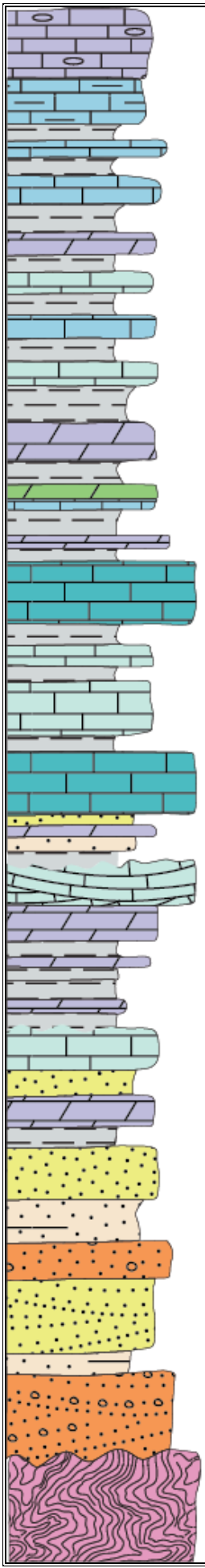


2020 Annual Report

2020 Board of Directors

Holly Fults – President

Linda Kaye Rogers – Vice President

John Worrall – Secretary/Treasurer

Doc Jones

Jeff Shaw / James “Toby” Shelton

2020 Staff Members

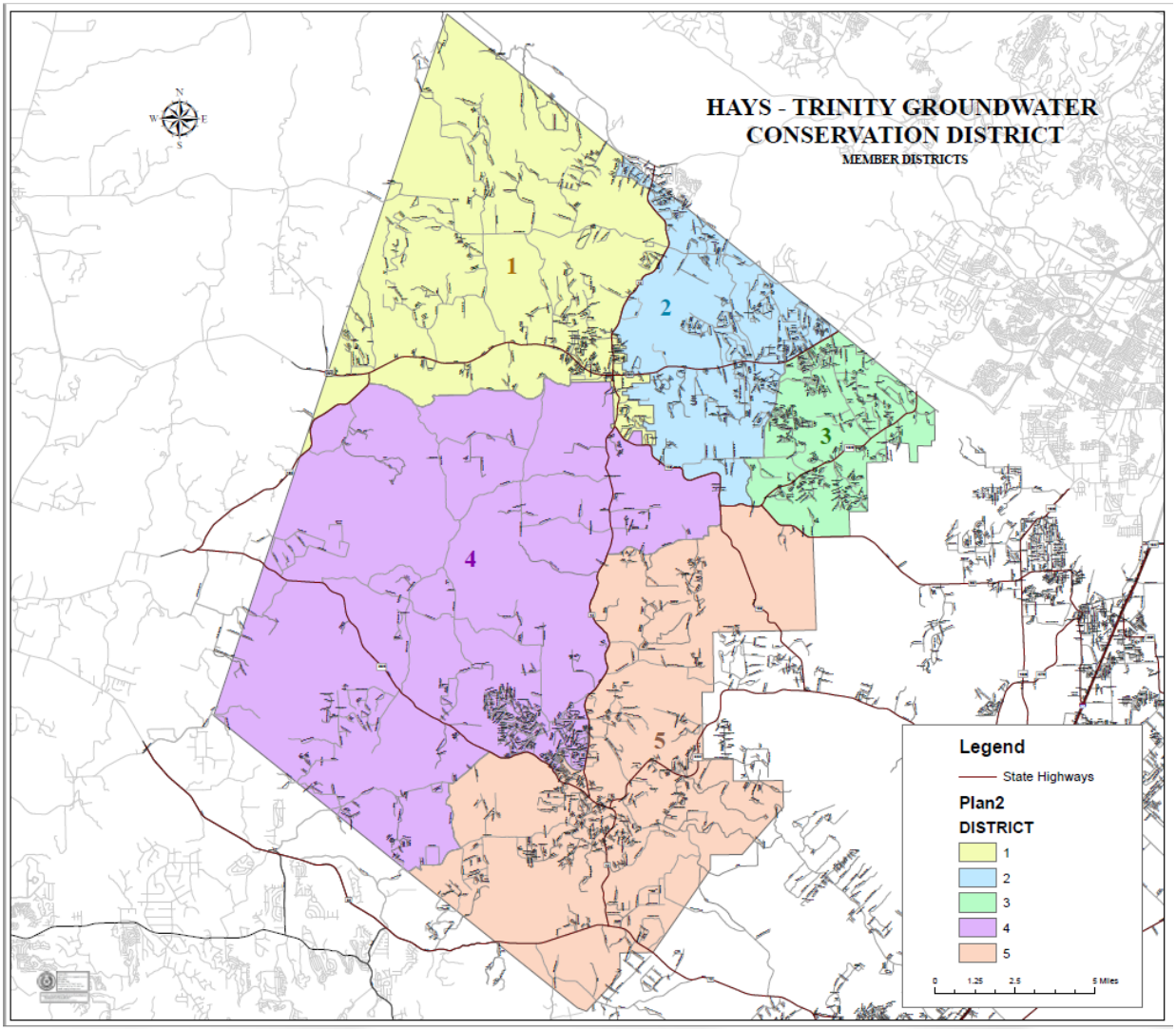
Charlie Flatten – General Manager

Philip Webster – Hydrogeologist

Keaton Hoelscher – Geo-Technician

Laura Thomas – Office Admin. (Aug. start)

Kayla Shearhart – Asst. Manager (Jan-April)



Researched and compiled by:

Charlie Flatten, General Manager
Philip Webster, Hydrogeologist
Keaton Hoelscher, Geoscience Technician
Laura Thomas, Office Administrator

2020 Board January to November: Linda Kaye Rogers, President; Holly Fults, Vice President; John Worrall, Secretary/Treasurer; Doc Jones; Jeff Shaw.

2020 Board November to December: Holly Fults, President; Linda Kaye Rogers, Vice President; John Worrall, Secretary/Treasurer; Doc Jones; James "Toby" Shelton.

2020 ANNUAL REPORT

HAYS TRINITY GROUNDWATER CONSERVATION DISTRICT
MANAGEMENT GOALS, OBJECTIVES, & PERFORMANCE STANDARDS

Executive Summary

The 2020 Annual Report is an account of the Hays Trinity Groundwater Conservation District's (District or HTGCD) management and protection of the Trinity Aquifer through the development of science, data gathering, regional groundwater planning, permitting, education, and outreach.

In 2020, the District initiated and participated in numerous activities including the development and refinement of local hydrogeologic science, education & outreach, policy directives, capital projects, and drought management in order to fulfill its objectives.

The financial health of the District in the short term is secure. However, due to revenue structures, a reduction in economic growth would negatively impact the District's budgets and its ability to effectively protect the groundwater resource. A move away from growth-based revenues is recommended.

The HTGCD Board of Directors held 17 Board meetings and 7 Public Hearings in 2020 (Appendix, Section 1).

The District registered 117 new well construction notifications in 2020; 115 are exempt from regulation and 2 non-exempt. The District issued 4 new permits for non-exempt withdrawals, bringing the number of active permits to 94. There were 616 new public water supply connections reported to the District (Appendix, Section 3). Permitted plus Exempt volumes of withdrawal rose from 7,719 to 7,782 acre-feet/year leaving 1,316 acre-feet/year available from the Texas Water Development Board's (TWDB) sliding Modeled Available Groundwater (MAG) allotment[1] in the year 2060 of 9,094 acre-feet/year for the District. It should be noted that the 1,316 acre-feet volume remainder must be shared by future exempt (domestic and agriculture[2]) and non-exempt (commercial) users.

Rules, Bylaws, Enabling Legislation, and other regulatory structures of the District can be found on the District website's Regulatory page.

The Governor of Texas ordered suspension of various provisions of the Open Meetings Act, Chapter 551, Government Code, effective March 16, 2020, in accordance with the Texas Disaster Act of 1975 due to the Covid-19 pandemic. The District fulfilled all of its functions and responsibilities with the aid of modern technology.

[1] TWDB MAG model run GR 16-023 stipulates a decreasing MAG over time.
[2] By Enabling Legislation design (and unlike most GCDs in the State), Agriculture is exempt from permitting in the HTGCD.

Introduction

The Hays Trinity Groundwater Conservation District was created by the 77th Texas State Legislature (S.B. 2, 2001) in order to compile and develop sound hydrologic data and to manage and protect the aquifers that supply safe water in western Hays County as illustrated by the Map on page 2. The District is governed by a locally elected Board of Directors and was managed in 2020 by District Staff as listed on the title page.

As required by District Bylaws (4.2, a) an annual report shall be prepared for and provided to the Board of Directors by District Staff on the status of the District and its programs. The *2021 Groundwater Management Plan* serves as a guide for the District's annual reports. The *2020 Annual Report* describes a methodology for tracking progress in achieving management goals. The headings in the report are prescribed by the Texas Water Development Board TWDB: TAC 356.52 (a)(2), (a)(3), TAC 356.52(a)(1), and in TWC 36.071. The District shall use this Report to document other business, such as Financial Reports.

Management Objectives and Performance Standards

1. Goal: Providing the Most Efficient Use of Groundwater

1.1. *Management Objectives*
Each year, the District will hold at least one educational event.

