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# water spouts

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## Upcoming 2018 NDSU Field Day and Tour

Oakes Irrigation Research Site    Aug 14    701-742-2744

## Overspray From Irrigation Systems Not Allowed on Roads

In 1989, the North Dakota Legislature passed a law concerning irrigation systems and roads. Section 61-14-16 of the North Dakota Century Code states:

*“No person may place, erect, or operate a sprinkler irrigation system, center pivot irrigation system, or other irrigation works or equipment upon or across any highway, street, or road or in such a manner as to willfully allow water from the irrigation works or equipment to flow or fall upon any highway, street, or road.”*

A person violating this section is guilty of an infraction. If you notice that the roads near your pivot are wet after irrigation, check the end gun on/off settings.

In the past, wet roads or a motorist driving into the water stream from an end gun have caused accidents.

This law does not apply to the transportation of irrigation works or equipment upon a highway, street or road. This means a moving irrigation system can be run across a road as long as it isn't spraying water.

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## Soil Water Deficit is Highly Variable Across North Dakota

Plants need water to grow. This water is extracted from the soil by the roots of the plants.

However, the amount of water held in the soil for plant use depends on the soil texture. For example, a sandy loam does not hold as much plant-available water as a silty clay loam soil. Water gets into the soil via precipitation or irrigation.

When crop water use exceeds the amount of water received on a field, it depletes the soil water reservoir. This creates a soil water deficit. If the deficit in the root zone exceeds a certain level, crop growth can be affected.

One way to look at the status of crop development across the state and the need for irrigation is to look at the estimated soil water deficit. I define soil water deficit as the difference between the total crop water use and precipitation received during a period of time.

Of course, this definition assumes that all the precipitation received on a field infiltrates into the soil, which is often not the case. However, even with this limitation, it provides an estimate of the water status of crops.

Crop water deficit maps are available on the North Dakota Agricultural Weather Network (NDAWN) website: <http://ndawn.ndsu.nodak.edu/>. They are under the “Applications” menu for crop water use maps.

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Corn Crop Water Deficit (inch) (2018-05-10 – 2018-07-16)

