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# water spouts

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## Retention Pond Development in the Upper Sheyenne Basin

Investigations have been under way during the past year by the Upper Sheyenne River Water Resource Board and North Dakota Irrigation Association to determine the feasibility of constructing water retention structures to create ponds on tributaries to the Sheyenne River. These ponds would serve the dual purpose of reducing flows into the Sheyenne River and providing water for irrigation development in the basin.

Considerable land in the basin in the New Rockford, Warwick, McVile and other areas is suitable for irrigation. Two sites have been identified on tributaries to the Sheyenne River in northeastern Eddy County on which ponds could be created for irrigation water supply. One of these sites would supply water for an existing irrigation system and has been approved by the Natural Resources Conservation Service (NRCS); the other site, if approved, would store and supply water for new irrigation development.

These water retention projects will compete for financial assistance within the NRCS Agricultural Water Enhancement Project (AWEP) sponsored by the Red River Valley Basin Commission.

People interested in developing or enhancing irrigation by use of retention ponds or other means in the Upper Sheyenne Basin are encouraged to contact me or the local NRCS office. Applications may be submitted at any time for most applicable programs, although deadlines are established for evaluation purposes. Submittal of an application is not binding on the producer until it is finalized and signed.

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## Summer Water Tours – North Dakota Water Education Foundation

These tours provide a firsthand look at North Dakota's critical water issues. Registration is \$15 per person and includes tour transportation, meals, refreshments, informational materials and a one-year subscription to North Dakota Water magazine. Tours organized by the North Dakota Water Education Foundation in the coming month:

### We Got the Beets Tour! – Aug. 24

This tour will begin and end in Bismarck. North Dakota is on the cutting edge of biological energy with a project that could bring major development to its small communities, more energy independence to the state and another high-value crop for farmers. Growing sugar (energy) beets for ethanol production has been done successfully in Europe, and field trials across North Dakota have shown the crop can be grown successfully, even under dryland production. The tour will visit a biomass testing laboratory, an ethanol plant and an energy beet demonstration plot, and participants will learn about the newest irrigation project utilizing the water from the McClusky canal.

### Devils Lake Solutions, East-end Flood Control Infrastructure – Sept. 13

This tour begins and ends in Devils Lake. The state's outlet was completed in 2005, and in the summer of 2010, the capacity was increased to 250 cubic feet per second (cfs). In addition to this outlet, the state is preparing to move forward on an east-end outlet option that would take water from the East Devils Lake near the Jerusalem Channel, as well as a flood control structure on Tolna Coulee. This is the second tour in the Devils Lake area this year. This tour focuses on the critical flood control infrastructure components as the lake reaches potentially disastrous high water levels.

To register online, go to [www.ndwater.com](http://www.ndwater.com) or send a check to NDWEF, P.O. Box 2254, Bismarck, ND 58502. Please indicate which tour you want to attend and include the number of people. For more information on the tours, give us a call or send an email.

**North Dakota Water Education Foundation**,  
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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 am defining 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. They are under the “Applications” menu for crop water use maps. A crop water deficit map for corn is shown in Figure 1, which shows the soil water deficit for corn from an emergence date of May 13 to Aug. 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 of 9.24 inches in Sidney, Mont., and a low of minus 2.12 at Bismarck. Generally, any location where the deficit is 3 inches or less for corn means that sufficient precipitation has been received and irrigation has not been required. However, this may not be true for a water-sensitive crop such as potatoes.

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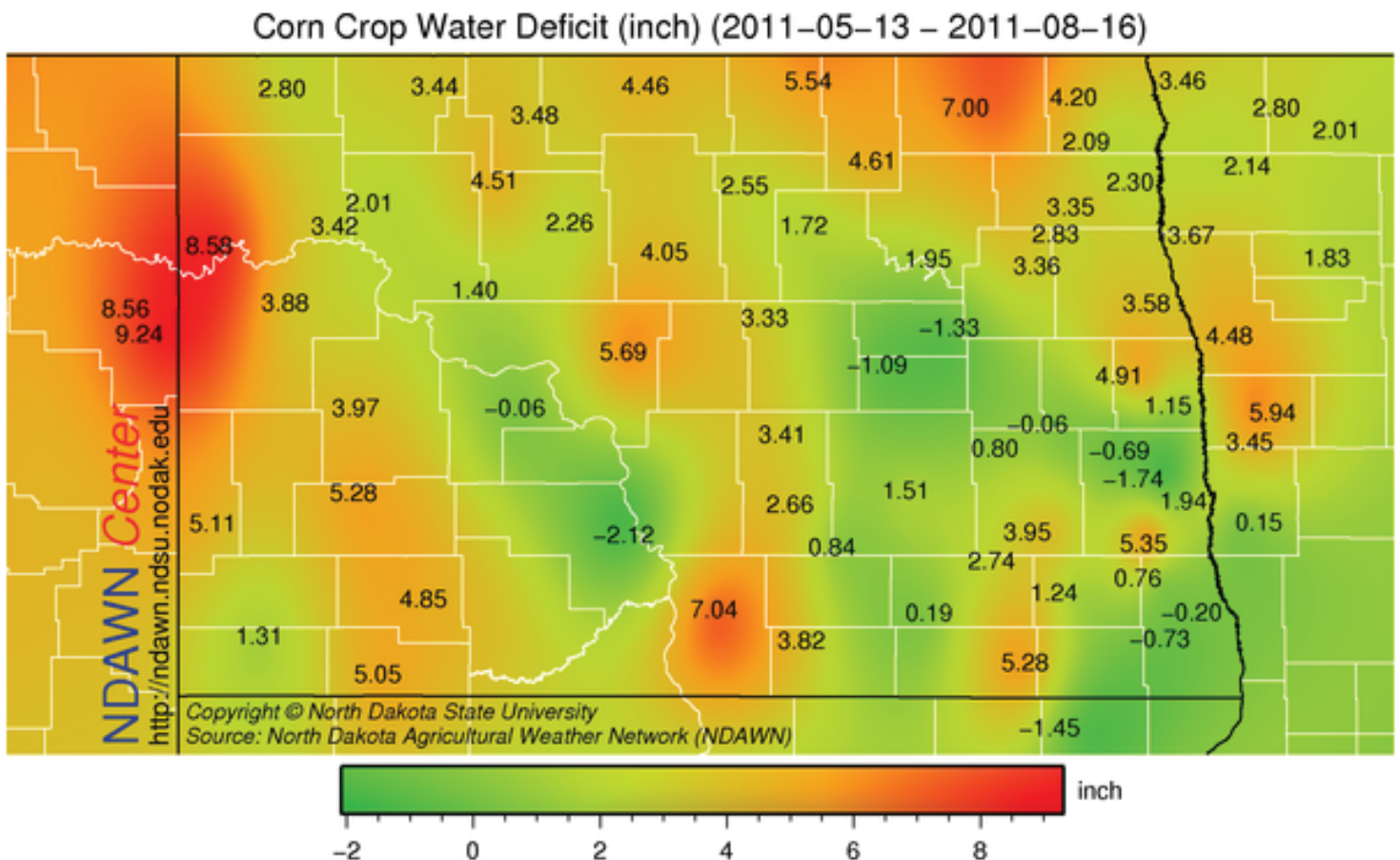


