



DROUGHTSCAPE

The Newsletter of the National Drought Mitigation Center



DIRECTOR'S REPORT



Michael J. Hayes Nebraska, on Sept. 25. Two events happened that day that reminded me of how a big picture view can help us understand events on the ground, and vice versa.

The first event occurred early in the morning. I got there in plenty of time, so I drove to the Platte River on the south edge of the city. Earlier, as I had driven past Grand Island, the Platte channels were dry, sandy beds. In Kearney, 50 miles to the west, the waters from the historical flooding in Colorado had just reached that section and the river was full and fast flowing. It was a remarkable difference in a matter of a few miles -- the

I made a presentation at the Nebraska Association of Resource Districts annual meeting in Kearney, in central

intersection of flood and drought on the landscape. That afternoon, as I drove past Grand Island again on my way back to Lincoln, the river bed channels were still dry and sandy, waiting for the influx of water that would arrive early the next morning. For a dramatic view of this transformation to the Platte River basin, see images from NASA's Earth Observatory, and click on "image comparison" for the interactive version.

<http://earthobservatory.nasa.gov/IOTD/view.php?id=82071>

The second event occurred during the presentation itself. The audience at this annual meeting is made up of many Nebraskans who are keenly aware of water, drought, and climate issues. I spoke about the current drought and showed various climate-related maps, and the audience aptly noted the gaps that still remain in our instrumental climate and stream gauge networks. We discussed the value

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In the photo at the top of the page, Lynn Myers, a rancher in western Nebraska, surveys his land. Myers advocates drought planning for ranchers and collaborates with the National Drought Mitigation Center to present workshops for ranchers. The next workshop will be Jan. 9 in Garden City, Kansas. Check Managing Drought Risk on the Ranch -- <http://drought.unl.edu/ranchplan> -- for details. Registration opens Nov. 1. Learn more about Myers' drought planning in the story on page 8.

Register now for Nov. 5 Kansas community drought planning workshop

The Lake Region Resource Conservation and Development organization in Ottawa, Kansas, is hosting a National Drought Mitigation Center workshop, "Drought Planning for Communities," Nov. 5, 2013, 1-3 p.m., at the Franklin County Annex Commissioners' Room, 1418 S. Main St., in Ottawa.

NDMC representatives Kelly Helm Smith, NDMC communication and planning specialist, and Brian Fuchs, NDMC climatologist, will help the Lake Region RC&D and other organizations begin a community drought planning process, based on the Guide to Community Drought Preparedness, and incorporating elements of the Community Capitals development approach.

Attending the workshop is free but please register by Oct. 31, 2013, by contacting Heather McPeck, Heather.Mcpeek@lakeregionrcd.org.



Director's report, continued

of remotely-sensed information and the scientific progress in helping us fill these gaps.

Remote sensing of drought is a fast-evolving field, critical both in countries with little or no ground-based observations and in places such as the United States, where we're constantly looking for finer-scale depictions of what's going on. In addition to VegDRI, a map based on satellite data, showing the effects of drought on vegetation, we're working on QuickDRI, a similar product that will detect faster-moving flash droughts. (See the story on page 12.)

Having several different ways to view drought adds up to a more detailed understanding of its extent, intensity and impacts.

Michael J. Hayes

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Drought Impacts WEBINAR SERIES

Presented by the Engaging Preparedness Communities working group of the National Integrated Drought Information System.

Please join us for a free monthly webinar series beginning in November that will explore current research and applications on drought impacts. Understanding impacts helps planners, decision makers and resource managers reduce vulnerability to future droughts.

The webinars, which start Nov. 6, are on Wednesdays, beginning at 1 p.m. Central time. Each will include:

- a focus on a specific effort to document drought impacts and the use of this information in decision-making
- discussion of NIDIS' role in the emerging Impacts Community of Practice
- a chance to ask questions via chat
- other interactive elements.

<http://go.unl.edu/a59d>



Nov. 6 **The Missing Piece and Field of Dreams**

Kirsten Lackstrom, Carolinas Integrated Sciences & Assessments (CISA), will provide an overview of drought impacts research, discussing "The Missing Piece," the results of a workshop on drought impacts held in Tucson in March. Alison Meadow, Southwest Climate Science Center at the University of Arizona's Institute for the Environment, will present an overview of her assessment of Arizona DroughtWatch, a drought impacts collection program, which is being published in an article in the Bulletin of the American Meteorological Society called "Field of Dreams or Dream Team?"

Dec. 4 **Colorado Water Conservation Board's Approach to Impacts Assessment**

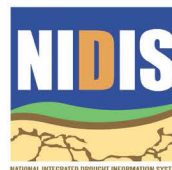
Taryn Finnessey, Colorado Water Conservation Board, will talk about how the State of Colorado has incorporated impacts and vulnerability assessment into its drought preparedness and how that information has helped to shape mitigation actions and recommendations for current and future drought planning efforts.

Jan. 8 **Citizen Science Observation Networks**

Kirsten Lackstrom will describe CISA's project to cultivate a network of drought impact observers in the Coastal Carolinas. CISA is recruiting volunteers for the Collaborative Community Rain, Hail and Snow Network (CoCoRaHS) and providing special training on coastal impacts. We will also hear from Henry Reges of CoCoRaHS, which has been providing its precipitation observers with the chance to submit drought impacts to the National Drought Mitigation Center's (NDMC) Drought Impact Reporter (DIR) since 2010. Kelly Helm Smith of the NDMC will provide a brief overview of the DIR's citizen science function.

Save the dates for more webinars:
Feb. 12 and March 12, 1 p.m. Central.
Registration is free but necessary
for access.

Visit: <http://go.unl.edu/a59d>



Fall outlook -- AZ and NM could dry out again -- and July-Sept

By Brian Fuchs, Climatologist,
National Drought Mitigation Center

Drought classifications are based on the U.S. Drought Monitor. Details on the extent and severity of drought are online at <http://droughtmonitor.unl.edu/archive.html>. The outlook integrates existing conditions with forecasts from the National Oceanic and Atmospheric Administration's Climate Prediction Center: <http://www.cpc.ncep.noaa.gov/>

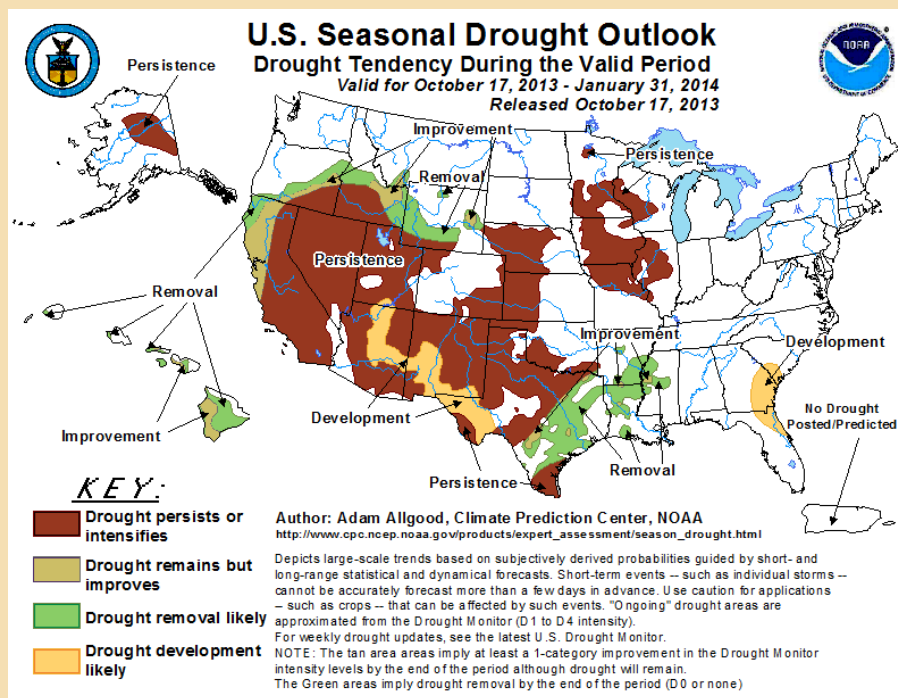
Climate Summary

From July through September, the majority of the United States recorded normal to above-normal precipitation. The monsoon season was especially strong and active over the Southwest, which brought significant improvements to drought in Arizona, New Mexico, and Colorado. The Southeast continued to receive above-normal precipitation, with areas of the Florida Panhandle, southern Georgia and Alabama receiving 12 to 16 inches of precipitation more than normal over the last three

months. One exception was the Midwest, which dried out rapidly in the last three months. Areas of Iowa, northern Missouri, Illinois and Wisconsin recorded precipitation that was 8-12 inches below normal and most of the Midwest was 4-8 inches below normal. The dryness led to drought developing and spreading through the region, especially during September.