Performance Standard
Each year, a summary of the District educational events schedule will be included in the Annual Report

HTGCD attended, participated, hosted, or presented in the following events:

January 2020

Participated: Southwest Travis County GCD Management Plan Committee

Participated: Regional Water Quality Protection Program

Participated: Region K Water Planning Group (State Water Plan)

Attended: Senate Water & Rural Affairs Interim Committee

Participated: Region L Water Planning Group (State Water Plan)

Participated: Texas Association of Groundwater Districts Business Meeting

Participated: Legislators' Office Visits

February 2020

Participated: Hays County Groundwater Modeling Taskforce

Participated: Central Texas Water Conservation Symposium

Participated: Region K Water Planning Group (State Water Plan) x2

Participated: Region L Water Planning Group (State Water Plan)

Hosted: Crystal Creek: overview of local geology and surface/ groundwater interactions

Participated: Blanco River aquifer Tool for Water and Understanding Resiliency and Sustainability Trends (BRATWURST): County Commissioner, Walt Smith

Participated: Regional Water Quality Protection Program

March 2020

Participated: Regional Water Quality Protection Program

Participated: BRATWURST modeling

Participated: Region L Water Planning Group (State Water Plan)

Participated: Blue Bag Lunch w/Texas Water Journal

Participated: Fall Creek Vineyards – water use consultation

Hosted: Well Intel

April 2020

Attended: Southwest Travis County GCD Board Meeting

Participated: BRATWURST modeling

Attended: Austin One-Water Working Group

Hosted: GBRA One-Water consultation

Attended: Stakeholder Advisory Panel for the Edwards-Trinity GAM (TWDB)

Participated: Legislators' Staff Consultations

Hosted: Kinder Morgan/Permian Highway Pipeline hydro-geologic safety consultation

May 2020

Participated: Kinder Morgan/Permian Highway Pipeline

Hosted: Well Intel Dashboard

Participated: Groundwater Evaluation Toolkit (GET) Model demonstration

Participated: Cypress Creek Watershed Protection Plan

Participated: TAGD Public Funds Investment Act training

Participated: USDA Bureau of Reclamation Grant education

June 2020

Hosted: Permittee Invited Well Inspection & Meter Read instruction

Attended: Surface-Groundwater Interaction Atlas presentation

Participated: BRATWURST modeling

Participated: Proposed Dye Trace Briefing: BPGCD

Participated: Regional Water Quality Protection Program

Participated: Hays County Commissioners Communications

July 2020

Participated: Proposed Hays County Funded Dye Trace Study: BSEACD & Hays Co

Participated: Kinder Morgan: Hays Co Road boring permit discussion

Hosted: DSWSC-HTGCD Board Sub-Committee

Hosted: Al Braun Cuttings Collection donation to BEG

Attended: Southwest Travis County GCD Board Meeting

Participated: Central Texas Water Efficiency Network

Participated: Hill Country Conservation Network

Attended: TWCA One Water Seminar

Participated: BRATWURST Modeling

Participated: Kinder Morgan: Road Boring Site Visit

Participated: Regional Water Quality Protection Program

Participated: Region L Water Planning Group (State Water Plan)

August 2020

Hosted: DSWSC-HTGCD Board Sub-Committee

Participated: Region K Water Planning Group (State Water Plan)

Attended: Jenning's Hays County Modeling Task Force

Attended: Texas Groundwater Summit

Participated: Kinder Morgan Boring Inspection x 2

Participated: GMA-9 subcommittee meeting

Participated: Texas Hill Country Conservation Network

Attended: TWDB GAM information

Participated: Regional Water Quality Protection Program

Hosted: Strategic Water Vision 2021 Consultant Planning

September 2020

Attended: Texas Association of Groundwater Districts: 2020 Texas Groundwater Summit

Attended: Hill Country Alliance -- Leadership Summit

Participated: Region L Water Planning Group (State Water Plan)

Participated: Fall Creek Vineyards invited well inspection/education

Participated: Regional Water Quality Protection Program

October 2020

Hosted: DSWSC-HTGCD Board Sub-Committee

Participated: Region K Water Planning Group (State Water Plan)

Participated: Hays County Dye Trace Study planning

Participated: 2020 Rainwater Revival

Participated: Regional Water Quality Protection Program

November 2020

Hosted: DSWSC-HTGCD Board Sub-Committee (cancelled)

Participated: Dripping Springs Utility Commission Mtg. (TCEQ Permit)

Participated: Region L Water Planning Group (State Water Plan)

Attended: Texas Association of GDs Legislative Committee meeting

Attended: Groundwater Management Area (GMA) – 10

Hosted: 2021 Strategic Water Vision Stakeholder meeting #1 (x2)

Attended: Texas Hill Country Aquifer Exchange

Participated: Hays County Dye Trace Study planning

Participated: Pedernales River Source Water Protection planning meeting

Participated: Cypress Creek Watershed Protection Plan

December 2020

Hosted: 2021 Strategic Water Vision Stakeholder meeting #2 (x2)

Participated: Legislator Groundwater Consultation

Participated: Hays County Commissioners Groundwater Legislation Consultation

Attended: Texas Association of GCD's Amicus Brief

Attended: Groundwater Management Area (GMA) – 10

Attended: Southwest Travis County GCD Board Meeting

Participated: Regional Water Quality Protection Program

Participated: Groundwater Management Area (GMA) – 9

2. Goal: Controlling and Preventing Waste of Groundwater

2.1. *Management Objectives*

Each year, the District will take complaints from any concerned citizen or entity in the District on cases of waste or possible waste.

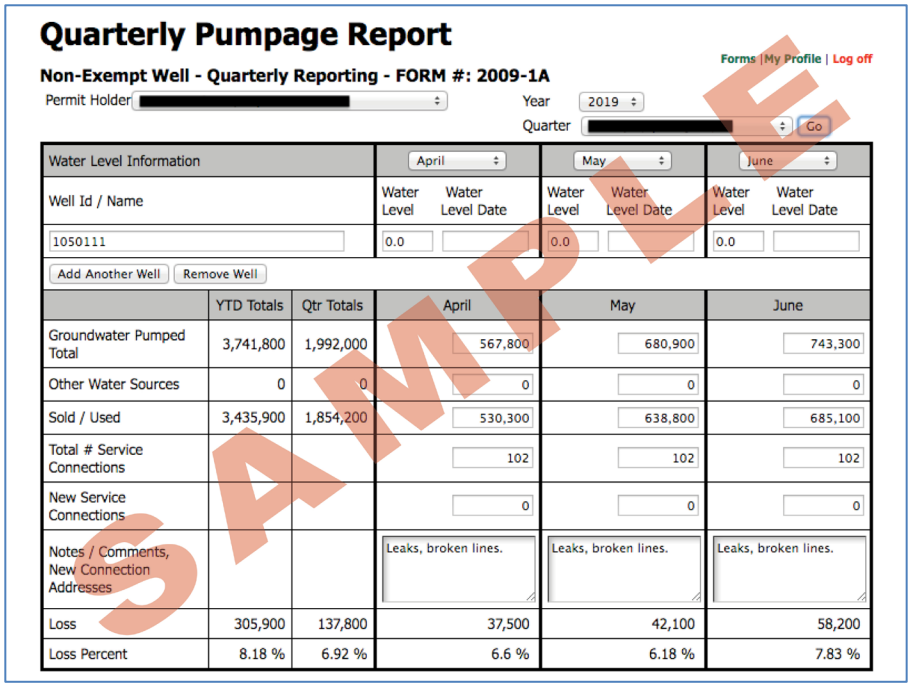
Performance Standard

In each Annual Report, the District will include a discussion of the recent issues with waste and recommend any amendments to the rules to prevent the waste of groundwater.

District Staff reports to the Board of Directors during public meetings on the topic of waste. No official public complaints were submitted to the District office concerning waste or possible waste during 2020. However, the District offices did field complaints about excessive irrigation and vanity ponds.

The District relies on the online Quarterly Reporting process that allows all District operating permit holders instant access to enter and review their own production, sales, connections, and percent

losses. Communication concerning loss is tied directly to each quarterly report. This gives the permit holder and the District an electronic record of reasons for loss including circumstances such as line-breaks, meter replacement, fires, or flushing. It also gives an indication of historic line loss and information on permitees who have habitually high line loss due to inadequate maintenance[3]. An example of a Quarterly Report can be found in **Figure 1,** below.



Quarterly Pumpage Report

Forms | My Profile | Log off

Non-Exempt Well - Quarterly Reporting - FORM #: 2009-1A

Permit Holder [redacted] Year 2019 Quarter [redacted] Go

Water Level Information			April		May		June	
Well Id / Name			Water Level	Water Level Date	Water Level	Water Level Date	Water Level	Water Level Date
1050111			0.0		0.0		0.0	

Add Another Well | Remove Well

	YTD Totals	Qtr Totals	April	May	June
Groundwater Pumped Total	3,741,800	1,992,000	567,800	680,900	743,300
Other Water Sources	0	0	0	0	0
Sold / Used	3,435,900	1,854,200	530,300	638,800	685,100
Total # Service Connections			102	102	102
New Service Connections			0	0	0
Notes / Comments, New Connection Addresses			Leaks, broken lines.	Leaks, broken lines.	Leaks, broken lines.
Loss	305,900	137,800	37,500	42,100	58,200
Loss Percent	8.18 %	6.92 %	6.6 %	6.18 %	7.83 %

SAMPLE

Figure 1: Quarterly Report showing an example of how line loss is calculated, and how permittees give reasoning behind their line loss.

3. Goal: Controlling and Preventing Subsidence

The rigid geologic framework of the region precludes significant subsidence from occurring. Therefore, this goal is not applicable to the operations of Hays Trinity Groundwater Conservation District.

4. Goal: Addressing Conjunctive Surface Water Management Issues

4.1. *Management Objective*

Each year, the District will promote the use of surface water or other alternatives to groundwater in growing areas where groundwater demand is projected to lower the water tables and to reduce stream and spring flow to unacceptable levels.

Performance Standard

The District will strive to meet with the planning departments of major surface water providers within the District at least once per year. The District will summarize these meetings and their outcomes in the Annual Report.

[3] Rule 2.1 Waste B, E.

Dripping Springs Water Supply Corporation (DSWSC) and the West Travis County Public Utility Authority (WTCPUA) are the two major surface water providers in the northern portion of the District. They supply wholesale and retail water sourced from the Lower Colorado River Authority (LCRA) Highland Lakes resource. Below is a list of meetings held with DSWSC.

