

# GROUNDWATER CONSERVATION

REAL LIFE STORIES

## **Growing Cotton North of the Canadian River**

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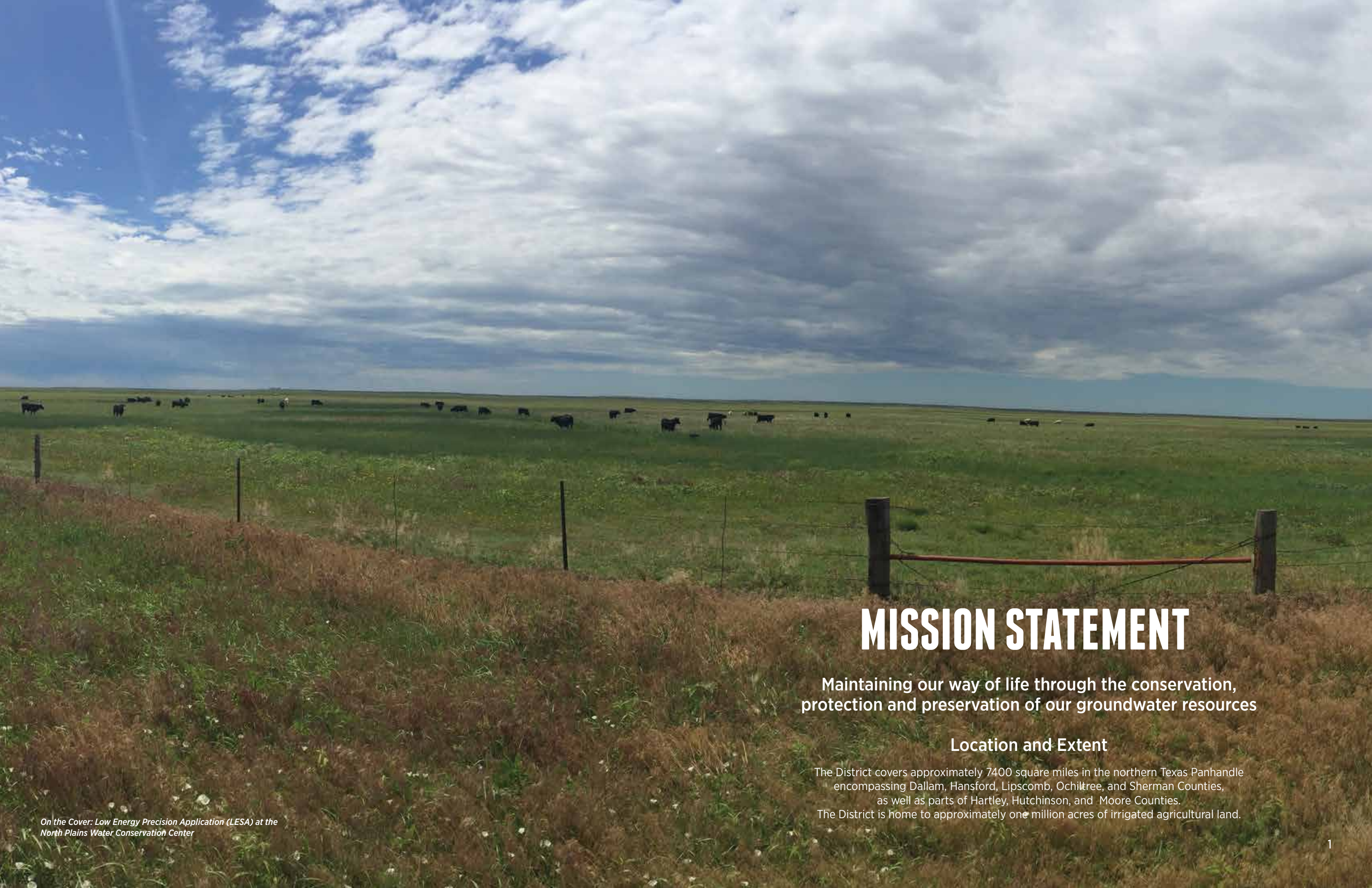
## **What is the Condition of the Ogallala Aquifer?**

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## **Farmers Invest Time into Growing Their Irrigation Conservation Knowledge**

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# MISSION STATEMENT

Maintaining our way of life through the conservation, protection and preservation of our groundwater resources

## Location and Extent

The District covers approximately 7400 square miles in the northern Texas Panhandle encompassing Dallam, Hansford, Lipscomb, Ochiltree, and Sherman Counties, as well as parts of Hartley, Hutchinson, and Moore Counties. The District is home to approximately one million acres of irrigated agricultural land.

## BOARD OF DIRECTORS



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## 2019 PRESIDENT'S ADDRESS



*Danny Krienke, President  
Board of Directors*

To assess how we are doing as a groundwater conservation district it seems logical to look at why the District exists in the first place. The foundation for what is now the North Plains Groundwater Conservation District (North Plains GCD) was formed all the way back in 1917 when the people of Texas approved the Conservation Amendment to the Texas Constitution. The Conservation Amendment requires the Texas Legislature pass laws to conserve and preserve the state's natural resources. In 1949, the legislature through the Underground Water Conservation District Act authorized that locally managed districts could be created through special legislation or by signed petition from landowners. In 1955, North Plains GCD was the second underground water conservation district created in the state through the petition process. Since its creation, the District's board has conserved, preserved, protected, and prevented waste of its groundwater resources by implementing conservation rules and programs authorized through state law.

Today, state law requires that groundwater conservation districts joint plan the desired future conditions (DFCs) of shared aquifers within sixteen Groundwater Management Areas (GMAs) designated and delineated by the state. A DFC is a quantifiable future groundwater condition that can be a particular groundwater level, a level of water quality, a volume of spring flows or another condition. The legislature does not tell the districts in a GMA what their goal should be, just that they must set a goal.

North Plains GCD joint plans the future of aquifers shared with the other three districts in the Texas Panhandle designated as GMA 1. In 2019, GMA 1 began its third 5-year joint planning cycle. The District uses annual groundwater production reporting from its well owners and annual groundwater level measurements compared to groundwater availability models to assess whether the District is achieving its DFC goal. In 2019, the comparison showed that the North Plains GCD is on track to achieve its goals for the Ogallala, Dockum and Rita Blanca aquifers, so it was not necessary to make any adjustments to the District's annual production rules. More information on joint planning can be found on page 22 of this report.

