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water spouts

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Upcoming 2022 Events

- Dec. 5-9 Irrigation Association Exposition and Education, Las Vegas, Nevada
- Dec. 6-9 North Dakota Water Users Convention
- Dec. 8 Bismarck Irrigation Workshop

2022 National Irrigation Association: Exposition and Education Week

The Irrigation Association will be hosting their annual exposition during the week of Dec. 5 to 9 with the trade show on Dec. 7-8 in the Las Vegas Convention Center. In addition to the irrigation exposition with over 500 exhibitors from around the world, there are five days of seminars, technical programs and education classes. For more information go to www.irrigation.org/2022show/.

Irrigation Workshop to be Held in Bismarck

The weather this year has presented many challenges. A cold, wet late spring made planting on time a problem, but when it did warm up, it really spurred crop growth. However, we had good rain amounts across the entire state so that by July most of the state was not in drought, yet there were some areas of the state where irrigation was needed. The drought returned in the fall but really helped the harvest. All in all, it turned out to be a good growing season.

The workshop on Thursday, Dec. 8, is in the Grand Pacific Room at the Bismarck Hotel and Conference Center in Bismarck. It will be held in conjunction with the North Dakota Water Users Association convention. NDSU Extension and the North Dakota Irrigation Association sponsor the workshop. An irrigation exposition for suppliers to display their products and services will be held at the same time. The registration fee of \$50 for the irrigation workshop (payable at the door) includes lunch. Registration begins at 7:30 a.m.

Economic opportunities associated with irrigation will be the theme of the workshop. The competition for water is increasing every year and access to good quality water for expanding irrigated acres will become more difficult in the future. However, with a reliable water source, investing in irrigation is a great hedge against drought periods during the growing season.

The first two presentations in the morning session will be held jointly with the Water Users. The first will be a panel discussion on economic opportunities for agriculture and the second will be a primer on western water law. After the morning break, workshop participants will go to the Grand Pacific room to hear an update of work at the Oakes irrigation research site, including some research on drought-resistant corn followed by a presentation on the State Revolving Fund (SRF) funding for irrigation districts.

The North Dakota Irrigation Association will hold its annual meeting in the same room from noon to 1:00 p.m.

The afternoon session will include presentations on the NRCS variable rate irrigation project, managing resistant weeds, automated drip irrigation for specialty crops (watermelon, cantaloupe and squash), updated irrigated crop budgets, an update on project pumping power and a primer on irrigation districts.

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This could be the last Issue of Water Spouts

I plan to retire from NDSU this winter and have no idea if someone else will assume the mantle of editor and collector of irrigation news.

The first issue of Water Spouts was published in May of 1973 and the compiler/editor was Sidney Black. It was developed by the NDSU Irrigation Task Force in anticipation of the irrigation development associated with the Garrison Diversion Project. The Garrison Diversion project had been reformulated in 1968 and it included the provision for 250,000 acres of irrigation development.

From 1975 to 1990, Darnell Lundstrom was the compiler/editor of Water Spouts. Then Jim Weigel assumed the job for 1991, and I became the compiler/editor in 1992. Next year would have been the 50th year of publishing Water Spouts, and I don't think there are any other irrigation newsletters in surrounding states or Canadian provinces that have been in continuous publication over that time period.

Coincidentally, in the early 1970s an inter-agency irrigation task force was organized primarily to exchange information about irrigation issues. A major accomplishment of this task force was to establish soil/water compatibility recommendations that each agency could agree with so that the end users of that information (irrigators) received the same soil/water compatibility information no matter what agency they were communicating with. The Natural Resources Conservation Service (NRCS) was given the charge to maintain and update the soil/water compatibility document. The current updated document is available from NDSU Extension as AE1637 Compatibility of North Dakota Soils for Irrigation (www.ndsu.edu/agriculture/ag-hub/publications/compatibility-north-dakota-soils-irrigation). This information was the basis for the irrigation soil compatibility layer on the North Dakota Department of Water Resources Mapservice website (<https://mapservice.dwr.nd.gov>).

Looking back through the files I inherited, it is interesting to note that in the 1974 irrigation survey, it was estimated that there was over 74,000 acres of irrigation in North Dakota. By 1985, there were about 197,000 acres of irrigation, but by 1988, with the advent of the Conservation Reserve Program (CRP), the irrigated acres had dropped to about 181,000. Today there are over 300,000 irrigated acres. That means that, since 1973, the state has gained almost 250,000 acres of irrigation through privately financed development by farmers. Recently, the state has gained irrigated land along the McClusky canal due to private initiative and help from personnel at the Garrison Diversion Conservancy District (GDGD). For the last 20 years, about 2,000 to 3,000 acres of new irrigation have been developed every year.

