FAYETTE COUNTY GROUNDWATER CONSERVATION DISTRICT

MANAGEMENT PLAN

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INTRODUCTION

District Mission

The purpose of the Fayette County Groundwater Conservation District (the District), as required in the Texas Water Code, Chapter 36, is to provide for conserving, preserving, protecting, and recharging the underground water and prevention of waste of the District's groundwater.

The District will develop, promote, and implement management strategies to provide for the conservation, preservation, protection, recharging, and prevention of waste of the groundwater resources, over which it has jurisdictional authority, for the benefit of the people that the District serves.

Guiding Principles

The District was formed, and has been operated from its inception, with the guiding belief that the ownership and pumpage of groundwater is a private property right. It is understood that, through the confirmation election of the District, the landowners relinquished some of their control over that right for the collective benefit of the community which the District serves.

The District has adopted the principle of "education first" and regulation as a last resort in their effort to encourage conservation of the resource. As a result, the rules of the District are designed to give all landowners a fair and equal opportunity to use the groundwater resource underlying their property for beneficial purposes. If, at the request of the constituents of the District, more stringent management strategies are needed to better manage the resource, these strategies will be put in place after an extensive educational process and with the perceived majority approval of the constituents. The District will continue to monitor groundwater quality and quantity in order to better understand the dynamics of the aquifer systems over which it has jurisdiction.

This management document is intended to be used as a tool to provide continuity in the management of the District. It will be used by the District staff as a guide to insure that all aspects of the goals of the District are carried out. It will be referred to by the Board for future planning, as well as a document to measure the performance of the staff on an annual basis

Conditions can change over time which may cause the Board to modify this document. The dynamic nature of this plan shall be maintained such that the District will continue to best serve the needs of the constituents. At the very least, the Board will review and readopt this plan every five years.

The goals, management objectives, and performance standards put forth in this planning document have been set at a reasonable level considering existing and future fiscal and technical resources. Conditions may change which could cause change in the management objectives defined to reach the stated goals. Whatever the future holds, the following guidelines will be used to insure that the management objectives are set at a sufficient level to be realistic and effective:

- The District's constituency will determine if the District's goals are set at a level that is both meaningful and attainable; through their voting right, the public will appraise the District's overall performance in the process of electing or re-electing Board members.
- The duly elected Board will guide and direct the District staff and will gauge the achievement of the goals set forth in this document.
- The interests and needs of the District's constituency shall control the direction of the management of the District.
- The Board will endeavor to maintain local control of the privately owned resource over which the District has jurisdictional authority.

- The District budget operates on an October 1 through September 30 fiscal year.
- The Board will evaluate District activities on a calendar year basis when considering stated goals, management objectives, and performance standards, any reference to the terms annual, annually, or yearly will refer to a standard calendar year of January 1 through December 31.

History

The Fayette County Groundwater Conservation District, formerly called the Colorado Valley Groundwater Conservation District, was created effective September 1, 2001 by the 77th Legislature in House Bill No. 1081 and was later confirmed by the voters of Fayette County in November of 2001, in accordance with the Underground Water Conservation Districts Act passed by the Texas Legislature in 1949 (currently codified as Chapters 35 and 36 of the Water Code, Vernon's Texas Codes Annotated).

Board of Directors

The Board of Directors is elected by the people within their Directors precincts, under the general Election laws of Texas.

Table 1: Board of Directors of the Fayette County Groundwater Conservation District*

Office	Name	Precinct	Term Ends
President	Leo J. Wick, Sr.	At Large	December 2014
Vice-President	Terry Hays	4	December 2014
Secretary/Treasurer	Cynthia Rodibaugh	3	December 2016
Director	Harvey Hayek	2	December 2014
Director	Robert Leer	1	December 2016

* This list of Directors is current as of the date of revision.

Location and Extent

The boundaries of the District are the same as, congruent with and coextensive with the boundaries of Fayette County, Texas, as stated in Section 3 of House Bill 1081, enacted by the Legislature of the State of Texas, meeting in Regular Session in 2001 as the 77th Legislature, and passed by the Texas House of Representatives on March 29, 2001 and by the Texas Senate on May 10, 2001, and signed by the Governor of the State of Texas on May 23, 2001.

Fayette County, 936 square miles in area, is in the Gulf Coastal Plain in east-central Texas. Bordering counties are: Bastrop on the northwest; Lee, Washington, and Austin on the north and northeast; Colorado on the east-southeast; and Lavaca and Gonzales on the south and southwest. La Grange, the county seat, is near the center of the county on U.S. Highway 77 and State Highway 71, about 60 miles southeast of Austin and 100 miles west of Houston.

Planning Period

This plan becomes effective upon review and approval by the Texas Water Development Board and remains in effect until a revised plan is approved or ten (10) years from the date of approval as administratively complete, whichever is later. The plan may be reviewed annually. However, the plan must be reviewed by the Board of Directors, readopted with or without revisions, and be resubmitted to the TWDB for approval at least once every five years to insure that it is consistent with the applicable Regional Water Plans and the State Water Plan.

As outlined in Chapter 36.1071, Texas Water Code and in 31 Texas Administrative Code §356.52(a)(1), the Management Plan is required, as applicable, to address the following management goals:

- Providing the most efficient use of groundwater
- Controlling and preventing waste of groundwater
- Controlling and preventing subsidence
- Addressing conjunctive surface water management issues
- Addressing natural resource issues
- Addressing drought conditions,
- Addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost effective, and
- Addressing in a quantitative manner the desired future conditions of the groundwater resources.

The following goals referenced in Chapter 36, Texas Water Code, have been determined not applicable to the District;

§ 36.1071(a)(3) Controlling and preventing subsidence
§ 36.1071(a)(4) Addressing conjunctive surface water management issues
§ 36.1071(a)(5) Addressing natural resource issues
§ 36.1071(a)(7) Addressing recharge enhancement
§ 36.1071(a)(7) Addressing precipitation enhancement
§ 36.1071(a)(7) Addressing brush control
§ 36.1071(a)(7) Addressing rainwater harvesting

GENERAL GEOLOGY AND HYDROLOGY

Topography

Topography in Fayette County consists of rolling to hilly uplands, and flat flood plains along the major streams. Flood-plain terraces, river flats, and marshes typify the valley bottoms. Elevation ranges from about 200 feet above sea level where the Colorado River crosses the Fayette-Colorado County line to over 550 feet in the southwest and northeast parts of the county. Most of the county is drained by the Colorado River and its tributaries. Major tributaries of the Colorado River draining Fayette County include Rabbs, Buckner's, and Cummins Creeks. The southern part of the county is drained by the east and west branches of the Navidad River and their tributaries, and the westernmost corner of the county is drained by Peach Creek, a tributary of the Guadalupe River.

Groundwater Resources

Aquifers of Fayette County have been divided by the Texas Water Development Board (TWDB) into two types, namely, major and minor aquifers. The TWDB has classified two major aquifers in Fayette County: the Carrizo-Wilcox and Gulf Coast. The Queen City, Sparta Sands, and the Yegua-Jackson are classified as minor aquifers. In addition to these aquifers, the alluvium of the Colorado River, as well as other geologic formations, are being tapped by wells within the County for domestic uses.

Most of the formations in Fayette County will yield some water, but only the sands of the Sparta Sand, Yegua Formation, Jackson Group, Catahoula Tuff, and Oakville Sandstone yield fresh to slightly saline water (having less than 3,000 parts per million dissolved solids) in significant quantities. The Carrizo Sand, sands of the Wilcox Group, the Queen City Sand, and the Quaternary alluvium are also capable of yielding water in the county; however, these contain usable quality water over limited areas of the county or occur at relatively great depths in comparison to other fresh water-bearing formations and consequently are not developed in Fayette County. The Wilcox Group is not known to yield water to wells in Fayette County. The Weches Greensand and Cook Mountain Formation generally do not yield usable quality water in sufficient quantities to constitute a supply.

Major Aquifers

Carrizo-Wilcox Aquifer

The Wilcox Group consisting of the Hooper Formation (lower Wilcox), the Simsboro Formation (Middle Wilcox), the Calvert Bluff (Upper Wilcox), and the overlying Carrizo Sand formation of the Claiborne Group form a hydrologically connected system known as the Carrizo-Wilcox Aquifer. The Carrizo-Wilcox crops out in a north-east trending belt 13 to 20 miles wide parallel to the Bastrop-Fayette county line through Lee, Bastrop and Caldwell Counties within Thornhill's study area.

Wilcox Group

The Simsboro Sands (Middle Wilcox) forms a prolific aquifer that is currently tapped or will be tapped in the future for large groundwater supplies in Bastrop, Lee, Milam, and Burleson Counties. The Calvert Bluff and Hooper Formations are not as favorable for development updip. The top of the Wilcox Group, in Fayette County, ranges from 1,500 feet below land surface in western Fayette County, to more than 5,500 feet in the downdip area. The Wilcox Group consists of various sediment material such as clay, silt, fine- to medium-grained sand and sandstone, shale, and some seams of lignite.

No known well is tapped into the Wilcox Group within the boundaries of the Fayette County Groundwater Conservation District.

Carrizo Sand

The Carrizo Sand is formed by massive, cross bedded, fine- to course grained ferruginous sand with a few relatively thin layers of clay. The Carrizo crops out on a north east trending band from one to four miles in width through Caldwell, Bastrop, and Lee counties, within Thornhill's study area. The Carrizo dips southeastward approximately 160 feet per mile near the outcrop, with the dip getting steeper, to approximately 250 feet per mile, downdip. Within Fayette County, the top of the Carrizo Sand's altitude ranges from 500 feet below mean sea level to more than 5,000 feet below mean sea level. Depth to the top of the Carrizo ranges from approximately 850 feet to more than 5,500 feet below land surface.

Based on information from the Fayette County Groundwater Conservation District database, there are 13 known wells in Fayette County known to be tapping this aquifer with an average depth of approximately 1,460 feet.

Gulf Coast Aquifer

The Gulf Coast aquifer consists of four distinct units, the Jasper aquifer, the Burkeville confining system, the Evangeline aquifer, and the Chicot aquifer. Within Fayette County, the Oakville Sandstone and the Catahoula Formation correspond to the Jasper aquifer. The base of the Fleming Formation to the Burkeville confining unit, and the upper part of the Fleming Formation and the Willis Formation correspond to the Evangeline aquifer. The Chicot aquifer is not present in Fayette County.

The Gulf Coast aquifer extends inland approximately 100 to 150 miles from the Gulf of Mexico in line approximately parallel to the Texas Gulf Coast. In Fayette County, the Gulf Coast aquifer formations crop out along the central and eastern portions of the county, with the Catahoula Formation, Oakville Sandstone, and Fleming Formation forming a north-east trending belt 13 to 16 miles wide. This belt is parallel to the Fayette-Colorado county line.

The aquifer consists of complex interbedded clays, silts, sands, and gravels, which are hydrologically connected to form a large, leaky artesian aquifer system.

Water quality is generally good in the shallower portion of the aquifer. In several areas at or near the coast, including Galveston Island and the central and southern parts of Orange County, heavy municipal or industrial pumpage has caused an updip migration, or saltwater intrusion, of poor quality water into the aquifer. Years of heavy pumpage for municipal and manufacturing use in portions of the aquifer have resulted in areas of significant water-level decline. Some of these declines have resulted in compaction of dewatered clays and significant land-surface subsidence. Recent reductions in pumpage in those areas have resulted in a stabilization and, in some cases, even improvement of groundwater quality.

Based on information from the Fayette County Groundwater Conservation District water well database, a combined total of approximately 4,328 wells are currently tapping into the formations of the Gulf Coast Aquifer in Fayette County. Average well depth in the Gulf Coast aquifer is approximately 202 feet.

Jasper Aquifer

The Jasper Aquifer consists of the Oakville Sandstone and the Catahoula Tuff. Hydrologically, it is part of the Gulf Coast aquifer. The formations of the aquifer crop out in the central part of Fayette County and cover approximately 250 square miles. The formations that comprise the Jasper dip southeastward approximately 75 to 100 feet per mile. Depth to the top of the Jasper The formation overlays the Catahoula Tuff and underlies the Burkeville Unit in Fayette County. The aquifer contains local pockets of sand, shale, and clay. The aquifer's rate of dip in Fayette County is not known at the present time. Currently, rural domestic users are tapping this formation for water supply.

Water quality of the Jasper Aquifer is adequate for municipal and domestic uses although hardness is somewhat elevated.

Evangeline Aquifer

The Evangeline aquifer is part of the Gulf Coast Aquifer and is separated from the Jasper aquifer by the Burkeville Confining System. Comprised of the upper portion of the Fleming Formation and the Willis Sand, the Evangeline aquifer outcrops throughout eastern Fayette County. The aquifer is under water table conditions throughout Fayette County with water levels generally shallow through the outcrop area. Sand thickness within the Evangeline ranges from zero feet to 200 feet near the southwestern county line. Water of good quality can be found in most wells producing from the aquifer.

Minor Aquifers and Formations

Oakville Sandstone and Lagarto Clay Formations

These formations are part of the Gulf Coast aquifer and are composed of two separate units within Fayette County. The Oakville Sandstone overlays the Lagarto Clay and is considered as one unit in Fayette County due to the difficulty in distinguishing each unit uniquely. The outcrop of the two units are east of a northeasterly line from Flatonia to Carmine. The outcrop area for the two units is approximately 13 miles in width in Fayette County. The combined unit consists of sand, gravel, clay and shale. The rate of dip within the County is not known at the present time. This aquifer is currently providing water supply for the cities of Ellinger, Fayetteville, and Flatonia. Some rural domestic users are also taping this formation.

Water quality from these two formations is generally acceptable although hardness is somewhat of a problem.

Catahoula Tuff Formation

The Catahoula Tuff Formation is part of the Gulf Coast aquifer and crops out in Fayette and Lee Counties varying in width from one to six miles in Fayette County. The formation follows a northeasterly line from Flatonia to La Grange. The formation consists of clay, sand, silt, and tufaceous sand. The rate of dip which the aquifer has within the County is unknown as is the downdip limit of fresh to slightly saline water. The Catahoula Tuff formation is supplying water to the cities of Carmine, La Grange, Flatonia, and Schulenburg and the rural population between these cities.