With 95-percent of the District's pumped groundwater being used for irrigation it makes sense that we would concentrate much of our conservation activity on agricultural irrigation conservation. The District's award-winning on-farm demonstrations emphasize irrigation best management practices designed to help the District and its people meet our goals. The demonstrations started in 2010 with the "200-12 Reduced Irrigation on Corn Demonstration" that was awarded the Texas Environmental Excellence Award for agriculture, the state's highest conservation award. Then in 2018, the "Master Irrigator" educational program gained the District another Texas Environmental Excellence Award for activating growers to successfully apply the information demonstrated.

In an effort to keep the District's conservation efforts relevant to the current conditions in agriculture, the focus of the District's demonstrations has shifted from corn production to cotton to reflect the higher numbers of cotton acres being planted in the District. To further explore the District's role in helping growers maximize water efficiency in growing cotton, the District enlisted the help of area cotton growers, cotton industry leaders and extension personnel to form a Cotton Project Advisory Committee (PAC).

The Cotton PAC said there was a need for basic information on how to grow cotton effectively. That request led to the 2019 educational video series "Cotton and Conservation," a cooperative effort

between AgriLife Extension Agronomist, Dr. Jourdan Bell, area extension agents, and North Plains GCD. You can find out more about the Cotton and Conservation Video Series on page 16.

The District also retained agricultural engineer Nich Kenny to deliver quality demonstrations at the North Plains Water Conservation Center (WCC) and on other farms in the District, as Leon New turned his attention to revising the Center Pivot Irrigation Manual for growers. New, a recognized pioneer in irrigation application technology and education should complete the publication near the end of 2020. Kenny led the 2019 demonstrations at the WCC to some compelling first-year results regarding cotton and corn rotations, populations and economics. Look at page 8 of this report for more on the 2019 agricultural demonstrations.

Once these results are quantified, they are of little use unless the District can get the information into the hands of those who can use it to save groundwater. This is where the District's Outreach Team goes into action. The District utilized traditional channels, from field days to news releases and newsletter articles to transfer this information to our stakeholders, however in the last decade electronic media has played an increasingly important role in getting the word out. In 2019, the District was consistently active on multiple social media services, reporting on District news and activities. The District has accumulated respectable participation numbers for an organization of its size. Specifically, the Cotton and Conservation video series along with virtual field days created during the 2019 season produced over 1000 views through YouTube and Facebook.

Finally, 2019 saw the continuation of the District's initiatives to help put conservation tools in the hands of those who need them. The District's rules are based on the concept that you must measure what you want to manage, so meters are required on all new permitted wells in the North Plains GCD. Since its inception in 2015 the District's meter reimbursement program has distributed \$965,307.90 in cost share funds for growers to help equip their wells with meters. In 2019 the District cost-shared \$78,584.86 for 84 new meters across the District. The 2019 Master Irrigator program, through its partnership with USDA Natural Resources Conservation Service, provided access to approximately \$374,000 for Master Irrigator program graduates to implement water conservation practices on their own operations.

As the District's president I am pleased with our progress in providing conservation programming to our stakeholders. Once you read this report, I believe you will see that we have a robust conservation and outreach effort. You will also see that our board of directors takes the mission statement, "Maintaining our way of life through conservation, protection, and preservation of our groundwater resources" very seriously and believes these are the kinds of things a groundwater conservation district should be doing.

Sincerely,



*Danny Krienke  
President, Board of Directors  
North Plains Groundwater Conservation District*

# MANAGEMENT GOALS

## A. Providing for the Most Efficient use of Groundwater

### 1. Groundwater Reporting

**Management Objective:**

Monitor total annual groundwater withdrawals through water use reporting by all producing groundwater right owners that have a well capable of producing more than 25,000 gallons of groundwater a day.

**Performance Standards:**

Annually, the District will collect production reports on all properties containing non-exempt wells and calculate annual groundwater withdrawals for the District.

**Action Taken:**

The District received production reports for 2018 from 2899 properties. Annual groundwater withdrawals were calculated and published in the Hydrologic Report and presented to the Board at the June 2019 board meeting.

**Table 1: Groundwater production reported to the District, 2014-2018 (Acre-feet).**

County	2014	2015	2016	2017	2018 <sup>[A]</sup>	Average <sup>[B]</sup>
Dallam	393,700	297,000	339,200	312,300	349,900	338,420
Hartley	442,100	332,700	391,600	376,000	422,600	393,000
Moore	210,000	156,700	185,700	173,100	200,600	185,220
Sherman	361,400	251,700	285,300	265,100	312,000	295,100
Hansford	211,700	148,800	170,400	146,700	190,800	173,680
Hutchinson	74,000	57,700	67,700	63,600	75,500	67,700
Lipscomb	48,800	39,400	42,300	44,200	44,200	43,780
Ochiltree	106,300	77,400	81,400	77,300	95,500	87,580
West	1,407,200	1,038,100	1,201,800	1,126,600	1,285,100	1,241,400
East	440,800	323,300	361,700	331,900	406,000	374,080
<b>Total</b>	<b>1,848,000</b>	<b>1,361,400</b>	<b>1,563,500</b>	<b>1,458,500</b>	<b>1,691,100</b>	<b>1,584,500</b>

[A] 2018 Production data are provisional and subject to minor changes.

[B] Average is an average of the last five years.

### 2. Well Registrations and Permitting

**Management Objective:**

All exempt and non-exempt wells constructed within the jurisdiction of the District are required to be registered or permitted in accordance to the District's Rules.

**Performance Standards:**

District staff will verify all wells within a Groundwater Production Unit(s) are registered or permitted in accordance with the District Rules during any site visits.

**Action Taken:**

In 2019, the District inspected all Groundwater Production Units (GPUs) on which applications were made for new permits for non-exempt wells. New exempt wells were registered and previously unregistered wells were discovered during inspections. The following table gives the results from permitting and inspecting wells in 2019.

**Table 2: Permitting and Inspecting wells**

Permitting and Inspecting Wells		
Non-exempt Permits	GPU's Inspected	New Exempt Wells Registered
272	1062	160

### 3. Conservation Demonstration and Education

**Management Objective:**

Provide support through the District's North Plains Water Conservation Center, demonstrations, and other District education programs to promote groundwater conservation.

**Performance Standards:**

At least annually, conduct field days and/or other events to educate stakeholders regarding water use efficiency technologies and practices. The District will publish reports on the activities at the North Plains Water Conservation Center and other demonstrations and education programs.

