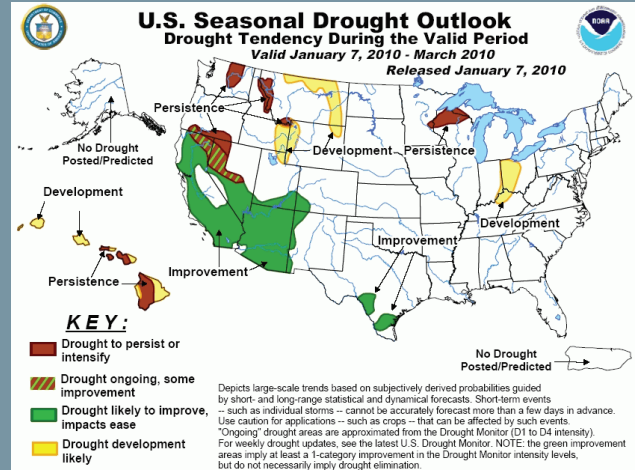
Congratulations to Dr. Jae Ryu, a hydrologist at the NDMC until early 2010, who is now at the University of Idaho. More on page 13.

About DroughtScope

DroughtScope is the quarterly electronic newsletter of the National Drought Mitigation Center. Please contact the editor by emailing droughtscope@unl.edu.

Drought Likely to Ease

Drought conditions in the Southwest, along the Gulf Coast, and in south Texas are likely to improve this winter and spring, due to the El Niño pattern that will gradually return to normal by late spring.



For the full outlook and summary of October-December 2009 drought conditions, please see pages 2-3.

Drought Recedes in 2009

The area of the United States that was abnormally dry or in drought was at its lowest point in 10 years in October 2009. For a complete climatological overview of drought in 2009, please see pages 4-5.

CA, TX Suffer Impacts from Ongoing Drought

The large, populous, drought-prone states of California and Texas were hardest hit by drought in 2009. An overview of impacts from October through December and a statistical summary of impacts in 2009 are on pages 6-7.

Inter-Regional Conference on Indices and Methods for Drought

December 8-11, 2009
University of Nebraska-Lincoln



Conferees Pick SPI for Global Drought Index

Undeterred by a December snow-storm, 54 drought scientists from 22 countries met in Lincoln, Neb., to establish a global drought monitoring standard. Dr. M.V.K. Sivakumar, left, of the World Meteorological Organization, was a co-organizer of the effort. Read more on pages 8-9.

Winter 2010

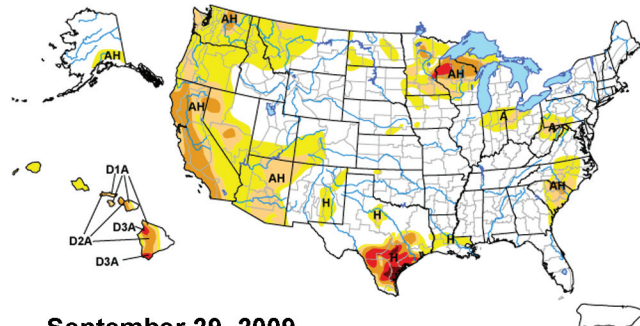
Winter 2010 Outlook and October to December Summary

By Brian Fuchs, Climatologist, National Drought Mitigation Center

Drought classifications are based on the U.S. Drought Monitor. For a detailed explanation, please visit <http://drought.unl.edu/dm/classify.htm>. The outlook integrates existing conditions with forecasts from the National Oceanic and Atmospheric Administration's Climate Prediction Center: <http://www.cpc.ncep.noaa.gov/>

Outlook: The current El Niño situation is projected to continue through the rest of winter, with warming in the Pacific waters leveling out around 1.5 degrees Celsius above normal and then retreating to around 0.5 degrees Celsius above normal by spring. The continued wet signal is showing up in the Climate Prediction Center forecasts, which should reduce drought conditions in the Southwest, the Gulf Coast and south Texas. As we approach the end of spring and move into summer, the ENSO signal becomes neutral.