Water quality from this formation is generally acceptable for municipal and domestic purposes although hardness is somewhat of a problem.

Queen City Sand

The Queen City Sand crops out in Bastrop and Lee Counties in a narrow band approximately three to five miles in width and roughly parallel to the Bastrop-Fayette County line. In Fayette County, this formation downdips at a rate of approximately 150 feet per mile from east to west. The formation's altitude ranges from 10 feet above mean sea level near the intersection of Buckner's Creek and State Highway 95 to approximately 4,000 feet below mean sea level near Fayetteville.

Water quality from this formation is adequate for municipal and domestic purposes though TDS values approach the recommended secondary limit. Fresh to slightly saline water is available west of a line from Flatonia to Ledbetter. Presently, the Fayette County Groundwater Conservation District database indicates 39 wells tap into this aquifer in Fayette County. Average well depth in the Queen City aquifer is approximately 639 feet.

Sparta Sand

The Sparta Sand Formation crops out in Bastrop and Lee counties in a very narrow band approximately one to two miles wide and along a line approximately parallel to the Bastrop-Fayette County line. The formation downdips approximately 175 feet per mile from the southwestern part of the County to the northeastern part of the County. The Sparta Sand's altitude ranges from 272 feet above mean sea level near the Bastrop County State Highway 95 intersection to 3,500 below mean sea level near Fayetteville.

Water quality from this formation is acceptable for municipal and domestic purposes although hardness and TDS concentrations approach Texas Department of Health's (TDH) recommended limits in some locations. Fresh to slightly

saline water is available west of a line from slightly west of Carmine to Flatonia.

Current records indicate a total of 224 wells tapping into the Sparta Sand in Fayette County, with an average depth of 224 feet.

Yegua Formation

The Yegua Formation crops out in Fayette and Lee County in a band approximately four to eight miles wide and along the Bastrop-Fayette County line. The Yegua Formation is composed of alternating layers of clay and silt with some thin seams of lignite. The formation downdips at a rate of 150 feet per mile. The formation reaches its deepest depth of 2,800 feet below mean sea level along the Fayette-Lavaca County line. Presently, the Yegua Formation is being utilized by rural landowners for domestic and livestock water supply.

The water quality from this formation is acceptable for municipal and domestic purposes although TDS and sulfate constituents exceeded the recommended maximum limits, and chloride and hardness constituents approached the maximum limits.

Jackson Group

The Jackson Group Formation crops out in Fayette and Lee Counties in a band approximately three to eight miles in width and along a northeasterly line from Flatonia to La Grange. The formation is composed of clay and silt with some minor deposits of sandstone. The formation dips within the County at a rate of approximately 150 feet per mile. The formation reaches an estimated 2,200 feet below mean sea level near Fayetteville. Current use of the Jackson Group is by the cities of Ledbetter, Flatonia, and Schulenburg as well as rural property owners.

Water quality from this formation is marginal for municipal and domestic purposes due to constituent levels exceeding recommended maximum limits for TDS, chloride, sulfate, and calcium carbonate in many locations throughout the County.

Yegua-Jackson Aquifer

In 2002, Texas Water Development Board is designated the Yegua Formation and the Jackson Group as a minor aquifer, *the Yegua-Jackson aquifer*. The primary rationale for this designation is that water use from the Yegua-Jackson aquifer ranks in the upper half of annual water use for the minor aquifers, with more than 11,000 acre-feet of water produced in 1997. The Yegua-Jackson aquifer extends in a narrow band from the Rio Grande and Mexico across the State to the Sabine River and Louisiana. Although the occurrence, quality, and quantity of water from this aquifer are erratic, domestic and livestock supplies are available from shallow wells over most of its extent. Locally water for municipal, industrial, and irrigation purposes is available. Yields of most wells are small, less than 50 gallons per minute, but in some areas, yields of adequately constructed wells may range to more than 500 gallons per minute. The Yegua-Jackson aquifer consists of complex associations of sand, silt, and clay deposited during the Tertiary Period. Net freshwater sands are generally less than 200 feet deep at any location within the aquifer.

Water quality varies greatly within the aquifer, and shallow occurrences of poor-quality water are not uncommon. In general, however, small to moderate amounts of usable quality water can be found within shallow sands (less than 300 feet deep) over much of the Yegua-Jackson aquifer.

Currently, 2922 wells are known to be producing from the Yegua-Jackson aquifer, with an average depth of 339 feet.

Alluvium

The alluvium (clay, silt, gravel, etc. deposited by running water) generally follows the flood plain of the Colorado River. The band's width varies from approximately one to eight miles. The alluvial's thickness is not known although some observations have estimated it does not exceed 60 feet. Wells in the alluvium are generally shallow and provide water in small quantities for rural domestic and livestock purposes within Fayette County.

Water quality from alluvial deposits is generally adequate for most uses in Fayette County although quantity is limited. These shallow wells use the alluvial deposits as a sand filter to provide some measure of water treatment. Currently, 384 wells are known to tap into this aquifer in Fayette County.

Physical Characteristics & Water-Bearing Properties

Of Geologic Units

Midway Group

Rocks of the Midway Group crop out in a northeast-trending belt, 2 to 3 miles wide, along the Bastrop-Travis County line and dip southeast toward the Gulf Coast. They underlie Fayette County at depths ranging from about 3,800 feet (well 67-14-901) to over 9,100 feet (well 66-18-402).

The Midway consists principally of shale, clay, and a few thin sand lenses. The thickness of the Midway Group in Fayette County is about 900 to 950 feet.

No water wells and only a few oil tests penetrate the Midway in Fayette County. The Midway generally does not yield usable quality water in significant quantities, even in its outcrop area, and is well below the base of fresh to slightly saline water in Fayette County.

Wilcox Group

Rocks of the Wilcox Group crop out in a northeast-trending belt, 9 to 15 miles wide, across northwestern Bastrop and adjoining counties. The Wilcox unconformably overlies the rocks of the Midway Group and unconformably underlies the Carrizo Sand of the Claiborne Group. The Wilcox is stratigraphically below all other aquifers in Fayette County and is the deepest rock unit containing fresh to slightly saline water.

The Wilcox consists of horizontally discontinuous beds of clay, silt, fine- to medium-grained sand and sandstone, sandy shale, and thin beds of lignite. The thickness of the Wilcox Group in Fayette County ranges from 2,400 to 3,800 feet. The depth to the top of the Wilcox Group in Fayette County ranges from 1,400 to about 6,000 feet.

Although the Wilcox Group occurs in the subsurface at varying depths throughout Fayette County, only that portion underlying the western and north western part of the county is believed to contain water of usable quality. The sands of the Wilcox Group contain fresh to slightly saline water at depths ranging from about 2,400 to over 3,800 feet in the county. The deepest fresh to slightly saline water in the Wilcox is east of Winchester and near the Lee County line. No water wells are known to penetrate the Wilcox Group in Fayette County, and the portion of the aquifer believed to contain fresh to slightly saline water is defined by interpretation of electric logs of oil tests penetrating the Wilcox.

Claiborne Group

Carrizo Sand

The Carrizo Sand crops out in a northeast band parallel to the Bastrop-Fayette County line about 4 to 5 miles wide through Bastrop and Lee Counties.

The Carrizo Sand lies unconformably on the Wilcox Group and underlies the Reklaw Formation. In the outcrop, the Carrizo is a white to gray, fine- to coarse-grained, massive sand containing abundant cross-beds and very thin laminae of carbonaceous material. Its thickness ranges from 200 to 300 feet. The top of the formation is about 500 feet below sea level in the northwest part of the county and about 5,500 feet below sea level in the southeast part of the county; the dip of the beds is variable, ranging from about 160 to over 250 feet per mile to the southeast.

Although the Carrizo is capable of yielding moderate to large quantities of water to wells, and is extensively developed in many areas of the State, it is underdeveloped in Fayette County.

Reklaw Formation

The Reklaw Formation conformably overlies the Carrizo Sand and crops out in a narrow belt, 1 to 1 1/2 miles wide, across Bastrop, Lee, Gonzales, and adjoining counties. The formation dips southeast and occurs in the subsurface throughout Fayette County.

The Reklaw consists of glauconitic sandstone interbedded with shale in the lower part of the formation and mainly clay and shale in the upper part. The thickness of the Reklaw ranges from about 225 to 400 feet in Fayette County.

In places in Fayette County the lower sands are very well developed and apparently are in hydrologic connection with the underlying Carrizo Sand. Although no wells are known to obtain water from the Reklaw in Fayette County, the lower sands probably contain fresh to slightly saline water in the northwestern part of the county.

Queen City Sand

The Queen City Sand conformably overlies the Reklaw Formation and is overlain conformably by the Weches Greensand. The Queen City crops out in Bastrop and Lee Counties and dips southeast toward the Gulf Coast at about 150 feet per mile.

The Queen City ranges from about 480 to 750 feet in thickness in Fayette County. Electric logs of oil tests penetrating the formation in Fayette County indicate that the formation consists of two or three 60-foot thick sands, usually near the top of the formation, separated by relatively thick sequences of thin sands interbedded with clay and sandy clay.

Approximately 36 water wells are known to be completed in the Queen City in Fayette County. The formation yields small to moderate quantities of water to wells in adjoining counties and provides a supply for the cities of Smithville and Giddings in adjoining Bastrop and Lee Counties, respectively. Small to moderate supplies of water could probably be developed in the northwestern part of Fayette County, but the water is very likely to be more mineralized than that from shallower formations such as the Sparta Sand and Yegua Formation.

Weches Greensand

The Weches Greensand conformably overlies the Queen City Sand and crops out in a northeast-trending belt about 1 mile wide in southeastern Bastrop County.

The Weches consists of about 75 to 150 feet of glauconitic shale with a few interbedded glauconitic sand and marl stringers. The Weches is relatively impermeable and is not known to yield water to wells in Fayette County.

Sparta Sand

The Sparta Sand is exposed in a band 1 to 2 miles wide from the west corner of Fayette County to near Smithville in Bastrop County generally paralleling the Fayette-Bastrop County line.

The Sparta Sand lies conformably on the Weches Greensand and grades upward into the sandy shale base of the Cook Mountain Formation.

The Sparta consists of fine- to medium-grained sand interbedded with a few lignitic shale beds. The thickness of the Sparta ranges from 0 to 275 feet and averages about 150 feet in Fayette County. The Sparta dips southeast at about 175 feet per mile.

The Sparta yields small to moderate quantities of fresh to moderately saline water to wells near the outcrop in western and northwestern Fayette County.

Cook Mountain Formation

The Cook Mountain Formation overlies the Sparta Sand and crops out in the extreme western and northwestern part of Fayette County. The Cook Mountain consists of clay, shale, and a few thin lenses of sandstone, limestone, glauconite, and gypsum.

The Cook Mountain ranges in thickness from 0 to 500 feet in Fayette County. The Cook Mountain is not known to yield water to wells in the county.

Yegua Formation

The Yegua Formation crops out in a 3½ to 5 mile wide band across western Fayette County. The trend of the outcrop is northeast, the median line of which extends generally from Winchester to about 2½ miles south of Elm Grove in the southwest portion of the county.

The Yegua Formation conformably and semi-gradationally overlies the Cook Mountain Formation and conformably underlies the Jackson Group. Local disconformities between the Yegua and Jackson have been observed but are not of regional extent.

The Yegua Formation consists of alternating beds of fine- to medium grained clay, silt, thin beds of lignite, and small quantities of gypsum. Thickness of the individual sand beds ranges up to 2 or 3 feet where observed but generally is much thinner. Some bentonite occurs in the upper beds.

Total thickness along the outcrop ranges from about 500 to 700 feet. Downdip in Fayette County, the thickness increases, ranging from 600 to over 1,000 feet. Over most of the area in which fresh water occurs, the total sand thickness ranges from

300 to 430 feet and is about 40 to 50 percent of the total formation thickness. The formation dips to the southeast approximately 150 feet per mile, attaining a depth of 2,800 feet below sea level at the southeast edge of the county.

The Yegua yields small to large quantities of water to wells in Fayette County for industrial, irrigation, livestock, and rural domestic purposes. All wells presently pumping from the Yegua in the county are in the outcrop or less than 4 miles downdip.

Jackson Group

The Jackson Group conformably overlies the Yegua Formation of the Claiborne Group and crops out in a band 4 to 6 miles wide trending northeast across central Fayette County. The Jackson consists mainly of clay, silt, and volcanic ash, interbedded with a few relatively thin lenticular beds of tuffaceous sandstone. The thickness of the Jackson in Fayette County ranges from 0 at the updip extent of the formation to a total thickness of from 600 to 1,100 feet. The strata comprising the Jackson Group dip toward the Gulf Coast at about 150 feet per mile, coincident with the general regional structure.

The Jackson Group yields moderate quantities of water to wells, principally for livestock and rural domestic purposes in the outcrop areas. The most productive strata consist of about 50 to 185 feet of tuffaceous sands in the uppermost part of the group. These upper Jackson sands apparently yield water of usable quality some distance downdip from the outcrop and are generally developed in conjunction with the overlying Catahoula Tuff.

Frio Clay

The Frio Clay does not crop out in Fayette County, but overlies the Jackson Group unconformably in the subsurface and is in turn overlain and overlapped by the Catahoula Tuff. The Frio Clay consists principally of clay and shale interbedded with a few thin sand beds. The Frio ranges in thickness from 0 at its updip pinchout to over 520 feet in southeast Fayette County. The Frio Clay is not known to yield water to wells in Fayette County.

Catahoula Tuff

The Catahoula Tuff overlies the upper part of the Jackson Group near its outcrop, but downdip in the southeastern part of Fayette County, the Catahoula overlies the Frio Clay which occupies a position stratigraphically between the Catahoula Tuff and the Jackson Group.

The Catahoula crops out in a belt approximately 1/2 to 4 miles wide across central Fayette County trending northeast through Flatonia, La Grange, and Carmine.

In Fayette County, the Catahoula consists of tuffaceous sand and sandstone interbedded with clay, silt, and tuff. The thickness ranges from 0 to over 500 feet. The Catahoula yields small to large quantities of water to wells in central and southeastern Fayette County for municipal, industrial, and irrigation as well as livestock and rural domestic purposes.

