WINTER2017

National Drought Mitigation Center

# DROUGHTSCAPE

The Newsletter of the National Drought Mitigation Center

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### About the photo

*The New Melones Lake in central California, nearest Tuttletown, has significantly decreased in size due to extended drought in the state. This photo was taken from one of its shores.*

**Photo courtesy of Bethany Vedder**

## DIRECTOR'S REPORT

**Mark Svoboda**

First off, let me wish a Happy New Year to all of our friends and collaborators! Before we look forward to what 2017 has in store, it is good to pause and look back and reflect on the good work accomplished by our staff in 2016.

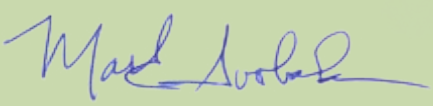
We wrapped up the year with a flurry — albeit not in the form of many snow flurries around these parts thus far — by co-conducting stakeholder workshops in Tunisia, Jordan and Morocco for the U.S. Agency for International Development. We completed those workshops with our partners at the International Center for Biosaline Agriculture and Water for Food Global Institute at the University of Nebraska for our Middle East North Africa project. In 2017, we will continue this project with a workshop in Lebanon, but also will do follow-up work in Tunisia.

Also in the last quarter of 2016, we conducted workshops with the National Integrated Drought Information System for the Drought Early Warning Systems in the Midwest and Pacific regions. The workshops were meant to strengthen relationships between states and regions as these two DEWS regions moved toward the end of their first year on the books.

Speaking of 2016, stay tuned for our soon-to-be-released inaugural National Drought Mitigation Center Annual Report. This report will look back on activities completed with our partners around the state, country and world over the year and also will include a recap of the NDMC's first 20 years as we celebrated our anniversary this past year. The new report will provide us an opportunity to unveil a fresh, new look via a new logo for the drought center as we move into our third decade of existence. Stay tuned.

We have also hit the ground running in the new year with several activities scheduled for the first quarter of 2017, including continued work with U.S. Department of Agriculture, NIDIS and USAID, along with revamped websites for the NDMC and the U.S. Drought Monitor. We also have follow-up activities focused on drought risk management planning and policy writeshops planned in the Caribbean with our colleagues at the Caribbean Institute of Meteorology and Hydrology in Barbados.

I hope that we will have a chance to cross paths or interact with many of you in the coming year as it seems we are poised to once again cover a lot of ground.



# NDMC, tribes partner to assess climate vulnerability

Cody Knutson and Kelly Smith are providing training and technical assistance to conduct climate vulnerability assessments for the Rosebud Sioux, Oglala Sioux, Standing Rock Sioux and Flandreau Santee Sioux tribes in South Dakota. The team will support the work of the Great Plains Tribal Water Alliance, which is facilitating the project with funding provided by the Bureau of Indian Affairs' Tribal Climate Resilience Program.

The GPTWA is an advisory committee to the Great Plains Tribal Chairman's Association on technical and policy issues regarding the waters resources of its member tribes. Other project partners include Louis Berger, an engineering company; NOAA and their National Drought Integrated Drought Information System; the High Plains Regional Climate Center; South Dakota State University; and the South Dakota School of Mines and Technology.

Specifically, the partners will:

1) provide training on conducting climate vulnerability assessments;

2) collaborate with the targeted tribes to assess climate vulnerabilities in their water sectors;

3) develop a water resources vulnerability assessment training guidebook for tribal managers; and

4) help each tribe monitor and communicate short and long-term climate and related impact information through the development of quarterly climate summaries.

Dr. Knutson attended a kick-off planning meeting Nov. 29 to outline project activities in Rapid City, South Dakota. The following day, he provided an introductory presentation on conducting vulnerability assessments during a session of the GPTWA Fall Water Conference in Rapid City devoted to the project. During the session, other team members provided an overview of the project, the development of climate summaries, and how this project fits into other climate-related activities underway in the Missouri Basin.

Additional project workshops are planned to begin during the spring of 2017 with the project scheduled for completion in the fall of 2018.

— CODY KNUTSON, NDMC

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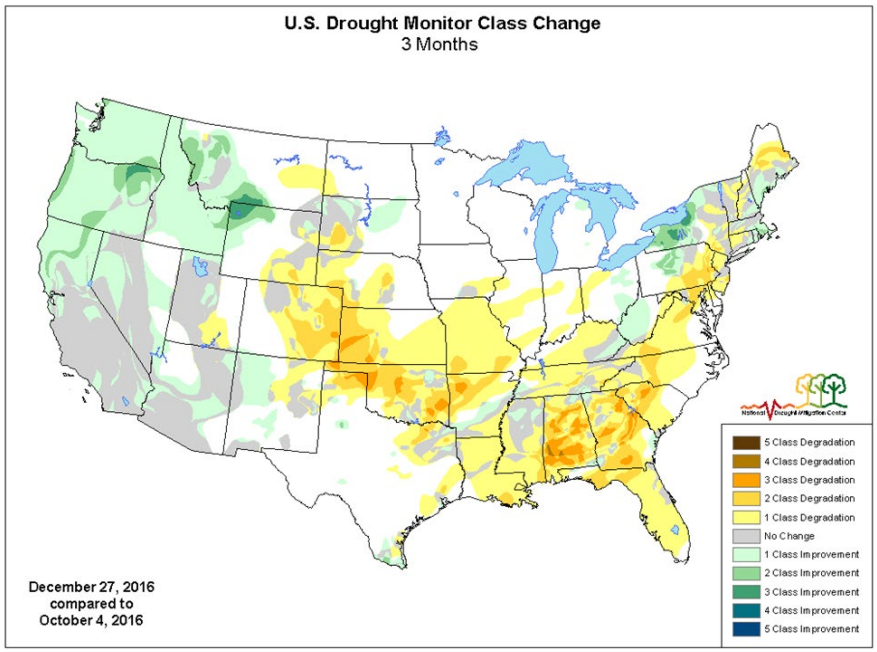
# For parts of country, drought intensified in fall

