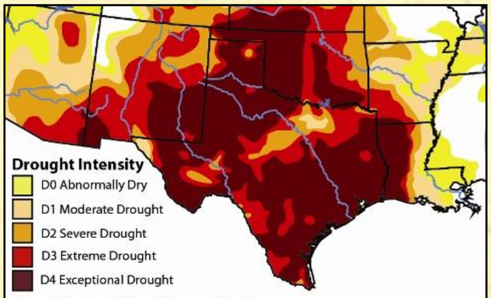
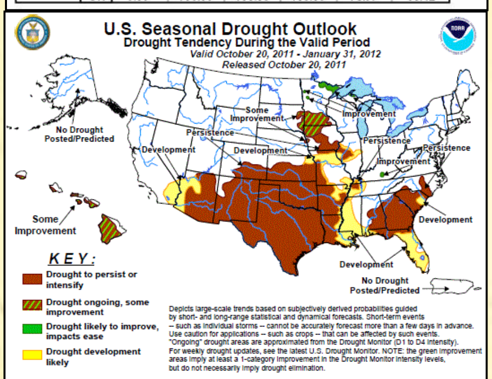
MANAGING DROUGHT IN THE SOUTHERN PLAINS

Webinar Topic: "Flash Drought"
October 27, 2011



Drought Conditions (Percent Area)

		None	D0–D4	D1–D4	D2–D4	D3–D4	D4
Current	NM	6.24	93.76	90.71	85.90	63.02	26.35
	TX	0.00	100.00	100.00	98.34	90.87	69.61
	OK	0.00	100.00	100.00	99.89	86.26	54.84
Two Weeks Ago	NM	2.44	97.56	93.25	87.07	63.02	26.35
	TX	0.00	100.00	100.00	99.15	91.96	73.13
	OK	0.00	100.00	100.00	100.00	80.31	59.10
Start of water year	NM	0.00	100.00	96.40	88.99	69.61	35.13
	TX	0.00	100.00	100.00	91.96	96.65	85.75
	OK	0.00	100.00	100.00	100.00	78.97	66.42



Is drought properly classified in your region? If not, let us know by:

- Adding to the Impact Reporter
- Contacting your State Climatologist
- E-mailing the Drought Monitor Authors at: droughtmonitor@unl.edu

Regional Drought Summary

Brian Fuchs, National Drought Mitigation Center

There was slight improvement in the overall drought intensity in the past two weeks, with the improvements coming primarily in the eastern part of the region. However, compared to this time last year, the area in drought in the Western U.S. has tripled, from 6% to 18% with 8% of the West in D3 or D4 drought, compared to none a year ago.

Precipitation during the next five days is expected to focus mostly on the eastern one-third of the country, primarily associated with an unseasonally strong low-pressure system over the northeast and potentially from Tropical Storm Rina depending on the storm track. The Southern Plains has some possibilities for precipitation with the system currently passing through, but beyond that conditions are expected to return to a dry pattern. Temperatures in the western half of the country are expected to remain above-normal while rain in the East is expected to bring slightly cooler temperatures. Beyond the passing of these systems, the warm and dry pattern across the southern plains is expected to return for the next 8-14 days and beyond. With further development of La Nina conditions, the region will be hard-pressed to make any substantial improvement to pervasive drought conditions within the coming months. For temperature and precipitation outlooks, visit the Climate Prediction Center.

Did You Know?

New products help us assess drought conditions on a finer spatial scale than can be accomplished with ground-based observations, primarily through the use of satellite, radar, and computer models. Some examples include:

- NLDAS Soil Moisture Estimates: combines observed data with hydrologic model; http://www.emc.ncep.noaa.gov/mmb/nldas/drought/
- VIC Soil Moisture Estimates (University of Washington): http://www.hydro.washington.edu/forecast/monitor
- Texas SPI: combines rainfall estimates derived from radar with historic precipitation distributions; http://atmo.tamu.edu/osc/drought

Resources

U.S. Drought Portal
http://www.drought.gov

Drought Impact Reporter
http://droughtreporter.unl.edu

State Climatologists
http://www.stateclimate.org

National Drought Mitigation Center
http://drought.unl.edu

Southern Climate Impacts Planning Program (SCIPP)
http://www.southernclimate.org

Climate Assessment for the Southwest (CLIMAS)
http://www.climas.arizona.edu

Past webinars, summaries, and Federal/State Assistance
http://www.drought.gov/portal/server.pt/community/southern_plains

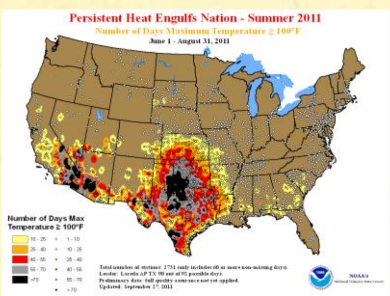
What is “Flash Drought”?