Oakville Sandstone and Lagarto Clay

The Oakville Sandstone overlies the Catahoula Tuff and is in turn overlain by the Lagarto Clay. The approximate outcrop areas of these units are shown on the regional geology map. Because the contact between the Oakville and Lagarto is difficult to distinguish in Fayette County, these formations are considered as a single unit in this report and are not differentiated on the county geologic map.

In general, the Oakville Sandstone consists of laterally discontinuous sand and gravel lenses interbedded with shaly sand, sandy shale, shale, and clay. Massive cross-bedded sandstone beds at the base grade upward into more thinly bedded sandy shale and clay near the top. The Lagarto Clay, in turn, consists mainly of massive clay interbedded with calcareous sand

and shale.

The combined thickness of the Oakville and Lagarto ranges from 0 to over 950 feet.

The Oakville and Lagarto yield small to moderate quantities of water to wells for municipal, industrial, irrigation, livestock, and rural domestic purposes.

Alluvium

Alluvial deposits of Quaternary age in Fayette County occur as a broad band ½ to 6 miles wide coinciding generally with the flood plain of the Colorado River and along some of its major tributaries. Terrace gravel deposits, also of Quaternary age, occupy the tops of some of the hills adjoining the Colorado River flood plain, but these have not been mapped and probably are not important as a source of ground water in Fayette County.

The alluvial deposits consist of sand, gravel, black clay, sandy clay, and shale. Maximum thickness of the alluvial deposits is not known but where observed in stream cuts do not exceed 60 feet. Shallow wells completed in the alluvium yield small quantities of water for livestock and rural domestic purposes.

Natural or Artificial Recharge and Discharge

Recharge is the addition of water to an aquifer. The principal source of ground-water recharge in Fayette County is precipitation that falls on the outcrop of the various aquifers. In addition, seepage from streams and lakes located on the outcrop and possibly interformation leakage are sources of ground-water recharge. Recharge is a limiting factor in the amount of water that can be developed from an aquifer, as it must balance discharge over a long period of time or the water in storage in the aquifer will eventually be depleted. Among the factors that influence the amount of recharge received by an aquifer are: the amount and frequency of precipitation; the areal extent of the outcrop of intake area; topography, type and amount of vegetation, and the condition of soil cover in the outcrop area; and the ability of the aquifer to accept recharge and transmit it to areas of discharge. On aquifer outcrops where vegetation is dense, the removal of underbrush and non-beneficial plants will reduce evaporation and transpiration losses, making more water available for ground-water recharge.

Discharge is the loss of water from an aquifer. The discharge may be either artificial or natural. Artificial discharge takes place from flowing and pumped water wells, drainage ditches, gravel pits, and other excavations that intersect the water table. Natural discharge occurs as effluent seepage, springs, evaporation, transpiration, and interformational leakage.

Ground water moves from the areas of recharge to areas of discharge or from points of higher hydraulic head to points of lower hydraulic head. Movement is in the direction of the hydraulic gradient just as in the case of surface-water flow. Under normal artesian conditions, as in Fayette County, movement of ground water usually is in the direction of the aquifer's regional dip. Under water-table conditions, the slope of the water table and consequently the direction of ground-water movement usually is closely related to the slope of the land surface. However, for both artesian and water-table conditions, local anomalies are developed in areas of pumping and some water moves toward the point of artificial discharge. The rate of ground-water movement in an aquifer is usually very slow, being in the magnitude of a few feet to a few hundred feet per year.

Data required for this section of the Fayette County Groundwater Conservation District Management Plan is taken from the Texas Water Development Board GAM Run 13-002 dated March 21, 2013. Texas Water Development Board GAM Run 13-002 is adopted in this management plan, in its entirety, as Appendix A.

Groundwater Availability

According to *Texas Water Development Board Report 56, Availability and Quality of Ground Water In Fayette County, Texas*, computations of the amount of water that may be available from the Carrizo in Fayette County are based upon coefficients of transmissibility and storage of 40,000 gpd per foot and 0.00016, respectively. It is estimated that a maximum of 20,000 acre-feet of water per year could be induced to move through the aquifer from its recharge area to wells in Fayette County.

However, in the case of the Gulf Coast aquifer, "the nature of the Gulf Coast aquifer makes it very difficult to determine the average recharge rate. As a result, the water availability from the Gulf Coast aquifer is established based on an estimate of maximum usage in the year 2050 by water user groups (WUGs) that are currently using the aquifer as a source plus the average water use for future conjunctive water use at the Lakeside, Gulf Coast, and Pierce Ranch Irrigation Districts."

Table 2 shows estimated amounts of available groundwater as estimated by the Lower Colorado Regional Water Planning Group (LCRWPG) Regional Water Plan adopted January 2011. In the plan, it is stated that: "The sources of groundwater availability data in this plan, in descending order of priority, are:

1. Managed Available Groundwater (MAG) values established by TWDB;
2. Preferred availability reported to the LCRWPA by a Groundwater Conservation District (GCD). Even where a GCD has a TWDB certified management plan, they may have been in the process of establishing a new availability, and were given the opportunity to have that availability included in this plan;
3. GCD availabilities adopted in a groundwater management plan, and;
4. In absence of any of the above, the availabilities established in the 2006 LCRWP"

Available groundwater in Fayette County, as shown in this table, is sufficient to meet all current municipal water needs, but due to large depths of water tables and locations of availability, development of some of the available water may not be economically feasible.

Table 2: Groundwater Availability in Fayette County Aquifers

In Acre Feet/Year

Aquifer	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Gulf Coast	8,697	8,697	8,697	8,697	8,697	8,697
Carrizo-Wilcox	400	400	400	400	400	400
Queen City	1,235	1,235	1,235	1,235	1,235	1,235
Sparta	4,500	4,500	4,500	4,500	4,500	4,500
Yegua-Jackson	20,000	20,000	20,000	20,000	20,000	20,000
Other Aquifer	3,696	3,696	3,696	3,696	3,696	3,696
TOTAL	**38,528**	**38,528**	**38,528**	**38,528**	**38,528**	**38,528**

Modeled Available Groundwater

Per Texas Water Code § 36.108 (9) (o), Modeled Available Groundwater (MAG), for each aquifer within its jurisdiction, is provided to the Fayette County Groundwater Conservation District by the Texas Water Development Board and are calculated based on the desired future conditions adopted by the member districts of GMA 12 and GMA 15. Modeled Available Groundwater for the Fayette County Groundwater Conservation District in the following tables are taken from GAM Runs 10-044 MAG (Carrizo), 10-045 MAG (Queen City), 10-046 MAG (Sparta), and 10-060 MAG (Yegua-Jackson) for GMA 12 and GAM Run 10-028 MAG (Gulf Coast) for GMA 15.

Table 3: Modeled Available Groundwater GMA 12

Aquifer	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Carrizo	1,000	1,000	1,000	1,000	1,000	1,000
Queen City	387	436	478	513	565	570
Sparta	3,507	3,592	3,637	3,656	3,711	3,729
Yegua-Jackson	5,762	5,762	5,762	5,762	5,762	5,762

Table 4: Modeled Available Groundwater GMA15

Aquifer	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Gulf Coast	9,204	9,073	8,905	8,895	8,886	8,856

Surface Water Resources and Availability

Surface water sources of Fayette County include the Colorado River, the Cedar Creek Reservoir, flood control reservoirs, and numerous small stock ponds. Among these, the Colorado River and the Cedar Creek Reservoir can be considered for any municipal use. At present, no surface water is used for municipal supply in Fayette County. The Fayette Power Plant uses water from the Cedar Creek Reservoir in its electricity generation activities. In addition to this, Colorado River provides water for small domestic uses.

Colorado River

Water quality of the Colorado River varies seasonally and along the length of the river. Since January 1984, water samples were collected and analyzed by the Lower Colorado River Authority (LCRA) Water Quality Monitoring Program for two locations on the Colorado River within Fayette County. These sampling sites are located at upstream and downstream of La Grange. The upstream sampling station is located on the Colorado River at the Highway 71 bridge and the downstream site is at the Highway 77 bridge.

Cedar Creek Reservoir

The LCRA water quality monitoring program collects and analyzes water samples from several locations of the Cedar Creek Reservoir since July 1986. One of these sampling sites is located near FM 159. This sampling site was selected for study to represent water quality of the reservoir because of the suitability of its location for an intake structure of a regional surface water system.

Surface Water Availability

Data required for this section of the Fayette County Groundwater Conservation District Management Plan is found on Page 5 of 9 of the Texas Water Development Board "Estimated Historical Water Use and 2012 State Water Plan Datasets: Fayette County Groundwater Conservation District", by Stephen Allen, P.G. dated February 6, 2013, adopted in this management plan as Appendix B.

Projected Surface Water and Groundwater Supply and Demand

Historical Water Usage

The Texas Water Development Board Water conducts an annual survey of ground and surface water use by municipal and industrial entities within the state of Texas. This survey collects the volume of both ground and surface water used, the source of the water, and other pertinent data from the users. The information obtained is then utilized by the Water Development Board for projects such as water use projections and resource allocation.

Data required for this section of the Fayette County Groundwater Conservation District Management Plan is found on Page 3 of 9 and Page 4 of 9 of the Texas Water Development Board "Estimated Historical Water Use and 2012 State Water Plan Datasets: Fayette County Groundwater Conservation District", by Stephen Allen, P.G. dated February 6, 2013, adopted in this management plan as Appendix B.

Population Projections

Fayette County has grown very modestly. The geographic distribution and population has remained relatively unchanged. The decline in the oil and gas exploration since the early 1980's and its distance from major population and employment centers have kept Fayette County's population relatively stable.

Fayette County has a diversified economy including livestock, poultry, crop production, power production, manufacturing industries, oil, gas and other mineral exploration, and recreation. Cattle raising and beef production is a major industry of the County. Agricultural products include grains, cotton, fruits, and vegetables.

The following total county population projections and designated water user groups (WUGs), which include the three major cities, rural water suppliers, and county-other within Fayette County, were taken from Volume 1 of the Lower Colorado Regional Water Planning Group (LCRWPG) Regional Water Plan adopted January 2011.

The three major cites in Fayette County are La Grange, Flatonia, and Schulenburg. Three other smaller cities of Fayette County are Carmine, Fayetteville, and Round Top.

Table 5: Population Projections by WUG for 2000-2060

City Name or WUG	2010	2020	2030	2040	2050	2060
Aqua WSC	602	787	939	1,057	1,193	1,372
Fayette WSC	7,147	10,252	12,807	14,795	17,070	20,081
Lee County WSC	1,730	2,375	2,906	3,319	3,792	4,418
Flatonia	1,543	1,712	1,851	1,959	2,083	2,247
La Grange	5,546	6,629	7,520	8,213	9,007	10,057
Schulenburg	3,194	3,695	4,108	4,429	4,796	5,282
County-Other	5,064	3,358	2,232	1,487	992	663
TOTAL COUNTY	**24,826**	**28,808**	**32,363**	**35,259**	**38,933**	**44,120**

Water Supply and Demand Projections

The water use categories shown in the projections below are defined by the Texas Water Development Board in *Water for Texas* and include: municipal, irrigation, livestock, steam electric, manufacturing, and mining.

Water for Texas 2007 defines municipal water use: "Municipal water use is defined as residential and commercial water use. Residential use includes single and multifamily residential household water use. Commercial use includes water for business establishments, public offices, and institutions but does not include industrial water use. Residential and commercial water uses are categorized together because both use water similarly for drinking, cleaning, sanitation, cooling, and landscape watering." Municipal use also includes subcounty groups including; cities with populations over 500 residents, utilities in unincorporated areas with water use in 2000 of 280 acre feet or greater, and unincorporated populations centers in sparsely populated counties.

The other user categories generally represent farm and industry. The agricultural water use categories (irrigation and livestock) include water used for on-farm irrigation of crops and livestock water consumption. Manufacturing water use primarily focuses on the five largest water-using industries in the state: chemicals, petroleum, paper and pulp, metals, and food processing. Mining use represents water used in the extraction of fuel and non-fuel minerals. Steam electric represents water used by the steam generating power plants – in this case, the Fayette Power Project.

Data required for this section of the Fayette County Groundwater Conservation District Management Plan is found on Page 6 of 9 and Page 7 of 9 of the Texas Water Development Board "Estimated Historical Water Use and 2012 State Water Plan Datasets: Fayette County Groundwater Conservation District", by Stephen Allen, P.G. dated February 6, 2013, adopted in this management plan as Appendix B.

Threats to Water Quality

The primary water quality issue for all of the surface water stream segments and the major groundwater aquifers in Fayette County is the increasing potential for water contamination due to nonpoint source pollution. Nonpoint source pollution is precipitation runoff that, as it flows over the land, picks up various pollutants that adhere to plants, soils, and man-made objects and, which eventually infiltrates into the groundwater table or flows into a surface water stream. As more and more land in the Colorado River watershed and aquifer recharge zones is developed, the runoff from precipitation events will pick up increasing amounts of pollution.

Another nonpoint source of pollution is the accidental spill of toxic chemicals near streams or over recharge zones that will send a concentrated pulse of contaminated water through stream segments and/or aquifers. Further, accidental subsurface contamination from activities associated with the exploration and production of oil and natural gas could cause water quality problems within the aquifers.

Public water supply groundwater wells that currently only use chlorination water treatment and domestic groundwater wells that may not treat the water before consumption, are especially vulnerable to nonpoint source pollution, as are the habitats of threatened and endangered species that live in and near springs and certain stream segments. Nonpoint sources of pollution are difficult to control and there has been increased awareness and research of this issue as well as interest in the initiation of abatement programs.

Threats to Water Quantity

The primary threat to agriculture in the Fayette County area is from external sources, such as the water shortages for irrigation that are anticipated to occur in Matagorda, Wharton, and Colorado counties during a repeat of the drought of record.