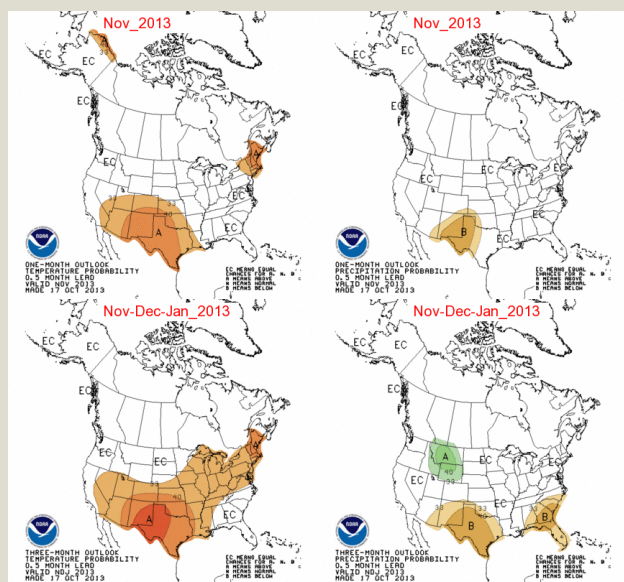
With the wet weather continuing in the Southeast, the temperatures over the last three months were below normal for the entire region and in portions of the Mid-Atlantic and Midwest. Temperatures in these areas were about 2 degrees Fahrenheit below normal, while most of the western half of the United States recorded above-normal temperatures. Areas of the Pacific Northwest and northern Rocky Mountains were 4-6 degrees above normal while most other areas were 2 degrees above normal. Most of this heat developed at the end of August and continued into September. Many areas, especially the Plains, had a fairly mild summer compared to the summer of 2012.

Even though most areas recorded above-normal precipitation and temperatures were moderate this summer, the extent of drought improved only slightly during the period from July to September. Overall, September ended with 45.46 percent of the contiguous 48 states in drought compared to 44.06 percent in July. The intensity of drought eased, with significant improvements in the most intense categories. Extreme drought improved from 13.57 to 4.33 percent and exceptional drought went from 4.68 to 0.31 percent.

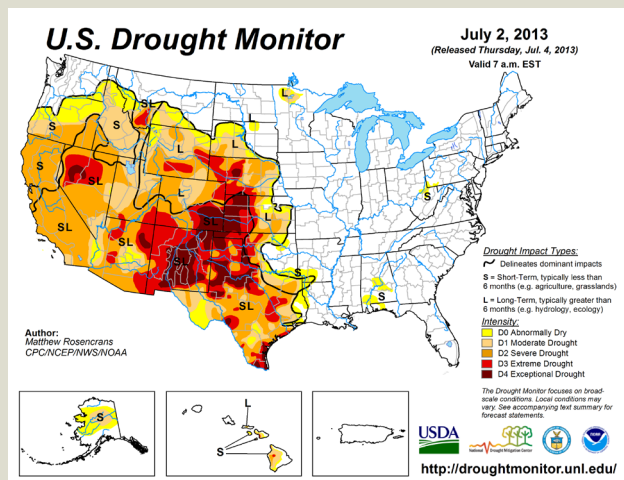


Outlook: According to the Climate Prediction Center's models, there is no strong signal for above-normal precipitation in the last quarter of the year other than over the northern Rocky Mountains. Over the southeast and southern Plains, there is a signal developing for a good chance for below-normal precipitation. The best chance for above-normal temperatures for the last quarter is over the southern United States, the central Plains, the Midwest and New England. Drought will persist in most areas, including the Hawaiian Islands, but improvements may come to areas of east Texas, Louisiana and Arkansas, northwest California and central Oregon, and central Idaho and Montana. Drought is also likely to develop in southeast Georgia, northeast Florida and southern South Carolina as well as an area from west Texas into Arizona.

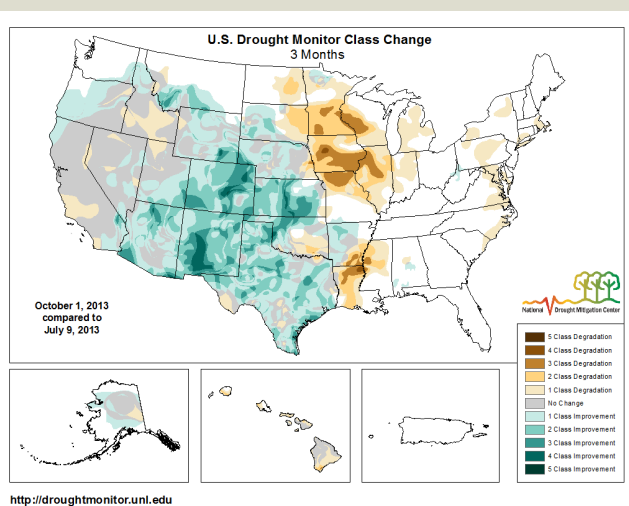
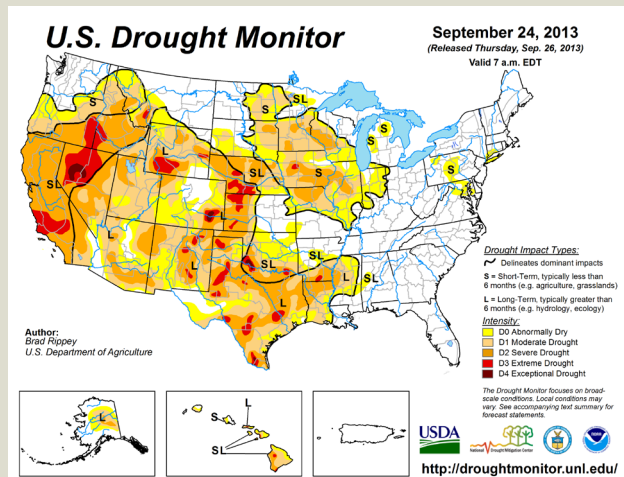
summary



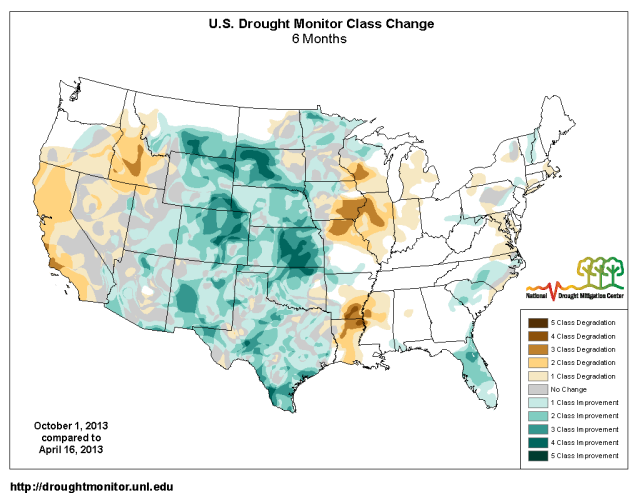
Above, maps from the Climate Prediction Center show areas with greater chances of above-normal temperatures in the left column and greater chances of above- and below-normal precipitation in the right column, for November (top) and November-January (bottom).



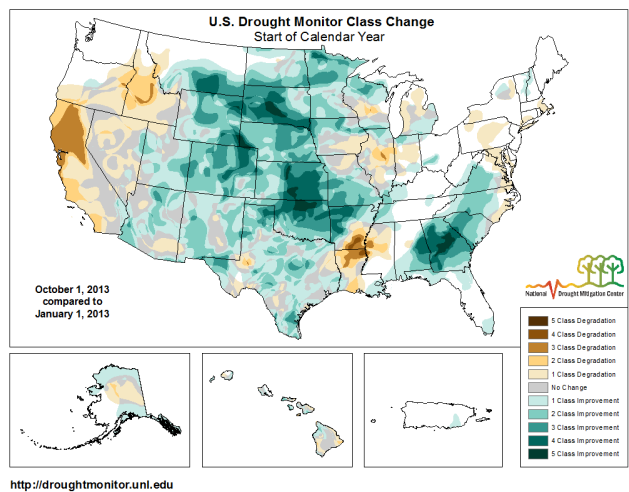
September ended with 45.46 percent of the contiguous 48 states in drought, compared to 44.06 percent in July.