**Action Taken:**

In January of 2019, the District co-sponsored a series of four Texas Panhandle Crop Production Clinics presented by DuPont Pioneer. The meetings took place in Dalhart on January 14, Dumas on January 15, Stratford on January 16, and Spearman on January 17. Nich Kenny, Irrigation Engineer, presented findings from the 2018 on-farm demonstrations performed at the North Plains Water Conservation Center (WCC) at Etter. Steve Amosson, retired Texas A&M Economist, promoted the District's award-winning Master Irrigator program and Kirk Welch, Assistant General Manager - Conservation Outreach, informed attendees about production reporting deadlines, cost-share programs and other relevant District information.

### The Master Irrigator Program

The Master Irrigator Program entered its fourth program year, with 22 participants graduating after 24 hours of intensive irrigation conservation education. Sessions addressed agronomics, irrigation scheduling, systems, and other topics. The 2019 Master Irrigator graduates represented approximately 50,000 irrigated acres and received over \$374,000 in funding from the United States Department of Agriculture - Natural Resources Conservation Service (USDA-NRCS) North Plains Environmental Quality Improvement Program (EQIP) fund. Individual graduates used a portion of the funds to implement water conservation



The Master Irrigator Class of 2019 produced 22 graduates representing about 50,000 acres of irrigated land in the District.

technologies and practices they learned in the class. The NRCS funding for the Master Irrigator was a four-year agreement that expired in 2019.

Since its inception in 2016, the program has produced 90 graduates representing over 263,000 acres of irrigated farmland. That's approximately 25 percent of the total irrigated acres in the District. In response to a recent survey of 2016 Master Irrigator graduates, 100 percent said they have implemented one or more conservation strategies they learned during the Master Irrigator program. The Master Irrigator is a 4-day interactive training program combining lecture and producer panel interaction to provide a fast track to adoption of irrigation conservation practices, tools and technologies. Ultimately the program helps growers be more efficient stewards of the area's groundwater resources.

**Management Considerations from the WCC 2019 Season**  
by Nicholas Kenny, PE

Demonstration work at the North Plains Water Conservation Center (WCC) in 2019 was focused on identifying details of a corn and cotton production system in the Texas North Plains. This rotation has proven to be highly effective at conserving water, while sustaining on-farm revenue in a two-year rotation. The 2019 campaign brought a few new insights to light. Because we are on the leading edge on many of these topics, it is too early to categorize any of these findings as anything more than considerations; but they should certainly be considered.

The corn and cotton rotation is effective because of how complimentary the two crops are. One is a grass and one is a broadleaf which is helpful for soil health, biodiversity, and weed control. Corn is a high-yielding crop with higher fertilizer and water inputs, while cotton is a scavenger that can make use of resources corn leaves behind. They are marketed to non-competitive sectors (food and fiber) yet utilize similar field equipment and configurations. Economically, both crops are viable but cannot be grown to maximum potential in isolation in the North Plains, primarily because of their unique water requirements. In rotation, however, they are quite symbiotic and have shown reciprocal benefits. Over a two-season span, a corn and cotton rotation can reduce water use by 10 acre-inches compared to back-to-back corn crops without reductions in on-farm income.



2019 was the third year for the WCC to be planted in a cotton and corn rotation.

The first consideration is that in a corn and cotton rotation where irrigation system capacity is 4 gallons per minute (GPM) / acre for corn and 3 GPM / acre for cotton, it is possible to bank water in the corn soil profile that can be extracted from the profile during the subsequent cotton crop. In 2019, the net difference between soil moisture extraction between corn and cotton was 10-inches; the corn following cotton banked 4-inches to the soil while the cotton following corn extracted 6-inches. The rest of the story is that the corn received 19-inches of irrigation and the cotton received 9-inches of irrigation,

a 10-inch difference in annual irrigation. There were 10-inches of in-season rainfall in the cotton and 6-inches in the corn.

The next consideration is that cotton variety classifications respond differently to irrigation inputs. The southern subsurface drip (SDI) blocks at the WCC were dedicated to Dr. Jourdan Bell's cotton Replicated Agronomic Cotton Evaluation project which provides a look at early and mid-early cotton varieties in multiple locations across the North Plains. A unique overlay of this cotton block at the WCC were two strategic irrigation management strategies: 1) early irrigation initiated at pinhead

square and 2) late irrigation initiated at full bloom, simulating delayed cotton irrigation after irrigation in corn. In all varieties, delayed irrigation initiation and less total water lead to reduced yield, but the yield hit was much less in the early-mid varieties which proved to be more able to transition to a vegetative state producing more bolls. This 2019 finding is revelatory, and the effort will be repeated in 2020 on the north SDI blocks.

**Table 3: 2019 WCC Yield and Water Summary – Cotton and Corn**

	Water (Inches)						
	Hybrid/Variety	Population	Yield**	Irrigation	Rain	Soil (4ft.)	Total Water
<b>West Pivot - Cotton</b>	DynaGro 3385	65K*	2.87	9.01	10.34	5.29	24.64
<b>South Drip - Cotton Limited</b>	RACE Trials	65K	2.38	4.04	10.99	5.49	20.52
<b>South Drip - Cotton Full</b>	RACE Trials	65K	2.85	7.26	10.99	4.43	22.68
<b>East Pivot - Corn North</b>	DynaGro 58VC37	32K	237	19.01	6.44	6.06	31.51
<b>East Pivot - Corn South</b>	DynaGro 58VC37	32K	230	19.01	6.44	6.10	31.55
<b>North Drip - Corn - 32K</b>	DynaGro 58VC37	32K	212	14.73	6.44	6.91	28.08

\*Cotton population in the West Pivot is averaged across the population study.  
\*\* Cotton Yield based on 500 lb / Bale and corn yield in moisture adjusted bushels / acre.

The 2019 SDI demonstrations yielded two important observations that will affect future SDI work: 1) Out-of-pattern irrigation events triggered a negative crop response and 2) Small, frequent irrigation events did not appear to reach far enough into the soil profile to promote a large root system. In future demonstrations, SDI corn will be irrigated based on 4 GPM) / acre system capacity with four consistent irrigation intervals: Daily, alternate day, every third day, and every fourth day.

The West center pivot at the WCC was committed to a cotton high-population demonstration. This project demonstrated upland cotton planted at 45 thousand (K), 65K, 90K, and 110K seeds / acre. Indications are that higher populations in cotton promote more first position early bolls which leads to better maturity, more plants in the field to help prevent late-season run-away, and the potential to terminate the crop sooner to reduce exposure to early frost. Due to less than favorable early growing conditions, the District reduced the 2019 populations by as much as half; however, the higher populations did produce better yield with higher quality. While this was the case in 2018 as well, these early results are not conclusive. The District will repeat the population demonstrations in 2020 to continue to collect more data on the topic. Irrigation water applied on cotton in 2019 ranged from 4-inches to 9-inches, which is what makes cotton vital for review in the Texas North Plains.