The primary water quantity issue in the Gulf Coast aquifer is subsidence, which is the dewatering of the interlayers of clay within the aquifer as a result of over-pumping. This compaction of the clay causes a loss of water storage capacity in the aquifer, which in turn causes the land surface to sink, or subside. Once the ability of the clay to store water is gone it can never be restored. The implementation of water conservation practices and conversion to surface water sources are currently the only remedies for this situation. Saltwater intrusion from the Gulf of Mexico into the Gulf Coast aquifer is also a potential concern due to groundwater pumping rates that are greater than the recharge rates of the aquifer.

The Carrizo-Wilcox aquifer's primary water quantity concern is the water-level declines anticipated through the year 2050 due to increased pumping. Groundwater withdrawals have increased an estimated 270 percent between 1988 and 1996, from 10,100 acre-feet/year to 37,200 acre-feet/year, from the mostly porous and permeable sandstone aquifer. The area in and around the Carrizo-Wilcox aquifer is expected to see continued population growth and increases in water demand. The TWDB co-sponsored a study of the Central Texas portion of the Carrizo-Wilcox aquifer using a computer model to assess the availability of groundwater in the area. Six water demand scenarios were simulated in the model, which ranged from considering only the current 1999 demand, to analyzing all projected future water demands through the year 2050. On the basis of the calibrated model, all withdrawal scenario water demands appear to be met by groundwater from the Carrizo-Wilcox aquifer through the year 2050. The simulations indicate that the aquifer units remain fully saturated over most of the study area. The simulated water-level declines in the Carrizo-Wilcox aquifer mainly reflect a pressure reduction within the aquifer's artesian zone. Some dewatering takes place in the center of certain pumping areas. In addition, simulations indicate that drawdown within the confined portion of the aquifer will significantly increase the movement of groundwater out of the shallow, unconfined portions to the deeper artesian portions of the aquifer. The relationships that currently exist between surface and groundwater may also change. Simulations indicate that the Colorado River, which currently gains water from the Carrizo-Wilcox aquifer, may begin to lose water to the aquifer by the year 2050.

Water Level Changes

One indication of groundwater availability involves changes in water table elevations that occur over time at specific locations. The Texas Water Development Board monitors over 20 wells in Fayette County and has collected water level information on these wells for many years. The Fayette County GCD is monitoring over 15 volunteer water wells within the district. By comparing the yearly water level measurements of wells for many years, a general trend of rising or falling of an aquifer's water level can be determined.

Projected Water Management Strategies for Fayette County

The Fayette County Groundwater Conservation District supports and encourages the use of water management strategies to meet any potential water demand shortfalls within Fayette County.

Data required for this section of the Fayette County Groundwater Conservation District Management Plan is found on Page 8 of 9 and Page 9 of 9 of the Texas Water Development Board "Estimated Historical Water Use and 2012 State Water Plan Datasets: Fayette County Groundwater Conservation District", by Stephen Allen, P.G. dated February 6, 2013, adopted in this management plan as Appendix B.

Desired Future Conditions

Pursuant to the requirements of Texas Water Code § 36.108, the Fayette County Groundwater Conservation District actively participates in developing the desired future conditions for the aquifers within the District's boundaries and within the boundaries of Groundwater Management Areas (GMAs) 12 and 15. In developing its desired future conditions for each aquifer within its boundaries, the Fayette County Groundwater Conservation District considers the condition of the aquifers within the management area, scientific data relevant to the development of the desired future conditions, and the results of groundwater availability modeling.

GMA 12 Desired Future Conditions

Current desired future conditions for the aquifers that lie within GMA 12 are listed in Table 6 below. Potions of the Wilcox Aquifer which underlie Fayette County have been deemed irrelevant in the district as there are no known water wells producing water from this aquifer. Should the need arise and conditions warrant management of the Wilcox Aquifer within the jurisdiction of the Fayette County Groundwater Conservation District, desired future conditions will be developed and adopted. Desired future conditions adopted by GMA 12 in cover the 2010 to 2060 timeframe.

Table 6: Adopted Desired Future Conditions for Fayette County GCD in GMA 12

Aquifer	Average Drawdown (ft)
Carrizo	60
Queen City	60
Sparta	60
Yegua-Jackson	75

GMA 15 Desired Future Conditions

Current desired future conditions for the aquifers that lie within GMA 15 are listed in Table 7 below. Desired future conditions adopted by GMA 15 cover the 2010 to 2060 timeframe. The adopted desired future conditions cover the portion of the Gulf Coast Aquifer within the boundaries of GMA 15.

Table 7: Adopted Desired Future Conditions for GMA 15

Aquifer	Average Drawdown (ft)
Gulf Coast	12

GOALS AND MANAGEMENT OBJECTIVES

Management of Groundwater Supplies

The District will manage the supply of groundwater within the District in order to conserve the resource while seeking to maintain the economic viability of all resource user groups, public and private. In consideration of the economic and cultural activities occurring within the District, the District will identify and engage in such activities and practices that, if implemented, would result in a reduction of groundwater use. An observation network shall be established and maintained in order to monitor changing storage conditions of groundwater supplies within the District. The District will make a regular assessment of water supply and groundwater storage conditions and will report those conditions to the Board and to the public. The District will undertake, as necessary, and cooperate with investigations of the groundwater resources within the District and will make the results of investigations available to the public upon adoption by the Board.

The District will adopt rules to regulate groundwater withdrawals by means of spacing and production limits. The District may deny a well construction permit or limit groundwater withdrawals in accordance with the guidelines stated in the rules of the District. In making a determination to deny a permit or limit groundwater withdrawals, the District will consider the public benefit against individual hardship after considering all appropriate testimony. The District shall pass rules specifying under what conditions the annual amount of groundwater permitted by the District for withdrawal from the aquifers located within the District may be curtailed.

The relevant factors to be considered in making a determination to deny a permit or limit groundwater withdrawals will include:

1. The purpose of the rules of the District
2. The equitable distribution of the resource
3. The economic hardship resulting from grant or denial of a permit or the terms prescribed by the permit

In pursuit of the District's mission of protecting and managing the resource, the District may require reduction of groundwater withdrawals to amounts which will not cause harm to the aquifer. To achieve this purpose, the District may, at the Board's discretion, amend or revoke any permits after notice and hearing. The determination to seek the amendment or revocation of a permit by the District will be based on aquifer conditions observed by the District. The District will enforce the terms and conditions of permits and the rules of the District by enjoining the permit holder in a court of competent jurisdiction as provided for in Section 36.102, Texas Water Code.

A contingency plan to cope with the effects of water supply deficits due to climatic or other conditions will be developed by the District and will be adopted by the Board after notice and hearing. In developing the contingency plan, the District will consider the economic effect of conservation measures upon all water resource user groups, the local implications of the degree and effect of changes in water storage conditions, the unique hydrogeologic conditions of the aquifers within the District and the appropriate conditions under which to implement the contingency plan.

The District will employ all technical resources at its disposal to evaluate the resources available within the District and to determine the effectiveness of regulatory or conservation measures. A public or private user may appeal to the Board for discretion in enforcement of the provisions of the water supply deficit contingency plan on grounds of adverse economic hardship or unique local conditions. The exercise of said discretion by the Board shall not be construed as limiting the power of the Board.

Actions, Procedures, Performance and Avoidance for Plan Implementation

The District will implement the provisions of this plan and will utilize the provisions of this plan as a guidepost for determining the direction or priority for all District activities. All operations of the District, all agreements entered into by the District and any additional planning efforts in which the District may participate will be consistent with the provisions of this plan.

The District will adopt rules relating to the permitting of wells and the production of groundwater. The rules adopted by the District shall be pursuant to Chapter 36, Texas Water Code and the provisions of this plan. All rules will be adhered to and enforced. The promulgation and enforcement of the rules will be based on the best technical evidence available. **District Rules, currently adopted and in effect, are available on the internet at:**

www.fayettecountygroundwater.com/district_rules.htm

The District shall treat all citizens with equality. Citizens may apply to the District for discretion in enforcement of the rules on grounds of adverse economic effect or unique local conditions. In granting of discretion to any rule, the Board shall consider the potential for adverse effect on adjacent landowners. The exercise of said discretion by the Board shall not be construed as limiting the power of the Board.

The District will seek the cooperation in the implementation of this plan and the management of groundwater supplies within the District. All activities of the District will be undertaken in cooperation and coordinated with the appropriate state, regional, and local water management entities.

Methodology for Tracking District Progress in Achieving Management Goals

The District will prepare and present an annual report to the Board of Directors on District performance with regard to achieving management goals and objectives. The presentation of the report will occur within 60 days of the end of each fiscal year. The first annual report will be prepared upon completion of the year after which the management plan is approved by the Texas Water Development Board. The report will be prepared in a format that will be reflective of the performance standards listed following each management objective. The report will include the number of instances in which each of the activities specified in the District's management objectives was engaged in during the fiscal year. Each activity will be referenced to the estimated expenditure of staff time and budget in accomplishment of the activity. The notations of activity frequency, staff time and budget will be referenced to the appropriate performance standard for each management objective describing the activity, so that the effectiveness and efficiency of the District's operations may be evaluated. The Board will maintain the report on file for public inspection at the District's offices upon adoption. This methodology will apply to all management goals contained within this plan.

Goal 1 – Management Strategies to Protect and Enhance the Quantity of Useable Groundwater by Encouraging the Most Efficient Use

The District will manage the supply of groundwater within the District based on the District's assessment of water supply and groundwater storage conditions. The District will monitor groundwater conditions closely through water level and water quality monitoring programs and will continue to maintain and update the District's database, which was begun in 2002. Computer modeling projects may be utilized in the future which could also aid in the decision making process by this District in the management of groundwater.

The District will adopt rules to regulate groundwater withdrawals by means of spacing and production limits. In addition the District may choose to identify areas within the District which, based on its monitoring programs are potential groundwater depletion or drought sensitive areas. These areas when identified may require specific District rules to ensure that groundwater supply is maintained and protected.

Management Objective 1.1: Establish a Water Level Monitoring Program

Establish a water level monitoring network by first, identifying the wells to be monitored, and secondly, by annually measuring the depth to water in those wells; record all measurements and/or observations; enter all measurements into District's computer data base; file specific locations of wells in the District's filing system. Establish a baseline by using existing wells, preferably those for which the District already has some historical data, in all major and minor aquifers where wells are available.

Performance Standards

1.1.a. Annually report to the Board of Directors on:

- the number of water level monitoring wells for which measurements were recorded each year.
- the number of data records entered into District's data base each year.
- the number of wells in the water level measurement network each year.
- the number of wells added to the network, if required, each year.

Management Objective 1.2: Set and Enforce Maximum Allowable Production Limits

Annually, the District will investigate all reports filed by District constituents, on forms provided by the District, regarding pumpage of groundwater in excess of the maximum production allowable under the District's rules. Investigation of each occurrence shall occur within 30 days of receiving the report. Each case will be remedied in accordance with District rules.

Performance Standards

1.2.a. Annually report to the Board of Directors on:

- the number of reports investigated each year.
- the average amount of time taken to investigate reports each year.
- the number of incidences where violations occurred and violators were required to change operations to be in compliance with District rules each year.

Management Objective 1.3: Implement Well Permitting Process

Issue water well drilling permits for the drilling and completion of non-exempt water wells in the District within 30 days of application, or as soon thereafter as possible. Randomly inspect new well drilling sites to be assured that the District's completion and spacing standards are met. Send written notification to the well owner if the well fails to meet standards within 30 days of inspection. The Board will vote on final approval of the permit at the next scheduled meeting and insure that well completion standards have been met.

Performance Standards

1.3.a. Annually report to the Board of Directors on:

- the number of permits issued each year in Fayette County.
- The number of on-site inspections performed of all wells for which District staff have reason to question compliance with District rules.
- the number of permits field checked each year.
- the number of letters mailed to permit applicants requesting applicant to provide additional information or make changes to comply with District rules.
- the number of these letters which result in changes to comply with District rules and the number of cases still open at year-end.

Goal 2 - Management Strategies to Protect and Enhance the Quantity and Quality of Useable Groundwater by Controlling and Preventing Contamination and Waste

Management Objective 2.1: Establish a Water Quality Monitoring Program

The District staff will obtain water quality samples for analysis from wells within the monitoring network in order to track water quality changes in the District, and will resample a representative group of the wells sampled the previous year. The results of the tests will be published and entered in to the District's computer data base, and will be made available to the public.

Performance Standards

2.1.a. Annually report to the Board of Directors on:

- the number of samples collected and analyzed each year
- the number of previously sampled wells that were sampled in the current testing year.
- the number of analyses entered into District's computer data base each year.

Management Objective 2.2: Assure Proper Closing, Destruction, or Re-Equipping of Wells

The District staff will inspect all sites reported as being open or improperly covered in a timely manner and follow through to assure proper closing or repair.

Performance Standards

2.2.a. Annually report to the Board of Directors on:

- the number of open, improperly covered, or deteriorated wells reported and inspected each year.
- the number of letters of notification of an open hole or deteriorated well mailed to well owners and/or operators each year.
- the number of wells the District required to be closed each year.

Management Objective 2.3: Encourage Plugging of Abandoned Wells

Field inspect each reported well abandoned or replaced, and assure proper closing under Water Well Drillers' Rules or that the well is re-equipped in accordance with District rules.

Performance Standards

2.3.a. Annually report to the Board of Directors on:

- the number of reported wells abandoned or replaced each year.
- the number of reported wells destroyed and noted on the topographic map each year.
- the number of reported wells re-equipped in accordance with the District's rules each year.

Management Objective 2.4: Control and Prevention of Water Waste

The District will investigate all identified wasteful practices within a reasonable number of working days of identification or complaint received, depending upon the magnitude of the wasteful practice.

Performance Standards

2.4.a. Annually report to the Board of Directors on:

- the number of wasteful practices identified and the average number of days District personnel took to respond or investigate after identification or complaint received.
- the actions taken to resolve the identification or complaint received.

Goal 3 – Management Strategies Under Drought Conditions

Management Objective 3.1: Curtailment of Groundwater Withdrawal

The annual amount of groundwater permitted by the District for withdrawal from the portion of the aquifers located within the District may be curtailed during periods of extreme drought in the recharge zones of the aquifers or because of other conditions that cause significant declines in groundwater surface elevations. Such curtailment may be triggered by the District's Board based on the groundwater elevation measured in the District's monitoring well(s).