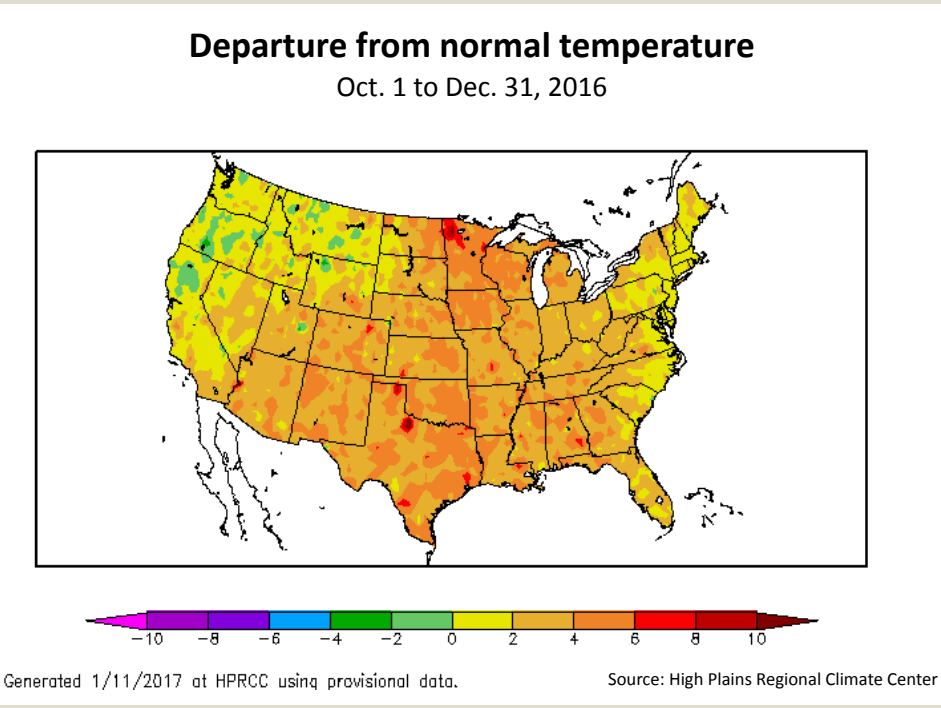
**BY BRIAN FUCHS**
*NATIONAL DROUGHT MITIGATION CENTER CLIMATOLOGIST*

*Drought classifications are based on the U.S. Drought Monitor. Details on the extent and severity of drought are online:* ***droughtmonitor.unl.edu****.*

*The outlook integrates existing conditions with forecasts from the National Oceanic and Atmospheric Administration's Climate Prediction Center:* ***www.cpc.ncep.noaa.gov.***




http://droughtmonitor.unl.edu




## Drought

As October began, 16.24 percent of the United States was in drought, and the year ended with 20.09 percent in drought. Severe drought worsened from 6.99 to 8.43 percent, extreme drought worsened from 2.63 to 3.78 percent, and exceptional drought worsened from 0.98 to 1.51 percent of the country. Much of this expansion was in the Plains and Southeast while improvements occurred in the West. Lingering drought was still affecting the Northeast.

## Temperatures

The end of 2016 was warmer than normal over almost the entire United States. A few mountainous areas of the Pacific Northwest were normal to 2 degrees cooler than normal, but most areas were 2 to 4 degrees warmer than normal for the quarter. The areas with the largest departures from normal were in the upper Midwest and portions of the southern Plains where temperatures were up to 6 degrees above normal.

## Precipitation

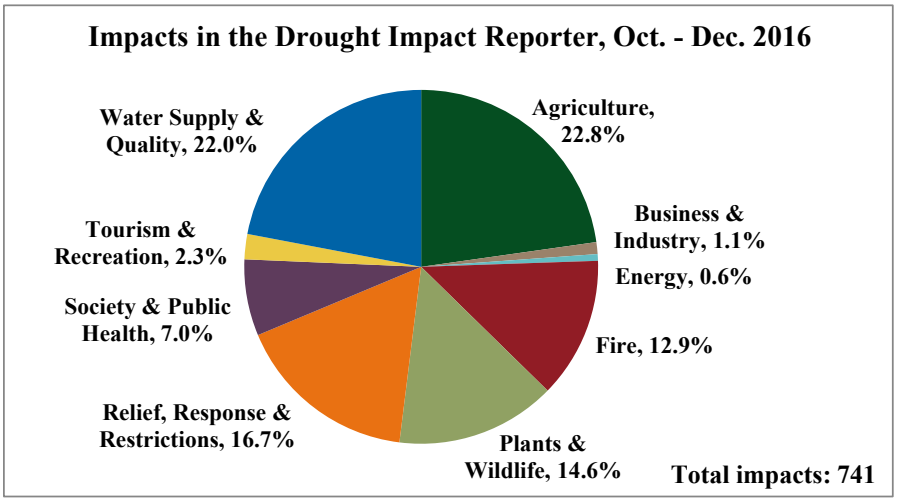
Dryness was a factor over much of the southern Midwest, Southeast and eastern portions of the southern Plains states. Much of this area recorded precipitation 10 inches below normal for the quarter. Normal to slightly below-normal precipitation was recorded over the central Plains, Midwest, central Rocky Mountains and the Mid-Atlantic. The coastal areas of Georgia and the Carolinas all had

