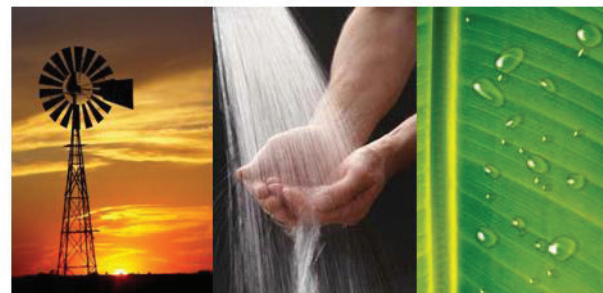


# North Plains Water News



A Publication of the NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT

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## Disciple or Braggart: The Story of the Corn Cotton Rotation at the WCC

by Nicholas Kenny, PE.



The North Plains Water Conservation Center (WCC) was not titled with a clandestine name to camouflage the purpose of the property. The priority is right on the nose: water conservation. But isolated efforts to conserve water across 280-acres only saves so much water. The real beauty of the WCC comes from executing the drum-beating parable from the Master, “Neither do men light a candle, and put it under a bushel, but on a candle-stick; and it giveth light unto all...” (Matt 5:15)

At the North Plains WCC we light a very small candle and raise it as high (and often) as we can.

2022 marks the fifth consecutive season of a corn/cotton rotation at the WCC, including completion of two full cycles of this rotation in Low Energy Precision Application (LEPA) pivots and subsurface drip (SDI). Irrigation system capacity is limited to 4 GPM/acre on corn and 3 GPM/acre on cotton, simulating a 3.5 GPM/acre capacity across the wetted acres.

Our focus has been to work from big to small in a production farming setting, identifying methods to optimize for water use efficiency and profitability. Our goal is to provide strategies that can be immediately applied across the million-plus irrigated acres in the district. After demonstrating four years of the corn/cotton rotation, this rotation is a winner.

The full-production irrigation application over the four-year corn/cotton rotation averaged as follows:

Corn LEPA	21.1 acre-inches / season
Corn SDI	19.6 acre-inches / season
Cotton LEPA	10.2 acre-inches / season
Cotton SDI	9.8 acre-inches / season

This pattern reduces to 15.7 acre-inches/season under LEPA and 14.7 acre-inches/season with SDI. When we include the dryland acres for regulatory limitations, we report 13.7 acre-inches/year across the 315-acres of the Water Conservation Center. The validation of the corn/cotton rotation comes from the average yields across all treatments; 244 bushel/acre corn and 2.9 bale/acre cotton, over the 4 seasons.

Arguably, the more important tale of the above figures is the improvements



*For the last 4 years the WCC has been demonstrating a corn/cotton rotation that optimizes water use efficiency and profitability. This rotation and the water use methods can be used across large and small farming operations. The goal of the WCC is to provide strategies to farmers that can be immediately applied to their own farms.*

over Year 1. The combined average irrigation across the rotation in 2018 was 20.4 acre-inches. The applied water on both the corn and cotton reflected irrigation system capacity and was not optimized for water use efficiency and serves as a reasonable baseline. The magic happened as we learned and began tightening up the system in 2019. The averages across the farm over the 4-year duration are:

2018	20.4 acre-inches/season
2019	12.2 acre-inches/season
2020	14.2 acre-inches/season
2021	15.7 acre-inches/season

The following keys were observed and implemented to improve water use efficiency in the rotation:

1. Over-irrigation and saturation can occur in corn at 4 gpm/acre, even when beginning the season with a weak soil profile. We have fine-tuned early season irrigation towards the critical management point, which has been a vital conservation strategy. The confidence that 4 GPM/acre can produce full-yield corn has helped overcome the concern of cotton mining soil water.

2. The proper perspective regarding the corn/cotton rotation is in the scope of the two-year rotation. In isolation, it appears that corn is luxuriously using water and cotton is unaccountably taking the corn's water. In a rotation, it takes

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## Understanding Auxiliary Wells Within the North Plains Groundwater Conservation District

An auxiliary well is an extra well placed within a landowners single GPU. The main purpose of this well is for feedlots and municipalities to use as a reserve well in case the existing, permitted well is **not** in use. According to **District Rule 3.3**, “the auxiliary well may be spaced closer to the owner's other wells than the

District's Spacing Rules permit. However, the Auxiliary well must comply with all other District spacing Rules, including the minimum distance from the property line and must be properly spaced from the wells of an adjacent landowner. If the Auxiliary well is constructed closer to another well of the owner than the District's Spacing Rules permit, the capacity of the Auxiliary well and the capacity of the owner's well closest to the Auxiliary well shall be combined to determine proper spacing from wells of an adjacent landowner. The Auxiliary well shall be included in the GPU's well density.”