Performance Standards

The District shall monitor at least one well each year.

3.1.a. Annually report to the Board of Directors the number of measurements obtained from the water level monitoring network. A summary report of the water level measurement results and an analysis of any situations that may require curtailment of groundwater withdrawal will be included in the report.

Goal 4 – Promote Water Conservation

Management Objective 4.1: Emphasize Water Conservation Program

The District will develop and sponsor a water conservation education curriculum, available upon request for all schools within the District. The District will utilize the methodologies listed under Goal 5 in order to raise public awareness of the necessity and importance of a water conservation program.

Performance Standards

4.1.a. Annually report to the Board of Directors on:

- the number of schools where water conservation education curriculums are presented each year.
- the number of water conservation articles presented to the public via the various methodologies outlined in Goal 5.

4.1.b. Promote and/or implement groundwater banking, recharge projects, rainwater harvesting and aquifer storage and recovery projects, where appropriate and cost-effective, to address areas with declining groundwater levels. Promotion of these projects may be accomplished through articles published in the District's annual newsletter.

Goal 5 – Implementation of Public Relations and Educational Programs to Assist in Accomplishing Goals 1 through 4

Management Objective 5.1: Produce and Disseminate Annual Newsletter

At least annually, produce a newsletter for distribution to District constituents who request a free subscription, and other interested parties. Articles will strive to discuss methods to enhance and protect the quantity of usable quality ground water within the District.

Performance Standards

5.1.a. Annually document number of newsletters published.

5.1.b. Annually document the circulation of the newsletter during that year.

Management Objective 5.2: Provide News Releases to District Media

Each year, news releases discussing methods to enhance, conserve and protect the quantity of usable quality ground water are written and distributed to all print and electronic media within the District. This may also include radio public service announcements discussing methods to enhance, conserve and protect the groundwater.

Performance Standards

5.2.a. Annually document number of news releases prepared and distributed to local and regional media detailing methods to enhance and protect the quantity and quality of usable ground water within the District.

Management Objective 5.3: Provide Public Information Boards at District Office

Each year, the District makes well information, technical reports, brochures, and other printed information available to the public in the District office.

Performance Standards

5.3.a. Annually document the number of publications made available to the public via the information boards.
5.3.b. Annually document the number of the items printed and/or photocopied for public distribution.

Management Objective 5.4: Provide Public Information Displays at Fairs/Meetings

Each year, the District will place informative displays at regional fairs, farm shows, and professional meetings to address the protection and enhancement of usable quality groundwater in the District.

Performance Standards

5.4.a. Annually document the number of the displays placed at regional fairs, farm shows, and professional meetings within the District's service area.

Management Objective 5.5: Offer Public Information Access via Internet

The District will make information about water and water conservation available to the public via its home page on the Internet. This information will be continuously updated.

Performance Standards

5.5.a. Annually document the number of "hits" the District web site receives.

Management Objective 5.6: Provide Classroom Presentations

Upon request by instructors, District staff or Board members will assist area classrooms in presenting information about ground water quality, quantity, and water conservation to public school students. The District will make films and videos on a wide-range of water-related subjects available through the District office. Eventually, the District will develop a conservation education program and its accompanying curriculum in public and/or private schools within its service area.

Performance Standards

5.6.a. Annually document the number of classroom presentations made or classroom and audio-visual materials provided.
5.6.b. Annually document the names of participating schools and any feedback from students/teachers.

Goal 6 Desired Future Conditions of the Aquifers within the Boundaries of the Fayette County Groundwater Conservation District

Management Objective 6.1: Document meetings attended

The Fayette County Groundwater Conservation District shall actively participate in joint planning regarding the desired future conditions for the aquifers within the District's boundaries and within the boundaries of Groundwater Management Areas (GMAs) 12 and 15.

Performance Standard

6.1 a. Annually, document the number of GMA 12 and GMA 15 meetings attended

Management Objective 6.2: Report Water Level Changes

At least once every three years, the District will evaluate the water levels within the monitoring well network for each aquifer to determine whether any changes in the monitoring well levels are in conformance to the desired future conditions adopted by the District.

Performance Standard

6.2 a. At least once every three years, report to the board of directors, water well levels within the monitoring well network for each aquifer.

6.2 b. At least once every three years, report to the board of directors, any changes to the water well levels within the monitoring well network for each aquifer.

6.2 c. At least once every three years, report to the board of directors, a comparison of drawdown, if any, within the monitoring network of each aquifer and the desired future conditions set for each aquifer.

Management Objective 6.3: Report Water Production from Permitted Wells

At least once every three years, the District will, based on information submitted on the annual water use reports, calculate the total amount of groundwater produced from permitted wells and report that amount to the board of directors.

Performance Standard

6.3 a. At least once every three years, report to the board of directors, the total amount of water produced by permitted water well owners and compare that total amount to the modeled available groundwater calculated by the Texas Water Development Board based on the adopted desired future conditions of the District.

Management Goals Not Applicable to the District

The Control and Prevention of Subsidence

The geologic framework, the population level, and the current groundwater demands of the District preclude any significant subsidence from occurring. This management goal is not applicable at this time to the operations of the District.

Addressing Conjunctive Surface Water Management Issues

Except as provided in Chapter 36 of the Texas Water Code, the District has no jurisdiction over surface water. The District shall consider the effects of surface water resources as required by Section 36.113 and other state law.

Since the District's boundaries fall within the bounds of the Lower Colorado River Authority (LCRA), the District will establish communications and share information with LCRA, as well as with the Cummins Creek Water Control and Improvement Project. These two entities are now receiving the District's newsletter. Additionally, the District will regularly invite these two entities to the District Board meetings, and a District representative will attend at least one of their meetings per year.

Addressing Natural Resource Issues Which Impact the Use and Availability of Groundwater and Which Are Impacted by the Use of Groundwater

This management goal is not applicable to the operations of the District, as there are at this time no known natural resource issues which impact groundwater in Fayette County. However, there is a concern about the possibility of oil and gas contamination. The District will investigate any reported contamination and work with the Railroad Commission to insure that any contamination is minimized or eliminated.

Addressing Recharge Enhancement

This management goal is not applicable to the operations of the District as it is cost prohibitive at this time.

Addressing Precipitation Enhancement

This management goal is not applicable to the operations of the District as it is cost prohibitive at this time.

Addressing Brush Control

The District is supportive of activities related to brush control as it relates to the recharge of the aquifers, however, this management goal is not applicable to the operations of the District as it is cost prohibitive at this time.

Addressing Rainwater Harvesting

This management goal is not applicable to the operation of the District as it is cost prohibitive at this time.

Future Activities, Plans And Programs

The District is always open for suggestions which will help in the conservation and protection of water. This section of the Management Plan is provided to identify plans, programs, services, and activities the District may develop in the future. Some of the items included in this list may be in some stage of development only through the association it may have with current activities of the District. Other items may only be suggestions and never be developed. All activities, plans and programs of the District have been developed after consideration and approval of the Board based on the benefit to the residents and the financial and staff capabilities of the District. The items listed below are not in any particular order of preference or need.

- Enhance and/or develop mapping and Geographic Information System (GIS) capabilities,
- Develop groundwater modeling capabilities,
- Develop display of water quality and quantity information,
- Expand or enhance water level and water quality observation well program as needed,
- Develop additional public education programs,
- Develop additional public school education programs,
- Develop more extensive library of groundwater data,
- Develop additional exchange of information between the District and water well drillers and pump installers,
- Develop or acquire new or revised pamphlets, publications or brochures for distribution.

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RESOLUTION ADOPTING AND APPROVING THE FAYETTE COUNTY GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

WHEREAS, Texas Water Code, Chapter 36, §36.1071 requires the District to develop a comprehensive management plan which addresses the following management goals, as applicable: (1) providing the most efficient use of groundwater; (2) controlling and preventing waste of groundwater; (3) controlling and preventing subsidence; (4) addressing conjunctive surface water management issues; (5) addressing natural resource issues; (6) addressing drought conditions; and (7) addressing conservation; and

WHEREAS, The Texas Water Development Board has adopted rules concerning Groundwater Management Plan Certification, found at 31 Texas Administrative Code, Chapter 356, Subchapter A; and

WHEREAS, The Fayette County Groundwater Conservation District (the "District") was created by an Act of the 77th Legislature effective September 1, 2001 and by subsequent approval by the voters of the District, and has operated under the rights, powers, privileges, authority, functions, duties, and requirements of Chapter 36 of the Texas Water Code, other provisions of the Texas Water Code, provisions of the general law of Texas and the Texas Constitution and under sections of the Texas Administrative Code since its creation; and

WHEREAS, The Fayette County Groundwater Conservation District intends to continue to carry out the purpose for which the Texas Legislature and the people created the District; and

WHEREAS, The Texas Water Code, §36.1071(e) requires the District to identify the performance standards and management objectives under which the District will operate to achieve the management goals; and

WHEREAS, The Board of Directors of the Fayette County Groundwater Conservation District believes that the Management Plan of the District reflects the best management of the groundwater for the District and meets the requirements of §36.1071; and

WHEREAS, The Board further believes that the description of activities, programs, procedures, performance, avoidance, specifications included in the Management Plan, and proposed Rules of the District, provide performance standards and management objectives necessary to effect the Management Plan in accordance with §36.1071; and

WHEREAS, The Management Plan includes estimates of the existing total usable amount of groundwater, the amount of groundwater being used in the District on an annual basis, projected groundwater supply and demand within the District and includes estimates of the annual amount of recharge to the groundwater resources within the District and how natural and artificial recharge may be increased; and

WHEREAS, The District is preparing and reviewing proposed rules, resolutions, orders, and directives to implement this plan; and

WHEREAS, The District is fully prepared to amend and or adopt additional rules or adopt resolutions and orders or issue directives in the future as determined by the Board of Directors to address issues identified in the future; and

WHEREAS, The District is fully prepared to amend this Plan as determined by the Board of Directors as necessary and in accordance with applicable laws of this state.

NOW THEREFORE BE IT RESOLVED THAT The Board of Directors of the FAYETTE COUNTY GROUNDWATER CONSERVATION DISTRICT does hereby adopt and approve the Fayette County Groundwater Conservation District Management Plan and directs the submission of such Management Plan to the Texas Water Development Board for approval.

CONSIDERED, PASSED, APPROVED, ADOPTED, RESOLVED, SIGNED AND DONE IN OPEN MEETING on this the _____ day of _____, 2013.

_____

Leo J. Wick, Sr., President

_____

Terry Hays, Vice President

_____

Cynthia Rodibaugh, Secretary-Treasurer

_____

Harvey Hayek, Director

_____

Robert Leer, Director

ATTEST:

_____

Cynthia Rodibaugh, Board Secretary

REFERENCES

Much of the information for this document was taken directly from the following sources:

Adopted Regional Water Supply Plan for the Lower Colorado Regional Water Planning Group (Region K), published July 2010

Adopted Management Plan for the Fayette County Groundwater Conservation District, Approved by the Texas Water Development Board on January 7, 2009.

Groundwater Availability Model Run 13-002, by Cindy K. Ridgeway, P.G. dated March 21, 2013.

Estimated Historical Water Use and 2012 State Water Plan Datasets, by Stephen Allen, P.G., dated February 6, 2013.

Groundwater Availability Model Run 10-044 MAG, by Mr. Wade Oliver dated July 9, 2012.

Groundwater Availability Model Run 10-045 MAG, by Mr. Wade Oliver dated July 9, 2012.

Groundwater Availability Model Run 10-046 MAG, by Mr. Wade Oliver dated July 9, 2012.

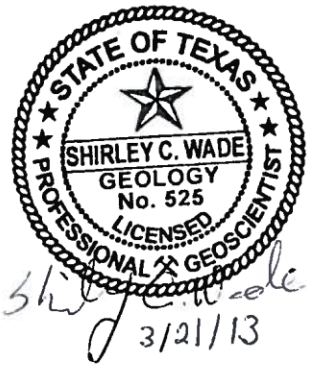
Groundwater Availability Model Run 10-060 MAG, by Wade Oliver dated July 9, 2012.

Groundwater Availability Model Run 10-028 MAG, by Melissa E. Hill, PhD, P.G. and Wade Oliver dated November 18, 2011.

Appendix A

GAM Run 13-002: Fayette County Groundwater Conservation District Management Plan

by Shirley Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 936-0883
March 21, 2013



The seal appearing on this document was authorized by Shirley Wade, P.G. 525 on March 21, 2013.

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GAM RUN 13-002: FAYETTE COUNTY GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

by Shirley Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 936-0883
March 21, 2013

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (h), states that, in developing its groundwater management plan, a groundwater conservation district shall use groundwater availability modeling information provided by the executive administrator of the Texas Water Development Board (TWDB) in conjunction with any available site-specific information provided by the district for review and comment to the executive administrator. Information derived from groundwater availability models that shall be included in the groundwater management plan includes:

- the annual amount of recharge from precipitation to the groundwater resources within the district, if any;
- for each aquifer within the district, the annual volume of water that discharges from the aquifer to springs and any surface water bodies, including lakes, streams, and rivers; and
- the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

This report (Part 2 of a two-part package of information from the TWDB to Fayette County Groundwater Conservation District) fulfills the requirements noted above. Part 1 of the 2-part package is the Historical Water Use/State Water Plan data report. The District should have received, or will receive, this data report from the Groundwater Technical Assistance Section. Questions about the data report can be directed to Mr. Stephen Allen, Stephen.Allen@twdb.texas.gov, (512) 463-7317.

The groundwater management plan for the Fayette County Groundwater Conservation District should be adopted by the district on or before October 9, 2013 and submitted to the executive administrator of the TWDB on or before November 8, 2013. The current management plan for the Fayette County Groundwater Conservation District expires on January 7, 2014.

This report discusses the methods, assumptions, and results from model runs using the groundwater availability models for the central part of the Carrizo-Wilcox, Queen City, and Sparta aquifers, the central portion of the Gulf Coast Aquifer, and the Yegua-Jackson Aquifer. Tables 1 through 5 summarize the groundwater availability model data required by the statute, and Figures 1 through 5 show the area of the model from which the values in the table was extracted. This model run replaces the results of GAM Run 08-35. GAM Run 13-002 meets current standards set after the release of GAM Run 08-35 including a refinement of using the extent of the official aquifer boundaries within the district. If after review of the figures, Fayette County Groundwater Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the Texas Water Development Board immediately. Per statute TWDB is required to provide the districts with data from the official groundwater availability models; however, the TWDB has also approved, for planning purposes, the fully penetrating alternative model for the central portion of the Gulf Coast Aquifer that can have water budget information extracted for the district. Please contact the author of this report if a comparison report using this model is desired.

