



**municipal. industrial. agricultural.**





# MISSION STATEMENT

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

## Location and Extent

The District covers approximately 7300 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



Harold Grall,  
*President*  
Moore County



Danny Krienke,  
*Vice President*  
Ochiltree County



Bob Zimmer,  
*Secretary*  
Hansford / Hutchinson  
County



Gene Born,  
*Director*  
Lipscomb County



Justin Crownover,  
*Director*  
Sherman County



Mark Howard,  
*Director*  
Hartley County



Zac Yoder,  
*Director*  
Dallam County

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## LETTER FROM THE PRESIDENT

Dear Stakeholders,

As we look to the future in the Texas Panhandle, water is, and will continue to be, the number one concern for our communities and economic development. With agriculture continuing to be the number one industry and water consumer, it is imperative that the NPGCD continue to make every effort possible to stay one step ahead of the demands placed upon our aquifer.

Since the turn of the century the District has a long record of achievements, including its implementation of yearly production reporting, production limitations, conservation programs, and partnerships with growers and different Federal, State, and local agencies.

The District has introduced several successful demonstration programs over the past several years that have been very advantageous to growers in the area and have also won several conservation awards. In 2011, being faced with the challenge of slowing down the decline of the aquifer without decimating local economies, the Board decided to demonstrate how currently available water conservation technologies and irrigation management practices can reduce groundwater use and still allow farmers to remain profitable. This all took place during one of the worst droughts in our history and proved highly successful during its five years of demonstration on several farming operations. This program was known as the “200-12 Reduced Irrigation in Corn Program,” which won The Texas Environmental Excellence Award in 2012.

In 2012, in partnership with Texas A&M Agrilife Extension Service and several area Extension agents, the Efficient Profitable Irrigation in Corn Program was born, known as the EPIC program. This proved to be a highly successful demonstration funded primarily by the NPGCD designed to address the adoption of improved irrigation management strategies to increase water use efficiency, crop productivity, and production profitability. This program won the Blue Legacy Award in 2012, and proved that you can increase net farm income pumping less water.

In 2018, the District won its second Texas Environmental Excellence Award. No other district has ever won two of these prestigious awards. This time it was for the Master Irrigator Program, brainchild of board member Danny Krienke. The Master Irrigator Program is twenty-four hours of intensive irrigation education. The goal is to teach producers irrigation management and conservation practices to save water, conserve energy, build soil health and enhance profitability. The curriculum covers topics such as soil moisture monitoring, sprinkler management and monitoring, conservation tillage practices and the importance of soil health and water holding capacity. Plus it exposes them to the latest technologies that can be utilized in their operations, all for the purpose of maximizing profit on every inch of water pumped. Through an agreement with the Natural Resource Conservation Service (NRCS), participants who complete the course and receive their certificate have priority access to the NPGCD Environmental Quality Incentives Program (EQIP) cost share fund. This fund provides producers with financial resources and one-on-one help to plan and implement practices on their own operations that they learn during the program. The program started in 2016. Since that time 45 participants have earned certificates. These Master Irrigators have contracts for \$795,000 worth of conservation equipment through EQIP. Additionally, graduates of the program contribute to the protection and conservation of 127,000 acres of irrigated crop land in the District.

Good programs require great leadership, NPGCD has been most fortunate over the years to have access to one of the top irrigation engineers in the country, Leon New. First as an extension agent with Texas A&M AgriLife and now as the District conservationist. Leon has worked directly alongside thousands of agricultural irrigators over the past 50 years and has had arguably the greatest impact on irrigation efficiency and water conservation in the Texas Panhandle-Plains region. Throughout

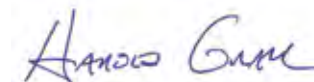
his career, Mr. New has been dedicated to helping farmers increase production from less water by advancing irrigation technology and water conserving best management practices. Leon was a recipient of the Blue Legacy Award in 2017. One of the many letters submitted in support of his nomination stated it best: “When you consider the word ‘Legacy’ and what it means, it is only natural for Leon New to win this award.”

In order for a program to be successful it must also have adequate funding. NPGCD has been fortunate to partner and collaborate with several agencies who are willing to invest with the District because we have a proven record of positive results over the years, and they have seen the value gained for our stakeholders. Success breeds success and our partners know that their funding has positive results. There have been several agencies involved in these endeavors. NRCS, Texas Water Development Board, and others have invested not only financially but with human capital in our projects, like Texas A&M AgriLife with people like Dr. Steve Amosson.

We have teamed up with private industry like Aquaspy, PivoTrac Monitoring, Servi-tech, Crop Quest, Reinke, Zimmatic, Valley, Trimble, Netafim, Better Harvest, Yaskawa, Professional Management Associates, and of course our partners that have made the North Plains Water Conservation Center so successful--Crop Production Services and Stan Spain.

Our programs also reach outside the farm and into the classrooms teaching young people the importance of conservation. We know that this great resource is not a “gift from parents, but a loan from our children”. This year we taught 214 4th graders in Dalhart, 323 in Dumas, and 290 in Perryton. Our partners in this program include Valero Mckee Refinery, Frank Phillips College Allen Campus, Amarillo College Moore County Campus Lions Club, AgriLife Extension and 4H, USDA-NRCS, and the Dumas High School Leo Club.

When you consider the impact a finite resource like water has on people's lives the challenges can be overwhelming. The NPGCD can never afford to be complacent. We must always search for every means possible, to continue to think outside the box and come up with provocative solutions, if necessary, to meet our number one goal--to prosper economically and conserve water for the next generation.



Harold Grall, Moore County Director,  
North Plains Groundwater Conservation District  
President 2016-2018  
harold@pureelementwater.com



The District’s Progress in Achieving Management Goals

With the passing of Senate Bill 1 in 1997 the 75th Texas Legislature required groundwater conservation districts to design management plans to meet specific strategic goals as outlined in the legislation. Senate Bill 1 created a statewide groundwater management and planning process, while preserving local control over the process through the districts. The districts are required to examine and revise their management plan at least every five years. The District’s last Management Plan was adopted in August 2013. In 2017, the District Board of Directors and staff reviewed and revised the District Management Plan with planned adoption prior to August 2018.

This annual report is intended to give an annual update on North Plains Groundwater Conservation District’s progress on each of the strategic goals included in its management plan. This report will be presented to the District’s Board of Directors in a timely manner, and then made available to the public. A copy of the most current annual report will be available for public review on the District website at [www.northplainsgcd.org](http://www.northplainsgcd.org) and at the District office.