In addition to these specific items of consideration, the District also demonstrated cover crops, cotton growth stages, cotton termination timing, corn fertilizer strategies, and soil moisture tools in 2019.

**Community Education**

The District held a xeriscape gardening class and rainwater harvesting class on Saturday, March 2 to provide water conservation information relevant to all the District's stakeholders. Neal Hinders of Canyon's Edge Plants presented on xeriscaping and Katherine Drury from High Plains Underground Water Conservation District talked about rainwater harvesting. A total of 12 participants attended the class at the WCC.

The District published reports on activities at the WCC and other demonstrations in the spring, summer and fall issues of the North Plains Water News as well as on the District website.

#### 4. Financial Assistance

##### **Management Objective:**

The District will encourage the adoption of technologies that promote efficient use of groundwater and conserve water by providing the means to purchase the technology.

##### **Performance Standards:**

At least annually, the District will seek financial assistance for stakeholders regarding conservation equipment and practices.

##### **Action Taken:**

In 2019, the District applied for and received a loan from the Texas Water Development Board (TWDB) for \$1,000,000 to be used to provide low-interest loans to irrigators for efficiency improvements to irrigation systems. Though not applied for in 2019, the District had almost \$300,000 worth of matching grants from the TWDB for the Irrigation Conservation Initiative (ICI). The ICI program provided for reimbursement of up to half the cost of certain approved conservation equipment. In October of 2019 the District with the support of the TWDB re-directed the ICI funds to be used to fund the Master Irrigator Program, as 2019 was the last year of the four-year funding agreement with NRCS. The District continued to provide the following financial assistance programs through 2019:

- USDA-NRCS North Plains Environmental Quality Incentive Program – reimbursed growers who graduated from the Master Irrigator program for the cost of efficient irrigation equipment and practices.
- TWDB Irrigation Meter Reimbursement – reimbursed eligible irrigators up to half the cost of flow meters.
- TWDB Irrigation Conservation Initiative – reimbursed up to half the cost of certain approved conservation equipment.

#### 5. Technical Assistance

##### **Management Objective:**

The District will assist stakeholders in collecting information and knowledge about practices and technologies that promote efficient use of groundwater.

##### **Performance Standards:**

The District will provide technical assistance to stakeholders when requested, and the information is beneficial for the efficient use of groundwater.

##### **Action Taken:**

District contract agriculture engineer, Nich Kenny, assisted graduates of the Master Irrigator program and others with the proper installation and operation of irrigation equipment to maximize performance and efficiency of the practices. In addition, the District received inquiries for groundwater-related technical assistance and provided information to help users conserve water. Technical services performed by the District included flow tests and water quality testing. The District also partnered with the United States Department of Agriculture – Natural Resources Conservation Service to inspect Variable Frequency Drives which allow for more control over electric irrigation motors. Finally, the District worked with the United States Geological Survey on a water quality investigation to provide a water quality base line of information that is available to the public upon request.

#### B. Controlling and Preventing the Waste of Groundwater

##### **Management Objective:**

Control and prevent the waste of groundwater as defined by state law.

##### **Performance Standards:**

The District will pursue any reported violations of the District's rules concerning groundwater waste.

##### **Action Taken:**

The District received four water waste reports in 2019. Two were investigated and resolved with letters from the General Manager. A third complaint was resolved by the owner before action could be taken. One waste report was investigated, but staff found no evidence of waste. The complaint was closed.

#### C. Controlling and Preventing Subsidence

Controlling and preventing subsidence has historically not been considered as challenging in the High Plains Aquifer System compared to other aquifer systems in Texas.

##### **Action Taken:**

District staff reviewed the TWDB report on subsidence; "Final Report: Identification of the Vulnerability of the Major and Minor Aquifers of Texas to Subsidence with regard to Groundwater Pumping, TWDB Contract Number 1648302062. The report lists the Ogallala aquifer with a high risk of subsidence and states, "Subsidence Risk is high with high subsidence risk in large areas of the aquifer".

The report lists the Dockum, Rita Blanca and Ogallala aquifers with a medium risk of subsidence and states, "subsidence potential exists but is not generally significant outside of hotspots within each aquifer".

Considering the extent of the study and due to the depth of the water and the nature of the geology within the District, extensive subsidence is unlikely and the District's Board of Directors, upon recommendation from qualified staff, have determined that this goal is not applicable to the District.

#### D. Addressing Conjunctive Surface Water Management Issues

##### **Management Objective:**

Address conjunctive water use issues with organizations that have relevant authority or jurisdiction.

##### **Performance Standard:**

Annually, the District's representatives will attend at least 75% of Region A: Panhandle Regional Water Planning Group's meetings. To further address conjunctive water use issues, the District will submit a copy of its management plan to The Canadian River Municipal Water Authority, Palo Duro Water District, and Red River Authority for their consideration and review.

##### **Action Taken:**

The Panhandle Water Planning Group (PWPG) Full Committee held a public meeting on Wednesday, June 26, 2019 at 2:00 PM in the Boardroom of the Panhandle Regional Planning Commission (PRPC), 415 W. 8th Avenue, Amarillo, Potter County, Texas. Steve Walthour, General Manager and Danny Krienke, GMA-1 Representative participated in the meeting.

The PWPG Agricultural Committee held a scheduled public meeting on Wednesday, June 26, 2019 at 10:00 AM in the 3rd Floor Conference Room of the PRPC, 415 W. 8th Avenue, Amarillo, Potter County, Texas. Steve Walthour, General Manager and Danny Krienke, GMA-1 Representative participated in the meeting.

The PWPG (Region A) held a scheduled public meeting on Wednesday, August 15th, 2018 at 1:30 PM in the Boardroom of the PRPC, 415 W. 8th Avenue, Amarillo, Potter County, Texas. Steve Walthour, General Manager participated in the meeting.

## E. Addressing Natural Resource Issues that Impact the Use and Availability of Groundwater and which are Impacted by the Use of Groundwater

### 1. Aquifer Monitoring

#### Management Objective:

Monitor aquifer characteristics that affect utilization and availability of groundwater and which are affected by the use of groundwater through District programs by maintaining a network of monitor wells.

