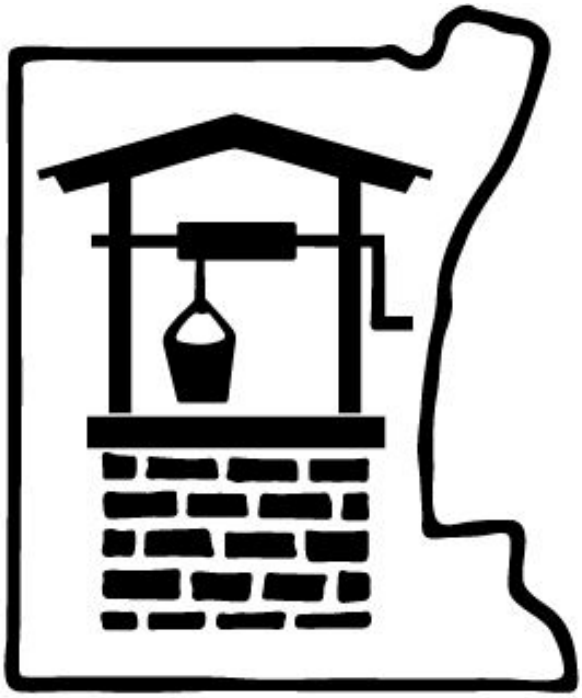
RUSK COUNTY GROUNDWATER CONSERVATION DISTRICT



DISTRICT ANNUAL REPORT 2020

SEPTEMBER 2019 TO AUGUST 2020

`

This page intentionally left blank.

CURRENT BOARD OF DIRECTORS

BOBBY BROWN – PRESIDENT

DAVID C. POWELL – VICE PRESIDENT

JOHN LANGSTON – SECRETARY/TREASURER

KEN RAGLE – DIRECTOR

ROY VANNOY – DIRECTOR

HARRY HAMILTON – DIRECTOR

EMILY WHITWORTH – DIRECTOR

HONORING PAST DIRECTORS

IN MEMORY OF JIM WHITE – DIRECTOR (DECEASED 2020)

DR. WILLIAM SHEEHAN– DIRECTOR (RETIRED 2020)

GENERAL MANAGER

ROBERT THORNTON *(BEGAN TENURE DECEMBER 2019)*

REPORT COMPLETED 10/21/2020

APPROVED

NOVEMBER 9, 2020

DISTRICT MISSION

"THE RUSK COUNTY GROUNDWATER CONSERVATION DISTRICT'S MISSION IS TO PRESERVE AND PROTECT THE GROUNDWATER RESOURCES OF THE DISTRICT FOR RUSK COUNTY RESIDENTS."

Table of Contents

METHODOLOGY FOR TRACKING DISTRICT PROGRESS IN ACHIEVING MANAGEMENT GOALS:

An annual report will be prepared and presented to the Board of Directors on District performance about achieving management goals and objectives. The presentation of this report will occur within the first quarter of the following fiscal year. The Annual Report will be prepared in a format reflective of the performance standards listed following each management objective. The District will maintain the reports on file for public inspection at the District's office upon adoption.

MANAGEMENT PLAN GOALS, OBJECTIVES & PERFORMANCE STANDARDS:

The Rusk County Groundwater Conservation District has seven (7) management objectives with fifteen (15) goals detailed in the Management Plan, Section 12, adopted November 12, 2018. These objectives and goals provide details along with the performance of the District in attaining these goals as follows:

12.1. PROVIDING THE MOST EFFICIENT USE OF GROUNDWATER

12.1.A. MAINTAIN A WELL REGISTRATION PROCESS

OBJECTIVE: The District will require the registration of all groundwater wells, exempt and non-exempt, new and existing, within the boundaries of the District to be registered in accordance with the District Rules.

PERFORMANCE STANDARD: The number of new and existing water wells registered with the District will be provided at the regular District Board meetings and in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

At each regular scheduled Board meeting, Well Statistics for the month are recorded and reported to the Board. The following are well statistics of the year for new, existing, exempt, and non-exempt wells all maintained in the District's database.

September 1, 2019 - August 31, 2020	
Authorizations to Drill & Produce Water:	66
Authorizations to Drill Denied:	0
Total Authorizations Overall:	1860
Amended Applications:	0
Amended Applications Denied:	0
Total Amended Applications Overall:	8
Rush Applications:	6
Total Rush Applications Overall:	42
Total Registrations Issued, New Wells:	57
Total Registrations Issued, Existing Wells:	80
Total Registrations Overall:	5097
Total Operating Permits (OP) Issued:	11
Total Permits OPs Issued Overall:	106
Total Operating Permits on File:	185
Transfer Inspections Completed:	6
Transfer Inspections Overall:	562
Surface Inspections Completed:	95
Surface Inspections Overall:	508
Large Diameter Wells Registered:	12
Large Diameter Wells Registered Overall:	432
Large Diameter Wells Plugged:	8
Large Diameter Wells Plugged Overall:	33
Plugged Oil and Gas Water Wells Overall:	766
Wells Plugged or Consumed in Mines Total Overall:	1249

*Overall: numbers since District or rule creation

12.1.B. MAINTAIN A WELL PERMITTING PROCESS

OBJECTIVE: The District will require all new and existing non-exempt water wells within the boundaries of the District to be permitted in accordance with the District Rules.

PERFORMANCE STANDARD: The District will process applications for operating permits of all non-exempt water wells pursuant to the permitting process of the District Rules. A summary of the number of applications for permitted use of groundwater will be provided at the regular District Board meetings and in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:
At each regular scheduled Board meeting, Well Statistics for the month are recorded and reported to the board which includes applications for permitted use.

To find more detail on the District managing groundwater supplies please refer to the District's Management Plan and Rules all available to the public on the District's website, www.rcgcd.org.

See Objective 12.1.A for Activity and Accomplishments regarding District Well Statistics.

12.1.C. MAINTAIN AN ELECTRONIC DATABASE

OBJECTIVE: Maintain the District's Groundwater Well Database for registrations, permits, and groundwater production volume. The database shall include information deemed necessary by the District to enable effective monitoring and regulation of groundwater in the District.

PERFORMANCE STANDARD: The District will document all new and existing wells in the District's database. All new and existing wells documented will be included in the District's Annual Report.

PERFORMANCE STANDARD: The District will include a summary of the estimated volume of water produced in Rusk County in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:
The District operates a web-based Groundwater Well Database and transitioned from a Microsoft Access/ArcGIS database in June 2017. The District began operation of a new web-based Database with improvements implemented and data transferred from the existing system to improve efficiency in all areas. All registrations, permits, and groundwater production volumes are accessible from the database for District use.

See Objective 12.1.A for Activity and Accomplishments regarding District Well Statistics.

See Appendix A, for Activity and Accomplishments related to documenting groundwater production.

See Appendix B, for Activity and Accomplishments related to documented new and existing wells in the District's database.

12.2. CONTROLLING AND PREVENTING WASTE OF GROUNDWATER

12.2.A. DISSEMINATE INFORMATION ON WASTE PREVENTION

OBJECTIVE: The District will provide information on an annual basis for educating the public on elimination, reduction, and prevention of the waste of groundwater. The District will use at least one of the following methods to provide information to the public annually:

a. Distribute literature packets or brochures;

b. Conduct public or school presentations;
c. Sponsor an educational program or course;
d. Provide information on the District's web site;
e. Submit an article for publication with local papers;
f. Present displays at public events.

PERFORMANCE STANDARD: A summary of the District's efforts to disseminate information on waste prevention will be included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:
The District disseminated waste prevention and conservation literature, materials, and demonstrations to the public in the following ways:

A. Information on conservation is found on the District's website at rcgcd.org by going to the http://rcgcd.org/water-conservation/ link.
B. Other disseminations included:
    a. July 2020: Facebook post of water conservation tips.
    b. August 2020: Facebook post of Texas Drought update; projected rainfall totals from Hurricane Laura.
    c. September 2020: Texas Drought update.
C. Press Release in Henderson Daily
    a. August 2020, District Ad showing area, aquifer, and directors.
    b. Tax and Budget Notice.
D. The District maintains a native, drought tolerant landscape around the District office to serve as an example of plants that can be utilized to minimize waste and promote conservation. The landscape and practice is promoted on the District's website.
E. The District's Website hosts several educational pieces readily available to the public. Specific topics by section on the website regarding waste prevention and conservation are as follows: Monitoring Programs, District Groundwater Geology and Groundwater Resources, Groundwater Well Education, Recharge Enhancement, Water Conservation, Youth Education Program, Groundwater Well Education, Conservation Education, and finally the District's Current Events, News, and Articles. Total website users for the year was 1,944
F. Donated $500 to Texas 4-H Water Ambassadors Program; Received notes of thanks from a Rusk County student and a Cherokee County student.

