JUNE 2014 VOLUME 60, NUMBER 6

THE CROSS SECTION

High Plains Underground Water Conservation District News

THIS ISSUE

PROPOSED REVISIONS TO HPWD RULE 5 ANNOUNCED

Public hearings will soon be scheduled to allow comments on proposed revisions to the High Plains Underground Water Conservation District's management plan and rules.

The hearings are tentatively set for July in Levelland and August in Canyon.

"Before we ratify these changes, we want the public to comment on proposed revisions to Rule 5. As always, our top priorities throughout this process have been to conserve water and to protect private property rights," said Board President Lynn Tate of Amarillo.

HPWD has encouraged input to the rules writing process since the project began in November of last year.

"We worked with commodity groups, individual crop and livestock growers, our District's County Advisory Committees, municipal users, city managers and others as we sought to understand every perspective on these rules," Tate reports.

"Now that we have the rules drafted, we'll seek final input from the community in July and August," he said.

In an effort to promote conservation of underground water resources without intruding on private property rights, the proposed Rule 5 accommodates a wide variety of approaches in crop and livestock production.

The Board believes the proposed Rule 5 will further the management goals for all aquifers in the District.

The Rule includes an Allowable Production Rate for wells, conservation reserve provisions, and recording and reporting options.

The complete proposed Rule 5 document and a summary of the proposed revisions are available online at **http://tinyurl.com/ljjfcn5**.

Copies of these documents are also available by contacting the HPWD office at (806) 762-0181.

According to Tate, the Board is also taking a look at the broader rules document, which includes definitions and provisions related to other aspects of the District's mission.

The HPWD rules were last amended November 12, 2013.

"As a board, we're eager to fulfill the mission of the water district and the vision of the 10-Year Amended Management Plan with rules that provide a reasonable and practical framework for water users. We're glad we've taken the time we have with Rule 5 and will be deliberate as we consider the other provisions in the District Rules," he said.

HPWD RAINWATER HARVESTING

Rainfall is collected in the passive rainwater harvesting demonstration garden at the HPWD office on May 23. Widespread rainfall ranging from 3-7 inches brought much needed drought relief to the region.

ANNUAL WATER LEVEL MEASUREMENTS INDICATE AN AVERAGE DECLINE OF -1.32 FEET WITHIN DISTRICT

Annual water level measurements indicate an average decline of -1.32 feet in the groundwater levels of the Ogallala Aquifer within the High Plains Water District in 2013.

This decline is 0.55 of a foot less than the -1.87 feet decline recorded in 2012 during extended drought conditions.

The 10-year average change (2004-2014) was -8.83 feet while the five-year average change (2009-2014) was -6.85 feet.

"It is important to remember that these values represent the average change in water levels across the district's 16-county service area. As always, we recommend that landowners review data from observation wells nearest their property for more representative data," said HPWD Manager Jason Coleman, P.E.

Winter water level measurements are made from December to March each year. This allows time for water levels in the aquifer to stabilize following the previous year's groundwater production.

The results of the 2013-2014 water level measurements are included in a new 76-page magazine-style report recently mailed to subscribers of *The Cross Section*.

It is also available for online viewing/downloading at **http://tinyurl.com/nefdmut.** We hope the new format is beneficial to all.

JULY 21 TURFGRASS FIELD DAY TO BE HELD IN LUBBOCK

Persons wanting to learn more about turf care for golf courses, athletic fields, commercial use, and residential use are encouraged to attend a July 21 turfgrass field day at the Texas Tech Quaker Research Farm, 200 N. Quaker Avenue, in Lubbock.

Registration for the free event begins at 7:00 a.m. The field day follows from 8 a.m. to 12 noon. A free lunch will be served after the event.

Sponsors include Texas A&M AgriLife Extension and the Texas Tech University Department of Plant and Soil Science. Supplemental funding for the research is provided by the High Plains Water District.

More information is available from Dr. Joey Young at 806-834-8457, and Vikram Baliga or Robert Scott at 806-775-1680.

HELP UPDATE OUR NEWSLETTER LIST

July 15 is the deadline to notify the High Plains Water District if you wish to receive an electronic version or a print version of *The Cross Section* newsletter.