MANAGEMENT GOALS

Providing for the Most Efficient Use of Groundwater (31TAC §356.5(A)(1))

A.1. Management Objective:

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

A.1. Performance Standards:

Annually the District will collect production reports on all properties containing non-exempt wells

Groundwater Production by County 2013-2017 (Table 1)

County	2013	2014	2015	2016	2017 <sup>[A]</sup>	Average <sup>[B]</sup>
Dallam	399,300	393,700	297,000	339,200	312,300	348,300
Hartley	459,000	442,100	332,700	391,600	376,000	400,280
Moore	228,300	210,000	156,700	185,700	173,100	190,760
Sherman	346,700	361,400	251,700	285,300	265,100	302,040
Hansford	202,000	211,700	148,800	170,400	146,700	175,920
Hutchinson	69,800	74,000	57,700	67,700	63,600	66,540
Lipscomb	42,600	48,800	39,400	42,300	44,200	43,460
Ochiltree	98,300	106,300	77,400	81,400	77,300	88,140
West	1,433,300	1,407,200	1,038,100	1,201,800	1,126,600	1,241,400
East	412,700	440,800	323,300	361,700	331,900	374,080
Total	1,846,000	1,848,000	1,361,400	1,563,500	1,458,500	1,615,480

[A] 2017 Production data are provisional and subject to minor changes.  
[B] Average is an average of the last five years.

A.2. Management Objective:

Provide support through the District’s North Plains Research Field (North Plains Water Conservation Center) to promote research into drought tolerant crops, efficient water management strategies and other research promoting water use efficiencies.

A.2. Performance Standards:

Annually the District will summarize its activities at the North Plains Research Field (North Plains Water Conservation Center) to be presented to the Board of Directors.

In 2017, the North Plains Water Conservation Center (NPWCC) was the site for the second year of Master Irrigator training in March and April. The District moved the program dates to earlier in the year to accommodate producers and coordinate with the NRCS EQIP funding. The Master Irrigator Program served 26 producers from the area in 2017.

In 2017, the severe outbreak of fumonisin (a mycotoxin caused by fungus Fusarium verticilliodes in corn kernels) occurred throughout the Texas High Plains, causing tremendous economic losses accompanied by huge anxiety among corn producers, the livestock industry, as well as agriculture lenders and bankers.

To find out the extent of this disease outbreak and the potential factors for the disease outbreak, Texas AgriLife conducted sampling in corn fields from Lubbock to Stratford in September and October, including the NPWCC. The NPWCC’s fumonisin level averaged 82.7 ppm, ranging from 14.0 ppm to 253.3 ppm. While weather conditions were right for an outbreak in this field, corn genetics, smut, and sap beetle feeding damages were also major contributing factors. The genetic background of a hybrid was related to the significant differences in fumonisin levels among the hybrids. Loss of kernel integrity played an important role for fungal colonization and fumonisin accumulation.

Grain yield per ear (213.0 g) was 4.1% lower in 3 gpm than in the 5 gpm (222.1 g), or about 251.3 bushels per acre (bpa) for 3 gpm and 262.1 bpa for 5gpm, assuming all had 30,000 plants per acre.

Corn ear worm feeding damage was very low at the NPWCC and not a factor for fumonisin accumulation. Unusually high feeding damage by sap beetles in this field might be a factor for the high fumonisin in some hybrids. The fumonisin level of 5 hybrids averaged 31 percent lower in 3 gallons per minute (gpm) per acre irrigation treatment (68.5 ppm) than 5 gpm per acre irrigation treatment (99.7 ppm). Grain yield per ear was 4.1% lower in 3 gpm (213.0 g ) than in the 5 gpm (222.1 g), or about 251.3 bushels per acre (bpa) for 3 gpm and 262.1 bpa for 5gpm, assuming all had 30,000 plants per acre.

The NPWCC was one of three locations for the last year of the “3-4-5 Gallon Production Maximization (GPM)” program. The demonstrations at the field included the use of Subsurface Drip Irrigation (SDI) and Low Energy Precision Application (LEPA) irrigation systems, and will help area growers develop strategies to improve groundwater management. The irrigation capacity of the field is 4 GPM per acre. The south half of the 110-acre east center pivot was the 3, 4 and 5 gpm per acre corn demonstration. The center pivot was equipped with LEPA UP-3 bubblers. In the SDI field, Stan Spain planted cotton on May 17th and corn (DynaGro 58VC37RIB) on May 25th.

Because the field is equipped with sufficient piping and metering, the NPWCC hosted NRCS representatives from around the region for a portable flow meter workshop on August 22. The District held its field day for the “3-4-5 GPM” demonstrations with Crop Production Services (CPS) on September 7th. Thirty participants attended the field day. Leon New delivered the 2016 “3-4-5 GPM” report just before the NPWCC Field Day. The 2017 report is due in July 2018.

Etter Water Well removed the west well pump so the District could inspect the pump, casing and screen. Video was taken of the casing and screened area and it was brushed to remove scale and particulates. On October 24th, the well was videoed after brushing but the video was too cloudy to be useful beginning at a depth of 540’. In November, Etter Water Well installed a 4” submersible pump and pumped out some of the particulates. The pump was operated for about 2 hours, withdrawing 19,800 gallons of groundwater. One last video was taken on December 4th to show a clearer picture of the brushing results. A new pump was installed on December 27th. A fitting with a shutoff valve was installed between the meter and the collector to enable the well to be pumped without introducing particulates into the mainline, thus protecting the SDI water supply. According to meter readings, the District pumped 199.66 acre-feet of groundwater at the Water Conservation Center or about 10 inches per irrigated crop acre.



Controlling and Preventing the Waste of Groundwater (31TAC §356.5(A)(1)(B))

B.1. Management Objective:

Control and prevent the waste of groundwater as defined by the Texas Water Code through the enforcement of District “Waste” rules.

B.1. Performance Standards:

Annually the District will summarize enforcement of “Waste” rule violations and report to the Board of Directors.

Waste rule violations in 2017 (Table 2)

Waste Violation Report	Description	Action	Resolution
0	N/A	N/A	N/A

Controlling And Preventing Subsidence (31TAC §356.5(A)(1)(C))

Due to the depth of water and the nature of the geology of the aquifer within the District, subsidence is unlikely and the District’s Board of Directors, upon recommendation from the staff, has determined that this goal is not applicable to the District.