Figure 1. Map generated by the North Dakota Agricultural Weather Network (NDAWN) website showing the corn water deficit across the state.

## Irrigation Plus Rain = Deep Wheel Tracks Under Center Pivots

This growing season is all about excess rain in many parts of the state. However, with the hot weather, irrigation systems have been running. Unfortunately, quite often after irrigating, we have seen intense rain events that may contribute to deeper wheel tracks under center pivots in low areas of the field.

Every irrigator with a center pivot knows that the wheel tracks under some towers can turn into deep ruts in parts of their fields. Variations in soil texture and slope cause ruts to vary in depth across a field. Finding wheel tracks up to 6 inches deep is common, even on very sandy soil, but when the wheel track is 12 inches or deeper, that is a time for concern.

Deep wheel tracks are caused by saturated conditions that reduce the weight-bearing capacity of soil. The deepest wheel tracks usually are found where water collects in low spots or under the first and second towers from the pivot point. Deep wheel tracks can cause drive wheels on towers to get stuck and trip the safety circuit on a center pivot. They also interfere with tillage and harvest operations.

Major factors that affect the depth of pivot wheel tracks are:

- Soil type – Usually locations in the field with heavier soils (clay, clay loams) have deeper tracks because they remain wet longer due to higher water holding capacity and slower drainage. Deep wheel tracks commonly form in the low spots where water accumulates. Often the wheel track acts as a drainage canal where rain and irrigation water run down the wheel track to the low spot.
- Number of revolutions the pivot makes in the tracks before tillage levels them
- Weight supported by each tower – Short spans between towers (130 to 170 feet) have less weight than long spans (180 to 200 feet).
- Amount of wheel contact area with the soil surface

Control of wheel track ruts is very simple: Control the water that is applied near the tower or can flow into a track. You can reduce deep wheel track problems using management or mechanical solutions. Some of the management methods you might use are:

- Schedule irrigation water applications to avoid unnecessary pivot revolutions.
- Allow the soil surface to dry between irrigation events, especially the soil in the wheel tracks. Sometimes this option is not feasible after a full crop canopy develops and shades the wheel tracks.

- On sloping areas where deep wheel tracks form every year, use surface or subsurface drainage to move the water out of the wheel track.
- Keep tire inflation pressures at the manufacturer's recommended level. This will maintain the proper amount of tire contact area.
- If you have deep wheel tracks in a perennial crop such as alfalfa, consider cutting and harvesting within the circles. If you have deep wheel tracks in only the low areas of your field, consider filling the bottom of the wheel tracks with crushed rock (1 to 3 inches in diameter). This will provide more load support for the towers.
- During the season, observe the pivot while it operates. If excessive ponding occurs where the deep wheel tracks are formed, you have to reduce the amount of water applied to that location.

Here are some of the mechanical changes you can make to help your pivot system reduce deep wheel tracks:

- Build a road for the tower wheels. Run the system to mark the wheel track location, then use a plow, disc plow or blade to build a ridge where the track is located. Be sure to pull soil from both sides of the track.
- Manufacturers of pivot systems offer a wide range of tire sizes designed to minimize deep wheel tracks. However, if you go to larger tires, you may have to increase the size and strength of the drive mechanism.
- Put directional sprinklers on either side of a tower. This directs water away from the wheel track. Some growers are using extra-long drop tubes on the two sprinkler locations on either side of a tower. The drop tube drags a weighted, directional sprinkler head that sprays water behind the wheels, thus keeping the wheel track dry.
- Attach track-closing disks to each tower. A disk on each side of the track pushes soil into the track as the tower moves through the field. A problem with using this option is the pivot can be moved only in one direction.
- The sprinklers near the tower can be located on "boom backs." The boom back allows the sprinkler to apply water to the soil behind the wheel so the track is dry when the tower passes. As in the previous suggestion, the pivot can be moved only in one direction.

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## **Spraying on the Road is Against the Law**

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, the end gun on/off settings need adjusting. In the past, wet roads or a motorist driving into water from the 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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