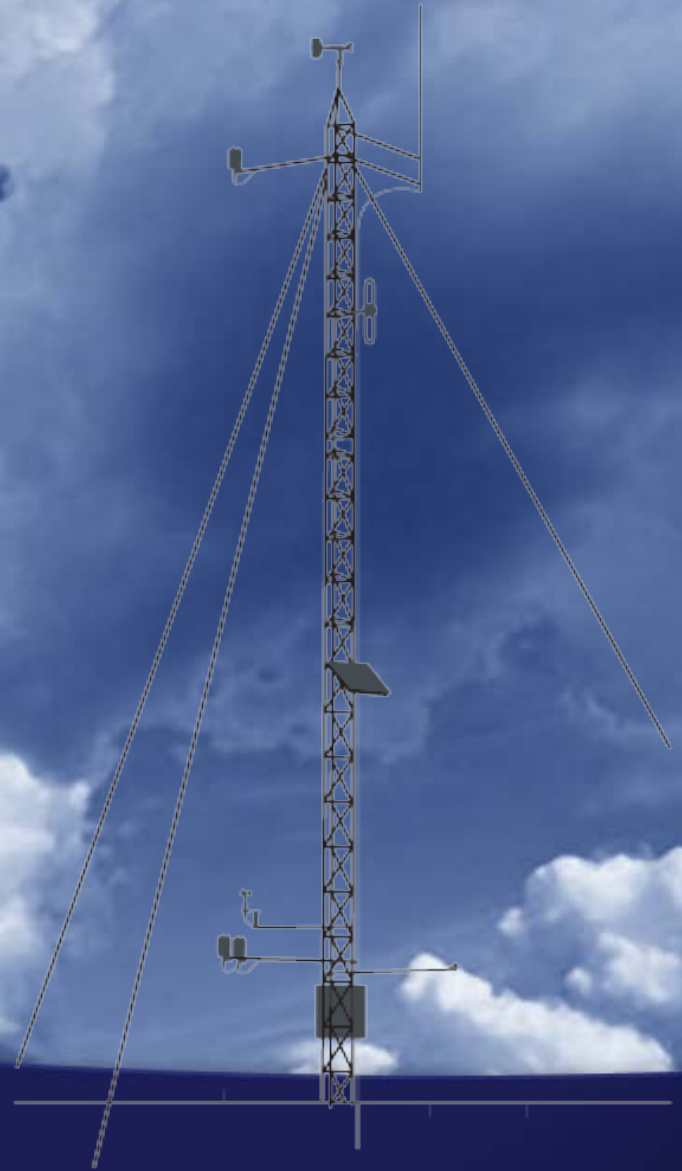# Utilizing Plant Available Water as a ~~Drought~~ Risk Monitoring Tool