Over the last 50 years, irrigation technology has changed significantly. In 1973, there were a variety of water application methods with the majority of the acres irrigated with surface systems such as siphon tubes and gated pipe and sprinkler systems that include tow-lines, big guns,

center pivots and hand-move systems. Except for the center pivot, most of these systems were labor intensive. Today, over 90% of the irrigated land has center pivots with a great many being controlled and managed with smart phones. In 1973, most center pivots required around 80 to 90 psi at the pivot point. Today, most center pivots are low pressure with operating pressures of 35 to 45 psi at the pivot point.

What does the future hold? The state soil survey shows that there are about 6 million acres of irrigable land and about 16 million acres of conditionally irrigable land, but most of these acres are located in areas without suitable water (quantity or quality problems). Most aquifers with irrigation quality water are becoming fully allocated, which is limiting irrigation development in some areas, but with access to Missouri River water, a study done by the North Dakota Irrigation Association in 2013 shows that an additional 300,000 to 400,000 acres of irrigation could be developed. As value-added processing of crops in North Dakota becomes more common, irrigation will become necessary to provide a consistent source for these plants, especially during times of drought. In addition, irrigation will provide a consistent source of forage and feed products to support value-added animal operations.

It has been my pleasure to provide Water Spouts to irrigators, the public and government agency personnel. Issues have been sent to seven states and three Canadian provinces for many years. I hope you have found it useful.

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Park Your Center Pivot in the Right Direction

When it comes to wind and sleet, the center pivot is a rather fragile machine. Center pivots that have no nearby protection such as windbreaks should be parked for the winter pointing to the **northwest or southeast**, not to the northeast or southwest.

From October to April the worst storms and highest winds come from the northwest, so properly parking a pivot will present the smallest surface area to the wind. Exceptions to the parking direction are center pivots that border windbreaks. In this case, the pivot should be parked next to the windbreak.

While you are parking your pivot for the winter, do the following checks, they could save you some work in the spring.

- Inspect the sprinklers. Either note the location or repair any damaged sprinklers or those not working properly.
- Check all gearboxes for moisture accumulation. Make sure each contains the proper amount and type of grease. Drain off any moisture present. If excessive moisture is evident, drain and replace the grease. Water mixed with the grease will decrease its lubrication ability and not provide the needed protection.
- Lubricate all fittings.

- Check the water drain valve at each span of a center pivot system.
- Remove and clean the system end cap. Here is where sand scale and other debris collects during the summer. Remove the sand trap, flush the system, and replace the trap. Drain all water-carrying lines. Drain the booster pump case.
- Inflate tires to recommended pressure.
- If livestock will be in the field with the pump and pivot, they should be fenced to keep the livestock away.

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Considerations for Reconditioning Too-dry Soybeans and Other Grain

Producers may want to recondition soybeans that were harvested at lower moisture contents to bring the moisture content up to the market standard of 13%. On a 40-bushel-per-acre yield, harvesting soybeans at 9% moisture content, rather than 13%, is equal to 1.8 bushels of lost weight per acre. At \$12 per bushel, that is \$21.60 per acre.

Just as grain is dried with bin fans, soybeans can be reconditioned by operating fans during periods with the desired air temperature and relative humidity. Reconditioning requires high airflow rates for several weeks using air with an average relative humidity of about 70% to recondition soybeans to 13% during normal fall temperatures of 30 to 60 F. Be aware that the air will be heated 3 to 5 degrees as it goes through the fan, which reduces the air relative humidity slightly.

A reconditioning zone develops and moves slowly through the bin in the direction of the airflow, which is similar to a drying zone in natural-air drying. Reconditioning occurs the fastest when the airflow rate, cubic feet of airflow per minute per bushel (cfm/bu), is high and the air is warm and humid. It will be the most successful in a drying bin with a fully perforated floor and a fan that can deliver at least 0.75 cfm/bu. Even with this airflow, moving a reconditioning front all the way through the bin would probably take at least a month of fan operation.

Producers need to compare the cost of fan operation with the benefit of marketing at the desired moisture content. To estimate the cost of operating the fan, assume a 1-horsepower fan motor will use 1 kilowatt of electricity for each hour of operation. For example, if reconditioning the soybeans takes 30 days of fan operation, that is 7,200 hours. Achieving an airflow rate of 0.75 cfm/bu on a 42-foot-diameter bin filled 20 feet deep with soybeans would require a 15-horsepower fan. The cost to operate the fan, assuming an electricity cost of 10 cents per kilowatt-hour, is \$10,800.