Conjunctive Surface Water Management Issues (31TAC §356.5(A)(1)(D))

Following notice and hearing, the District coordinates the development of the management plan with surface water management entities as required by 31 TAC §356.6(a)(4). Documentation regarding this coordination effort is located in Appendix K of the District’s management plan. The District also coordinates the development of the plan with the Panhandle Regional Water Planning Group.

D. 1. Management Objective:

Each year, the District will participate in the regional planning process by attending at least 75 percent of the Region A – Panhandle Regional Water Planning Group meetings to encourage the development of surface water supplies to meet the needs of water user groups in the District.

D. 1. Performance Standard:

The summary of attendance of a District representative at Region A - Panhandle Regional Water Planning Group meetings will be reported to the District Board of Directors.

2017 Panhandle Regional Water Planning Group Meetings

**January 17, 2017** – The Panhandle Water Planning Group (PWPG) meeting was the same day as the North Plains GCD board meeting. General Manager, Steve Walthour and Danny Krienke were required to attend North Plains GCD board meeting.

**July 26, 2017** – The PWPG approved the minutes from the previous meeting and accepted the financial report. The PWPG appointed Donna Kizziar to the Environmental Seat, amended contracts, received a report regarding the 2017 State Water Plan and began work on the 2021 Regional Water Plan. General Manager, Steve Walthour attended the meeting on behalf of the District and Director, Danny Krienke, attended as Groundwater Management Area – 1 representative.

**December 5, 2017** – The PWPG reviewed a demand analyses for various water user groups and proposed revisions to draft projections as appropriate. The PWPG approved the methodology for estimating groundwater supply allocations and discussed proposed TWDB Rule Revisions. The PWPG received reports from Region B, Region O, and comments from the TWDB. General Manager, Steve Walthour attended the meeting on behalf of the District.

Natural Resource Issues That Impact the Use and Availability of Groundwater and Which Are Impacted by the Use of Groundwater (31TAC §356.5(A)(1)(E))

The District has determined that the current natural resource issues that may impact the use and availability of groundwater within the District are water quality issues and declining water tables.

E.1. Management Objective:

Monitor aquifer characteristics that impact the use and availability of groundwater and which are impacted by the use of groundwater through District programs by maintaining a network of water quality and water level monitor wells.

E.1. Performance Standards:

**A.** District staff will collect and analyze water samples from appropriate monitor wells periodically but not less often than once every five years.



Mineral Analyses from Wells within the District (Table 3)

Parameter	Units	2015 Number of Analyses	2015 Average Analysis	2016 Number of Analyses	2016 Average Analysis	2017 Number of Analyses	2017 Average Analysis
Sulfate	mg/l	6	24.3	16	29.6	22	49.1
Nitrate	mg/l	6	7	16	8.8	22	12.37
Total Iron	mg/l	6	0.069	16	0.1	22	0.16
Chlorides	mg/l	6	19.1	16	68.8	22	24
Fluoride	mg/l	6	0.96	16	0.2	22	0.55
Total Hardness	mg/l	6	204	16	244	22	214

*\*Note 2017 test results do not include analyses performed after May 10, 2017.*

**B.** District staff will perform water quality analyses for select materials for District well owners upon request. Results for the 2017 testing by request are included in Table 3 above, which is published in the 2017 Hydrology and Groundwater Resources Report.

**C.** District staff will summarize their water quality activities and make the information available to the Board of Directors and the public annually. Results for 2017 water quality testing are summarized in the 2017 Hydrology and Groundwater Resources Report and reflected here in Table 3 above.

**D.** District staff will collect aquifer water level measurements annually.

2017-2018 Average Depth to Water and Comparisons of Average Declines in Select District Water Level Monitor Wells (Table 4)

County	Avg. Depth to Water (ft.)	2017 Avg. Well Decline (ft.)	2016 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	286	3.56	3.49	3.43	3.66	3.69	3.09
Hansford	308	2.19	2.15	2.12	1.95	2.06	1.65
Hartley	366	4.30	4.22	4.19	3.86	3.32	3.00
Hutchinson	351	1.90	1.88	1.86	1.81	1.67	1.59
Lipscomb	161	.71	.69	.68	.58	.43	.43
Moore	357	3.13	3.06	3.00	2.46	2.70	1.86
Ochiltree	343	1.68	1.64	1.61	1.41	1.53	1.21
Sherman	311	3.05	3.00	2.89	2.63	2.83	2.23
District-wide	310	2.57	2.52	2.47	2.30	2.28	1.88

*\*The information in Table 4 was derived from an analysis of monitor well hydrographs created from the data in the District’s water level database. The analysis data from some monitor wells, indicating both rises and declines, are not sufficiently consistent to ensure accuracy and reliability in their use. Such data may be excluded during the calculations of declines, depth to water or saturated aquifer formation.*

E. 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 annually. Groundwater level declines and average depth to water are summarized in the 2016-2017 Hydrology and Groundwater Resources Report and reflected here in Table 4 above.

F. District staff will summarize or update aquifer saturated material information and make the information available to the Board of Directors and the public at least every two years.

Estimated Saturated Thickness by County for 2017 (Table 5)

Dallam	Hartley	Sherman	Moore	Hansford	Hutchinson	Ochiltree	Lipscomb
154 ft.	141 ft.	152 ft.	146 ft.	175 ft.	147 ft.	196 ft.	203 ft.

*The saturated thickness of the Ogallala aquifer ranges from less than 10 feet to over 300 feet and has an estimated average thickness of 164 feet across the District (Table 5).*

Staff presented the 2017-2018 Hydrology and Groundwater Resources Report was presented to the Board of Directors on June 4, 2018 as recorded in the minutes of the board meeting.

E.2. Management Objective:

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

E.2. Performance Standard:

- A. District staff will pursue repair or plugging of deteriorated wells. (See Table 6)
- B. District staff will summarize the deteriorated well activities and make the information available to the Board of Directors and the public annually.

Deteriorated Wells (Table 6)

Reported/Discovered	Investigated	Plugged	Capped
0	N/A	N/A	N/A

Addressing Drought Conditions (31TAC §356.5(A)(1)(F))

North Plains Groundwater Conservation District lies in an area of the state of Texas that has a semi-arid climate. Semi-drought conditions are experienced year-round and the District works to educate the public about methods to conserve water all year, but particularly during dry periods.

F.1. Management Objective:

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

F.1. Performance Standards:

Annually, the District will conduct water conservation communications and education activities. These activities will be summarized annually and presented to the Board of Directors.