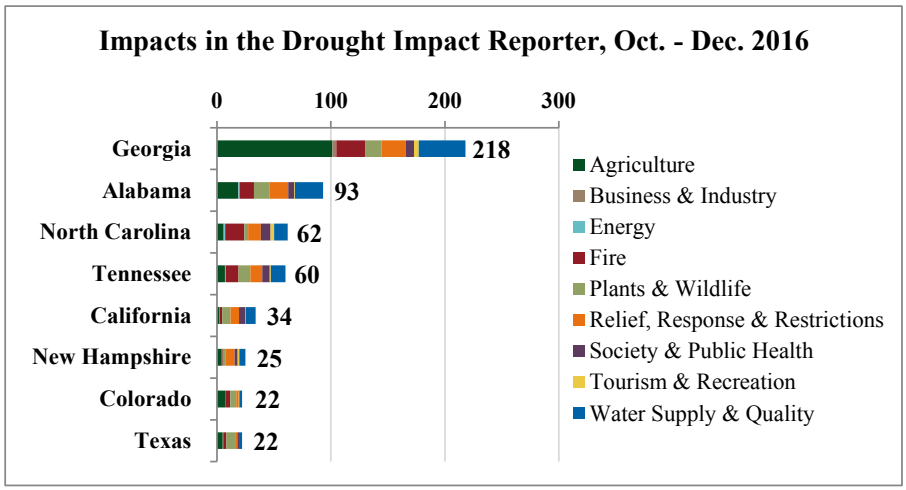
*Continued on* **page 5**

# Fire danger, sequoia deaths and retracting drought

**BY DENISE GUTZMER**
*NATIONAL DROUGHT MITIGATION CENTER DROUGHT IMPACT SPECIALIST*

Parts of the western third of the U.S. emerged from drought in the last quarter of 2016, while parts of the eastern two-thirds of the country saw shifts in drought status. Fire danger increased in the Southeast as drought rapidly intensified in October and November, as did the number of wildfires charring the region until rains eased drought conditions in December. Georgia and Alabama residents contributed many observations to the Drought Impact Reporter in the latter part of 2016, with at least 173 impacts from individual and Community Collaborative Rain, Hail and Snow Network observers in Georgia, 44 from Alabama, 31 from North Carolina and 28 from Tennessee. Rarely does the DIR get that many submissions from volunteers, but it was a testament to the drought severity and expanse in the region. Altogether, the NDMC added more than 740 impacts to the DIR in the last quarter of 2016.




Source: National Drought Mitigation Center

## Wildfires in the Southeast

From east Texas and Louisiana across the Southeast, fire danger was high and problematic during the fall. Many states and counties restricted outdoor burning with the hope of tamping down fires before they started, but the region battled many wildfires anyway. At times, more than three dozen wildfires flared in the Southeast, testing human endurance and logistics as fire departments stretched thin struggled to keep up.

Arson was also a factor in some of the fires, as in the Gatlinburg, Tennessee, firestorm. Strong winds ahead of a front drove fires through the Gatlinburg area, with the Chimney Tops No. 2 fire consuming more than 17,000 acres and nearly 1,700 homes and businesses. Residents had little warning and fled with the clothes they had on and little else. More than a dozen people perished. A storm front pushing into the region drove the fire, with gusts around 90 mph, and although accompanying rains in subsequent days and weeks eased drought conditions slightly, much of the area remained dry.

## Dry summer diminished forage, hay growth in Northeast, Southeast

The Northeast and the Southeast suffered from drought during the growing season and had little forage growth for livestock feed and no hay stored for the winter. Many producers began feeding hay in late summer or early fall because grasses were not growing. They were not able to stockpile hay for winter and worried about what they were going to do when cold weather arrived. In Alabama, a website was created to connect hay sellers and buyers, and peanut growers were advised to

*Continued on* **page 5**

*Continued from* **page 4**

make alternative feed by baling plants once the peanuts were harvested. Some cattle producers dealt with the hay shortage by selling livestock.

"Worsening drought leaves Maine farms, wells in bad shape," by Abigail Curtis, Bangor Daily News (Maine), Oct. 14, 2016

"Local dairy farms struggle amidst drought conditions, low milk prices," by Xander Landen, SentinelSource.com (Keene, N.H.), Oct. 1, 2016

"State drought team issues emergency declaration," by Mary Sell, TimesDaily.com (Florence, Ala.), Oct. 19, 2016

"Cattle farmers hope for assistance," by Bernie Delinski, TimesDaily.com (Florence, Ala.), Oct. 20, 2016

### Home foundations, roads cracking in Southeast

Shifting soil in the Southeast has damaged many home foundations and roadways as drought caused soils to crack and contract, perhaps a lesser known, but costly consequence of drought. The movement kept many foundation repair businesses busy in northern Alabama. Severe cracks and damage also appeared in many sections of the Natchez Trace Parkway during the fall. Visitors were warned that the road surface had moved because underlying soils had shrunk. Maintenance crews were repairing areas needing urgent attention.

**DROUGHT IMPACT REPORTER**

For more detailed reports, visit **droughtreporter.unl.edu**

"Extreme drought causes home foundation cracks across the Valley," by Chris Davis, WHNT-TV News 19 Huntsville (Ala.), Oct. 12, 2016

"Drought causing cracking, movement in pavement on Natchez Trace Parkway," by Donesha Aldridge, WJTV 12 (Jackson, Miss.), Oct. 28, 2016

### California losing many trees to drought

Roughly 62 million trees died from drought in California in 2016, according to the U.S. Forest Service, as the multiyear drought stretched on and the tragedy of tree deaths continued. Stressed trees were collapsing or dropping branches without any warning, killing a woman during a photo shoot for a wedding party in December and a woman in northern California in early January 2017. Dozens of dead sequoias were also observed in late 2016, although seeing dead sequoias still standing used to be a rare event among trees that live thousands of years.

The millions of dead trees, posing a fire danger, as well as a threat to public safety, also meant plenty of work for tree cutters.