12.2.B. IDENTIFY WASTEFUL PRACTICES

OBJECTIVE: The District will identify wasteful practices within the boundaries of the District through the following methods:

a. Track water loss for all water utilities within the District;
b. Enforce District Rule 9.2.5 requiring inspection and/or plugging of oil and gas groundwater wells.

PERFORMANCE STANDARD: The District will include a summary of the total volume of water loss from water utilities in the District's Annual Report.

PERFORMANCE STANDARD: The District will include the total oil and gas groundwater wells inspected and plugged each fiscal year in the Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:
Through Rule 9.2.5, continued efforts to eliminate comingling of aquifers zones of different quality and prevent waste of water from one zone to another. Facebook posts…June 2020: Jesus monitoring camera equipment for a downhole inspection. March 2020: Jesus monitoring a downhole inspection.

See Objective 12.1.A Activity and Accomplishments for oil and gas groundwater wells inspected and plugged.

See Appendix A for summary of water loss of Rusk County water utilities.

12.3. ADDRESSING CONJUNCTIVE SURFACE WATER MANAGEMENT ISSUES

12.3.A. PARTICIPATING IN THE REGIONAL WATER PLANNING PROCESS

OBJECTIVE: The District will attend at least one East Texas Regional Water Planning Group (Region I) and the Northeast Texas Regional Water Planning Group (Region D) meeting each fiscal year.

PERFORMANCE STANDARD: The District will participate in the regional planning process by attending at least one meeting of Region I and Region D meetings each fiscal year. A report will be presented at a regular board meeting of the District on conjunctive surface water issues of the appropriate Regional Water Planning Groups. Attendance of meetings for Region I and Region D will be included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:
District representatives attended Regional Water Planning Group (RWPG) I meetings. Following attendance of RWPG I meetings, the District Board was briefed on the status and activities at the following regular board meeting. The following are dates that District Representatives attended and participated in the RWPG D & I meetings:

RWPG	Meeting Date	Representative
Region I	**January 15, 2020**	**Robert Thornton**
Region I	**August 5, 2020**	**Robert Thornton**
Region I	**September 16, 2020**	**Robert Thornton**

12.4. ADDRESSING NATURAL RESOURCE ISSUES

12.4.A. MONITOR WATER LEVELS

Objective: The District will manage and maintain its existing water level monitoring program. The District will monitor water levels within the District boundaries at least annually and will be recorded in the District's database.

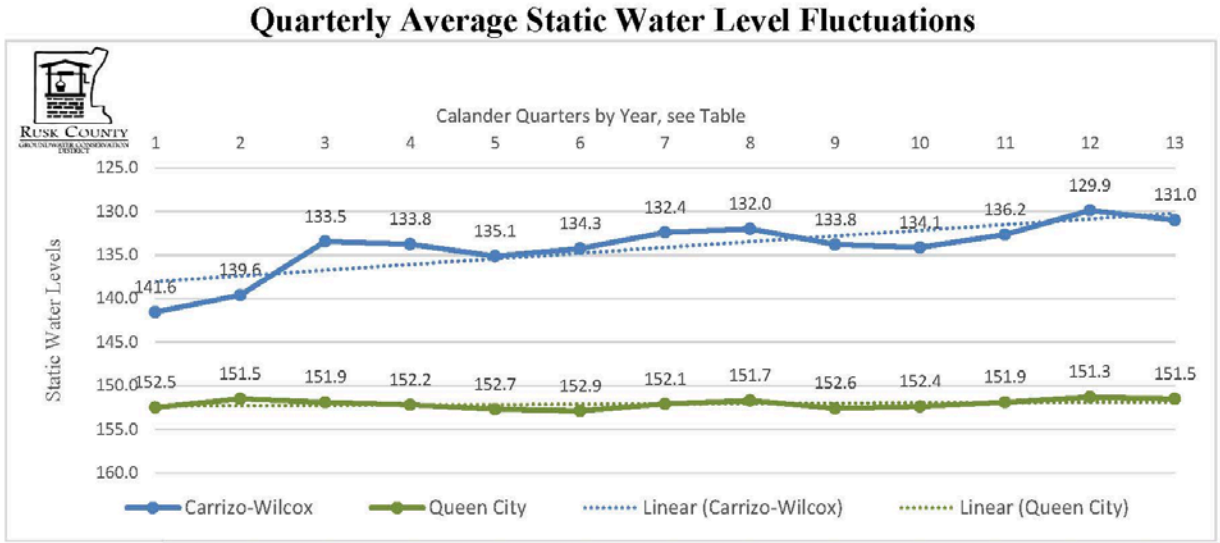
PERFORMANCE STANDARD: A description of the number of wells measured and the monitoring results of the year will be included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:

AQUIFER MONITORING

MONTHLY: The District collects static water level readings at about 16 monitor wells monthly.
January 2020: Facebook post of Jesus checking water levels in the field.
March 2020: Facebook post of Robert checking water level of a well.
QUARTERLY: The District collects static water level readings at about 50 monitor wells quarterly. As wells are plugged by owners, the District shifts its wells monitored and numbers accordingly. This data is maintained in the District's database.
REAL-TIME STATIONS: The District has four (4) real-time water level monitoring stations recorded by transducers. Data from these monitor wells is uploaded daily via satellite to the Texas Water Development Board site, and is linked to the District website for real-time coverage locally.

Data is collected in the field and evaluated by depth to water from surface and is kept in the District's database. The District's quarterly average aquifer levels by Depth to Water are displayed in the following graph.
See Appendix A, for Annual Groundwater Elevations report.



	Q3_17	Q4_17	Q1_18	Q2_18	Q3_18	Q4_18	Q1_19	Q2_19	Q3_19	Q4_19	Q1_20	Q2_20	Q3_20
Quarter Label	1	2	3	4	5	6	7	8	9	10	11	12	13
Static Elevation	141.6	139.61	133.46	133.77	135.13	134.27	132.42	132.01	133.8	134.1	132.7	129.9	131.0
	152.5	151.5	151.9	152.2	152.7	152.9	152.1	151.7	152.6	152.4	151.9	151.3	151.5

12.4.B. ADDRESS ABANDONED AND NUISANCE WELLS

OBJECTIVE: The District will encourage the plugging of abandoned and nuisance groundwater wells. The District will conduct inspections of groundwater wells within the District's boundaries to encourage proper maintenance of groundwater wells and to document abandoned and nuisance

groundwater wells that pose a risk to the District's groundwater resources.

PERFORMANCE STANDARD: A description of the number of wells inspected, the number of wells in violation, and the number of wells brought into compliance or plugged will be included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:
The District promotes its Abandoned Well Program to assist and encourage well owners to cap or plug abandoned or nuisance groundwater wells. Many of these are old, large diameter wells.

The District conducts healthy well inspections of existing wells, newly drilled wells, and down-hole inspections of groundwater wells for oil and gas rig supply and exploration. This helps the District in identifying potential risks to the aquifer and those well owners by eliminating public health and safety risks of groundwater commingling and abandonment. All inspected wells and recorded and kept on file at the District Office and in the District's Database.

In addition, seven WSC entities' existing wells were inspected.

A description of wells identified through the District's healthy well inspection program is outlined below:

District Abandoned & Nuisance Well Prevention			
September 1, 2019 - August 31, 2020	**2019-2020**	**2018-2019**	**2017-2018**
Transfer Inspections Completed:	6	11	10
Surface Inspections Completed:	95	87	125
Wells sent Notice of Violation:	4	12	22
Wells brought into compliance:	4	7	12
Wells Plugged or Consumed in Mines:	102	109	142
Well Plugging Reimbursements:	0	0	0

12.5. ADDRESSING DROUGHT CONDITIONS

12.5.A. DROUGHT CONTINGENCY PLAN

OBJECTIVE: The District will implement its Drought Contingency Plan (DCP) if conditions meet the criteria listed in the plan. The District will evaluate its DCP annually to determine if any amendments are necessary and properly respond to drought conditions locally.

