water spouts

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Upcoming NDSU Field Day

Potato Field Day NPPGA – Larimore, Inkster, Hoople	Aug. 26	(218) 773-3633

Potato Field Day Aug. 26

The potato field day this year is a full day consisting of three events on Thursday, Aug. 26, 2010.

The first event will start with a 7 a.m. pancake breakfast at the Carl Hoverson farm near Larimore followed by a field tour of irrigated potatoes starting at 8:15 a.m. The farm is on the south side of the intersection of U.S. Highway 2 and North Dakota Highway 18 (about 25 miles west of Grand Forks).

The second event will start with a noon lunch at the Forest River Colony followed by a field tour of irrigated potato plots at 1:30 p.m. To get to the colony from the Hoverson farm, go north on North Dakota Highway 18 about 14 miles, then turn west on County Road 1 (33rd Avenue Northeast), go through Inkster and turn north on 41st Street.

The third event is a twilight tour that starts with research presentations at 5 p.m. on the Oberg farm near Hoople followed by a barbecue at 6 p.m. The Oberg farm is on the east side of North Dakota Highway 18 one mile south of Hoople.

Summer Water Tours – North Dakota Water Education Foundation

This summer, the North Dakota Water Education Foundation (NDWEF) has organized several water tours. 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. The August tours are:

Sites of the Southwest – Aug. 12

This tour will begin and end in Dickinson. The Southwest Pipeline Project began in 1983 and provides clean, safe water to communities and farms throughout southwestern North Dakota. Tour participants will visit the Southwest Water Authority headquarters, along with the operations and maintenance center for a telemetry demonstration. The tour then proceeds to Richardton to visit the Red Trail Energy ethanol plant and Assumption Abbey. The final stop will be near Dodge to see a newly constructed water depot project.

Northwest Oil Impact Tour – Aug. 17

This tour will begin and end in Watford City. Oil development in northwestern North Dakota is having a significant impact on fresh-water sources in the area. This tour will show some of the infrastructure impacts that come with oil development and the oil-impacted areas of Williams and McKenzie counties. Tour participants will go on-site for a drilling rig tour and see a presentation on the process of hydraulic fracturing near an ongoing well fracture. Learn how water supply projects are working together with the oil industry to meet critical water needs. The tour then will visit Lake Sakakawea to learn how lake levels impact area businesses, irrigation, water use and management.

To register, 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 e-mail.

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NDSU Extension Service
North Dakota State University

This Year, Irrigation Requirements Vary Greatly

Unlike the previous two growing seasons, this year, daily air temperatures have been normal or above in most areas of North Dakota. In addition, most parts of the state have received consistent and significant rain amounts through the middle of July. The long-season crops such as corn, soybeans, dry beans and potatoes are all in the growth stage, where they are setting fruit. This is the most critical water use period for these crops and when every inch of irrigation can make a huge difference in yield.

One way to evaluate irrigation needs across the state is to view a crop water use deficit map obtained from the North Dakota Agricultural Weather Network (NDAWN – *http://ndawn.ndsu.nodak.edu/*). Irrigated corn accounts for about 40 percent of the irrigated cropland in North Dakota, and by viewing a corn crop water deficit map as shown in Figure 1, you can quickly pick out the areas of the state where irrigation is needed. In looking at Figure 1, remember a positive deficit means the corn crop water use exceeds the rain amounts received at each NDAWN weather station.