"Whittier park closed after tree toppled over, killing 1 and injuring 7," by Matt Hamilton, Los Angeles Times (Calif.), Dec. 18, 2016

"Drought is damaging California's giant sequoias," by Vicky Hallett, The Washington Post (D.C.), Dec. 9, 2016

"The 102 million dead trees in California's forests are turning tree cutters into millionaires," by Thomas Curwen, Los Angeles Times, Dec. 14, 2016

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above-normal precipitation due to Hurricane Matthew sweeping by the region. The water year started well over the West with most areas recording normal to above-normal precipitation. Areas along the Washington and Oregon coast and into northern California received 10 to 15 inches above normal precipitation.

### Outlook

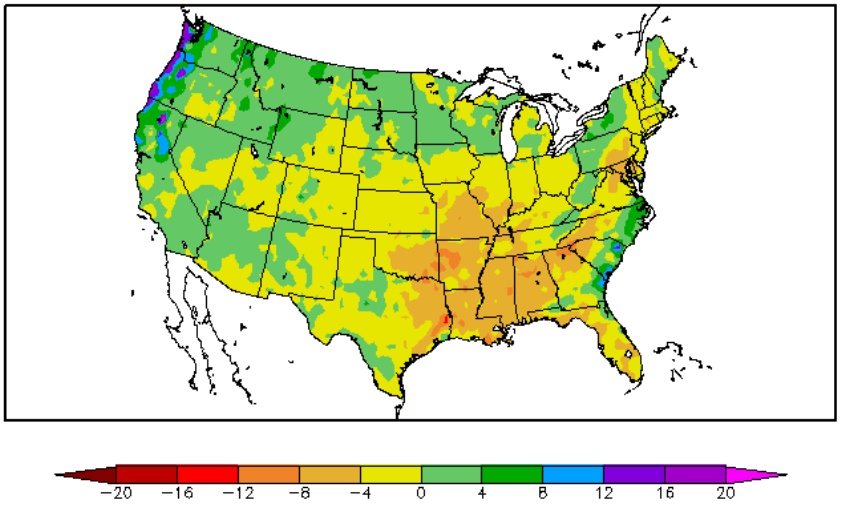
Through the end of April, drought conditions are expected to improve over much of California and Nevada, the Southeast, New England and central Plains. Drought is likely to develop over the Florida peninsula and the southern tip of Texas while persisting in the southern Plains and Southwest.

**MONTHLY DROUGHT AND IMPACT SUMMARIES**

For a more detailed review of conditions, please visit **drought.unl.edu/newsoutreach/monthlysummary.aspx**

**Departure from normal precipitation**

Oct. 1 to Dec. 31, 2016




Generated 1/11/2017 at HPRCC using provisional data.

Source: High Plains Regional Climate Center

# Drought shifted across U.S. in 2016

**BY BRIAN FUCHS**
*NATIONAL DROUGHT MITIGATION CENTER CLIMATOLOGIST*

Drought conditions varied widely during 2016 with the year starting with most drought in the West and ending with significant drought development in the Southeast.

The year started with 18.39 percent of the contiguous states in drought and ended with 24.04 percent in drought. The level of severe drought was stable with just more than 10 percent at both the beginning and end of the year. Extreme drought improved from 5.16 to 4.53 percent, and exceptional drought improved from 2.70 to 1.81 percent of the country.

Drought peaked at the end of November when 31.46 percent of the country was in drought with the rapid expansion taking place in the Southeast. The least amount of drought was in March with just more than 12 percent of the continental United States in drought. Extreme and exceptional drought peaked in November at 8.66 percent of the CONUS compared to just 2.26 percent in June, which was the lowest amount for the year.

With the large population centers of the Southeast, New England and southern California all in drought in November, there were about 148 million people being affected by drought at that time, the peak for 2016, and in stark contrast to the 39 million being affected in March, the lowest number for the year.

In 2016, the entire United States had above-normal temperatures with Georgia experiencing their warmest year on record. It was the second warmest year on record for the United

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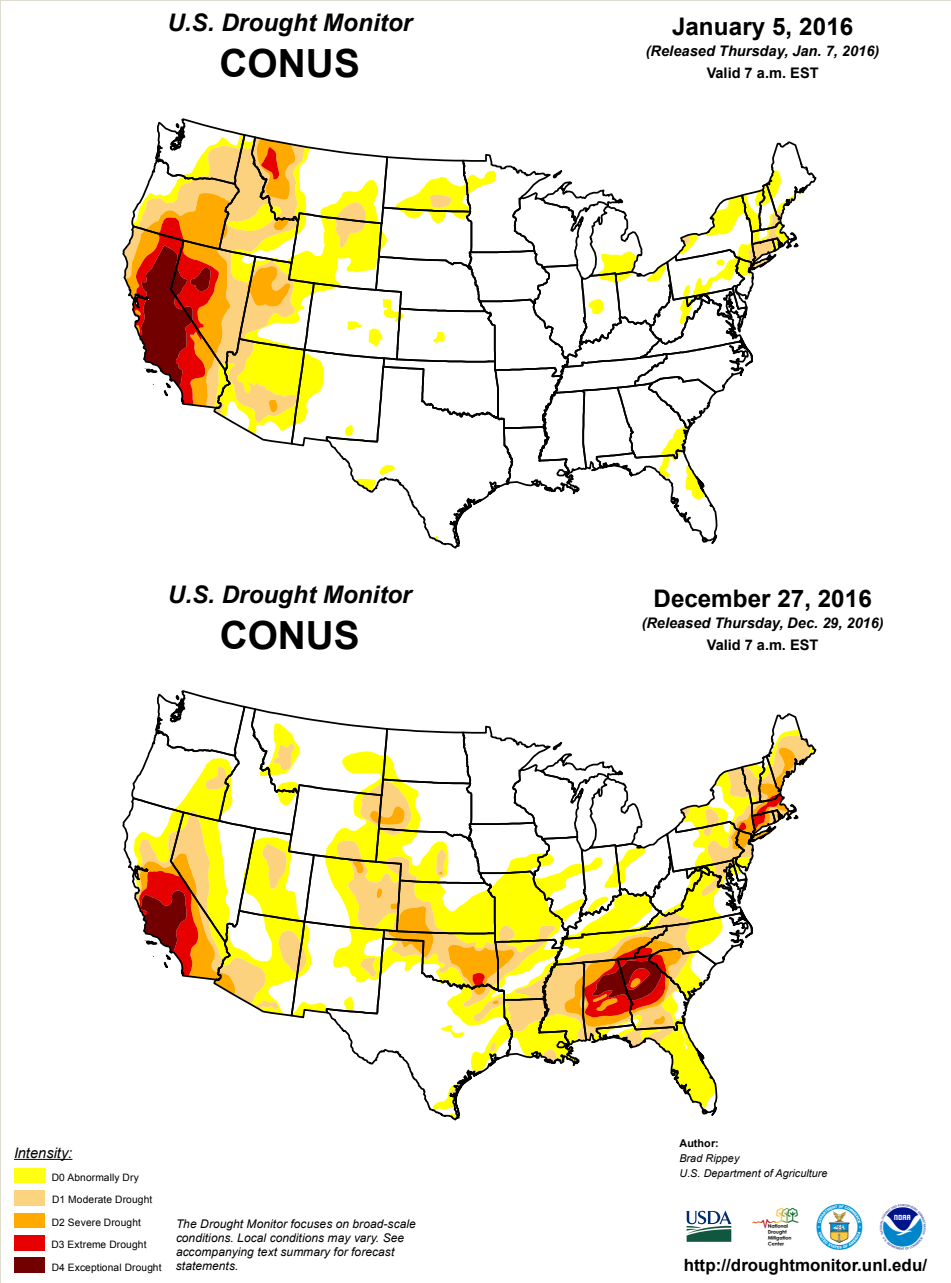


