2026 LAVACA
REGIONAL WATER PLAN

INITIALLY PREPARED PLAN

Prepared by: Lavaca Regional Water Planning Group
With administration by: Lavaca-Navidad River Authority

MARCH 1, 2025

LAVACA
Regional Water Planning Group

BLACK & VEATCH

2026 Lavaca Regional Water Plan

Initially Prepared Plan

Prepared by:

Lavaca Regional Water Planning Group

with funding assistance from the Texas Water Development Board

With assistance from:

Black & Veatch Corporation

TBPE Reg. No. F-258

Document is for Interim Review and Not Intended for Construction, Bidding, or Permit Purposes.

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92863.

Texas Serial No.

March 1, 2025

Date

March 2025

BV Project 410083

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Water Measurements

Acre-foot (AF) = 43,560 cubic feet = 325,851 gallons
Acre-foot per year (ac-ft/yr) = 325,851 gallons per year = 893 gallons per day
Gallons per minute (gpm) = 1,440 gallons per day = 1.6 ac-ft/yr
Million gallons per day (mgd) = 1,000,000 gallons per day = 1,120 ac-ft/yr

INITIALLY PREPARED PLAN

EXECUTIVE SUMMARY

Lavaca Regional Water Plan

B&V PROJECT NO. 411083

PREPARED FOR

Lavaca Regional Water Planning Group

1 MARCH 2025

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List of Abbreviations

ac-ft	Acre-Feet
ac-ft/yr	Acre-Feet per Year
DCP	Drought Contingency Plan
DFC	Desired Future Condition
DOR	Drought of Record
DWDOR	Drought Worse than the Drought of Record
IBT	Interbasin Transfer
LNRA	Lavaca-Navidad River Authority
LRWPA	Lavaca Regional Water Planning Area
MAG	Modeled Available Groundwater
MWP	Major Water Provider
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SWP	State Water Plan
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
WAM	Water Availability Model
WMS	Water Management Strategy
WWP	Wholesale Water Provider
WUG	Water User Group

Executive Summary

ES.1 Introduction

The 2026 Regional Water Planning process continues the planning process set forth by the 2001 Regional Water Plans (RWPs) for the State of Texas. Beginning in 2021, the 2026 RWP process sought to combine a variety of expertise and interests to prepare updated plans for the 16 unique planning regions within the state. These "initially prepared" RWPs were to be submitted to the Texas Water Development Board (TWDB) by March 3, 2025. Following a comment period from state agencies and the general public, these plans will be finalized and adopted by October 20, 2025, to be combined into the 2027 State Water Plan (SWP). In order to provide consistency and facilitate the compilation of the different regional plans, the TWDB requires the incorporation of the data from the completed regional plans into a standardized on-line database, referred to as TWDB DB27.

The reports from TWDB DB27 are available at https://www3.twdb.texas.gov/apps/SARA/reports/list.

Additional instructions include:

1. Enter '2026 Regional Water Plan' into the "Report Name" field to filter to all DB27 reports associated with the 2026 Regional Water Plans
2. Click on the report name hyperlink to load the desired report
3. Enter planning region letter parameter, click view report

Reports available include:

1. Water User Group (WUG) Population
2. WUG Demand
3. Source Availability
4. WUG Existing Water Supply
5. WUG Identified Water Needs/Surplus
6. WUG Second-Tier Identified Water Need
7. WUG Data Comparison to 2026 RWP
8. Source Data Comparison to 2026 RWP
9. WUG Unmet Needs
10. Recommended WUG Water Management Strategies (WMS)
11. Recommended Projects Associated with WMSs
12. Alternative WUG WMSs
13. Alternative Projects Associated with WMSs
14. WUG Management Supply Factor
15. Recommended Water Management Strategy Supply Associated With a New or Amended Interbasin Transfer (IBT) Permit

16. WUG Recommended WMS Supply Associated with a New or Amended IBT Permit and Total Recommended Conservation WMS Supply
17. Sponsored Recommended WMS Supplies Unallocated to WUGs
18. Major Water Provider (MWP) Existing Sales and Transfers
19. MWP WMS Summary

ES.2 Scope of Work

The scope of work was prepared through a public process and is reflected in the tasks below:

Task 1 – Planning Area Description

Task 1 was intended to collect data and to provide a physical, social, and economic description of the Lavaca Regional Water Planning Area (LRWPA). The LRWPA is located along the southeastern Texas coast and consists of all of Lavaca and Jackson Counties, as well as Precinct 3 of Wharton County and the majority of the City of El Campo**.** The eastern portion of Wharton County, including a very small portion of El Campo, is included in the Lower Colorado Regional Water Planning Area (Region K) and planning efforts are coordinated as necessary between this and other neighboring regions. Figure ES-1 shows a map of the planning area. Chapter 1 provides a description of the planning area in detail.

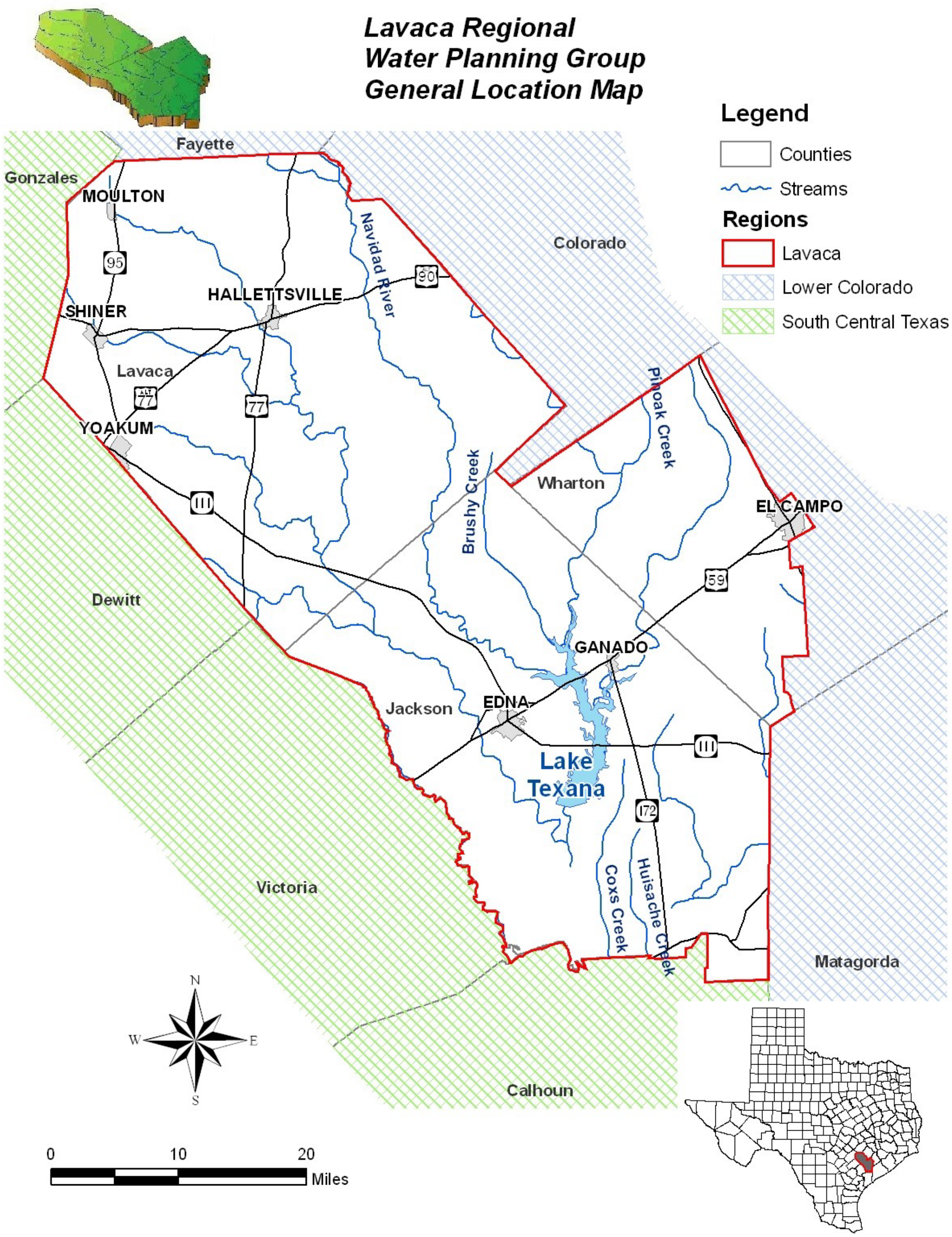

Figure ES-1 General Location Map

Task 2A and 2B – Non-Population Related Water Demand Projections and Population and Population-Related Water Demand Projections

Tasks 2A and 2B were intended to prepare population and water demand projections for the LRWPA. Chapter 2 summarizes this data and discusses the procedures used to obtain revised population and demand projections. These revised projections were then submitted to TWDB in a formal request to be accepted for use in the SWP. The total demands for each county or portion of a county are shown in Table ES-1. Since agriculture constitutes the dominant water use in the basin, nearly 90 percent of the demands shown are related to irrigation. In addition, Chapter 2 lists the Major Water Providers (MWPs) in the region. The MWP in the LRWPA is the Lavaca-Navidad River Authority (LNRA). Further information regarding population and water demand projections is available in Chapter 2.

Table ES-1 Total Water Demands (acre-feet per year)

Counties	2030	2040	2050	2060	2070	2080
Jackson	96,979	98,086	98,122	98,159	98,198	98,238
Lavaca	18,891	18,911	18,931	18,952	18,974	16,332
Wharton (Region P)	93,420	93,421	93,422	93,423	93,424	93,425
LRWPA Total	**209,290**	**210,418**	**210,475**	**210,534**	**210,596**	**207,995**

Task 3 – Analysis of Current Water Supplies

The availability of surface water and groundwater supplies was determined in Task 3. Surface water sources were determined to be limited under drought-of-record (DOR) conditions. The only surface water supply determined to be available during DOR was a supply of 79,000 acre-feet/year (ac-ft/yr) from Lake Texana, the only reservoir in the region; of this 79,000 ac-ft, 4,500 ac-ft is reserved for required releases for the bays and estuaries. This brings the available firm yield to 74,500 ac-ft for all decades in the planning horizon. This firm yield was determined using an unmodified version of the Texas Commission on Environmental Quality (TCEQ) Lavaca River Water Availability Model (WAM) Run 3. Only a small portion of this supply is contracted through the Lavaca-Navidad River Authority (LNRA) to customers within the region. The remaining supply is used to meet demands from outside of the region.

Groundwater supplies are responsible for meeting nearly all of the Water User Group (WUG) demands within the LRWPA, although a portion of the Irrigation demands are met through surface water from the Colorado River in Region K through the Garwood Irrigation Division. Available groundwater for this planning cycle was based on the Desired Future Condition (DFC) of the Central Gulf Coast Aquifer, which was determined by the Groundwater Conservation Districts within Groundwater Management Area 15. The TWDB used a groundwater availability model to convert the DFC into a volume of groundwater known as the Modeled Available Groundwater, or MAG. The MAG is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer.

Table ES-2 Lavaca Region Groundwater Availability for Gulf Coast Aquifer (ac-ft/yr)

County	Basin	Year					
		2030	2040	2050	2060	2070	2080
Jackson	Colorado-Lavaca	28,157	28,157	28,157	28,157	28,157	28,157
	Lavaca	49,484	49,484	49,484	49,484	49,484	49,484
	Lavaca-Guadalupe	12,930	12,930	12,930	12,930	12,930	12,930
	County Total	***90,571***	***90,571***	***90,571***	***90,571***	***90,571***	***90,571***
Lavaca	Guadalupe	41	41	41	41	41	41
	Lavaca	19,942	19,937	19,937	19,930	19,926	19,908
	Lavaca-Guadalupe	401	401	401	401	401	401
	County Total	***20,384***	***20,379***	***20,379***	***20,372***	***20,368***	***20,350***
Wharton (Lavaca Region Portion)	Colorado	874	874	874	874	874	874
	Colorado-Lavaca	14,100	14,100	14,100	14,100	14,100	14,100
	Lavaca	63,193	63,193	63,193	63,193	63,193	63,193
	County Total	***78,167***	***78,167***	***78,167***	***78,167***	***78,167***	***78,167***

The Lavaca Regional Water Planning Group (RWPG) was made aware in previous planning cycles that water demands in neighboring regions have caused a demand for water within the LRWPA sooner than initially expected. As such, the Lavaca RWPG understands that continued coordination with neighboring RWPGs is essential to maintaining consistency among the different regions and ensuring that supplies and management strategies are properly developed. Based on the coordination that has occurred to date, implementation of water management strategies (WMSs) currently planned for Regions L and N are not expected to impact supplies in the LRWPA. For additional information regarding the determination of available water supplies, refer to Chapter 3.

Task 4 – Identification of Water Needs

Task 4 was to determine the surpluses and shortages resulting from the division of available resources performed for Task 3. Table ES-3 includes a summary of water shortages/needs for the LRWPA.

Table ES-3 Water Needs (ac-ft/yr)

County	WUG	Basin	2030	2040	2050	2060	2070	2080
Jackson	Irrigation	Lavaca	1,115	1,115	1,115	1,115	1,115	1,115
Jackson	Manufacturing	Colorado-Lavaca	3,679	4,313	4,334	4,355	4,377	4,401
Lavaca	Irrigation	Lavaca	500	500	500	500	500	500
Wharton	Irrigation	Lavaca	7,716	7,716	7,716	7,716	7,716	7,716
LRWPA Total Needs			**13,010**	**13,644**	**13,665**	**13,686**	**13,708**	**13,732**

The sum of projected shortages for the planning horizon is 13,732 ac-ft/year. While not identified in this RWP, recent activity by existing and potential future customers of LNRA has shown that new industrial demands in the region may be within the planning horizon. Currently, LNRA is looking at various WMS options to meet the potential needs. These strategies are discussed in Chapter 5. For additional information regarding the determination of water needs, refer to Chapter 4.

Task 5 – Evaluation and Selection of Water Management Strategies and Water Conservation Recommendations

A process for the evaluation of feasibility of strategy implementation was developed in Task 5. WMSs were presented in a form so that all potential alternatives were identified and evaluated in accordance with local desires and needs. The costs of potential WMSs were given the most consideration during the strategy selection process for meeting Irrigation needs because irrigators are sensitive to the increase in water prices and all shortages in the LRWPA were assumed to impact these users.

The Lavaca RWPG presented its process for identifying potentially feasible WMSs for public comment at the October 23, 2023, Region P meeting.

The approved documented process is as follows:

1. Current water planning information, including specific WMS of interest, will be solicited from WUGs and Wholesale Water Providers (WWPs) in Fall 2023.
   a. Solicitation of planning information will include the recommended WMSs in the 2021 RWP.
   b. WUGs/WWPs will be encouraged to classify each WMS on their 2021 Plan list as included or rejected for the 2026 Planning Cycle and provide comments, and to list additional WMS that will be new for the 2026 Planning Cycle.
2. A list of potential WMSs will be prepared based on an initial technical evaluation and needs analysis and the comments received, which will be available for consideration by the RWPG by early 2024.
3. Additional WMSs may be brought forth to the RWPG for consideration until March 2024.
4. The list of potential WMSs will be further considered to identify “potentially feasible” or “not potentially feasible” WMSs for WUGs and WWPs with identified water needs.

The potential WMSs considered in the 2026 RWP are as follows:

- Municipal Drought Management.
- Manufacturing Drought Management.
- Municipal Conservation.
- Irrigation Conservation.
- Manufacturing Conservation.
- Expand Use of Groundwater.
- Reuse.
- Lake Texana Yield Enhancement Project.

- Lavaca-Navidad River Authority (LNRA) Desalination.
- LNRA Aquifer Storage and Recovery.
- Lake Texana Dredging.

Several strategies considered for evaluation were for meeting Irrigation and Manufacturing water needs. Several other strategies were evaluated at the request of the project sponsor or were included to encourage conservation and drought management in the region. If a project sponsor wishes to be considered for certain types of State funding, the project that the funding is requested for must be included in the Regional and SWP.

Potential WMSs that were recommended were those that met irrigation needs, have the potential to increase WWP supplies, or could help municipalities increase their access to water supplies or use water more efficiently or reduce their water use during times of drought.

Further discussion of recommended and alternative WMSs is included in Chapter 5. In addition, a section was included in Chapter 5 to discuss recommended conservation strategies. Water conservation plans are required for any entity seeking a TWDB loan, a new or amended surface water right, or current holders of existing surface water diversion permits under certain circumstances.

Task 6 – Impacts of the Regional Water Plan

The purpose of Task 6 was to determine the effects of WMSs on water resources, agricultural resources, and natural resources. In addition, determination of social and economic impacts resulting from voluntary redistribution of water from rural regions to population centers was considered. This activity was part of a consensus-based planning effort to include local concerns in the statewide water supply planning process.

Overall, the recommended strategies keep the groundwater levels at a sustainable level and have no impact on spring flows. As a result of drought management, conservation, and reuse strategies being implemented, there is only a slight reduction in instream flows and bay and estuaries flows during times of drought. Frequency targets for meeting freshwater inflow goals to Lavaca Bay that were met using the unmodified TCEQ WAM Run 3 continue to be met when incorporating the WMSs into the model. The Lavaca RWPG balanced meeting water needs with good stewardship of water, agricultural, and natural resources within the Region.

Task 7 – Drought Response Information, Activities, and Recommendations

Task 7 presents all necessary requirements for drought management and contingency plans, as well as a summary of information provided by water systems in the Lavaca Regional Water Planning Area regarding drought, including preparations and response throughout the Region. Drought preparations and response are described in detail in Chapter 7.

The definition of DOR is “the period of time when historical records indicate that natural hydrological conditions would have provided the least amount of water supply,” according to Texas Administrative Code Title 31, Part 10, Chapter 357, Subchapter A, Rule 357.10.

Within the Lavaca Regional Water Planning Area, the DOR is most specifically associated with the hydrologic conditions of the Lake Texana. While Lake Texana was not yet constructed in the 1950s, the lake’s performance under a repeat of DOR conditions can be analyzed using the TCEQ Lavaca River Basin WAM. The current DOR for Lake Texana is defined as beginning in December 1952 and lasting through April 1957.

While RWPs must address water supply needs during a repeat of the DOR, RWPGs may choose to consider scenarios and/or qualitatively address uncertainty and a drought worse than the drought of record (DWDOR) in their region. On a regionwide basis, the Lavaca RWPG considered planning for uncertainty and DWDOR by analyzing the impacts to the Lake Texana firm yield when applying an increase to reservoir evaporation and decrease to streamflow of 5 percent, 10 percent, and 20 percent during the DOR . The impacts were discussed by the Lavaca RWPG at a RWPG meeting where the impacts to groundwater were also discussed, as most of the region uses groundwater rather than surface water. Consideration to assuming only 90 percent of the modeled available groundwater is available for use was given. After much discussion, the Lavaca RWPG chose not to plan for uncertainty or DWDOR on a regional scale through either of the mentioned methods at this time. In the future, if better forecasting tools are made available, the Lavaca RWPG will revisit.

Drought contingency plans (DCPs) are required of certain water right owners and applicants. These documents have become integral to providing a reliable supply of water throughout the State. The Lavaca RWPG acknowledged that the DCP for the LNRA is the best drought management tool for surface water supplies in the Lavaca Region. LNRA uses multiple triggers at each stage that include water surface elevations of the lake as well as a broad trigger that allows for any additional scenario that would cause the LNRA to notify its customers that a drought stage has been triggered.

Throughout the region, the DCPs for groundwater users are developed specifically to their use and location. Aquifer properties can vary across the region and it can be difficult to require the same triggers for all users of a particular groundwater source that covers several counties. The Lavaca RWPG acknowledges that the municipalities that use groundwater have the best knowledge to develop their DCP triggers and responses.