The North Plains GCD Board of Directors has proposed the repeal of District Rule, Chapter 3.3 Auxiliary Wells and will hold a public hearing concerning the proposal immediately preceding the October board meeting. The date of the October board meeting and hearing have yet to be determined but will be publicized according to State notice requirements for rule-making procedures. If you have any questions, please call the office at 806-935-6401.

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## Corn Cotton Rotation

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shape as a symbiotic relationship, where full attention can be given to corn and cotton respectively, greatly improving conservation and profitability.

3. SDI can be intensely managed around small rainfall events in corn, commonly reducing irrigation inputs by 1-2 acre-inches annually, compared to a LEPA pivot. This opportunity exists because of the more frequent, smaller duration applications. SDI consistently showed a marginal improvement in efficiency over the LEPA system in all treatments by eliminating surface evaporation and runoff. The trade-off is that manager inputs are regular and frequent. In very dry winters, early season repair of the drip tape is excessive.

4. With the later planting dates of corn and cotton (Early May for cotton and late May for corn), a light pre-water strategy at the time of pre-emergent herbicides proved to be very useful in maximizing water use efficiency in the corn/cotton rotation, especially in the seasons with weak or non-existent winter precipitation. 55,000 plants/acre delivered the best yield and quality results in cotton. Cotton cold germination has been a challenge, requiring seeding rates greater than 100,000 seeds/acre in multiple seasons. Planting dates, varieties, and seeding rates are crucial aspects to consider with cotton.

5. Sensor and information technologies are vital in optimizing corn and cotton crops. The most useful tools utilized are GroGuru probes, AquaSpy Probes, Ceres Imaging, and PivoTrac monitoring. These are mature, supported platforms that deliver information on soil, system, and plant conditions. Utilization of these tools, in some combination, is considered necessary to achieve peak water management and yield performance.

6. Volunteer corn has proven difficult to control in the subsequent cotton crop. Similarly, heavy corn residue has proven useful in cotton germination and difficult for cotton stands and harvest. Corn residue declines rapidly during the cotton crop and cotton stalks do not seem to inhibit germination, production, and harvest.

The corn/cotton rotation expresses attractive features that appear to be symbiotic in nature:

1. Both crops are primary crops with premium status commodity markets. During the period of this demonstration, prices have been very strong for both corn and cotton, making each iteration of the rotation profitable on its own merit.

2. Corn and cotton make use of the same field configurations and farm equipment. This includes planters, sprayers, pivots, etc. The dissimilar harvest equipment has been well-handled by the introduction of the stripper baler that simplifies the investment in cotton harvest equipment.

3. Corn and cotton are very well supported with aggressive breeding programs and modern industry support. This trait is not slowing or waning in the Texas North Plains as cotton varieties are becoming better calibrated for the climate and corn is still the agriculture volume leader, commanding the ongoing support of highly sophisticated plant breeding technologies.

4. Corn is a C4 monocot (grass) with a fibrous root system. Cotton is a dicot with a taproot. These opposite, foundational genetic traits have been a key in optimizing this system through soil water management; water applied to optimize efficient corn yields is in practice banked water for the following cotton season. Of course, the diversity is ideal for soil health, disease resistance, and pest control options.

5. Both have common herbicide resistance platforms.

6. The seasonality is such that planting can be performed in order and harvest windows are practically offset.

7. Cotton in a rotation in loamy soil is greatly preferred to monoculture cotton in sandy soils.

When I first moved to Texas, I was cautioned by a close friend that folks in Texas can be a touch self-aggrandizing. He paused and continued, "But they have something to brag about." I feel a bit like an egotist boasting on behalf of the work at the WCC. However, regarding the work on the corn/cotton rotation, I feel like we have something to brag about. The corn and cotton rotation has all the right ingredients to maintain our way of life though the conservation of our groundwater resources. 💧

## Save Paper and Water by Choosing our E-Newsletter

North Plains GCD now offers our district newsletters by email. If you would like us to send you a digital copy of the newsletter, you can go online at [www.northplainsgcd.org/sign-e-news/](http://www.northplainsgcd.org/sign-e-news/) and fill out the form, or just email [info@northplainsgcd.org](mailto:info@northplainsgcd.org). You can also go online to download previous newsletters, and find us on Facebook, Twitter and Instagram.



## Staff Volunteer Across the District!



Employees Odell Ward and Keila Davila work one of the two drink stands at the XIT Rodeo and Reunion in Dalhart, Texas. Every year staff volunteer to sell drinks at all three events at XIT.



Employees Mitch Funk and Braden Cadenhead selling drinks at the XIT drink stand on Friday, August 4<sup>th</sup> at the Pork Chop Feed.