PERFORMANCE STANDARD: A summary of the evaluation of the District's Drought Contingency Plan and any revisions to the plan for proper response to drought conditions will be included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:
The District's DCP to be evaluated as required annually by the District's Board of Directors and General Manager at November 2020 meeting.

12.5.B. TRACK DROUGHT CONDITIONS

OBJECTIVE: The District will monitor drought conditions using a suitable source such as the U.S. Drought Monitor or the Palmer Drought Severity Index Map.

PERFORMANCE STANDARD: Link's on the District's web page to the Palmer Drought Severity Index, U.S. Drought Monitor, and the TWDB's website on drought will be made available to the public.

PERFORMANCE STANDARD: A summary of monitored drought conditions will be provided at the regular District Board meetings and in the District's Annual Report.

PERFORMANCE STANDARD: Monthly rainfall across Rusk County is monitored through six (6) District rain gauges, and two (2) additional sites – Texas A&M at Overton & a National Weather Service site in Henderson.

ACTIVITY AND ACCOMPLISHMENTS:

Drought conditions are tracked in the District and surrounding area with the Palmer Drought Severity Index Map and the Texas Drought Monitor once a month and presented at the Monthly Board meetings. The Palmer Drought Severity Index Map, Texas Drought Monitor, and the TWDB's website on drought are made available to the public on the District's web page, http://rcgcd.org/monitoring-programs/. Facebook Posts…February 2020: Newest weather station at Lake Striker. August 2020: Texas Drought update; projected rainfall totals from Hurricane Laura. September 2020: Texas Drought update.

For most of the fiscal year, rainfall outpaced the average year cumulative. Only in December 2019 did the average year cumulative fall short -0.70". The driest month of the fiscal year was November 2019, when only 0.65" of rain fell on average across the county.

12.6. ADDRESSING CONSERVATION, RECHARGE ENHANCEMENT, AND RAINWATER HARVESTING

12.6.A. PUBLIC EDUCATION TO EMPHASIZE WATER CONSERVATION

OBJECTIVE: In coordination with efforts in waste prevention, the District will provide information on an annual basis to promote conservation. The District will use at least one of the following methods to provide information to the public annually:

a. Distribute literature packets or brochures;
b. Conduct public or school presentations;
c. Sponsor an educational program or course;
d. Provide information on the District's web site;
e. Submit an article for publication with local papers; and

f. Present displays at public events.

PERFORMANCE STANDARD: A summary of the District's efforts to disseminate information on water conservation will be included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:
See Objective 12.2.A for Activity and Accomplishments regarding efforts to disseminate information on water conservation. July 2020: Facebook post of water conservation tips. Donated $500 to Texas 4-H Water Ambassadors Program; Received notes of thanks from a Rusk County student and a Cherokee County student.

12.6.B. RECHARGE ENHANCEMENT

OBJECTIVE: To continue education on the diversity of the resource, the District will provide information relating to recharge enhancement on the District web site.

PERFORMANCE STANDARD: Information that has been provided on the District web site will be included or summarized in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:
Recharge Enhancement education and external links are made available to the public on the District's web page in the Education Tab at, http://rcgcd.org/205-2/. This material provides information on groundwater movement and aquifer characteristics regarding recharge enhancement within Rusk County.

12.6.C. RAINWATER HARVESTING

OBJECTIVE: The District will promote rainwater harvesting by providing information about rainwater harvesting on the District web site.

PERFORMANCE STANDARD: Information that has been provided on the District web site will be included or summarized in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:
Rainwater Harvesting education and external links are made available to the public on the District's web page in the Education Tab at, http://rcgcd.org/rain-water-harvesting/. This material provides information for an alternative water supply, reducing stress on our area aquifers, and complexity of the unit's design.

12.7. ADDRESSING THE DESIRED FUTURE CONDITIONS OF THE GROUNDWATER RESOURCES

12.7.A. MANAGE AND MAINTAIN A WATER LEVEL MONITORING PROGRAM

OBJECTIVE: The District will manage and maintain its existing water level monitoring program. The District will monitor water levels within the District

boundaries at least annually and will be recorded in the District's database, as part of Objective 12.4.A. The District will evaluate water level trends and compare to the DFCs adopted by the District's.

PERFORMANCE STANDARD: A description of the number of wells measured and the monitoring results of the year will be included in the District Annual Report.

PERFORMANCE STANDARD: An annual comparison of water level changes to the District's DFC will be evaluated and included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:
See Objective 12.4.A. Activity and Accomplishments for the District managing and maintaining its existing water level monitoring program and results.

See Appendix A for annual comparison of water level changes to the District's DFC.

12.7.B. MONITOR ESTIMATE ANNUAL PRODUCTION

OBJECTIVE: The District will estimate total annual groundwater production for each aquifer based on water use reports, estimated exempt use, and other relevant information and compare production estimates to the Managed Available Groundwater (MAG).

PERFORMANCE STANDARD: An annual comparison of total recorded and estimated annual production to the District's MAG will be evaluated and included in the District's Annual Report.

ACTIVITY AND ACCOMPLISHMENTS:
See Appendix A below for total estimated annual production compared to the MAG.

APPENDIX A
DISTRICT MAG & DFC COMPARISON & PRODUCTION REPORTING ANALYSIS 2019

PRODUCTION REPORTING ANALYSIS WITH MAG COMPARISON AND WATER LOSS ANALYSIS 2019

BY ROBERT THORNTON, GENERAL MANAGER
AUGUST 24, 2020

The Rusk County Groundwater Conservation District (District) requires reporting of groundwater production for all permit holders of non-exempt wells, mining, and oil and gas rig supply and exploration. Meters are required for groundwater production of oil and gas, mining, and permitted wells outside of agricultural and domestic usage.

The District's 2018 Management Plan requires the District to monitor estimated annual production (12.7.B.) and conduct an annual comparison of the District's water level changes to its adopted DFC (12.7.A.). This report reviews the production by type of use with comparisons to past years' statistics.

Acronyms & Definitions

- An acre-foot is defined as the volume of one acre of surface area to a depth of one foot.
- 1 acre-foot = 325,852 liquid gallons
- a/f: acre-feet
- PWS: Public Water Supply
- GAM: Groundwater Availability Model
- MAG: Managed Available Groundwater
- GMA 11: Groundwater Management Area 11
- TCEQ: Texas Commission on Environmental Quality
- TWDB: Texas Water Development Board

PRODUCTION REPORTING STATISTICS

Overall total reports submitted decreased by 7 from 2018, with the largest decrease of four (4) reports from Mining. There were no increases in numbers of reports, but Steam Electric and Non-Exempt Outside of PWS stayed the same at one (1) and 20 respectively.

Reports Received				
Type	**2016**	**2017**	**2018**	**2019**
PWS Total:	87	87	87	**87**
Mining Total:	26	12	9	**5**
Oil & Gas Total:	9	12	17	**14**
Steam Electric Total:	1	1	1	**1**
Non-Ex Outside of PWS Total:	25	41	20	**20**
Overall Total:	148	153	134	**127**

Overall total production decreased by 360.7 a/f from 2018, and compared to 2017, was almost the same in terms of overall total. The largest increase in production came from Domestic/Livestock and Non-Exempt Outside of PWS with 84 a/f and 47.2 a/f respectively. Oil and gas was down 1.6 a/f. The largest decrease in production came from Mining at 272.6 a/f. In 2016, Mining decreased by 1,757.3a/f due to closure of the Oak Hill Mine.