Task 8 – Unique Stream Segments, Reservoir Sites, and Legislative Recommendations

Task 8 presents the RWPG's unique stream segments, unique reservoir sites, and legislative, administrative, and regulatory recommendations.

No designation of unique stream segments or reservoir sites was recommended for the current round of regional water planning.

Several policy issues have been adopted by the Lavaca RWPG concerning regulatory and legislative issues. These recommendations are listed below and are described in detail in Chapter 8:

- Environmental Issues
- Ongoing RWPG Activities
- Inter-Regional Coordination
- Conservation Policy
- Sustainable Yield of the Gulf Coast Aquifer
- Support of the Rule of Capture
- Groundwater Conservation Districts
- Establishment of Fees for Groundwater Export
- Limits for Groundwater Conservation Districts

Task 9 – Implementation and Comparison to the Previous Regional Water Plan

Task 9 includes a discussion and survey of the implementation status of WMS projects that were recommended in the 2021 RWP, as well as providing a summary comparison of the 2026 RWP to the 2021 RWP with respect to population, demands, water availability and supplies, water needs, WMSs, and assessment of progress toward regionalization. Details of this task are discussed in Chapter 9.

Task 10 – Public Participation

Public participation has been encouraged through the efforts of the RWPG members as they take information back to the WUGs they represent. This was the most effective method of informing the public of the progress of the Plan. Public meetings were held throughout the planning cycle to review the population and water demand data; the supplies, surpluses, and shortages; and management strategies. Meetings of the Planning Group followed the Open Meetings Act requirements and were well attended by the members and non-voting members, but participation by the general public has been somewhat limited. Stakeholder outreach and meeting events are summarized in Chapter 10.

INITIALLY PREPARED PLAN

CHAPTER 1: DESCRIPTION OF THE LAVACA REGIONAL WATER PLANNING AREA

Lavaca Regional Water Plan

BV PROJECT NO. 410083

PREPARED FOR

Lavaca Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

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List of Abbreviations

ac-ft/yr	Acre-Feet per Year
CRP	Clean Rivers Program
CAFO	Confined Animal Feeding Operations
DFC	Desired Future Condition
DO	Dissolved Oxygen
E. coli	*Escherichia coli*
GPCD	Gallons per Capita Daily
GIS	Geographic Information System
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
H-GAC	Houston-Galveston Area Council of Governments
LNRA	Lavaca-Navidad River Authority
LRWPA	Lavaca Regional Water Planning Area
QAPP	Quality Assurance Project Plan
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
Region K	Lower Colorado Regional Water Planning Area
Region L	South Central Texas Regional Water Planning Area
STWM	South Texas Watermaster
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks & Wildlife Department
TSWQS	Texas Surface Water Quality Standards
TWDB	Texas Water Development Board
USGS	United States Geological Survey
WMA	Wildlife Management Area

1.0 Description of the Lavaca Regional Water Planning Area

1.1 Introduction and Background

Sections 16.051 and 16.055 of the Texas Water Code direct the Executive Administrator of the Texas Water Development Board (TWDB) to prepare and maintain a comprehensive State Water Plan as a flexible guide for the development, management, and conservation of all water resources in Texas to ensure that sufficient supplies of water will be available at a reasonable cost to ensure public health, safety, and welfare; further the State's economic growth; and protect agricultural and natural resources of the entire state.

In February 1998, the TWDB adopted rules establishing 16 regional water planning areas and designated initial members of each Regional Water Planning Group (RWPG), representing 11 interests. In 2011, the TWDB added a 12th interest to represent the Groundwater Management Areas (GMAs). Each RWPG has the option to add interest group categories and members. With technical and financial assistance from the TWDB, and in accordance with planning guidelines it set forth, the RWPGs prepared a consensus-based Regional Water Plan (RWP) for 2001. The TWDB assembled the 16 RWPs into the 2002 State Water Plan. Subsequent cycles of planning have resulted in water plan updates at 5-year intervals, including the 2006, 2011, 2016, and 2021 Regional Water Plans (compiled by TWDB into the 2007, 2012, 2017, and 2022 State Water Plans, respectively). The sixth cycle of regional water planning has produced an "initially prepared" RWP that is required to be submitted to the TWDB by March 3, 2025, and will be finalized, adopted, and submitted to the TWDB in October 2025. Subsequently, by January 2027, the TWDB will prepare the 2027 State Water Plan, which will incorporate the adopted Regional Water Plans.

This chapter summarizes the results of Task 1 of the current planning cycle and describes the Lavaca Regional Water Planning Area.

1.2 Description of the Lavaca Regional Water Planning Area

The Lavaca Regional Water Planning Area is located along the southeastern Texas coast and consists of Lavaca and Jackson Counties, and a portion of Wharton County, as shown on Figure 1-1. The portion of Wharton County within the Lavaca Region includes Precinct 3 and the majority of the City of El Campo. The eastern portion of Wharton County, including a very small portion of El Campo, is included in the Lower Colorado Regional Water Planning Area (Region K). Planning efforts are coordinated, as necessary, between this and other neighboring regions.

The Lavaca Region is bounded by Victoria and DeWitt Counties to the southeast, Gonzales and Fayette Counties to the northwest, Colorado County to the northeast, Matagorda County and the remainder of Wharton County to the east, and Calhoun County, Lavaca Bay, and Carancahua Bay to the south. The Lavaca Region is located in the Lavaca, Lavaca-Guadalupe Coastal, and the Colorado-Lavaca Coastal River Basins.

The Lavaca Region is located in the Gulf Coastal Plains region of Texas and contains both Gulf Coast prairies and marshes and Blackland Prairies. The Gulf Coast prairies and marshes encompass the majority of the region. These habitats contain marsh and saltwater grasses in tidal areas and bluestems and tall grasses inland. Hardwoods grow in limited amounts in the bottomlands. The upland soils consist of clays, clay loams, sandy loams, and black soils. The natural grasses make the region ideal for cattle grazing, and the productive soils and typically flat topography support the farming of rice, sorghum, corn, cotton, wheat, and hay.

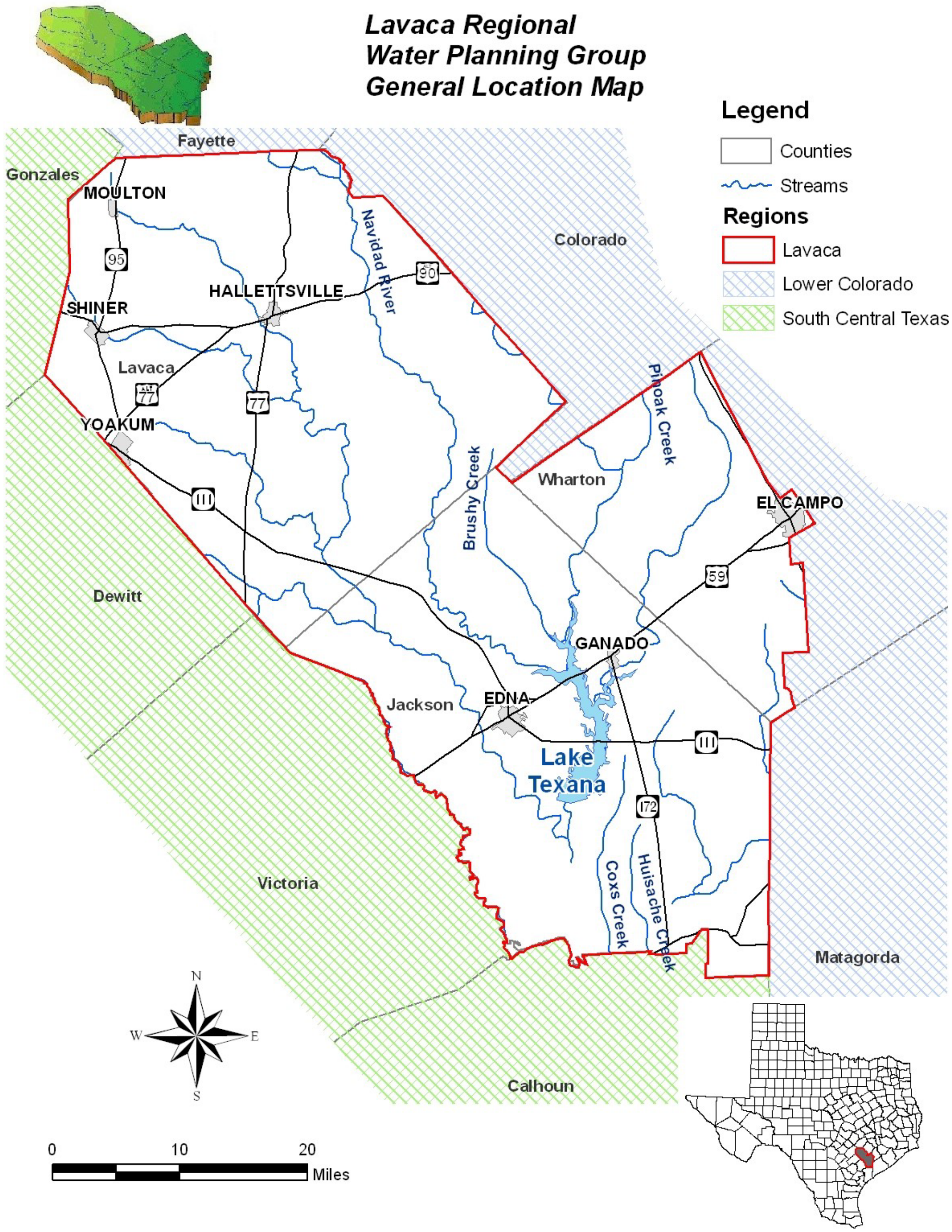

Figure 1-1 General Location Map

The Blackland Prairies are mainly shrink-swell clays that form cracks in dry weather. A large amount of timber grows along the streams, and even though it was originally grasslands, most of the area has been cultivated with productive grasses. The land is used as croplands and grasslands and the grasslands are used as pastures. According to the United States Geological Survey (USGS) ecoregion description, the major crops supported by the Blackland Prairies are cotton, grain sorghum, corn, wheat, pecans, soybeans, and hay.

The counties have hot and humid summers which are occasionally relieved by thunderstorms. The average growing seasons are 311 days in Jackson County, 270 days in Lavaca County, and 291 days in Wharton County. The mean rainfall is approximately 43.6 inches annually for the region. Average temperatures for the region vary, from lows of 41° F in January to highs of 94° F in July. Jackson County encompasses 857 square miles (mi^2); Lavaca County encompasses 970 mi^2; and Wharton County encompasses 1,094 mi^2, of which approximately half is in the planning area.[1]

1.2.1 Governmental Entities in the Lavaca Planning Region

The primary governmental entities in the region are municipal and county governments. Jackson and Lavaca Counties are included on the Golden Crescent Regional Planning Commission, which was established in 1968. This commission also includes the counties of Calhoun, DeWitt, Goliad, Gonzales, and Victoria, which are located in the South-Central Texas Regional Water Planning Area (Region L). Member cities within Jackson and Lavaca Counties include Edna, Ganado, Hallettsville, Moulton, Shiner, and Yoakum. The Commission assists in developing opportunities for intergovernmental coordination to increase economic opportunities for the region as well as other regional concerns, such as environmental resources and transportation. The Jackson County Soil and Water Conservation District, Jackson County Navigation District, Jackson County Hospital District, Lavaca County Soil and Water Conservation District, and the Lavaca-Navidad River Authority (LNRA) are additional special districts created under Texas law. The Jackson Countywide Drainage District and the Jackson County Rural Fire and Emergency Services Districts are also included in the Lavaca Region.

Wharton County is a member of the Houston-Galveston Area Council of Governments (H-GAC), which was established in 1966 and includes 12 other counties located to the east and north of Wharton County. H-GAC is focused on economic development for the region, as well as environmental issues, such as evaporation and air quality, water quality, solid waste, geographic information systems (GIS) and demographic information, and social and nutrition services to senior citizens. El Campo is also a representing city of the H-GAC.

In addition to these entities, there are several regulatory authorities that influence long-range water planning in the Lavaca Region. The South Texas Watermaster (STWM) monitors the regional water uses in seven south-central Texas river basins, including the Lavaca River Basin. The STWM plays a role in allocation of water supplies by user in the event of drought conditions. Field investigations also play a role in locating illegal diversions of water. Regarding state agencies, the TWDB, Texas Commission on Environmental Quality (TCEQ), and Texas Parks & Wildlife Department (TPWD) are responsible for gathering information on water supply and quality. The LNRA manages the surface water supplies in Jackson County. There are also soil and water conservation districts in the region.

The Lavaca Region also lies within GMA 15. GMAs were created to provide for organized planning of groundwater resources and are responsible for working with Groundwater Conservation Districts (GCDs)

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[1] Source: Texas State Historical Association. Texas Almanac 2024-2025

within the GMA boundaries to define Desired Future Conditions (DFCs) for the GMA. DFCs are the quantified condition of groundwater resources within a GMA that would occur at one or more specific future times. Groundwater Conservation Districts (GCD) meet collectively within the GMA and determine DFCs, which then are utilized to model groundwater resources and establish appropriate levels of groundwater use to realize the DFCs. The Lavaca Region includes the Coastal Bend GCD in Wharton County, and the Texana GCD in Jackson County. The primary focus of these districts is to preserve and protect groundwater supplies in their respective counties for future generations, and the districts are responsible for working with GMA 15. The initial management plans for the Coastal Bend and Texana districts were both certified by the TWDB on September 28, 2004. The most recent versions of their groundwater management plans were most recently updated on November 12, 2024, and April 20, 2023, for the Coastal Bend and Texana GCDs, respectively. The Lavaca County GCD was created by the 80th Texas Legislature on May 25, 2007, but due to lack of local support, it is not currently in existence.

1.2.2 General Economic Conditions

The regional planning area is described below on a county-by-county basis.

The economy of Jackson County includes plastics manufacturing and agribusiness. The major agricultural interests in Jackson County include corn, cotton, rice, and beef cattle. These agricultural products had a market value of approximately $85 million in 2023, according to the Texas Almanac, 2024-2025.

The economy of Lavaca County includes varied manufacturing, oil and gas production, agribusiness, and tourism. The major agricultural interests in Lavaca County include cattle, forage, poultry, rice, corn, and grain sorghum, with a market value of approximately $50.5 million in 2023, according to the Texas Almanac, 2024-2025.

The economy of Wharton County includes oil, agribusiness, hunting leases, varied manufacturing, and government services. The major agricultural interests in Wharton County include rice, grain sorghum, cotton, milo, corn, eggs, turf grass, beef cattle, aquaculture, and soybeans; with a market value of approximately $208.5 million for the entire county in 2023 (the county is only partially contained in the Lavaca Region), according to the Texas Almanac, 2024-2025.

According to the U.S. Census Bureau, the 2018-2022 median household income was approximately $67,176 for Jackson County, $58,530 for Lavaca County, and $59,712 for all of Wharton County. The Texas median household income was approximately $72,284 during the same period. Unemployment in 2022 was approximately 3.5 percent in Jackson County, 3.3 percent in Lavaca County, and 3.8 percent in Wharton County.

The value of properties within the Lavaca Region has increased substantially in recent years, as shown in Table 1-1.

Table 1-1 Property Value by County

County	2013 Property Value	2018 Property Value	2023 Property Value
Jackson	$2,459,407,498	$2,839,195,180	$5,032,822,066
Lavaca	$4,209,668,856	$4,596,168,697	$7,273,050,498
Wharton	$4,532,539,863	$4,628,596,988	$8,280,663,718
Source: *Texas Almanac* 2013-2014, 2018-2019, 2024-2025			

1.3 Population and Municipal Water Use in the Lavaca Region

A summary of population and water usage by county is shown in Table 1-2. The Lavaca Regional Water Planning Area (LRWPA) population for 2021 was 52,132, based on the TWDB Water Use Survey Historical Summary Estimate. Cities in the LRWPA include Hallettsville, Moulton, Shiner, and Yoakum in Lavaca County; Edna and Ganado in Jackson County; and the largest city in the region, El Campo in Wharton County.

Table 1-2 Population and Water Usage by County for the Lavaca Regional Water Planning Area

		County		
		Jackson	Lavaca	Wharton
Year 2021 Population		15,121	20,544	16,467
Year 2021 Reported Water Usage (acre–feet)	Municipal	1,643	2,701	2,250
	Manufacturing	496	501	0
	Mining	0	1,779	0
	Steam Electric	0	0	0
	Livestock	626	1,889	250
	Irrigation	53,924	7,120	41,598

1.4 Non-Municipal Water Use in the Lavaca Region

According to the TWDB 2021 Water Use Survey Historical Summary Estimate, irrigated agriculture constitutes over 89 percent of the total water use in Jackson, Lavaca, and Wharton Counties within the LRWPA. Municipal water use accounts for 6 percent, the second largest share of use categories in the region. Livestock use in the Lavaca Region accounted for just over 2 percent of 2021 use, and manufacturing, steam-electric, and mining water use combined also made up approximately 2 percent use.

In previous plans, the prevalence of water conservation practices in the area was studied using aerial photography and GIS. Approximately 14,232 of the rice acres in the LRWPA were improved with conservation practices. The majority of this acreage, over 13,000 acres, was located in Wharton County.

1.5 Lavaca Regional Water Supply Sources and Providers

The available water supply within the region includes both groundwater and surface water. Groundwater is provided nearly exclusively by the Gulf Coast Aquifer. Primary surface water sources are the Navidad and Lavaca Rivers and Lake Texana. Additional information regarding water sources and providers in the Lavaca Region is discussed at length in Chapter 3 of this plan.

1.5.1 Groundwater Sources

The majority of water currently used in the Lavaca Region is groundwater. In 2011, at the start of the most recent drought, the Lavaca Region pumped approximately 216,000-acre-feet of groundwater to supply domestic, agricultural, municipal, and industrial uses. This trend of primarily relying on groundwater is expected to continue in the Lavaca Region due to relatively low demand for municipal water and the rural nature of the area, which makes large-scale distribution systems economically infeasible. Agricultural needs will also likely continue to be met through groundwater resources due to the lack of availability and affordability of large surface water supplies.

The Gulf Coast Aquifer System is the only major aquifer in the Lavaca Region and is the predominant supply source, serving approximately 86 percent of the total supply. There are no minor aquifers located in Jackson or Wharton Counties.

For more information about groundwater resources and availability in the Lavaca Region, refer to Section 3.3 of this plan.

1.5.2 Surface Water Sources

The major river basins that are located (at least partially) within the Lavaca Regional Water Planning Area include the Lavaca, Colorado-Lavaca, and Lavaca-Guadalupe Basins. Approximately 90 percent of the geographic area of the Lavaca Region is located within the Lavaca River Basin, which has a total drainage area of 2,318 square miles and includes the Lavaca and Navidad Rivers. Smaller tributaries in the Lavaca Region include the Arenosa, Big Rocky, Brushy, Chicolete, Clarks, Cox, East Carancahua, Huisache, Mixon, Pinoak, Rocky, Sandy, West Carancahua, and East and West Mustang Creeks. Figure 1-2 shows the location of the Lavaca Basin and adjacent basins. There are no major springs in the Lavaca Region.

1.5.3 Use by Source

Average groundwater pumpage for 2011 to 2013 (recent drought years) was 81,785 acre-feet per year (ac-ft/yr) in Jackson County, 13,603 ac-ft/yr in Lavaca County, and 166,768 ac-ft/yr for the entirety of Wharton County (including the portion of Wharton County located in Region K). Water levels have remained relatively stable in the region, with some declines and some increases over the last several decades. Additional discussion of aquifer conditions is provided in Subsection 3.2.3 of this plan.