Summer Municipal Cooperative Conservation Project

The summer municipal cooperative conservation project, also known as Operation: Summer Showers, is a program specifically designed to address domestic conservation at the time of the year when home water usage is at its highest. The project is scheduled for summer, when outdoor use spikes due mostly to lawn and garden irrigation. The project completed its seventh year in 2017. Through cooperation with local city halls, the District distributed summer water conservation kits that included: a low-flow showerhead, a sprinkler gauge, a faucet leak gauge and leak detector tablets. By including the low-flow showerhead and other indoor water saving tools, the kit helped homeowners save water inside, as well as outside. The city halls partnered with the District by acting as distribution points for the kits, sharing the expenses and by helping get the word out that the kits were available. Local radio stations and newspapers also joined in the effort by offering free or discounted public service announcements about Operation: Summer Showers. The District also featured the campaign on all social media platforms. Seven area city halls partnered with the District for the project in 2017.

For other District conservation outreach activities see Item G.1b. Performance Standards.

Water Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, or Brush Control, Where Appropriate And Cost-Effective (31TAC §356.5(A)(1)(G))

G.1. Water Conservation

G.1a. Management Objective:

Support research and field demonstrations to foster adoption of agriculture water conservation technologies and practices.

G.1a. Performance Standards:

Annually, the District will summarize the project results to be presented to the Board of Directors.

“3-4-5 Gallon Production Maximization (GPM) Corn Demonstration Project”

The 2017 “3-4-5 Gallon Production Maximization (GPM) Project” continued to capitalize on advanced soil moisture monitoring to guide cooperating growers in strategically managing their irrigation to minimize production costs and groundwater usage, while maximizing corn yield per inch of groundwater pumped.



The “3-4-5 GPM” project uses the latest water conservation technologies and practices to grow corn, based on the availability of water. Groundwater availability within the District varies from less than 3 gallons per minute (gpm) to over 5 gpm. Factors affecting groundwater availability include well pumping plant efficiency and aquifer capacity for the land to be irrigated. Most irrigating farmers within the District use between 3 gpm and 5 gpm to grow crops. To address these local conditions, the “3-4-5 GPM” project demonstrates best management practices and technologies to grow crops using 3 gpm, 4 gpm and 5 gpm of irrigation water, as needed. More specifically, the project is based on applying 1.10 inches of irrigation weekly, using an irrigation capacity of 3 gpm, 1.49 inches using 4 gpm, and 1.85 inches using 5 gpm. The District partners with the Texas Water Development Board, corporate partner, CPS and area growers to make the project possible.



Project lead Leon New said the 2017 “3-4-5 GPM” project further revealed the benefits of strategic irrigation management. “Cooperators produced good corn yields in the 3 and 4 GPM per acre fields by utilizing strategic, precision irrigation, combined with beneficial rainfall, conservation tillage and many other important efficiency and water management practices,” said New. For the final year of the “3-4-5 GPM” project corn yields ranged from 221 to 277 bushels per acre.

Project results include comparative corn yields, measured irrigation, rainfall and net soil water using center pivot Low Energy Precision Application (LEPA), Precision Mobile Drip Irrigation (PMDI) and Subsurface Drip Irrigation (SDI) systems.

The District conducted the demonstrations at these three sites: NPWCC at Etter, Board President Harold Grall’s farm in Moore County and Board Vice President Danny Krienke’s farm in Ochiltree County. CPS also conducted a “3-4-5 GPM” demonstration at another location at the NPWCC, in cooperation with farm operator, Stan Spain.

The NPWCC experienced some of the most impressive results of the demonstration. Spain raised 260 bushels per acre (bpa) of corn with only 11.38 inches of irrigation. The field received 12.62 inches of in-season rainfall, bringing the total water on the crop to 24 inches. The crop yielded 10.8 bushels per inch of total water and 21.1 bushels per inch of irrigation. Spain irrigated the field with a LEPA center pivot system.

The 4 gpm corn in this field yielded 270 bpa with 13.67 inches of irrigation. Added to the 12.62 inches of rain received on the field, the total water was 26.29 inches. The 4 gpm corn yielded 10.2 bpa per inch of total water and 19.75 bpa per inch of irrigation. The 5 gpm corn also yielded 270 bpa, but with 15.94 inches of irrigation. That’s 2.27 inches more irrigation than the 4 gpm to get the same yield. Including the 12.62 inches of rainfall, the total water was 28.56 inches. The 5 gpm corn yielded 9.5 bpa per inch of total water and 16.94 bpa per inch of irrigation. Based on these numbers, the 3 and 4 gpm were certainly more water-efficient and New says that the project proves that 3 and 4 gpm systems are also the most cost efficient. “When we look at the economics of these demonstrations we consider the cost of irrigation, seed, fertilizer and harvesting,” said New. “When we calculate these costs, net return favors 3 and 4 gpm.”

This field was also involved in year two of the side-by-side comparison between SDI and LEPA center pivot irrigation. LEPA, as was used in the example above, applies the irrigation water in a bubble or similar pattern no more than 18 inches above the soil using drop hoses. It is reported to reach application efficiency levels of 95 percent. SDI uses drip lines buried in the ground delivering water directly to the crop root zone. The WCC provides the opportunity to compare the two high-efficiency systems side-by-side.

In the 2016 side-by-side comparison, the LEPA system out-performed the SDI by an average of about 8 bushels per acre. However, in 2017 the tables were turned with the SDI coming out slightly ahead with an average of about 4 bushels more per acre across the different pumping capacities. “This is why I wanted to be able to compare these two technologies side-by-side,” said New. “While two years of data is not conclusive, it adds to the body of information we started last year that is helping us evaluate the two systems in terms of efficiency and cost effectiveness.”

In addition, the District continued demonstrations initiated in 2015 to compare PMDI to LEPA. PMDI involves drip hoses being pulled around the field by the center pivot system and applying the irrigation directly to the soil. Unfortunately, technical issues during the first year invalidated the results. In 2016, however, with no technical issues, the PMDI out-performed LEPA by an average of 10 bpa, creating some hope that it could be a more efficient alternative to LEPA, with less up-front cost than SDI. Then came the 2017 demonstration and LEPA out performed PMDI. More data is still needed to develop any definitive conclusions.