Brad Illston

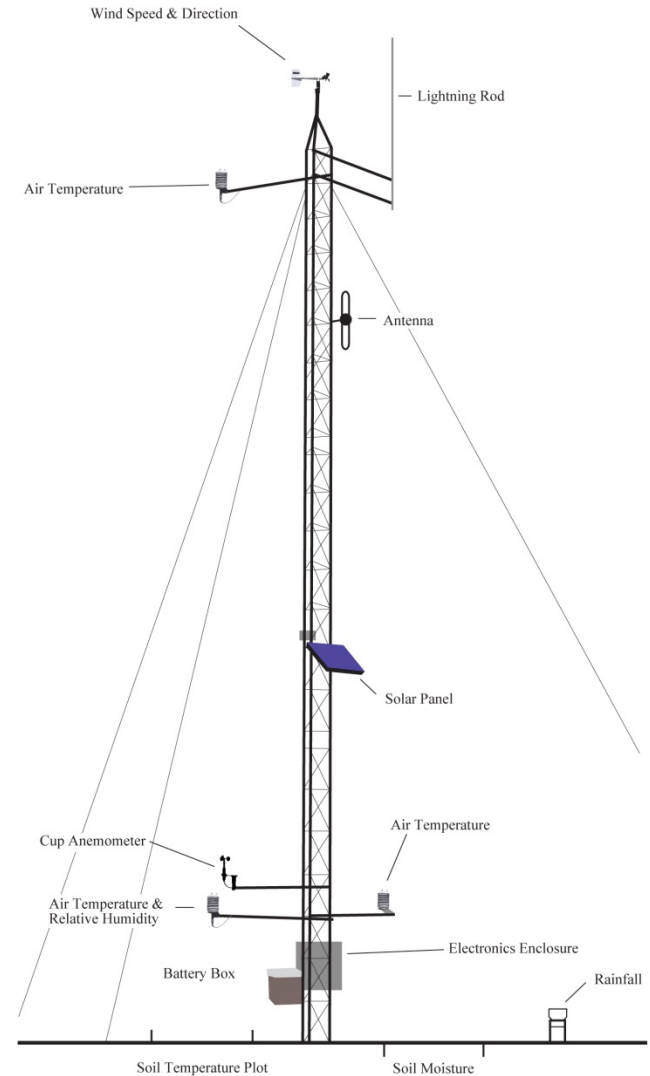Oklahoma Mesonet

Research Team Leader

Background

- Weather and climate network covering the State of Oklahoma-- Planned 1986-1991. The idea was conceived following disastrous Tulsa flood of 1984. Similar ideas were blossoming in Stillwater for an agricultural network.

- Commissioned in 1994

- Atmospheric measurements with 5-minute resolution, available to users within 5 minutes of collection

- Subsurface temperature and moisture measurements at various depths

- Over 5 billion observations archived

Technical Details

- 120 remote weather stations
- 3300 sensors and 250 computers linked
- About 700,000 observations ingested each day
- 2-way communications
- Solar powered
- 30-day storage in on-site dataloggers
- Produce ~63,000 products and files for users each day

Wind Speed & Direction
Lightning Rod
Air Temperature
Antenna
Solar Panel
Cup Anemometer
Air Temperature
Air Temperature & Relative Humidity
Battery Box
Electronics Enclosure
Rainfall
Soil Temperature Plot
Soil Moisture

Soil Moisture Instrument

- Campbell Scientific 229-L Matric Potential sensor

- Measures matric potential

- Estimates Volumetric Water Content

- Depths of 5cm, 10cm*, 25cm, and 60cm

Mesonet
Oklahoma's Weather Network
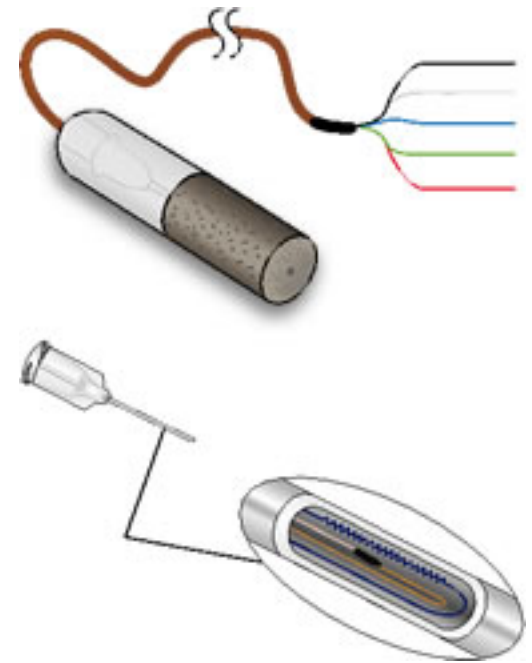
Plant Available Water