October: October brought above-normal precipitation to much of the United States outside of the Southwest, Mid-Atlantic, and Florida. Unseasonably cool weather along with widespread precipitation brought many harvest delays throughout the Grain Belt. Throughout the Mississippi and Missouri River basins, most locations recorded more than 200 percent of normal precipitation during the month. These rains helped to reduce the intensity and area of drought, especially in Texas, Minnesota, Wisconsin, Ohio and Montana. The areas that did not record much if any precipitation during October saw droughts intensify or start to develop. Abnormally dry conditions were introduced into parts of Florida, while moderate and severe drought (D1/D2) was introduced and expanded over much of Arizona. Some early season rain and snow in California helped to get the 2009-10 water year off to a good start and contributed to some overall drought improvements, especially in northern California. According to the U.S. Drought Monitor, only 10.70 percent of the United States was experiencing drought at the end of October, compared with 12.61 percent at the beginning of the month. At the end of October, only 0.07 percent of the country was experiencing exceptional drought (D4), which is the smallest percentage since April 2008.



September 29, 2009

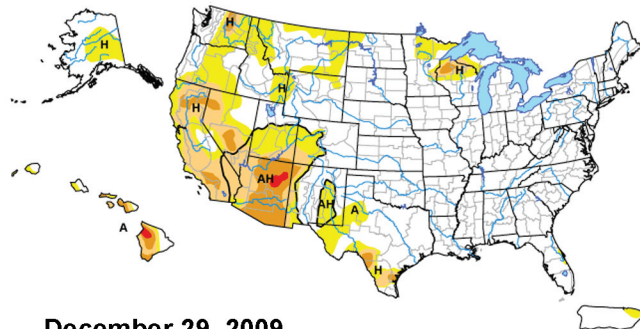
Abnormally dry conditions were introduced into parts of Florida, while moderate and severe drought (D1/D2) was introduced and expanded over much of Arizona. Some early season rain and snow in California helped to get the 2009-10 water year off to a good start and contributed to some overall drought improvements, especially in northern California. According to the U.S. Drought Monitor, only 10.70 percent of the United States was experiencing drought at the end of October, compared with 12.61 percent at the beginning of the month. At the end of October, only 0.07 percent of the country was experiencing exceptional drought (D4), which is the smallest percentage since April 2008.

November: Warm and dry conditions dominated the climate during November for most of the United States. The overall status of drought for the country remained nearly the same throughout November, with 11.05 percent of the United States in drought compared to 10.70 percent at the beginning of the month. Extreme (D3) drought was downgraded to severe in Wisconsin, while a new area of D3 was introduced in Arizona. D1/D2 conditions were also expanded in Arizona and into southern Nevada and Arizona. The lingering effects of the dismal monsoon season over Arizona led to a quite rapid expansion and intensification of drought. Af-