The three-year “3-4-5 GPM Project” builds on the district’s award winning “200-12 Project” that ended in 2014. Participants in the “3-4-5 GPM” project are using variable rate irrigation (VRI) to simulate 3, 4, and 5 gallons per minute, per acre irrigation conditions in side-by-side, production-scale demonstrations. The “3-4-5 GPM” project” also uses a comprehensive resource management approach including irrigation scheduling and management technologies, maximized delivery systems, conservation tillage practices, hybrid technology, and pest and nutrient management to optimize conditions for water savings and maximum yield.

In summarizing the three-year “3-4-5 GPM” project, New said he observed, even back during the “200-12” project, that many times growers were over-watering with 5 gpm and that it needed to be approached strategically to make the best of use of the water. “I think we’ve pretty well proven that if a farmer will use the tools, including soil moisture probes and efficient delivery systems, and take care of the soil with residue management, then 4 gpm pumping capacity is sufficient to produce a profitable corn crop, while using the water efficiently.”

Producers had the opportunity to learn more about the demonstrations at two grower meetings held in September. Among other topics the meetings focused on many of the techniques and technologies that make up the resource management system applied to the District’s demonstrations.

Master Irrigator Program and Agricultural Water Conservation Outreach

The Master Irrigator Class of 2017 was the second group to take part in this groundbreaking conservation program. The Master Irrigator Program is a cooperative initiative of the District, the United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS) and Texas A&M University designed to promote widespread adoption of technologies and practices to achieve agricultural water conservation in the northern Panhandle. In 2016, the District worked with USDA-NRCS to establish the North Plains GCD EQIP Fund as an incentive for irrigators who

Practice	Amount
Flow Meters	\$9,759.34
Pivot Conversions	\$110,627.77
New Pivots	\$231,488.55
Soil Probes	\$41,838.39
Variable Frequency Drive	\$27,570.11
Total	\$421,284.16

completed the training. NRCS allocated \$1.6 million to the fund to be distributed over 4 years. In the first two years, the program has attracted 51 initial participants, with 46 completing the course. Graduates from the two courses have benefitted from \$740,103.07 from the fund to assist with new conservation



farms. In addition to the EQIP Fund, NRCS agreed to match up to \$45,000 to promote the Master Irrigator Program and other agricultural water conservation outreach programs. The table below outlines the funding and practices.

Master Irrigator training is an irrigation management curriculum made up of 4 days of intensive, interactive irrigation education. The program is focused on increasing understanding and proficiency with the latest irrigation management tools, technologies and practices. Armed with this knowledge, irrigators select tools and strategies that fit their operation and can be implemented to maximize return on investment for every drop of water used.

A project advisory panel made up of farmers and industry and conservation leaders continued throughout 2017 to work with Dr. Steve Amosson, formerly of Texas A&M AgriLife, to fine tune the curriculum for the course.

**Variable Frequency Drives for Electric Irrigation Well Pump Motors Assistance**

Variable Frequency Drives (VFDs) allow electric pump motors on irrigation wells to speed up or slow down to adjust pump performance and to match operating conditions. Used correctly, VFDs can save energy, while maintaining pumping plant efficiency.

In 2017, the District continued working with the USDA-NRCS and local growers to assist with the NRCS pump testing requirements and application process for installing VFDs on irrigation wells. The pump tests consisted of two tests, one before and one after the installation of the VFD. The tests determined the efficiency and cost savings for the pumping systems. The District performed 13 pumping tests for growers that were approved for funding through NRCS EQIP for VFDs.

**Irrigation Conservation Initiative Grant Program**

Agricultural irrigators in the District have financial and technical assistance for implementing certain irrigation efficiency equipment, including soil moisture probes, pivot monitoring and control systems, telemetry and on-farm weather stations. The program is made possible by \$300,000 in grants from the TWDB. The program, known as the Irrigation Conservation Initiative (ICI) requires irrigating producers to participate in at least one of the District’s educational programs or activities to be eligible for cost share. In 2017, 29 irrigators gained eligibility by attending one of two “3-4-5 GPM” project field days. The cost share program will cover up to half of the cost of the selected technology or practice.

**G.1b. Management Objective:**

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

**G.1b. Performance Standards:**

Annually the District will disseminate groundwater conservation and waste prevention information through a variety of media, activities and events. Activities will target agricultural, residential and young stakeholders. A summary of educational activities will be presented to the Board of Directors each year.

**Conservation Outreach Activities**

**Annual Water Festivals**

The District presented the 12th annual children’s water festival in 2017. The event, currently dubbed the “Save the Planet’s Water Festival,” welcomed 832 fourth grade students and 84 teachers and staff for a grand total of 916 participants over the three days of festivals. The District held the events on May 16th in Perryton, May 17th in Dalhart and May 18th in Dumas. The Festival leads potential Water Rangers on a full day of training and fun to ultimately prepare them to “protect and conserve groundwater wherever they find it.” Throughout the day the new recruits visited seven



stations featuring activities, presentations and games with water conservation and natural resource themes. Once they completed their Water Ranger “basic training,” they earned the right to be called a Water Ranger.

During the festivals, the students learned about topics including the Ogallala aquifer, watershed protection, the history of water in the region and much more.

**In-Class Groundwater Conservation Presentations**

District personnel provided in-class groundwater conservation education for 4th grade classes in Moore County reaching approximately 345 students. In the summer,

District staff partnered with Killgore Memorial Library to present water conservation education to approximately 200 students in kindergarten through 6th grades in Dumas, Cactus and Sunray, as a part of the library’s “Build a Better World” summer education program. The District provides in-class presentations by request on a first come, first served basis.

**Groundwater Conservation Presentations**

The District provides presentations to community and civic organizations and stakeholders within the District, and to industry groups locally, state-wide and beyond. District personnel also participated in community events across the District throughout the year. Presentations and participation in 2017 included:

January 4	Steve Walthour, National Water Resources Association Leadership Forum, Las Vegas, NV
January 9	Leon New/Kirk Welch, Pioneer Crop Production Clinic – Dalhart, TX
January 10	Leon New/Kirk Welch, Pioneer Crop Production Clinic – Dumas, TX
January 11	Leon New/Kirk Welch, Pioneer Crop Production Clinic – Stratford, TX
January 12	Leon New/Kirk Welch, Pioneer Crop Production Clinic – Spearman, TX
January 23	Steve Walthour, NRCS State Technical Advisory Committee, Austin, TX
January 25	Steve Walthour, Texas Water Development Board, Water for Texas - Agricultural Water Conservation: Success Stories from the Field, Austin, TX
March 3	Steve Walthour, Texas Water Consercation Association - San Antonio, TX
March 22	Steve Walthour, Master Irrigator, North Plains Water Conservation Center, Etter, TX
March 22	Master Irrigator Session 1: Agronomics - North Plains WCC, Etter, TX
March 29	Master Irrigator Session 2: Irrigation Scheduling - North Plains WCC, Etter, TX
March 31	Steve Walthour, High Plains Public Radio – Book Review of Ogallala Blue
April 5	Master Irrigator Session 3: Systems - North Plains WCC, Etter, TX
April 12	Master Irrigator Session 4: Systems & Special Topics - North Plains WCC, Etter, TX
May 16	“Save Our Planet’s Water Festival” – Perryton, TX
May 17	“Save Our Planet’s Water Festival” – Dalhart, TX
May 18	“Save Our Planet’s Water Festival” – Dumas, TX
May 21	Steve Walthour, High Plains Public Radio, Garden City Kansas, KS
July 13	Steve Walthour, Dumas Lions Club, What Is an “Ogallala”?, Dumas, TX
July 26	Steve Walthour, Panhandle Regional Water Planning Meeting, Amarillo
Aug. 5-7	Staff, XIT Rodeo, Dalhart, TX
August 30	Steve Walthour, Texas Groundwater Summit – Getting Deep: Water Wells (Moderator), San Marcos, TX
August 31	Steve Walthour, Texas Groundwater Summit - DFC Tracking Panel, San Marcos, TX
September 7	Steve Walthour/Stam Spain, NPWCC Field Day, Dumas, TX
September 20	Leon New/Danny Kreinke, NPGCD Grower Day, Perryton, TX
October 25	Kirk Welch, Groundwater Foundation National Conference, Boise, ID
October 28	Steve Walthour, Rain Water Harvesting, Dumas, TX
November 8	Steve Walthour/Keith Good, TAGD Leadership Training, Amarillo, TX
December 6	Steve Walthour, Radio Interview regarding Master Irrigator, Perryton, TX



## North Plains Water News

The District published the North Plains Water News (NPWN) four times in 2017. The NPWN is a four-page newsletter that features articles highlighting the District's regulatory, scientific and education outreach activities, as well as other relevant news relating to water. In addition to mailing the print version to over 1200 recipients, the newsletter is also available on the District website at [www.northplainsgcd.org](http://www.northplainsgcd.org). In 2017, the District distributed the newsletter via email to more than 1000 e-mail addresses.



## Conservation News Releases

The District employed a consistent media relations and public relations campaign featuring news releases highlighting the activity of the Board of Directors and updates on the District's conservation outreach programs. The District also responded to media requests for information and assisted television, radio, print and online news agencies in the coordination of coverage that extended the conservation message.

## Rainwater Harvesting

The District partnered with Texas A&M AgriLife Extension and Research to offer a workshop exploring the topic of rainwater harvesting. Charles Hillyer, Extension Specialist – Irrigation Engineer, presented the workshop on Saturday, October 28 at North Plains Groundwater Conservation District at 603 East 1st St. Hillyer gave an overview of the principles of rainwater harvesting to inform interested stakeholders and provide a head start to anyone wanting to plan their own system.

The District has rainwater harvesting information available upon request at the District office.

## Xeriscaping Class

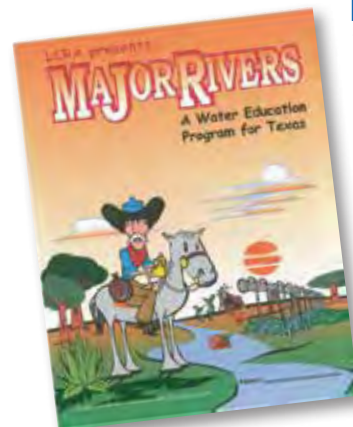
The District held a water wise Gardening Class on March 11, 2017 presented by Neal Hinders, owner of Canyon's Edge Plants. Hinders taught the 10 attendees how to have a beautiful landscape while being responsible stewards of the area's precious water resources. Hinders discussed xeriscaping concepts and low-water use plant varieties and their characteristics.

The class was free to the public, and attendees received free resources on water wise gardening and xeriscaping. One \$30 gift card to Canyon's Edge Plants was won by class attendee Cindy Rhoades, and all attendees received 25 percent off up to \$100 at Canyon's Edge Plants.

The District has information regarding xeriscaping and low water use plants available upon request at the District office.

## Major Rivers Curriculum

The Major Rivers Curriculum was made available by request to any class within the District.



## Fifth Grade WaterWise Education Curriculum

The WaterWise Conservation Education Program was made available to all fifth graders in the District. 2017 is the seventh year of the program and 814 fifth grade students and their teachers participated. Through an in-class, teacher-led



conservation curriculum and a take-home kit filled with conservation tools, students and their families are learning and saving water. Numbers shown are for 2015-2016.

## TOTAL PROJECTED PROGRAM SAVINGS:

ANNUAL	LIFETIME
3,981,672	24,100,366 gallons of water
14,990	94,177 therms of gas
128,521	808,893 kWh of electricity



## Water Conservation Calendar Art Contest

The District sponsored the 13th Annual Water Conservation Calendar Artwork Contest in 2017. The contest was open to 4th, 5th and 6th grade students throughout the District. Students submitted their entries to the District office where staff selected 12 monthly winners and one grand prize, cover winner. The 2017 Water Conservation Calendar featured all winning artwork. The grand prize winner received a \$50 gift card and the entry was displayed on the cover of the calendar. The other winners received \$25 gift cards. The District produced 400 calendars and

distributed them to the winners, other individuals by request, and through the District office and city offices throughout the District.

## Groundwater Presentation at Farm Bureau Ag Fairs

Approximately 375 students participated in the "Edible Aquifer" activity presented in cooperation with the Moore County Farm Bureau. The "Edible Aquifer" teaches the students about the composition of aquifers in a unique and memorable way. By leading the students through the process of constructing an aquifer out of a variety of tasty materials, the idea is reinforced that our aquifer is formed by layers of geologic material. After the ice, the soda, the ice cream, and the chocolate milk mix are all combined to form the "Edible Aquifer," the message is driven home when the students lower a straw in to the concoction and "pump" the mixture out, dirt and all. The activity uses the powerful sense of taste to reinforce the concept of the aquifer and where our water comes from.