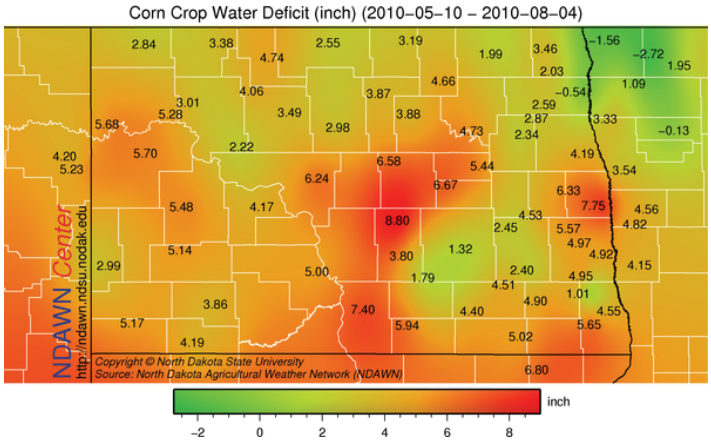

Figure 1. Corn crop water deficit map from NDAWN for May 10 to Aug. 4, 2010. A corn emergence date of May 10 was selected. A positive deficit indicates corn water use exceeds rain amounts received at each NDAWN weather station site.

Except for the central part of the state east of Bismarck, the corn water deficit is rather low for August. However, this may not be true on your fields. With frequent rain events, you easily can be fooled into thinking your crop has sufficient soil moisture. When managing water applications with a center pivot, getting behind in water applications can be costly. Crops are growing quickly and using between 0.25 and 0.3 inch of water each day.

Check the Soil Moisture in Your Field

Checking the soil moisture level in your field is the only way to know when irrigation is needed. By using the "feel method," you can estimate the soil moisture level with reasonable accuracy. The feel method involves taking a soil sample, 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 your hand. If the ball of soil breaks easily, then the soil is at less than field capacity.

At this time of year, subsoil moisture can have a large influence on crop development; thus, checking the soil moisture down to the 3-foot depth is important. Center pivots with less than 6 gallons per minute of flow capacity per irrigated acre (about 800 gallons per minute for a quarter-section machine) may not be able to keep up with crop water demand during August. Starting to irrigate early may be wise for irrigators with low-flow capacity irrigation systems.

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The Oakes Aquifer

The Oakes aquifer underlies about 110 square miles in southeastern Dickey and southwestern Sargent counties. The aquifer material ranges from silts, clays and deltaic sands deposited in Lake Dakota to coarse sands and gravels deposited by meltwater channels. Saturated thickness can exceed 150 feet in some areas of the aquifer, although a large part of the development uses multiwell systems due to much thinner saturated thickness.

A total of 13,612 acres are permitted for irrigation from the Oakes aquifer. Of this, 1,670 acres lie within the Oakes test area (OTA). Approximately 1,000 acres of the land in the

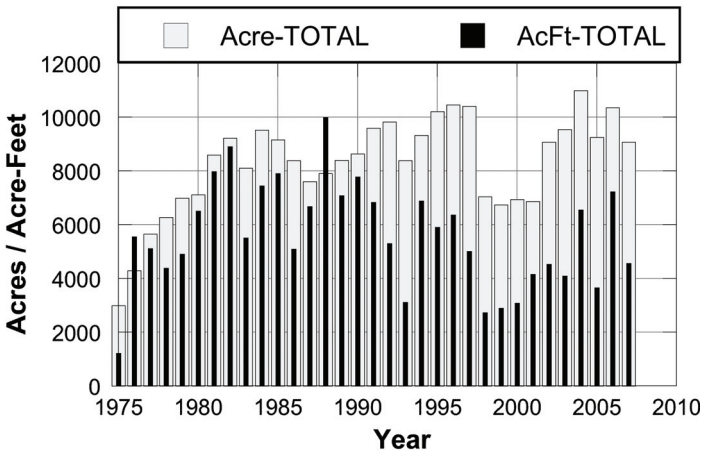

Figure 1. Annual water use and acres irrigated from the Oakes aquifer 1975-2007.