Increasing the moisture content from 9% to 13% would increase the quantity of soybeans by 1,019 bushels. At a price of \$9 per bushel, this is worth \$9,171, which is less than the cost of operating the fan in this example. You

would need only a 3-horsepower fan to provide an airflow rate of about 0.25 cfm/bu, but reconditioning the beans would take about 90 days.

If the fan is operated just in periods of very high humidity, such as during fog or when the relative humidity is near 100%, the soybeans in part of the bin would be too wet to be stored safely. Mixing the wet layers with dry layers would reduce the spoilage risk and discounts for marketing wet beans. However, stirring increases the bean damage. Emptying the bin and moving the beans through a grain-handling system will provide only limited mixing because the majority of the grain comes from the top of the bin in a funnel shape with a center unloading sump.

A humidistat can operate the fan when the relative humidity will average about 70%. Even though the humidity level varies considerably during the day, it will average about 70% if the fan is operated for a time when the humidity is 90% and for a time when it is 50%. Setting the humidistat to operate the fan when the humidity exceeds about 55% would be a reasonable starting point. However, the humidity setting would need to be adjusted based on a measured soybean moisture content.

To avoid wetting the beans to moisture levels unsafe for storage, add a second humidistat to stop the fan when the relative humidity reaches very high levels or use a microprocessor-based fan controller that monitors temperature and humidity and runs the fan only when air conditions will bring the crop to the desired moisture content. A disadvantage of these options is that the fan does not run as many hours. Controlling the fan manually and operating it during the night and a portion of the day, based on the measured humidity, is another option, but fan and moisture control is not as accurate with this method.

Soybeans expand when they absorb moisture, so a moisture content increase of more than a point or two could create enough pressure to damage the grain bin's bolted connections or even cause the bin to rupture. The bin warranty may be voided if damage occurs while reconditioning grain.

One way to reduce the pressure is to unload some beans from the bin periodically. Another way to reduce the damage potential is to use a negative pressure system to pull humid air down through the soybeans and remove the soybeans from the top of the bin as they are reconditioned. An additional way to reduce the pressure is to use a vertical-stirring auger to mix the beans periodically. Unfortunately, these methods of reducing pressure have not been well researched and are based on field experience primarily with smaller bins.

For more information about reconditioning, drying, handling and storing soybeans, visit the NDSU Extension Service's soybean production guide at <https://bit.ly/ndsusoybeanproduction> and NDSU's grain drying and storage website at www.ndsu.edu/agriculture/ag-hub/ag-topics/crop-production/drying-storage.

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County commissions, North Dakota State University and U.S. Department of Agriculture cooperating.

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This publication will be made available in alternative formats for people with disabilities upon request, 701-231-7861.

May 2022

- Welcome – *Tom Scherer*
- Updated Extension Irrigation Publications and Irrigated Crop Budgets – *Tom Scherer and Ron Haugen*
- Electrical Safety Is Important When Starting Your Irrigation System – *Tom Scherer*
- The Cost to Pump Water Keeps Increasing – *Tom Scherer*
- ND Water Education Foundation Summer Water Tours

June 2022

- Project Safe Send 2022, Get Rid of Unused Pesticides – *Aubrey Sondrol*
- Air in the Pipeline, Not Good – *Tom Scherer*
- How Long Would You Expect a Center Pivot and Its Components to Last? – *Tom Scherer*
- Calibrating a Center Pivot for Chemigation – *Tom Scherer*
- ND Water Education Foundation Summer Water Tours

July 2022

- Oakes Irrigation Research Site Field Day, Aug. 4 – *Kelly Cooper*
- Soil Water Deficit Is Highly Variable Across North Dakota – *Tom Scherer*
- How Long Does It Take to Apply an Inch of Water With a Pivot? – *Tom Scherer*
- Overspray From Irrigation Systems Not Allowed on Roads – *Tom Scherer*

August 2022

- Northern Plains Potato Field Day – *Andy Robinson*
- The NDSU Arboretum Experience – *Esther McGinnis*
- Crop Water Use in August – *Tom Scherer*
- Selecting the Right Size Pipe for Irrigation – *Tom Scherer*

September 2022

- Upper Missouri Water Association Meeting, Oct 17-18
- North Dakota Irrigation Statistics: 2021 Growing Season – *Tom Scherer*
- Estimating the Amount of Pump Water – *Tom Scherer*
- Centrifugal Pumps: Reducing Cavitation and Impeller Wear – *Tom Scherer*
- When Handling Anhydrous Ammonia, Don't Hurry – *John Nowatzki*
- Fruit, Hemp and Vegetable Field Day on September 15th

October 2022

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