The change map above shows that drought developed in the Midwest but improved in the Plains and Southwest during the summer. Drought in the West mostly stayed the same.

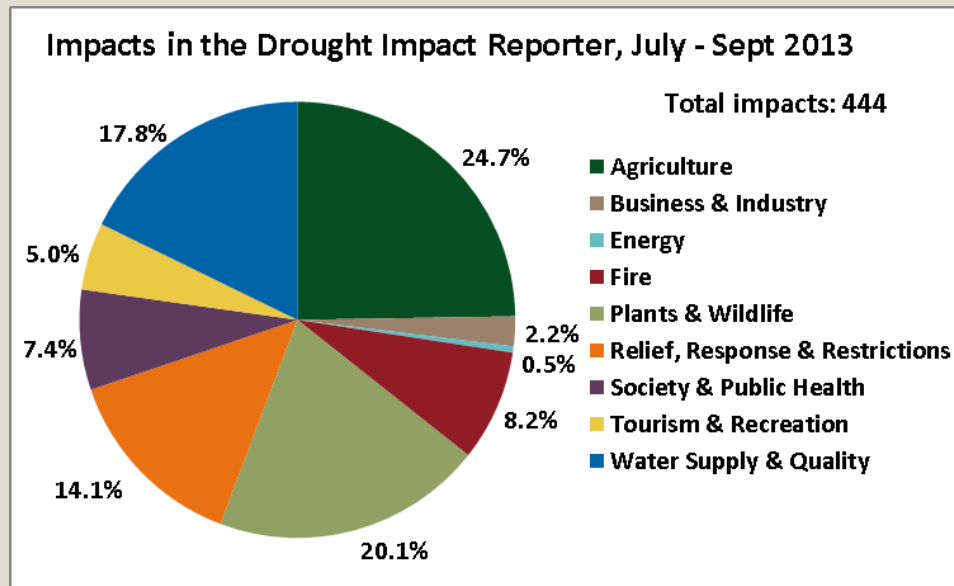


The map above shows drought developing in central and western states but improving through Texas, the Southwest and the Plains in the past six months. The year-to-date view below shows drought developing in the West and South but improving in the Plains.



Midwest flash drought affects corn, soybeans; Southwest,

by Denise Gutzmer, NDMC
Drought Impact Specialist



Nearly one-quarter of the 444 impacts entered in the Drought Impact Reporter during the third quarter of 2013 related to agriculture as a flash drought unfolded in parts of the Midwest. Midwestern farmers hoped for good crop yields this year after the 2012 drought hurt corn and soybean production, but July and August did not bring as much rain as usual, stunting crop growth at a time when moisture was needed to boost the size of corn kernels and soybeans. Some Wisconsin, Iowa, Missouri, western Kansas and Indiana farmers saw their corn crops die, while others found that their yields were not hurt as much as feared by the lack of rain. Overall, corn yields seem to be better than anyone would have dared hope in the Midwest and near or at record levels in Alabama, Georgia, Indiana and Ohio as of mid-September.

The USDA Crop Production report, released Sept. 12, forecast slightly higher corn production and lowered the outlook for soybean production, due to the hot, dry

weather. Corn production was forecast to be 13.8 billion bushels, up less than 1 percent from the August forecast, and could be a record harvest. The corn forecast was higher because corn in areas less affected by drought was expected to compensate for the drought-affected areas. Soybean production was forecast at 3.15 billion bushels, down 3 percent from August, and could be the fourth largest harvest on record.

Agribusinesses hurt by high grain prices

Poor grain harvests in 2012 drove up prices, raising production costs for agribusinesses that struggled to find good quality corn at a decent price. Some of the corn was tainted with aflatoxin, a harmful contaminant produced by mold, which forced some ethanol plants to turn away corn that had high concentrations because the ethanol producing process concentrates the aflatoxin and can raise concentrations too high for the after product to be sold to farmers for cattle feed.

High corn and soybean prices cut into **Archer Daniels Midland Co.**'s second quarter earnings, which dropped 21 percent. Profits for the agricultural services segment, which includes grain merchandising, dipped 34 percent to \$81 million. Foreign-currency hedging losses and an increased provision related to a legal matter also contributed to the losses.

"UPDATE: ADM 2nd-Quarter Net Falls 21% on Legal Costs; Sales Weaken," by Dow Jones Business News, NASDAQ.com (New York), August 06, 2013.

The 2012 drought continued to lower **Bunge's** profit in the second quarter of 2013. Its net income after paying preferred dividends dropped to \$110 million, 75 cents per share, compared to \$265 million, or \$1.78 per share, during the second quarter of 2012. Higher prices for grain and other agricultural products reduced profits.

"Drought Cuts into Bunge Profit," Food Manufacturing (Wisconsin), July 26, 2013.

Cargill saw better earnings in fiscal year 2013, which ended May 31, at \$2.31 billion than it did in 2012 with earnings of just \$1.17 billion.

Earnings from Cargill's meat processing business fell in fiscal year 2013, due to drought, high feed costs and the small number of cattle in the U.S.

"Cargill ends its year with \$2 billion in earnings," by Mike Hughlett, *Minneapolis-St. Paul Star Tribune*, Aug. 28, 2013.

Quarterly earnings for **CHS Inc.**, the country's largest agricultural cooperative, based in Inver Grove Heights, Minnesota, dropped 38 percent after drought in 2012 and the wet spring in 2013. Third quarter earnings were \$250.8 million, compared to \$405.1 million the previous year. Quarterly sales, however, were \$11.9 billion, 8 percent higher than the \$11 billion in sales the previous year. Scheduled maintenance

West deal with low reservoirs, stressed wildlife

lasting more than a month at an oil refinery in Laurel, Montana, also hampered profits.

"CHS 2Q profit falls on weather," by Mike Hughlett, *Minneapolis-St. Paul Star Tribune*, July 10, 2013.

Soy processors in the Midwest awaited the new soybean crop after late-planted soybeans were slow to mature. In the meantime, two Cargill Inc. plants in Kansas City, Missouri, and Wichita, Kansas, and an Archer Daniels Midland plant in Deerfield, Missouri, closed until more soybeans become available. The Kansas City plant was closed Sept. 19-22, and the Wichita and Deerfield plants remain idled. A Bunge Ltd. soy processing plant in Emporia, Kansas, that closed in the spring expects to reopen in October when the newly harvested soybeans are ready to crush.

"UPDATE 1-Slow start to U.S. soy harvest idles Midwest processors," by Julie Ingwersen and Michael Hirtzer, *Reuters*, Sept. 26, 2013.

Cattle in U.S. feedlots

Livestock producers have been culling cattle for years as drought reduces grass and hay growth and dries up water sources. The feedlot inventory on Sept. 1 was 9.88 million, the lowest since 2003, and 7 percent lower than a year earlier. The August feedlot placement total was 1.79 million, which was 11 percent lower than last year. The weight group seeing the biggest decrease in placements was animals weighing less than 700 pounds. Feedlot placements are an indicator of the beef supply in coming months, after cattle are fattened for slaughter.

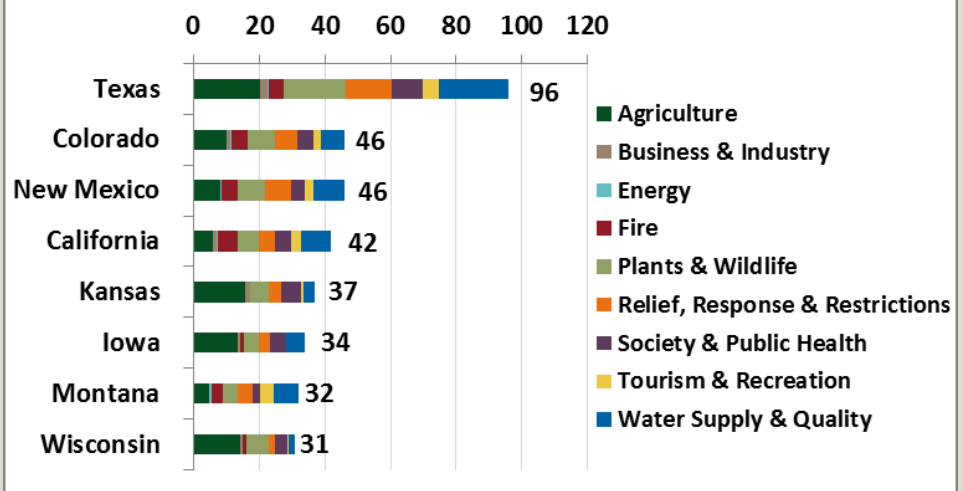
"Lack of cattle catches up with beef industry," by Derrell Peel, *Oklahoma State University Extension, Drovers Cattle Network*, Sept. 23, 2013.