The courtesy reply card included in the 2013-2014 water level measurement report did not include a space to provide the recipient's name, return address, or e-mail address.

We ask that you simply write this information on the card when returning it to the district office.

You may also call the district at (806) 762-0181 or e-mail info@hpwd.com to let us know how you wish to receive the newsletter.

THE CROSS SECTION

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UNDERSTANDING SOIL MOISTURE CONCEPTS CAN HELP OPTIMIZE WATER MANAGEMENT FOR CROP PRODUCTION

EDITOR'S NOTE: In celebration of its 60th anniversary of publication, future issues of *The Cross Section* will feature guest articles from researchers, agribusiness leaders, landscape irrigation specialists, and others. In this issue, Dr. Dana Porter shares her insights on how soil moisture can improve irrigation management. She is an Associate Professor and Agricultural Engineer with the Texas A&M AgriLife Research and Extension Center at Lubbock--**CEM**.

By Dr. Dana Porter

Recent rainfall in the Texas High Plains has provided much needed soil moisture to establish summer crops. Whether deciding "if, when and how much to irrigate," or "how long will the recent rainfall satisfy the crop," understanding and applying soil moisture management concepts are important to optimizing water management for crop production.

Understanding soil moisture dynamics: Rainfall or irrigation enters soil through infiltration at a rate up to the soil's ability to absorb the water (*permeability*).

Water applied at rates faster than the soil's permeability will be lost as runoff, unless the water can be stored on the surface (*impounded*). Runoff risk is higher on sloping land and on "tight" soils (such as clays or clay loams) with low permeability.

Applied water can infiltrate the soil, filling the soil profile until it is saturated (if enough water is applied). Water will drain (*percolate*) from a saturated or very wet soil until it reaches field capacity. Water is removed from the soil through continued slow drainage, evaporation and plant uptake (*transpiration*) until the plant can no longer effectively extract the water (*permanent wilting point*). Though there is still some water held tightly to soil particles, it is effectively unavailable for plants to use. The water stored between field capacity and permanent wilting point is called plant available water.

Plant available water is that which can be retained in the soil between field capacity and the permanent wilting point. It is often expressed as a volumetric percentage or in inches of water per foot of soil depth. Approximate plant available water storage capacities by soil textures are illustrated below.

As a crop removes plant available water from the soil and the remaining water becomes increasingly difficult to extract, the crop may begin to undergo drought stress, negatively affecting crop growth and yield. The goal of irrigation is to replace this soil moisture before excessive drought stress can reduce yield.

Management Allowable Depletion (MAD) is a management concept that represents a fraction of soil water depletion that will trigger an irrigation application before significant drought stress occurs.

For many crops, 50% plant available water depletion (*50% MAD*) is recommended; for drought sensitive crops, the value will be less than 50% of the soil's plant available water holding capacity.

Root zone depth: Roots generally are developed early in the season, and will grow in moist (*not saturated or extremely dry*) soil. Soil compaction, caliche layers, perched water tables, and other impeding conditions limit the effective rooting depth. Many crops tend to extract most of their water requirement from the top one to two feet of soil, and almost all of their water from the top 3 feet of soil, if water is available. Some crops, such as alfalfa and sunflower, can effectively extract water at greater depths.

Methods used to measure soil water are classified as direct or indirect. The direct method refers to the gravimetric method in which a soil sample is collected, weighed, oven-dried and weighed again to determine the sample's water content. The gravimetric method is the standard against which the indirect methods are calibrated. Some commonly used indirect methods include electrical resistance, capacitance and tensiometry.

All soil moisture monitoring methods have advantages and limitations. They vary in cost, accuracy, ease of use, and applicability to local conditions. Most require calibration for accurate moisture measurement. Proficiency of use and interpreting information results from practice and experience under given field conditions.