Meetings*:*

- Charlie Flatten and select Board members met on a more than monthly basis with Kyle Dannhaus and select Board members of DSWSC on water conservation, legislation, permitting, and fee definitions.
- Charlie Flatten and WTCPUA Director met to discuss the PUA's potential expansion of services and/or expansion of supplies to the DSWSC.
- Charlie Flatten serves on both of the District's Regional Water Planning Groups (Blanco/Guadalupe and Colorado River basins) where he monitors future plans to move surface water up into the HTGCD.

5. Goal: Addressing Natural Resource Issues Which Impact the Use and Availability of Groundwater and Which are Impacted by the Use of Groundwater

5.1. *Management Objective*

Each year, the District will make at least one endorsement or contribution to ongoing studies of geologic, environmental, or hydrogeologic studies being performed in the district area.

Performance Standard

Each year, a summary of the District's contributions or endorsements of ongoing studies will be included in the Annual Report.

Dedicated Monitor Well Project: The HTGCD Dedicated Monitor Well Project continued in 2020 with the completion of the Burton Ranch Monitoring Well. The Dedicated Monitor Well Project is designed to provide long-term water-level monitoring and ongoing groundwater quality data from carefully selected well sites in western Hays County. A complete aquifer formation evaluation program was carried out at each borehole, including core and cutting samples analyses, geophysical logging, down-hole video, aquifer testing, and water sample recovery. An extensive technical report was completed for each location and posted to the District website. Funding for the project came from HTGCD, Hays County, Dripping Springs Water Supply Corporation, and Barton Springs Edwards Aquifer Conservation District (BSEACD). Technical support and assistance were provided by Blanco Pedernales Groundwater Conservation District, BSEACD, Edwards Aquifer Authority, Texas Water Development Board, the University of Texas Bureau of Economic Geology, and the Texas State University Meadows Center for Water & the Environment. There is also outstanding cooperation and assistance from local landowners who allow District access to their properties.

As a result, continuous water level data and periodic water quality samples are collected from the dedicated monitor wells and made available to the public. Through ongoing monitoring of the dedicated wells, the District continues to expand the reliable long-term record of water levels and groundwater quality, a critical dataset for informing groundwater management decisions.

Blanco River Aquifer Tool for Water and Understanding Resiliency and Sustainability Trends (BRATWURST): HTGCD technical staff worked with a group of geoscientists led by the Meadows Center to develop the second phase of this surface-groundwater interaction-based model. Phase 2 will include the development of a numerical model from the conceptual model, which will have the capabilities to simulate groundwater recharge, spring discharge, flow in the Trinity Aquifer, and surface water-groundwater interactions. The groundwater flow model will provide HTGCD, BSEACD, and Hays County with a valuable tool for evaluating groundwater availability in Hays County and pumping impacts to the Trinity Aquifer, springs, and surface water. See *Blanco River Aquifer Assessment Tool A Tool to Assess How the Blanco River interacts With Its Aquifers: Creating the Conceptual Model* (Martin et al., 2019).

District Hydrogeological Analyses of the Trinity Aquifer System: Hydrogeologic data from the Trinity Aquifer was collected and analyzed during 2020. This is an ongoing project designed to acquire and interpret pertinent technical data and to apply this information to District operational management. Data includes geophysical well logs, cuttings samples, groundwater levels, groundwater samples & chemical analyses, pumping test reports, surface geology, and groundwater use (pumpage). This information is maintained in the District's growing database and is used in conjunction with the TWDB groundwater database. Local and regional modeling projects such as the TWDB Conceptual Model of the Hill County Trinity Aquifer and more local modeling will incorporate this data into their analyses.

Jacob's Well Groundwater Management Zone: In March 2020, HTGCD Board of Directors approved the creation of the Jacobs Well Groundwater Management Zone (JWGMZ) via Rule 15. This project was the culmination of technical staff, an interagency group of groundwater scientists, and stakeholder collaboration. Staff began an implementation process to guide permittees in the regulatory process. The Board also began JWGMZ specific Drought Stage declarations based on triggers set by rule. Rule 15 expressly specifies that the Board will take no enforcement action until March 2021. Note: An April 2021 Public Hearing and Board action delayed enforcement due to Covid concerns.

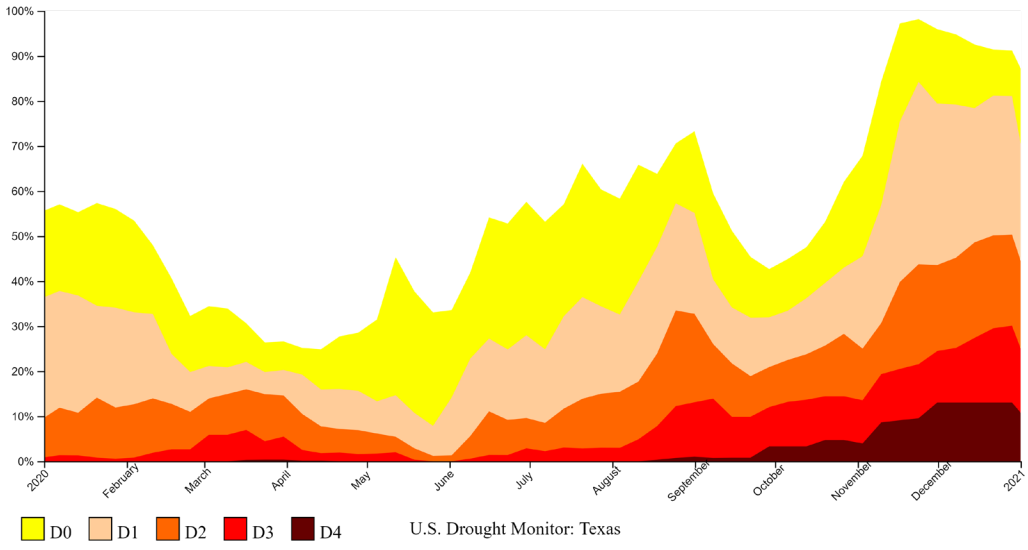
HTGCD Surface Water Monitoring Project: Groundwater-surface water interactions are a critical component of the story of recharge and discharge within the Trinity Aquifer in western Hays County. By periodically measuring surface water flows, hydrogeologists develop a greater understanding of how these interactions impact the aquifer and change over time. Going forward, technical staff plans to collect surface water flow data in the Blanco, Onion Creek, and Barton Creek basins to develop a greater understanding of groundwater-surface water interactions in the District.

Lower Trinity Project: The Project was initiated in 2012 to evaluate the potential for an alternative groundwater source for western Hays County. Previous Lower Trinity studies have consisted of aquifer testing to define aquifer parameters and overall groundwater availability and adding Lower Trinity wells to the District's Monitoring network. The hydrogeological evaluation of the Lower Trinity Aquifer continued in 2020 with the addition and analyses of geophysical logs and water samples. The northeastern part of the District is an area of ongoing study due to rapid development where the Middle Trinity Aquifer appears to be dewatered, and new wells are finding minimal production from the Lower Trinity Aquifer.

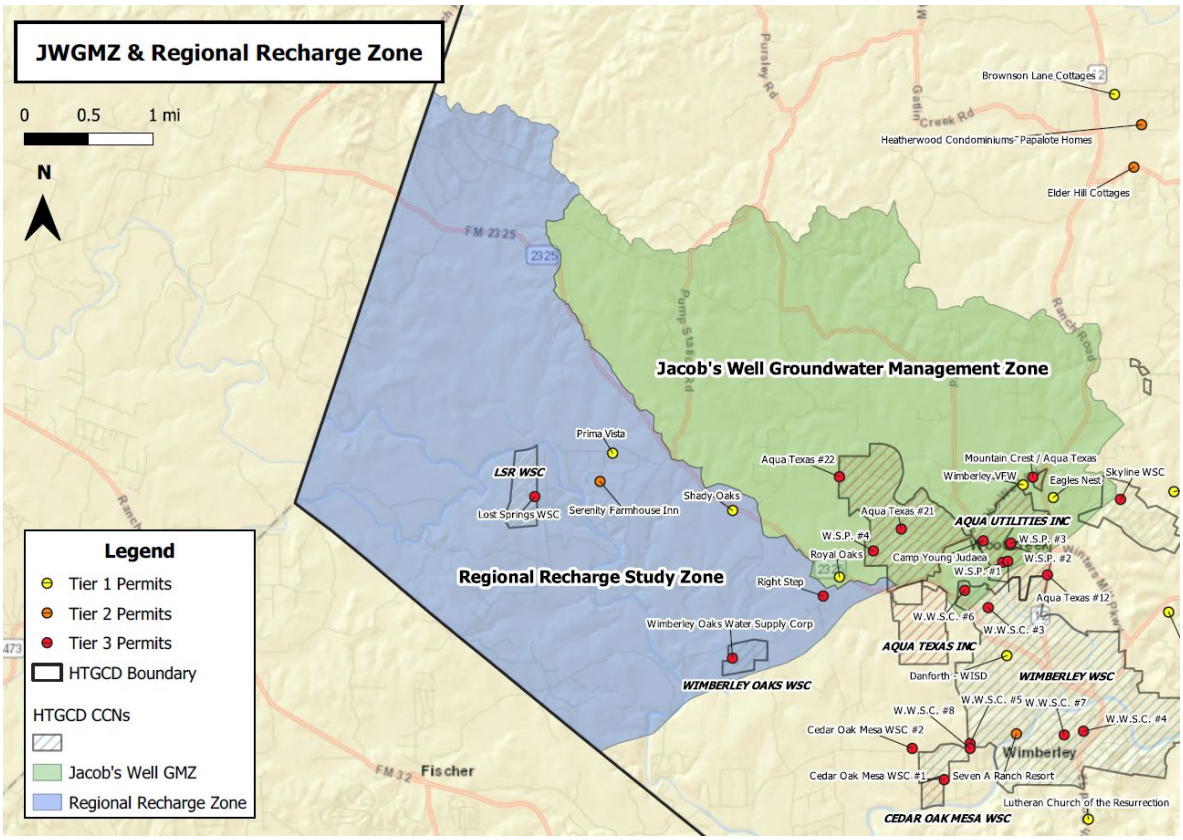
6. Goal: Addressing Drought Conditions

The continued health and potential sustainability of the Trinity Aquifer is the primary informer of the District's outlook and actions. Drought is the most difficult variable in the hydrologic equation to manage. In order to protect drinking water wells and thus property values, the District employs a variety of drought management tools ranging from education to prescribed curtailment. The District began the process of updating Rule 13 – Drought Management, in order to determine drought status more accurately. Due to concerns by several permittees, that process was tabled.