#### Performance Standards:

- i. District staff will periodically collect and analyze water samples from appropriate monitor wells.
- ii. District staff will perform water quality analyses for select constituents for well owners upon request.
- iii. Annually, District staff will summarize their water quality activities and make the information available to the Board of Directors and the public.

**Table 4: Mineral analyses from wells within the District**

Parameter	Units	2017 Number of Analyses	2017 Average Analyses Result	2018 Number of Analyses	2018 Average Analyses Result	2019 Number of Analyses	2019 Average Analyses Result
Sulfate	mg/l	22	49.1	32	50.8	29	44.68
Nitrate	mg/l	22	12.37	32	11.14	29	1.65
Total Iron	mg/l	22	0.16	32	0.234	29	.043
Chlorides	mg/l	22	24	32	60.77	29	30.57
Fluoride	mg/l	22	0.55	32	.0466	29	0.66
Total Hardness	mg/l	22	214	32	217	29	208

- iv. District staff will collect aquifer water level measurements annually.

#### Action Taken:

Water levels for select District wells were measured in January and February of 2019 and reported in the Hydrologic Report.

**Table 5: Depth to water by county**

Dallam	Hartley	Sherman	Moore	Hansford	Hutchinson	Ochiltree	Lipscomb
314	356	330	348	312	349	356	158

- v. Annually, District staff will summarize groundwater level declines and average depth to water and make the information available to the Board of Directors and the public.

#### Action Taken:

Groundwater level declines and average depth to water are calculated and published in the annual Hydrologic Report.

**Table 6: 2019 average depth to water and comparisons of average decline in select District water level monitor wells**

County	Avg. Depth to Water (ft.)	2019 Avg. Well Decline (ft.)	2018 Avg. Well Decline (ft.)	Current 5-Year Avg. Well Decline (ft.)	Previous 5-Year Avg. Well Decline (ft.)	Current 10-Year Avg. Well Decline (ft.)	Previous 10-Year Avg. Well Decline (ft.)
Dallam	302	3.71	3.65	3.59	3.51	3.65	3.23
Hansford	307	2.03	2.00	1.98	1.86	1.94	1.65
Hartley	362	3.00	3.06	3.12	3.30	3.23	3.42
Hutchinson	351	1.70	1.69	1.69	1.64	1.67	1.63
Lipscomb	181	1.19	1.16	1.14	.91	.98	.75
Moore	359	2.68	2.67	2.66	2.44	2.60	1.84
Ochiltree	347	1.75	1.72	1.69	1.60	1.53	1.35
Sherman	320	3.46	3.33	3.21	2.68	2.86	2.32
District-wide	316	2.44	2.41	2.39	2.24	2.31	2.02

*\*The information in Table 6 is derived from analyses of monitor well hydrographs created from current and historical information. The analyses (indicating both rises and declines) may indicate the quality of information collected from a few specific wells is less than optimal. Such data may be included in the calculations of declines, depth to water or saturated aquifer formation as it represents the best, or in some cases, the only information available.*

- vi. At least on a two-year cycle, District staff will summarize or update aquifer saturated material information and make the information available to the Board and the public.

#### Action Taken:

The District calculates saturated thicknesses every other year and using District monitor well data. The next scheduled update will be published in 2021.

**Table 7: 2019 Estimated average aquifer thickness by county (District area only).**

Dallam	Hartley	Sherman	Moore	Hansford	Hutchinson	Ochiltree	Lipscomb
161 ft.	129 ft.	137 ft.	115 ft.	158 ft.	128 ft.	134 ft.	225 ft.

## 2. Deteriorated Wells

#### Management Objective:

Investigate and address deteriorated wells that may pose a threat to water quality.

#### Performance Standard:

District staff will pursue repair or plugging of deteriorated wells.

#### Action Taken:

In 2019, District staff inspected 911 wells. District staff observed 170 deteriorated wells that contained casing in good condition but did not meet the following conditions: 1) The well had been capped with a covering that is not easily removed. 2) If a cap is present it must be capable



of sustaining weight of at least 400 pounds. 3) The well is sealed to prevent the pollution of groundwater.

District staff installed 170 temporary caps that met the District's requirements and also instructed the owners in writing as to how to bring these wells into full permanent compliance. Well owners have permanently capped 46 of these wells according to District rules.

### 3. Aquifer Information

#### **Management Objective:**

The District will provide easy access to public information available about the aquifers and wells within the District's jurisdiction.

#### **Performance Standards:**

The District will maintain a web-based application for providing information about the groundwater resources in the region.

#### **Action Taken:**

The public can view a variety of maps and publications related to District groundwater resources on the District's website at [www.northplainsgcd.org](http://www.northplainsgcd.org). The subpage for Aquifer Data & Maps had the highest number of visitors in 2019, with 1,576 page views.

## F. Addressing Drought Conditions

North Plains Groundwater Conservation District lies in an area of the State of Texas that has a year-round, semi-arid climate. The area experiences generally dry conditions year-round compared to other areas of the state. The District works to educate the public about methods to conserve water all year, but particularly during dry periods.

### 1. Current Drought Conditions

#### **Management Objective:**

Provide information about the current drought conditions in the area.

#### **Performance Standards:**

Maintain information about the current drought conditions on the District's website.

#### **Action Taken:**

The District links the weekly drought monitor published by the National Drought Mitigation Center at the University of Nebraska – Lincoln on the website at [www.northplainsgcd.org](http://www.northplainsgcd.org).

### 2. Conservation Education

#### **Management Objective:**

Provide stakeholders with information and tools to conserve during dry and peak use periods.

#### **Performance Standards:**

Annually, the District will conduct water conservation communications and education activities.

#### **Action Taken:**

The District has coordinated the Operation Summer Showers program each summer since 2011 to equip households in the area with water-saving shower heads, a water bottle, a rain gauge, leak detecting tablets, a drip gauge, and an informational leaflet with conservation tips. Through a partnership with seven city halls in the North Plains, 214 conservation kits were distributed during the summer of 2019, with the capacity to save millions of gallons of groundwater. Drought conditions and water conservation tips were also communicated through the District's social media accounts and website.

## G. Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, and Brush Control, Where Appropriate and Cost-Effective

### 1. Conservation

#### a) Groundwater Conservation Reserve Program

#### **Management Objective:**

Provide program allowing permitted well owners that timely report their groundwater production to retain any unused allowable annual production for future years, promoting the conservation of groundwater.

#### **Performance Standards:**

Annually, District staff will report to permitted well owners the well owner's conservation reserve.