## Statistics Comparison

| Week | None | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4 |
|---|---|---|---|---|---|---|
| Jan. 5, 2017 | 68.57 | 31.43 | 18.39 | 10.03 | 5.16 | 2.70 |
| Dec. 27, 2017 | 49.19 | 50.81 | 24.04 | 10.09 | 4.53 | 1.81 |

**Source: National Drought Mitigation Center**

*Above is a U.S. Drought Monitor weekly comparison between the first map released in 2016 and the last. The statistical comparison shows a just over 5 percent increase in drought coverage between Jan. 5 and Dec. 27, with drought spreading across much of the Midwest and Southeast.*

 

**Barbara Perry | Submitted to the Drought Impact Reporter**

*Barbara Perry shared this image of cattle from her farm in Georgia with the Drought Impact Reporter on Nov. 19, 2016. In it, dust from drought is stirred up by cattle around feeding troughs. "I've been growing cattle since 2000, and this is by far the driest I've seen. I've experienced low weaning weights, record number of cull cattle not bred back, and more sickness due to dust from drought. This has been a tough year in the cattle business with rainfall totals for the year being 24.5 inches," Perry wrote.*

# Dryness affects new regions of country, costs California $600 million in lost revenue in 2016

**BY DENISE GUTZMER**
*NATIONAL DROUGHT MITIGATION CENTER DROUGHT IMPACT SPECIALIST*

California entered 2016 still mired in drought, as it had been for four years, and the winter did not bring enough snow to free the state from the dry stretch that began in 2012. Storms chipped away at the drought affecting the western U.S., giving the region a reprieve after several years of below-normal precipitation. Unfortunately, a warm spring melted California's snowpack and much of the Western U.S.'s snowpack, stealing the slow melt that keeps rivers flowing during the summer months.

As summer began, dryness took hold in the Southeast and began to develop in the Northeast, too. These areas became pockets of searing drought, drying up crops, grazing and water supplies through the fall, when the dry spell turned even crueler, as documented in the more than 1,600 impacts added to the Drought Impact Reporter during the year. Surprisingly, Georgia had the most impacts in 2016, as more than 180 volunteers including 20 CoCoRaHS observers, submitted their own drought observations, pushing the total number of impacts for the state to 254 for the year. Meanwhile California, dealing with years of intense drought, had 221 impacts, including 16 from CoCoRaHS observers.

## Georgia and the Southeast

The lack of rain brought crop growth to a standstill in Georgia and the Southeast. The outpouring of details from Georgia revealed that ponds were drying up, planting was postponed, and forage was not growing for the cattle, leading to early feeding of livestock and having no hay stored for winter feeding. Circumstances were very difficult for farmers in the Southeast, as the many voices from Georgia indicated.

## Northeast

Farmers in the Northeast also faced immense challenges during the summer. In an area where irrigation systems are not commonly used, it was difficult to cope with the lack of rain and get water on the crops because irrigating involves many man-hours moving pipes; there also is a high expense for running pumps. Crop production was down and some crops outright failed, while other farmers

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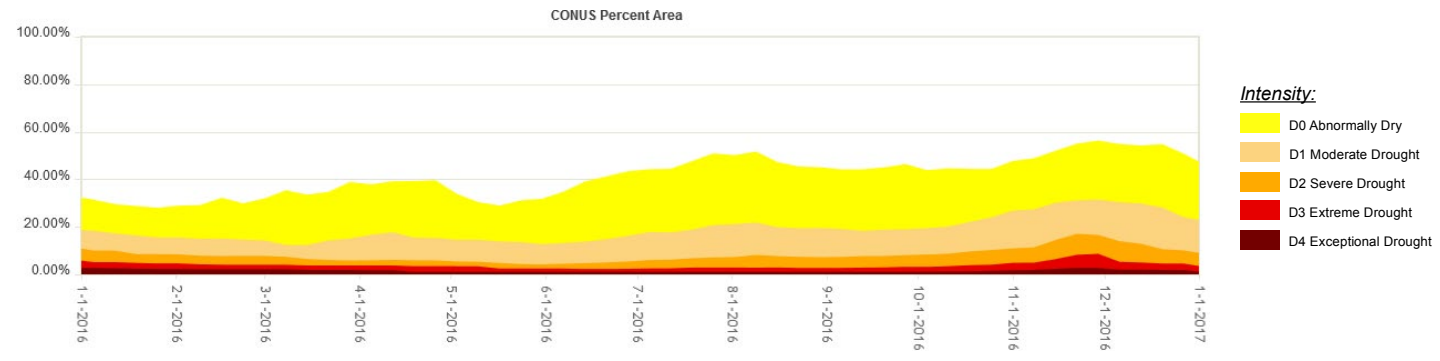