The District fulfilled its Annual Requirements described below and began implementing the Rules associated with the Jacob's Well Groundwater Management Zone, which was created to protect Trinity Aquifer resources in the Jacob's Well Springshed. Those Rules provide for stronger drought restrictions in the Management Zone. The District is fulfilling its Rule 16 requirement to gather scientific data on the 56-square mile Regional Recharge Study Zone. See Appendix, Section 6: *JWGMZ Technical Presentation, July 2019 Presentation* (Gary, et al., 2019).



Percent of Texas in Drought Throughout 2020. D0 = No Drought, D4 = Max Drought



6.1. *Management Objective*

The District has developed individual permit specific User Drought Contingency Plans to protect and conserve groundwater during critical drought conditions. The plan will be updated as additional data becomes available.

Performance Standard

The District will post a copy of the plan on the HTGCD website and will include an updated Drought Contingency Plan, available to end-users, in the Annual Report.

The District updated its Drought Contingency Plan in 2020 to reflect new drought requirements for the JWGMZ (see Appendix, Section 6).

The District continues to use the User Drought Contingency Plan (UDCP) for all non-exempt operating permit holders (see Appendix, Section 6). The UDCP is available for review on the District's website under Forms.

The Water Conservation Plan is also part of the paperwork required by the District for all new and amendment operating permit applications to be administratively complete.

A Drought Production Cutback Chart is included with each new permit, amended permit, and permit renewal. An example of a Drought Production Cutback Chart can be seen in Figure 2, below. The

cutback chart divides the permitted amount of each permit to show an exact monthly production, in gallons, for every possible drought stage so permit holders can prepare for Board-declared drought conditions.

[redacted]

0.448057 Acre Feet — **Drought Contingency Plan**

2019 Permit — **Production Cutback Chart**

146,000 Gallons

	Actual Use Gallons		**Baseline Gallons**	Stage 1 Voluntary 10%	Stage 2 Alarm 20%	Stage 3 Critical 30%	Stage 4 **Emergency** 40%	Gallons Over
January		6%	8,760	7,884	7,008	6,132	5,256	
February		7%	10,220	9,198	8,176	7,154	6,132	
March		7%	10,220	9,198	8,176	7,154	6,132	
April		7%	10,220	9,198	8,176	7,154	6,132	
May		8%	11,680	10,512	9,344	8,176	7,008	
June		10%	14,600	13,140	11,680	10,220	8,760	
July		12%	17,520	15,768	14,016	12,264	10,512	
August		12%	17,520	15,768	14,016	12,264	10,512	
September		10%	14,600	13,140	11,680	10,220	8,760	
October		8%	11,680	10,512	9,344	8,176	7,008	
November		7%	10,220	9,198	8,176	7,154	6,132	
December		6%	8,760	7,884	7,008	6,132	5,256	
Totals	0		146,000	131,400	116,800	102,200	87,600	0

SAMPLE

Figure 2. Example of a Drought Contingency Plan Production Cutback Chart.

6.2. *Management Objective*

Each quarter, the District will check the National Weather Service – Climate Prediction Center website (https://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/psi/202001-202001) for updates of the Palmer Drought Index. The District will download the updated Palmer Drought Severity Index (PDSI) map and check for periodic updates on www.waterdatafortexas.org/drought.

Performance Standard

Quarterly, the District will assess the status of drought in the District and prepare a quarterly briefing to the Board of Directors. The downloaded PDSI maps will be included with copies of the quarterly briefing in the District Annual Report to the Board of Directors.

The General Manager's Monthly Report includes a briefing on the status of drought within the District and is given to the Board of Directors during Board Meetings. The briefing includes maps from the US Drought Monitor and the Palmer Drought Severity Index, monitor well level averages, and HTGCD drought trigger updates (see Appendix, Section 6). HTGCD Staff records and addresses all filed complaints of waste or possible waste during the drought briefing. HTGCD Staff provides a monthly review of the current drought status to the Board of Directors at regular open meetings.

6.3. *Management Objective*

Each year, the District will collect monthly water level data from a network of monitoring wells.

Performance Standard

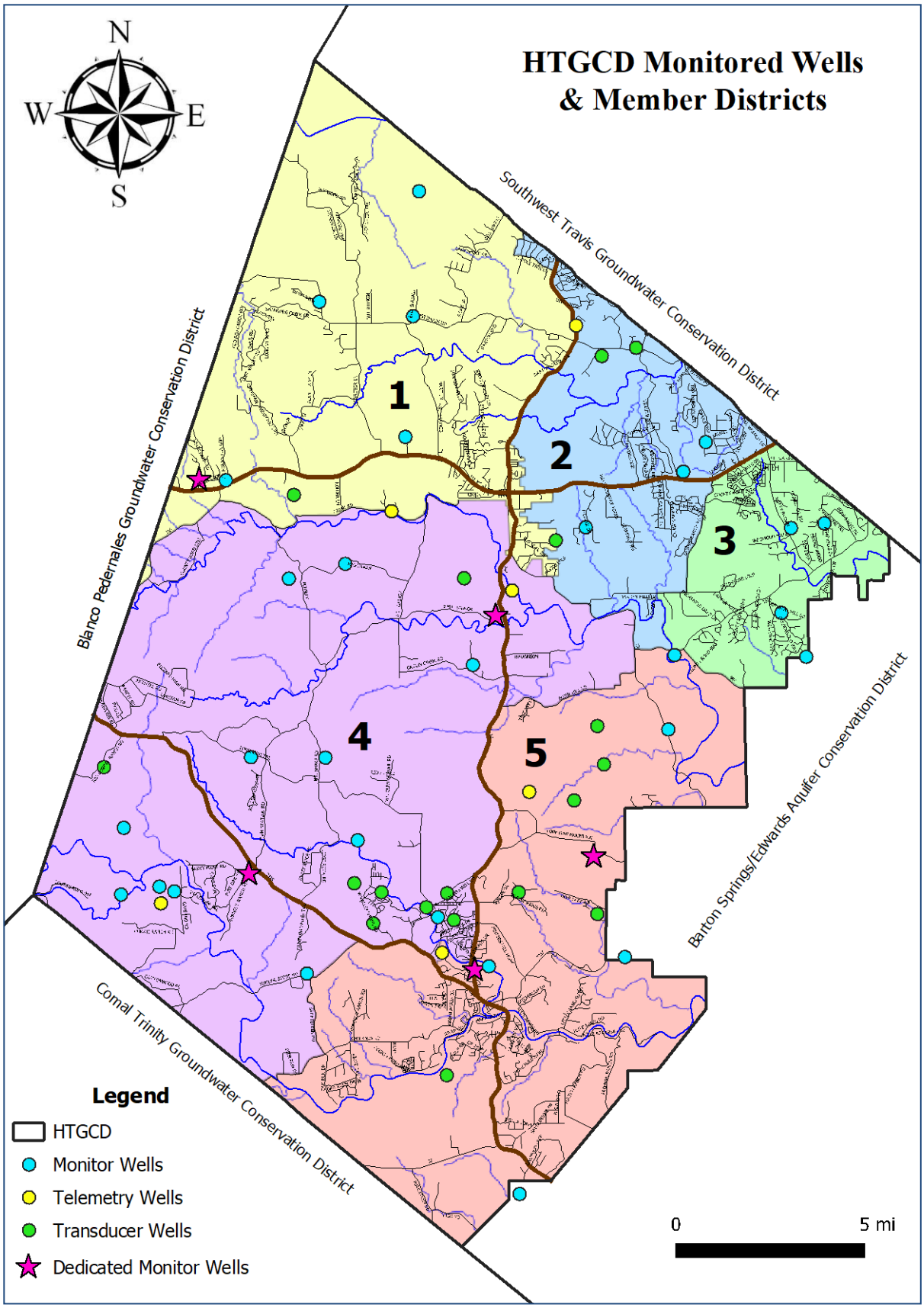
Each year, a report of the District water level collection activities, including a table of the water levels measured in District monitoring wells, will be included in the annual report.

Hydrographs for Mount Baldy and Henly Church wells (Figures 3 and 4, page 16), and the flow rates from the Blanco and Pedernales Rivers are used to measure the current health of the aquifer. You can find current flow rates of the Blanco and Pedernales Rivers on the District Drought Management webpage.

Monthly, District Staff collects water levels from dedicated District monitor wells. The information collected is entered into and displayed on the District's website as hydrographs transposed with rainfall data collected from NOAA. The public can access the District's website for more specific data by scrolling over the hydrographs to see elevation above mean sea level and surface to top of water table measurements. The HTGCD monitoring well location map can be found on page 15.

In addition, District staff downloads quarterly data from 18 transducer wells within western Hays County. This information is located on the District's website for public use.

See Appendix, Section 6 for the 2020 Monitor Well Levels chart describing monthly water level measurements.



The HTGCD Monitor Well Map.