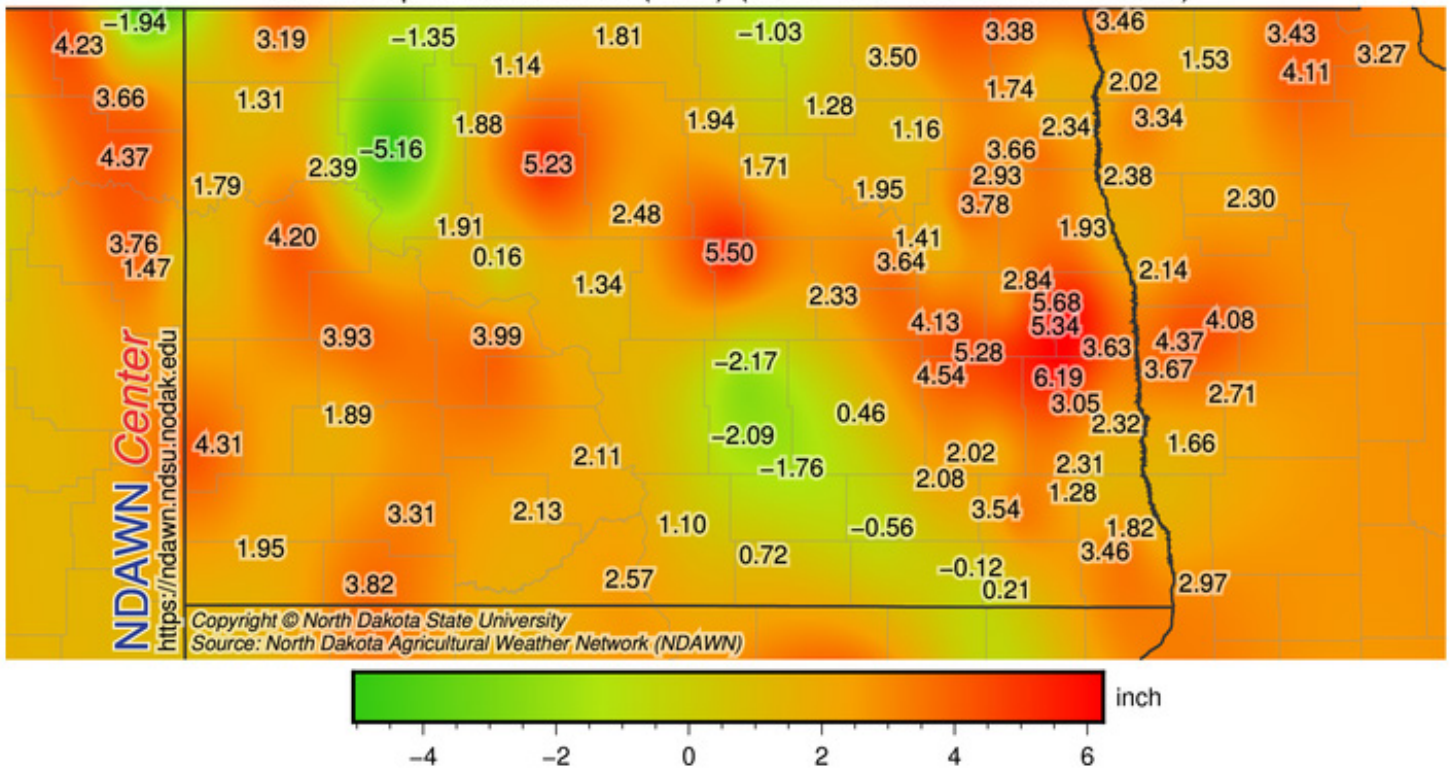


Figure 1. Map generated by the North Dakota Agricultural Weather Network (NDAWN) website showing the corn water deficit across the state. Positive numbers indicate that the corn has used more water than provided by precipitation from May 20 to July 16. Negative numbers indicate that precipitation amounts have exceeded corn water use for the same time period.

A water deficit map for corn is shown in Figure 1. Because corn planting dates were about normal this year, I selected an emergence date of May 10; thus, the map shows the soil water deficit for corn from May 10 to July 16.

Positive numbers mean the corn water use has exceeded the precipitation amount received at each NDAWN station. Negative numbers indicate precipitation has exceeded corn water use. As you can see, the soil water deficit varies greatly across the state, with a high that exceeds 6 inches north of Fargo to a negative 5 inches in the Minot area.

This map only shows the rain received at the NDAWN weather station locations; therefore, local areas may have deficits that are more or less than shown.

Generally, any location where the deficit is 3 inches or less for corn means that sufficient precipitation has been received up to this point in the growing season. However, this may not be true for a water-sensitive crop such as potatoes.

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## Watch Your Soil Water – It Can Change Very Quickly

When describing the growing season so far, rain appears to have been plentiful across much of the state. However, corn is tasselling and soybeans are blooming, which means we have entered the part of the growing season with the highest daily crop water use.

We are about 300 corn heat units above normal; thus, daily crop water use easily can exceed a quarter of an inch, resulting in rapidly depleted soil water reserves.

### Check Soil Water

Crops are growing quickly and using an increasing amount of water each day. When managing water applications with a center pivot, getting behind is very easy if you don't watch your soil water levels. We are entering the critical irrigation period, and the only way to be certain of the amount of available soil water is to check several locations in every field.

The easiest and most convenient way to check soil water in multiple field locations is with a soil probe. The soil probe should be at least 3 feet long to obtain a soil sample down to the 2- to 3-foot depth.

A typical soil probe is made of stainless steel and removes a soil core about  $\frac{3}{4}$  inch in diameter. A one-piece, 3-foot soil probe sells for about \$100 to \$150. Some fertilizer plants carry 2-foot soil probes to sell to their customers.

Low amounts of soil water, especially in the subsoil, can affect the growth and development of deep-rooted crops such as corn, sugar beets, sunflowers and alfalfa. By using the "feel method," you can estimate the soil water level with reasonable accuracy.