Additional information about soil moisture sensors is included in the publication, "Irrigation Monitoring with Soil Water Sensors." View it online at **http://cotton.tamu.edu/Irrigation/SoilWaterSensors.pdf**

Crop water use estimates for major crops in the Texas High Plains are available online at **watermgmt.tamu.edu.**

This information and knowledge of available soil moisture can be used to estimate when irrigation

SEE CROP WATER PAGE FOUR

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CROP WATER USE VARIES BY SOIL

FROM PAGE THREE

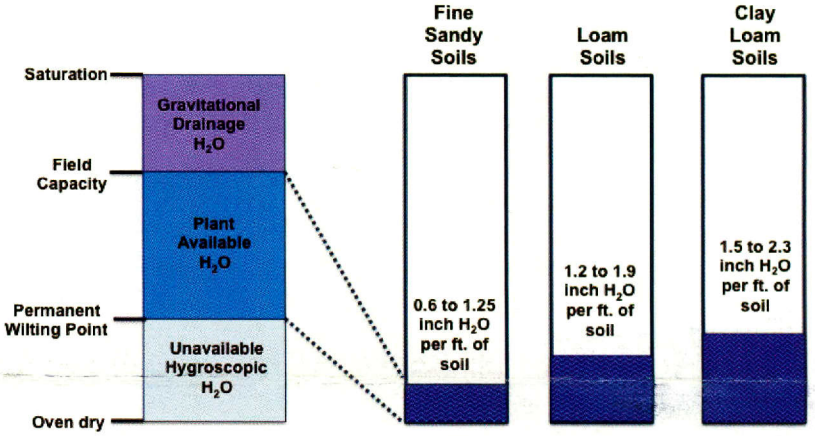
will be needed and how much water will be needed.

For instance, in the recent crop water use estimates at right, corn at the 6-leaf stage has been using approximately 0.25 inches of water per day for the last 7 days.

A Pullman clay loam soil at field capacity (*following recent rains)* has about 0.9 inches of water available to management allowable depletion, assuming a root depth of 1 ft. (early season). This would provide sufficient moisture for approximately 3 to 4 days (*0.9 inches water in soil divided by 0.25 inches water use per day equals 3.6 days*).

If the effective root zone is 2 ft. deep, stored soil water should be sufficient to support the crop for about one week (*1.9 inches water allowable depletion per 2 ft soil divided by 0.25 inches water use per day = 7.6 days*).

Bermudagrass is using approximately 0.19 inches of water per day. If the root zone depth is 1 ft., then there would be enough water to last 4 to 5 days without drought stress.



Soil Series	Available H2O (inches)			50% MAD (inches water)		
	1 ft. soil	2 ft. soil	3 ft. soil	1 ft. soil	2 ft. soil	3 ft. soil
Acuff	1.9	3.8	5.7	0.9	1.9	2.8
Amarillo	1.7	3.6	5.5	0.9	1.8	2.7
Brownfield	1.2	2.4	3.6	0.6	1.2	1.8
Olton	2.0	4.1	6.1	1.0	2.0	3.0
Pullman	1.9	3.8	5.7	0.9	1.9	2.8
Sherm	2.0	3.9	5.7	1.0	2.0	2.9

CORN		Short Season Var. Water Use				Long Season Var. Water Use				
Seed Date	Acc GDD	Growth Stage	Day	3day	7day	Seas. in.	Growth Stage	Day	3day	7day	Seas. in.
			-----in/d-----					-----in/d-----			
04/01	1188	12-leaf	.31	.24	.37	12.7	12-leaf	.31	.24	.37	12.7
04/15	1008	10-leaf	.30	.23	.32	9.0	10-leaf	.30	.23	.32	9.0
05/01	789	6-leaf	.22	.18	.25	5.5	6-leaf	.22	.18	.25	5.5
05/15	544	4-leaf	.18	.11	.15	2.6	4-leaf	.18	.11	.15	2.6

COTTON		Texas High Plains Area Water Use				South Plains Area Water Use				
Seed Date	Acc GDD	Growth Stage	Day	3day	7day	Seas. in.	Growth Stage	Day	3day	7day	Seas. in.
			-----in/d----					-----in/d----			
05/01	459	Emerged	.11	.09	.14	4.5	Emerged	.06	.05	.07	2.1
05/15	331	Emerged	.11	.09	.14	2.6	Emerged	.06	.05	.07	1.2
06/01	155	Emerged	.11	.09	.10	0.9	Emerged	.06	.05	.04	0.3

Fescue/Bluegrass lawn water use 0.26 inch
Bermuda grass lawn water use 0.19 inch