The only reservoir in the Lavaca Regional Water Planning Area is Lake Texana. The available firm yield of Lake Texana is 74,500 ac-ft/yr. The Lavaca and Navidad Rivers also supply some run-of-river water to the Lavaca Region, primarily for irrigation purposes. Chapter 3 provides more information on current water supplies.

1.5.4 Major Water Providers

A major water provider is, by definition used for regional water planning purposes, a Water User Group or a Wholesale Water Provider of particular significance to the region's water supply as determined by the RWPG. This may include public or private entities that provide water for any water use category. As determined by the Lavaca Regional Water Planning Group (Lavaca RWPG), the LNRA is considered the only major water provider located in the Lavaca Region for this planning cycle.

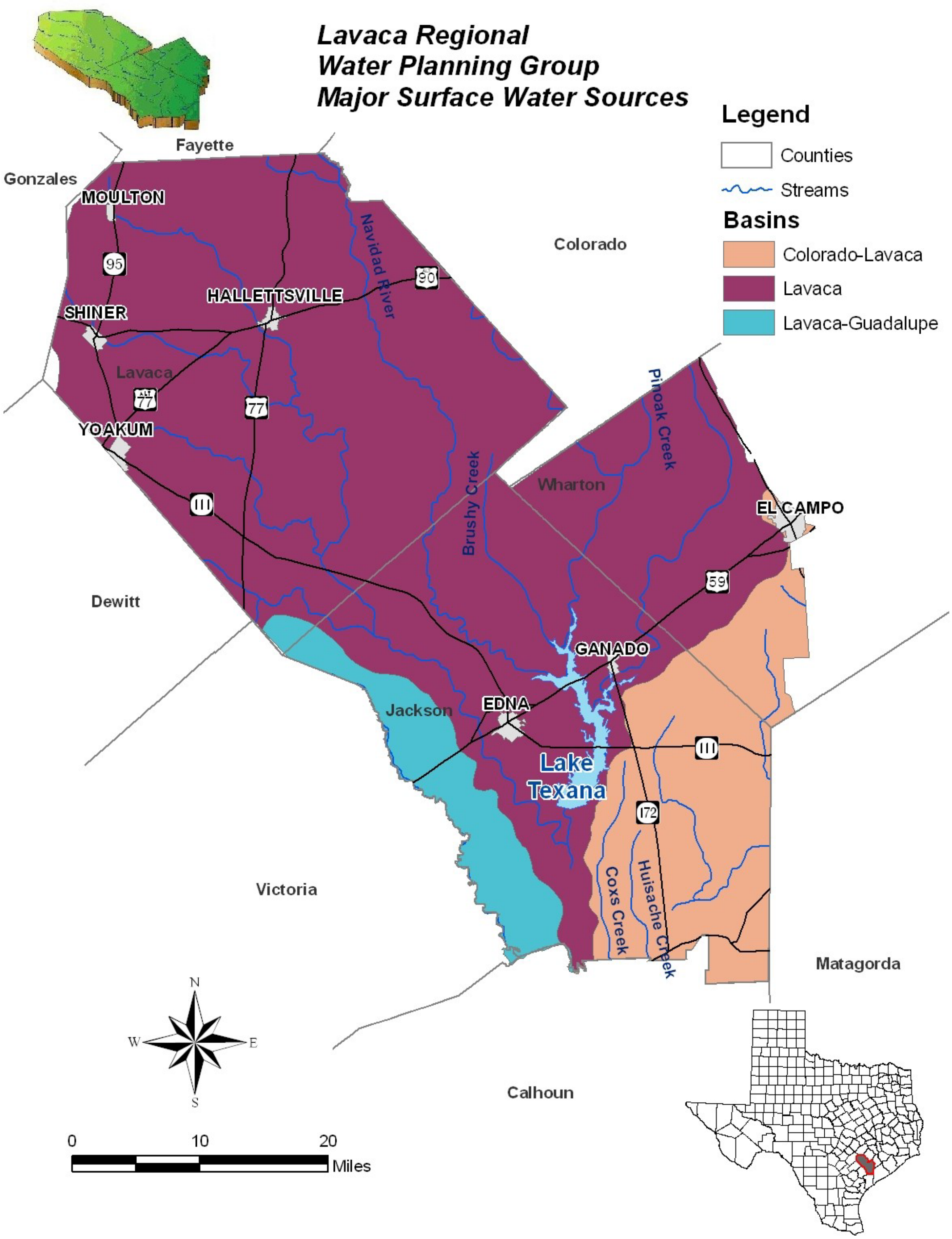

Figure 1-2 Major Surface Water Sources

The LNRA operates and maintains Lake Texana. Water transfers outside the Lavaca Region account for most of the water sales from Lake Texana. LNRA has a total of 86,500 ac-ft/yr, consisting of 74,500 ac-ft/yr of available firm yield and 12,000 ac-ft/yr available on an interruptible basis. The following amounts are contracted annually:

- 178 ac-ft/yr firm yield to the City of Point Comfort in Calhoun County.
- 31,440 ac-ft/yr firm yield to the City of Corpus Christi and surrounding areas.
- 12,000 ac-ft/yr interruptible water to the City of Corpus Christi and surrounding areas.
- 41,200 ac-ft/yr firm yield to Formosa Plastics in Calhoun County and Jackson County.
- 1,032 ac-ft/yr firm yield to Inteplast Corporation in Jackson County.
- 594 ac-ft/yr firm yield to the Calhoun County Navigation District in Calhoun County.
- 56 ac-ft/yr firm yield held in reserve.

Of the 86,500 ac-ft/yr contracted annually, 75,068 ac-ft/yr is dedicated for water uses outside the region. Within the LRWPA, a total of 1,032 ac-ft/yr firm yield is committed to Inteplast (manufacturing), located in Jackson County, and 10,400 ac-ft/yr of firm yield is committed to Formosa Plastics for use in Jackson County. In addition, as the LNRA develops new water supply projects, they expect to provide Formosa Plastics with an additional 3,878 ac-ft/yr in 2030 and 4,950 ac-ft/yr by 2040.

1.6 Natural Resources and Water Quality

The primary agricultural issue in the Lavaca Region is the availability of sufficient quantities of irrigation water for rice farming under drought of record conditions. Natural resources, on the other hand, are impacted from both water quantity and water quality issues.

A table of state, local, and regional planning information reports and data compiled for the 2026 Lavaca Regional Water Plan is attached in Appendix 1A. A summary of some of this information pertaining to water planning is summarized in the following subsections.

1.6.1 Aquatic Resources

As described previously, the Lavaca Regional Water Planning Area consists of three basins: the Lavaca, Colorado-Lavaca, and the Lavaca-Guadalupe Basins. In total, the Lavaca Regional Water Planning Area contains 373 stream miles, with the Lavaca River Basin consisting of the majority with 335 stream miles, and the Colorado-Lavaca Basin and the Lavaca-Guadalupe Basin containing 20 stream miles and 18 stream miles, respectively.

The Lavaca River Basin is primarily drained by two major rivers: the Lavaca River and the Navidad River. Approximately 60 percent of the Lavaca River Basin is drained by the Navidad River and its tributaries, while the Lavaca River and its tributaries drain the remaining 40 percent. The Lavaca River originates in the southern portion of Fayette County and outfalls into Lavaca Bay, while the Navidad River also originates in Fayette County but flows into Lake Texana, and from there continues to its confluence with the Lavaca River, approximately 8 miles downstream of the Palmetto Bend Dam. The Lavaca River then flows into Lavaca Bay/Chocolate Bay, then to Matagorda Bay, then to the Gulf of Mexico.

1.6.2 Water Quality

To support its charge to restore and maintain the quality of water in the state, the TCEQ establishes the Texas Surface Water Quality Standards (TSWQS) in Title 30 of the Texas Administrative Code (TAC) §307.

The TCEQ distinguishes between classified and unclassified water bodies. Classified segments are listed and described in Appendix A of the TSWQS. Unclassified segments are water bodies not identified in Appendix A of the Standards. For each classified segment and for some unclassified segments, the TCEQ identifies site-specific uses and water quality criteria.

The Lavaca Regional Water Planning Area has eight classified stream segments with five in the Lavaca Basin, two in the Colorado-Lavaca, and one in the Lavaca-Guadalupe. Table 1-3 provides a list of all classified and unclassified stream segments in the Lavaca Region for which the TCEQ assesses and reports water quality, and identifies each segment's site-specific uses and water quality criteria.

The TCEQ evaluates water bodies in the state and identifies those that do not meet the TSWQS. Every two years, the TCEQ compiles the Texas Integrated Report, which identifies water bodies with water quality impairments[2] and those with concerns for use attainment and screening levels[3]. Impaired segments are water bodies that do not meet one or more water quality standards. Segments with water quality concerns are water bodies that are near nonattainment of the water quality standards based on numeric criteria or that have water quality not meeting screening levels.

Classified and unclassified stream segments in the Lavaca Region with water quality concerns or impairments are listed in Table 1-4. Data from the TCEQ 2022 Texas Integrated Report – Index of Water Quality Impairments indicate that within the Lavaca Region, there are nine segments with water quality impairments and five with water quality concerns. Of the nine impairments, the majority are for bacteria in water (six segments). Bacteria in water is determined based on the concentration of an indicator bacteria depending on whether the water body is fresh or saline. For freshwater sources, the indicator bacteria is *Escherichia coli* (E. coli) and for saline sources, it is Enterococci.

There are three segments with water quality impairments and two segments with water quality concerns for depressed dissolved oxygen (DO). DO is a measure of the amount of oxygen that is available in the water for metabolism by microbes, fish, and other aquatic organisms. The other three water quality concerns are for chlorophyll-a and total phosphorus in water, which are both indicative of nutrient enrichment. The TCEQ does not currently have numeric water quality standards for nutrients in rivers, streams, and estuaries. Instead, the TCEQ uses screening methods to evaluate whether a water body exceeds screening levels for phosphorus, ammonia nitrogen, nitrate nitrogen, and chlorophyll-a. Water bodies that exceed the screening levels for nutrients are shown as having a water quality concern for the applicable pollutant. For some freshwater reservoirs, the TCEQ has numeric criteria for chlorophyll-a; however, none is included within the Lavaca Regional Water Planning Area.

The TCEQ 2022 Texas Integrated Report – Potential Sources of Impairments and Concerns[4] includes information on possible sources that could contribute to water quality impairments or concerns. According to the report, the majority of water quality concerns and impairments in the Lavaca Region are of an unknown origin or attributed to nonpoint sources. Nonpoint source pollution represents the primary water quality issue for surface water and major groundwater aquifers in the LRWPA. Nonpoint source pollution is precipitation runoff that, as it flows over the land, picks up various pollutants that

[2] TCEQ *2022 Texas Integrated Report - Index of Water Quality Impairments*. https://www.tceq.texas.gov/downloads/water-quality/assessment/integrated-report-2022/2022-imp-index.pdf
[3] TCEQ *2022 Texas Integrated Report – Water Bodies with Concerns for Use Attainment and Screening Levels.* https://www.tceq.texas.gov/downloads/water-quality/assessment/integrated-report-2022/2022-concerns.pdf.
[4] TCEQ *2022 Texas Integrated Report – Potential Sources of Impairments and Concerns.* https://www.tceq.texas.gov/downloads/water-quality/assessment/integrated-report-2022/2022-sources.pdf.

adhere to plants, soils, and man-made objects and eventually infiltrates into the groundwater table or flows into a surface water stream. Another source of pollution is the accidental spill of toxic chemicals near streams or over recharge zones that can send a concentrated pulse of contaminated water through stream segments and/or 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 and point source pollution, as are the habitats of threatened and endangered species that live in and near seeps and certain stream segments. Nonpoint sources of pollution are difficult to control. There has been increased awareness of this issue, which has sparked additional research and interest in the initiation of nonpoint source pollution abatement programs. According to the 2022 Lavaca-Navidad River Authority Basin Summary Report, water quality in the Lavaca Basin appears to be improving because of upgrades to industrial pretreatment and wastewater treatment plants.

Table 1-3 Site-Specific Stream Segment Uses and Water Quality Criteria 2022

Stream Segment #	Stream Segment Name	Classified (C) or Un-classified (U)	Basin	Uses[1]			Site-Specific Numeric Water Quality Criteria[2]						
				Recreation	Aquatic Life	Water Supply	Chloride Annual Avg (mg/L)	Sulfate Annual Avg (mg/L)	TDS Annual Avg (mg/L)	DO (mg/L)	pH Range (standard units)	Indicator Bacteria Fecal Coliform / Enterococci (30-day Geometric mean CFU/100ml)	Temp (°F)
1402F	Blue Creek	U	Colorado-Lavaca	--	--	--	--	--	--	--	--	--	--
1502	Tres Palacios Creek Above Tidal	C	Colorado-Lavaca	PCR1	E	--	250	100	800	5	6.5–9.0	126	90
1601	Lavaca River Tidal	C	Lavaca	PCR1	H	--	--	--	--	4	6.5–9.0	35	95
1601C	Dry Creek	U	Lavaca	--	--	--	--	--	--	--	--	--	--
1602	Lavaca River Above Tidal	C	Lavaca	PCR1	H	PS	200	100	700	5	6.5–9.0	126	91
1602A[2]	Big Brushy Creek	U	Lavaca	--	H	--	--	--	--	5	--	--	--
1602B[2]	Rocky Creek	U	Lavaca	--	H	--	--	--	--	5	--	--	--
1602C	Lavaca River Above Campbell Ranch	U	Lavaca	--	H	--	--	--	--	5	--	--	--
1603	Navidad River Tidal	C	Lavaca	PCR1	H	--	--	--	--	4	6.5–9.0	35	91
1604	Lake Texana	C	Lavaca	PCR1	H	PS	100	50	500	5	6.5–9.0	126	93
1604A[2]	East Mustang Creek	U	Lavaca	--	I	--	--	--	--	4	--	--	--
1604B	West Mustang Creek	U	Lavaca	--	--	--	--	--	--	--	--	--	--
1604C	Sandy Creek	U	Lavaca	--	--	--	--	--	--	--	--	--	--
1605	Navidad River Above Lake Texana	C	Lavaca	PCR1	H	PS	100	50	550	5	6.5–9.0	126	91

Stream Segment #	Stream Segment Name	Classified (C) or Un-classified (U)	Basin	Uses[1]			Site-Specific Numeric Water Quality Criteria[2]						
				Recreation	Aquatic Life	Water Supply	Chloride Annual Avg (mg/L)	Sulfate Annual Avg (mg/L)	TDS Annual Avg (mg/L)	DO (mg/L)	pH Range (standard units)	Indicator Bacteria Fecal Coliform / Enterococci (30-day Geometric mean CFU/100ml)	Temp (°F)
1605A[2]	West Navidad River	U	Lavaca	--	H	--	--	--	--	5	--	--	--
2453	Lavaca Bay/Chocolate Bay	C	Lavaca-Guadalupe	PCR1	E / O	--	--	--	--	5	6.5–9.0	14 / 35	95
2453A	Garcitas Creek Tidal	U	Lavaca-Guadalupe	--	H	--	--	--	--	4	--	--	--
2453C	Arenosa Creek	U	Lavaca-Guadalupe	--	--	--	--	--	--	--	--	--	--
2453OW	Lavaca Bay / Chocolate Bay (Oyster Waters)	U	Lavaca-Guadalupe	--	--	--	--	--	--	--	--	--	--
2456	Carancahua Bay	C	Colorado-Lavaca	PCR1	E / O	--	--	--	--	5	6.5–9.0	14 / 35	95
2456A	West Carancahua Creek Tidal	U	Colorado-Lavaca	--	--	--	--	--	--	--	--	--	--
2456OW	Carancahua Bay (Oyster Waters)	U	Colorado-Lavaca	--	--	--	--	--	--	--	--	--	--

Sources: TCEQ *2022 Texas Surface Water Quality Standards, Appendix A - Site-specific Uses and Criteria for Classified Segments*. 30 TAC §§307.1 – 307.10. & TCEQ *2022 Texas Surface Water Quality Standards, Appendix D - Site-specific Uses and Criteria for Unclassified Water Bodies*. 30 TAC §§307.1 – 307.10. & TCEQ *2022 Texas Surface Water Quality Standards, Appendix G - Site-specific Recreational Uses and Criteria for Unclassified Water Bodies*. 30 TAC §§307.1 – 307.10.

[1] Uses: PCR1 = Primary Contact Recreation 1 (Activities that are presumed to involve a significant risk of ingestion of water, e.g., wading by children, swimming, water skiing, diving, tubing, surfing, handfishing as defined by Texas Parks and Wildlife Code, §66.115, and the following whitewater activities: kayaking, canoeing, and rafting); E = Exceptional; H = High; I = Intermittent; O = Oyster Waters; PS = Public Water Supply

[2] Criteria: Water quality standards or conditions established by the TCEQ that are to be met in order to support and protect desired uses, i.e., existing, designated, attainable, and presumed uses.

Table 1-4 Stream Segment Water Quality Concerns and Impairments in the Lavaca Region

Stream Segment#	Stream Segment	Total Phosphorus	Chlorophyll-a	Depressed DO	Bacteria in Water
1402F	Blue Creek				
1502	Tres Palacios Creek Above Tidal			Concern[2]	
1601	Lavaca River Tidal				
1601C	Dry Creek			Concern[2]	
1602	Lavaca River Above Tidal				Impairment[1]
1602A	Big Brushy Creek				
1602B	Rocky Creek	Concern[2]			Impairment[1]
1602C	Lavaca River Above Campbell Branch			Impairment[1]	
1603	Navidad River Tidal				
1604	Lake Texana				
1604A	East Mustang Creek				
1604B	West Mustang Creek				
1604C	Sandy Creek				
1605	Navidad River Above Lake Texana				
1605A	West Navidad River				
2453	Lavaca Bay / Chocolate Bay				
2453A	Garcitas Creek Tidal			Impairment[1]	
2453C	Arenosa Creek				Impairment[1]
2453OW	Lavaca Bay / Chocolate Bay (Oyster Waters)				Impairment[1]
2456	Carancahua Bay		Concern[2]		Impairment[1]
2456A	West Carancahua Creek Tidal		Concern[2]	Impairment[1]	
2456OW	Carancahua Bay (Oyster Waters)				Impairment[1]

[1]Source: TCEQ *2022 Texas Integrated Report – Index of Water Quality Impairments.*

[2] Source: TCEQ *2022 Texas Integrated Report – Water Bodies with Concerns for Use Attainment and Screening Levels.*

1.6.3 Recreational and Natural Resources

Lake Texana is the main recreational area in the Lavaca Region. There are 10 public boat ramps, a 250-acre Mustang Wilderness Campground for primitive camping, a marina, picnic sites, Brackenridge Recreation Complex, which includes the Brackenridge Park campground (240 acres), Brackenridge Main Event Center Complex (180 acres), Texana Park (590 acres), kayaking, and boating. Brackenridge Recreation Complex and Lake Texana State Park are located across State Highway (SH) 111 from each other, on the west side of the SH 111 Bridge. Some of the recreational activities enjoyed at these parks are camping, boating, fishing, and picnicking. The area has nature-viewing opportunities including birds and alligators. Hunting and fishing are popular recreational activities throughout the entire Lavaca Region. Deer and waterfowl hunting are the most common. The Gulf Coastal Plains support a wide variety of animal species. The threatened, endangered, or rare species within Jackson, Lavaca, and Wharton Counties are shown in Table 1-5.

The LNRA operates Lake Texana to provide freshwater inflows for the bay and estuary in order to reduce high salinity events in Lavaca Bay and to protect coastal habitats. LNRA has an agreement with the TPWD and TCEQ for a freshwater release program.

The TPWD currently manages 48 Wildlife Management Areas (WMAs) in the state with a total of 576,238 acres. WMAs were established as sites to perform research on wildlife populations and habitat, conduct education on sound resource management, and provide public hunting, hiking, camping, bird-watching and a host of other outdoor recreational opportunities. The D.R. Wintermann WMA lies within Region P, encompassing 246 acres.