- Amount of water in the soil available to the plants.
- Difference in calculated water content between and water content at wilting point (-1500 kPa).
- Column weighted.
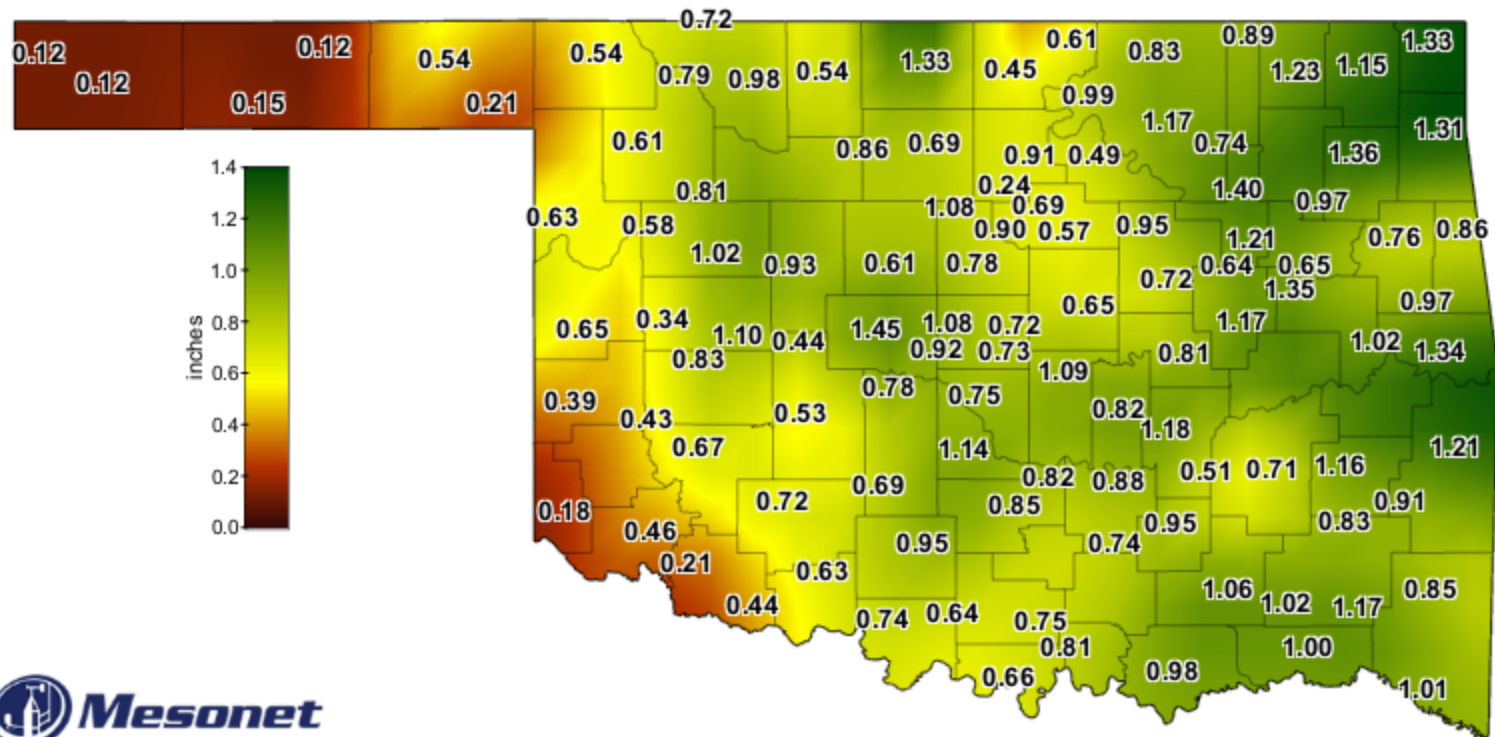- 10cm (4"), 40cm (16"), and 80cm (32")