## Meter Reimbursement Program

On January 31, 2017 the North Plains Groundwater Conservation District concluded the meter installation period from the first contract of its three meter-reimbursement contracts with the Texas Water Development Board (TWDB). From the beginning of the contract in October of 2014 through the end of the installation period the District reimbursed half the cost of 673 meters. The District's expenditures for meters during that time equaled \$574,592.69.

The meter reimbursement program is designed to help offset the cost to area irrigators who put flow meters on irrigation wells. Under the second contract the District has \$800,400 available for meter reimbursement which allows the District to operate the program through December 2019. Under this second contract during 2017, the District reimbursed \$83,843.86 for half the cost of an additional 92 meters.

The funds for the meter reimbursement program come from grants made available by the TWDB. The TWDB funds are awarded to groundwater districts across the state with the understanding that meters are an accepted and effective management tool for producers and groundwater conservation districts.

The TWDB awarded the District an additional \$295,050 in August 2015 (third contract), bringing the grand total for the program to almost \$1.7 million dollars. The additional funds should allow the District to operate the meter reimbursement program through December 2021. As a condition of receiving the funds, the District requires participants to report their various crops, crop acres and estimated inches of water applied to those various crops annually for five years after the contract's



meter installation period. This allows the District to more accurately estimate, by county, the inches of water each crop uses. This information is used in regional planning and eventually incorporated into the Texas State Water Plan.

It is estimated that the TWDB funds will allow the District to assist local irrigators with the purchase of approximately 2,300 meters over the duration of the meter reimbursement contracts.

G.2. Recharge Enhancement

The District has limited surface water resources to enhance recharge through diversion or infiltration of surface water. The District explored recharge enhancement through its precipitation enhancement program. The District discontinued its funding for the precipitation enhancement program in 2006. The District could not quantify if, and to what extent, the program positively affected precipitation and subsequent recharge. Therefore, recharge enhancement through surface water diversion or infiltration, or through precipitation enhancement could not be proven to be effective. The District has determined that this objective is not applicable at this time.

G.3. Rainwater Harvesting

G.3. Management Objective:

Provide public information regarding rainwater harvesting.

G.3. Performance Standards:

The District’s activities in rainwater harvesting education will be summarized annually and presented to the Board of Directors.

The rainwater harvesting education and outreach activity conducted by the District is described under the Performance Standards for Item G.1b.

G.4. Precipitation Enhancement

The District has determined that this objective is not applicable at this time.

G.5. Brush Control

G.5. Management Objective:

Provide public information regarding brush control.

G.5. Performance Standards:

Maintain brush control literature in the District office. The District’s activities in addressing brush control education will be summarized annually and presented to the Board of Directors.

Brush control information is available in the District office at 603 E. 1st Street, Dumas, TX.

Desired Future Conditions (DFC) of the Groundwater Resources (31TAC\$356.5(A)(1)(H))

H.1. Management Objective:

Revise District Rules to achieve Desired Future Conditions of the Ogallala, Rita Blanca and Dockum aquifers.

H.1. Performance Standards:

The District will update its rules within one year of adoption of the management plan. Annually the District will review its rules and conservation programs to determine if they are achieving the DFCs.

The current District Management Plan was adopted by the Board of Directors in May of 2013 and approved by the TWDB in July of 2013. The acceptance by the TWDB began the 1-year window for adoption of rules to achieve the DFC’s. In July of 2014 the District passed new rules designed to make adjustments in the Annual Allowable Production, if necessary, to meet the Desired Future

Conditions. In April 2015 the Board repealed the existing rules and approved newly proposed and revised rules for the District. The decision was the culmination of three years of review by the board. The rules regarding the DFCs were moved, unchanged, from Chapter 4 in the previous rules to Chapter 8 in the current rules. On July 20, 2016 the Board of Directors reviewed the rules and programs and determined they were sufficient to meet the DFC as the District’s 2016 production was 34.6 percent below the Modeled Available Groundwater levels as indicated by the TWDB.

H.2. Management Objective:

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

H.2. Performance Standards:

Annually review groundwater production information, GAMs, and water level measurements to characterize aquifer conditions compared to the DFCs and report findings to the Board of Directors.

District Hydrologist, Dale Hallmark, compiled the following information showing the status of the aquifer in relation to Modeled Available Groundwater (MAG) based on the District’s DFCs.

Table 8 provides a comparison of the 5-year average groundwater production and the 2017 groundwater production to the 2020 MAG.

The MAG is a calculation provided by the TWDB that estimates the amount of groundwater that is available for pumping and yet still achieve the District’s approved DFCs. Based on the 5-year average (2013-2017), the remaining MAG across the District is 29.06 percent. The average remaining MAG for the four eastern counties is 55.91 percent, and 13.11 percent for the western counties.

For the 2017 production, the total remaining MAG across the District is 35.96 percent. The remaining MAG for the four eastern counties is 60.89 percent, and 21.15 percent for the western counties.

If the District continued to pump at 2017 rates, a pumping reduction would be required to achieve the DFC for the western counties by 2030, and the eastern counties would not require a reduction in pumping during the observed period of the MAG, through 2062. At the 2017 pumping rate, the pumping would need to be reduced by 46,256 acre-feet in the Western four counties by 2030 to achieve the DFC. At the 5-year average rate, pumping would need to be reduced in the Western four counties by 161.14 thousand acre-feet by 2030.

District Production Trend Compared to Ogallala Modeled Available Groundwater (Table 8)

County	2020 MAG	2017 Production	2017 Difference	Average Production 2013-2017	Average Difference
Dallam	401,663	312,300	-22.25%	348,300	-13.29%
Hartley	409,187	376,000	-8.11%	400,280	-2.18%
Moore	219,654	173,100	-21.19%	190,760	-13.15%
Sherman	398,183	265,100	-33.42%	302,040	-24.15%
Hansford	275,016	146,700	-46.66%	175,920	-36.03%
Hutchinson	62,803	63,600	1.27%	66,540	5.95%
Lipscomb	266,809	44,200	-83.43%	43,460	-83.71%
Ochiltree	243,778	77,300	-68.29%	88,140	-63.84%
West	1,428,687	1,126,500	-21.15%	1,241,380	-13.11%
East	848,406	331,800	-60.89%	374,060	-55.91%
Total	2,277,093	1,458,300	-35.96%	1,615,440	-29.06%



**H.3. Management Objective:**

Joint plan with other Groundwater Conservation Districts to achieve DFCs.

**H.3. Performance Standards:**

At least annually report the joint planning committee activities to the Board of Directors.