Source: National Drought Mitigation Center

*This graph shows the percentage change in drought by category during 2016.*

*Continued from* **page 6**

States in 122 years of record and was the 23 wettest year on record, too. Much of the country was near average to above average, though, with areas in New England and the Southeast outliers with below-normal for precipitation. Only Connecticut, Georgia and Massachusetts had top-10 driest years with Connecticut being the fourth driest year ever. In contrast, both Minnesota and Wisconsin had their second wettest years ever.

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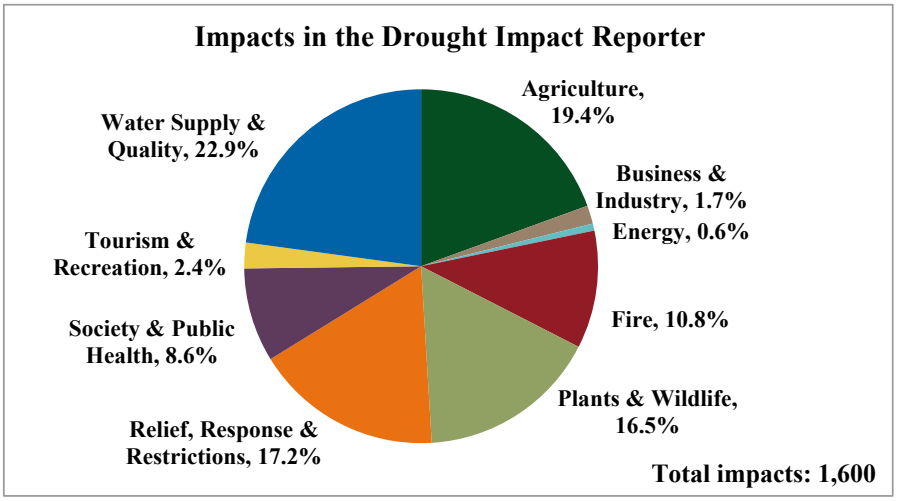
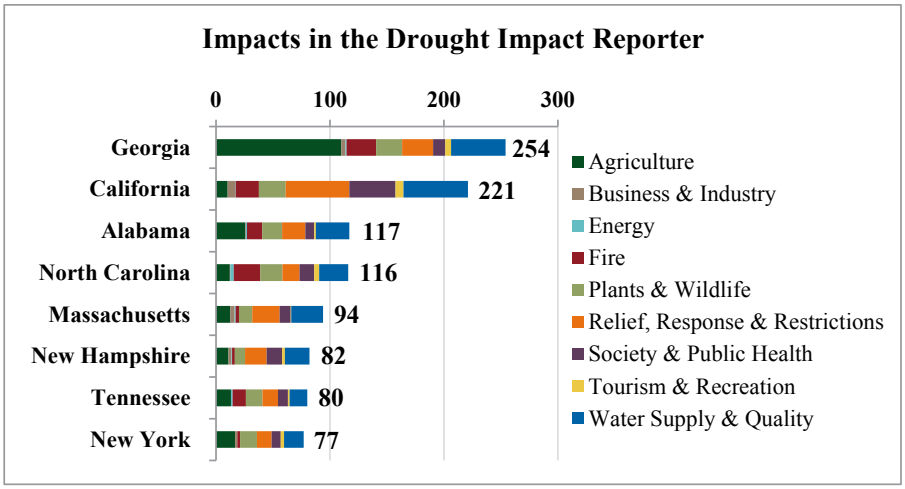
fought to keep crops growing at a high cost. Grapes, however, were one crop that thrived in the dryness.

## California's agricultural loss

Drought cost California farmers an estimated $603 million in 2016, according to a study from the University of California at Davis. Winter precipitation lessened the impacts felt from drought in previous years, but parts of the state, such as the San Joaquin Valley, still desperately needed rainfall. Farmers fallowed 78,780 acres in 2016 for lack of water, compared to 500,000 unplanted acres in 2015, costing farmers $247 million in crop revenue and shorting the rural economy about 1,815 jobs this year. Farmers also spent an extra $303 million to pump groundwater to replace water that state and federal water projects could not provide. Including indirect costs, the total economic cost of drought in 2016 may have been about $603 million, which is less damaging than in 2015 when drought cost the farm economy $2.7 billion.

"Drought costs California farms $600 million, but impact eases," by Dale Kasler, The Sacramento Bee (Calif.), Aug. 15, 2016




Source: National Drought Mitigation Center


NDMC

*Svoboda and Wall facilitating a breakout session related to the Composite Drought Index for Tunisia in October 2016.*

# Forums introduce Composite Drought Index, ask for potential users' feedback

**KELLY HELM SMITH**
*NATIONAL DROUGHT MITIGATION CENTER COMMUNICATIONS AND PLANNING SPECIALIST*

Workshops in Tunisia, Jordan and Morocco in October introduced country representatives to the new, regional Composite Drought Index, and helped them consider how to tailor the CDI to their own needs.