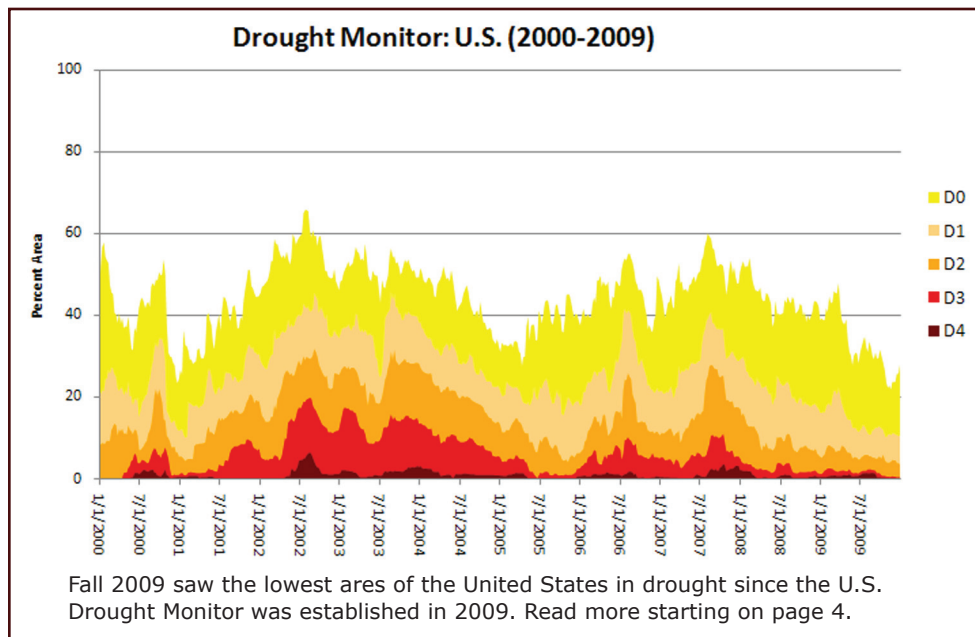
October to December Summary, continued

ter a dry October, the Mid-Atlantic states were on the wet end of the spectrum for November, with observed precipitation of more than 200 percent of normal commonplace throughout the region. This led to improvement and elimination of almost all drought in this area, outside of some lingering abnormally dry conditions in the Carolinas. Another dry month for portions of Florida permitted some expansion of D0 and an introduction of D1 along the eastern coast of the state. Exceptional (D4) drought was removed from Texas, leaving Texas free from exceptional drought for the first time since November 2008.

December: The area of the United States in drought at the end of December was slightly less than in November. Above normal precipitation was widespread in the High Plains and Upper Midwest, Southeast, Gulf Coast, and portions of the West. With this precipitation a reduction in drought intensity was shown on the U.S. Drought Monitor in Texas, California, Nevada and portions of western Arizona during December. December ended with just 10.46 percent of the United States in drought, compared to 11.05 percent at the end of November. The only area of extreme drought (D3) was in Arizona, while the eastern two-thirds of the country was drought-free, with the exception of northern Wisconsin and parts of Texas. Reductions in drought intensity over southern California, Nevada and western Arizona came as a result of several precipitation events during the month. The area of D2 was reduced in northern California. D3 was also eliminated from Texas for the first time since February 2008 as a continued pattern of above normal precipitation dissipated impacts and brought improving conditions.



December 29, 2009





Winter 2010

2009 Year in Review

By Brian Fuchs, Climatologist, National Drought Mitigation Center

Drought classifications are based on the U.S. Drought Monitor. For a detailed explanation, please visit <http://drought.unl.edu/dm/classify.htm>.

Statistical Milestones for the U.S. Drought Monitor in 2009

Greatest extent of D0-D4: 47.91 percent of the U.S. on 3/24/2009
Greatest extent of D1-D4: 22.30 percent of the U.S. on 3/24/2009
Greatest extent of D3/D4: 2.45 percent of the U.S. on 1/27/2009
Smallest extent of D0-D4: 21.74 percent of the U.S. on 11/17/2009
Smallest extent of D1-D4: 10.06 percent of the U.S. on 10/27/2009*
Smallest extent of D3/D4: 0.17 percent of the U.S. on 12/15/2009**

* This was the smallest extent of drought shown on the USDM since it started in 1999

** This was the smallest extent of D3/D4 since April 2000.

Drought dwindled across the United States in 2009, despite a continuing multi-year drought in the west.

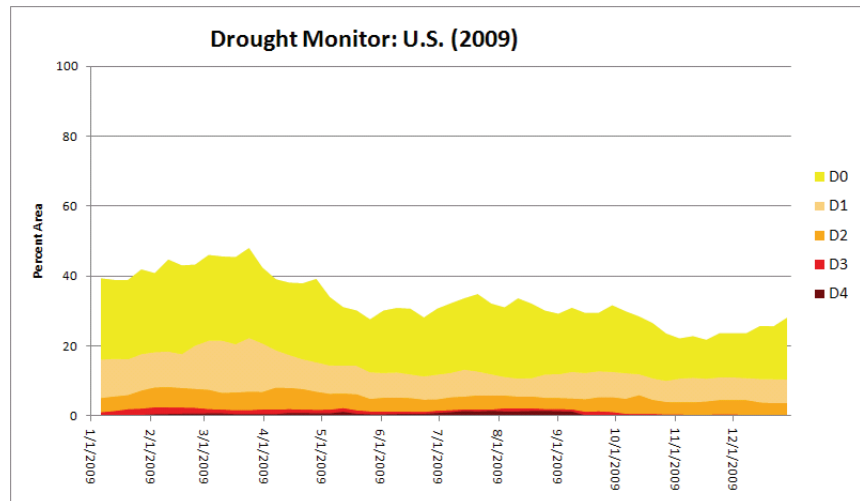
Southeast

At the beginning of the year, the southeastern United States was still in the grips of a multi-year drought, with lingering impacts, especially in the hydrology of the region. With above-normal rainfall throughout the year, this drought was finally put to rest by early winter. The Southeast was drought-free as of the December 22 release of the United States Drought Monitor.