State Briefs

Texas

Texas had 96 drought impacts

States with the most impacts, July - Sept 2013



in the third quarter as water supplies fell to alarming levels in the western half of the state and crops struggled. The state was last relatively drought-free in the spring of 2010, but has had varying levels of drought since then, never allowing water supplies or soil moisture to fully recover. Consequently, farmers have struggled to produce crops and pastures and rangeland has not been very productive, limiting the carrying capacity of the land.

The USDA cut its August estimate of cotton production in Texas down to 4.12 million bales, a decline of 18 percent, due to drought. The nation's anticipated cotton harvest fell from 14 million bales in May to 13.05 bales in the Aug. 12 report. Texas is the nation's largest cotton grower.

"Cotton Glut Expands to Record as Hanes Profit Gains: Commodities," by Luzi Ann Javier and Marvin Perez, *The Washington Post* with Bloomberg, Aug. 29, 2013.

Colorado

Colorado, with 46 impacts for the quarter, was in dire need of rain much of the summer, with wildfires burning and agricultural efforts frustrated by the lack of rain. Colorado was expected to produce

just 43.5 million bushels of wheat in 2013, due to spring freezes and drought, down from the 73.8 million bushels grown in 2012. Roughly 700,000 acres of wheat in the southeastern part of the state were abandoned, leading to a shortage of certified wheat.

"Colorado winter wheat crop smallest since 2006," *North Forty News* (Colorado), Sept. 5, 2013.

"Drought leads to tighter Colo. wheat seed supply," by Catherine Tsai, *Associated Press*, Aug. 6, 2013.

Pastures in southeastern Colorado had only sparse clumps of dry grass. The Winter Livestock Cattle Auction in La Junta moved three times the usual number of animals during the summer as ranchers sold part or all of their herds because it is not profitable to feed cattle during a drought.

Cattle Ranching Walloped by Persistent Drought," by Ben Markus, *Colorado Public Radio*, Aug. 26, 2013.

New Mexico

New Mexico had 46 impacts reported from July through September. Water supplies were nearly depleted, forcing an early end to the irrigation season for those drawing water from the Rio Grande River. Farmers had

continued on page 8

Impacts, continued

little water or forage to work with, leading to many cattle sales. In early September, the cattle population had fallen 20 percent lower than the previous year.

An active monsoon season brought plenty of rain to Colorado, which filled the Pecos River in eastern New Mexico. Pecos River storage went from 11 percent full to 92 percent full in less than two weeks, allowing water to be released to Texas. Reservoirs on the Rio Grande River benefitted some from the rain, but not nearly as much as the reservoirs on the Pecos River.

"Ranchers forced to sell off cattle," by Lauren Hansard, KOB Eyewitness News 4 (New Mexico), Sept. 9, 2013.

"Storms push New Mexico out of 'extreme drought'," Associated Press, *The Santa Fe New Mexican*, Sept. 24, 2013.

California

Drought has gripped California since early 2012 and has slowly intensified, with losses from agricultural damage in the first half of 2013. Tehama County sustained \$6.9 million in damage to rangeland and barley production during the first half of 2013. Similar problems were reported across much of the state, with the reduced carrying capacity of pastures and rangeland, forcing producers to thin their herds. By the end of August, nearly the entire state of California was recognized as a drought disaster area by the U.S. Department of Agriculture.

"Tehama County drought finding sought," by Rich Greene, Red Bluff (California) Daily News Online, July 3, 2013.

"Poor grass production hurts California cattle ranchers," by California Farm Bureau, Drovers Cattle Network (Kansas), July 9, 2013.

Water

Too many consecutive dry seasons were straining water supplies in Texas, New Mexico and California, where reservoirs were low and the public was urged to conserve water. In Texas and New

Mexico, groundwater levels were low and many reservoirs held only a fraction of their capacity, while in California, low reservoir levels spurred state officials to warn water systems and the public to begin preparing for another dry year.

"State urges steps to prepare for drought in 2014," by Matt Weiser, *The Sacramento (California) Bee*, Sept. 6, 2013.

Las Vegas, Nevada

In the Colorado River Basin, below-average rainfall continued to reduce flows and water levels in reservoirs, prompting the U.S. Bureau of Reclamation officials to announce plans to reduce the flow from Glen Canyon Dam in 2014 because water demand exceeds supply.

The Southern Nevada Water Authority declared an emergency and hastened the construction of a \$12 million project to prolong the life of the oldest, shallowest intake pipe in Lake Mead to ensure water through the summer of 2014. If the water level of Lake Mead recedes another 40 to 45 feet, the shallowest intake pipe will no longer be useable.

"Feds announce cuts to releases from Lake Powell," by Brian Maffly, *The Salt Lake Tribune*, Aug. 16, 2013.

"\$12 million emergency fix sought to ensure water flow from Lake Mead," by Henry Brea, *Las Vegas Review-Journal*, Sept. 5, 2013.

Hydropower in Colorado River Basin

Drought has lessened the flow through the Colorado River Basin, limiting hydropower generation at dams in the Southwest. At Hoover Dam, new wide-head turbines were being installed to keep the power plant functioning as water levels decline in Lake Mead. Full capacity power production at Hoover Dam is 2,074 megawatts, but low water levels diminished production to 1,735 MW in August for a decline of just over 8 percent. Power production at Glen Canyon

Dam in 2014 is expected to be down by 8 percent.

With the Colorado River providing less water, resulting in reduced hydropower production, the Western Area Power Administration will probably pay an estimated \$10 million to purchase power supplies in 2014.

"Colorado River Hydropower Faces a Dry Future," by Katherine Tweed, *IEEE Spectrum* (New York), Sept. 19, 2013.

Wildfires

Wildfires burning in the U.S. in 2013 have cost more than \$1 billion to suppress. The National Interagency Fire Center in Boise raised the national wildfire preparedness level on Aug. 20 to the top level, the highest it has been in the last five years. From the start of 2013 through Aug. 20, 33,000 fires charred 3.4 million acres, 963 homes and 30 commercial buildings and cost 30 firefighters their lives.

"Hot, dry summer pushes wildfire spending past \$1B," Associated Press, (Nampa) *Idaho-Press Tribune*, Aug. 21, 2013.

Low water supplies hurt western wildlife

Very few birds visited the Lower Klamath National Wildlife Refuge in southern Oregon and northern California because its marshes had mostly dried up by early July for the earliest dry date in the last 70 years. Despite being on the Pacific Flyway, the refuge had not received Klamath River water since March, leaving no water to draw migratory birds. Indian tribes and agriculture have older water rights than the refuge does, leaving the refuge dry when water is scarce.

"Key wildlife refuge hit hard in Klamath Basin's water wars," by Scott Learn, *The (Portland) Oregonian*, July 7, 2013.

Birds went instead to the nearby Tule Lake National Wildlife Refuge, where roughly nine thousand ducks died from avian

botulism. Overcrowding facilitates the spread of disease.

"Klamath drought kills thousands of refuge waterfowl," by Jeff Barnard, Associated Press, *The Medford (Oregon) Daily Tribune*, Aug. 29, 2013.

Fish kills

Below-normal rainfall in parts of the western U.S. allowed the levels of rivers and lakes to drop precipitously, jeopardizing fish health and related recreational opportunities. Fish kills occurred, and some river were closed to fishing temporarily until conditions improved.

Heat and low water levels at Strawberry Reservoir southeast of Salt Lake City, Utah, led to a fish kill involving about 600 dead fish in the Ladders area of the lake. Aquatic vegetation died as water receded, while warming water limited the amount of oxygen in the water. Strawberry Reservoir was at 79 percent of capacity around July 21.

"Fish kill at reservoir tied to drought," Associated Press, (Tucson) *Arizona Daily Star*, July 21, 2013.