Table 1-5 Threatened, Endangered, and Rare Species Found in Jackson, Lavaca, and Wharton Counties (as of March 2024)

Species	
Threatened Species	
Black Rail	*Laterallus jamaicensis*
Black-spotted Newt	*Notophthalmus meridionalis*
Cagle's Map Turtle	*Graptemys caglei*
Oceanic Whitetip Shark	*Carcharhinus longimanus*
Piping Plover	*Charadrius melodus*
Reddish Egret	*Egretta rufescens*
Rufa Red Knot	*Calidris canutus rufa*
Shortfin Mako Shark	*Isurus oxyrinchus*
Swallow-tailed Kite	*Elanoides forficatus*
Texas Fawnsfoot	*Truncilla macrodon*
Texas Horned L	*Phrynosoma cornutum*
Texas Pimpleback	*Quadrula petrina*

Species	
Texas Tortoise	*Gopherus berlandieri*
West Indian Manatee	*Trichechus manatus*
White-faced Ibis	*Plegadis chihi*
White-nosed Coati	*Nasua narica*
White-tailed Hawk	*Buteo albicaudatus*
Wood Stork	*Mycteria americana*
Endangered	
Attwater's Greater Prairie-Chicken	*Tympanuchus cupido attwateri*
Blue Whale	*Balaenoptera musculus*
Gulf of Mexico Bryde's Whale	*Balaenoptera edeni*
Houston Toad	*Anaxyrus houstonensis*
Interior Least Tern	*Sterna antillarum athalassos*
North Atlantic Right Whale	*Eubalaena glacialis*
Sei Whale	*Balaenoptera borealis*
Sperm Whale	*Physeter macrocephalus*
Whooping Crane	*Grus americana*
Rare	
Alligator Gar	*Atractosteus spatula*
American Bumblebee	*Bombus pensylvanicus*
American Eel	*Anguilla rostrata*
Bald Eagle	*Haliaeetus leucocephalus*
Big Brown Bat	*Eptesicus fuscus*
Big Free-tailed Bat	*Nyctinomops macrotis*
Chestnut-collared Longspur	*Calcarius ornatus*
Comanche Harvester Ant	*Pogonomyrmex comanche*
Eastern Box Turtle	*Terrapene carolina*
Eastern Red Bat	*Lasiurus borealis*
Eastern Spotted Skunk	*Spilogale putorius*
Franklin's Gull	*Leucophaeus pipixcan*

Species	
Hoary Bat	*Lasiurus cinereus*
Humpback Whale	*Megaptera novaeangliae*
Indianola Beakrush	*Rhynchospora indianolensis*
Long-tailed Weasel	*Mustela frenata*
Marsh-elder Dodder	*Cuscuta attenuata*
Mountain Lion	*Puma concolor*
Mountain Plover	*Charadrius montanus*
Northern Yellow Bat	*Lasiurus intermedius*
Opossum Pipefish	*Microphis brachyurus*
Prairie Skink	*Plestiodon septentrionalis*
Pygmy Rattlesnake	*Sistrurus miliarius*
Silverband Shiner	*Notropis shumardi*
Slender Glass Lizard	*Ophisaurus attenuatus*
Smooth Softshell	*Apalone mutica*
South Texas Spikesedge	*Eleocharis austrotexana*
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Southern Flounder	*Paralichthys lethostigma*
Sprague's Pipit	*Anthus spragueii*
Strecker's Chorus Frog	*Pseudacris streckeri*
Sutherland Hawthorn	*Crataegus viridis var. glabriuscula*
Swamp Rabbit	*Sylvilagus aquaticus*
Texas Beebalm	*Monarda viridissima*
Texas Diamondback Terrapin	*Malaclemys terrapin littoralis*
Texas Map Turtle	*Graptemys versa*
Texas Tauschia	*Tauschia texana*
Texas Willkommia	*Willkommia texana var. texana*
Threeflower Broomweed	*Thurovia trifloral*
Timber (Canebrake) Rattlesnake	*Crotalus horridus*
Tricolored Bat	*Perimyotis subflavus*

Species	
Welder Machaeranthera	*Psilactis heterocarpa*
Western Box Turtle	*Terrapene ornata*
Western Burrowing Owl	*Athene cunicularia hypugaea*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Western Hog-nosed Skunk	*Conepatus leuconotus*
Western Massasauga	*Sistrurus tergeminus*
Woodhouse's Toad	*Anaxyrus woodhousii*
Wright's Trichocoronis	*Trichocoronis wrightii var. wrightii*
Source: Texas Parks & Wildlife Department, Wildlife Division, Non-game and Rare Species and Habitat Assessment programs. County Lists of Texas' Special Species (Jackson, Lavaca, and Wharton Counties, updated March 2024).	

1.6.4 Navigation

Aquatic navigation within the Lavaca Regional Water Planning Area is generally recreational in nature, with boaters and fishermen utilizing rivers and streams as well as Lake Texana. There is also heavy recreational use in the bays and estuaries at the southern end of the region. The strategies considered in the current list of potential water management strategies for the 2026 Lavaca Regional Water Plan are not anticipated to adversely impact navigation in the region.

1.6.5 Threats to Agricultural and Natural Resources

The Regional Water Plan Guidelines (31 TAC §357.30(7)) require that planning groups identify threats to the state's agricultural and natural resources due to issues with water quantity or water quality problems related to supply. Any potential threat to agricultural resources would be of particular concern for the Lavaca Region, as irrigated agriculture is by far the largest water user in the region. Irrigation in the region relies almost exclusively on groundwater. Groundwater conditions have been favorable and should continue to be favorable within the Lavaca Region for the pumping of substantial quantities of good quality water. There is the potential for agriculture in some portions of the region to experience shortages under drought conditions coupled with peak production, with the likely result being temporary use of groundwater resources beyond the average recharge rate. Chapter 5 provides several potential water management strategies that can help address these water shortages for agriculture.

Natural resources in the region, particularly streams and riparian habitats, can also be impacted by drought conditions. Flows for many streams in the region show a high seasonal variability and flows in some streams may be drastically reduced or eliminated under prolonged dry conditions. Irrigation return flows play an important role in maintaining streamflows during moderately dry conditions. While observations of streamflow during a recent drought event indicate that irrigation returns and streamflow are both minimal under exceptional drought conditions, it is likely that for moderately dry conditions the increased amount of groundwater entering a stream through irrigation return flows would help to sustain habitats that would otherwise be water-stressed. Chapter 5 discusses how threats to natural resources can be managed while meeting water shortages in the region.

1.7 Existing Water Plans

1.7.1 Existing Regional and Local Water Management Plans

The LNRA has published a Land Management Plan and a Water Resource Management Plan, which addresses use and development of the LNRA property and the organization's water rights and includes future water development strategies. These plans were developed in accordance with Texas Water Code Section 11.173(b). In addition, each of LNRA's major water customers has a TCEQ-approved water conservation and drought contingency plan. An LNRA, TCEQ, and USGS cooperative program has routinely collected water quality monitoring data in Lake Texana since 1988. Through this program, the USGS and LNRA have been collecting annual pesticide monitoring data since 1992 at stations on Lake Texana. LNRA prepares an annual Lavaca Basin Water Quality Update report, in cooperation with the TCEQ. As of March 2024, the most current report is dated 2023. This report includes a description of major water quality events in the Lavaca Basin, public outreach and education, water quality monitoring, and watershed planning, and is used to inform stakeholders, concerned citizens, and the communities LNRA serves about water quality and resource management.

As stated in the report, "With only three waterbodies included in the 2022 Texas §303(d) List, the Lavaca River Basin maintains some of the highest water quality in the State." LNRA's water quality monitoring program includes contracts with the USGS and the Guadalupe-Blanco River Authority, which provides laboratory analyses of water samples. This program was developed under the auspices of the Clean Rivers Program (CRP), a statewide effort administered by the TCEQ to encourage the assumption of responsibility for water quality monitoring by local entities already managing water supplies, and the management of water quality on a river basin basis, rather than by political subdivisions whose interests may cut across multiple river basins or be restricted to portions of basins. Locations, parameters, and details of sample collection, handling, and analytical methodologies for the CRP are detailed in the Quality Assurance Project Plan (QAPP) prepared by the LNRA which is filed with, and approved by, TCEQ every 2 years.

The LNRA has designated a Lavaca Basin CRP Steering Committee to advise the LNRA on water quality issues and priorities. Since FY2005, the LNRA has been conducting the following water quality monitoring under the CRP QAPP:

- 20 parameters including field data (e.g., DO, water temperature, pH, specific conductivity, salinity, flow) and conventional water chemistry analytes including total suspended solids, sulfate, chloride, ammonia nitrogen, nitrate nitrogen, total phosphorus, total alkalinity, total organic carbon, turbidity, and total hardness.
- E. coli bacterial analyses in Lake Texana and in the Lavaca River.
- Chlorophyll-a analysis in Lake Texana.

Water sampling sites are fixed and include Lake Texana and its inflows (West and East Mustang Creeks, Sandy Creek, and Navidad River), the Lavaca River both above tidal and below the Palmetto Bend spillway to Lavaca Bay, and Rocky Creek.

In addition to CRP monitoring, LNRA contracts with the USGS to perform additional flow and water quality monitoring in the Lavaca Basin. Streamflows at multiple gaging stations (Lavaca River near Edna and Hallettsville, Dry Creek near Edna, Providence City, Sublime Sandy Creek near Louise, West Mustang Creek near Ganado, East Mustang Creek near Louise, and the Navidad River near Speaks, Morales, and Strane Park) are monitored directly by radio telemetry and interface into LNRA's computer-based hydrologic data collection system. USGS monitors Dry Creek and Lake Texana and its four inflows for metals and organics (pesticides) in both the water column and in the bottom sediments.

LNRA has developed a GIS-based database to store geographic and attribute data for the Lavaca Basin. This system uses base maps of aerial photographs or USGS topographic maps and overlays data upon these electronic maps in layers. This system is computer-based, and updates/changes can be made relatively easily. Hard-copy maps may be printed as needed. Information layers in the LNRA GIS database include the following attributes:

- Wastewater treatment plants with attributes such as capacity, type, date of permit renewal, contact information, etc.
- City and town information
- Soils
- Gas and oil wells
- Gas and oil pipelines
- Water quality sampling sites
- Rivers, streams, roads, county lines
- Water permit holders
- Cultural resources
- Land use
- Parks and trails
- Observation wells
- Piezometers
- Boat ramps
- Threatened species locations
- Injection disposal wells
- Confined animal feeding operations (CAFOs)
- Precipitation and streamflow gages

The LNRA is notified of Texas Pollutant Discharge Elimination System permit applications submitted to TCEQ and National Pollutant Discharge Elimination System applications submitted to the US Environmental Protection Agency for point source discharges and industrial stormwater discharge permits. These are reviewed by the LNRA, and appropriate actions are taken (i.e., submission of written comments, negotiation with applicants, requests for hearings and party status) to assure protection of Lake Texana water quality.

With regards to the municipal demand centers in the region, El Campo has a 2017 Comprehensive Plan that provides infrastructure assessment and recommendations, among other information. Master plan information is not available for several of the cities in the Lavaca Region. These cities are relatively small, there is relatively low municipal usage, and there is very little expected growth in municipal usage. The Texana and Coastal Bend GCDs create their own groundwater management plans, as described in Section 1.2.1

1.7.2 Regional and State Flood Plans

In 2019, the Texas legislature passed Senate Bill 8 to establish a new regional and state flood planning process aimed at protecting against loss of life and property from flooding. The TWDB delineated 15 Regional Flood Planning Areas and appointed initial members to the Regional Flood Planning Groups. The Regional Flood Planning Groups then prepared and submitted Regional Flood Plans in January 2023 and submitted Amended Regional Flood Plans to the TWDB in July 2023. The approved Regional Flood Plans were then incorporated into the state's first 2024 State Flood Plan. Similar to the regional water planning process, the regional flood planning process will recur in 5-year cycles.

Each Regional Flood Plan includes a Flood Hazard Risk Assessment, Flood Management Evaluations, Flood Management Strategies, Flood Management Projects, and administrative, regulatory, and legislative recommendations. Identification of evaluations, strategies, and projects in the Regional Flood Plan can enable sponsors to be eligible for certain types of funding from the TWDB, including the newly established Flood Infrastructure Fund.

The Lavaca Regional Water Planning Area is predominantly located in the Region 10 Lower Colorado-Lavaca Flood Planning Region, with a small portion of Lavaca County located within the Region 11 Guadalupe Flood Planning Region. The Region 10 and Region 11 Regional Flood Plans identified the number of structures located in the 100-year floodplain for each county. For Jackson County, Lavaca County, and Wharton County, there were 2,128 structures, 1,171 structures, and 7,121 structures, respectively. The Region 10 Regional Flood Plan included a total of 184 flood management evaluations (studies), 49 flood mitigation projects, and five flood management strategies. For the portion of Lavaca County in Region 11, one flood management evaluation (study), zero flood mitigation projects, and five flood management strategies were identified in the Regional Flood Plan. For more information about the regional flood planning process and for copies of the state and regional flood plans, visit https://www.twdb.texas.gov/flood/planning/.

1.7.3 Current Preparations for Drought

The LNRA developed a Water Conservation Plan and Drought Contingency Plan in 1995 and they have been updated multiple times. Both plans were updated in April 2019 in accordance with the TCEQ guidance for the Lavaca River Basin, including Lake Texana. The goals of the Water Conservation Plan are to reduce the quantity of water required through implementation of efficient water supply and water use practices, without eliminating any use. The Drought Contingency Plan provides procedures for both voluntary and mandatory actions to temporarily reduce water usage during a water shortage crisis. The drought of record period for the Lavaca Region is December 1952 through April 1957. More details related to drought preparation and response are discussed in Chapter 7 of this report. Multiple smaller entities within the Lavaca Regional Water Planning Area also maintain Water Conservation and Drought Contingency Plans in accordance with TCEQ requirements.

1.7.4 Water Loss Audits

House Bill 3338, passed by the 78th Texas Legislature (2003), requires public utilities providing potable water to file water audits with the TWDB once every 5 years giving the most recent year's water loss. The TWDB subsequently commissioned a study of available loss data. Eight public utilities in the LRWPA submitted water loss audit data as part of the required 2020 submittal to TWDB. Total GPCD loss rates for the utilities within the LRWPA were found to vary from 11.4 to 19.5 percent, with Shiner having the lowest reported loss percentage, and Wharton County WCID 1 having the highest. Losses may vary annually and could currently be higher or lower.

Total losses are not limited to loss from known leaks, although for some utilities, leakage is responsible for a majority of lost water. Total loss also includes meter inaccuracy, unmetered or unauthorized water use, unidentified line leaks, and storage overflows. Real loss accounts for reported breaks and leaks, and unreported losses.

Table 1-6 and Table 1-7 summarize the 2020 water loss audit data available for the Lavaca Regional Water Planning Area, which includes eight submitted water audits.

Table 1-6 2020 Water Loss Audit Summary for the Lavaca Region[1]

Region (Number of Audits Submitted)	Median or average	Real Loss GMD (<32 conn/mi)	Real Loss GCD	Apparent Loss GCD	Water Loss GCD	ILI (>= 3,000 connections)	Total GPCD	GPCD Loss	Real Loss Cost ($)	Apparent Loss Cost ($)
Region P (8)	Median	447.57	33.45	4.42	44.71	3.81	105	16	4,770	6,797
	Average	447.57	33.10	7.24	40.34	3.81	109	16	9,123	10,190
Statewide (1,776)	Median	454.87	29.38	5.12	37.23	2.33	100	14	11,514	6,613
	Average	854.93	47.80	7.22	55.02	2.84	116	21	145,613	64,262

[1]Source: TWDB 2020 Summary of Water Loss Audit Data by Region with Statewide Totals.
GMD = gallons per mile per day; GCD = gallons per connection per day; ILI = Infrastructure Leakage Index; GPCD = gallons per capita daily

Table 1-7 2020 Water Loss Audit Summary by Utility for the Lavaca Region[1]

Name of Utility	Real Loss GMD (<32 conn/mi)	Real Loss GCD	Apparent Loss GCD	Water Loss GCD	ILI (>= 3,000 connections)	Total GPCD	GPCD Loss	Real Loss Cost ($)	Apparent Loss Cost ($)
City of Edna		33.42	2.34	35.75		93	15	15,661.00	6,130.00
City of El Campo		54.12	3.68	57.79	3.81	146	25	24,542.00	27,825.00
City of Ganado		33.48	9.14	42.62		117	19	3,763.00	8,904.00
City of Hallettsville		25.54	7.72	33.26		131	16	5,044.00	23,360.00
City of Shiner		44.55	4.27	48.82		255	29	18,556.00	7,463.00
City of Yoakum		35.15	1.77	36.91	2.00	149	21	13,203.00	7,178.00
Wharton County WCID 1 Louise	833.71	43.65	4.56	48.21		82	16	4,495.00	4,021.00

[1]Source: TWDB 2020 Summary of Water Loss Audit Data by Utility.
GMD = gallons per mile per day; GCD = gallons per connection per day; ILI = Infrastructure Leakage Index; GPCD = gallons per capita daily

The Lavaca RWPG recognizes the value of advanced metering infrastructure (AMI) and leak detection technologies in providing more accurate water accountability.

Appendix 1A. Sources Used

Document	Description / Importance
Texas State Historical Association. *Texas Almanac: 2013-2014, 2018-2019, 2024-2025.*	Provides background information and statistics on Texas and each county.
TWDB. *2022 State Water Plan.*	The official water plan for Texas. Describes current use and supply, identifies water management measures and environmental concerns, and offers recommendations.
TWDB 2021 Water Use Survey Historical Summary Estimate.	Resource on TWDB website based on water use survey data submitted by utilities and other water users in Texas.
US Census Bureau. *Total Population Estimates for Texas Counties and Places.* Census 2020.	Resource for population estimates for Texas counties and places in various years.
US Census Bureau. *2018-2022 American Community Survey 5-Year Estimates.*	Resource for economic characteristics in Texas counties.
Lavaca-Navidad River Authority. *2022 Lavaca-Navidad River Authority Basin Summary Report*	Provides background information in the Lavaca River Basin. Summarizes Stream Segment Uses and Water Quality Criteria in the Lavaca River Basin in 2022.
Texas Clean Rivers Program and TCEQ. 2022. *2022 Texas Integrated Report – Index of Water Quality Impairments.*	Summarizes the water quality impairments for each segment and assessment unit in Texas.
Texas Commission on Environmental Quality. 2022. *2022 Texas Integrated Report – Water Bodies with Concerns for Use Attainment and Screening Levels.*	Summarizes the water quality concerns for each segment and assessment unit in Texas.
Texas Commission on Environmental Quality. 2022. *2022 Texas Integrated Report – Potential Sources of Impairments and Concerns.*	Summarizes the potential sources that may cause or contribute to each segment and assessment unit that has a water quality impairment or concern.
Region 10 Lower Colorado-Lavaca Regional Flood Planning Group. 2023. *Adopted Amended 2023 Region 10 Regional Flood Plan.*	Inaugural Regional Flood Plan for Region 10 that describes the region, flood hazard risks, flood mitigation needs, evaluations, projects, and strategies.
Region 11 Guadalupe Regional Flood Planning Group. 2023. *Adopted Amended 2023 Region 11 Regional Flood Plan.*	Inaugural Regional Flood Plan for Region 11 that describes the region, flood hazard risks, flood mitigation needs, evaluations, projects, and strategies.
Texas Parks and Wildlife Department, Wildlife Division, Non-game and Rare Species and Habitat Assessment programs. County Lists of Texas' Special Species. [Lavaca County, Jackson County, and Wharton County: March 2024].	Lists endangered, threatened, and rare species for each county.