The National Drought Mitigation Center is co-leading a $4 million research effort with the Dubai-based International Center for Biosaline Agriculture. The U.S. Agency for International Development is funding the one-year project through March 2017, which includes a research component with other University of Nebraska groups, the Center for Advanced Land Management Information Technologies, and the Robert B. Daugherty Water for Food Global Institute.

NDMC social scientists Cody Knutson, Theresa Jedd and Nicole Wall organized forums in Tunis, Tunisia; Amman, Jordan; and Rabat, Morocco, in October; and in Beirut, Lebanon, in January. With support from the United Nations Food and Agriculture Organization, the first three workshops drew about 80 participants from agencies related to water, health and agriculture, along with others from non-governmental organizations and universities.

The forums were a chance to introduce participants to the Composite Drought Index for each country. The CDI can be used to monitor the onset, duration and end of drought. One of the goals of each forum was to gather country-specific feedback on how well the CDI represented past droughts. The forums also helped each country move toward establishing systems for monitoring and managing drought.

Calvin Chris Poulsen, NDMC GIS Developer, traveled to Dubai in December to help transfer the Composite Drought Index at ICBA into open source code. This is a step toward enabling the individual countries to modify the regional CDI to meet their own specific needs.

This effort is part of FAO's Near East and North Africa Water Scarcity Initiative, a 10-year project.

*Find the project Facebook page here.*

## MIDDLE EAST & NORTH AFRICA PROJECT

In early December, NDMC geospatial analyst Chris Poulsen met with the International Center for Biosaline Agriculture in Dubai, United Nations Emirates, to transfer the technology for the Composite Drought Index.

This is one of his views of Dubai.

Photo courtesy Chris Poulsen

NDMC

*Stuart Foster, state climatologist for Kentucky, gives a talk on weather networks across the Midwest Region at the Midwest Drought Early Warning Systems workshop in Cedar Rapids, Iowa.*

# Workshops promote DEWS community building

Workshops in Illinois and Ohio in December continued to help build the drought network community across the eight-state NIDIS Midwest Drought Early Warning System region.

Four meetings, held in November and December took place in Rochester, Minnesota; Cedar Falls, Iowa; Champaign, Illinois; and Cincinnati, Ohio, paired neighboring states together to build relationships and foster an environment where each could learn from the other. Illinois and Indiana were paired; as were Minnesota and Wisconsin; Missouri and Iowa; and Ohio and Kentucky.

The workshops provided a historical drought overview and climate outlook; discussion of drought and climate tools, drought-related needs and critical issues; information from state agencies on how drought events are planned for and managed; and development of strategies to improve drought early warning and resiliency in the Midwest.

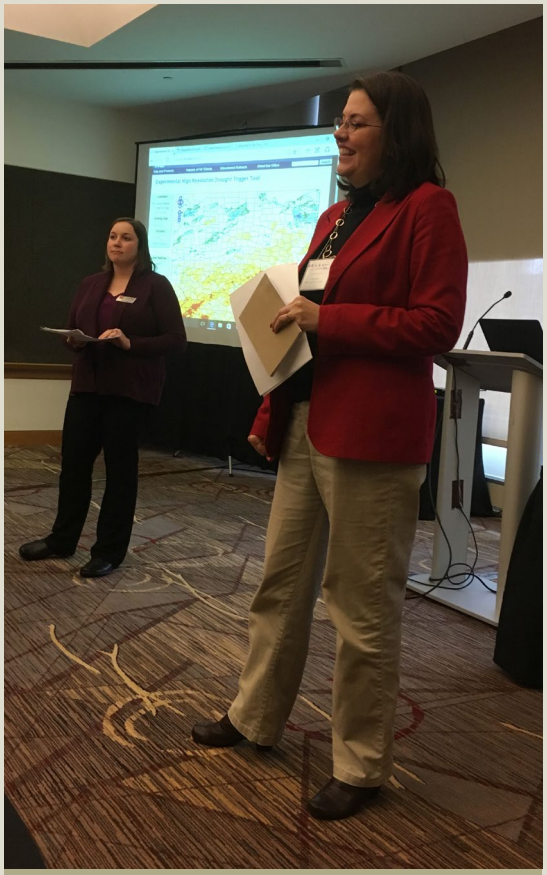
Participants included federal, state and local stakeholders from a variety of sectors.

From the workshops, the Midwest DEWS planning team, which includes people from the drought center and the National Integrated Drought Information System, among others, generated ideas to help improve drought communication and transfer among the states and regions. A few of the ideas included:

- developing a common resource drought matrix;
- developing a state-centric or sector-specific web page for communication of drought information;
- developing a drought notification system in which stakeholders could choose what alerts they want to receive.

The planning team will take these ideas to stakeholders to gauge their feasibility and value. From those discussions, the planning team will rank them based on need so the most useful tools for drought early-warning systems and partners are created first.

— TONYA BERNADT AND SHAWNA RICHTER-RYERSON



NDMC

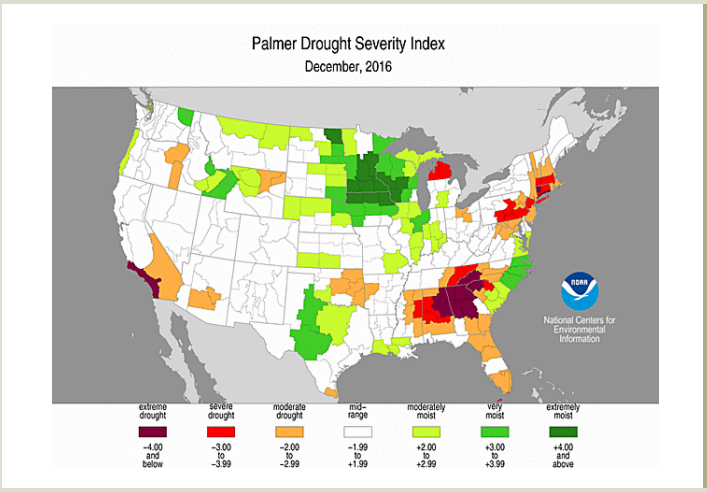
*Crystal Stiles with the High Plains Regional Climate Center (left) and Beth Hall of the Midwestern Regional Climate Center discuss climate tools with stakeholders at the Midwest DEWS meeting in December in Cincinnati, Ohio.*

# Workshop examines link between drought, socioeconomic impacts

The NDMC hosted a workshop with public water suppliers in North Carolina's Neuse and Cape Fear River basins, along with private, state and federal advisors, to gather feedback on the results of a project to better understand the links between drought indicators and socioeconomic impacts in the basins.