Several reservoirs in northern Nevada were low enough to threaten fish' survival toward the end of July after a hot, dry summer ramped up demand for irrigation water. Five hundred to 600 trophy trout died at the Knott Creek Reservoir in Humboldt County, Nevada. The catch limit on trout was lifted at the Wild Horse Reservoir in Elko County so anglers could catch the fish before they died as the water level receded. Biologists relocated white crappies from the Willow Creek Reservoir because it held just 10 percent of capacity.

"Drought, heat lower reservoirs, impact boating, fish in Northern Nevada," by Jeff DeLong, *Reno (Nevada) Gazette-Journal*, July 24, 2013.

Several western Montana rivers, such as the Dearborn, Smith and Sun, were closed to fishing during the warmest parts of the day to reduce stress on fish

while flows were low and water temperatures were warm. The Blackfoot River closed to fishing altogether due to the low water level.

"Warm flows prompt 'Hoot Owl' Fishing on Dearborn, Smith, and Sun Rivers," by Montana Fish, Wildlife & Parks, July 18, 2013.

"Fishing closed, irrigation reduced on Blackfoot River and tributaries," by Rob Chaney, *Missoula (Montana) Missoulian*, Sept. 5, 2013.

Wild Horses

Drought in the western U.S. reduced supplies of water and forage for wildlife, threatening the survival of some animals and prompting the U.S. Bureau of Land Management to take action. The BLM hauled 25,000 gallons of water five times a week during the summer to four sites in Lincoln County, Nevada, for wild horses that did not have adequate supplies of food or water. The forage was sparse and of poor quality, so they also brought hay. The daily tab for the hay and water

deliveries was \$5,000.

"Govt. hauls water to horses in drought-ravaged West," by Julie Cart, *Los Angeles Times*, July 26, 2013.

The U.S. Bureau of Land Management also planned to remove 1,300 wild horses and burros across the West this summer in areas where drought reduced food and water for the animals to the point of crisis. There were 855 wild horses and burros to be gathered in Nevada, 140 in Oregon, 105 in Arizona, 65 in New Mexico, 50 in Colorado and 25 in Idaho. In eastern Nevada, limited food and water, severe drought conditions and the rapidly deteriorating body condition of wild horses led to an emergency horse gather on July 23 to move 50 horses to better pasture and facilities.

"BLM to remove 1,300 mustangs in West this summer," by Associated Press, (Pocatello) *Idaho State Journal*, July 21, 2013.

"BLM begins emergency wild horse gather," by *The Ely (Nevada) Times*, July 26, 2013.

Drought Impacts, sliced, diced and served to suit your needs

Monthly Summaries

<http://drought.unl.edu/NewsOutreach/MonthlySummary.aspx>

Weekly Summaries by email

email Denise Gutzmer, dgutzmer2@unl.edu

For near-real-time updates, archived impacts and interactive searching:

Drought Impact Reporter*

<http://droughtreporter.unl.edu>

Submit a report, even upload photos:

<http://public.droughtreporter.unl.edu/submitreport/>

*search by time, place, source, category, term and more

Ranchers rely on plans to weather drought: Learn more at

By Tonya Haigh, Rural Sociologist, National Drought Mitigation Center

When the rain shut off in 2012, western Nebraska rancher Lynn Myers had a plan. Myers and his wife Marlene and children run a cow-calf and bred heifer operation in western Nebraska, and received less than five inches of rain (less than a third of normal) between fall 2011 and June 2012. By mid-April, Myers knew, by continuously monitoring his pastures, that it was time to make some decisions. He had a destocking plan in place that would get his animal numbers in line with the amount of forage he thought his pastures could produce. He knew the plan would help keep his rangelands and his business finances healthy during the drought because before drought, he had focused on building pasture root reserves, stockpiling extra grass, and leaving enough litter on the ground to hold any moisture that might fall.

Ted Alexander, a rancher in south-central Kansas, had been implementing his drought plan for

a bit longer, as southern Kansas has experienced various levels of drought since 2011. Alexander has had a written drought plan for his operation for 15-plus years. It is an integral piece of his business plan as a seasonal custom grazer. Alexander has spent hours in his pastures monitoring range condition, and precisely calculating the amount of forage produced with each inch of precipitation he receives. He keeps track of all of the precipitation that falls on his place, and only stocks his pastures to the amount of available forage he knows will grow. He uses managed intensive grazing to improve water quality and quantity, soil health and native rangelands, while maintaining individual animal performance, and increasing the pounds of beef produced per acre. His drought plan includes four dates throughout the year to make the decisions necessary to balance his forage availability with forage needs, and to protect the health of his rangelands.

Myers and Alexander are leaders among ranchers with regard to planning for drought, and may also be teaching the rest

extension and media resources, have historically focused on responding to, and recovering from, drought. During a drought, for example, a producer may find many resources on hay and forage hotlines, finding alternative feeds, tax programs and advice, culling and marketing advice, and testing water quality, as well as promises of federal disaster aid. It has been demonstrated, though, that such ad-hoc drought responses are expensive and do little to reduce a rancher's ongoing drought vulnerability. In fact, some drought responses may increase drought vulnerability by encouraging ranchers to "wait and see," resulting in overgrazed and degraded rangelands.

Preparing and planning for drought may offer substantial benefits for rangeland managers. While drought is rarely obvious in its initial stages, grazing decisions in the early stages of drought will have a tremendous impact on range health in later stages of drought, as well as on the rancher's ability to graze throughout the drought. Preparation and planning are particularly important to the hydrologic health of rangelands. Best management practices and avoidance of overstocking help the infiltration capacity and soil water-holding ability of rangelands. On the other hand, overstocking during drought has a negative effect on soil health and soil water-holding ability. Poor quality rangelands with degraded vegetation will experience drought conditions more frequently than rangelands in good hydrological condition.

Myers and Alexander are two of ten Great Plains ranchers who agreed to help develop the National Drought Mitigation

of us how we might adapt to the climate extremes we face in our future. Despite the fact that drought is a normal part of the Great Plains climate, and that drought is a major threat to the financial and natural resource health of Great Plains ranches, most ranchers have been less prepared for drought than they should be.

Drought relief programs, as well as



Lynn Myers and his wife, Marlene, owners of the Tippetts Myers Ranch, won an Excellence in Grazing Management Award.

Jan. 9 workshop in Garden City, Kansas

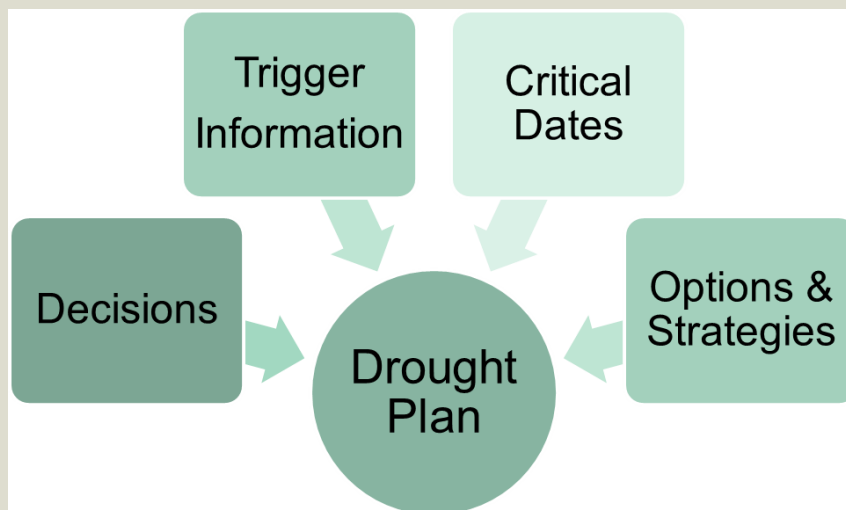
Center's "Managing Drought Risk on the Ranch" website and planning handbook in 2009. The materials were developed by the NDMC to help rangeland managers think about developing drought plans for their own operations. It includes the following recommendations:

1. Prepare for drought by increasing the health of the overall operation and maximizing flexibility.
2. Write a drought plan that includes what to do during drought and when.
3. When conditions require it, implement the plan and don't second-guess it.
4. After drought, have a plan for restoring the health of all parts of the ranch operation.
5. Monitor how the drought plan works, and improve it as you learn.

The ranchers at the core of the project emphasized that because they had worked on their ranch health and flexibility before drought, they knew they could take actions that would help them protect their range, finances, and other resources during drought. They also emphasized that it was important, once conditions triggered the drought plan, to be committed to following the plan without second-guessing it or looking back.