INITIALLY PREPARED PLAN

CHAPTER 2: PRESENTATION OF POPULATION AND WATER DEMANDS

Lavaca Regional Water Plan

BV PROJECT NO. 410083

PREPARED FOR

Lavaca Regional Water Planning Group

1 MARCH 2025

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APPENDICES

List of Abbreviations

ac-ft/yr	Acre-Feet per Year
GPCD	Gallons per Capita Daily
LNRA	Lavaca-Navidad River Authority
MWP	Major Water Provider
RWPG	Regional Water Planning Group
TDC	Texas Demographic Center
TWDB	Texas Water Development Board
WUG	Water User Group
WWP	Wholesale Water Provider

2.0 Presentation of Population and Water Demands

2.1 Introduction

2.1.1 Scope of Work

This chapter presents the results of Task 2A and 2B of the project scope, which addresses updated population and water demand data for the region and outlines the guidelines and methodology used for the update. To provide consistency and facilitate the compilation of the different regional plans, the Texas Water Development Board (TWDB) required the incorporation of this data into a standardized online database referred to as TWDB DB27. This information is contained within the following tables:

- Table 2-1 – Lavaca Region Water User Group Population by Utility and Rural County
- Table 2-2 – Water Demand by Water User Group, County, and Basin
- Table 2-4 – Lavaca Region Water Demands on the Lavaca-Navidad River Authority (LNRA) (Major Water Provider)

2.1.2 Background

Senate Bill 1 (SB 1), 75th Texas Legislature, established a new approach to the preparation of the State Water Plan, requiring local consensus on regional plans first. Each regional planning group works with the TWDB to develop a regional water plan in accordance with TWDB guidelines. Each regional planning group of the state, including the Lavaca Regional Water Planning Group (Lavaca RWPG) prepared and submitted regional plans in 2001, 2006, 2011, 2016, and 2021. The Lavaca Regional Water Planning Group contracted with Black & Veatch to prepare the 2026 Lavaca Regional Water Plan.

One primary goal of the regional water planning process is to identify water supply development strategies that will be reliable during times of drought for all users in the State. The initial step in the planning effort is to quantify existing and future water demands. Each regional planning group works with the TWDB to develop population and water demand projections for the 50-year planning horizon, and this chapter documents the methodology and results of this effort by the Lavaca RWPG.

2.1.3 Description of the Region[1]

The Lavaca Region comprises Jackson County, Lavaca County, and Precinct 3 of Wharton County, including the majority of the City of El Campo. The eastern portion of Wharton County is included in the Lower Colorado Regional Water Planning Area (Region K). As a rural area with a large agriculture sector, the water demand in the Lavaca Region is largely associated with agricultural irrigation. Refer to Figure 1-1 (in Chapter 1 of this document) for a map of the Lavaca Regional Water Planning Area.

2.2 Methodology and Projections[2]

The following methodology for generation of population and water demand projections was developed in accordance with TWDB guidance and relevant scope items for the 2026 Regional Water Planning effort.

[1] Chapter 1: Description of the Lavaca Regional Water Planning Area.
[2] TWDB Exhibit C General Guidelines for Fifth Cycle of Regional Water Plan Development.

2.2.1 General

The TWDB distributed draft livestock, steam-electric power, and manufacturing demand projections via a January 2022 communication for review by the Lavaca RWPG. A second TWDB communication in August 2022 accompanied the TWDB's draft irrigation and mining water demand projections. Initial draft population, municipal water demand projections was sent via a January 2023 communication, and a follow-up TWDB communication was distributed in February 2023, including an optional 0.5 migration scenario. These communications also included a summary of the projection methodologies and specific steps a regional planning group must follow in requesting revisions to the projections, if necessary. Once submitted to the TWDB by the regional planning groups, the projection revision requests were also reviewed by the Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, and the Texas Department of Agriculture prior to being approved by the TWDB in November 2023.

TWDB rules require that projection analyses be performed for each identified municipal and non-municipal water user group (WUG). Municipal WUGs are defined in 31 TAC §357.10(42) as follows:

1. Privately-owned utilities that provide an average of more than 100 acre-feet per year (ac-ft/yr) for municipal use for all owned water systems;
2. Water systems serving institutions or facilities owned by the state or federal government that provide more than 100 ac-ft/yr for municipal use;
3. All other Retail Public Utilities not covered in (a) and (b) that provide more than 100 ac-ft/yr for municipal use;
4. Collective Reporting Units, or groups of Retail Public Utilities that have a common association and are requested for inclusion by the RWPG; and
5. Municipal and domestic water use, referred to as county-other, not included in (a)-(d).

Non-municipal WUGs include manufacturing, irrigation, steam-electric power generation, mining, and livestock water use, and are also referred to within each county (i.e., Jackson County Mining, Jackson County Manufacturing, etc.). The planning process also designates Wholesale Water Providers (WWP), which are persons or entities having contracts to sell any volume of water wholesale. In addition to WWPs, the regions must determine the Major Water Providers (MWP) in the region. MWP are defined as a Water User Group or Wholesale Water Provider of particular significance to the region's water supply, as determined by the regional planning group. The Lavaca RWPG has designated the LNRA as the only Major Water Provider within the Lavaca Region. Associated water commitments for the LNRA are identified within the plan and discussed in detail in Section 2.3 of this chapter.

The Lavaca RWPG analyzed all TWDB-provided draft population and water demand projections and requested input from the utilities and counties in the region regarding population and water demand projections. The Lavaca RWPG considered changes where appropriate and justifiable by TWDB requirements, finally requesting TWDB revisions to the draft irrigation, manufacturing, and livestock demand projections. No revisions were requested to the TWDB draft projections for population or for municipal, steam-electric, and mining demands. The detailed methodologies and resulting finalized population and demand projections of this process are discussed in the following sections of this chapter.

2.2.2 Population Projections

Population changes, along with daily water use per person, directly drive municipal water demand changes. Thus, establishing accurate population estimates and projections is a primary goal in the regional water planning process. The Lavaca Region is relatively rural compared to more densely populated areas of the state, and municipal water demand is a smaller share of the total water demand for the Lavaca Region. TWDB staff distributed draft population data and projections for planning group review for municipal WUGs delineated by utility service area boundaries.

The draft population projections in this plan were developed in accordance with TWDB guidelines, utilizing the 2020 US Census data and growth projections established by the Office of the State Demographer. These population projections of certain counties and WUGs differ significantly from those in the 2021 Regional Water Plans, which was previously based on 2010 US Census data and did not include population declines. The 2026 population projections are based on county-level projections from the Texas Demographic Center (TDC), which used migration rates between the 2010 and 2020 Census to project future growth. These projections include associated updates in the TDC cohort model to reflect updated birth and mortality rates. The TWDB drafted WUG-level population and water demand projections using the TDC's full-migration scenario (1.0) projections and provided the half-migration scenario (0.5) projections by Region-County for the planning groups' consideration. The higher of the total regional populations is the allowable cap on total population for the region.

The Lavaca RWPG's request was to use the 0.5 migration scenario for the WUGs in Wharton County, while using the 1.0 migration scenario for the WUGs in Lavaca County and Jackson County.

The population projections indicate that the population of the Lavaca Region will increase approximately 22 percent from 53,799 in the year 2030 to 65,399 in the year 2080. Population in Jackson County is projected to increase 26 percent over the planning horizon from 15,769 in 2030 to 19,935 people in 2080. Wharton County is split between two regional water planning areas, with the western portion of Wharton County located in the Lavaca Region and the eastern portion considered part of the Lower Colorado Regional Water Planning Area. The Lavaca Region portion of Wharton County is expected to remain steady, from 16,611 in 2030 to 16,674 in 2080. Population in Lavaca County is projected to increase 34 percent over the planning horizon from 21,419 in 2030 to 28,790 in 2080.

After the review, the Lavaca RWPG agreed that no additional revision requests would be submitted to the TWDB regarding the draft population projections. The draft TWDB population projections were formally approved by the Lavaca RWPG at the July 24, 2023, meeting with no recommended revisions. The population projections were formally adopted by the TWDB, and the projections were incorporated into the TWDB online database (DB27). Population projections are included in Table 2-1 at the end of the chapter and are also provided in Appendix 2A, Population and Water Demand Data Reports from TWDB (DB27).

2.2.3 Municipal Water Demand Projections

After population is established for each WUG, the second key variable in the TWDB's municipal water demand projections is per capita daily use, which represents the average number of gallons of water used per person per day (also noted commonly as gallons per capita daily and abbreviated as GPCD). Municipal water demand projections are the product of population projections and per capita daily use projections for each WUG.

The per capita daily use estimate is unique for each municipal reporting entity and generally determined using responses to the TWDB's 2011 Water Use Survey. The year 2011 is generally considered a "dry year" for much of the State of Texas and this dataset is assumed to be representative of water use during times of drought. In projecting per capita daily use for future decades of the planning horizon, the TWDB reduced per capita use assuming future water efficiency savings due to federal standards of plumbing fixtures and appliances.

Embedded within the municipal water demand projections are estimated savings due to plumbing codes and water-efficient appliances, as determined by the TWDB. These estimated savings, in gallons per capita daily and ac-ft/yr, are summarized in a table provided in Appendix 2B.

For this planning cycle, the draft municipal water demand projections incorporated GPCD values that were carried over from the 2022 State Water Plan, minus estimated accumulated plumbing code savings.

Municipal water demand for the Lavaca Region is projected to increase slightly over the planning horizon, due to a moderate increase in population projections coupled with a gradual projected decline in per capita use. The resulting Lavaca Region municipal demand projections range from 8,219 ac-ft/yr in 2030 to 9,877 ac-ft/yr in 2080.

These municipal water demand projections were adopted by the TWDB for use in the 2026 Lavaca Regional Water Plan and are presented for each municipal WUG by county, river basin, and decade in Table 2-2. The GPCD values used to calculate municipal water demand projections are provided in Table 2-3. Data is also provided in a different format in Appendix 2A “Population and Water Demand Data Reports from TWDB (DB27).”

2.2.4 Irrigation Water Demand Projections

Agricultural water use within the Lavaca Region is by far the greatest use in the area, with these demands making up more than 80 percent of the total demand in the region. It is important to the Lavaca RWPG that the irrigation water demands are planned for as accurately as possible during times of drought.

For this planning cycle, the methodology the TWDB used to develop the draft irrigation water demand projections was to take the average irrigation water use estimate by county for the years 2015-2019 and hold it constant for the 2030-2080 planning decades.

The Lavaca RWPG agreed that for the Lavaca Regional Water Planning Area, a three-year period from 2011 to 2013 better represented the drought / dry-year period than the five-year period from 2015 to 2019. Based on local knowledge, the intensity of the drought did not begin until 2011. At the December 5, 2022, Lavaca RWPG meeting, the Lavaca RWPG approved to request that the TWDB revise the irrigation demand projections for the region to reflect the average irrigation water use during 2011-2013 for all three counties (Jackson, Lavaca, and Wharton).

These revised irrigation water demand projections were adopted by the TWDB for use in the 2026 Lavaca Regional Water Plan and are presented by county, river basin, and decade in Table 2-2. Data is also provided in a different format in Appendix 2A “Population and Water Demand Data Reports from TWDB (DB27).”

2.2.5 Steam-Electric Water Demand Projections

For this planning cycle, the methodology the TWDB used to develop the draft steam-electric water demand projections is for the 2030 projections to be based on the highest water use volume from 2015 to 2019, plus new planned facility demands, and minus scheduled retiring facility demands. The draft projections were kept constant from 2030 to 2080.

At the December 5, 2022, Lavaca RWPG meeting, the Lavaca RWPG agreed to approve the draft steam-electric water demand projections without requesting any revisions. These unchanged steam-electric water demand projections were adopted by the TWDB for use in the 2026 Lavaca Regional Water Plan and are presented by county, river basin, and decade in Table 2-2. Data is also provided in a different format in Appendix 2A "Population and Water Demand Data Reports from TWDB (DB27)."

2.2.6 Manufacturing Water Demand Projections

For regional water planning purposes, manufacturing water use is considered to be the cumulative water demand by county and river basin for all industries within specified industrial classifications as calculated by the TWDB.

For this planning cycle, the methodology the TWDB used to develop the draft manufacturing water demand projections is to establish a baseline and project out based on expected growth. The baseline is established by the highest water use volume from 2015 to 2019, using data from the annual water use survey. Since the first projected decade (2030) of the full planning horizon (2030–2080) is more than 10 years from the baseline water use data, the statewide annual historical water use rate of change from 2010-2019 provided by the U.S. Census Bureau's County Business Patterns was chosen as the proxy to adjust the baseline value to the initial year of projections value (2030). For each planning decade after 2030, a statewide manufacturing growth proxy was applied annually to project increases in manufacturing water demands.

At the December 5, 2022, Lavaca RWPG meeting, the LNRA informed the Lavaca RWPG of manufacturing water demands not captured in the draft projects. LNRA has executed a water contract with an existing manufacturing customer for 10,400 ac-ft/yr of water in Jackson County, which will begin in 2030 and carry through to 2080. An additional contract amendment for water from the Lake Texana Yield Enhancement Project will require 3,878 ac-ft/yr when it comes online in 2030 and 4,950 ac-ft/yr in 2040-2080. These two amendment volumes are increased projections in all decades for Jackson County.

These revised manufacturing water demand projections were adopted by the TWDB for use in the 2026 Lavaca Regional Water Plan and are presented by county, river basin, and decade in Table 2-2. Data is also provided in a different format in Appendix 2A "Population and Water Demand Data Reports from TWDB (DB27)."

2.2.7 Mining Water Demand Projections

The TWDB mining water demand projections were developed through a 2022 TWDB-contracted study with the University of Texas Bureau of Economic Geology and U.S. Geological Survey. The study estimated current mining water use and projected that use across the planning horizon utilizing data collected from trade organizations, government agencies, and other industry representatives. Individual projections were made for sectors including oil and gas, aggregates, and coal and lignite. These projections were then summed for each county.

At the December 5, 2022, Lavaca RWPG meeting, the Lavaca RWPG agreed to approve the draft mining water demand projections without requesting any revisions, although the Lavaca RWPG did note concerns that the use of other data sources by the TWDB may have yielded results lowering the mining demands for Lavaca County. These unchanged mining water demand projections were adopted by the TWDB for use in the 2026 Lavaca Regional Water Plan and are presented by county, river basin, and decade in Table 2-2. Data is also provided in a different format in Appendix 2A "Population and Water Demand Data Reports from TWDB (DB27)."

2.2.8 Livestock Water Demand Projections

The TWDB draft livestock water demand projections utilized an average of TWDB's 2015-2019 livestock water use estimates for the 2030 projections. Water use estimates apply a water use coefficient for each livestock category to county level inventory estimates from the Texas Agricultural Statistics Service. The rate of change for projections from the 2021 Regional Water Plans was then applied to the new base. In the case of the Lavaca Region, the livestock water demand was constant from 2030 to 2080.

At the December 5, 2022, Lavaca RWPG meeting, the Lavaca RWPG discussed the TWDB methodology for the calculation of the historical livestock water use estimates. Overall, the RWPG was comfortable with the methodology, with the exception of the water rate per head for fed/other cattle. The TWDB methodology used 15 GPCD. The RWPG had concerns that 15 GPCD did not sufficiently take into consideration the number of pregnant/lactating cattle and their increased water needs, as well as the hot, humid temperatures the region experiences. The Lavaca RWPG approved to request that the TWDB use 30 GPCD to calculate the water demands for fed/other cattle for all three counties. The request nearly doubled the livestock water demand for the region as compared to the draft projections.

These revised livestock water demand projections were adopted by the TWDB for use in the 2026 Lavaca Regional Water Plan and are presented by county, river basin, and decade in Table 2-2. Data is also provided in a different format in Appendix 2A "Population and Water Demand Data Reports from TWDB (DB27)."

2.3 Major Water Providers

The sole Major Water Provider (MWP) in the Lavaca Regional Water Planning Area, as determined by the Lavaca RWPG, is the Lavaca-Navidad River Authority (LNRA), which holds rights to the firm yield of Lake Texana. Lavaca Region demands on LNRA are given in Table 2-4 at the end of the chapter. The majority of the water supplied by the LNRA goes to meet demands outside of the Lavaca Region. Chapter 5 will consider potential water management strategies to increase LNRA's water supplies, which may provide water for existing and future customers in and outside of the region.

Table 2-1 Lavaca Region Water User Group Population by Individual Water Utility or Rural County

Region	Water User Group	County Name	P2030	P2040	P2050	P2060	P2070	P2080	Region Split Pop.(1)	County Split Pop.(2)
P	Edna	Jackson	5,848	6,213	6,534	6,807	7,089	7,381		
P	Ganado	Jackson	1,850	1,813	1,817	1,773	1,727	1,676		
P	Quadvest	Jackson	55	75	89	107	124	142	P	
P	County-Other	Jackson	8,016	8,661	9,194	9,689	10,203	10,736		
		Jackson Total	15,769	15,769	15,769	15,769	15,769	15,769		
P	Hallettsville	Lavaca	3,027	3,255	3,479	3,751	4,031	4,319		
P	Moulton	Lavaca	776	746	717	689	662	636		
P	Shiner	Lavaca	2,282	2,441	2,598	2,781	2,970	3,166		
P	Yoakum	Lavaca	3,852	4,057	4,251	4,445	4,648	4,860	P	P
P	County-Other	Lavaca	11,482	12,297	13,082	13,965	14,874	15,809		
		Lavaca Total	21,419	22,796	24,127	25,631	27,185	28,790		
P	El Campo	Wharton	12,447	12,575	12,580	12,573	12,568	12,562	P	
P	Wharton County WCID 1	Wharton	730	738	777	807	840	874		
P	County-Other	Wharton	3,434	3,469	3,407	3,355	3,297	3,238	P	
		Wharton Total	16,611	16,782	16,764	16,735	16,705	16,674		
		LRWPA TOTAL	53,799	56,340	58,525	60,742	63,033	65,399		

1. If "P" is present in the column titled "Region Split Pop.", the Water User Group is located in more than one region, and the projections listed in the row represent only the Water User Group's population projections within that particular region, not the Water User Group's total population projections.
2. If "P" is present in the column "County Split Pop.", the Water User Group is located in more than one county, and the projections listed in the row represent only the Water User Group's population projections within that particular county, not the Water User Group's total population projections.