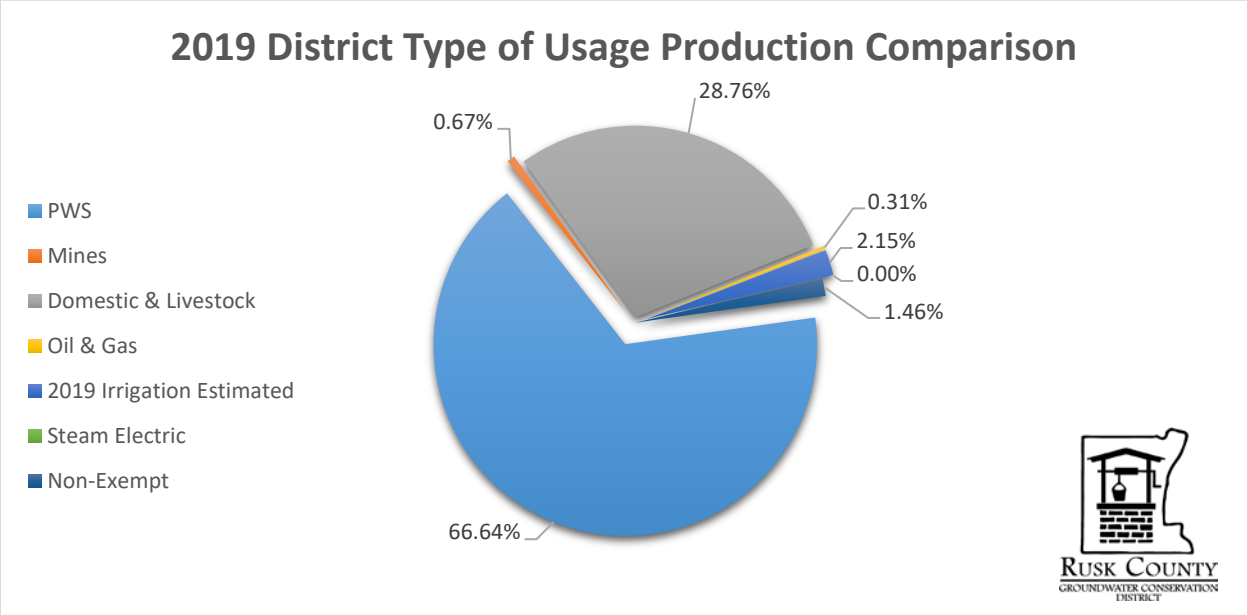
Total Production by Type of Use (acre-feet per year)									**Production Difference from 2018 to 2019**
	2016		**2017**		**2018**		**2019**		
PWS:	5,920.2	56.7%	5,693.4	65.6%	6,015.9	66.5%	**5,784.2**	**66.6%**	**-231.7**
Mining:	1,988.6	19.1%	231.3	2.7%	330.7	3.7%	**58.1**	**0.7%**	**-272.6**
Oil & Gas:	85.3	0.8%	47.2	0.5%	28.8	0.3%	**27.2**	**0.3%**	**-1.6**
Steam Electric:	7.4	0.1%	41.4	0.5%	0.0	0.0%	**0.0**	**0.0%**	**0.0**
Non-Exempt outside of PWS:	40.2	0.4%	140.6	1.6%	79.5	0.9%	**126.7**	**1.5%**	**47.2**
Irrigation-TWDB:	148.0	1.4%	200.0	2.3%	173.0	1.9%	**187.0**	**2.2%**	**14.0**
Domestic & livestock-TWDB:	2,244.0	21.5%	2,328.0	26.8%	2,412.0	26.7%	**2,496.0**	**28.8%**	**84.0**
Overall Total:	10,433.7	100%	8,681.9	100%	9,039.9	100%	**8,679.2**	**100%**	**-360.7**

*TWDB irrigation estimates included for '16-'18. 2019 is estimated.

*TWDB Domestic & Livestock production is provided in 5-10 year intervals to coincide with the State Water Plan.

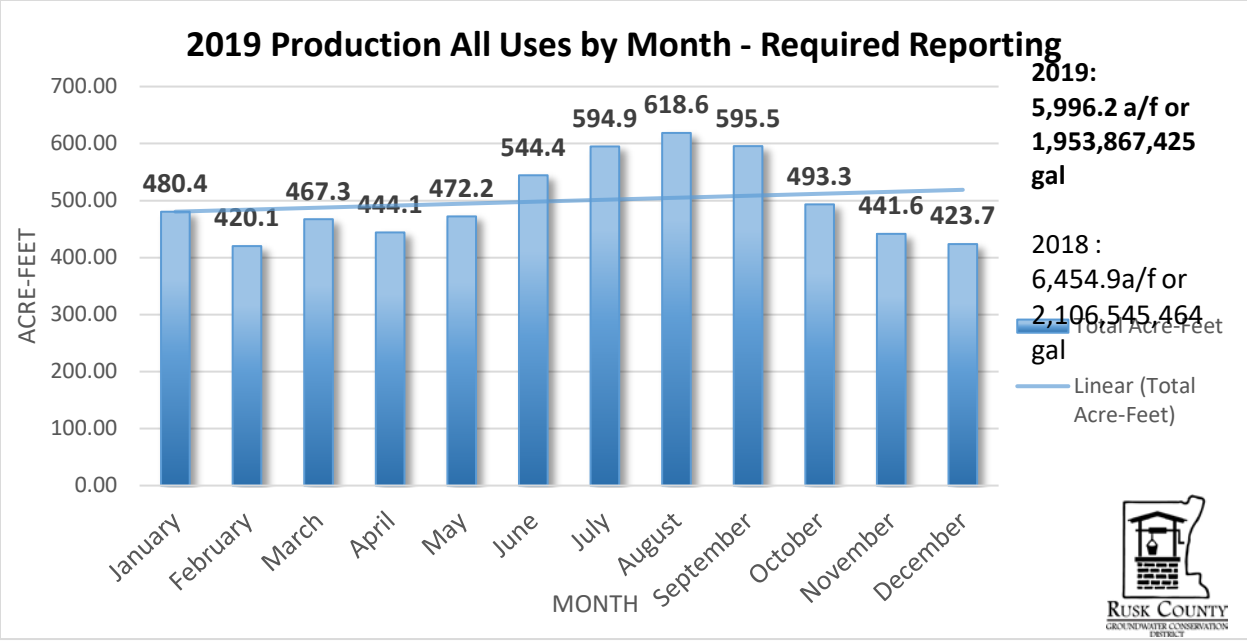
PRODUCTION BY TYPE OF USE

Production by Type of Use in Rusk County in 2019 continues to be led by Public Water Suppliers producing 67%, Domestic & Livestock at 28.8%. Smaller amounts were seen in Irrigation at 2.2%, Non-Exempt at 1.5%, Mining at 0.7%, and Oil & Gas at 0.3%.



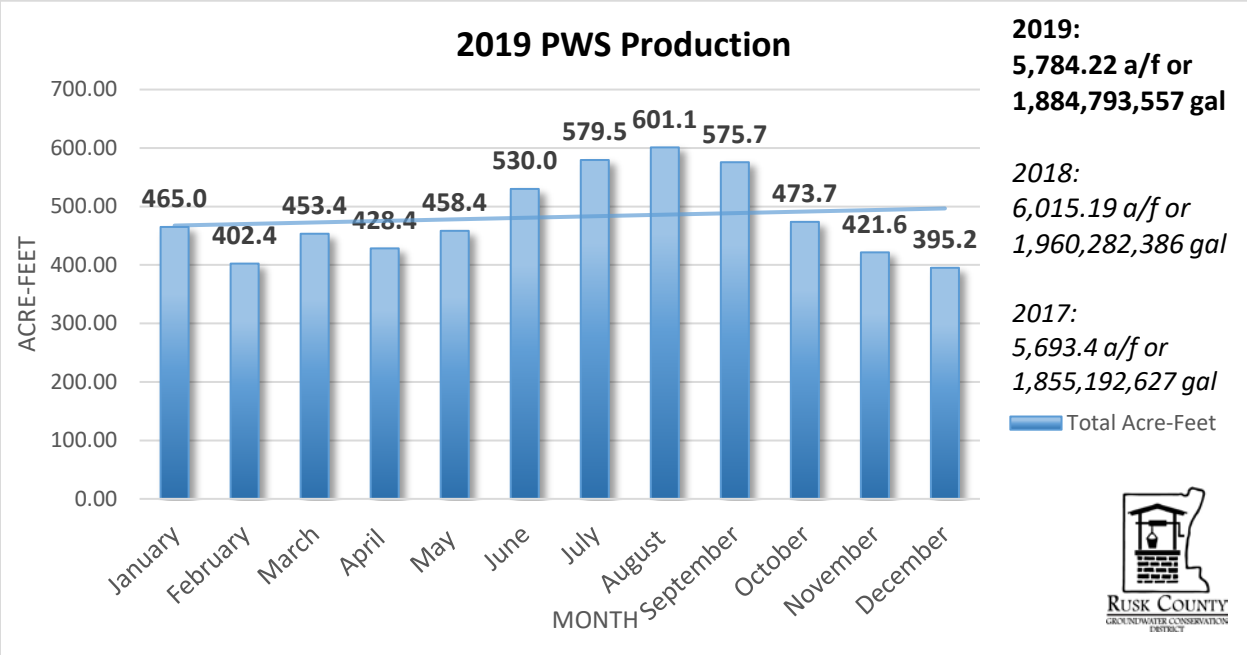
TOTAL PRODUCTION BY MONTH FOR ALL TYPES OF USE

Total Production for all Uses shows the largest month of production was August at 618.6 a/f and the lowest month of production being February at 420.1 a/f. There was a decrease in production toward the end of the year.