Since then, Alexander and Myers have worked with NDMC staff in leading drought planning workshops for ranchers in Kansas, Nebraska, Wyoming, Colorado, and New Mexico, and leading a webinar series to educate extension and other advisors on drought planning. These resources can be found at drought.unl.edu/ranchplan.

Recently, the ranchers have suggested getting back together

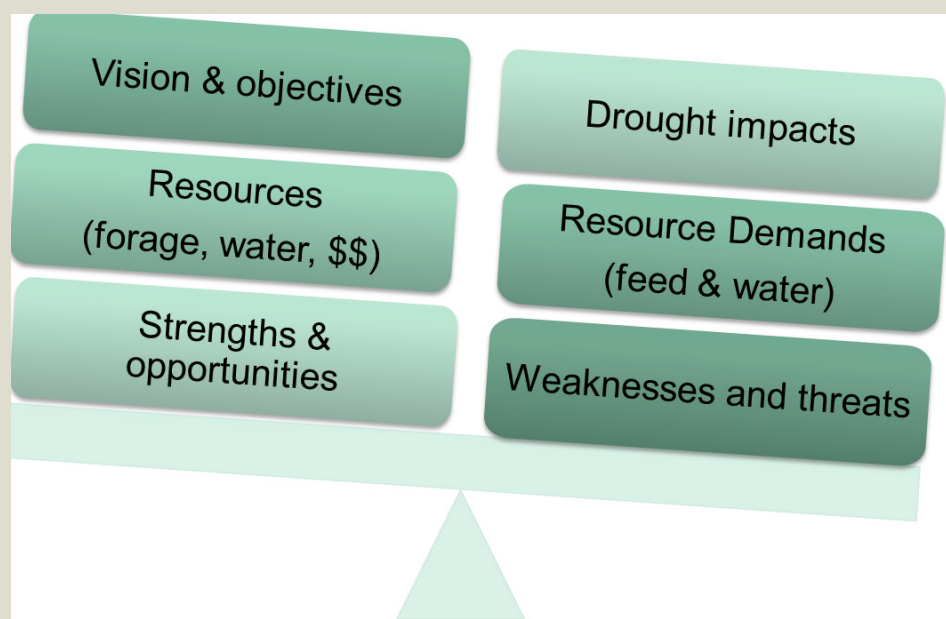


to share experiences from recent drought. Their experience with recent drought and expertise in monitoring their resources are telling them that they may need to think even more proactively to adapt to what looks to be a more extreme climate in the future. Their business plans may need to reflect this possibility, and they see a growing need for adaptive management. Ranchers like Lynn Myers and Ted Alexander are leading the way by sharing their experiences with researchers, with advisors, and with other ranchers.

To facilitate this discussion, the National Drought Mitigation

Center will offer a workshop on Planning for Extreme and Extended Drought on January 9, 2014, in Garden City, Kansas. The workshop will feature information for ranchers and also for irrigated crop producers who are dealing with long-term choices associated with declining aquifer levels. The workshop is open to the public. To register, please visit: <http://go.unl.edu/chb4>

Story reprinted from the forthcoming November edition of *Prairie Fire* -- <http://prairiefirenewspaper.com>



Surveys, focus groups for “Useful to Usable” project help ag and climate researchers understand farm decision-making

Farmers are front-line land management decision makers. They think about commodity prices, input prices, the weather, and much more in deciding how best to use land. But climate? Maybe, maybe not.

Yet the climate – the pattern of interactions between air, water, land, and living systems that manifest each day as weather – affects farmers’ success, and farmers’ decisions in turn affect the greenhouse gases that contribute to climate change, researchers say.

Researchers at the National Drought Mitigation Center and others from the University of Nebraska-Lincoln have teamed up with Purdue University in a multi-institution project to learn how to make climate information useful to farmers and to the people who advise farmers.

Useful to Usable (U2U): Transforming Climate Variability and Change Information for Cereal Crop Producers, funded by the U.S. Department of Agriculture, is a project designed to improve the resilience and profitability of U.S. farms in the Corn Belt in a changing climate. The team of 50-plus researchers includes experts in applied climatology, crop modeling, agronomy, information technology, agricultural economics and other social sciences.

Tonya Haigh, a rural sociologist at the NDMC, and Cody Knutson, leader of the NDMC’s Planning and Social Sciences program area, played key roles in designing surveys taken by almost 5,000 Corn Belt farmers and 2,080 technical advisors, and they led focus groups in Nebraska for the project. They are both co-authors of published articles based on the surveys.

As the research team observes

in an article in *Climatic Change Letters*, agriculture is both vulnerable to global climate change and a significant source of the greenhouse gases that are driving climatic shifts.

Haigh emphasized the need to distinguish between farmers and the various professionals who advise them, and to target information for specific decisions. “We’ve learned that farmers and farm advisors may use information very differently and have differing levels of interest in the details and levels of science,” she said. “There’s an investment that has to happen in order to understand and use climate information. We want to target the information to the people who have the motivation to invest.”

What have they learned so far?

Regardless of their beliefs about climate change, farmers are concerned about drought, high temperatures and damaging precipitation. Two-thirds of farmers said farmers should take steps to protect land from increased weather variability, but only 23 percent of farmers thought that the government or farmers should do more to reduce greenhouse gases.

Fortunately, as the researchers observed, many practices that protect land from weather variability also reduce greenhouse gas emissions, so it makes sense to promote these dual-purpose practices.

Advisors – including



Tonya Haigh

government, non-profit, for-profit and Extension employees – also agree that changing practices to cope with increasing climate variability is important, but are not very confident in their ability to incorporate weather and climate information in their advice. As a group, they were less influenced by historical weather information or longer-term climate outlooks than they were by current weather or short-term forecasts.

Others at UNL’s School of Natural Resources involved in different aspects of the project are Martha Shulski, director of the High Plains Regional Climate Center, and Tapan Pathak, Extension Educator in Climate Variability.

“One outcome of the U2U project will be a suite of climate-based decision tools that will help, to start with, Corn Belt farmers deal with climate variability,” Haigh said. “Our hope is that these tools will get used because of what we’ve learned about the specific information crop advisors want, and when they want it.”

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Arbuckle, J., L. Prokopy, T. Haigh, J. Hobs, T. Knoot, C. Knutson, A. Loy, A. Mase, J. McGuire, L. Morton, J. Tyndall, M. Widhalm. 2013. Climate change beliefs, concerns, and attitudes toward adaptation and mitigation among farmers in the Midwestern United States. *Climatic Change Letters*, 117(4):943-950.

Follow U2U’s progress:
<http://AgClimate4U.org>

Drought Management Database archives strategies

Decision-makers in various capacities can take preventive action to reduce the impacts of drought. The National Drought Mitigation Center launched a Drought Management Database in 2013 to help people find strategies for dealing with drought and see what others in different places are trying.

"The Drought Management Database website is a great resource for finding the latest news on drought mitigation and response strategies that are being implemented around the country, as well as more detailed information on strategies being implemented in various sectors, such as agriculture or water management," said Cody Knutson, the principal investigator on the project and leader of the NDMC's Planning and Social Science area. "By showcasing what people are doing in the field to better mitigate and respond to drought, the database provides information and new ideas and, hopefully, the motivation for others to undertake similar efforts that are most relevant or appropriate for their particular situation. People often need to see that someone else has tried something and that it works before they are willing to try it themselves."

The database categorizes solutions by eight main sectors and provides several filters to help refine searches. Main sectors include Farming, Livestock Production, Water Supply & Quality, Energy, Recreation & Tourism, Fire, Plants & Wildlife, and Society & Public Health. Filters include publication date, activity type (i.e., education, planning), scope (jurisdiction), where the resource originated, and resource type (i.e., media, scholarly, website). There is also a search function.

Some scopes and sectors, such as those related to agriculture, benefit from well-developed networks of professional support, such as extension educators at land-grant universities. In other words, there is quite a bit of good advice available for farmers and ranchers. Other scopes and sectors, such as Energy or Recreation & Tourism, with fewer available resources, may reflect lower awareness of drought or disincentives to speak about it publicly.

Integrating drought planning into other types of planning, such as comprehensive, zoning, infrastructure, and multi-hazard plans, is a timely idea, particularly in light of the growing number of planning entities that are focusing on climate change. The NDMC hopes that this process of mainstreaming drought planning will yield a new crop of specific ideas that explicitly recognize the natural connections between land use and water.