Annually, employees of the NPGCD volunteer to hand out tea at the Wheatheart of the Nation Celebration in Perryton, Texas. Pictured left to right are Braden Cadenhead, Curtis Schwertner, and Krystal Donley.



# The “Save the Planet’s Water Festival” Is Back in 2022!

Due to Covid-19 the North Plains GCD was unable to present the annual Water Festival’s for the years of 2020 and 2021, but we were back in action for 2022! Once again, fourth grade students in the North Plains GCD had a blast in May when they attended the 14th annual Save the Planet’s Water Festivals! North Plains GCD staff and partners were in Dalhart on May 17, Perryton on May 18, and Dumas on May 19 and 20 to provide a variety of interactive experiences and share the importance of water with students through classic activities like Aquatic Art, We All Live Downstream, and the grand finale Green Earth Magic Show!

To enhance students’ appreciation for agricultural uses of water, each festival had an activity presented by a local commodity group partner. Texas Corn Producers Board presented at the Moore County Community Building, Hilmar Cheese presented at the Rita Blanca Coliseum in Dalhart, and Plains Cotton presented at Frank Phillips College in Perryton. Although students attending the water festivals are surrounded by agriculture, they often do not fully understand what happens to the plants that are harvested or cows that are raised in this area. By bringing in these organizations, students were able to enhance their agricultural, as well as environmental literacy, in one day!

The district is blessed with amazing partners that volunteer their time and expertise to help the Save the Planet’s Water Festivals be successful each year, and this year was no exception. Thanks to the volunteers, partners, and dedicated staff; fourth grade students learned about water conservation, pollution prevention, aquifers, water user groups, and how they can do their part to help save the planet’s water. 💧



4H20 Ambassador Justin Hill presents *We All Live Downstream* to students. Students learned about pollutants, runoff and how it effects our water.



NPGCD employee Keila Davila showed students how to test the PH level of water in the activity *What’s in My Water*.

# In Class Presentations for the 2022-2023 school year!

To help schools meet educational standards and expand students’ natural resource knowledge, the district is happy to offer unique educational presentations to classes within the North Plains GCD boundaries:

**We have 3 presentations pre-planned and ready to go:**

- **Soil Lab (Grades 3-8)** - Learn about the properties of soils and how they are formed. Students will participate in a hands-on investigation to observe how water moves through different soils, and then discuss the real-world implications of a soil’s water retention or drainage.
- **EnviroScape Adventure (Grades K-8)** - Explore the water resources of a realistic model town and learn how the water cycle and watersheds can be impacted by human activities. Please keep in mind that a short version of this activity is presented at the 4<sup>th</sup> grade water festivals each year.
- **Friends of the Farm (Grades K-8)** - What did you wear, eat, and do today? Discover all the ways that local agriculture impacts your life and see how farmers use and save water.

**We can customize presentations to meet your needs. Here are some examples of what we have done in the past:**

- **6<sup>th</sup> Grade PEGS** - We focused the presentation on the book they were currently reading “A Long Walk to Water” relating it back to their lives and how they get their water: while explaining how their water comes from under the ground and how important it is they conserve water in their own homes.
- **Water Cycle (Grades PreK-4)** - We explained and had activities for students of all ages to learn about the water cycle. Each activity is different depending on the grade level.

Reach out with your water education requests! We can help!

To book an in-class presentation, please call or text Baylee Barnes at 806-930-6934 or e-mail [bbarnes@northplainsgcd.org](mailto:bbarnes@northplainsgcd.org) with your proposed date (at least 2-3 weeks notice preferred), number of classes, grade level, and the presentation requested. Due to staff availability, presentation dates are limited and available on a first-come, first-served basis. 💧