Plant Available Water
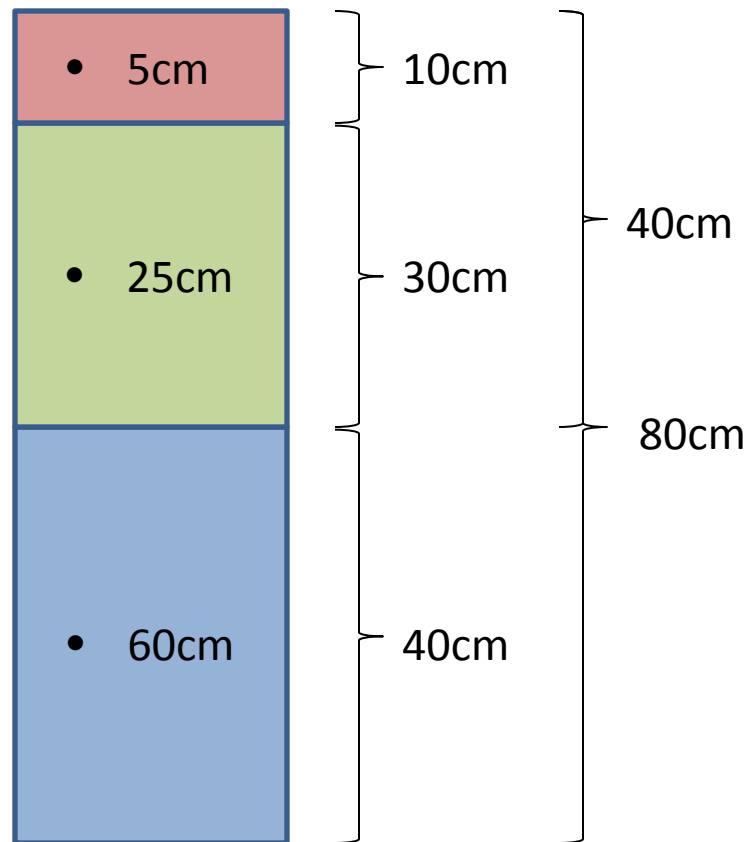
$$PAW_{80} = (WC_{05} - WP_{05}) * 10$$
$$+ (WC_{25} - WP_{25}) * 30$$
$$+ (WC_{60} - WP_{60}) * 40$$