Curating content for the Drought Risk Management

Database is an ongoing project and a natural outgrowth of the NDMC's mission to circulate information that will help reduce societal vulnerability to drought. The Drought Mitigation News feature on the homepage of the database also provides a way to display drought mitigation news stories that turn up in the NDMC's automated daily search. The stories provide a glimpse of issues and solutions as they occur around the country.

The Drought Risk Management Database is funded under a grant from the Sectoral Applications Research Program (SARP) of the National Oceanic and Atmospheric Administration (NOAA) Climate Program Office. The products chosen for this database represent the judgment of the National Drought Mitigation Center and its partners and do not necessarily reflect the views or policies of NOAA.

Suggestions for content for the database are welcome, as are original descriptions of what's been tried, for better or worse. Please email suggestions to ndmc@unl.edu.

The screenshot shows the homepage of the Drought Management Database at <http://drought.unl.edu/droughtmanagement/Home.aspx>. The page features a navigation bar with links: Home, Full Search, About, Submit a Strategy, and State Planning Info. Below the navigation bar is a banner image of a dry, brown landscape with the text "National Drought Mitigation Center". The main content area is titled "Drought Management Database" and includes an "Introduction" section, a "Quick Search by Sector" section with buttons for Farming, Livestock Production, Water Supply & Quality, Energy, Recreation/Tourism, Fire, Plants & Wildlife, and Society & Public Health, and a "Featured Strategy" section titled "Ruinous Drought Tests Kansas Model for Supplying Water to Farms". On the right side, there is a "Recent Drought Mitigation News" section with several news items, including "State urges steps to prepare for drought in 2014", "Fighting wildfires with science - CBS (NAT)", "Nitrate spike tests Des Moines water supplies - Des Moines Register (IA)", "Wind Power Firms Push to Extend Tax Credit", and "Can this couple have their quail habitat and graze it too? - Gilmer (Texas) Mirror". At the bottom of the page, there is a "More information..." link and the URL <http://drought.unl.edu/droughtmanagement/Home.aspx>.

QuickDRI to be a faster-response complement to VegDRI

Researchers associated with the National Drought Mitigation Center are leading a four-year NASA-funded project to develop the Quick Drought Response Index, or QuickDRI, to complement VegDRI by detecting drought's effects on vegetation at time intervals of a month or less.

VegDRI, now an operational tool with a map released every week or every two weeks, shows the effects of drought on vegetation at seasonal scales, based on data from remote sensing, climate observations and static biophysical variables such as land use. The fast-onset “flash” drought in 2012 highlighted the need for tools to detect fast-moving drought.

“One of the outcomes we are hoping to achieve with a tool/product like QuickDRI is to help us monitor and detect flash droughts,” said Mark Svoboda, leader of the NDMC’s Monitoring Program Area. “These tend to sneak up on us and can have major environmental, agricultural or fire impacts. The timing of droughts is a critical component in assessing their overall magnitude and potential impacts.”

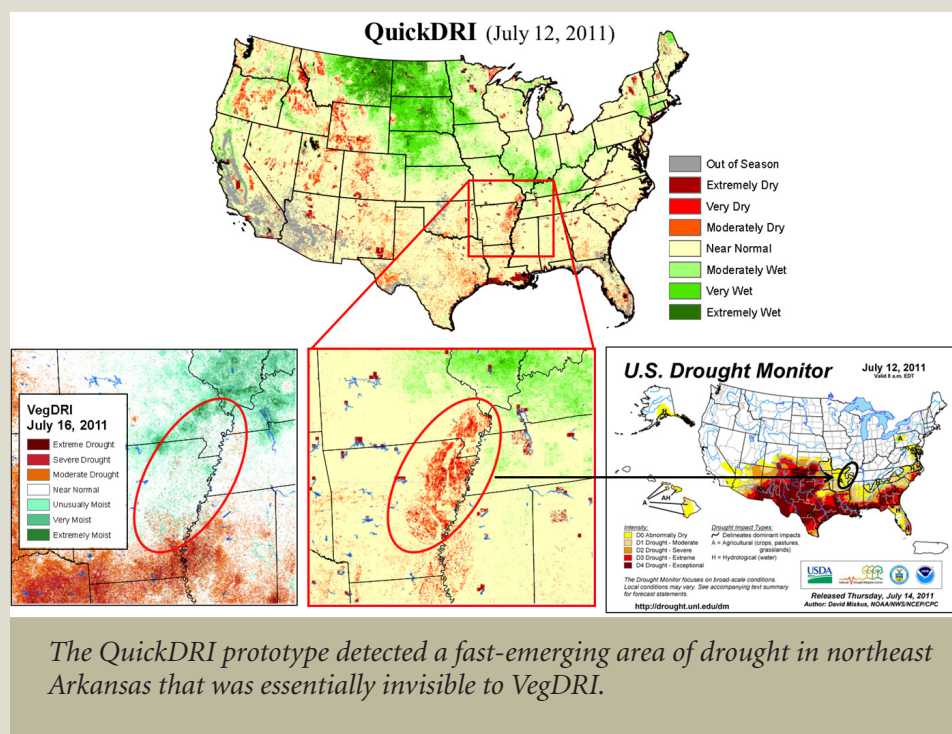
After a one-year feasibility study yielded promising results, the QuickDRI research team received \$1.3 million for a three-year project to turn QuickDRI into an operational tool. The grant award is from NASA’s Applied Sciences for Water Resources program, led by Bradley Doorn.

“We were able to leverage previous experience and partnerships to move forward,” said Brian Wardlow, director of the Center for Advanced Land Management Information Technologies at the University of Nebraska-Lincoln. Wardlow, who is affiliated with the National Drought Mitigation Center, also based at UNL, and Svoboda

are the principal investigators, and Tsegaye Tadesse, NDMC climatologist, is also on the project.

Partners include Martha Anderson of the U.S. Department of Agriculture’s Agricultural Research Service and Chris Hain at the University of Maryland, who produce the Evaporative Stress Index (ESI); Jesslyn Brown with the U.S. Geological Survey’s Earth Resources Observation and Science Center; and Matthew Rodell, at NASA’s Goddard Space Flight Center, who produces

trying to integrate data along a vertical column,” Wardlow said. Above ground, QuickDRI will use the Normalized Differentiated Vegetation Index (NDVI), as does VegDRI, to detect plant condition. On the Earth’s surface, QuickDRI will incorporate the ESI, which reflects boundary layer conditions, that is, evaporative moisture loss from plants. Below ground, QuickDRI will use data from GRACE satellites, which shows how much moisture is in plants’ root zones.



groundwater maps based on data from the GRACE satellites. The maps are on the NDMC’s website.

“We’re building on the VegDRI experience,” Wardlow said. “The VegDRI concept was developed more than a decade ago,” when there were very few long-term records of satellite data to work with. “Since then, other products and histories have become available that will allow us to have a more rapid response indicator of agricultural drought.”

With QuickDRI, “We’re

QuickDRI may also make use of the Standardized Precipitation Evaporation Index, which incorporates a calculation of evaporation by taking both temperature and precipitation into account, instead of just precipitation. The Standardized Precipitation Index is calculated based solely on precipitation. Whereas VegDRI uses a 6- or 9-month SPI, QuickDRI will use a 3-month SPI or SPEI, Wardlow said.

Incorporating a temperature variable will give a fuller picture of

NDMC Co-Hosts NASA Workshop

drought's effects on vegetation. "If you've got a dry, cool spring, the SPI might be showing moderate to severe drought, but crops and lawns are not showing much stress because there's not as much demand for moisture," Wardlow said. Evaporation from plants is slower in cooler weather, and stored moisture in the soil may be sufficient. "Dry and cool means something different than if it's dry and hot," he said. "We're hoping to get a truer representation of agricultural conditions with this model."

"Our traditional climate-derived drought indicators don't always do the best job of seeing the relationship and interplay between precipitation, soil moisture, temperature and potential evapotranspiration and their impact on crops and the environment," Svoboda said. "Satellites and their early detection of plant stress help us bridge the gap between climate-based indicators and newer vegetation indices."

He added that satellite-derived indicators are critical for augmenting ground-based observation networks, which, he said, "will never be as dense as we need them to be."

The project will incorporate feedback from users throughout, and QuickDRI will have the advantage of a pre-established user community from VegDRI, Wardlow said. Users include U.S. Drought Monitor authors, the Bureau of Land Management, and many other land and resource managers at state agencies and various organizations.

Svoboda, who is also a U.S. Drought Monitor author, said, "This tool could really help fill a gap in our nation's drought early warning capacity for these rapid onset types of drought."