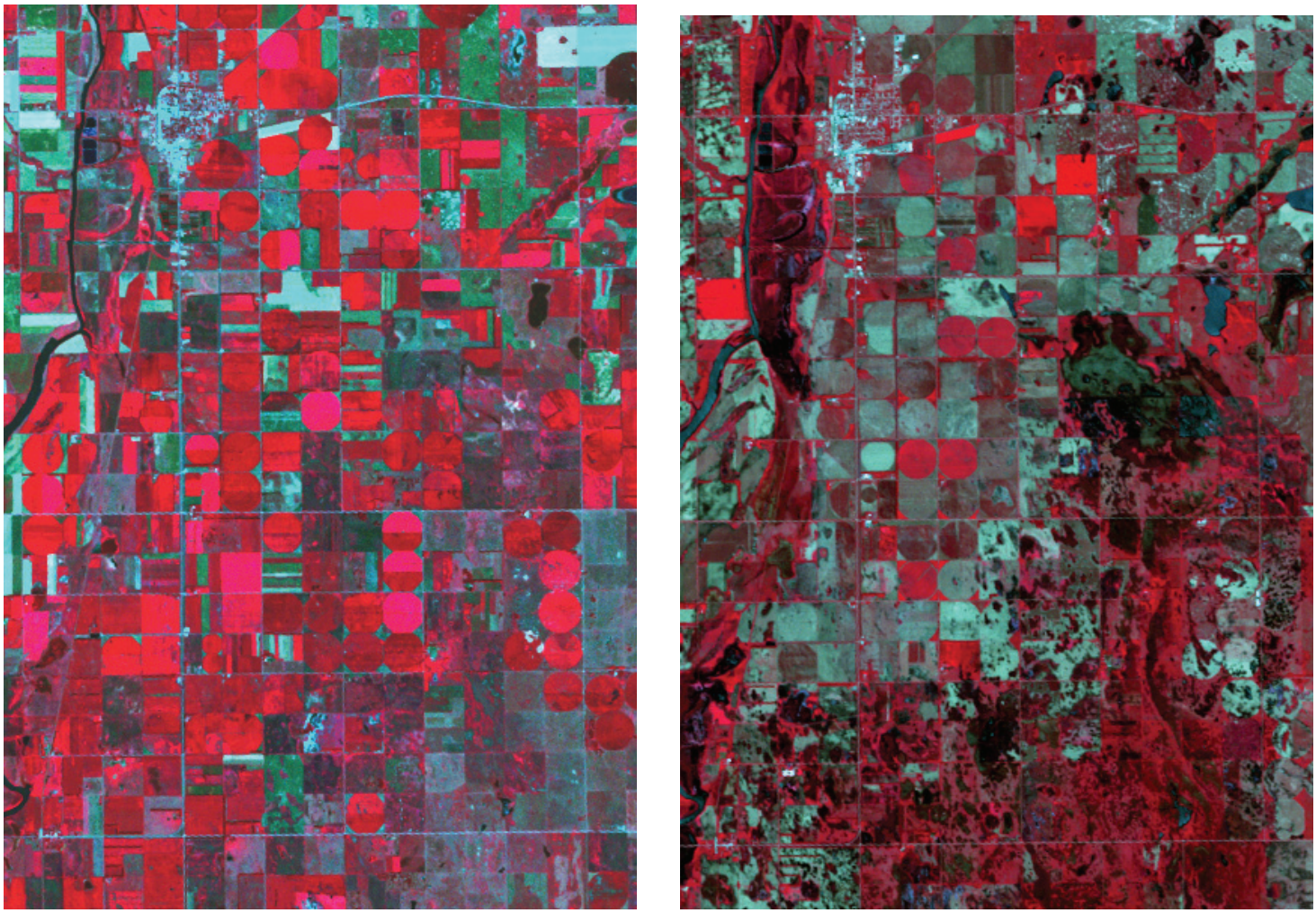

Figure 2. a) Aug. 8, 1992, and b) June 16, 2010, LANDSAT image (bands 4, 3 and 2) (CIR) of central part of the Oakes aquifer. Black is water. Red is healthy vegetation.

test area is supplied with OTA water. Permit applications are pending for the irrigation of an additional 3,444 acres. Junior to this, the Dickey-Sargent Irrigation District has an application pending to irrigate 5,000 acres in the OTA.

A groundwater flow model has been developed to evaluate pending water permit applications. The project is nearing completion, with some analysis and report preparation remaining.

Although 13,612 acres are approved for irrigation, the actual irrigated area has not exceeded 11,000 acres (Figure 1). Since the wet period that began in this area in 1993, many pivots to the east and south of the OTA have not been used in many years. Often high water tables have precluded planting. The effect of the high water table is illustrated in the right image in Figure 2.