METHODS:

In accordance with the provisions of the Texas State Water Code, Section 36.1071, Subsection (h), the groundwater availability models for the Carrizo-Wilcox, Queen City, and Sparta aquifers, the central portion of the Gulf Coast Aquifer, and the Yegua-Jackson Aquifer were run for this analysis. Fayette County Groundwater Conservation District Water budgets for the historical model periods were extracted using ZONEBUDGET Version 3.01 (Harbaugh, 2009) The average annual water budget values for recharge, surface water outflow, inflow to the district, outflow from the district, net inter-aquifer flow (upper), and net inter-aquifer flow (lower) for the portions of the aquifers located within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Carrizo-Wilcox, Queen City, and Sparta aquifers

- We used version 2.02 of the groundwater availability model for the central part of the Carrizo-Wilcox, Queen City, and Sparta aquifers. See Dutton and others (2003) and Kelley and others (2004) for assumptions and limitations of the groundwater availability model for the central part of the Carrizo-Wilcox, Queen City, and Sparta aquifers.

- This groundwater availability model includes eight layers which generally represent the Sparta Aquifer (Layer 1), the Weches Confining Unit (Layer 2), the Queen City Aquifer (Layer 3), the Reklaw Confining Unit (Layer 4), the Carrizo Aquifer (Layer 5), the Upper Wilcox or Calvert Bluff Formation (Layer 6), the Middle Wilcox or Simsboro Formation (Layer 7), and the Lower Wilcox or Hooper Formation (Layer 8). Individual water budgets for the District were determined for the Sparta Aquifer (Layer 1), the Queen City Aquifer (Layer 3), and the Carrizo-Wilcox Aquifer (Layer 5 through Layer 8 collectively).

- Groundwater in the Carrizo-Wilcox, Queen City, and Sparta aquifers ranges from fresh to brackish in composition (Kelley and others, 2004). Groundwater with total dissolved solids of less than 1,000 milligrams per liter are considered fresh and total dissolved solids of 1,000 to 10,000 milligrams per liter are considered brackish.

- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).

Gulf Coast Aquifer

- Version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer was used for this analysis. See Chowdhury and others (2004) and Waterstone and others (2003) for assumptions and limitations of the groundwater availability model.

- The model for the central portion of the Gulf Coast Aquifer assumes partially penetrating wells in the Evangeline Aquifer due to a lack of data for aquifer properties in the deeper, lower section of the aquifer.

- This groundwater availability model includes four layers, which generally represent the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2),

the Burkeville Confining Unit (Layer 3), and the Jasper Aquifer including parts of the Catahoula Formation (Layer 4).

- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).

Yegua-Jackson Aquifer

- We used version 1.01 of the groundwater availability model for the Yegua-Jackson Aquifer. See Deeds and others (2010) for assumptions and limitations of the groundwater availability model.
- This groundwater availability model includes five layers which represent the outcrop section for the Yegua-Jackson Aquifer and younger overlying units (Layer 1), the upper portion of the Jackson Group (Layer 2), the lower portion of the Jackson Group (Layer 3), the upper portion of the Yegua Group (Layer 4), and the lower portion of the Yegua Group (Layer 5).
- An overall water budget for the District was determined for the Yegua-Jackson Aquifer (Layer 1 through Layer 5 collectively for the portions of the model that represent the Yegua Jackson Aquifer).
- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifer according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the model results for the aquifers located within the district and averaged over the duration of the calibration and verification portion of the model runs in the district, as shown in Tables 1 through 5.

- Precipitation recharge—The areally distributed recharge sourced from precipitation falling on the outcrop areas of the aquifers (where the aquifer is exposed at land surface) within the district.
- Surface water outflow—The total water discharging from the aquifer (outflow) to surface water features such as streams, reservoirs, and drains (springs).
- Flow into and out of district—The lateral flow within the aquifer between the district and adjacent counties.

- Flow between aquifers—The net vertical flow between aquifers or confining units. This flow is controlled by the relative water levels in each aquifer or confining unit and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs. "Inflow" to an aquifer from an overlying or underlying aquifer will always equal the "Outflow" from the other aquifer. In some cases this flow term includes lateral flow between the official aquifer and adjacent portions of the same hydrogeologic units which are not part of the official aquifer and may contain brackish water.

The information needed for the District's management plan is summarized in Tables 1 through 5. It is important to note that sub-regional water budgets are not exact. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that straddles a political boundary, such as a district or county boundary, is assigned to one side of the boundary based on the location of the centroid of the model cell. For example, if a cell contains two counties, the cell is assigned to the county where the centroid of the cell is located (Figures 1 through 5).

TABLE 1: SUMMARIZED INFORMATION FOR THE SPARTA AQUIFER THAT IS NEEDED FOR THE FAYETTE COUNTY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT. THESE FLOWS MAY INCLUDE BRACKISH WATERS.

Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Sparta Aquifer	379
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Sparta Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Sparta Aquifer	514
Estimated annual volume of flow out of the district within each aquifer in the district	Sparta Aquifer	178
Estimated net annual volume of flow between each aquifer in the district	From the Sparta Aquifer into younger overlying units	1,656
	From the Weches Formation confining unit into the Sparta Aquifer	1,534
	From Sparta Aquifer to brackish Sparta	38

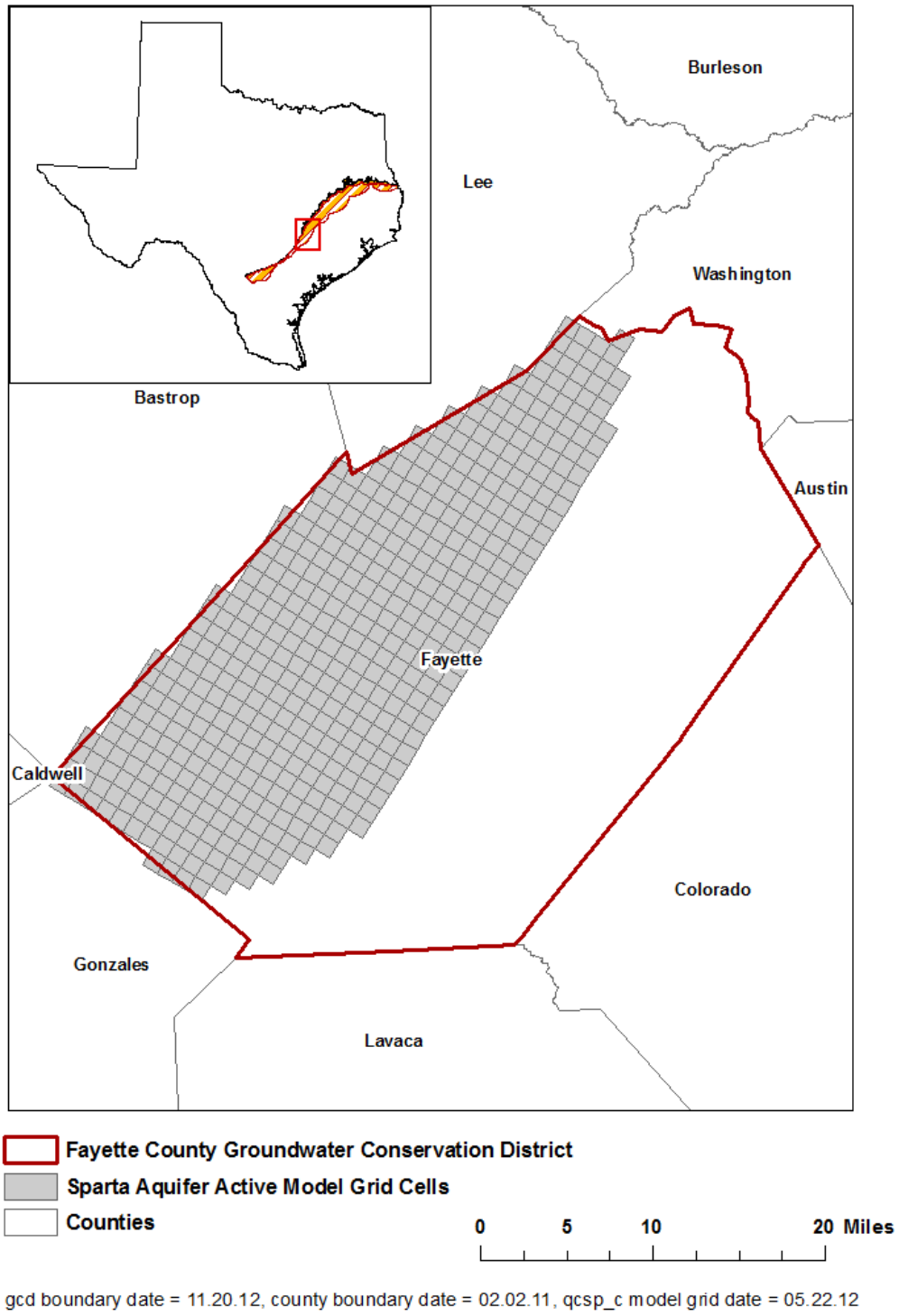

FIGURE 1: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE SPARTA AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 2: SUMMARIZED INFORMATION FOR THE QUEEN CITY AQUIFER THAT IS NEEDED FOR THE FAYETTE COUNTY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT. THESE FLOWS MAY INCLUDE BRACKISH WATERS.

Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Queen City Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Queen City Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Queen City Aquifer	1,935
Estimated annual volume of flow out of the district within each aquifer in the district	Queen City Aquifer	499
Estimated net annual volume of flow between each aquifer in the district	From the Queen City Aquifer into the Weches Formation confining unit.	1,430
	From the Reklaw Formation confining unit into the Queen City Aquifer	198
	From the Queen City Aquifer to the brackish Queen City	87

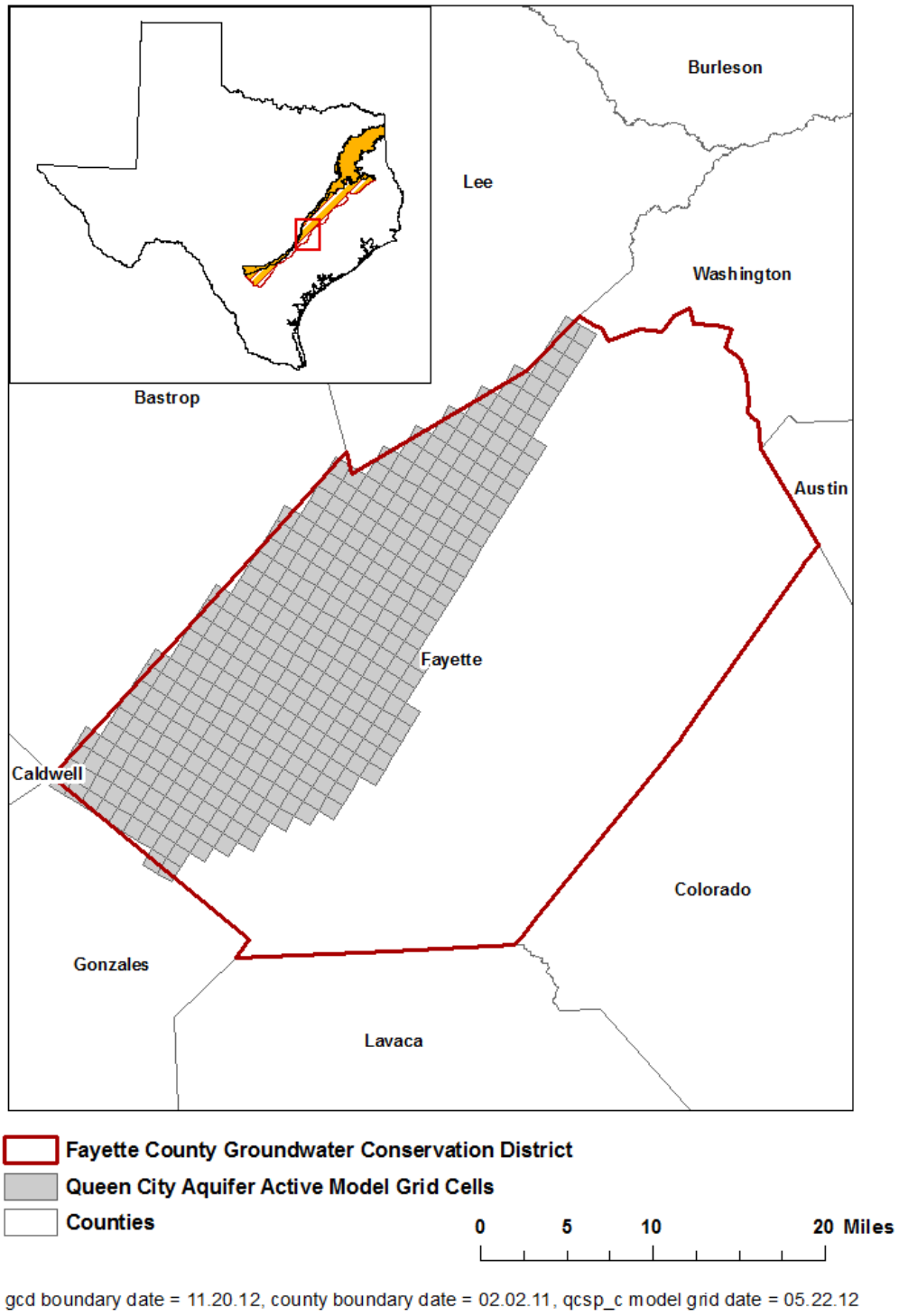

FIGURE 2: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS FROM WHICH THE INFORMATION IN TABLE 2 WAS EXTRACTED (THE QUEEN CITY AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 3: SUMMARIZED INFORMATION FOR THE CARRIZO-WILCOX AQUIFER THAT IS NEEDED FOR THE FAYETTE COUNTY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT. THESE FLOWS MAY INCLUDE BRACKISH WATERS.

Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Carrizo-Wilcox Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Carrizo-Wilcox Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Carrizo-Wilcox Aquifer	7,134
Estimated annual volume of flow out of the district within each aquifer in the district	Carrizo-Wilcox Aquifer	2,966
Estimated net annual volume of flow between each aquifer in the district	From the Carrizo-Wilcox Aquifer into the Reklaw confining unit.	231
	From the Carrizo-Wilcox Aquifer to the brackish Carrizo-Wilcox	4,115

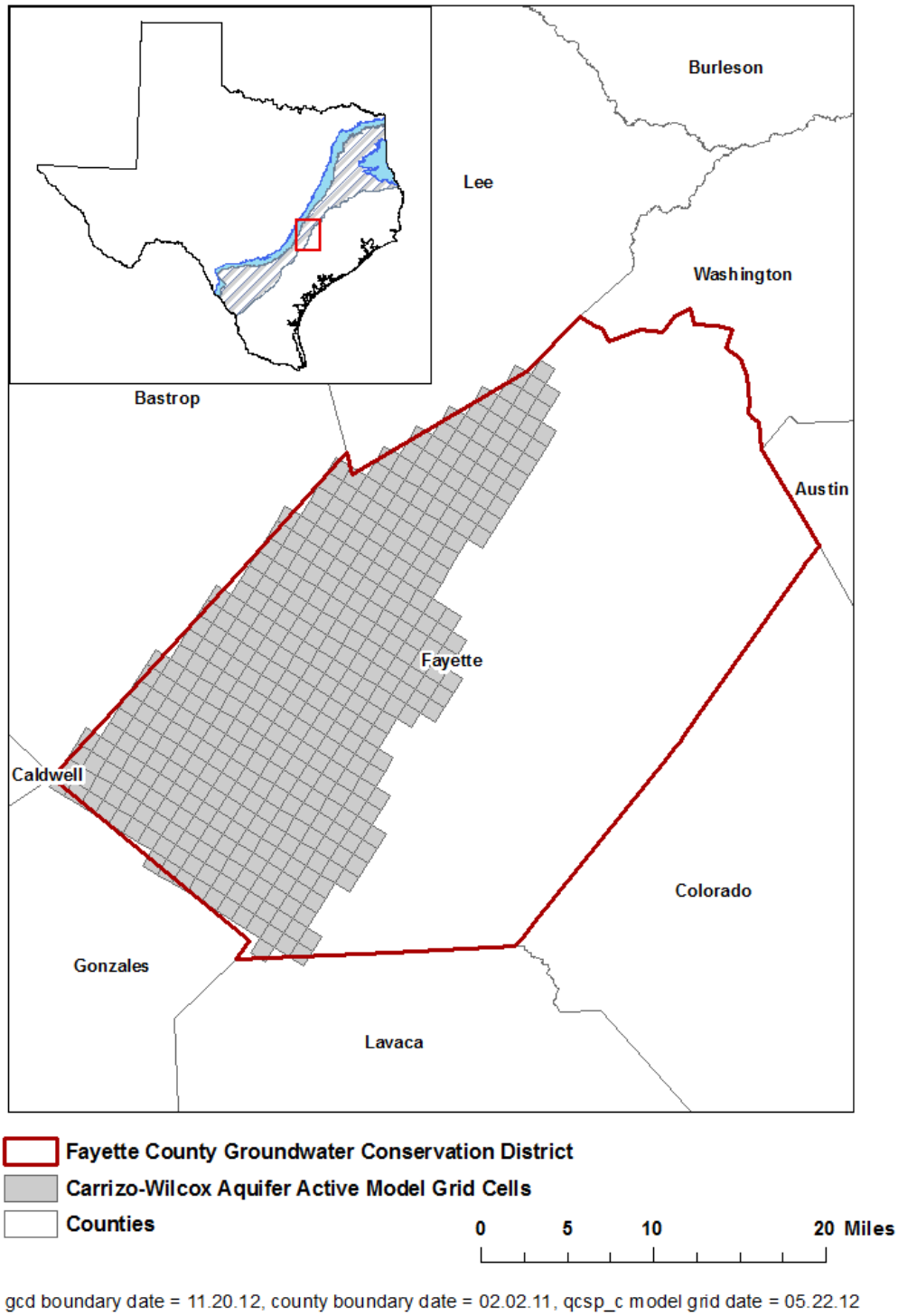

FIGURE 3: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS FROM WHICH THE INFORMATION IN TABLE 3 WAS EXTRACTED (THE CARRIZO-WILCOX AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 4: SUMMARIZED INFORMATION FOR THE GULF COAST AQUIFER THAT IS NEEDED FOR THE FAYETTE COUNTY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT. THESE FLOWS MAY INCLUDE BRACKISH WATERS.

Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer	1,955
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Gulf Coast Aquifer	982
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer	279
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer	1,375
Estimated net annual volume of flow between each aquifer in the district	From the Gulf Coast Aquifer into underlying units	599[1]

1) Estimated from the groundwater availability model for the Yegua-Jackson Aquifer

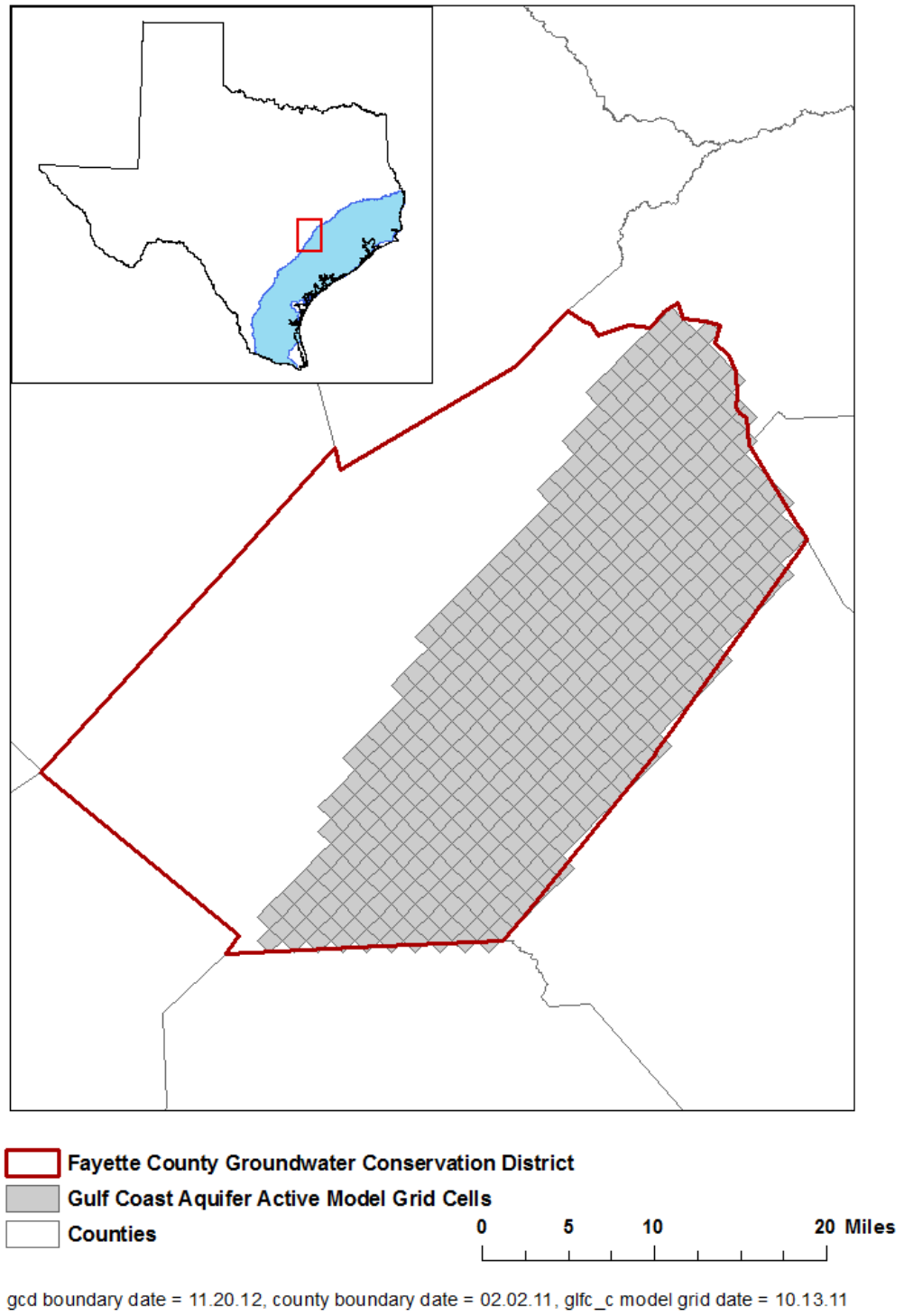

FIGURE 4: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE GULF COAST AQUIFER FROM WHICH THE INFORMATION IN TABLE 4 WAS EXTRACTED (THE GULF COAST AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 5: SUMMARIZED INFORMATION FOR THE YEGUA-JACKSON AQUIFER THAT IS NEEDED FOR THE FAYETTE COUNTY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT. THESE FLOWS MAY INCLUDE BRACKISH WATERS.

Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Yegua-Jackson Aquifer	47,304
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Yegua-Jackson Aquifer	59,160
Estimated annual volume of flow into the district within each aquifer in the district	Yegua-Jackson Aquifer	9,849
Estimated annual volume of flow out of the district within each aquifer in the district	Yegua-Jackson Aquifer	6,492
Estimated net annual volume of flow between each aquifer in the district	From Yegua-Jackson Aquifer to brackish Yegua-Jackson	728
	From the Catahoula and overlying units into the Yegua-Jackson Aquifer	599

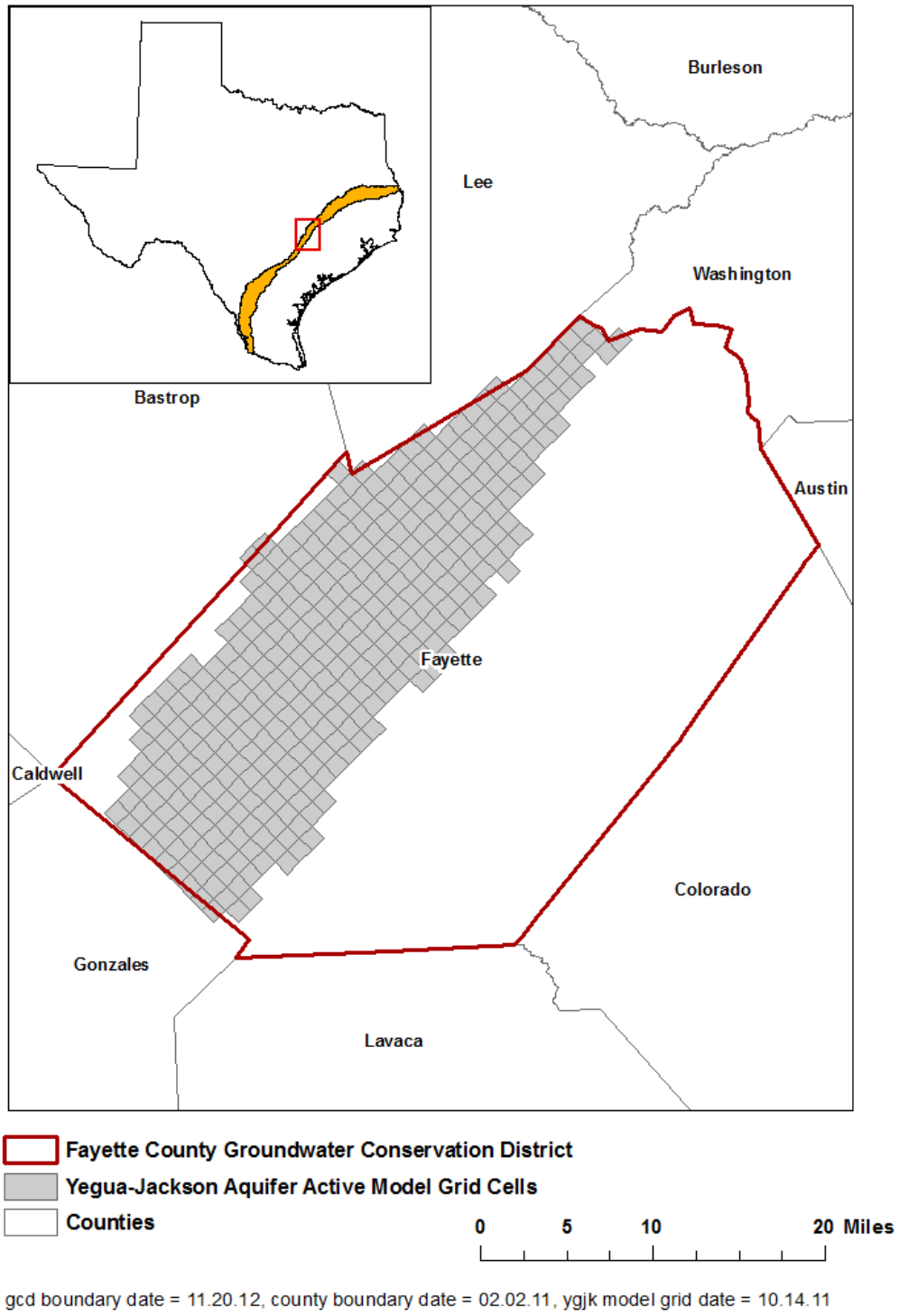

FIGURE 5: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE YEGUA-JACKSON AQUIFER FROM WHICH THE INFORMATION IN TABLE 5 WAS EXTRACTED (THE YEGUA-JACKSON AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

LIMITATIONS

The groundwater model(s) used in completing this analysis is the best available scientific tool that can be used to meet the stated objective(s). To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision making, the National Research Council (2007) noted:

> *"Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results."*

A key aspect of using the groundwater model to evaluate historic groundwater flow conditions includes the assumptions about the location in the aquifer where historic pumping was placed. Understanding the amount and location of historic pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and interaction with streams are specific to particular historic time periods.