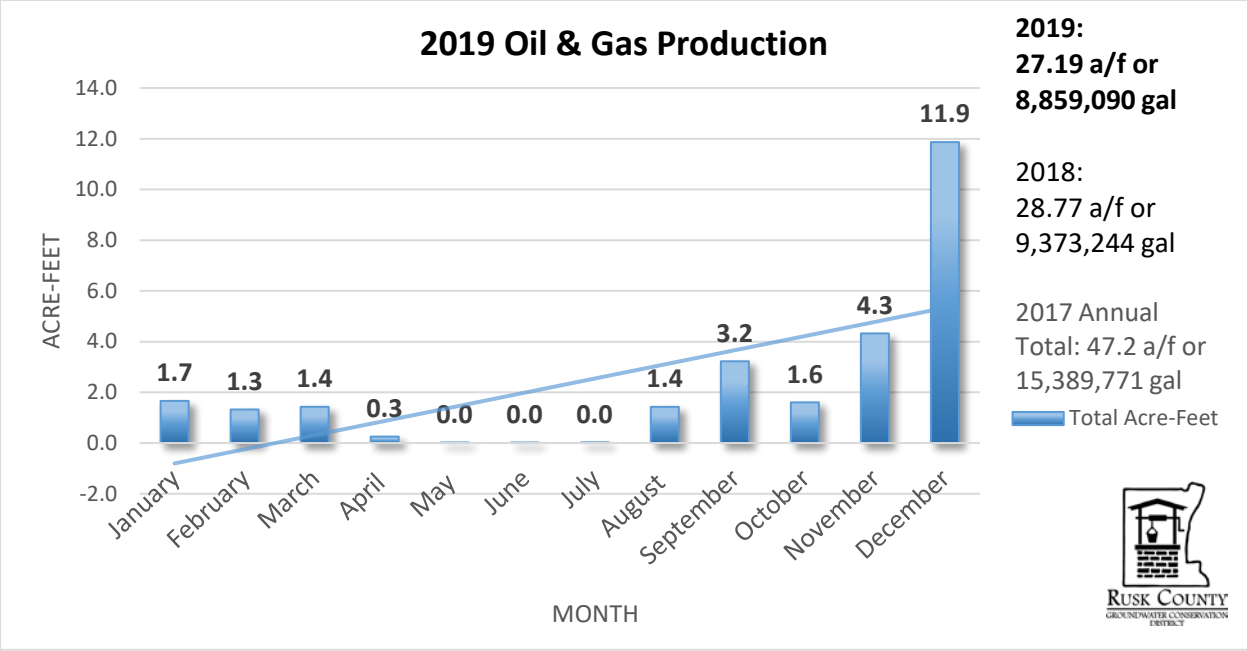


PRODUCTION BY TYPES OF USE

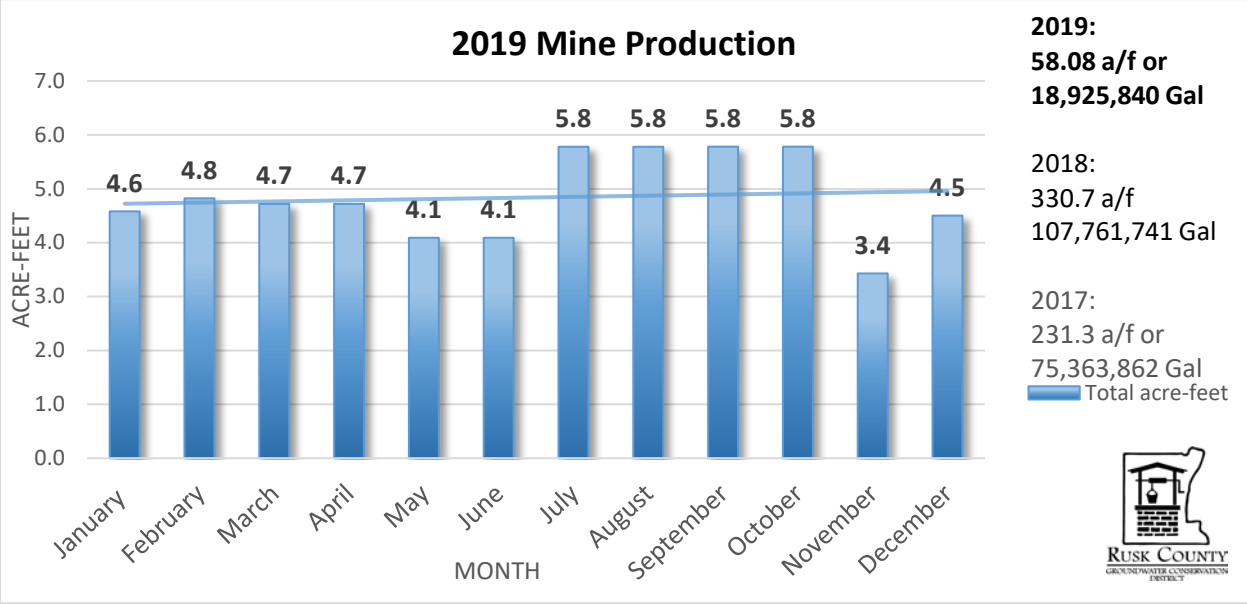
PWS production decreased from 2018 by 231 a/f. PWS's largest month of production was August at 601.1 a/f and the lowest month of production, December at 395.2 a/f.



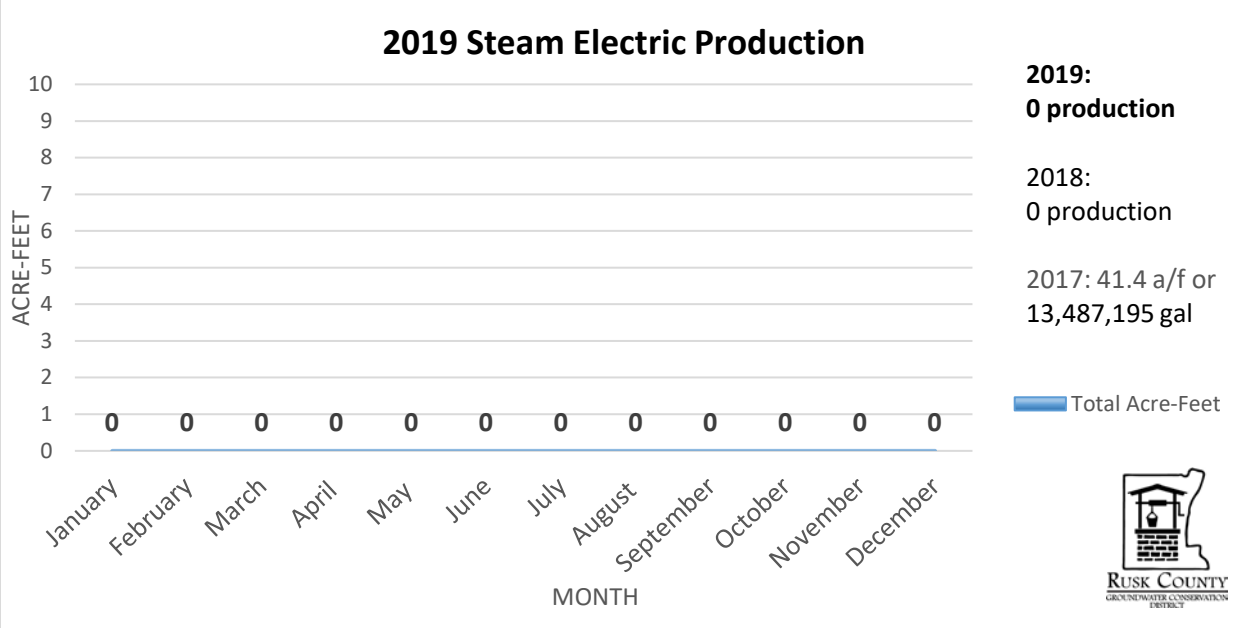
Oil & Gas production decreased from 2018 by 1.58 a/f. Oil and Gas's largest month of production was December at 11.9 a/f and the lowest months of production were April-July at 0.0-0.3 a/f. The year ended with an increase in production.