#### **Action Taken:**

The District reported cumulative and available groundwater conservation reserve to each non-exempt well owner, or the well owner's agent, as part of 2019 Annual Allowable Production reporting forms on November 5, 2019 for production year 2019.

#### b) Conservation Education

#### **Management Objective:**

Conduct conservation education activities to encourage water conservation and create informed and educated citizens who will be dedicated stewards of their resources.

#### **Performance Standards:**

Annually, the District will disseminate groundwater conservation and waste prevention information through a variety of media, activities, and events.

#### **Action Taken:**

The District used traditional and social media, community engagement and educational outreach in 2019 to extend the message of the value of water and individual responsibility for water conservation. From newsletters delivered to a list of over 2000 emails and 1000 traditional mail boxes, to social media posts viewed around the world, and agriculture conservation training and assistance, the District reached thousands with this important information.

Now in its fourth year, Master Irrigator has become the District's signature educational event, with 90 total graduates representing 263,000 acres at the conclusion of the 2019 class.

#### **Hosting the Texas H2O Ambassadors**

In July, the North Plains Groundwater Conservation District had an excellent opportunity to inform young people from across the state about how we steward water in the Northern Panhandle. With the help of several guest speakers, our team welcomed the Texas 4-H2O Ambassadors to the WCC as a part of their Leadership Academy. The North Plains District is one of



Texas A&M AgriLife Extension Agronomist Dr. Jourdan Bell talked to the 4-H2O Ambassadors about the importance of maximizing crop production per drop of irrigation applied.

the only groundwater districts in the state to operate a demonstration farm like the WCC, so it offers a unique perspective on how water can be managed and conserved. The day consisted of a tour of the WCC including presentations by district staff and guest speakers. The idea was to arm these young adults with information to make them effective ambassadors for water conservation.



*District staff took a break to pose for a team picture while volunteering to serve drinks during the XIT Rodeo and Reunion in Dalhart.*

The Texas 4-H2O Water Ambassadors Program is geared specifically toward high school aged students to help get young people involved in the water industry and conservation. Students learn about the leadership, science and technology of water within the program. Once they finish, the ambassadors are required to provide a minimum of 40 hours of service over a 12 month period. Texas 4-H and Texas A&M AgriLife Extension lead the program with additional support from the Texas 4-H Youth Development Foundation.

The District employs partnerships whenever possible to achieve greater results than working as a single entity.

For example, the District sponsored and presented at the DuPont Pioneer Texas Panhandle Crop Production Clinics in January in Dalhart, Dumas, Stratford, and Spearman. At each of these meetings, Nich Kenny, Steve Amosson and Kirk Welch delivered presentations about District demonstrations and programs. The District also provided support to the Texas Alliance for Groundwater Districts' annual Texas Groundwater Summit.

Annually, the District reaches out to area communities to be a part of local celebrations. In 2019 the District's outreach team attended several community events to spread water conservation information. The District had a presence at the Dumas/Moore County Chamber of Commerce Banquet in Dumas, XIT General Office Cowboy Christmas in July in Channing, XIT Rodeo & Reunion in Dalhart and Wheatheart of the Nation Block Party in Perryton.

With 982 Twitter followers, 644 Facebook fans, and 254 Instagram followers, North Plains GCD shares District information, water conservation tips, and groundwater-related content to our stakeholders with the click of a button. Posts have resulted in thousands of interactions and have proven to be useful in keeping stakeholders informed.

In 2019, District personnel were invited to every elementary school in Dumas to conduct a soil porosity lab with 4th grade students. In the activity, students receive information on water conservation and learn how groundwater moves through different soil types.

By offering educational presentations to schools and civic groups, the District helps create the next generation of water stewards.

### **Cotton and Conservation Video Series and Virtual Field Days**

The Cotton & Conservation educational video series, a cooperative program with Texas A&M AgriLife Extension, began video productions in June 2019. The District brought together a



*Outreach team member Paige Glazner captured content provided by Dr. Jourdan Bell for the Cotton and Conservation Video Education Series.*

Project Advisory Committee (PAC) made up of local cotton growers, industry representatives and educators to discuss the needs of growers in the area. The District had historically been corn country, but in 2018 growers planted more acres to cotton than corn for the first time in history. The cotton PAC said growers needed basic information about how to grow cotton efficiently and they



did not need another meeting to try to schedule around. Based on input from the PAC, Texas A&M AgriLife Agronomist Dr. Jourdan Bell presented a proposal for a joint effort to present an educational video series. Based on the proposal Texas A&M would provide agricultural expertise and the District would provide funding and outreach support. The video productions would document real-world cotton growing experiences from multiple locations across the District.

The video series documented the trials and tribulations of one of the most difficult cotton seasons in a decade. The locations corresponded

with Dr. Bell's Replicate Agronomic Cotton Evaluation (RACE) trials within the District's boundaries. The season began with six RACE locations and one at the WCC. However, after untimely cool temperatures and moisture during and after planting, the project ended-up with only two of the RACE fields and the field at the WCC that still had a cotton crop.

The Cotton and Conservation video series documented the progress of the three cotton fields located in Moore, Sherman, and Dallam counties, respectively. AgriLife Extension agents visited fields every other week to track the crop development and provide updates on insect and disease pressure, irrigation management, and other factors. After recording in the field, District outreach staff members edited the videos and released them on the District's website ([www.northplainsgcd.org/cotton](http://www.northplainsgcd.org/cotton)) and YouTube channel. The series gave producers a close-up look at how the cotton was managed in this area, albeit under some very tough conditions. During the 2019 season, District staff worked with experts from Extension to produce 31 videos, resulting in 1091 views.

Another video series debuted at the end of July, taking the place of a traditional field day that would take growers away from their operations. The Virtual Field Day playlist can be found on YouTube and at [www.northplainsgcd.org/virtualfieldday](http://www.northplainsgcd.org/virtualfieldday).

Nich Kenny, and Dr. Bell provided updates on the progress of agricultural demonstrations ongoing at the WCC. The video presentations are listed by topic, so you can watch whichever sessions you want, as your schedule allows. The District shares these videos and other information on a variety of social media sites. You'll find the District on Facebook, Twitter (@northplainsgcd), Instagram (@northplainsgcd), YouTube, and LinkedIn.

### **New Partners and Activities at Water Festivals**

Fourth grade students in the North Plains had a blast at the end of April 2019 when they attended the 13th annual Save the Planet's Water Festivals! North Plains GCD staff and partners were in Dumas on April 24, Dalhart on April 25, and Perryton on April 26 to provide a variety of interactive experiences and share the importance of water with students. In addition to classic activities like Aquatic Art, We All Live Downstream, and the grand finale Green Earth Magic Show, the district was proud to offer some new presentations that students enjoyed this year!