Table 2-2 Water Demand by Water User Group, County, and Basin

WUG Name	WUG County	WUG River Basin	Water Demand (ac-ft/yr)					
			2030	2040	2050	2060	2070	2080
County-Other, Jackson	Jackson	Colorado-Lavaca	258	276	294	309	326	342
County-Other, Jackson	Jackson	Lavaca	492	529	561	591	622	655
County-Other, Jackson	Jackson	Lavaca-Guadalupe	60	64	68	72	76	80
Edna	Jackson	Lavaca	866	917	964	1,004	1,046	1,089
Ganado	Jackson	Lavaca	204	199	199	194	189	184
Quadvest	Jackson	Colorado-Lavaca	12	16	19	23	27	31
Irrigation	Jackson	Colorado-Lavaca	23,834	23,834	23,834	23,834	23,834	23,834
Irrigation	Jackson	Lavaca	47,626	47,626	47,626	47,626	47,626	47,626
Irrigation	Jackson	Lavaca-Guadalupe	7,038	7,038	7,038	7,038	7,038	7,038
Livestock	Jackson	Colorado-Lavaca	470	470	470	470	470	470
Livestock	Jackson	Lavaca	693	693	693	693	693	693
Livestock	Jackson	Lavaca-Guadalupe	208	208	208	208	208	208
Manufacturing	Jackson	Colorado-Lavaca	8,727	9,361	9,382	9,403	9,425	9,449
Manufacturing	Jackson	Lavaca	106	114	114	115	115	115
Manufacturing	Jackson	Lavaca-Guadalupe	6,385	6,850	6,865	6,880	6,897	6,913
County-Other, Lavaca	Lavaca	Guadalupe	6	7	7	8	8	9
County-Other, Lavaca	Lavaca	Lavaca	1,424	1,517	1,614	1,723	1,836	1,950
County-Other, Lavaca	Lavaca	Lavaca-Guadalupe	1	1	1	1	1	1
Hallettsville	Lavaca	Lavaca	675	723	773	833	895	959
Moulton	Lavaca	Lavaca	156	149	143	138	132	127
Shiner	Lavaca	Lavaca	529	564	601	643	687	732
Yoakum	Lavaca	Lavaca	670	703	736	770	805	842
Irrigation	Lavaca	Lavaca	8,692	8,692	8,692	8,692	8,692	8,692

WUG Name	WUG County	WUG River Basin	Water Demand (ac-ft/yr)					
			2030	2040	2050	2060	2070	2080
Livestock	Lavaca	Guadalupe	21	21	21	21	21	21
Livestock	Lavaca	Lavaca	3,484	3,484	3,484	3,484	3,484	3,484
Livestock	Lavaca	Lavaca-Guadalupe	40	40	40	40	40	40
Manufacturing	Lavaca	Lavaca	528	548	568	589	611	634
Mining	Lavaca	Lavaca	2,665	2,665	2,665	2,665	2,665	0
County-Other, Wharton	Wharton	Colorado	72	73	71	70	69	68
County-Other, Wharton	Wharton	Colorado-Lavaca	74	74	73	72	71	69
County-Other, Wharton	Wharton	Lavaca	294	295	290	285	280	276
El Campo	Wharton	Colorado	311	313	314	313	313	313
El Campo	Wharton	Colorado-Lavaca	1,899	1,912	1,912	1,912	1,911	1,910
El Campo	Wharton	Lavaca	95	95	95	95	95	95
Wharton County WCID 1	Wharton	Lavaca	121	122	129	134	139	145
Irrigation	Wharton	Colorado-Lavaca	4,709	4,709	4,709	4,709	4,709	4,709
Irrigation	Wharton	Lavaca	83,737	83,737	83,737	83,737	83,737	83,737
Livestock	Wharton	Colorado	8	8	8	8	8	8
Livestock	Wharton	Colorado-Lavaca	151	151	151	151	151	151
Livestock	Wharton	Lavaca	344	344	344	344	344	344
Manufacturing	Wharton	Colorado-Lavaca	33	34	35	36	37	38
Steam Electric Power	Wharton	Lavaca	1572	1572	1572	1572	1572	1572

Table 2-3 Gallons Per Capita Per Day Values

Water User Group Name	Water User Group County	Gallons Per Capita Per Day (GPCD)					
		2030	2040	2050	2060	2070	2080
County-Other	Jackson	90.24	89.59	89.59	89.59	89.59	89.59
Edna	Jackson	132.25	131.74	131.74	131.74	131.74	131.74
Ganado	Jackson	98.34	97.79	97.79	97.79	97.79	97.79
Quadvest	Jackson	195.15	194.69	194.69	194.69	194.69	194.69
County-Other	Lavaca	111.27	110.71	110.71	110.71	110.71	110.71
Hallettsville	Lavaca	198.98	198.29	198.29	198.29	198.29	198.29
Moulton	Lavaca	178.91	178.29	178.29	178.29	178.29	178.29
Shiner	Lavaca	207.05	206.40	206.40	206.40	206.40	206.40
Yoakum	Lavaca	155.23	154.66	154.66	154.66	154.66	154.66
County-Other	Wharton	114.35	113.75	113.75	113.75	113.75	113.75
El Campo	Wharton	165.35	164.71	164.71	164.71	164.71	164.71
Wharton County WCID 1	Wharton	148.48	147.89	147.89	147.89	147.89	147.89

Table 2-4 Lavaca Region Water Demands* on Lavaca-Navidad River Authority (Major Water Provider)

WUG Name	WUG County	Water Demand (ac-ft/yr)					
		2030	2040	2050	2060	2070	2080
Manufacturing	Jackson	14,574	15,681	15,717	15,754	15,793	15,833
Municipal	N/A	0	0	0	0	0	0
Irrigation	Jackson	0	0	0	0	0	0
Livestock	Jackson	0	0	0	0	0	0
Mining	N/A	0	0	0	0	0	0
Steam-Electric	N/A	0	0	0	0	0	0
* Demands only include customers inside of the Lavaca Region.							

Appendix 2A. Population and Water Demand Data Reports from TWDB (DB27)

DRAFT Region P Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
Jackson County Total	**15,769**	**16,762**	**17,634**	**18,376**	**19,143**	**19,935**
Jackson County / Colorado-Lavaca Basin Total	**2,604**	**2,829**	**3,013**	**3,188**	**3,369**	**3,556**
Quadvest*	55	75	89	107	124	142
County-Other	2,549	2,754	2,924	3,081	3,245	3,414
Jackson County / Lavaca Basin Total	**12,573**	**13,293**	**13,942**	**14,472**	**15,020**	**15,586**
Edna	5,848	6,213	6,534	6,807	7,089	7,381
Ganado	1,850	1,813	1,817	1,773	1,727	1,676
County-Other	4,875	5,267	5,591	5,892	6,204	6,529
Jackson County / Lavaca-Guadalupe Basin Total	**592**	**640**	**679**	**716**	**754**	**793**
County-Other	592	640	679	716	754	793
Lavaca County Total	**21,419**	**22,796**	**24,127**	**25,631**	**27,185**	**28,790**
Lavaca County / Guadalupe Basin Total	**52**	**55**	**59**	**63**	**67**	**71**
County-Other	52	55	59	63	67	71
Lavaca County / Lavaca Basin Total	**21,359**	**22,732**	**24,059**	**25,558**	**27,108**	**28,708**
Hallettsville	3,027	3,255	3,479	3,751	4,031	4,319
Moulton	776	746	717	689	662	636
Shiner	2,282	2,441	2,598	2,781	2,970	3,166
Yoakum*	3,852	4,057	4,251	4,445	4,648	4,860
County-Other	11,422	12,233	13,014	13,892	14,797	15,727
Lavaca County / Lavaca-Guadalupe Basin Total	**8**	**9**	**9**	**10**	**10**	**11**
County-Other	8	9	9	10	10	11
Wharton County Total	**16,611**	**16,782**	**16,764**	**16,735**	**16,705**	**16,674**
Wharton County / Colorado Basin Total	**2,248**	**2,270**	**2,261**	**2,252**	**2,241**	**2,230**
El Campo*	1,682	1,699	1,700	1,699	1,698	1,697
County-Other*	566	571	561	553	543	533
Wharton County / Colorado-Lavaca Basin Total	**10,831**	**10,942**	**10,936**	**10,921**	**10,908**	**10,894**
El Campo*	10,253	10,359	10,363	10,357	10,353	10,349
County-Other*	578	583	573	564	555	545
Wharton County / Lavaca Basin Total	**3,532**	**3,570**	**3,567**	**3,562**	**3,556**	**3,550**
El Campo*	512	517	517	517	517	516
Wharton County WCID 1	730	738	777	807	840	874

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region P Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
County-Other*	2,290	2,315	2,273	2,238	2,199	2,160
Region P Population Total	**53,799**	**56,340**	**58,525**	**60,742**	**63,033**	**65,399**

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region P Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Jackson County Total	**96,979**	**98,195**	**98,335**	**98,460**	**98,592**	**98,727**
Jackson County / Colorado-Lavaca Basin Total	**33,301**	**33,957**	**33,999**	**34,039**	**34,082**	**34,126**
Quadvest*	12	16	19	23	27	31
County-Other	258	276	294	309	326	342
Manufacturing	8,727	9,361	9,382	9,403	9,425	9,449
Livestock	470	470	470	470	470	470
Irrigation	23,834	23,834	23,834	23,834	23,834	23,834
Jackson County / Lavaca Basin Total	**49,987**	**50,078**	**50,157**	**50,223**	**50,291**	**50,362**
Edna	866	917	964	1,004	1,046	1,089
Ganado	204	199	199	194	189	184
County-Other	492	529	561	591	622	655
Manufacturing	106	114	114	115	115	115
Livestock	693	693	693	693	693	693
Irrigation	47,626	47,626	47,626	47,626	47,626	47,626
Jackson County / Lavaca-Guadalupe Basin Total	**13,691**	**14,160**	**14,179**	**14,198**	**14,219**	**14,239**
County-Other	60	64	68	72	76	80
Manufacturing	6,385	6,850	6,865	6,880	6,897	6,913
Livestock	208	208	208	208	208	208
Irrigation	7,038	7,038	7,038	7,038	7,038	7,038
Lavaca County Total	**18,891**	**19,114**	**19,345**	**19,607**	**19,877**	**17,491**
Lavaca County / Guadalupe Basin Total	**27**	**28**	**28**	**29**	**29**	**30**
County-Other	6	7	7	8	8	9
Livestock	21	21	21	21	21	21
Lavaca County / Lavaca Basin Total	**18,823**	**19,045**	**19,276**	**19,537**	**19,807**	**17,420**
Hallettsville	675	723	773	833	895	959
Moulton	156	149	143	138	132	127
Shiner	529	564	601	643	687	732
Yoakum*	670	703	736	770	805	842
County-Other	1,424	1,517	1,614	1,723	1,836	1,950
Manufacturing	528	548	568	589	611	634
Mining	2,665	2,665	2,665	2,665	2,665	0
Livestock	3,484	3,484	3,484	3,484	3,484	3,484
Irrigation	8,692	8,692	8,692	8,692	8,692	8,692

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

DRAFT Region P Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Lavaca County / Lavaca-Guadalupe Basin Total	**41**	**41**	**41**	**41**	**41**	**41**
County-Other	1	1	1	1	1	1
Livestock	40	40	40	40	40	40
Wharton County Total	**93,420**	**93,439**	**93,440**	**93,438**	**93,436**	**93,435**
Wharton County / Colorado Basin Total	**391**	**394**	**393**	**391**	**390**	**389**
El Campo*	311	313	314	313	313	313
County-Other*	72	73	71	70	69	68
Livestock*	8	8	8	8	8	8
Wharton County / Colorado-Lavaca Basin Total	**6,866**	**6,880**	**6,880**	**6,880**	**6,879**	**6,877**
El Campo*	1,899	1,912	1,912	1,912	1,911	1,910
County-Other*	74	74	73	72	71	69
Manufacturing*	33	34	35	36	37	38
Livestock*	151	151	151	151	151	151
Irrigation*	4,709	4,709	4,709	4,709	4,709	4,709
Wharton County / Lavaca Basin Total	**86,163**	**86,165**	**86,167**	**86,167**	**86,167**	**86,169**
El Campo*	95	95	95	95	95	95
Wharton County WCID 1	121	122	129	134	139	145
County-Other*	294	295	290	285	280	276
Steam Electric Power*	1,572	1,572	1,572	1,572	1,572	1,572
Livestock*	344	344	344	344	344	344
Irrigation*	83,737	83,737	83,737	83,737	83,737	83,737
Region P Demand Total	**209,290**	**210,748**	**211,120**	**211,505**	**211,905**	**209,653**

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

Appendix 2B. Region P Municipal GPCD Savings Due to Plumbing Codes

County	EntityName	Base GPCD	Passive Conservation Savings (GPCD)					
			2030	2040	2050	2060	2070	2080
JACKSON	County-Other, Jackson	95	4.76	5.41	5.41	5.41	5.41	5.41
JACKSON	Edna	137	4.75	5.26	5.26	5.26	5.26	5.26
JACKSON	Ganado	103	4.66	5.21	5.21	5.21	5.21	5.21
JACKSON	Quadvest	199	3.85	4.31	4.31	4.31	4.31	4.31
LAVACA	County-Other, Lavaca	116	4.73	5.29	5.29	5.29	5.29	5.29
LAVACA	Hallettsville	204	5.02	5.71	5.71	5.71	5.71	5.71
LAVACA	Moulton	184	5.09	5.71	5.71	5.71	5.71	5.71
LAVACA	Shiner	212	4.95	5.6	5.6	5.6	5.6	5.6
LAVACA	Yoakum	160	4.77	5.34	5.34	5.34	5.34	5.34
WHARTON	County-Other, Wharton	119	4.65	5.25	5.25	5.25	5.25	5.25
WHARTON	El Campo	170	4.65	5.29	5.29	5.29	5.29	5.29
WHARTON	Wharton County WCID 1	153	4.52	5.11	5.11	5.11	5.11	5.11

County	EntityName	Base GPCD	Passive Conservation Savings (ac-ft/yr)					
			2030	2040	2050	2060	2070	2080
JACKSON	County-Other, Jackson	95	42.74	52.49	55.72	58.72	61.83	65.06
JACKSON	Edna	137	31.12	36.61	38.50	40.11	41.77	43.49
JACKSON	Ganado	103	9.66	10.58	10.60	10.35	10.08	9.78
JACKSON	Quadvest	199	0.24	0.36	0.43	0.52	0.60	0.69
LAVACA	County-Other, Lavaca	116	60.83	72.87	77.52	82.75	88.14	93.68
LAVACA	Hallettsville	204	17.02	20.82	22.25	23.99	25.78	27.62
LAVACA	Moulton	184	4.42	4.77	4.59	4.41	4.23	4.07
LAVACA	Shiner	212	12.65	15.31	16.30	17.44	18.63	19.86
LAVACA	Yoakum	160	20.58	24.27	25.43	26.59	27.80	29.07
WHARTON	County-Other, Wharton	119	17.89	20.40	20.04	19.73	19.39	19.04
WHARTON	El Campo	170	64.83	74.51	74.54	74.50	74.47	74.44
WHARTON	Wharton County WCID 1	153	3.70	4.22	4.45	4.62	4.81	5.00

INITIALLY PREPARED PLAN

CHAPTER 3: ANALYSIS OF CURRENT WATER SUPPLIES

Lavaca Regional Water Plan

BV PROJECT NO. 410083

PREPARED FOR

Lavaca Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

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ac-ft	Acre-Feet
ac-ft/yr	Acre-Feet per Year
DB27	State Water Planning Database for the 2027 State Water Plan
DFC	Desired Future Condition
DOR	Drought of Record
gpd/ft	Gallons per Day per Foot
GAM	Groundwater Availability Model
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
LNRA	Lavaca-Navidad River Authority
LRWPA	Lavaca Regional Water Planning Area
MAG	Modeled Available Groundwater
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
ROR	Run-of-River
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
WAM	Water Availability Model
WUG	Water User Group

3.0 Analysis of Current Water Supplies

3.1 Introduction

The available water supply within the region includes both groundwater and surface water. Groundwater is provided from the Gulf Coast Aquifer System. Primary surface water sources are the Navidad and Lavaca Rivers and Lake Texana.

Much of the regional water demand is supplied by groundwater. Approximately 86 percent of the existing water supplies come from groundwater. The Gulf Coast Aquifer System is the predominant supply source.

Surface water supplies are obtained from Lake Texana and run-of-river (ROR) flows from the Lavaca and Navidad Rivers and some creeks. In addition, the portion of the Garwood Irrigation District within the Lavaca Region receives some surface water supplies from the Colorado River in Region K. The majority of the Lavaca Regional Water Planning Area (LRWPA) is in the Lavaca River Basin. Surface water supplies account for approximately 14 percent of the total existing water supplies. The only reservoir in the Lavaca Region is Lake Texana, and there are no major springs in the LRWPA.

This chapter summarizes the results of Task 3 and describes the resources available to the LRWPA and their allocation to Water User Groups (WUGs) throughout the LRWPA. To provide consistency and facilitate the compilation of the different regional plans, the Texas Water Development Board (TWDB) required the incorporation of this data into a standardized online database referred to as TWDB DB27. DB27 reports that contain this information are identified below and are in Appendix 3A accompanying this chapter.

- Region P Source Availability

  The definition of Source Availability, according to the Texas Administrative Code (TAC) 357.10(3), is the maximum amount of raw water that could be produced by a source during a repeat of the drought of record (DOR), regardless of whether the supply is physically connected to or legally accessible by Water User Groups (WUG).

- Region P WUG Existing Water Supply

  The definition of Existing Water Supply, according to the TAC 357.10(3), is the maximum amount of water that is physically and legally accessible from existing sources for immediate use by a WUG under a repeat of DOR conditions.

Some of the information contained within this chapter is based on Chapter 1, Description of the Lavaca Regional Water Planning Area. For a complete and detailed list of sources, refer to Chapter 1, Appendix 1A.

3.2 Identification of Groundwater Sources

3.2.1 Groundwater Aquifers

The only major aquifer in the Lavaca Region is the Gulf Coast Aquifer System. This aquifer accounts for nearly all the groundwater supply to the LRWPA. The Jackson Group, a minor aquifer in northwest Lavaca County, likely provides very small amounts of supply for domestic and livestock uses, although information on availability is limited and it has not been shown as a source of supply in this plan.

The Gulf Coast Aquifer System consists of four general water-producing units. The shallowest is the Chicot aquifer, followed by the Evangeline and Jasper aquifers and then the Catahoula Sandstone. These formations are composed of interbedded layers of sand, silt, and clay, with minor amounts of small gravel in some locations. Shale can also be present at deeper depths, below the base of the Evangeline aquifer where the Burkeville confining zone exists and separates the Evangeline aquifer from the Jasper aquifer. The aquifer beds vary in thickness and composition and are normally discontinuous over extended distances.

The Chicot and Evangeline aquifers provide large amounts of freshwater. The aquifers contain freshwater to depths that range from 1,400 to 1,700 feet in the portion of Wharton County in the LRWPA, according to Report 270.

Recharge to the aquifers is principally from the infiltration of precipitation and streamflow. Average annual rainfall in the LRWPA ranges from about 34 to 46 inches per year. The eastern portion of the region experiences the upper end of the average annual rainfall amounts.

The geographic coverage of the Gulf Coast Aquifer System within the Lavaca Region is shown on Figure 3-1. The area includes the Jasper, Evangeline, and Chicot aquifer formations. The Gulf Coast Aquifer System parallels the coast, covers the Lavaca Region, and also extends outside the LRWPA to the northeast and southwest.

Minor aquifers are not present in Jackson or Wharton Counties for which estimates of groundwater availability have previously been provided, as groundwater in the two counties is pumped from the Gulf Coast Aquifer System. Data and text from the TWDB and US Geological Survey reports for Wharton and Jackson Counties do not reference minor aquifers in these two counties.