In the first quarter of 2009, D1 expanded and D2 developed over Florida, where the usual dry season was especially dry, with less than 25 percent of normal precipitation over most of the peninsula. All along the Gulf Coast, abnormally dry to severe drought emerged. Fortunately, precipitation that was well above normal covered the region in early spring, and the drought that had stretched from Louisiana to Georgia ended.

Texas

Texas was another location that stood out as we entered 2009. In early January, 9 percent of the state was already suffering from extreme (D3) to exceptional (D4) drought. Rains im-





2009 Year in Review, continued

proved conditions in the north in the spring, but extreme and exceptional drought expanded in south Texas, where many agricultural and hydrological impacts were reported. By the end of March, almost 80 percent of the state was suffering from drought, and by the end of July almost 25 percent of the state was in D3/D4 status, leading many to compare it with the drought of record in the 1950s. By the middle of March, more than 71 percent of the state was in drought, compared to 25 percent at the start of the year. Drought continued and worsened during the summer. Agricultural losses mounted as crops failed and ranchers had to cull their herds due to lack of adequate feed. The fall finally brought much-needed rains to Texas. By the end of the year, only lingering D2 conditions remained in south Texas.

Midwest and Plains

A widespread area of drought in the upper Midwest expanded during the year but improved by the fall. Many areas of the central plains had a dry spring, but few if any impacts were evident. Most agricultural producers welcomed the dry weather as they planted their crops for the year. In summer, dryness remained over much of the High Plains, but relatively cool weather suppressed any drought-related impacts. Above-normal precipitation in the fall brought an overall reduction of drought in the upper Midwest, including the elimination of extreme drought from Wisconsin. Lingering hydrological impacts were the basis for the moderate drought (D2) conditions at the end of the year.

West

Drought continued in 2009 as much of the western United States recorded another year of below-normal precipitation. Early in 2009, the California drought benefitted from several good storms that brought much needed snow and rain to the region. They led to the removal of D3 in northern California in March and improvements to D2 along the central valley, but this pattern proved to be short-lived. Most locations ended the wet portion of their years below normal, in many cases for the second or third year in a row. Severe drought expanded through much of California. The exception was portions of the northern Rocky Mountains that saw good snows during the winter. Fall brought a wet start to the new water year, so much of the severe drought in California decreased, and moderate drought in Oregon improved.

After a disappointing monsoon season, severe drought encompassed most of Arizona by the end of the year, with extreme drought introduced in the northeast portion of the state at the end of the year.

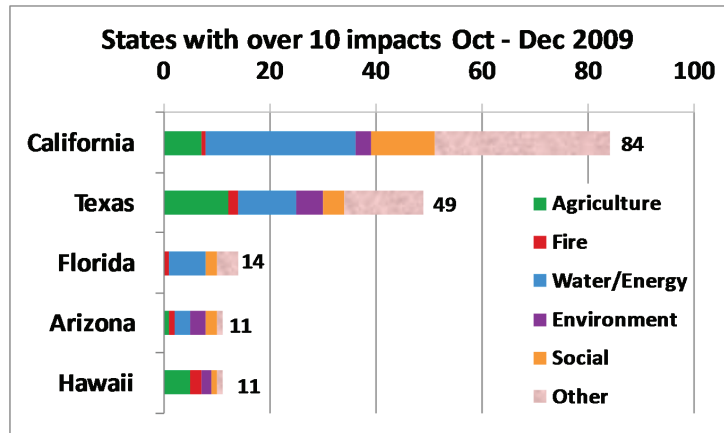
New Mexico, which had a decent start to the monsoon season, saw drought intensity reduced and eliminated over the western half of the state.

Hawaii did not see much improvement to drought, with overall drought status and the level of D3 drought remaining nearly unchanged for the year. The Big Island, Maui, and Molokai have been the islands hardest hit by the current drought, which first showed up on the U.S. Drought Monitor in the spring of 2008.