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, 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 go off without a hitch. Volunteers include:

- Amarillo College** – Moore County Campus
- Dumas High School** – Leo Club Lions
- Frank Phillips College** – Allen Campus staff and students
- Texas Master Naturalists** – Panhandle Chapter
- Dalhart High School** – Mrs. Holden's students
- Bonnie Pendleton**, entomology professor at West Texas A&M University
- Kevin Pshigoda** - Ochiltree County Soil & Water Conservation District
- Sonia Burgos** - Natural Resources Conservation Service
- Individual volunteers** – Krista Markham and Steve Swanson



Thanks to volunteers, partners, and dedicated staff, fourth grade students learned about water conservation, pollution prevention, aquifers, water user groups, and more.

**Table 8: District conservation outreach activities**

Date	Event	Attendance
Jan 14-17	Pioneer Crop Production Clinics – Nich Kenny, Steve Amosson and Kirk Welch shared about District demonstrations and activities	350
February 7	Master Irrigator Presentation – Wray, CO – Steve Walthour	50
February 28	Master Irrigator Presentation – Dumas Noon Lions – Steve Walthour	60
March 13	Master Irrigator Presentation – Dumas Rotary Club – Steve Walthour	20
March-April	Master Irrigator – intensive irrigation conservation class for agricultural producers, taught by experts	22
March	In-class presentations for fourth graders – Julia Stanford, Curtis Schwertner, Paige Glazner	225
March 2	Xeriscaping Class – gardening expert Neal Hinders taught participants about drought-tolerant plants	12
March 2	Rainwater Harvesting Class – Katherine Drury, HPWD	12
April 24	Dumas Water Festival – fourth grade students learned about water conservation through activities	340
April 25	Dalhart Water Festival – fourth grade students learned about water conservation through activities	155
April 26	Perryton Water Festival – fourth grade students learned about water conservation through activities	280
July 19	4H2O Ambassador Tour - WCC	25
July 24	Master Irrigator Presentation – Southern Region Conference, College Station – Steve Walthour	150
November 19	Farm Bureau Ag Days – aquifer presentation to fourth graders	340
November 20	Texas A&M AgriLife Extension – Master Irrigator presentation to eighth graders	300
December	In-class presentations for fourth graders	75



Almost 800 4th graders had water conservation fun at the Save Our Planet's Water Festivals.



Kid's art teaches us that every drop counts!



The District joined in the fun at the XIT Ranch General Office in Channing.



GM Steve Walthour talks water with Rotarians.

## CONSERVATION OUTREACH ACTIVITIES



Volunteers have fun at the Save Our Planet's Water Festivals.



Texas A&M AgriLife partners on Cotton and Conservation Series.



Growers learning to get more from less.

**c. Conservation Rule Compliance**

**Management Objective:**

Monitor and enforce compliance to District Rules

**Performance Standards:**

The District staff will report the enforcement to the Board as needed.

**Action Taken:**

In 2019, District well owners filed 2897 Annual Groundwater Production Reports. 2880 Groundwater Production Units reported groundwater use within the Annual Allowable Production limit in a timely manner. Of the 17 who exceeded groundwater withdrawal limits, twelve were administratively resolved and five owners paid fines and/or installed meters.

**Table 9: 2019 Annual Production Reporting Compliance**

Compliance with District Rules	Exceeded Groundwater Production Limit	Administratively Resolved	Completed Mitigation Action
2880	17	12	5

A compliance matter is only considered an enforcement action if administrative remedies have been exhausted and the person is required to appear before the Board of Directors.

On July 9, 2019, the Board conducted a Public Hearing Concerning the Application for Exception to District Rules 3.4; 3.7; 5.1.1.; 5.1.4.A.; and 5.1.5. The Board granted the applicant an exception to District Rule 3.4., adopted by the District on April 14, 2015. The exception waived the requirement that a Replacement Well must be within fifty (50) yards of the well being replaced, thereby authorizing that the applicant’s new well qualified as a replacement for a plugged well. The Board further ordered that the applicant install a District-approved flow meter on applicant’s new replacement well.

**d) Recharge Enhancement**

The District has limited surface water resources to achieve enhanced recharge through diversion or infiltration of surface water. The District explored recharge enhancement through its precipitation enhancement program, and the District discontinued funding for the program in 2006. The District could not quantify if, or to what extent, the program positively affected recharge or groundwater use in the District. The Board of Directors determined recharge enhancement through surface water diversion, infiltration, or precipitation enhancement is not currently viable or practical. For this management plan, this goal is not applicable to the District.

**2. Rainwater Harvesting**

**Management Objective:**

The District promotes rainwater harvesting by maintaining rainwater harvesting information at the District Office and provides literature about its benefits at a public meeting held at least once annually.

**Performance Standards:**

Annually District staff will report to the Board of Directors the number of people who attended the rainwater harvesting meetings.

**Action Taken:**

The District offered a rainwater harvesting class on Saturday, March 2 in conjunction with a xeriscaping class. The rainwater harvesting information was presented by Katherine Drury from

High Plains Underground Water Conservation District. The class was advertised on social media, flyers at local gardening shops, and the District website. Twelve people attended the classes.

**3. Precipitation Enhancement**

The District discontinued its funding for the precipitation enhancement program in 2006. The District could not quantify if, or to what extent, the program positively affected recharge or groundwater use. The Board of Directors determined that precipitation enhancement is not currently viable or practical. For this management plan, this goal is not applicable to the District.

**4. Brush Control**

The District has a semi-arid climate, has very little surface water, experiences low annual rainfall and has a depth to groundwater exceeding 300 feet. Considering the District’s low rainfall, depth to groundwater and lack of surface water resources; brush control as a form of recharge enhancement or groundwater conservation is not practicable or effective. The District has determined that brush control is not a viable groundwater conservation goal for this area and is therefore not applicable

**H. Addressing the Desired Future Conditions**

**1. Compare DFCs to Aquifers’ Conditions**

**Management Objective:**

Monitor the condition of the aquifers and status of groundwater production compared to the adopted DFCs.

**Performance Standards:**

Annually review groundwater production information, GAMs, and water level measurements to characterize aquifer conditions compared to the DFCs.

**Action Taken:**

The Board reviewed groundwater production information, GAMs, and water level measurements to characterize aquifer conditions compared to the DFCs on Tuesday, July 9, 2019 at the Hampton Inn & Suites, 2010 South Dumas Avenue, Dumas, TX, 79029.

