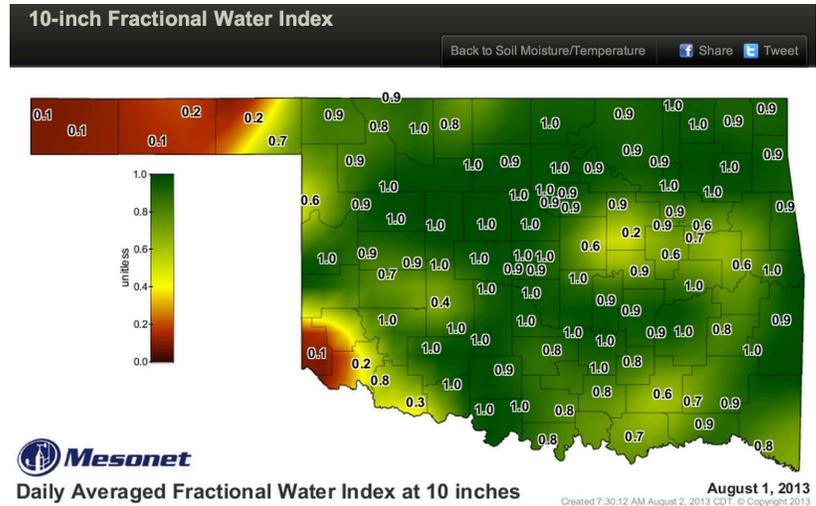


FRACTIONAL WATER INDEX

Fractional Water Index maps and graphs are available on the Oklahoma Mesonet website, <http://mesonet.org>, in the “Weather” section, under “Soil Moisture/Temperature.” Fractional Water Index values are displayed in statewide maps and time-series graphs for individual Mesonet sites.

Fractional Water Index is an indicator of soil moisture at three depths. It is essentially a point measure at 2-inch (5 cm), 10-inch (25 cm) and 24-inch (60 cm) depths. The scale ranges from wet soil at 1.0 to dry soil at 0.0. It provides an indication of plant available water divided into tenths. Fractional Water Index is independent of soil type.



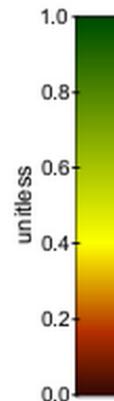
Fractional Water Index was specifically developed for the Campbell 229-L soil moisture sensor by soil scientists at the Agricultural Research Service’s Grazinglands Research Station in El Reno, Oklahoma. This sensor measures over the range of matric potential values from -0.085 bars to -8.52 bars (-8.5 kPa to -852 kPa). This range covers plant available water from field saturation to wilting point.

The following table lists Fractional Water Index ranges as they relate to generalized plant growth and stress responses. Plant responses vary with species, variety, cultural care and pests.

Fractional Water Index (FWI) and Generalized Plant Response

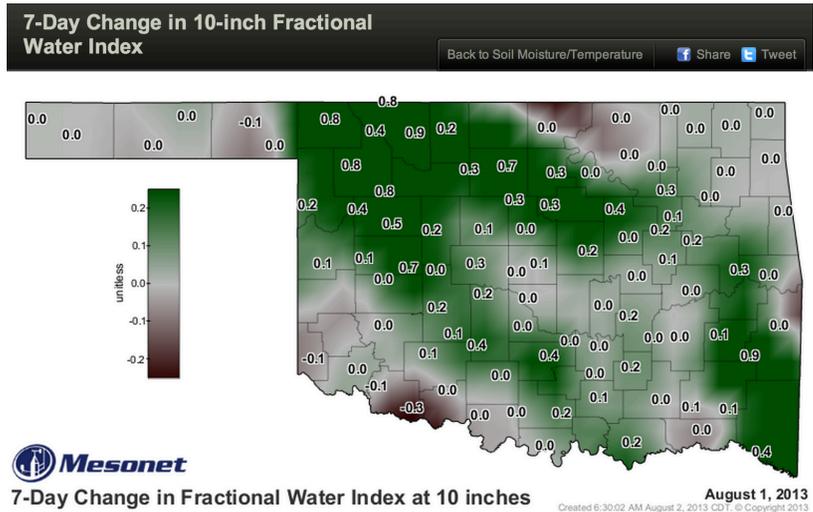
Lower FWI	Upper FWI	Generalized Plant Response
	1.0	Saturated soil
0.7	0.9	Optimum for plant growth
0.4	0.7	Water stress
0.1	0.4	Wilting
0.0	0.1	Powder dry soil

*NOTE: Because of the measurement principal employed by the sensor, useful values cannot be acquired during frozen soil conditions.



All Fractional Water Index display products are updated daily after midnight. The Campbell 229-L soil moisture sensor is a heat dissipation sensor. It operates by measuring a temperature difference after a heat pulse.

The magnitude of the heat dissipation varies as a function of the amount of water surrounding the sensor. Because of the measurement principal employed by the sensor, useful values cannot be acquired during frozen soil conditions and are not reported during those time periods. All sensors are under a mix of summer growing grasses and forbs.



The 7-Day Change in Fractional Water Index map provides a one-week statewide change over time. Green colored areas indicate increases in soil moisture. Grey-purple colored areas indicate loss of soil moisture over a one-week time frame.



The Soil Moisture Graph shows daily Fractional Water Index changes for a single Mesonet site. Graphs available go from the most recent 7 days back to the most recent 90 days. With the sensors at three depths, the depth of water infiltration from rain events can be monitored on a daily basis.

For longer Fractional Water Index time scales, refer to “Long-Term Averages” maps and graphs on the Oklahoma Mesonet website in the “Weather” section and under the “Past Data & Files” group.

Authors: Albert Sutherland and Brad Illston. Version date: August 6, 2013
 Ref: Illston, et.al. 2008. *Mesoscale Monitoring of Soil Moisture across a Statewide Network*. Journal of Atmospheric and Oceanic Technology, 25, 167-181.