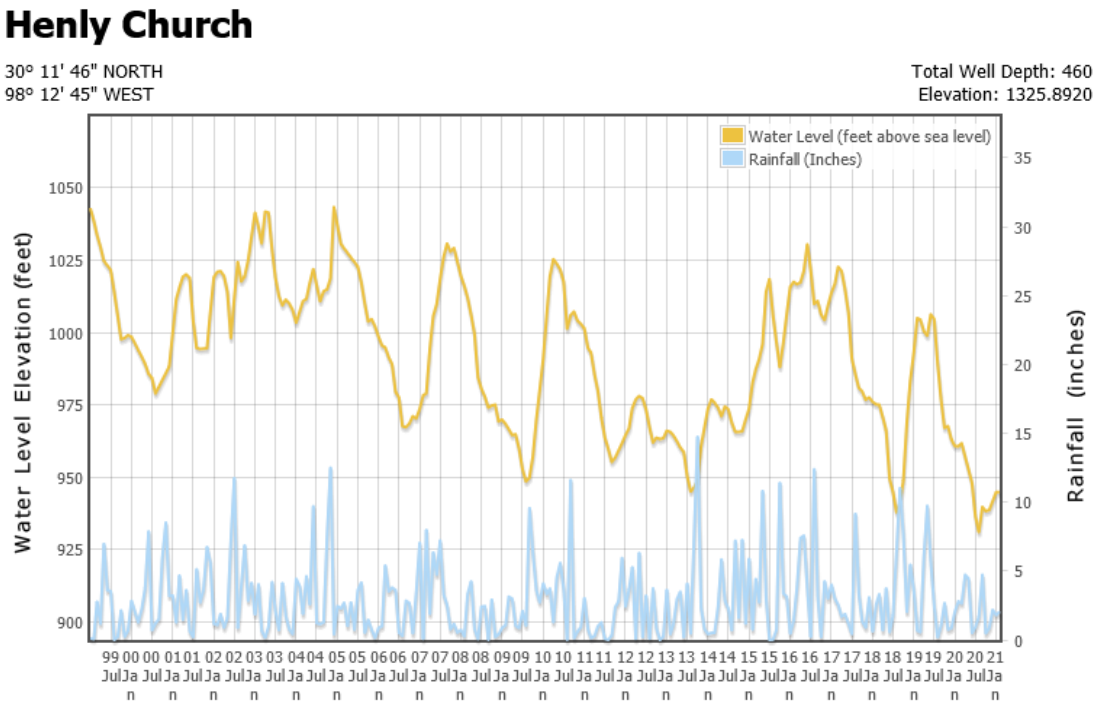


Figure 3: Henly Church hydrograph of water level elevation (feet above sea level) against monthly rainfall (inches).

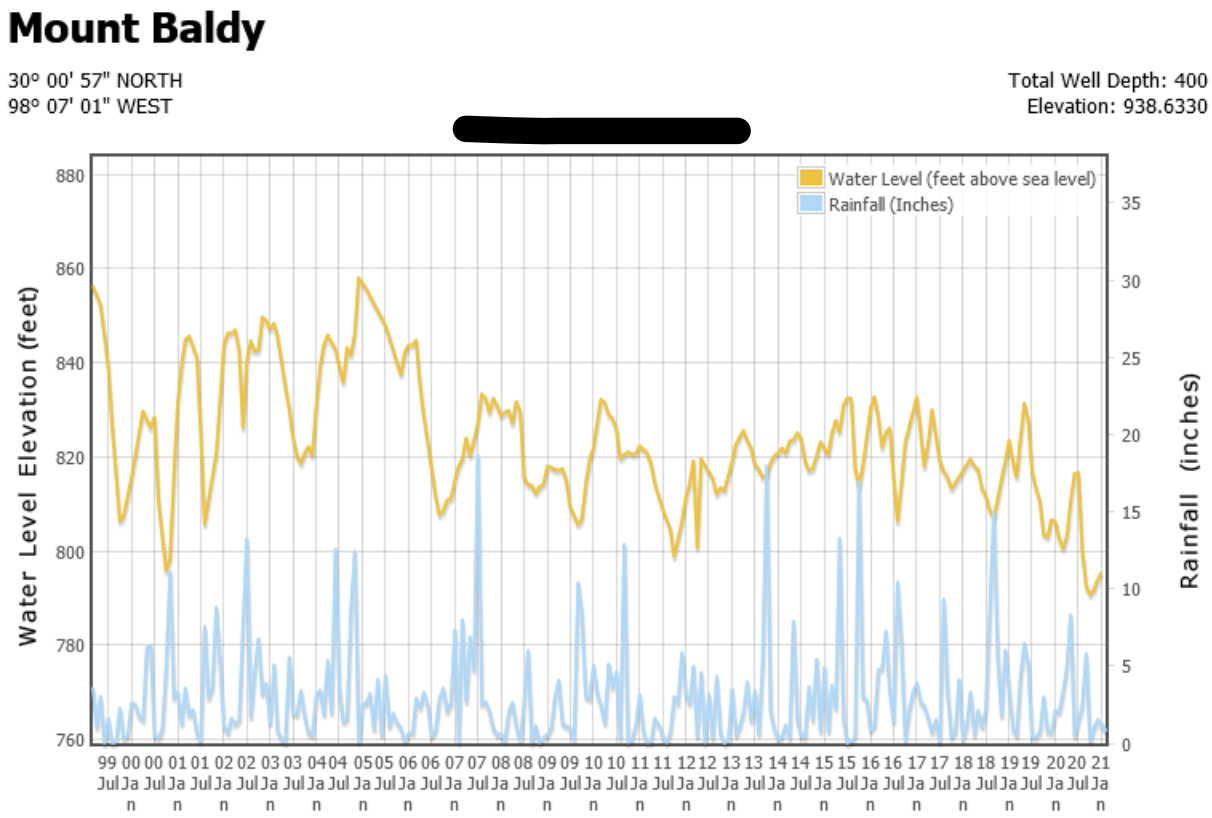


Figure 4: Mount Baldy hydrograph of water level elevation (feet above sea level) against monthly rainfall (inches)

6.4. *Management Objective*

Each year, the District will monitor data collected from the U.S. Geological Survey (USGS) water-flow monitoring stations on the Blanco River, Pedernales River, Onion Creek, and at Jacob's Well Spring.

Performance Standard

Each year, the District will review the prior year's monitoring data with local, state, or federal organizations and prepare a summary to be included in the Annual Report.

The Pedernales and Blanco River flow are HTGCD's Drought Indicators. Current conditions of the Drought Indicators are hosted on the Drought Management page of the District website.

Jacobs Well Spring flow is measured monthly for current conditions as a marker for drought curtailment in the JWGMZ.

Onion Creek and Jacob's Well Spring are also monitored for an overall measure of Middle Trinity aquifer health. **Measurements for 2020 showed below-average streamflow all year.**

7. Goal: Addressing Conservation

7.1. *Management Objective*

Each year, the District will submit one article for publication regarding water conservation to at least one newspaper of general circulation in Hays County.

Performance Standard

Each year, a copy of the article submitted for publication will be included in the Annual Report.

The District submitted the following articles for publication; (see Appendix, Section 7)

- "*Jacobs Well Groundwater Management Zone Moves Into 20% Drought* August 18, 2020 on the topic of new drought stage.
- "*New Jacob's Well Groundwater Management Zone*" Press Release dated March 23, 2020 on the creation of the GMZ.

8. Goal: Addressing Recharge Enhancement

Due to the geologic and hydrostratigraphic structure of the Trinity sub-aquifers, the implementation of significantly effective recharge enhancement to the primary source aquifer may not be practical. Current interpretation of geologic data suggests that downward leakage within the Trinity Group is limited to specific reaches along the Blanco River and Onion Creek. The majority of recharge takes place west of the bounds of the HTGCD near the sedimentary wedge-edge of the water bearing rock units through diffuse infiltration. Given the location of suspected recharge and its nature, neither general land management nor focused enhancement practices may be feasible. Therefore, until additional Hydrogeologic data is available, this goal is not applicable to the operations of this District.

9. Goal: Addressing Rainwater Harvesting

9.1. *Management Objective*

Each year, the District will make at least one endorsement or contribution to programs that encourage, install, educate, or assist individuals in the implementation of rainwater harvesting systems in the District area.

Performance Standard

Each year, the District will provide records of contributions or promotions of rainwater harvesting events or companies in its Annual Report.

The HTGCD sponsored the *2020 Hill Country Living FESTIVAL + Rainwater Revival* in the amount of $500.00. Due to the Covid-19 Pandemic, the event was limited to virtual content. The District produced a promotional video featuring the District's purpose and value for use in the Revival's Virtual Vendor Hall Video Content section.

The District encourages the use of rainwater collection systems on all new homes, businesses, and existing buildings during every monthly Board Meeting as part of the General Manager's Report.

Additionally, District staff receive TCEQ mailings concerning new business development within the District's boundary. A review of the packets includes direct communication, not only with TCEQ about the project, but also with the developer and their engineer. This includes inquiry about the installation of rainwater harvesting on common buildings or the ability of residents to install rainwater harvesting equipment.

10. Goal: Addressing Precipitation Enhancement

This goal is not applicable to the operations of this District.

11. Goal: Addressing Brush Control

11.1. *Management Objective*

The District will attend or contribute to at least one event each year that promotes and educates the public on proper land management practices.

Performance Standard

Each year, the District will provide records of contributions or promotions of land management events or companies in its Annual Report.

District staff attend and participate in the monthly Regional Water Quality Protection Program which focuses local agency and NGO capacity on a variety of land management best practices including brush control in the Edwards Aquifer Contributing and Recharge Zone.

District staff monitored and alerted the public to the various risks associated with the construction, including brush eradication, along the pathway of the Kinder Morgan Pipeline through western Hays County.

District staff promotes recharge of the aquifer through such means as proper brush management and reestablishment of deep-rooted native grasses to promote infiltration into the aquifer during monthly Board Meetings in the General Manager's Report.