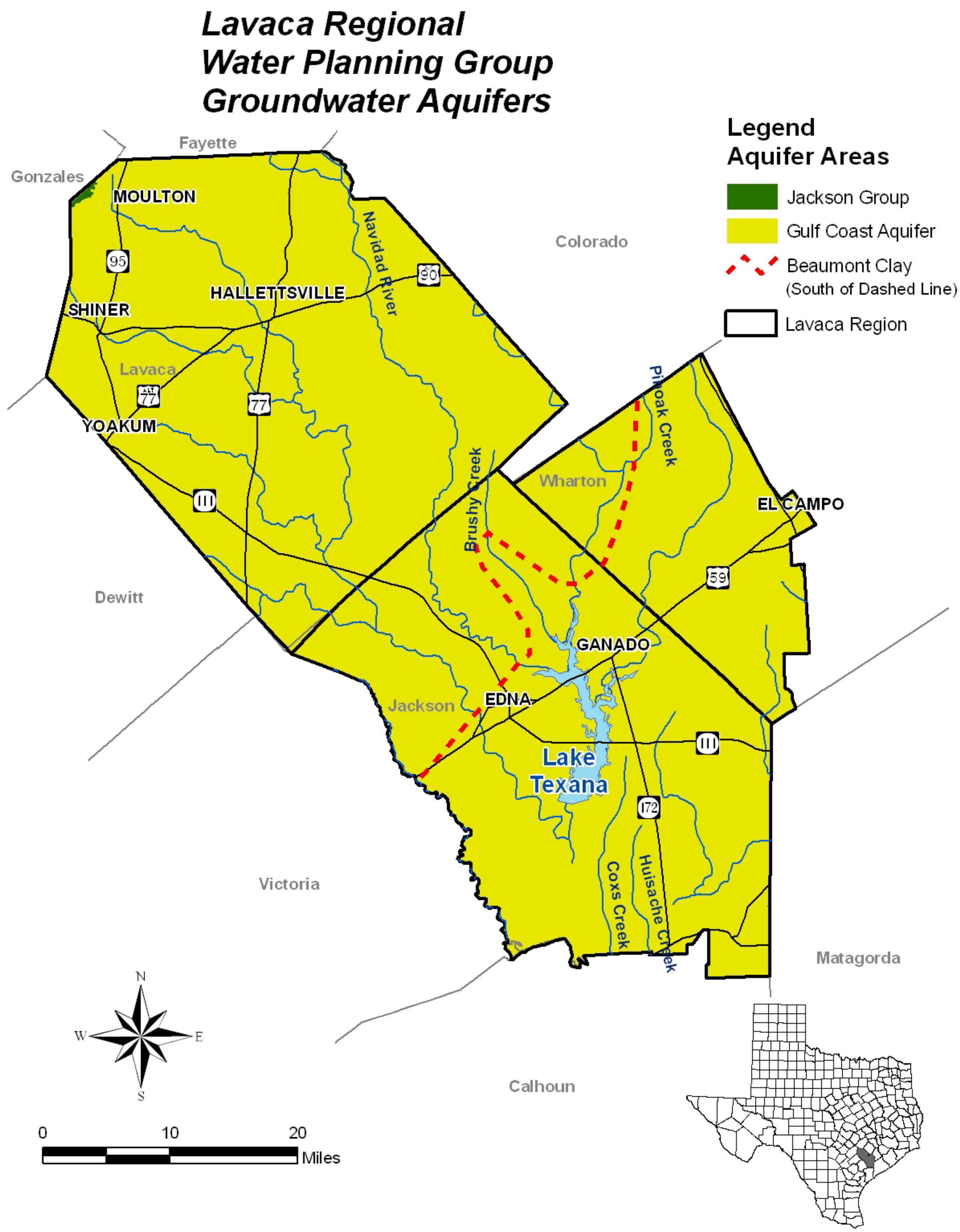

Figure 3-1 Groundwater Aquifers

3.2.2 Groundwater Use Overview

Groundwater in the region is pumped for domestic, agricultural, municipal, and industrial uses. According to the TWDB historical groundwater pumpage estimates, in 2011, at the start of the most recent drought, the Lavaca Region pumped approximately 216,000 acre-feet (ac-ft) of groundwater for these purposes. Agricultural irrigation accounts for approximately 92 percent of the groundwater pumped in the region. Wells used for agricultural irrigation tend to be deeper than the shallower wells used for pumping water for livestock purposes. Municipal and public usage, which includes usage for cities, communities, parks, campgrounds, and water districts, represents approximately 5 to 6 percent of the groundwater pumped. Approximately 1 to 2 percent of groundwater pumped in the LRWPA is for industrial and mining needs, including manufacturing and other industrial uses.

3.2.3 Aquifer Conditions

Groundwater conditions have been historically favorable and will likely continue to be favorable within the Lavaca Region for the pumping of substantial quantities of good quality water. Recent drought years have shown that unusual increases in pumping for extended periods in neighboring regions could potentially impact domestic wells in the Lavaca Region.

The Gulf Coast Aquifer System was deposited in a manner that resulted in substantial thicknesses of sand that contain fresh (good quality) groundwater. The aquifer has about 200 to 450 feet of sand that contains freshwater in Lavaca County. Sand thickness tends to be greater in the southeastern part of the county. In Jackson and Wharton Counties within the LRWPA, the Gulf Coast Aquifer System contains about 300 to 700 feet of freshwater sands in most of the area. In the southern part of Jackson County, north of Lavaca Bay, a limited area of the aquifer has 0 to 200 feet of sand that contains freshwater of less than 1,000 milligrams per liter (mg/L) total dissolved solids.

A Central Gulf Coast Groundwater Availability Model (GAM) was developed for the Central Gulf Coast Aquifer System in the LRWPA, and the model is described in a report prepared by TWDB titled Groundwater Availability Model of the Central Gulf Coast Aquifer System: Numerical Simulations through 1999. The model divides the Gulf Coast Aquifer into four layers that are the Chicot aquifer, Evangeline aquifer, Burkeville Confining System, and the Jasper aquifer. The main layers of the model that provide substantial amounts of water are the Chicot, Evangeline, and Jasper aquifers. For modeling purposes, the Catahoula Sandstone in northwestern Lavaca County is considered to be hydraulically connected to the Jasper aquifer. Further to the southeast, the Catahoula contains a greater percentage of fine-grained material and functions as a confining layer below the Jasper aquifer.

Based on the GAM, the estimated transmissivity for the Chicot aquifer in the LRWPA ranges from less than 15,000 gallons per day per foot (gpd/ft) near the outcrop up to 220,000 gpd/ft near southern Wharton County and eastern Jackson County. The Evangeline aquifer transmissivity ranges from less than 7,500 gpd/ft near the outcrop up to 85,000 gpd/ft in southern Jackson County. The Central Gulf Coast GAM estimates that the transmissivity for the Jasper aquifer ranges from about 250 gpd/ft in eastern Lavaca County to 7,500 gpd/ft in eastern Wharton County. Pumping test data from a City of Hallettsville (Lavaca County) public supply well completed in the Jasper aquifer show transmissivity values ranging from 4,500 gpd/ft to 10,000 gpd/ft. The transmissivity values for the Chicot and Evangeline aquifers indicate that they are capable of transmitting large quantities of water to wells. The transmissivity values calculated from the City of Hallettsville well indicate that the Jasper aquifer is capable of transmitting moderate quantities of water to wells.

The development of large quantities of groundwater within the LRWPA has resulted in potentiometric head decline in the Gulf Coast Aquifer System. Data in TWDB Report 289, combined with water level changes since about 1970, indicate that the potentiometric head in the Chicot aquifer has declined approximately 20 feet, and up to possibly 80 to 120 feet since 1900 as a result of the pumping that has occurred in the area. For the Evangeline aquifer, approximately 20 to possibly 100 feet of potentiometric head decline has occurred since 1900 as the result of the withdrawals of groundwater. The depth interval screened by the large capacity wells in the Lavaca Region normally ranges from about 300 to 600 feet, with some wells' screening depths as deep as 1,200 to 1,400 feet. Static water levels measured in the wells normally range from about 50 to 120 feet below land surface. This illustrates that a substantial amount of available drawdown in the wells will continue to sustain the overall pumpage in the LRWPA.

Static (non-pumping) water levels have been measured in wells in Wharton and adjoining counties for decades to help monitor the response of the aquifer to pumpage. The wells screen the Chicot and/or Evangeline aquifers. Water levels have remained relatively stable in the region, with some declines and some increases over the last several decades.

Figure 3-2 and Figure 3-3 show the static water level since 2010 for Well 66-53-406 (no longer actively monitored) and Well 66-61-302, respectively, in the western part of Wharton County. A cause of concern during the most recent drought (2011 to 2014) was the potential that a prolonged drought combined with potential continued increased pumping in neighboring regions could result in larger water level declines. These figures show that while water levels in the aquifer in western Wharton County did drop during the drought, the aquifer has recharged itself since 2014 and by 2017 to 2018 was back to levels similar to those before the drought occurred. In addition, the figures show the seasonal variation in water level on an annual basis.

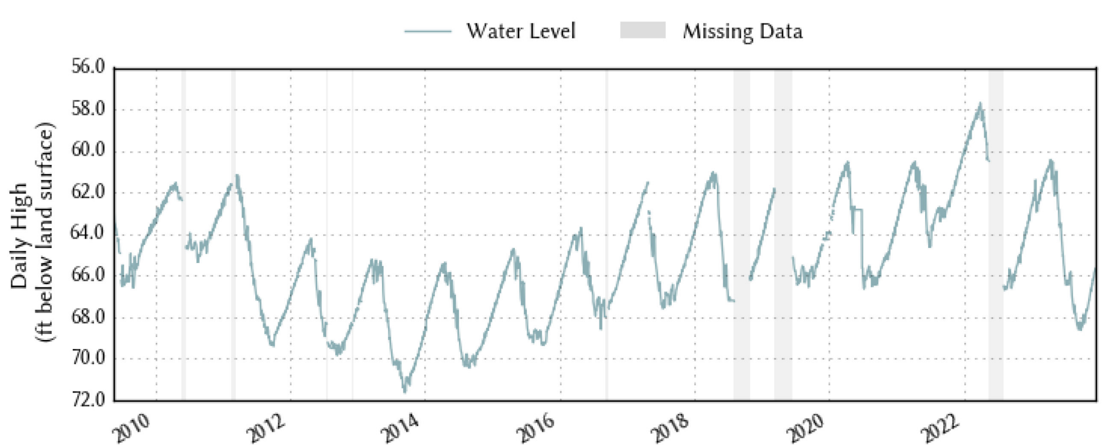

Figure 3-2 Static Water Levels in West Wharton County (Well 66-53-406)

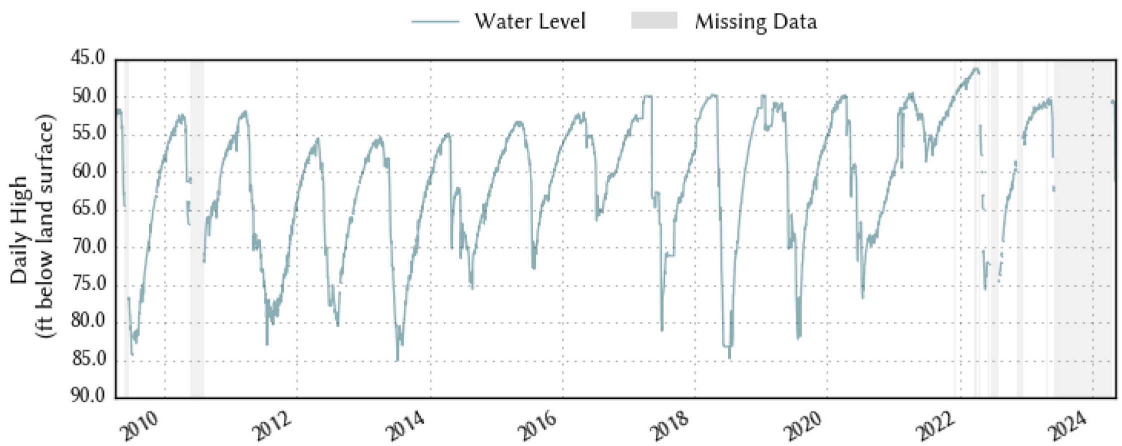

Figure 3-3 Static Water Levels in West Wharton County near Louise, Texas (Well 66-61-302)

3.2.4 Groundwater Quality

Water samples have been collected from wells for water chemistry analysis for over 40 years within the LRWPA. Groundwater in the LRWPA is generally of good quality, although test results for some wells have shown tested constituents above the maximum contaminant level. In general, the areas with groundwater quality issues occur in Lavaca County where water demand is lower than the estimates of available groundwater supply. In Jackson and Wharton Counties, data show that the groundwater for large capacity production is of good quality, has not been adversely impacted by past pumping, and should not be adversely impacted by estimated future pumping.

3.2.5 Water Level Monitoring Program for the LRWPA

A Water Level Monitoring Program for the LRWPA was developed as part of the 2006 planning cycle. The Water Leveling Monitoring Program was designed to assess changes in groundwater pumping conditions that occur through the irrigation season. An objective of the study was to estimate the effects that increases in pumpage during the irrigation season could have on water levels in wells and on the pumping rates and pumping lifts of wells. The irrigation and public supply wells located in the study area provide data that reflect the response of the aquifer to the pumping. This information has relevance to the overall pumping costs that agriculture has to shoulder in providing water for irrigated crops and how water levels and pumping rates could change if there were a significant change in groundwater pumping in the region.

A number of conclusions were drawn from data collected as part of the program between its inception in 2001 through the spring of 2005. Results indicated that pumping rates of the large capacity irrigation wells can decline a few hundred gallons per minute during the irrigation season due to static water level decline and resulting in increased pumping lift. In turn, the increased pumping lift through the irrigation season can result in an estimated 10 to 15 percent increase in the cost of pumping water. The data show that the seasonal fluctuations in static water levels in wells were greater in 2002 and 2003 than in 2004 because there was less precipitation and probably higher amounts of pumping in the growing seasons of 2002 and 2003 than during the growing season of 2004. Within the study area, there was a small rise in the static water levels in wells from 2001 through the spring of 2005. The small rise in static water levels probably is the result of less groundwater pumping, particularly in 2004. The static water level fluctuations during the irrigation season normally are greater in the deeper wells that are pumped at higher rates and less in the shallower wells that normally do not have as high pumping rates or total pumped volume.

3.2.6 Subsidence Effects

Land surface subsidence is best described as follows: the artesian pressure within the confining layers of the aquifer keeps the clays fully saturated and at the same pressure as the aquifer sand layers above and below the clay layers. As water is pumped from the sands the pressure is reduced in them and the pressure in the clays begins decreasing as small amounts of water flow from clays to the sands. As water flows from the clays, the clay matrix compresses slightly. This, in turn, results in a small amount of subsidence of the land surface.

Data show that small amounts of land surface subsidence have resulted from the withdrawal of groundwater that helps to support the economic viability of the Lavaca Region. Available data indicate subsidence of up to 1.5 feet in the southeastern part of Jackson County with lesser subsidence in other areas for 1900 through the mid-1970s. [1]Subsidence since the 1970s is estimated to have been relatively minor in the LRWPA.

3.2.7 Public Supply Groundwater Usage

The Lavaca Region relies on groundwater to provide all of the municipal water supply. This accounts for approximately 4.9 percent, or 9,958 ac-ft of the existing supplies in the LRWPA. Within the LRWPA, Jackson County accounts for approximately 24.2 percent, or 2,401 ac-ft of the region's municipal groundwater usage; Lavaca County accounts for 46.7 percent, or 4,649 ac-ft; and Wharton County accounts for 29.2 percent, or 2,908 ac-ft. There are 12 major municipal users scattered throughout the LRWPA. The major municipal users in Jackson County are Edna, Ganado, Quadvest, and the county other category. Municipal users represent water utilities with an annual usage of at least 100 ac-ft/yr or approximately 33 million gallons per year, while County Other represents water utilities with a usage of less than 100 ac-ft/yr, as well as property owners, parks, campgrounds, and other areas supplied by domestic wells. The major municipal users in Lavaca County are Hallettsville, Moulton, Shiner, Yoakum, and County Other. The major municipal users in Wharton County are El Campo, Wharton County WCID 1, and County.

3.2.8 Agricultural Groundwater Usage

According to data obtained from the TWDB, groundwater pumpage in Wharton County within the LRWPA has averaged more than 80,000 ac-ft/yr since 1967. From 1984 through 2003, pumpage within the region averaged about 99,000 ac-ft/yr with the principal usage being the irrigation of rice. The pumpage for rice irrigation is distributed throughout the region within Wharton County. The location of the region boundary in Wharton County is shown on Figure 3-1. This figure also shows the eastern portion of Jackson County which immediately adjoins Wharton County to the southwest.

In 2011, groundwater pumped for agricultural practices, principally irrigation, accounted for approximately 95 percent or 194,150 ac-ft of the groundwater pumped in the Lavaca Region. In terms of the region's total agricultural groundwater pumpage, Jackson County accounted for about 45 percent; Lavaca County, 5 percent; and Wharton County, 50 percent of the groundwater pumped. Agricultural pumpage represents water that is used for livestock purposes and irrigation of crops. Groundwater used for irrigation represented approximately 99 percent of the groundwater pumped for agriculture in the LRWPA. The main crop is rice with smaller acreages of cotton, grain sorghum, soybeans, turfgrass, aquaculture, and corn.

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[1] TWDB Report 289, Digital Models for Simulation of Groundwater Hydrology of the Chicot and Evangeline Aquifers Along the Gulf Coast of Texas (May 1985).

The LRWPA's agricultural irrigated areas are scattered throughout Wharton and Jackson Counties and are concentrated in the southeastern part of Lavaca County. Groundwater pumpage accounted for about 97 percent of the water supplied for irrigated agriculture in 2011. The remainder of the water was provided by surface water from creeks and rivers. Surface water was used in combination with groundwater to irrigate some areas in southern and western Jackson County, and surface water from the Colorado River was used to irrigate about 1,500 acres in the northwestern part of Wharton County.

Projected agricultural irrigation demands for the 2030 through 2080 planning horizon are 78,498 ac-ft/yr for Jackson County, 8,692 ac-ft/yr for Lavaca County, and 88,446 ac-ft/yr for the portion of Wharton County within the LRWPA.

3.3 Groundwater Availability for the Central Gulf Coast Aquifer System

Available groundwater is the volume of groundwater that can be withdrawn from an individual aquifer in accordance with the principle by which the aquifer is being managed or an assumed management approach. That managing principle, typically stated as a sustainability goal, can be stated in various ways, and the mechanism through which availabilities are being stated throughout Texas is evolving. Before the advent of Groundwater Management Areas (GMAs) (HB 1763, 79th Legislature), an aquifer, or portion of an aquifer, may or may not have had a governmental entity managing the way that aquifer was being managed. If an aquifer, or portion of an aquifer, was managed, it was by a Groundwater Conservation District (GCD) whose jurisdiction can coincide with the boundary or boundaries of one or more counties or an aquifer. Most aquifers span multiple counties, and in that case the entire aquifer can be managed by one or more GCDs, with some portions not managed at all. GMAs are a different concept in that every county in the State is in one or more of 16 GMAs. For the most part, the major aquifers are not split across multiple GMAs, and the goal is to manage entire aquifer systems across political subdivisions in a consistent way.

The Lavaca Region is within GMA 15. The GCDs within GMA 15 worked together to determine the desired future condition (DFC) of the Gulf Coast Aquifer System. DFCs are essentially management goals for each aquifer. The DFCs for the Gulf Coast Aquifer System, adopted by GMA 15 on October 14, 2021, are summarized as follows:

- No more than 13 feet of average drawdown for the Gulf Coast Aquifer System by December 2080 relative to January 2000 conditions. (GMA-wide).
- Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 15 feet in December 2080 from January 2000 conditions for Jackson County.
- Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 18 feet in December 2080 from estimated year 2000 conditions for Lavaca County.
- Drawdown shall not exceed an average of 15 feet in Chicot and Evangeline Aquifers in December 2080 from January 2000 conditions for Wharton County.

The TWDB took the DFC for the aquifer and ran a groundwater availability model (GAM) that converted the DFC into a volume. This volume is considered the modeled available groundwater (MAG). The MAG, which is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer, is documented in TWDB reports, with the GMA 15 Central Gulf Coast Aquifer System MAG being documented in TWDB report GR 21-020_MAG, dated August 16, 2022. The report provides the MAG values for the Lavaca Region by county and basin, as shown in Table 3-1.