WC = Calculated Water Content
WP = Water Content at Wilting Point

Plant Available Water

4-inch Plant Available Water

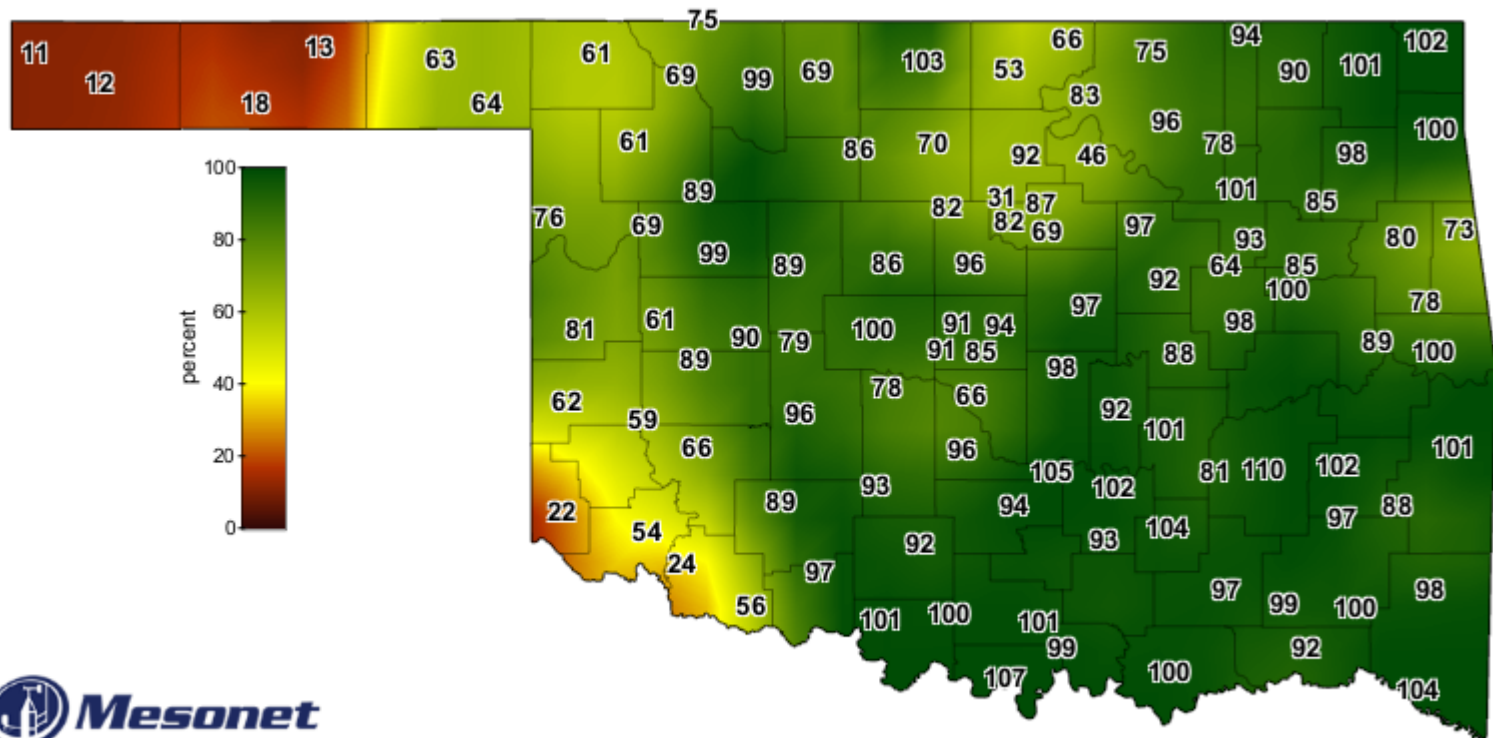April 26, 2015

Percent Plant Available Water

- Amount of water in the soil available to the plants.

- Difference in PAW between field capacity and wilting point.

- Column weighted.
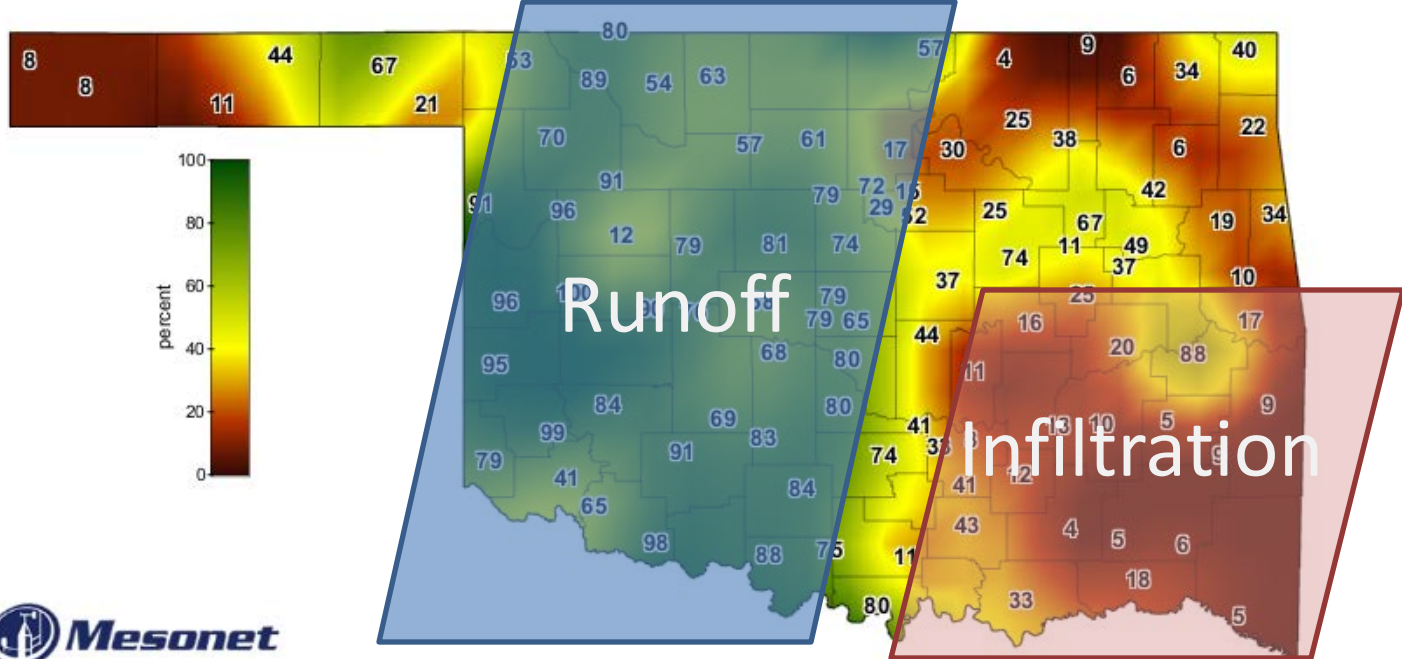
Percent Plant Available Water