The District also provides educational materials for the public to take home on the subject of native plants, rainwater harvesting, aquifer storage and recovery, and other educational topics.

12. Goal: Addressing Desired Future Conditions (DFCs)

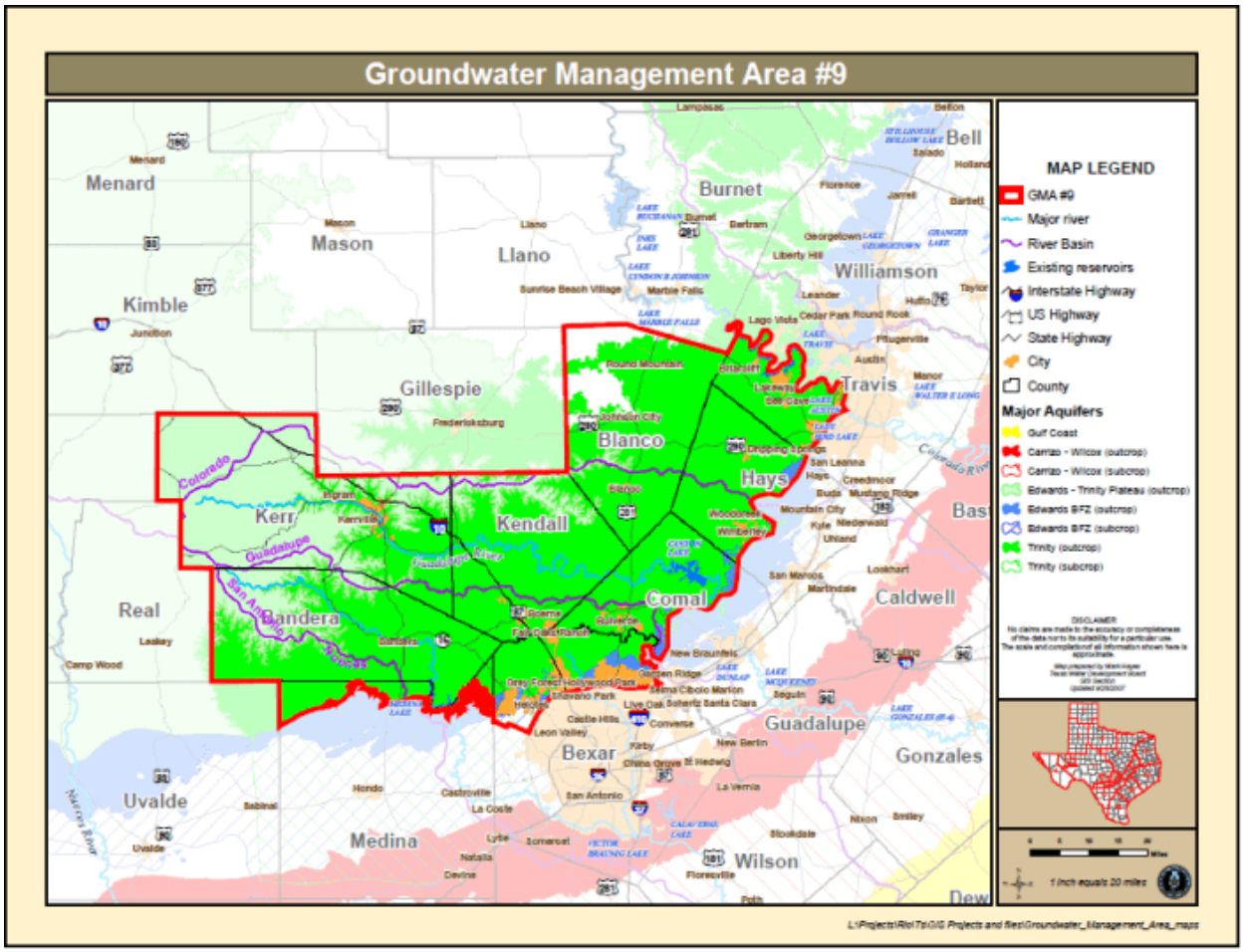
12.1. *Management Objective*

The District is working within the framework of Groundwater Management Area- 9 (GMA-9) to upgrade and maintain a well database map and files that will identify all District monitoring wells in the management area. The District will work with GMA-9 and their consultants on an acceptable method to analyze and report drawdown levels relative to the DFC. Deliverables may include potentiometric surface maps of the Middle and Lower Trinity Aquifers and selected hydrographs plus other documents generated by the consultants.

Performance Standard

Each year, the District will review the average drawdown of at least two Trinity Aquifer monitor wells, one in each Planning Region, against the DFC projected average regional drawdown for western Hays County. The District shall provide a summary in its Annual Report.

Texas Regional Water Planning requires that all Districts across the Hill Country Trinity Aquifer work together as a Groundwater Management Area (see map, page 20) to develop and monitor a 50-year aquifer level management goal. This decision is known as a Desired Future Condition (DFC). The DFC for the Trinity aquifer-wide is 30-feet of average drawdown over 50-years. The TWDB has scientifically quantified that average drawdown as a volume—and allotted the District 9,098 acre-feet/year of Modeled Available Groundwater (MAG).



Groundwater Management Area 9

Water Planning Region K: Henly Church Hydrograph

Applying a trendline to the Henly Church hydrograph from 2008 – 2021 (the period of interest for DFC analysis) displays slightly decreasing water levels for that period (-0.48 ft./yr.) (Figure 5). This would indicate a water level decrease of 9.58 ft. from 2008 – 2021. Evaluating the water level trendline for the entire period of record for this well (1999 – 2021) shows a historical trend that is still negative but has a larger decrease of -2.30 ft./yr., resulting in a 46.04 ft. drop in water level over that time period. Figure 5 demonstrates the difficulties of applying a trend line to a small sample size.

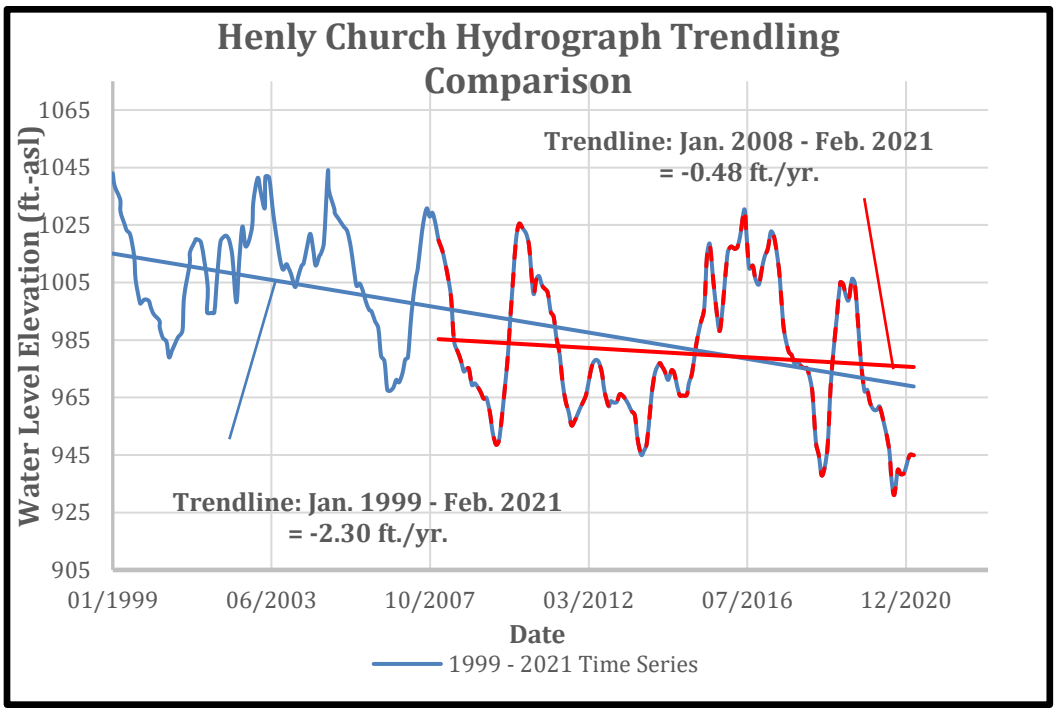


Figure 5: Henly Church Water Level Trendline Comparison showing data from January 1999 to February 2021. The graph shows two trendlines, the blue starting in January 1999, the red starting in January 2008.

Water Planning Region L: Glenn Hydrograph

The Glenn hydrograph trendline is positive (increase in water level over time) at a rate of +1.50 ft./yr. This would indicate an increase of 19.53 ft. during the 2008 – 2021 time period (Figure 6). Like the Henly well, the Glenn well experiences large seasonal fluctuations in water level that make accurate assessment of water level trends difficult to conduct. As such, caution should be exercised when using trendlines to evaluate long-term karst aquifer trends.