The feel method involves obtaining a soil sample at some depth, forming a ball in your hand and squeezing. The response of coarse-textured soils to squeezing at field capacity will leave no free water on the soil ball, but a wet outline of the soil ball will be left on the hand. If the ball of soil breaks easily, then the soil is less than field capacity.

Managing subsoil water always is difficult because it involves determining if enough rain has been received to recharge the soil profile before the high-water-use period begins. Recharging the root zone with irrigation is easy when the crop is young because it is not using much water. Most of the applied water will infiltrate into the soil.

This may not be true later in the season, when the crop is taller, more mature and using a greater amount of water. Therefore checking soil water during the next six weeks in each field at least weekly is important. For irrigators with low-flow capacity irrigation systems, starting the pivot early may be wise.

### **Scheduling Irrigation**

With variable rainfall events, determining when to irrigate and how much water to apply can be difficult. A system for scheduling irrigation events must be followed.

Scheduling using the "checkbook" method requires the irrigator to measure rainfall amounts, record irrigation amounts and obtain an estimate of daily crop water use. Using these data, a soil water balance sheet can be developed to determine the daily soil water deficit.

This method is called the checkbook method because it is very similar to how you balance your bank checkbook. If you think of rain and irrigation amounts as deposits and crop water use as withdrawals from the "soil water bank," then you have the idea.

The procedure is outlined in the NDSU Extension publication "Irrigation Scheduling by the Checkbook Method" (AE792). An Excel spreadsheet version has been developed that can be used in North Dakota and Minnesota. Information on both can be found at [www.ag.ndsu.edu/irrigation/irrigation-scheduling](http://www.ag.ndsu.edu/irrigation/irrigation-scheduling).

The most difficult part of scheduling irrigation is obtaining the daily crop water use values. Fortunately, you have two relatively easy ways to obtain these numbers. AE792 contains tables that provide estimates of the daily crop water use for the most commonly irrigated crops in North Dakota. All you need is a record of the daily maximum temperature and the number of weeks past emergence.

More accurate estimates of daily crop water can be obtained from the NDAWN website by looking under "Applications." You can obtain daily crop water use in numerical tables or maps for alfalfa, turf grass, corn, pinto beans, wheat, barley, potatoes, sugar beets, sunflowers and soybeans.

The crop water use estimates from the website are more accurate than the values in the crop water use tables in AE792 because local daily weather is used to calculate the crop water use. You can select crop water use tables for any of the NDAWN weather stations and a particular crop or you can view a map of North Dakota with crop water use values superimposed at the location of each weather station.

A site-specific irrigation-scheduling program also is available in the "Applications" section of the NDAWN website. This is the most accurate irrigation scheduling method because it uses the soil properties for your specific field and weather data from the nearest NDAWN station. A users manual for this program can be found at [www.ag.ndsu.edu/irrigation/irrigation-scheduling](http://www.ag.ndsu.edu/irrigation/irrigation-scheduling).

Knowing crop water use, using an irrigation scheduling method and monitoring soil water on a regular basis will help you optimize your irrigation water management and provide the best yield possible.

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## **North Dakota Water Education Foundation – Summer Water Tours**

Clean water is important for the development of North Dakota, and the best way to learn  
about water projects is to see them in person via a tour.

These tours provide a firsthand look at North Dakota's critical water issues.

Registration is \$20 per person and includes tour transportation, meals, refreshments,  
informational materials and a one-year subscription to North Dakota Water magazine.

### **Tours offered are:**

- Fargo-Moorhead Flood and Water Management Tour – Aug. 1
- Missouri River Development Tour – Aug. 17

For more information about each tour and to register, go to [www.ndwater.com/programs](http://www.ndwater.com/programs) and click  
on "Summer Water Tours" on the left-hand menu or send a check to NDWEF, PO Box 2254,  
Bismarck, ND 58502. Please indicate which tour or tours you want to attend and include the  
number of people who will attend. For more information, give us a call or send an email.

**North Dakota Water Education Foundation, 701-223-8332**

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