Center pivots near Oakes in the upper left part of the photo and to the south of Oakes on land overlying the OTA are clearly visible. Within the OTA, drains installed by the U.S. Bureau of Reclamation in the mid-1980s control the water level. The area to the east and south of the test area is largely flooded (the black areas). Center pivots operating in 1992 can be seen in the right image in Figure 2 in areas that are flooded.

The changes that are observed in the 1992 and 2010 LANDSAT images are in the water level in the Oakes aquifer (Figure 3, next page). Water levels at observation well 130-059-24DDD2 were 4 feet lower during the 1980s through early 1990s than from the mid-1990s to the present. In this area, that is the difference between land highly suited to irrigation and land that cannot be planted in some years or has significant yield reduction in others due to the high water table.

Water management in aquifers such as the Oakes, with limited available drawdown across much of the area, presents some complex management issues. During dry periods, plenty of land is available to irrigate, but large appropriations put senior appropriators at risk because recharge rates are low and water use is high per acre.

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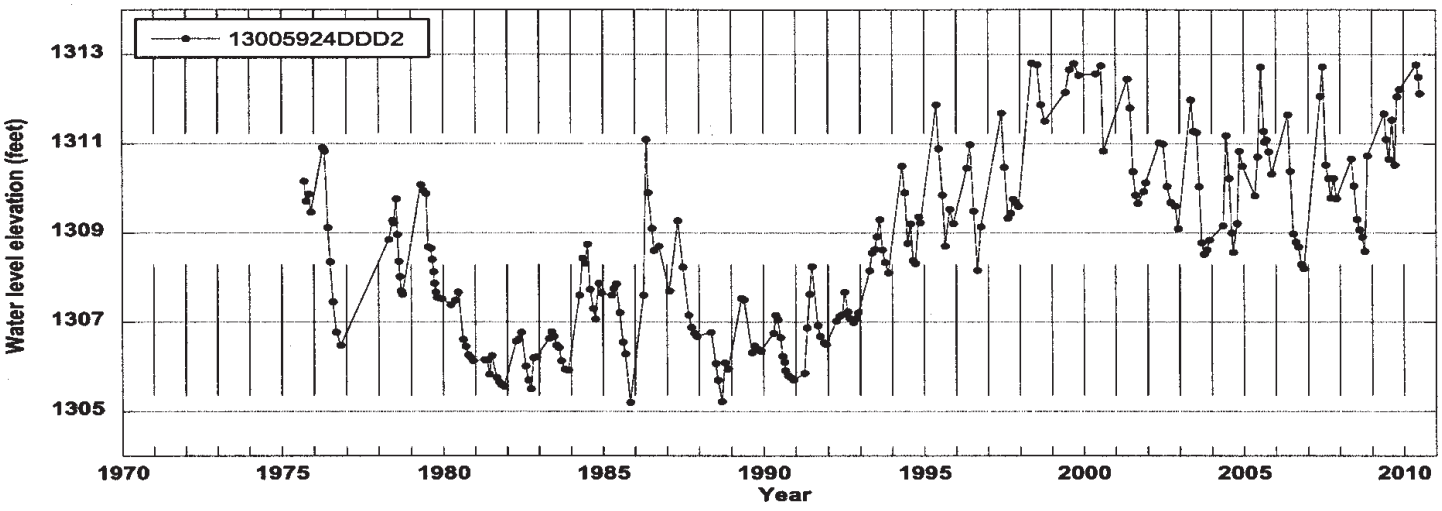

Figure 3. Hydrograph of water levels at NDSWC observation well 130-059-24DDD2 east of the test area.

Wet periods result in excessive ponding, which results in loss of crop yields in some areas and cropland in others. During wet periods, recharge rates are high and water use per acre is low, allowing more acres to be irrigated in wet periods.

Would increasing the total appropriation from an aquifer decrease the high water table problems? Would that benefit offset the larger reduction in irrigated acres during periods of drought that may be required with a larger total appropriation?

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