By Mekita Rivas, School of Natural Resources, University of Nebraska-Lincoln

The NASA Water Resources Program Strategy and Investigator Meeting was Sept. 24-26 at the Nebraska Champions Club. The meeting was hosted jointly by the National Drought Mitigation Center (NDMC) and the Center for Advanced Land Management Information Technologies (CALMIT), both based at the University of Nebraska-Lincoln.

"We have advised this NASA program on strategies and critical information needs of the global drought monitoring community in areas such as water, agricultural and food security," said Brian Wardlow, UNL associate professor and CALMIT director. "NASA has used this feedback to help guide the development of several research and applications priorities with the NASA Water Resources program to maximize the use of their satellite observations and other data assets to support drought monitoring."

About 50 members of the NASA Applied Sciences Water Resources community from across the country attended the meeting, held at UNL for the first time.

Faculty members in attendance were from universities including Columbia University, University of

Maryland, John Hopkins University, University of California-Santa Barbara, University of California-Irvine and University of Florida. Scientists from federal agencies such as NASA, NOAA, USDA and USGS also attended.

"This meeting brought in the who's who of current experts and researchers in the field from around the United States," said Mark Svoboda, leader of the NDMC's Monitoring program area. "It offered up a first-hand view of what's current and state-of-the-art in the satellite operations field."

NASA's invitation to UNL to host the meeting was the direct result of several years of successful collaborations among the NASA Applied Water Resources Program, NDMC and CALMIT, Svoboda said.

The meeting's primary objective was to review progress on applications of remote sensing for water resources monitoring and management, with a primary focus on drought monitoring and quantification of drought impacts.

"The meeting was critically important for identifying NASA program research and applications priorities in the area of water related to agriculture, drought, water resource management and sustainability issues," Wardlow said.

Wilhite leads international effort

Don Wilhite, founding director of the NDMC, chaired the advisory and management committees for the Integrated Drought Management Program at meetings held Oct. 14-15 at the World Meteorological Organization headquarters in Geneva, Switzerland.

The objective of the IDMP is "to

support stakeholders at all levels by providing them with policy and management guidance through globally coordinated generation of scientific information and sharing best practices and knowledge for integrated drought management."

More about the program: <http://www.hmndp.org/presentations/SE-W4-B.pdf>

Speaking of drought ...

Great American Adaptation Road Trip

Uncovering stories of people and places using their wits and resources to adapt to the impacts of climate change

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September 21, 2013

LEAVE A COMMENT



Fighting Drought with a New Super Corn

Gothenburg, Nebraska to Belmond, Iowa



The Road Trippers: Kirsten & Allie

FIND A STORY

Adaptation Strategy

Coastal protection

The National Drought Mitigation Center was a stop on the Great American Adaptation Road Trip, a quest undertaken in summer 2013 by Kirsten Howard and Allie Goldstein, graduate students at the University of Michigan's School of Natural Resources and Environment. The result (so far) is a collection of highly informative blog entries, including one on drought that National Geographic reposted. <http://adaptationstories.com/2013/09/21/fighting-drought-with-a-new-super-corn/>



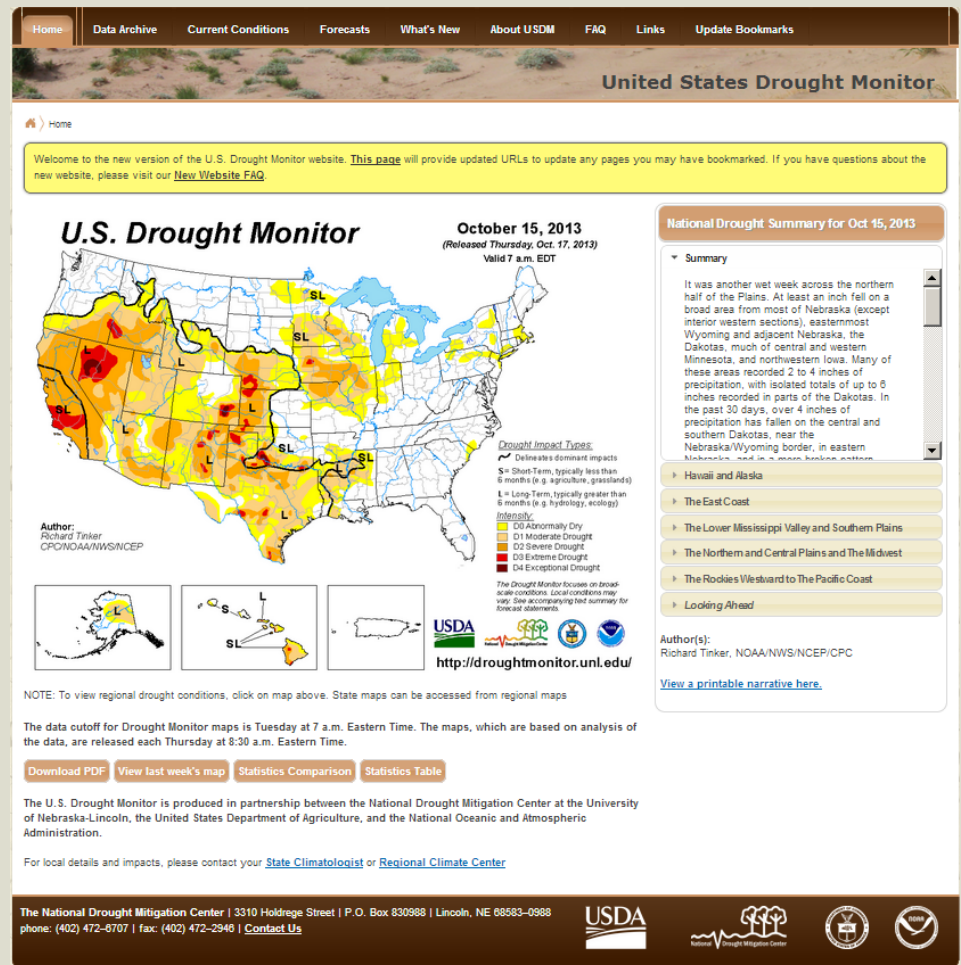
Deb Wood, left, led learners of all ages through a drought activity at NaturePalooza, Sept. 24, at UNL's School of Natural Resources.



Mike Hayes, NDMC director, leads a delegation from the Czech Republic -- visiting scientists, longtime collaborators and burgeoning Husker fans -- on the famed Tunnel Walk at Memorial Stadium.

U.S. Drought Monitor website upgrade offers more info

The U.S. Drought Monitor website has an updated look and new features requested by users.



- On the front page, the narrative is now next to the map, visible without scrolling.
- On the Data Archive page, where you can see maps from different dates side by side, it is now possible to compare the map showing all 50 states. Previously, the contiguous 48 states was the most comprehensive view available on the Archive page.
- The new website uses map projections specific to each state or region, an improvement from the previous site.
- The new website now offers "categorical" statistics about drought status. Categorical statistics add up to 100 percent. Previously, the site listed areas in, for example, D2 or worse, but not just D2.
- The new website also has new interfaces for other monitoring and forecasting products, and makes more data available in more formats.
- The new site offers multiple map styles with different amounts of text.
- Perhaps most importantly, it includes an Update Bookmarks tab, to help you find links that have changed.
- Stay tuned for more new U.S. Drought Monitor products and services in coming weeks.

Kudos to Chris Poulsen, NDMC geospatial analyst, and Jeff Nothwehr, NDMC GIS and web specialist, for the upgrade.

<http://droughtmonitor.unl.edu>

Jerri Hammonds @jl_hammonds [Follow](#)

How do you define #drought? #needtoknow >> LOW lake levels!

3:08 PM - 24 Sep 2013

Sonja Koukel @SKoukel [Follow](#)

@jl_hammonds #drought no green grass. Can you say "paint the yard?"

3:08 PM - 24 Sep 2013

EDEN @EDENTweets [Follow](#)

welcome to the Managing #Drought chat @climatchick

3:09 PM - 24 Sep 2013

Tom Dean @tdean_dean [Follow](#)

#drought No livestock on range #NMdrought

3:09 PM - 24 Sep 2013

@EDENTweets' "Managing #Drought" was the inaugural tweet chat of @EDENTweets, Sept. 24, 2013, highlighting resources to help people cope with drought. Co-hosts were New Mexico Extension, the National Drought Mitigation Center and the National Integrated Drought Information System. Transcript: <http://go.unl.edu/h3m5>