Impact Summary for October-December 2009

By Denise D. Gutzmer, Drought Impact Specialist

California and Texas had the most drought impacts in the last quarter of 2009, according to the Drought Impact Reporter. California, where drought is ongoing, had 84, and Texas, where drought has eased substantially after a summer of fierce heat, had 49. Fewer impacts were entered for much of the country toward the end of the year as drought conditions improved and affected less area than at any other time in the last ten years. Water supply was still a concern in west central Florida and Arizona, while agriculture in Hawaii was hampered by dry conditions.



The Drought Impact Reporter currently categorizes impacts by sector. The graph shows the proportion of reports in each sector. Most if not all of the "Water/Energy" impacts are related to water supply.

Listed below are representative impacts from California and Texas from the last three months. For more information about drought impacts in these states, please visit: the Drought Impact Reporter, <http://droughtreporter.unl.edu>, the California Department of Water Resources Drought page at <http://www.water.ca.gov/drought/>, and Societal Impacts of Climate on Texas at the state climatologist's office, <http://atmo.tamu.edu/osc/socimpacts/soc09.html>.

California

Members of the state Board of Food and Agriculture and the Central Valley Regional Water Quality Control Board met in Fresno on Oct. 14 to discuss how food and farming may be affected by insufficient water supplies. *Fresno Bee*, Oct. 8

A privately owned marina on Lake Elsinore benefitted when the city-owned Seaport Boat Launch had to close due to low water levels. The owner of the marina said about 30 more boats than usual had taken advantage of the marina's long launch, and that lower lake levels were also making more good fishing spots available on an emerging sandbar. *The Californian*, Oct 25

Water restrictions in San Diego became more stringent on November 1 when officials reduced lawn watering from 10 minutes to seven minutes, three times per week. 10News.com, Oct. 29

The governor announced continued funding for food distribution through the Fresno Community Food Bank for residents of the west side of the San Joaquin Valley who are unemployed due to drought and pumping restrictions in the delta. ABC30.com, Nov. 10

Water authorities requested a 20 percent reduction in water use in Mendocino County, following a mandate for a 50 percent reduction in water use over the summer, when Lake Mendocino was exceptionally low. *Ukiah Daily Journal*, Nov. 18

Impact Summary for October-December 2009, continued

The state Department of Water Resources offered an initial allocation for local communities of 5 percent of their water supply request for 2010. This is the lowest initial allocation ever put forth by the DWR after last year's lowest allocation of 15 percent, which was eventually increased to 40 percent. *Mercury News*, Dec. 1.

The Santa Clara Valley Water District ordered a mandatory reduction in water use of 15 percent because reservoirs contained only 64 percent of their capacity in March 2009. Residents responded by lowering their water use by 18 percent. Persistent drought spurred the board to extend the mandatory water restrictions from December 31, 2009 through June 30, 2010. *SFGate*, April 3

Texas

In Lavaca County, 225 farmers wanted to purchase hay through Project Cooperative Hay Lift, a program designed to provide reasonably priced hay. The high number of applicants led to a lottery system to select hay recipients. The program was also successful in Victoria County. *The Gonzales Inquirer*, Oct. 5

Ten thousand live oak trees have perished from drought in Bexar County, according to a forester and arborist with the Texas Forest Service. *MySanAntonio.com*, Oct. 10

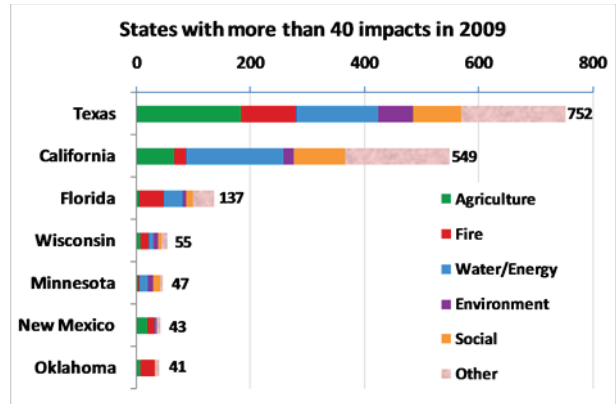
The Texas governor announced a state of disaster because the prolonged drought has severely cut hay and forage supplies, jeopardizing the livestock population. *Examiner.com*, Oct. 19

Lower Colorado River Authority officials met with farmers in Matagorda to inform them that there may not be sufficient water for irrigation next year. *News 8 Austin*, Oct. 20