The workshop was Dec. 8 in Cary, North Carolina. NDMC staff and project collaborators from the United Kingdom and Germany presented project results demonstrating the types of local impacts that have occurred during recent droughts in the basins as indicated by a variety of drought indices, such as the U.S. Drought Monitor, the Palmer Drought Severity Index and the Standardized Precipitation. This included presenting different methods for assessing these relationships through qualitative comparisons, statistical correlations and time-line scenarios.

Discussion among participants revealed potential applications of the information for assisting in making timely management decisions during drought, as well as institutional and public education efforts about the effects of local drought. Work will continue to refine project results and package them for use by local collaborators through the summer of 2017.




*North Carolina workshop participants looked the U.S. Drought Monitor, the Palmer Drought Severity Index (shown here) and other measures of drought indices to link drought with socioeconomic impacts.*

**NOAA**

This international project is sponsored by the Belmont Forum, which is a group of the world's major and emerging funders of global environmental change research. The U.S. portion of the work is supported by the National Science Foundation.

— CODY KNUTSON, NDMC

# NDMC teams up to help Rio Grande Basin ranchers prepare for dry conditions

Drought researchers are still working on making accurate long-term drought predictions, and they have had some success in looking at the El Niño/La Niña sea surface temperature pattern. The La Niña pattern has sometimes, but not always, been associated with drier weather across the southern United States. Working on improving forecasts raises the question, what would people do differently if they knew it was going to be a dry winter?

In response to a La Niña forecast made in summer 2016 for winter 2016-2017, the National Drought Mitigation Center is partnering with the U.S. Department of Agriculture's Climate Hubs and with the National Integrated Drought Information System to host workshops for ranchers, agricultural producers, and other stakeholders in New Mexico and Texas to see how and whether they could make use of forecasts.

Learning how forecasts are used in decision-making helps tailor forecasts to users' needs, and thinking about how to use forecasts helps farmers and ranchers assess the full range of coping options that are available to them. Knowing what type of information stakeholders want and need helps to develop better decision making tools.

Workshops were in Las Cruces, New Mexico, and Weslaco, Texas, in October and December. Follow-up workshops will be in or near the same locations in the spring. If you would like to be notified when they are scheduled, please contact Brian Fuchs, bfuchs2@unl.edu.

**Get the presentations**

Click here to view the presentations from Las Cruces.

# North Platte Tourney 'low tech, high engagement'

**SHAWNA RICHTER-RYERSON**
*NDMC COMMUNICATIONS ASSOCIATE*


**Tarik Abdel-Monem/University of Nebraska Public Policy Center**

*Tarik Abdel-Monem of the University of Nebraska Public Policy Center created a video about the North Platte Natural Resources District drought tournament Nov. 18 in Scottsbluff, Nebraska. To view it, click the play button above or click here.*

A recent drought tournament in Western Nebraska had stakeholders from a variety of sectors talking drought.

Drought preparedness. Drought mitigation. Drought planning.

North Platte Natural Resources District and the National Drought Mitigation Center co-hosted the event in November in Scottsbluff, Nebraska, in preparation for drought planning for the district to be completed this year.

The scenario event brought together 20 stakeholders from the agriculture, finance, tourism, health, social services and veterans affairs sectors and broke them into four diverse teams.

Teams then tackled three rounds of intensifying drought, all based on 2012 drought conditions, the last severe drought to affect the state. They heard character narratives that focused on how drought affects revenues, water restrictions, public health and air quality, broadening the scope of teams' planning efforts.

Teams were given 30 to 50 minutes per round to identify drought vulnerabilities, address those vulnerabilities through mitigation and response strategies, and identify partnerships and resources needed to implement the strategies, according to the final report. Teams were then scored on how well they addressed the social, economic and environmental aspects of drought on a multi-sector level; whether they included mitigation and response strategies; whether they balanced trade-offs and costs; and whether they included partners in implementing their solutions.

"It was low tech and high energy," said Nicole Wall, outreach and research specialist with the drought center. "Drought and hydrological scenarios were laid out in a way that was realistic to the participants. They also tapped into maps and real-life drought impact narratives that captured the socio-spatial apects of decision making. People were empowered to work together and talk."

The game fostered relationship building among sectors and encouraged understanding of the different interests at stake when droughts strike.

"By tapping into players' competitive side, it's hoped that they will be creative and gain a new appreciation for the challenges others outside their sector face," Wall wrote in the report.

In their follow-up survey, many participants said the workshop did open their eyes to the broader effects and impacts associated with drought.

"It gave me wider views outside of the farm," one participant wrote. "It helped me think more about the social and health impacts that can be associated with drought."

Most participants also expressed interest in helping the NRD define the most feasible and comprehensive local mitigation and response strategies to address drought hazards as the district works toward a new drought plan.

To view a video of the tournament, click here.

## Other tournaments

The National Drought Mitigation Center also paired up with the National Integrated Drought Information System to facilitate a drought tournament with the Kansas Water Office on Dec. 1, 2016, in Emporia, Kansas. The goal was to generate awareness about the perceptions of drought, look at current planning and identify where there are gaps in information related to drought planning.