4-inch Percent Plant Available Water

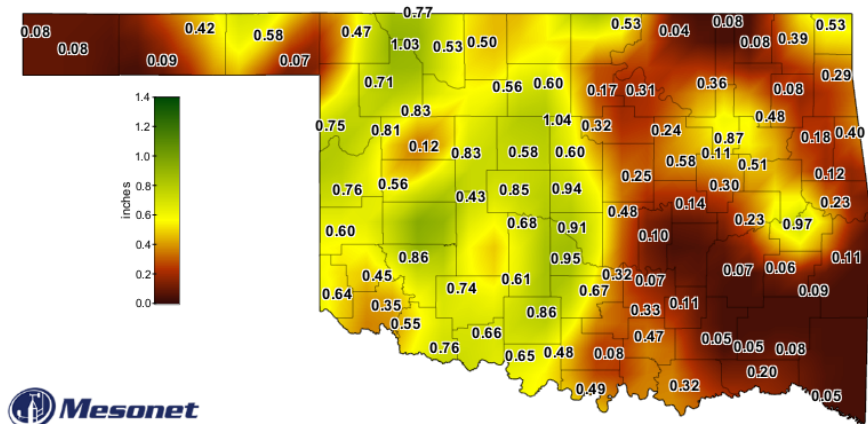April 26, 2015

Soil Conditions

4-inch Percent Plant Available Water

12:00 PM October 9, 2011 CDT
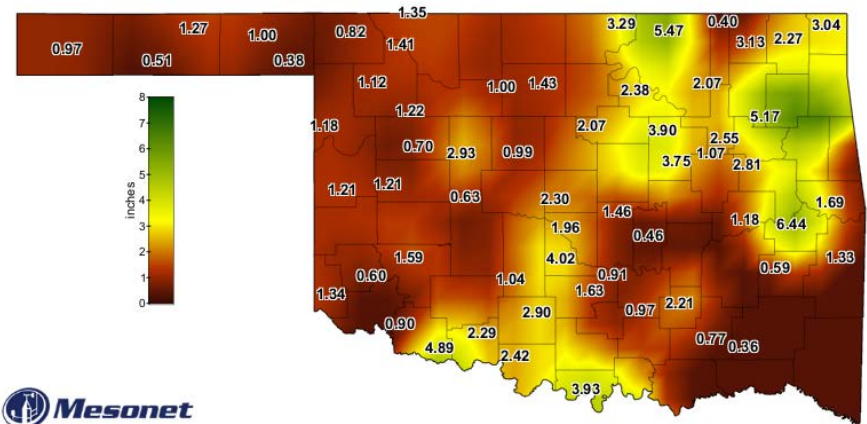Created 4:48:27 PM May 29, 2015 CDT. Copyright 2015

- Assists in describing soil conditions.

Depth Comparison

4-inch Plant Available Water — 12:00 PM October 9, 2011 CDT

32-inch Plant Available Water — 12:00 PM October 9, 2011 CDT

- Allows analysis of location and vertical span of the moisture content.