Citrus grown in the Rio Grande Valley is smaller than usual and unblemished, thanks to the dearth of storms. The harvest was delayed by a few weeks to allow additional growth. *The Packer*, Nov. 6

The salinity of Matagorda Bay increased due to heavy water withdrawals upstream. The change in salinity has also drawn wildlife common to the Gulf into the bay. *News 8 Austin*, Nov. 19

More geese than usual are flocking to Lubbock lakes as drought dries up area playa lakes, according to local ornithologists. *Lubbockonline.com*, Dec. 18



California and Texas accounted for the vast majority of the 1,891 impacts added to the Drought Impact Reporter in 2009. The chart above shows impacts by sector for the states that had more than 40.

Scientists Agree on an International Standard for Drought Monitoring

Drought scientists from all over the world met Dec. 8-11 in Lincoln, Neb., and reviewed many ways of measuring drought before agreeing that the Standardized Precipitation Index (SPI) should become the global standard. The 54 scientists from 22 different countries released the Lincoln Declaration on Drought Indices on Dec. 11 at the workshop's conclusion.

Dr. Mannava V. K. Sivakumar, director of the Climate Prediction and Adaptation Branch of the WMO, shared the recommendations Dec. 15 at a press conference on Drought Monitoring and Food Security during the United Nations Climate Change Conference in Copenhagen.

The declaration recommends that all National Meteorological and Hydrological Services around the world should use the Standardized Precipitation Index (SPI) to characterize meteorological droughts. Sivakumar assured participants that countries should continue to monitor drought according to their local needs, and that the global standard would not pre-empt any local authority.

In fact, he said, increasing access to information has made it possible for individuals to assume more decision-making responsibility. In turn, this places an obligation on scientists to produce information that people can understand and use. "In the past, you did not have information at your fingertips in time to use it," he said. "Today, especially in a democratic society, there is a lot of information dissemination and action at the individual level. It's an indication of the progress we're making with time. If there's drought, governments can recommend that farmers reduce plant populations. But who does it? The farmer himself has to do it. At the end of the day, even if policy is prescriptive, actions are local. A forecast has value only when individuals act on it."

He said that adopting an international standard would provide the basis for global communication about drought and will contribute to early warning systems so policymakers and the international aid community can deliver more timely relief.

"Given the complexity in defining drought historically, the selection of a primary index or measure of meteorological drought is an important step forward," said Dr. Donald A. Wilhite, director of the School of Natural Resources at the University of Nebraska-Lincoln and founding director of the National Drought Mitigation Center (NDMC). "This is a step toward developing early warning systems to improve drought preparedness world-wide."



Participants listened to comments from Adrian Trotman, representing the Caribbean Institute for Meteorology and Hydrology in Barbados.

Scientists Agree on an International Standard for Drought Monitoring, continued

The SPI is an index that calculates the probability of precipitation for any selected time scale, based on the long-term precipitation record. SPI values range from more than 2 (extremely wet) to less than -2 (extremely dry), with .99 to -.99 considered the near-normal range. Maps normally depict SPI values as colors, with reds and yellows meaning dry and greens and blues meaning wet.

Various agencies and organizations in the United States regularly compute the SPI, including the NDMC: <http://drought.unl.edu/monitor/spi.htm>. The WMO will develop a user manual on the SPI to help countries that have not yet implemented it.

Workshop participants recommended that the WMO establish working groups to recommend universal indices for agricultural and hydrological droughts within a year. The same level of drought severity can cause different impacts in different regions due to varying underlying vulnerabilities, so workshop participants also recommended that a simple, systematic analysis of drought impacts in different sectors should be initiated in all affected countries.

The workshop brought together 54 participants from 22 countries around the world.

The workshop was organized jointly by the WMO and by the School of Natural Resources and the National Drought Mitigation Center (NDMC) at the University of Nebraska. The workshop was co-sponsored by the National Oceanic and Atmospheric Administration (NOAA), the U.S. Department of Agriculture, and the United Nations Convention to Combat Desertification (UNCCD).

NDMC Structures WMO Group Process

The National Drought Mitigation Center worked closely with the World Meteorological Organization to design and facilitate breakout sessions at a WMO workshop in Lincoln, Neb., that helped experts from all over the world agree on preferred ways of monitoring drought. Concurrent breakout sessions focused on meteorological, hydrological and agricultural drought. Participants identified various drought indices, listed their pros and cons, and went through a consensus process to select a preferred index. The following day, breakout participants reported results back to the full group. The group focusing on meteorological drought was able to concur on a single index, while the others recommended further study.