**November 9, 2017** – The Groundwater Management Area 1 Joint Planning Committee elected officers, discussed bylaws and reviewed management plans. The committee reviewed recent legislation that could affect joint planning and directed the district managers to work on a method of comparing the member districts rules. General Manager, Steve Walthour; Directors Danny Krienke, Bob Zimmer, and Gene Born; and Hydrologist, Dale Hallmark attended the meeting on behalf of the District.

The report for joint planning was presented to the Board of Directors at multiple board meetings including the April 11 and June 20, 2017 meetings as reflected in the District’s official minutes.

North Plains Groundwater Conservation District joint-planned with the three other Groundwater Management Area 1 member districts in 2017. The groundwater management area planning process included one public meeting held at the Panhandle Regional Planning Commission, 415 SW 8th Avenue in Amarillo. The Joint Planning Committee (JPC) consisted of a representative from each of the four districts in the GMA, and one at-large member. North Plains GCD Secretary Bob Zimmer presided over the committee. North Plains GCD Vice President Danny Krienke served as its representative to the Panhandle Regional Water Planning Group.

The representatives of the member districts retained the Panhandle Regional Planning Commission for administrative services including: preparation of meetings, assistance in development of agenda packets, fulfilling secretary of state requirements with regards to Texas Open Meetings Act, and maintaining Texas Public Records. North Plains GCD assisted in the planning process by providing technical services and coordinating the groundwater availability modeling of proposed Desired Future Conditions, as needed. The member districts considered various presentations and information to address Texas Water Code Chapter 35 and Chapter 36 requirements.

**H.4. Management Objective:**

Manage groundwater withdrawal amounts based on an allowable production limitation in order to achieve DFCs.

**H.4. Performance Standards:**

Annually the District will summarize the previous year’s allowable production compliance. Each year the compliance results will be presented to the Board of Directors.

**Other Management Goals included In the Plan by the District**

No other management goals are listed at this time.

**DISTRICT FINANCIALS**

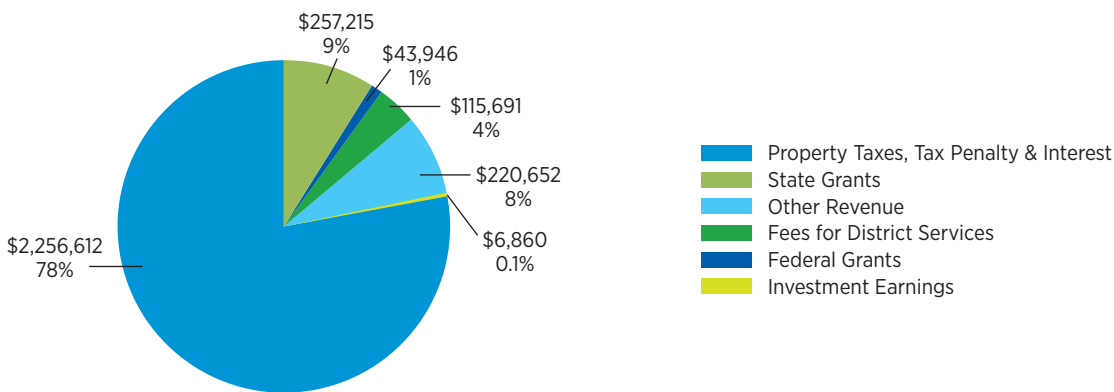
For the fiscal year ending September 30, 2017, the District’s net financial position increased by \$0.27 million, or nearly 7.4%, because of 2017 District operations. During the year, the District had expenditures that were \$0.27 million less than the \$2.91 million generated in tax and other revenues for District programs. The total cost of all the District’s programs and activities after charges for services and operating grants was \$2.10 million.

The cost of all governmental activities this year was \$2.64 million. However, our taxpayers ultimately paid only \$2.06 million because some of the costs were paid by those who directly benefited from the programs (\$0.28 million) or by grants the District acquired at the direction of the Board (\$0.30 million) that subsidized certain conservation programs.

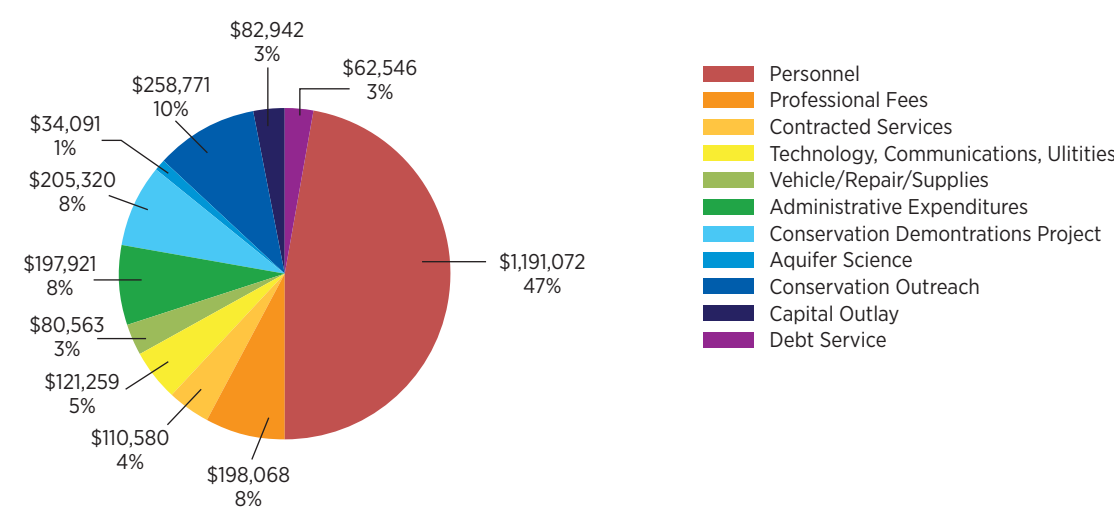
The District completed the year with a fund balance of \$1.73 million, which is up from the previous year’s balance of \$1.37 million.

At the end of the fiscal year the District had \$2.48 million invested in a broad range of capital assets including facilities and equipment for water conservation. The amount represents a net decrease of just over \$0.18 million or 6.92% less than last year. The following charts show the District’s revenues and other financing sources, as well as the District’s expenditures for the fiscal year ending September 30, 2017.

**Revenues and Other Financing Sources**



**Total Expenditures**







P.O. Box 795 • 603 East 1st Street • Dumas, TX 79029 • 806/935-6401 • Fax 806/935-6633 • [northplainsgcd.org](http://northplainsgcd.org)