Because the application of the groundwater models was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations related to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and overall conditions of the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

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Appendix B

Estimated Historical Water Use And 2012 State Water Plan Datasets:

Fayette County Groundwater Conservation District

by Stephen Allen
Texas Water Development Board
Groundwater Resources Division
Groundwater Technical Assistance Section
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February 6, 2013

GROUNDWATER MANAGEMENT PLAN DATA:

This package of water data reports (part 1 of a 2-part package of information) is being provided to groundwater conservation districts to help them meet the requirements for approval of their five-year groundwater management plan. Each report in the package addresses a specific numbered requirement in the Texas Water Development Board's groundwater management plan checklist. The checklist can be viewed and downloaded from this web address:

https://www.twdb.state.tx.us/groundwater/docs/GCD/GMPchecklist0113.pdf

The five reports included in part 1 are:

1. Estimated Historical Water Use (checklist Item 2)

   from the TWDB Historical Water Use Survey (WUS)
2. Projected Surface Water Supplies (checklist Item 6)
3. Projected Water Demands (checklist Item 7)
4. Projected Water Supply Needs (checklist Item 8)
5. Projected Water Management Strategies (checklist Item 9)

   reports 2-5 are from the 2012 State Water Plan (SWP)

Part 2 of the 2-part package is the groundwater availability model (GAM) report. The District should have received, or will receive, this report from the Groundwater Availability Modeling Section. Questions about the GAM can be directed to Dr. Shirley Wade, shirley.wade@twdb.texas.gov, (512) 936-0883.

DISCLAIMER:

The data presented in this report represents the most updated Historical Water Use and 2012 State Water Planning data available as of 2/6/2013. Although it does not happen frequently, neither of these datasets are static and are subject to change pending the availability of more accurate data (Historical Water Use data) or an amendment to the 2012 State Water Plan (2012 State Water Planning data). District personnel must review these datasets and correct any discrepancies in order to ensure approval of their groundwater management plan.

The Historical Water Use dataset can be verified at this web address:

http://www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/

The 2012 State Water Planning dataset can be verified by contacting Wendy Barron (wendy.barron@twdb.texas.gov or 512-936-0886).

For additional questions regarding this data, please contact Stephen Allen (stephen.allen@twdb.texas.gov or 512-463-7317) or Rima Petrossian (rima.petrossian@twdb.texas.gov or 512-936-2420).

Estimated Historical Water Use
TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water historical use estimates are currently unavailable for calendar years 2005, 2011 and 2012. TWDB staff anticipates the calculation and posting of these estimates at a later date.

FAYETTE COUNTY

All values are in acre-feet/year

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	GW	2,529	277	0	152	49	342	3,349
	SW	0	0	0	149	0	1,821	1,970
1980	GW	3,023	194	0	498	9	337	4,061
	SW	0	0	12,905	554	90	1,598	15,147
1984	GW	2,950	224	0	117	6	203	3,500
	SW	0	0	14,176	341	9	1,836	16,362
1985	GW	3,226	219	0	185	6	192	3,828
	SW	0	0	14,100	530	9	1,736	16,375
1986	GW	2,924	204	0	166	6	193	3,493
	SW	0	0	12,105	666	9	1,758	14,538
1987	GW	3,182	49	0	240	6	195	3,672
	SW	0	0	7,976	960	0	1,762	10,698
1988	GW	3,308	42	0	254	5	200	3,809
	SW	0	0	15,016	1,014	0	1,808	17,838
1989	GW	3,320	38	0	330	7	196	3,891
	SW	0	0	12,453	290	0	1,781	14,524
1990	GW	3,397	32	0	80	7	203	3,719
	SW	0	0	11,701	320	0	1,834	13,855
1991	GW	2,940	42	0	80	39	207	3,308
	SW	0	0	13,210	320	0	1,866	15,396
1992	GW	3,191	65	0	60	47	262	3,625
	SW	0	0	8,292	240	0	2,359	10,891
1993	GW	3,346	65	0	234	47	256	3,948
	SW	0	0	9,949	285	0	2,309	12,543
1994	GW	3,198	82	0	341	47	248	3,916
	SW	0	16	13,193	290	0	2,238	15,737
1995	GW	3,364	108	0	282	46	228	4,028
	SW	0	16	15,574	345	0	2,053	17,988
1996	GW	3,507	124	0	274	46	189	4,140
	SW	0	0	24,334	334	0	1,706	26,374
1997	GW	3,357	122	0	270	46	207	4,002

Estimated Historical Water Use
TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water historical use estimates are currently unavailable for calendar years 2005, 2011 and 2012. TWDB staff anticipates the calculation and posting of these estimates at a later date.

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1997	SW	0	0	10,538	330	0	1,876	12,744
1998	GW	3,179	136	0	282	43	221	3,861
	SW	0	0	13,246	344	0	1,994	15,584
1999	GW	3,445	130	0	271	43	233	4,122
	SW	0	0	12,875	331	0	2,091	15,297
2000	GW	3,516	162	0	559	43	239	4,519
	SW	0	0	35,234	230	0	2,155	37,619
2001	GW	2,088	129	0	522	19	138	2,896
	SW	0	0	17,053	213	0	2,195	19,461
2002	GW	1,851	134	0	511	19	139	2,654
	SW	0	0	15,260	209	0	2,205	17,674
2003	GW	2,743	160	0	691	19	137	3,750
	SW	0	0	15,260	326	0	2,180	17,766
2004	GW	2,378	96	0	725	19	138	3,356
	SW	0	0	15,259	201	0	2,191	17,651
2006	GW	3,629	205	0	730	3	229	4,796
	SW	0	0	22,628	270	0	2,062	24,960
2007	GW	2,420	233	11	376	2	242	3,284
	SW	0	0	18,778	174	0	2,181	21,133
2008	GW	3,262	224	11	0	2	213	3,712
	SW	0	0	19,135	76	0	1,917	21,128
2009	GW	3,297	214	12	424	27	214	4,188
	SW	0	0	20,552	176	77	1,921	22,726
2010	GW	3,151	226	15	200	31	201	3,824
	SW	0	0	18,797	126	93	1,804	20,820

Projected Surface Water Supplies
TWDB 2012 State Water Plan Data

FAYETTE COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
K	COUNTY-OTHER	COLORADO	HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	102	102	102	102	102	102
K	IRRIGATION	COLORADO	COLORADO RIVER COMBINED RUN-OF-RIVER IRRIGATION	534	534	534	534	534	534
K	LIVESTOCK	BRAZOS	LIVESTOCK LOCAL SUPPLY	2	2	2	2	2	2
K	LIVESTOCK	COLORADO	LIVESTOCK LOCAL SUPPLY	1,746	1,746	1,746	1,746	1,746	1,746
K	LIVESTOCK	GUADALUPE	LIVESTOCK LOCAL SUPPLY	142	142	142	142	142	142
K	LIVESTOCK	LAVACA	LIVESTOCK LOCAL SUPPLY	472	472	472	472	472	472
K	STEAM ELECTRIC POWER	COLORADO	COLORADO RIVER RUN-OF-RIVER	1,267	1,267	1,267	1,267	1,267	1,267
K	STEAM ELECTRIC POWER	COLORADO	HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	41,601	41,601	41,601	41,601	41,601	41,601
	Sum of Projected Surface Water Supplies (acre-feet/year)			**45,866**	**45,866**	**45,866**	**45,866**	**45,866**	**45,866**

Projected Water Demands
TWDB 2012 State Water Plan Data

Please note that the demand numbers presented here include the plumbing code savings found in the Regional and State Water Plans.

FAYETTE COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
K	MINING	BRAZOS	29	29	29	29	29	29
K	LIVESTOCK	BRAZOS	24	24	24	24	24	24
K	COUNTY-OTHER	COLORADO	464	307	206	137	93	64
K	STEAM ELECTRIC POWER	COLORADO	29,622	29,702	33,002	63,843	63,843	69,753
K	MINING	COLORADO	4	4	4	4	4	4
K	IRRIGATION	COLORADO	702	657	615	575	539	506
K	LIVESTOCK	COLORADO	1,774	1,774	1,774	1,774	1,774	1,774
K	AQUA WSC	COLORADO	90	115	135	150	168	194
K	FAYETTE WSC	COLORADO	846	1,193	1,464	1,676	1,933	2,274
K	LEE COUNTY WSC	COLORADO	254	338	407	461	522	609
K	LA GRANGE	COLORADO	963	1,129	1,264	1,362	1,483	1,656
K	FLATONIA	GUADALUPE	76	82	88	92	97	105
K	COUNTY-OTHER	GUADALUPE	31	18	11	6	4	2
K	MINING	GUADALUPE	7	7	7	7	7	7
K	LIVESTOCK	GUADALUPE	144	144	144	144	144	144
K	COUNTY-OTHER	LAVACA	185	111	68	41	25	16
K	FAYETTE WSC	LAVACA	74	105	129	147	170	200
K	SCHULENBURG	LAVACA	644	733	801	853	919	1,012
K	MANUFACTURING	LAVACA	205	230	254	277	297	322
K	MINING	LAVACA	2	2	2	2	2	2
K	IRRIGATION	LAVACA	37	35	33	31	29	27
K	LIVESTOCK	LAVACA	455	455	455	455	455	455
K	FLATONIA	LAVACA	263	286	306	319	337	363
	Sum of Projected Water Demands (acre-feet/year)		**36,895**	**37,480**	**41,222**	**72,409**	**72,898**	**79,542**

Projected Water Supply Needs
TWDB 2012 State Water Plan Data

Negative values (in red) reflect a projected water supply need, positive values a surplus.

FAYETTE COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
K	AQUA WSC	COLORADO	0	0	0	0	0	0
K	COUNTY-OTHER	COLORADO	-118	-115	-14	55	99	128
K	COUNTY-OTHER	GUADALUPE	135	148	155	160	162	164
K	COUNTY-OTHER	LAVACA	41	93	28	-32	-25	-16
K	FAYETTE WSC	COLORADO	111	-236	-507	-719	-976	-1,317
K	FAYETTE WSC	LAVACA	10	-21	-45	-63	-86	-116
K	FLATONIA	GUADALUPE	69	63	57	53	48	40
K	FLATONIA	LAVACA	107	84	64	51	33	7
K	IRRIGATION	COLORADO	466	511	553	593	629	662
K	IRRIGATION	LAVACA	-20	-18	-16	-14	-12	-10
K	LA GRANGE	COLORADO	1,549	1,383	1,248	1,150	1,029	856
K	LEE COUNTY WSC	COLORADO	36	0	0	0	0	0
K	LIVESTOCK	BRAZOS	-22	-22	-22	-22	-22	-22
K	LIVESTOCK	COLORADO	845	845	845	845	845	845
K	LIVESTOCK	GUADALUPE	179	179	179	179	179	179
K	LIVESTOCK	LAVACA	264	264	264	264	264	264
K	MANUFACTURING	LAVACA	-45	-70	-94	-117	-137	-162
K	MINING	BRAZOS	13	-4	-22	-28	-29	-29
K	MINING	COLORADO	466	466	466	466	466	466
K	MINING	GUADALUPE	53	53	53	53	53	53
K	MINING	LAVACA	32	32	32	32	32	32
K	SCHULENBURG	LAVACA	175	86	18	-34	-100	-193
K	STEAM ELECTRIC POWER	COLORADO	13,246	13,166	9,866	-20,975	-20,975	-26,885
	Sum of Projected Water Supply Needs (acre-feet/year)		**-205**	**-486**	**-720**	**-22,004**	**-22,362**	**-28,750**

Projected Water Management Strategies
TWDB 2012 State Water Plan Data

FAYETTE COUNTY

WUG, Basin (RWPG)

All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
COUNTY-OTHER, COLORADO (K)							
EXPANSION OF SPARTA AQUIFER	SPARTA AQUIFER [FAYETTE]	123	120	19	0	0	0
COUNTY-OTHER, LAVACA (K)							
EXPANSION OF GULF COAST AQUIFER	GULF COAST AQUIFER [FAYETTE]	0	0	0	32	25	16
FAYETTE WSC, COLORADO (K)							
DEVELOPMENT OF OTHER AQUIFER	OTHER AQUIFER [FAYETTE]	0	0	79	291	548	889
EXPANSION OF GULF COAST AQUIFER	GULF COAST AQUIFER [FAYETTE]	0	236	428	428	428	428
FAYETTE WSC, LAVACA (K)							
EXPANSION OF GULF COAST AQUIFER	GULF COAST AQUIFER [FAYETTE]	0	21	45	63	86	116
IRRIGATION, LAVACA (K)							
EXPANSION OF SPARTA AQUIFER	SPARTA AQUIFER [FAYETTE]	20	18	16	14	12	10
LIVESTOCK, BRAZOS (K)							
DEVELOPMENT OF OTHER AQUIFER	OTHER AQUIFER [FAYETTE]	22	22	22	22	22	22
MANUFACTURING, LAVACA (K)							
EXPANSION OF GULF COAST AQUIFER	GULF COAST AQUIFER [FAYETTE]	0	0	0	2	20	43
EXPANSION OF SPARTA AQUIFER	SPARTA AQUIFER [FAYETTE]	45	70	94	115	117	119
MINING, BRAZOS (K)							
EXPANSION OF GULF COAST AQUIFER	GULF COAST AQUIFER [FAYETTE]	0	4	22	28	29	29
SCHULENBURG, LAVACA (K)							
EXPANSION OF YEGUA-JACKSON AQUIFER	YEGUA-JACKSON AQUIFER [FAYETTE]	0	0	0	0	0	9
MUNICIPAL CONSERVATION	CONSERVATION [FAYETTE]	43	104	157	159	167	184

Projected Water Management Strategies
TWDB 2012 State Water Plan Data

WUG, Basin (RWPG)

All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
STEAM ELECTRIC POWER, COLORADO (K)							
NEW LCRA CONTRACTS	COLORADO RIVER COMBINED RUN-OF-RIVER - LCRA SUPPLY REALLOCATION [TRAVIS]	0	0	0	20,975	20,975	26,885

Sum of Projected Water Management Strategies (acre-feet/year)	**253**	**595**	**882**	**22,129**	**22,429**	**28,750**