Above, Ray Motha, chief meteorologist for the U.S. Department of Agriculture, and Nicole Wall, NDMC public participation specialist, led a breakout session on agricultural drought indicators. Other breakouts focused on meteorological and hydrological drought.

U.S. Drought Monitor Forum Speakers Emphasize Services, Stakeholders and Scale

Speakers at the biennial U.S. Drought Monitor Forum emphasized the importance of providing drought and climate information that is relevant at local scales, and said that the proposed National Climate Service can benefit from the experiences of the U.S. Drought Monitor and the National Integrated Drought Information System (NIDIS).

"NIDIS has most of the things a national climate service has to wrestle with," said Dr. Kelly Redmond, deputy director of the Desert Research Institute and regional climatologist for the Western Regional Climate Center. In drought monitoring, "We need techniques and approaches that really meet the needs of stakeholders. They're asking for information at a finer scale. We need to go where the customer wants us to go. In the West, 'no county left behind' is the scale to be shooting for."

"Our job is to understand the decisions they're trying to make and give them information they can use," said Eileen Shea, chief of the Climate Services Division of the National Oceanic and Atmospheric Administration's National Climatic Data Center. "We need to be responsive and relevant, and to be responsive and relevant, we need to be working with those customers all the time."

Shea said that providing a service is not the same as providing a product, such as a regular map. Instead, it's about providing information based on continuous interaction with decision-makers and the various user communities.

"The U.S. Drought Forum in Austin this year provided the drought community with an opportunity to come together and talk about issues related to drought early warning in a place that had valuable recent and on-going drought experiences to share," said Mike Hayes, director of the National Drought Mitigation Center.



The most recent U.S. Drought Monitor Forum, October 7-8, 2009, was in Austin, Texas, hosted by the Lower Colorado River Authority and sponsored and organized by the National Drought Mitigation Center. Above, attendees posed outside the LCRA's Red Bud Educational Center, located on the Colorado River.

The process that goes into each U.S. Drought Monitor (drought.unl.edu/dm) map is one of continuous and vigorous interaction. The Drought Monitor map has been produced weekly since 1999, showing the extent and intensity of drought across the United States. Drought Monitor authors rotate in two-week shifts, and are from the National Oceanic and Atmospheric Administration, the U.S. Department of Agriculture, the National Drought Mitigation Center, and the Western Regional Climate Center. About 270 climatologists, hydrologists, meteorolo-

U.S. Drought Monitor Forum, continued

gists, extension agents and other drought observers across the country review the draft of each week's map. Reconciling multiple data sources and condensing the impacts of drought on various sectors at various times and space scales to a single value for each area often leads to vigorous discussion and has led over time to a strong shared understanding of drought.

The U.S. Drought Monitor Forum, held every other year, is a chance for Drought Monitor authors, reviewers and stakeholders to fine tune the product and the process, reviewing the latest tools, analyses, and needs. This forum, October 7-8, 2009, was in Austin, Texas, hosted by the Lower Colorado River Authority and was sponsored and organized by the National Drought Mitigation Center. The North American Drought Monitor Forum, bringing in Mexico and Canada for discussion of the North American Drought Monitor, a separate product, is held in alternate years. The next one will be in April, 2010, in Asheville, N.C., hosted by the National Climatic Data Center. NIDIS (drought.gov) was established in 2006 to assemble federal resources into a single drought monitoring and early warning system. NOAA is leading the effort.

Other speakers at the Forum focused on advances in drought monitoring that are making information available at finer scales. John Nielsen-Gammon, Texas state climatologist, described various techniques his office is using to depict drought more accurately at county and sub-county scales.

Michael Moneypenney, National Weather Service, representing the North Carolina Drought Task Force, described a process North Carolina uses each week to gather drought data and impacts from across the state and send a synthesized recommendation for the state to the Drought Monitor authors.

All of the speakers' presentations are on-line:
<http://drought.unl.edu/news/dmforumTX2009.html>.