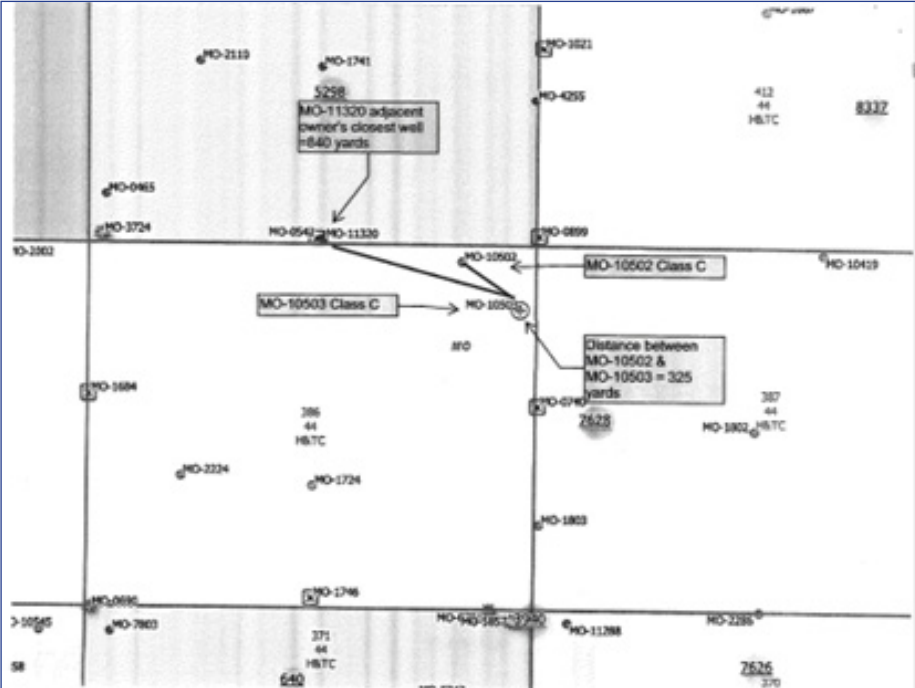


Students participate in a Soil Lab activity by measuring the water filtered through clay to see how porous the material is.



EnviroScape Adventure teaches about watersheds and how important it is to minimize our pollution footprint.





Auxiliary Wells

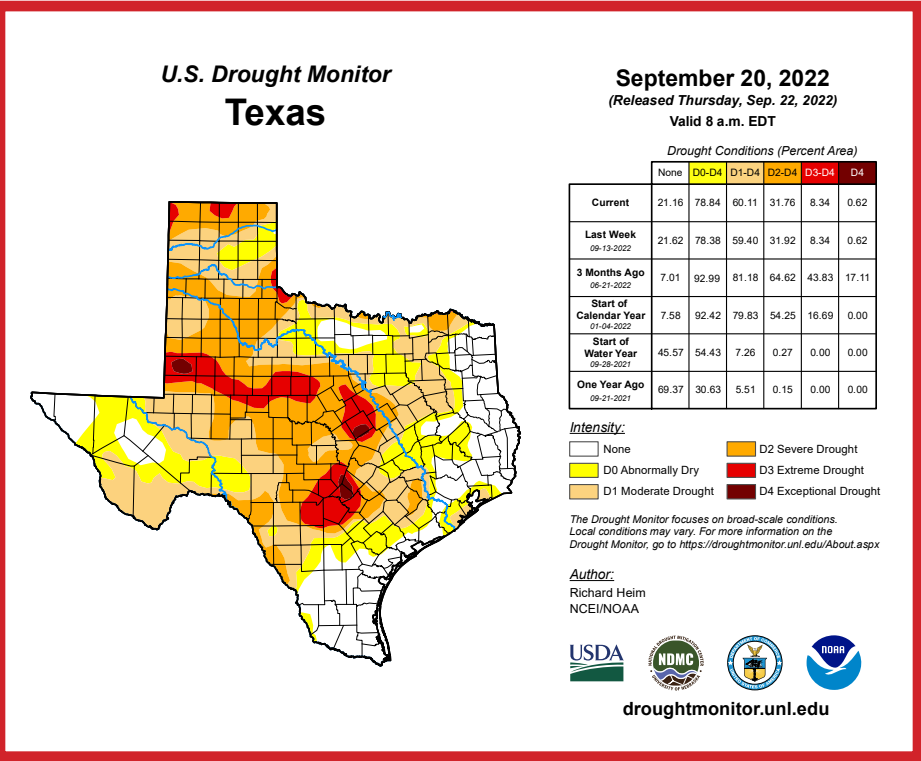
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An example of the combined well density is as follows: An existing owner’s well is a Class C (MO-10502) that can pump up to 400 GPM. The owner would like to install an auxiliary Class C well (MO-10503) 325 yards away from MO-10502. The capacity of MO-10502 (400 GPM) plus the capacity of MO-10503 (400 GPM) = 800 GPM. An 800 GPM well must be a minimum of 500 yards (Class D) from the adjacent landowner’s wells. Lastly, the auxiliary well shall be included in the GPU’s well density. One non-exempt well for every 64 acres. 640-acre section equals 10 non-exempt wells. 💧

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Mitchell “Mitch” Funk recently joined the district as a Natural Resource Specialist. Mitch grew up in Dumas and graduated from Dumas High School. He still has family in Dumas, but also has extended family throughout the district in Follett, Perryton, and Spearman. While still in high school, Mitch participated in welding shop. He also has experience building cooling coils for irrigation motors and building or repairing water distribution pipelines for water produced in oil and gas production. When asked what brought him to work at the district, Mitch said, “I previously worked in the animal health sector of Agriculture and wanted to expand my knowledge in crop production and irrigation. Also, I plan to go back to school and needed a job that allows me to maintain a good work, home, and school balance.” Mitch also stated that he hopes to gain experience with and knowledge of groundwater to help implement new conservation measures in the future. 💧