Planning

4-inch Plant Available Water

12:00 PM October 9, 2011 CDT
Created 4:48:27 PM May 29, 2015 CDT. Copyright 2015

- Allows agriculture users to understand conditions before planting.
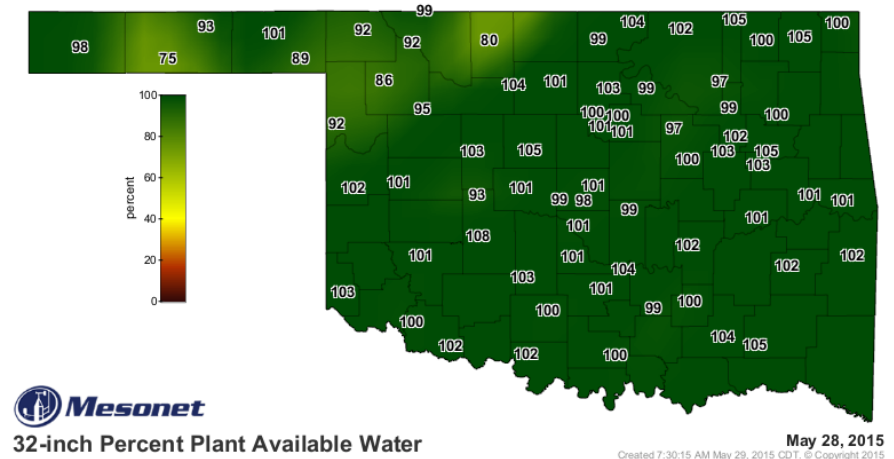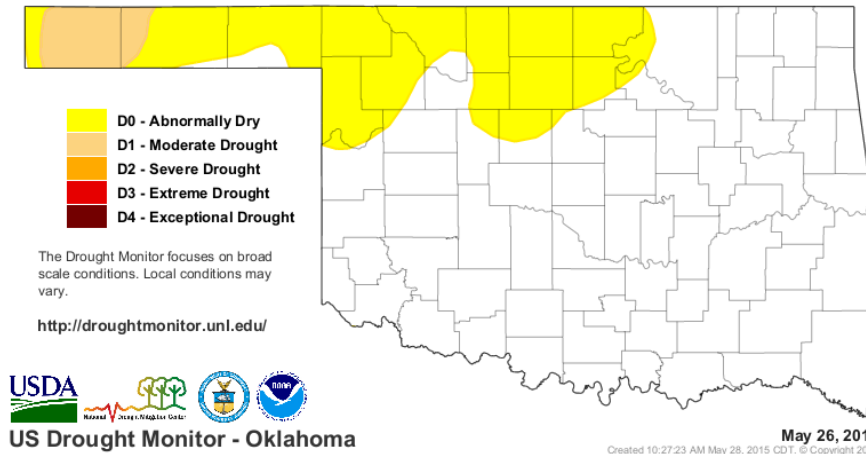
Risk Management Tool
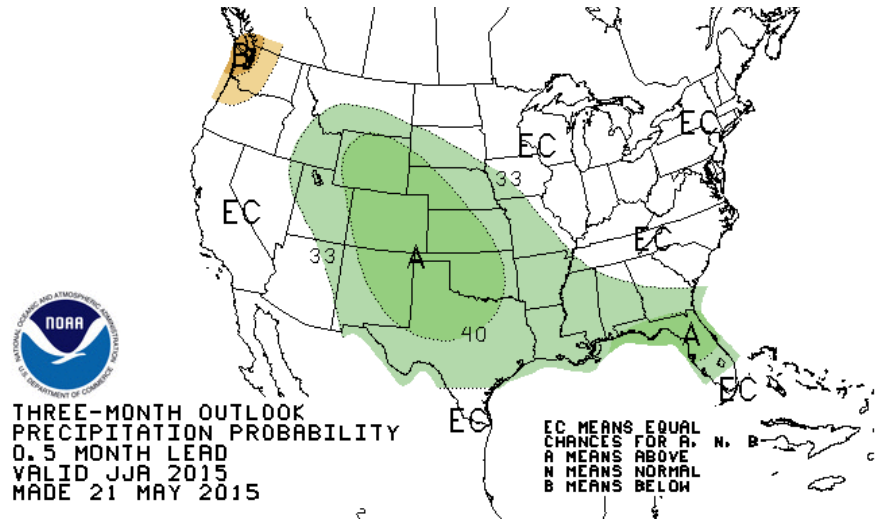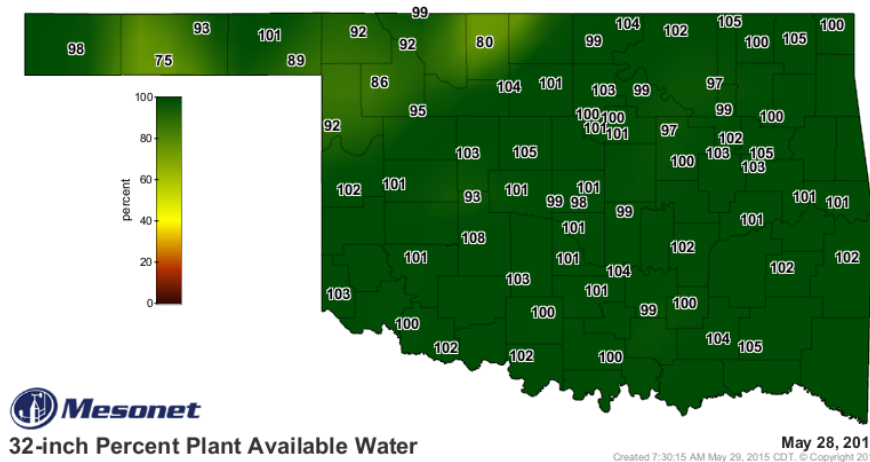
- Combining PAW and CPC Rainfall Probability provides a risk management tool.