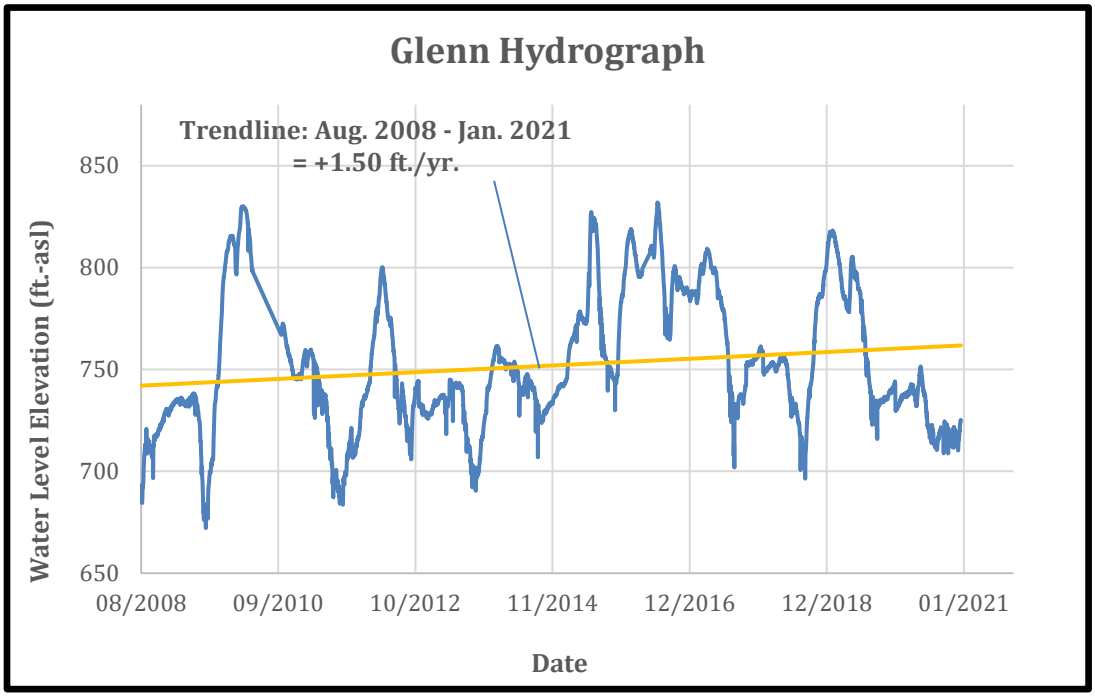


Figure 6: Glenn Hydrograph showing the trendline from August 2008 to January 2021.

12.2. *Management Objective*

The Modeled Available Groundwater (MAG) for the Trinity Aquifer in the District is derived from the DFC and requires frequent review against estimated pumpage.

Performance Standard

The District shall prepare an Annual Report of MAG estimated pumpage to monitor District compliance. A summary shall be presented to the District Board and made available to the public and included in the Annual Report.

The Available Groundwater HTGCD Trinity Aquifer System chart (Table 1, page 24) has been updated for 2020 and includes estimated exempt use production numbers and actual production reported from non-exempt permit holders from 2009 through 2020. A summary (Figures 7 and 8, pages 25,26) shall be provided to the District's Board of Directors during the annual report presentation. Special attention should be given to the following data:

During 2020, 117 new exempt wells were drilled within the District boundary, 2 being geothermal. Using 330 gallons per day, we can calculate that 42 acre-ft/year will be produced on average. The total exempt use for domestic and agriculture use during 2020 is shown on the chart as 3,758 acre-ft/year.

The sum of permitted "non-exempt use" during 2020 is 3,924 acre-ft. Adding "non-exempt use" and "exempt use" (3,758 and 3,924) the District is committed to 7,782 acre-ft/year. Actual non-exempt 2020 production reported to the District totaled 2,231 acre-ft. This amount is just greater than half the total of committed non-exempt permitted amount of 3,903 acre-ft.

Extrapolating a linear trend based on the previous 5-years of data, permitted plus exempt use will reach the MAG, 9,098 acre-feet, in 2026 (Figure 10).

The Hays Trinity Groundwater Conservation District's total MAG (Modeled Available Groundwater) is 9,098 acre-ft. Subtracting the committed number (7,782) from the MAG (9,098) equals 1,316 acre-ft remaining for both permitted and exempt use combined.

Table 1 Modeled Available Groundwater in the Trinity Aquifer System within the Hays Trinity GCD jurisdiction (acre-feet per year).

Available Groundwater HTGCD-Trinity Aquifer System: Acre Feet / Year: December 31, 2020

	Year-End 2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	**2020**		2060
Modeled Available Groundwater (1)		9,109	9,109	9,109	9,109	9,109	9,109	9,109	9,109	9,109	9,109	**9,098**		**9094 (1)** Projected
Exempt Use: Domestic/Agricultural	3,300 (2)	3,322	3,358	3,398	3,448	3,495	3,542	3,577	3,616	3,663	3716	**3758**	2,026	5,784 (3)
Non-Exempt Use: Permitted (5)	1,860	1,877	2,442	2,451	2,854	2,989	3,310	3,326	3,545	3,741	3,903	**3,924**	-614	3,310
Non-Exempt Use: No Permit -Estimated (6)	100	100	100	100	100	100	100	100	100	100	100	**100**		0
Non-Exempt Use: Reporting - No Permit (7)	482	364	306	235	19	2	3	4	0	0	0	**0**		0
Sub-Total Committed	5,742	5,663	6,206	6,184	6,421	6,586	6,955	7,007	7,261	7,504	7,719	**7,782**		
Net Available Groundwater (MAG-Sub-Total)		3,446	2,903	2,926	2,688	2,523	2,154	2,102	1,848	1,605	1,390	**1,316**		
Actual Production Reported: Acre Feet	1,987	1,796	2,004	1,691	1,599	1,532	1,537	1,586	1,815	1,904	1,940	**2,231**		

2009 = 99 new Well Construction Notifications or 37AF
2010 = 59 new Well Construction Notifications or 22 AF
2011 = 96 new Well Construction Notifications or 36 AF
2012 = 107 new Well Construction Notifications or 40 AF
2013 = 135 new Well Construction Notifications or 50 AF
2014 = 126 new Well Construction Notifications or 47 AF
2015 = 127 new Well Construction Notifications or 47 AF
2016 = 95 new Well Construction Notifications or 35 AF
2017 = 105 new Well Construction Notifications or 39 AF
2018 = 126 new Well Construction Notifications or 47 AF
2019 = 144 new Well Construction Notifications or 53 AF
2020 = 115 new Well Construction Notifications or 42 AF*
* Referrences to 117 wells includes two non pumping geothermal wells

(1) These TWDB GR 16-023 MAG model run numbers decrease over time, and incorperate assumptions on future use
(2) Approved by the HTGCD Board of Directors on April 25, 2011.
(3) Used HDR's NA Case 5,784 (Water-Wastewater Plan for Hays County, 2011); Not reserved for exempt use
(4) Newly Registered Exempt Use wells in 2019 (114 x 330 gpd x 365) / 325,851
(5) Total AF permitted for pumping in existing operational permits
(6) Non-Exempt Use: not permitted and not reporting; Goal: permit users and move 100 AF towards 0 AF
10 AF calculated: Identified & Under Investigation = 50 cases @ 2 AF each = 100 AF
(7) Non-Exempt Use: reporting but not permitted; Goal: permit users and move 4 AF towards 0 AF

Numbers at a Glance

Total Registered non-exempt wells:	108
Total Registered exempt wells (estimated):	1,888
Total monitor wells:	59
Total registered producing wells:	**1,996**
Utility Connections:	8,259
Total Volume **Permitted** (estimated):	4,124 a-f/y
Total non-exempt produced:	2,231 a-f/y
Total exempt use (estimated):	3,758 a-f/y
Total **produced** (estimated):	5,989 a-f/y
Total Managed Available Groundwate	**9,098 a-f/y**

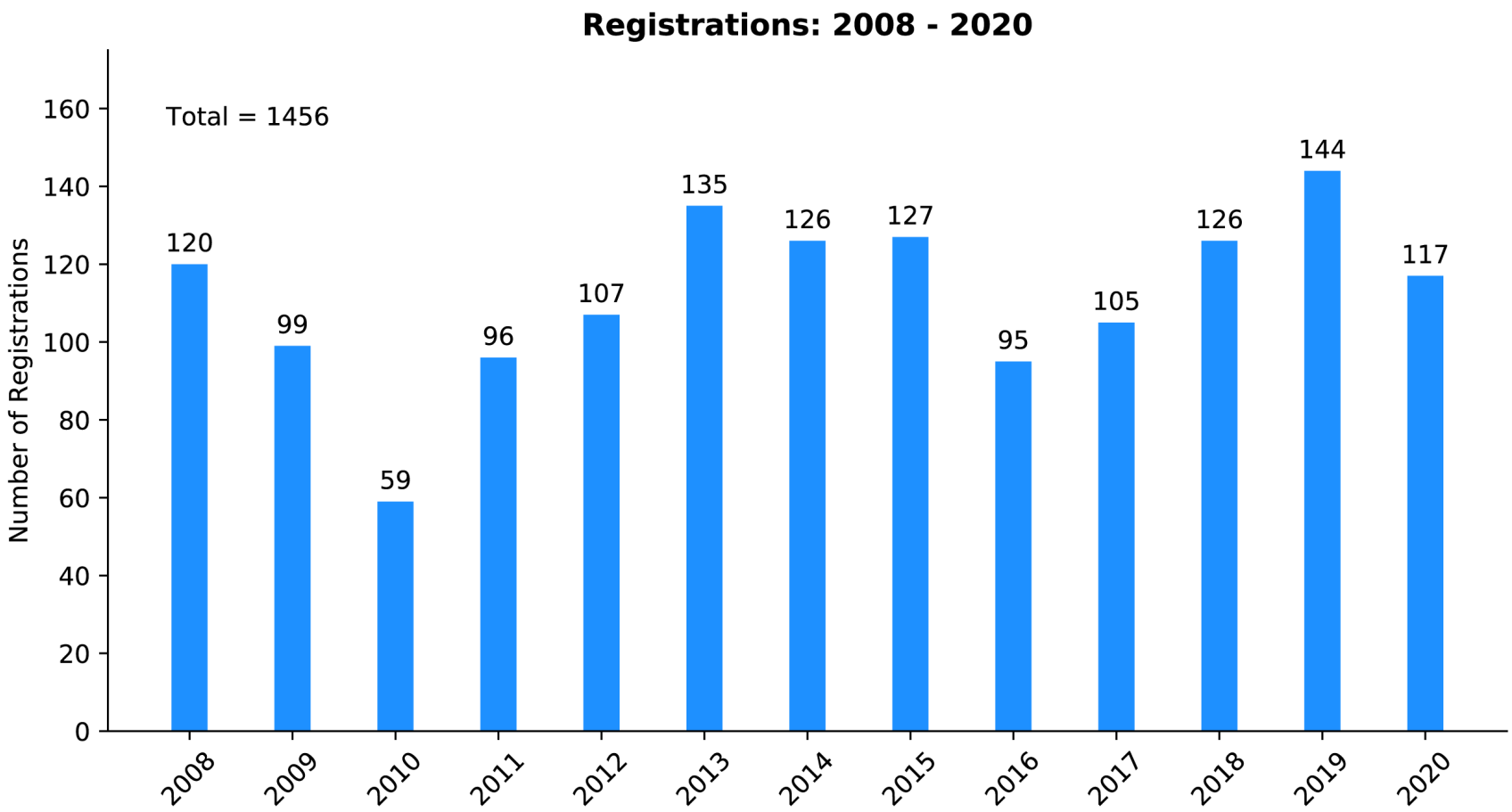


Figure 7. Wells drilled by year, includes geothermal and non-producing monitoring wells.