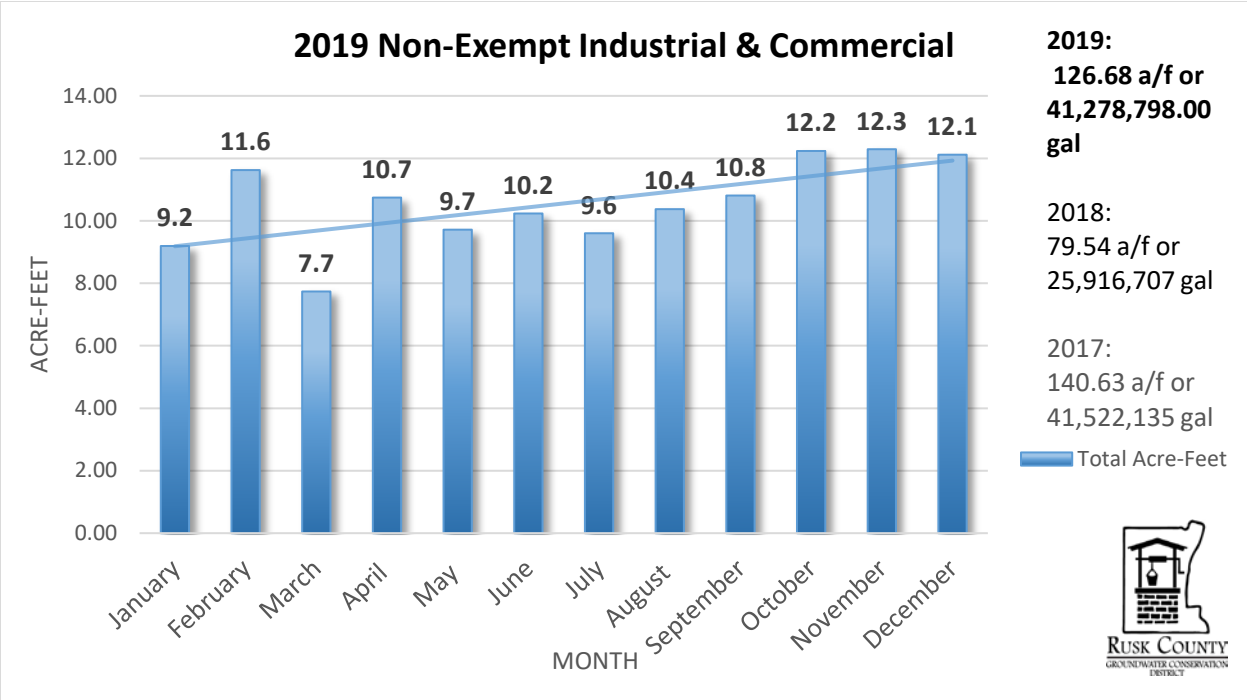
Mine production decreased from 2018 by 272.62 a/f. Mining's largest months were July-October at 5.8 a/f with the lowest month being November at 3.4 a/f. The trend line was relatively flat.



Steam Electric Production Steam Electric did not produce groundwater during 2019. The last year of production was 2017 at 41.4 a/f.



Non-Exempt outside of PWS production increased 47.14 a/f. Non-exempt's largest month of production was November at 12.3 a/f with the lowest in March at 7.7 a/f. There was an increase in production at year's end.



SUMMARY OF WATER LOSS OF RUSK COUNTY WATER UTILITIES

The District's Management Plan requires a summary of water loss from water utilities (12.2.B). The TWDB provided the District with the most current data regarding water loss as recorded through water utility surveys for Rusk County. All utilities are required to submit an audit every five-years. Utilities required to submit an audit every year are those with more than 3,300 connections, or who have a financial obligation with the agency. The following submitted five-year audits for 2019: Ebenezer WSC, Goodsprings WSC, Goodsprings WSC Plant C, Price WSC, Pleasant Hill WSC, and Southern Utilities – Laird Hill. In addition, The City of Henderson submitted its yearly audit for 2019. The total real water loss in 2019 from the reporting utilities was 60,501,959.5 gal. or 185.67 a/f. The breakdown is below.

WSC	**2019 Total Real Water Loss (gal. and a/f)**
Ebenezer	641,002.71 gal./1.97 a/f
Goodsprings	13,691,603 gal./42.02 a/f
Goodsprings Plant C	1,035,737.25 gal./3.18 a/f
Price	3,245,246.91 gal. or 9.96 a/f
Pleasant Hill	92,805.12 gal./0.28 a/f
Southern Utilities – Laird Hill	7,027,374.52 gal./21.57 a/f
*City of Henderson	34,768,190 gal/106.70 a/f

*The City of Henderson used 33% surface water and 67% groundwater in 2019.

Past Data for City of Henderson

The 2017 survey shows the City of Henderson produced 11.2% surface water and produced 88.8% groundwater, with a total real loss of 117,343,563 gallons.
The 2018 survey shows the City of Henderson produced 18.33% surface water and produced 81.67% groundwater, with a total real loss of 121,340,421 gallons. The difference in 2018 and 2019 is due to the replacement of some malfunctioning meters and that documentation was more accurate in 2019, according to City of Henderson.
Past Data for Other Entities
The 2015 survey provided from the TWDB in 2016 was raw data before cleaned up. A clean version of the 2015 survey was provided in 2018. Twenty-one (21) utilities reported water loss in 2015 for a total of 25,897,290 gallons, with 100% groundwater produced and no surface water.
Water loss can be accounted for line failures and repairs, meter accuracy, and other unmetered fields.

NON-EXEMPT WELLS/PERMITTED WELLS

The total permitted amount of groundwater in the District is to be compared to the Managed Available Groundwater (MAG) on an annual basis as guided by the District's Management Plan and Chapter 36 of the Texas Water Code in evaluation of the resource.
The District is to issue permits up the point that the total volume of exempt and permitted groundwater production will achieve an applicable desired future condition. Meaning, the District can permit over the MAG if there is no adverse effect on the groundwater levels as compared to the DFCs.
The District has permitted **183** non-exempt wells, totaling **9,568** a/f per year permitted production. Due to new operating permits, permit renewals, and identifying historical data for existing wells, there was an increase in permitted production.
The District's current MAG is **20,837 a/f** per year.

Non-Exempt Wells Permitted		
Year	**Amount of Permits**	**Permitted Production A/F**
2016	127	7,621
2017	138	7,583
2018	169	9,295
2019	183	9,568

MANAGED AVAILABLE GROUNDWATER (MAG) IN RUSK COUNTY

GMA 11 adopted new DFCs January 11, 2017, the TWDB has developed and produced GAM RUN 17-024 MAG, June 19, 2017. The District adopted DFCs for Rusk County April 10, 2017.

- MAG of the Carrizo-Wilcox Aquifer from years 2020 to 2040 is **20,837 a/f**.
- MAG of the Carrizo-Wilcox Aquifer from years 2050 to 2070 is 20,818 a/f.

Rusk County MAG Values (acre-feet per year)									
		Regional Water	River	Year					
Aquifer	County	Planning Area	Basin	2020	2030	2040	2050	2060	2070
Carrizo-Wilcox	Rusk	I	Neches	11,769	11,769	11,769	11,750	11,750	11,750
Carrizo-Wilcox	Rusk	I	Sabine	9,068	9,068	9,068	9,068	9,068	9,068
			Totals	**20,837**	**20,837**	**20,837**	**20,818**	**20,818**	**20,818**

DESIRED FUTURE CONDITIONS (DFCS) IN RUSK COUNTY

The District's groundwater elevations are compared to the 1999 baseline. The District makes these comparisons on an annual basis for the DFC and MAG, as guided by the District's Management Plan, Chapter 36 of the Texas Water Code and best management practices of our groundwater resources. A report on the evaluation of the 2019 groundwater elevations to the DFC was provided by William R. Hutchison, Ph.D., P.E., P.G. His analysis found that Rusk County's monitoring data are consistent with the Desired Future Conditions (DFCs).

DFC for the Carrizo-Wilcox Aquifer in Rusk County from 2018 to 2070 is **23 feet**, from the 1999 water levels.

District Rule 8.2, Actions Based on Aquifer Response to Pumping

"The District shall utilize its existing well monitoring program, to access aquifer levels in the District and the effects caused by groundwater production to enforce the District's adopted Desired Future Conditions of the aquifers and to conserve and preserve groundwater availability and protect groundwater users and groundwater ownership and rights."