**Table 10: Production Compared to MAG**

County	2020 MAG	2018 Production	2018 Percent Difference between MAG and Production	Average Production 2014-2018	Average Percent Difference between MAG and Production 2014-2018
Dallam	401,663	349,900	-12.88%	338,420	-15.74%
Hartley	409,187	422,600	3.27%	393,000	-3.95%
Moore	219,654	200,600	-8.67%	185,220	-15.67%
Sherman	398,183	312,000	-21.64%	295,100	-25.88%
Hansford	275,016	190,800	-30.62%	173,680	-36.84%
Hutchinson	62,803	75,500	20.21%	67,700	7.79%
Lipscomb	266,809	44,200	-83.43%	43,780	-83.59%
Ochiltree	243,778	95,500	-60.82%	87,580	-64.07%
West	1,428,687	1,285,100	-10.05%	1,241,400	-13.10%
East	848,406	406,000	-52.14%	374,080	-55.90%
<b>Total</b>	<b>2,277,093</b>	<b>1,691,100</b>	<b>-25.73%</b>	<b>1,615,480</b>	<b>-29.05%</b>

## 2. Joint Planning

### Management Objective:

The District will participate in the joint planning process of the Groundwater Management Area 1 with other groundwater conservation districts.

### Performance Standards:

A District representative will participate in each GMA-1 joint planning meeting.

### Action Taken:

The Groundwater Management Area 1 (GMA #1) met on Thursday, March 28, 2019 at 10:00 a.m. in the PRPC Board Room, 415 SW 8th Avenue, Amarillo, Texas with the following North Plains Representatives in attendance: Danny Krienke – GMA #1 Representative to the Regional Planning Group (RPG), Bob Zimmer - Joint Planning Representative, and Steve Walthour - General Manager.

District representatives Danny Krienke – GMA #1 Representative to the RPG, Bob Zimmer - Joint Planning Representative and Steve Walthour - General Manager attended the GMA #1 joint planning meeting on Monday, August 26, 2019 at 2:00 p.m. in the PRPC Board Room, 415 SW 8th Avenue, Amarillo, Texas.

## 3. Allowable Production Limitation

### Management Objective:

Manage groundwater withdrawal amounts based on allowable production limits to achieve DFCs.

### Performance Standards:

The Board of Directors will review groundwater withdrawal amounts annually, and may modify annual allowable groundwater production limits consistent with its Rules to achieve the DFCs and preservation of the groundwater resources in the region.

### Action Taken:

The Board of Directors reviewed annual groundwater withdrawal on Tuesday, July 9, 2019 at the Hampton Inn & Suites, 2010 South Dumas Avenue, Dumas, TX, 79029, and determined it was not necessary to modify production limits.

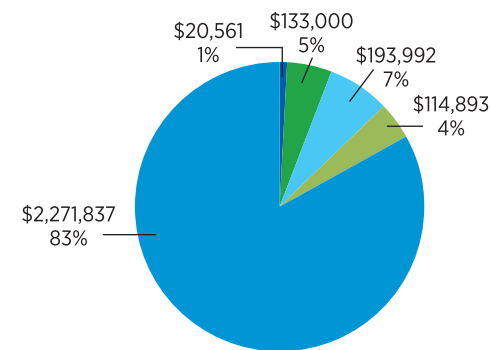
## I. Other Management Goals Included in the Plan by the District

No other management goals are listed at this time.

## DISTRICT FINANCIALS

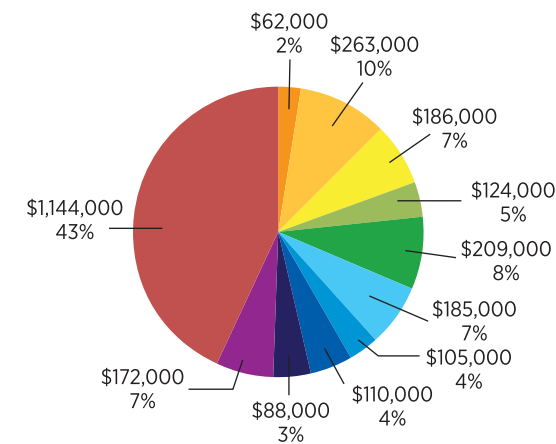
For the fiscal year ending September 30, 2019, the District's net financial position increased by \$170,000, or nearly 3.98%, because of this year's operations. During the year, the District had expenditures that were \$170,000 less than the \$2.73 million generated in tax, fees, and other revenues for District programs. The total costs for all District activities this year was \$2.65 million. However, taxpayers ultimately financed \$2.28 million for these program activities because the District received funds from other state and federal agencies for agriculture conservation programs and from District services that benefit individuals, as shown in the chart below. The District general fund balance increased from \$2.01 million in 2018 to \$2.10 million in 2019. At the end of Fiscal Year 2019, the District had \$2.41 million invested in a broad range of capital assets including facilities and equipment for water conservation.

The following charts show the District's revenues and other financing sources as well as the District's expenditures based on budget area and program area for the fiscal year ending September 30, 2019.



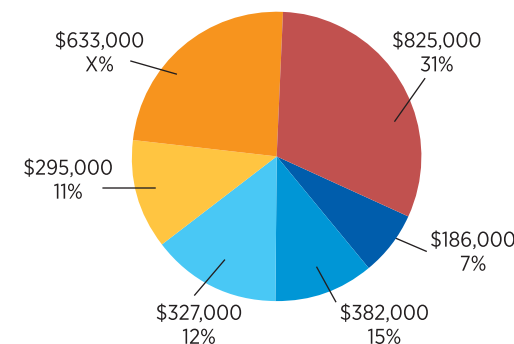
### Revenues and Other Financial Sources

- Property Taxes
- State Grants
- Other Revenue
- Fees for District Services
- Investment Earnings



### Total Expenditures

- Personnel
- Debt Service
- Capital Outlay
- Administrative Expenditures
- Technology/Communications/Utilities
- Conservation Demonstration Projects
- Conservation Outreach
- Aquifer Science
- Contracted Services
- Vehicle/Repair/Supplies
- Professional Fees



### Expenditures by Program Area

- Conservation Education and Assistance
- Permitting, Production, Well Compliance
- Public Information and Open Meetings Support/Governmental Accounting
- Aquifer Science
- Legal/Intergovernmental Affairs/Tax Collection
- Administrative Expenditures



*The Canadian River*  
*Photo by: Julia Stanford*