Presenters:

Mark Svoboda, National Drought Mitigation Center
Martha Anderson, USDA ARS Hydrology & Remote Sensing Lab
Brian Wardlow, National Drought Mitigation Center
Pat Guinan, Missouri State Climatologist

Drought is usually thought of as a slow-onset disaster, but much like flash floods, drought can develop very quickly. During summer, if evapotranspirtation (ET) – loss of water from the soil and plants to the atmosphere – is high, soil moisture can be depleted rapidly producing drought conditions even when precipitation departures are not all that extreme. In addition to soil moisture status, ET is affected by temperature, relative humidity, solar radiation (sunlight) and wind. Any one of these can contribute to higher-than-normal ET rates, but when several combine the results can be disastrous. This past spring and summer combined unprecedented heat with above-average wind speeds, low relative humidity, and abundant sunshine, resulting in ET rates as much as double their long-term average. Essentially, this means that an inch of rain which in some locations may provide sufficient soil moisture for 6 days may be depleted in only 3 days.

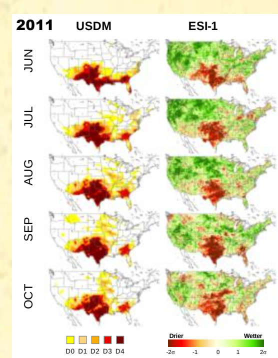
Drought is defined by its intensity and duration. A very intense drought coming on quickly can have a magnitude similar to a slower-developing but longer-lasting event. The term “flash drought” was first coined in 2000 when rapid-onset of extreme drought conditions developed in Oklahoma and Texas as severe short-term precipitation deficits and extreme heat overwhelmed soil moisture reserves. In 2011, these “flash drought” conditions were repeated, but this time in the absence of severe short-term precipitation deficits. April and May in Missouri and Arkansas were extremely wet, including the flood-of-record along the White River in Arkansas. During the subsequent summer months, precipitation was below-normal, but it was not at the extremes experienced in Oklahoma and Texas. Yet by mid-July it was apparent that things were not quite right. Reports started coming in from southwest Missouri that farmers were giving up on the corn crop, soybeans were stressed and pastures were burning up.

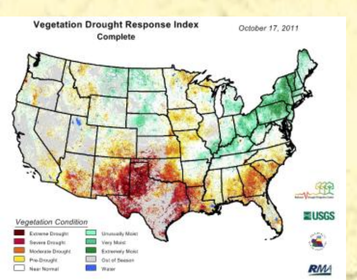


These reports ran counter to many of the precipitation-based indicators that continued to show near-normal conditions. The primary factors were heat and wind. The core of the southern plains heat, which had temperatures similar to those in the Arizona and California desert, spread outward from Texas and Oklahoma, where it combined with strong winds to produce the perfect conditions for flash drought. Based on field reports, D1 (moderate) drought was introduced on July 12 and D2 (severe) drought introduced on August 2. Had there been other ET-based or temperature-based drought indicators, they may have allowed earlier detection and consequently earlier action on depicting the more severe conditions. This underscores the importance of *systematic* reporting - whether from extension, USDA agencies, individuals, or media – and for people in the affected areas asking questions of the Drought Monitor authors and state climatologists.

Tools to Monitor Rapid-Onset of Drought Conditions

ET is a good indicator of what the plants are actually experiencing. It is difficult to measure directly over large areas, but it can be calculated using satellite-based remote-sensing. Surface temperature is related to the amount of water in the soil. Dry soils retain and give off more heat than moist soils. This “heat flux” can be measured by satellite and used to estimate actual ET. This is compared to how much ET would be possible given the weather conditions, if moisture were not limited, called potential ET. Anomalies in the ratio of the two gives an Evaporative Stress Index (ESI). As long as there is sufficient soil moisture, actual and potential ET are nearly in balance, giving a high ESI value. But as plants use up available water, ESI declines rapidly as there is no more water to extract from the soil, while the atmosphere continues to demand water. This is the situation at which point plants become stressed and drought impacts begin to emerge.





Another indicator, the Vegetation Drought Response Index, or VegDRI (http://vegdri.unl.edu), combines vegetation “greenness”, as calculated by satellites, with climate-based drought indices and other biophysical data such as landcover, soil characteristics, elevation, irrigation, and ecological settings. VegDRI works by identifying anomalies, or variations from average conditions, where vegetation is stressed because of it being too dry or too wet. VegDRI is computed bi-weekly and includes a 20+ year historical record (available on the website). It also masks areas that are out of season to limit false positives, as dormant vegetation could be mistaken for drought. Current VegDRI values in west Texas are among the most extreme values observed during the last 20 years.