The District has adopted three threshold average aquifer drawdown levels to act as triggers to provide for increased levels of District regulatory responses based on the average aquifer drawdown levels in three consecutive years. Each level is based on an average of three consecutive years immediately prior to reaching the trigger.

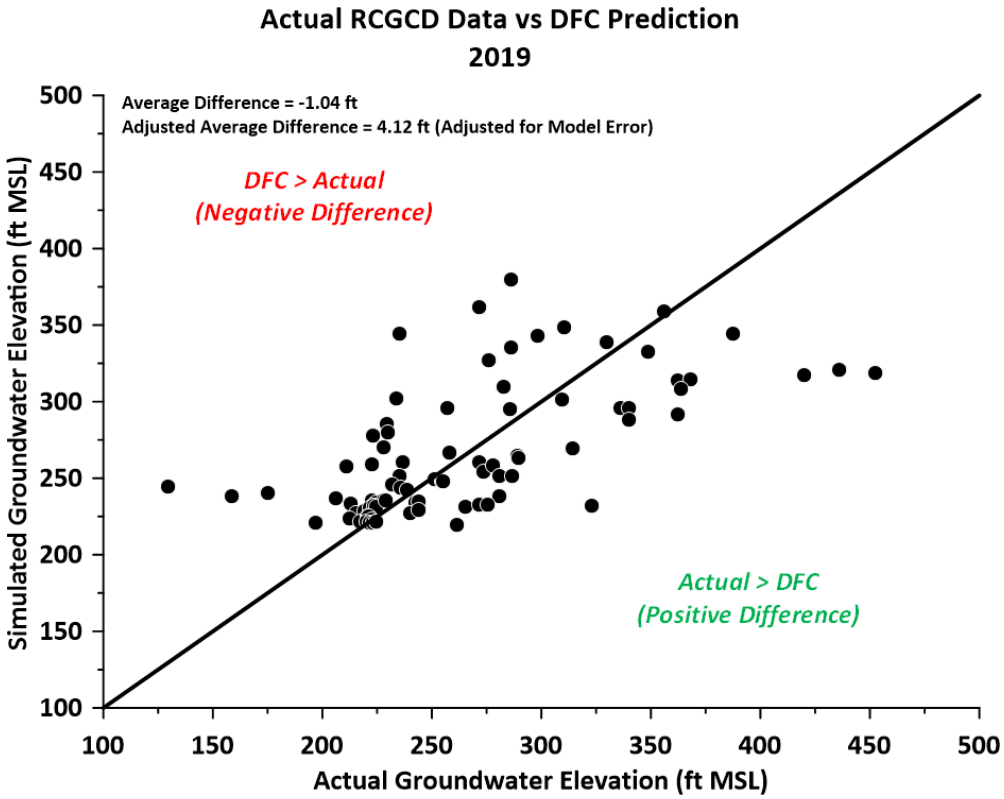
Based on Dr. Hutchison's 2019 report on the groundwater elevations compared to the DFC (immediately below), no threshold levels have been triggered.

Dr. Bill Hutchison Report on Groundwater Elevations

On April 9, 2020, you provided an Excel file named Q4_2019.xlsx. Column AZ of that file contained monitored groundwater elevations for the fourth quarter of 2019. These data were combined with the 2009 to 2018 data previously gathered to create the file MonWellSum2009-2019.xlsx. These data include the model grid row, column, and layer associated with the location of the well as well as the distance (feet) to the center of the one-square mile model cell.
Comparison of 2019 Data to DFC Simulation

The data from 2019 were added to the comparison of actual monitoring well data with simulated groundwater elevations from the desired future condition simulation of the groundwater availability model. These results are summarized in the file Compare20092019.xlsx. Please note that this file contains a summary for all years as well as individual well comparisons for each year (i.e. one tab in the spreadsheet for each year of comparison).

The figure below presents a summary of the 2019 comparison.



Each data point represents a single monitoring well for which there was a fourth quarter measurement in 2019 (85 points total). The diagonal black line represents the one-to-one line where the actual groundwater elevation equals the simulated groundwater elevation from the

DFC run for 2019. A point above and to the left the one-to-one line depict an instance where the DFC groundwater elevation in greater than the measured groundwater elevation. A point below and to the right of the one-to-one line depict an instance where the actual groundwater elevation is greater than the simulated groundwater elevation from the DFC run. The average difference for all 85 points is -1.04 feet, which suggests that the actual groundwater elevations are slightly below the desired future conditions. However, an analysis of model calibration uncertainty in Rusk County yields the conclusion that the average error of the model is 5.16 feet. Thus, the adjusted average difference is 4.12 feet.

The positive adjusted average difference suggests that the 2019 actual groundwater conditions are higher than the "expected" groundwater elevations as articulated in the desired future conditions.

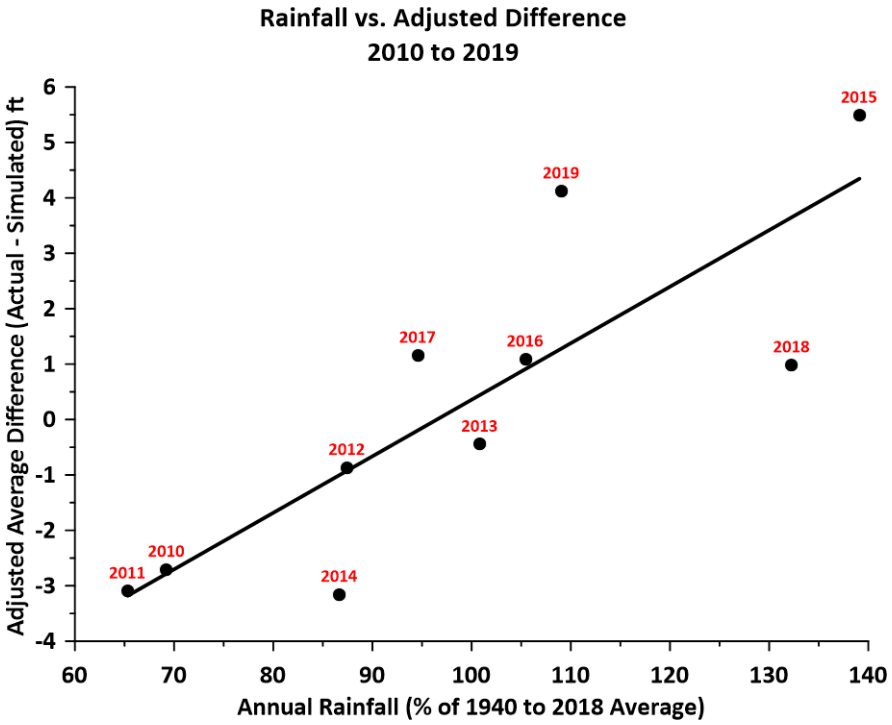
Update to Analysis of Precipitation

Desired future conditions are simulated with an assumption of no variation in annual recharge (i.e. precipitation is simulated with an average value each year from 2000 to 2070). As a result, the simulated groundwater elevations are impacted only by antecedent conditions and changes in pumping. One the other hand, the actual groundwater elevations are impacted by changes in precipitation and recharge. In summary, it is expected that in "wet" years, recharge will increase and pumping will decrease and result in an increase in groundwater elevation; and it is expected that in "dry" years, recharge will decrease and pumping will increase and result in a decrease in groundwater elevations.

Given the general nature of the annual increases and decreases in groundwater elevation and the fact that the DFC simulation does not account for variations in recharge, an analysis of the annual rainfall and the adjusted average difference (actual – simulated) was previously completed and reported at the August 5, 2019 Rusk County GCD Board meeting. From this analysis, it was concluded that 76 percent of the variation in the average difference is explained by the variation in annual rainfall.

This analysis of the relationship to annual precipitation and changes in monitored groundwater levels was updated as part of this analysis. The results are presented graphically below. The updated analysis shows that, for the years 2009 to 2019, 69 percent of the variation in the adjusted average difference is explained by the variation in annual rainfall. From the perspective of assessing the consistency of actual monitoring data and the results of the DFC simulation, the difference between 69 percent and 76 percent is not significant. However, it does demonstrate that the comparison of actual data and the simulated DFC groundwater elevations must take rainfall/recharge into consideration when interpreting the comparison.

See graph below.