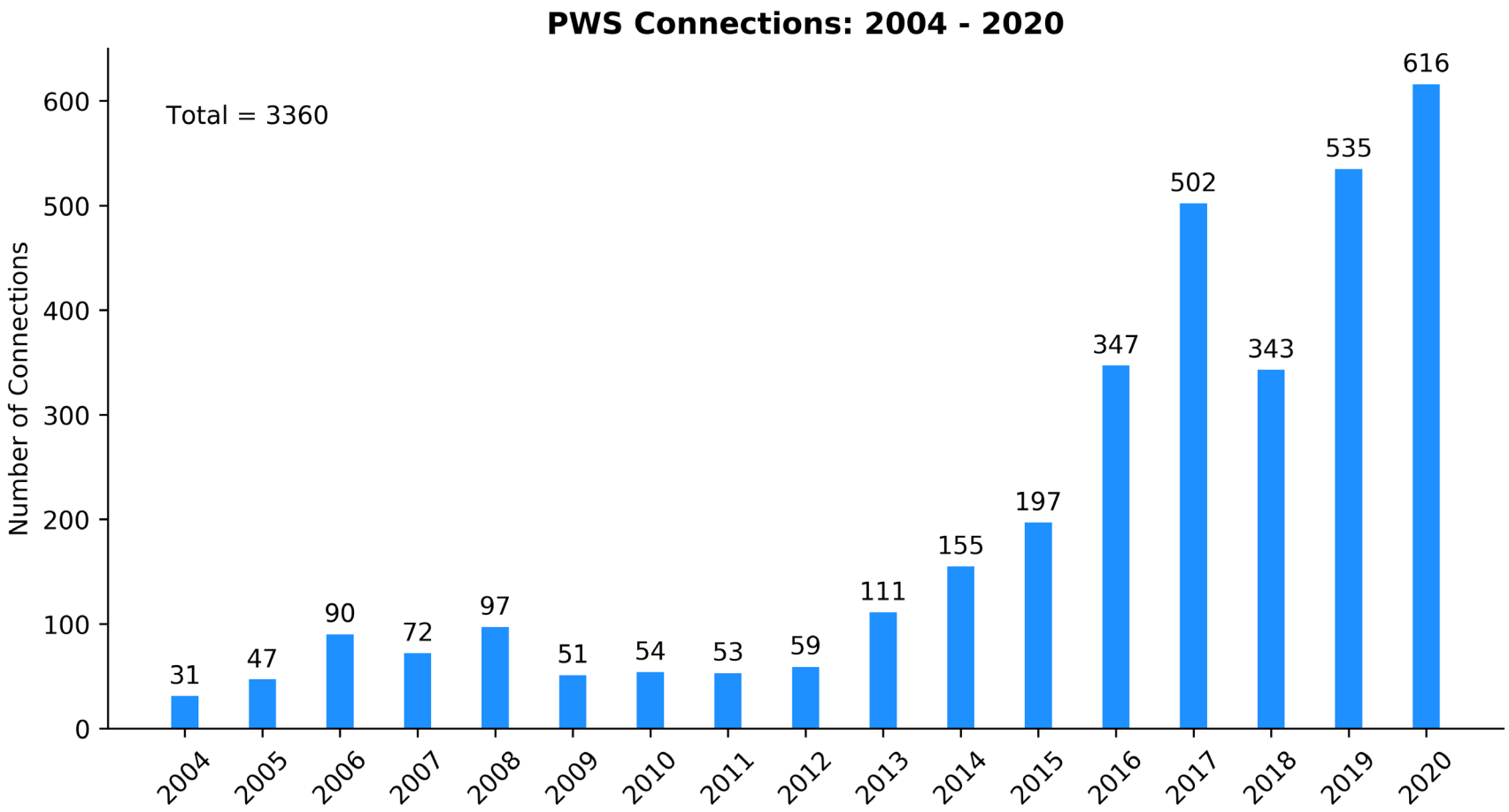


Figure 8. Public Water Supply Connections by year.

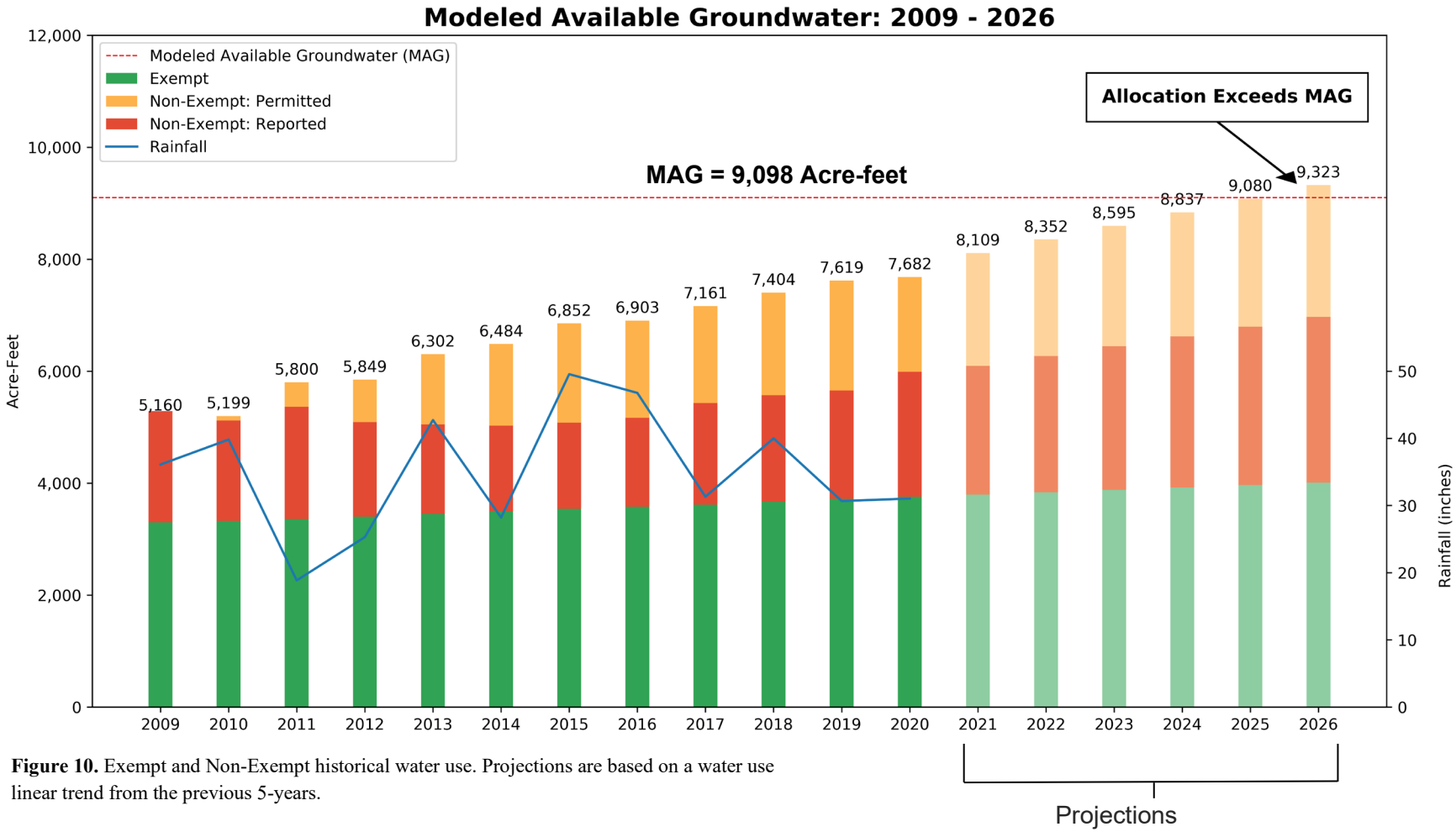


Figure 10. Exempt and Non-Exempt historical water use. Projections are based on a water use linear trend from the previous 5-years.

Appendix:

Section 1.	Board Meeting and Public Hearing Agendas
Section 2.	Manager's Reports
Section 3.	Well and Connections Reports
Section 4.	Financial Statement, Mitigation Fund, 2020 Audit Summary
Section 5.	Project Reports
Section 6.	Drought Support Documents
Section 7.	Newspaper Articles and Press Releases
Section 8.	Rainwater Harvesting Support Documents
Section 9.	Review of Professional Services

References

Martin, N.M., Green, R.T., Nicholaides, K.D., Fratesi, S.B., Nunu, R.R., and Flores, M.E, 2019, Blanco River Aquifer Assessment Tool: A Tool to Assess How the Blanco River Interacts with Its Aquifer: Creating the Conceptual Model. Technical Report prepared for the Meadows Center for Water and the Environment. Texas State University at San Marcos, Texas. 136 p. + attachments.

Jones, I., 2017, GAM Run 16-023 MAG: Modeled Available Groundwater for the Aquifers in Groundwater Management Area 9, Texas Water Development Board, 26 p.