Drought Monitor Comparison
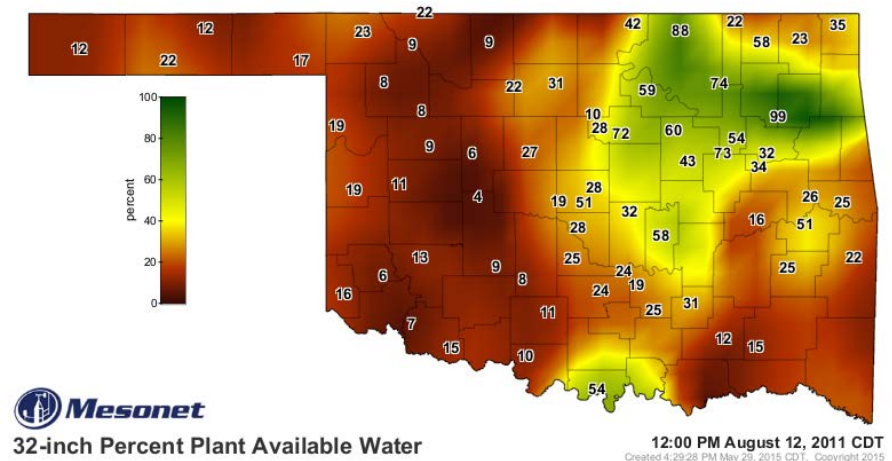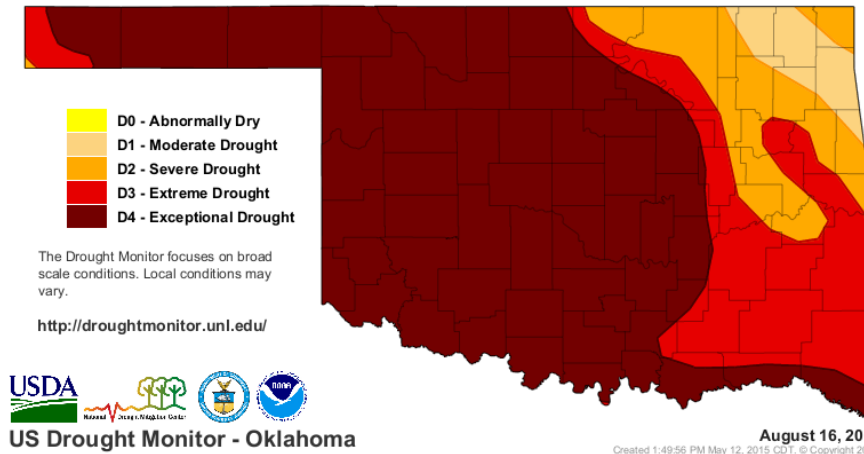
- Can provide daily updates of drought conditions.

Drought Monitor Comparison

- Can provide daily updates of drought conditions.

Questions?