Conclusions

Based on these analyses, Rusk County's monitoring data are consistent with the desired future condition. The positive adjusted average difference suggests that the 2019 actual groundwater conditions are higher than the "expected" groundwater elevations as articulated in the desired future conditions. The comparison with annual rainfall data show that most of the variation is explained by variations in rainfall and recharge, which are not considered in the desired future condition statement.

APPENDIX B

DOCUMENTED NEW & EXISTING WELLS IN DISTRICT DATABASE

The District recorded 136 wells in its database. Recorded Exempt Wells totaled 126: 20 de-watering, 47 monitor, 40 domestic, 2 irrigation/livestock, 8 Rig/Supply-Oil & Gas, and 9 other or unknown uses. Recorded Non-Exempt Wells totaled 10; 2 domestic, 4 irrigation/livestock, 4 poultry.

Exempt	Domestic	Vaughn Washington	RC2020-0043	3/11/2020
Exempt	Domestic	Steve Fountain	RC2020-0044	3/16/2020
Exempt	Domestic	Ben Ferrell	RC2020-0046	3/30/2020
Exempt	Domestic	Dean Ragsdale	RC2020-0067	4/15/2020
Exempt	Domestic	Joyce Roland	RC2020-0068	4/17/2020
Exempt	Domestic	Garry Antunes Jr.	RC2020-0069	4/20/2020
Exempt	Domestic	Holmes, James	RC2020-0071	4/22/2020
Exempt	Domestic	Harry Hamilton	RC2020-0072	4/22/2020
Exempt	Domestic	Patricia Jones	RC2020-0076	4/30/2020
Exempt	Domestic	Anthony C. Powers	RC2020-0077	5/1/2020
Exempt	Domestic	Shirlann Alexander	RC2020-0078	5/5/2020
Exempt	Domestic	Joshua Boyett	RC2020-0079	5/6/2020
Exempt	Domestic	James Stephenson	RC2020-0080	5/11/2020
Exempt	Domestic	Bruce Bailey	RC2020-0085	5/15/2020
Exempt	Domestic	Michael S. Meredith	RC2020-0088	5/27/2020
Exempt	Domestic	Patricia Jones	RC2020-0090	5/28/2020
Exempt	Domestic	Chance and Jennifer Bell	RC2020-0099	6/19/2020
Exempt	Domestic	Valerie Valerio	RC2020-0100	6/30/2020
Exempt	Domestic	Steven Blair	RC2020-0101	7/10/2020
Non exempt	Domestic	Robert Hemus	RC2020-0113	7/24/2020
Non exempt	Domestic	Jackson, Brian	RC2020-0114	7/27/2020
Exempt	Domestic	Robert Hemus	RC2020-0115	7/28/2020
Exempt	Domestic	Hunter Higginbotham	RC2020-0116	8/10/2020
Exempt	Domestic	Randall Richardson	RC2020-0117	8/24/2020
Non exempt	Irrigation	Torrence, Billy	RC2019-0232	9/30/2019
Non exempt	Irrigation	Torrence, Billy	RC2019-0234	10/11/2019
Non exempt	Irrigation	The Church at Lake Cherokee	RC2019-0245	12/17/2019
Non exempt	Irrigation	Jason Flanagan	RC2020-0103	7/14/2020
Exempt	Livestock	Matt Fowler	RC2019-0246	12/31/2019
Exempt	Livestock	Lisa Savage	RC2020-0084	5/15/2020
Exempt	Monitor	East Texas Salt Water Disposal Co.	RC2019-0230	9/26/2019
Exempt	Monitor	East Texas Salt Water Disposal Co.	RC2019-0231	9/26/2019
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0022	2/4/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0023	2/4/2020
Exempt	Monitor	TCEQ	RC2020-0029	2/7/2020
Exempt	Monitor	North American Coal Corp, Sabine Mine	RC2020-0033	2/20/2020
Exempt	Monitor	North American Coal Corp, Sabine Mine	RC2020-0034	2/20/2020
Exempt	Monitor	Railroad Commission of Texas	RC2020-0035	2/20/2020
Exempt	Monitor	Sadler's BBQ	RC2020-0038	2/27/2020
Exempt	Monitor	Sadler's BBQ	RC2020-0039	2/27/2020

Exempt	Monitor	Sadler's BBQ	RC2020-0040	2/27/2020
Exempt	Monitor	Sadler's BBQ	RC2020-0041	2/27/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0048	4/3/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0049	4/3/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0050	4/3/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0051	4/7/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0052	4/7/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0053	4/7/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0054	4/7/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0055	4/7/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0056	4/7/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0057	4/7/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0058	4/7/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0059	4/7/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0060	4/7/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0061	4/7/2020
Exempt	Monitor	Luminant Mining Co, LLC	RC2020-0062	4/7/2020
Exempt	Monitor	RockCliff Energy, LLC	RC2020-0063	4/13/2020
Exempt	Monitor	RockCliff Energy, LLC	RC2020-0064	4/13/2020
Exempt	Monitor	RockCliff Energy, LLC	RC2020-0065	4/13/2020
Exempt	Monitor	RockCliff Energy, LLC	RC2020-0066	4/13/2020
Exempt	Monitor	RockCliff Energy, LLC	RC2020-0081	5/14/2020
Exempt	Monitor	RockCliff Energy, LLC	RC2020-0082	5/14/2020
Exempt	Monitor	RockCliff Energy, LLC	RC2020-0083	5/14/2020
Exempt	Monitor	CEFCO Convenience Stores	RC2020-0091	5/28/2020
Exempt	Monitor	CEFCO Convenience Stores	RC2020-0092	5/28/2020
Exempt	Monitor	CEFCO Convenience Stores	RC2020-0093	5/28/2020
Exempt	Monitor	CEFCO Convenience Stores	RC2020-0094	5/28/2020
Exempt	Monitor	CEFCO Convenience Stores	RC2020-0095	5/28/2020
Exempt	Monitor	Railroad Commission of Texas	RC2020-0097	6/11/2020
Exempt	Monitor	Velvin Oil Company	RC2020-0105	7/17/2020
Exempt	Monitor	Velvin Oil Company	RC2020-0106	7/17/2020
Exempt	Monitor	Velvin Oil Company	RC2020-0107	7/17/2020
Exempt	Monitor	Velvin Oil Company	RC2020-0108	7/17/2020
Exempt	Monitor	Velvin Oil Company	RC2020-0109	7/17/2020
Exempt	Monitor	Velvin Oil Company	RC2020-0110	7/17/2020
Exempt	Monitor	Velvin Oil Company	RC2020-0111	7/17/2020
Non exempt	Poultry	Tony Dinh	RC2019-0238	11/14/2019
Non exempt	Poultry	Tony Dinh	RC2019-0239	11/14/2019
Non exempt	Poultry	Jimmy Ung	RC2020-0118	8/26/2020

Non exempt	Poultry	Jimmy Ung	RC2020-0119	8/26/2020
Exempt	Rig Supply	Sabine Oil & Gas Corporation	RC2019-0229	9/20/2019
Exempt	Rig Supply	Sabine Oil & Gas Corporation	RC2020-0021	1/28/2020
Exempt	Rig Supply	RockCliff Energy, LLC	RC2020-0027	2/6/2020
Exempt	Rig Supply	RockCliff Energy, LLC	RC2020-0028	2/7/2020
Exempt	Rig Supply	Sabine Oil & Gas Corporation	RC2020-0047	4/3/2020
Exempt	Rig Supply	Sabine Oil & Gas Corporation	RC2020-0098	6/30/2020
Exempt	Rig Supply	Sabine Oil & Gas Corporation	RC2020-0102	7/14/2020
Exempt	Rig Supply	Sabine Oil & Gas Corporation	RC2020-0112	7/20/2020
Exempt	Unknown	Jerry Hudman	RC2020-0045	3/17/2020
Exempt	Unknown	Holly Hamilton	RC2020-0070	4/22/2020
Exempt	Unknown	Ludy Tomlin	RC2020-0073	4/27/2020
Exempt	Unknown	Ludy Tomlin	RC2020-0074	4/29/2020
Exempt	Unknown	Ludy Tomlin	RC2020-0075	4/29/2020
Exempt	Unknown	Ronald Moore	RC2020-0087	5/22/2020
Exempt	Unknown	Patricia Jones	RC2020-0089	5/28/2020
Exempt	Unknown	Kent Hope	RC2020-0096	5/29/2020
Exempt	Unknown	Michael S. Meredith	RC2020-0104	7/16/2020