Gregg Garfin, above left, moderated the U.S. Drought Monitor author panel at the end of the day Wednesday. Authors present were, from left to right, Brian Fuchs, Eric Luebehusen, Laura Edwards, Richard Heim, Mark Svoboda, Mike Brewer, and Matt Rosencrans. Among the research needs the authors identified were more data on soil moisture, more consideration of whether there should be two maps to reflect long- and short-term conditions, correlations of drought impacts with drought status, more timely GIS input, and how to account for varied topography such as the mountainous areas of the West.

Winter 2010

Researchers Document Effects of Drought on Bird Populations

Drought reduces bird populations in a 15-state region in the central United States, according to "Effects of Drought on Avian Community Structure," published Dec. 21 in *Global Change Biology*, coauthored by Dr. Brian Wardlow, GIScience program area leader at the National Drought Mitigation Center. Wardlow was part of a team led by researchers at the University of Wisconsin-Madison.

"Our big motivation for this project is to find out to what extent extreme weather is affecting bird communities across the United States," said Dr. Thomas P. Albright, a post-doc in the SILVIS Lab at UW-Madison. "There are pretty strong measured effects if you select precipitation at the right time frame."

The researchers found that both the number of individual birds and the number of bird species in a given area declined during and after droughts of 32 weeks or longer, Albright said. Overall, bird populations declined by more than 10 percent in dry areas.

The effects of drought varied according to climate regimes – mountainous, arid plains, or more humid temperate areas. They also varied according to birds' migratory patterns.

The most vulnerable were those that migrated long distances. Birds that migrated short distances suffered smaller declines in population, and birds that stayed put had the smallest declines. In fact, non-migrating birds in western mountainous areas saw populations increase by an average of 10 percent during drought. Birds that receive food, water or habitat from humans also fared comparatively well. The effects of drought were more pronounced in the arid central plains than in the more humid eastern states.

After examining various possibilities, the researchers determined that the Standardized Precipitation Index, with its flexible time scale, was the most useful way to characterize drought. The researchers compared periods of drought with bird counts from the North American Breeding Bird Survey, a monitoring program established in 1966 by the U.S. Geological Survey and the Canadian Wildlife Service.



Subsequent research is likely to focus on finding the precise mechanisms responsible for the population declines, Albright said. Possibilities he cited included birds dying from lack of water, food or habitat; birds dispersing to alternate locations; and/or birds not reproducing when they are under drought stress.

The article is on *Global Change Biology's* website: <http://www3.interscience.wiley.com/journal/123221917/abstract?CRETRY=1&SRETRY=0>



Photos courtesy of Bruce Rosenstiel. The dickcissel, above, and the scissor-tailed flycatcher, below, are grassland Neotropical migrants.

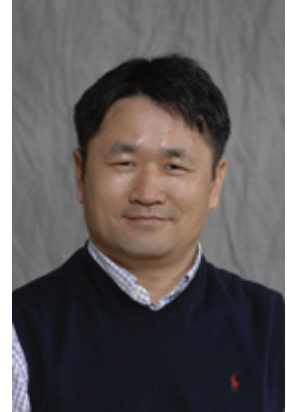


Winter 2010

NDMC Congratulates Jae Ryu on New Position in Idaho

Congratulations to Dr. Jae Ryu, P.E., a hydrologist who is now in a tenure track faculty position in Water Resources Engineering at the University of Idaho in Boise. Jae was with the NDMC from 2006 until January 2010. His new position will focus on water resources management and planning in Idaho and the west, including mitigation and adaptation strategies for climate change impacts, and he will be working with state and federal personnel located in Boise.

At the NDMC, Jae's research focused on hydrologic drought and stream-flow forecasting; water resources planning; identification of regional drought characteristics; the application of drought planning methodologies for drought preparedness; and assisting in the development of research and web-based decision-support tools for decision makers, such as the Republican River Basin decision-support portal and the U.S. Drought Atlas. Jae anticipates that he will continue to collaborate with NDMC faculty on projects of mutual interest in the future.



Jae Ryu

He received his Ph.D. in 2006 and an M.S. in 2001 in civil and environmental engineering from the University of Washington. He earned an M.S. in 1998 and a B.S. in 1996 in agricultural engineering from Konkuk University in Seoul, Korea. Jae's professional memberships include the American Society of Civil Engineers, the American Geophysical Union, and the American Water Resources Association.

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