Table 3-1 Modeled Available Groundwater Volumes for the Gulf Coast Aquifer System in the Lavaca Region (ac-ft/yr)

Region	County	Basin	Year					
			2030	2040	2050	2060	2070	2080
P	Jackson	Colorado-Lavaca	28,157	28,157	28,157	28,157	28,157	28,157
		Lavaca	49,484	49,484	49,484	49,484	49,484	49,484
		Lavaca-Guadalupe	12,930	12,930	12,930	12,930	12,930	12,930
		County Total	**90,571**	**90,571**	**90,571**	**90,571**	**90,571**	**90,571**
P	Lavaca	Guadalupe	41	41	41	41	41	41
		Lavaca	19,942	19,937	19,937	19,930	19,926	19,908
		Lavaca-Guadalupe	401	401	401	401	401	401
		County Total	**20,384**	**20,379**	**20,379**	**20,372**	**20,368**	**20,350**
P	Wharton	Colorado	874	874	874	874	874	874
		Colorado-Lavaca	14,100	14,100	14,100	14,100	14,100	14,100
		Lavaca	63,193	63,193	63,193	63,193	63,193	63,193
		County Total	**78,167**	**78,167**	**78,167**	**78,167**	**78,167**	**78,167**
		Region Total	**189,122**	**189,117**	**189,117**	**189,110**	**189,106**	**189,088**

In the GR21-020 MAG report, MAG values were determined for the years between 2000 and 2080. The regional water planning period is 2030 – 2080, so the groundwater availability numbers for the region are the same as the MAG numbers. Table 3-2 shows the resultant availability numbers for the Gulf Coast Aquifer System within the Lavaca Region, which are used for planning purposes.

Table 3-2 Lavaca Region Groundwater Availability for the Gulf Coast Aquifer System (ac-ft/yr)

Region	County	Basin	Year					
			2030	2040	2050	2060	2070	2080
P	Jackson	Colorado-Lavaca	28,157	28,157	28,157	28,157	28,157	28,157
		Lavaca	49,484	49,484	49,484	49,484	49,484	49,484
		Lavaca-Guadalupe	12,930	12,930	12,930	12,930	12,930	12,930
		County Total	**90,571**	**90,571**	**90,571**	**90,571**	**90,571**	**90,571**
P	Lavaca	Guadalupe	41	41	41	41	41	41
		Lavaca	19,942	19,937	19,937	19,930	19,926	19,908
		Lavaca-Guadalupe	401	401	401	401	401	401
		County Total	**20,384**	**20,379**	**20,379**	**20,372**	**20,368**	**20,350**

Region	County	Basin	Year 2030	2040	2050	2060	2070	2080
P	Wharton	Colorado	874	874	874	874	874	874
		Colorado-Lavaca	14,100	14,100	14,100	14,100	14,100	14,100
		Lavaca	63,193	63,193	63,193	63,193	63,193	63,193
		County Total	78,167	78,167	78,167	78,167	78,167	78,167
		Region Total	**189,122**	**189,117**	**189,117**	**189,110**	**189,106**	**189,088**

3.4 Identification of Surface Water Sources

The LRWPA is located in the Lavaca, Colorado-Lavaca Coastal, and Lavaca-Guadalupe Coastal River Basins. Approximately 90 percent of the LRWPA is located in the Lavaca River Basin. A portion of the surface water supply during non-drought years is obtained from ROR water rights out of the Lavaca and Navidad Rivers. These are the two main rivers in the LRWPA. The remaining surface water from sources within the region is obtained from Lake Texana, the only reservoir in the region. Refer to Figure 1-2 in Chapter 1 for the location of major surface water sources. Surface water sources outside of the region include the Colorado River in Region K, the Lower Colorado Region. A portion of the Garwood Irrigation District is located within the Lavaca Region and receives some surface water supplies from the Colorado River in Region K.

3.4.1 Available Surface Water

Surface water availability was estimated for the 2026 Regional Water Plan (RWP) using the unmodified Run 3 version of the 2023 Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM) for the river basins within the LRWPA. The WAMs use the Water Rights Analysis Package, developed at Texas A&M University, to simulate authorized diversions under current and future conditions using historical rainfall and evaporation data. Despite the more recent drought, the DOR for this region of Texas occurred in the 1950s and is reflected in the historical dataset. Water diversions are modeled according to the parameters of each particular water right and taken in priority order, so that the most senior water rights are satisfied before junior rights are allowed to divert water. Output files are compared by reviewing the statistical frequency of meeting diversion amounts or target instream flow levels. The reliable yield of a water right is the least amount of water diverted among all the calendar years modeled. For reservoirs, an additional step is required to determine firm yield. Water stored in reservoirs allows diversions to continue during periods of drought; however, diverting at high rates rapidly depletes storage. To find the optimal target for a reservoir, an iterative process is used, modeling the permit first at its full authorized diversion, and then at reduced target diversions until a yield is identified that is met throughout the simulation period.

There were originally eight WAM scenarios (referred to as model runs) simulated under the TCEQ program. The Guidelines for Regional Water Planning require the use of WAM Run 3, the full authorized diversion of current water rights with no return flows, when determining the supply available to the region. This is a very conservative approach since diversions for municipal and manufacturing use typically return up to 60 percent of that water to streams as treated wastewater effluent. However, the majority of water rights do not address return flows to source streams, implying a right to full consumptive use.

ROR water from the Lavaca and Navidad Rivers is used primarily for irrigation purposes. No surface water is currently being used within the region for municipal purposes, and only a small amount is used for industrial purposes. Table 3-3 shows the permitted diversions within the LRWPA. However, these permitted diversion rights in the LRWPA have 0 ac-ft/yr of firm yield under DOR conditions, so there is no supply shown for these diversions in the 2026 RWP. Individual water right appropriations of rivers and creeks in the LRWPA are included in Appendix 3B.

Table 3-3 Permitted Diversions from LRWPA Rivers and Streams

Stream	Permitted Authorization (ac-ft/yr)
Lavaca River	4,547.5
Navidad River	2,050.0
West Mustang	3,155.0
East Mustang	3,313.0
Sandy Creek	3,023.0
Pinoak Creek	5,007.0
Goldenrod Creek	2,950.0
Sutherland Branch	400.0
Arenosa Creek	10.0
Rocky Creek	33.0
Stage Stand Creek	640.0
Lunis Creek	100.0
Porters Creek	3,306.0
Total	**33,534.5**

Lake Texana is the only reservoir in the LRWPA. It was developed as part of the Palmetto Bend Reclamation Project in 1968. Lake Texana had an original firm yield of 79,000 ac-ft. Of this amount, 4,500 ac-ft of water was reserved for required releases for the bays and estuaries. This brings the available firm yield to 74,500 ac-ft. Projected sedimentation was incorporated into the model runs for 2030 to 2080, in determining the firm yield of Lake Texana. The Lavaca Regional Water Planning Group (Lavaca RWPG) incorporated sedimentation in the WAM analyses by using the Volumetric and Sedimentation Survey of Lake Texana report by the Texas Water Development Board, dated August 2020. The 2020 TWDB sedimentation survey indicates that Lake Texana has lost capacity at an average of 288 ac-ft/yr since impoundment due to sedimentation below conservation pool elevation (44.0 feet NGVD29). The Lavaca RWPG used the area and capacity curve tables in the 2020 Volumetric and Sedimentation Survey of Lake Texana report to extrapolate and develop area-capacity rating curves for 2030 through 2080. The projected firm yield of Lake Texana for 2030-2080 is 74,500 ac-ft/yr. Details for the hydrologic model used for determining the Lake Texana firm yield are provided in Table 3-4.

Table 3-4 Details for Hydrologic Model Used

Model Name	Version Date	Input/Output Files Used	Date Model Used	Comments
Unmodified TCEQ Lavaca WAM Run 3	10/1/23	2030 and 2080 model runs – created .YRO output files	12/1/23 -BV	2030 and 2080 model Firm Yield was consistent; no other runs were performed

The surface water availability for the Colorado River water rights in Region K was determined using the Region K Supply Evaluation WAM, which is an approved, modified version of the TCEQ Colorado River WAM. The total availability for the irrigation portion of the Garwood Irrigation Division water right is 100,000 ac-ft/yr. Sixteen percent of the Garwood Irrigation Division is within the Lavaca Region. Therefore, the amount of available surface water from the Colorado River for the Lavaca Region during the DOR is 16,000 ac-ft. The Arbuckle Reservoir, a new reservoir along the Colorado River, is expected to provide additional reliability for the Colorado River during DOR conditions.

3.5 Major Water Providers

The only major water provider in the LRWPA is the Lavaca-Navidad River Authority (LNRA), which holds rights to the firm yield of Lake Texana. Corpus Christi and its surrounding service area contracts for use 31,400 ac-ft of this water. Another 41,200 ac-ft is contracted for industrial use to Formosa Plastic Corporation, 1,032 ac-ft to Inteplast Corporation, 594 ac-ft to Calhoun County Navigational District, and 178 ac-ft to the City of Point Comfort.

Within the LRWPA, a total of 1,032 ac-ft firm yield is committed to Inteplast (manufacturing), located in Jackson County, and 10,400 ac-ft of firm yield is committed to Formosa Plastics (manufacturing) for use in Jackson County. In addition, as the LNRA develops new water supply projects, they expect to provide Formosa Plastics with an additional 3,878 ac-ft/yr in 2030 and 4,950 ac-ft/yr by 2040.

As additional existing and potential customers develop plans to establish facilities within the LRWPA, the LNRA will look at options for creating additional water supplies to meet those new demands. Chapter 5 discusses the potential water management strategies that could create additional water supplies for the LNRA.

A volume of water equal to 4,500 ac-ft is set aside from the firm yield of Lake Texana for environmental flows. Additionally, the LNRA releases water from reservoir storage to meet pass-through requirements as set forth in an agreement with Texas Parks and Wildlife Department. This agreement stipulates freshwater release rates for bay and estuary inflows that are based on historical mean and median monthly streamflows in the Lavaca Basin.

In addition to the firm yield rights listed above, LNRA has a total of 12,000 ac- ft/yr of interruptible water supply from Lake Texana. The majority of this supply is contracted to the City of Corpus Christi. Although this amount is not reliable in DOR conditions, these supplies are available for typical conditions.

Table 3-5 provides a list of existing supplies for the Major Water Provider in the region by decade and category of use. This list only includes supplies to entities within Region P.

Table 3-5 Lavaca Region Water Supplies* from Lavaca-Navidad River Authority (Major Water Provider)

Water User Group Name	Water User Group County	Water Supplies (ac-ft/yr)					
		2030	2040	2050	2060	2070	2080
Manufacturing	Jackson	11,432	11,432	11,432	11,432	11,432	11,432
Municipal	N/A	0	0	0	0	0	0
Irrigation	N/A	0	0	0	0	0	0
Livestock	N/A	0	0	0	0	0	0
Mining	N/A	0	0	0	0	0	0
Steam-Electric	N/A	0	0	0	0	0	0

* Supplies shown are only for customers inside the Lavaca Region.

3.6 Inter-Regional Coordination

The Lavaca RWPG understands that continued coordination with neighboring regional water planning groups is essential to maintaining consistency among the different regions and ensuring that supplies and management strategies are properly developed. Based on the coordination that has occurred to date, implementation of water management strategies currently planned for Regions L and N are not expected to impact supplies in the LRWPA.

3.7 Water Supply Allocations

Water supply allocations by WUG, county, and basin are shown in Appendix 3A. Existing water supplies determined for WUGs and the major water provider, LNRA, are legally and physically available under DOR conditions. The methodology used for allocating existing water supplies in the 2026 Lavaca RWP involved making minor updates to the existing supply allocation from the 2021 Lavaca RWP, based on the limited growth in the region and the limited impacts on water supplies the recent drought has had. There are no identified municipal water shortages in the region, although some municipal WUGs are looking at ways to increase their water supplies, which is addressed in Chapter 5. Irrigation and Manufacturing water shortages are projected for Jackson County. Irrigation water shortages are projected for Lavaca County and for the Lavaca Region portion of Wharton County. While the manufacturing water shortages are projected to increase over the planning horizon, the irrigation water shortages for all counties remain constant across the planning horizon.

Appendix 3A. TWDB DB27 Reports

DRAFT Region P Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Groundwater Source Availability Total				**189,122**	**189,117**	**189,117**	**189,110**	**189,106**	**189,088**
Carrizo-Wilcox Aquifer	Lavaca	Lavaca	Fresh	0	0	0	0	0	0
Gulf Coast Aquifer System	Jackson	Colorado-Lavaca	Fresh/ Brackish	28,157	28,157	28,157	28,157	28,157	28,157
Gulf Coast Aquifer System	Jackson	Lavaca	Fresh/ Brackish	49,484	49,484	49,484	49,484	49,484	49,484
Gulf Coast Aquifer System	Jackson	Lavaca-Guadalupe	Fresh	12,930	12,930	12,930	12,930	12,930	12,930
Gulf Coast Aquifer System	Lavaca	Guadalupe	Fresh	41	41	41	41	41	41
Gulf Coast Aquifer System	Lavaca	Lavaca	Fresh	19,942	19,937	19,937	19,930	19,926	19,908
Gulf Coast Aquifer System	Lavaca	Lavaca-Guadalupe	Fresh	401	401	401	401	401	401
Gulf Coast Aquifer System	Wharton	Colorado	Fresh	874	874	874	874	874	874
Gulf Coast Aquifer System	Wharton	Colorado-Lavaca	Fresh	14,100	14,100	14,100	14,100	14,100	14,100
Gulf Coast Aquifer System	Wharton	Lavaca	Fresh	63,193	63,193	63,193	63,193	63,193	63,193
Yegua-Jackson Aquifer	Lavaca	Lavaca	Fresh	0	0	0	0	0	0

Surface Water Source Availability Total				**74,500**	**74,500**	**74,500**	**74,500**	**74,500**	**74,500**
Texana Lake/Reservoir	Reservoir**	Lavaca	Fresh	74,500	74,500	74,500	74,500	74,500	74,500

Region P Source Availability Total	**263,622**	**263,617**	**263,617**	**263,610**	**263,606**	**263,588**

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

DRAFT Region P Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Jackson County WUG Total			**93,231**	**93,231**	**93,231**	**93,231**	**93,231**	**93,231**
Jackson County / Colorado-Lavaca Basin WUG Total			**29,725**	**29,725**	**29,725**	**29,725**	**29,725**	**29,725**
Quadvest*	P	Gulf Coast Aquifer System | Jackson County	31	31	31	31	31	31
County-Other	P	Gulf Coast Aquifer System | Jackson County	342	342	342	342	342	342
Manufacturing	P	Gulf Coast Aquifer System | Jackson County	169	169	169	169	169	169
Manufacturing	P	Texana Lake/Reservoir	4,879	4,879	4,879	4,879	4,879	4,879
Livestock	P	Gulf Coast Aquifer System | Jackson County	470	470	470	470	470	470
Irrigation	P	Gulf Coast Aquifer System | Jackson County	23,834	23,834	23,834	23,834	23,834	23,834
Jackson County / Lavaca Basin WUG Total			**49,267**	**49,267**	**49,267**	**49,267**	**49,267**	**49,267**
Edna	P	Gulf Coast Aquifer System | Jackson County	1,089	1,089	1,089	1,089	1,089	1,089
Ganado	P	Gulf Coast Aquifer System | Jackson County	204	204	204	204	204	204
County-Other	P	Gulf Coast Aquifer System | Jackson County	655	655	655	655	655	655
Manufacturing	P	Gulf Coast Aquifer System | Jackson County	115	115	115	115	115	115
Livestock	P	Gulf Coast Aquifer System | Jackson County	693	693	693	693	693	693
Irrigation	P	Gulf Coast Aquifer System | Jackson County	46,511	46,511	46,511	46,511	46,511	46,511
Jackson County / Lavaca-Guadalupe Basin WUG Total			**14,239**	**14,239**	**14,239**	**14,239**	**14,239**	**14,239**
County-Other	P	Gulf Coast Aquifer System | Jackson County	80	80	80	80	80	80
Manufacturing	P	Gulf Coast Aquifer System | Jackson County	360	360	360	360	360	360
Manufacturing	P	Texana Lake/Reservoir	6,553	6,553	6,553	6,553	6,553	6,553
Livestock	P	Gulf Coast Aquifer System | Jackson County	208	208	208	208	208	208
Irrigation	P	Gulf Coast Aquifer System | Jackson County	7,038	7,038	7,038	7,038	7,038	7,038

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region P Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Lavaca County WUG Total			**19,685**	**19,685**	**19,685**	**19,685**	**19,685**	**19,685**
Lavaca County / Guadalupe Basin WUG Total			**30**	**30**	**30**	**30**	**30**	**30**
County-Other	P	Gulf Coast Aquifer System | Lavaca County	9	9	9	9	9	9
Livestock	P	Gulf Coast Aquifer System | Lavaca County	21	21	21	21	21	21
Lavaca County / Lavaca Basin WUG Total			**19,614**	**19,614**	**19,614**	**19,614**	**19,614**	**19,614**
Hallettsville	P	Gulf Coast Aquifer System | Lavaca County	959	959	959	959	959	959
Moulton	P	Gulf Coast Aquifer System | Lavaca County	156	156	156	156	156	156
Shiner	P	Gulf Coast Aquifer System | Lavaca County	732	732	732	732	732	732
Yoakum*	P	Gulf Coast Aquifer System | Lavaca County	842	842	842	842	842	842
County-Other	P	Gulf Coast Aquifer System | Lavaca County	1,950	1,950	1,950	1,950	1,950	1,950
Manufacturing	P	Gulf Coast Aquifer System | Lavaca County	634	634	634	634	634	634
Mining	P	Gulf Coast Aquifer System | Lavaca County	2,665	2,665	2,665	2,665	2,665	2,665
Livestock	P	Gulf Coast Aquifer System | Lavaca County	3,484	3,484	3,484	3,484	3,484	3,484
Irrigation	P	Gulf Coast Aquifer System | Lavaca County	8,192	8,192	8,192	8,192	8,192	8,192
Lavaca County / Lavaca-Guadalupe Basin WUG Total			**41**	**41**	**41**	**41**	**41**	**41**
County-Other	P	Gulf Coast Aquifer System | Lavaca County	1	1	1	1	1	1
Livestock	P	Gulf Coast Aquifer System | Lavaca County	40	40	40	40	40	40
Wharton County WUG Total			**85,751**	**85,751**	**85,751**	**85,751**	**85,751**	**85,751**
Wharton County / Colorado Basin WUG Total			**395**	**395**	**395**	**395**	**395**	**395**
El Campo*	P	Gulf Coast Aquifer System | Wharton County	314	314	314	314	314	314
County-Other*	P	Gulf Coast Aquifer System | Wharton County	73	73	73	73	73	73

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region P Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Livestock*	P	Gulf Coast Aquifer System | Wharton County	8	8	8	8	8	8
Wharton County / Colorado-Lavaca Basin WUG Total			**6,884**	**6,884**	**6,884**	**6,884**	**6,884**	**6,884**
El Campo*	P	Gulf Coast Aquifer System | Wharton County	1,912	1,912	1,912	1,912	1,912	1,912
County-Other*	P	Gulf Coast Aquifer System | Wharton County	74	74	74	74	74	74
Manufacturing*	P	Gulf Coast Aquifer System | Wharton County	38	38	38	38	38	38
Livestock*	P	Gulf Coast Aquifer System | Wharton County	151	151	151	151	151	151
Irrigation*	P	Gulf Coast Aquifer System | Wharton County	4,709	4,709	4,709	4,709	4,709	4,709
Wharton County / Lavaca Basin WUG Total			**78,472**	**78,472**	**78,472**	**78,472**	**78,472**	**78,472**
El Campo*	P	Gulf Coast Aquifer System | Wharton County	95	95	95	95	95	95
Wharton County WCID 1	P	Gulf Coast Aquifer System | Wharton County	145	145	145	145	145	145
County-Other*	P	Gulf Coast Aquifer System | Wharton County	295	295	295	295	295	295
Steam Electric Power*	P	Gulf Coast Aquifer System | Wharton County	1,572	1,572	1,572	1,572	1,572	1,572
Livestock*	P	Gulf Coast Aquifer System | Wharton County	344	344	344	344	344	344
Irrigation*	K	Colorado Run-of-River	16,000	16,000	16,000	16,000	16,000	16,000
Irrigation*	P	Gulf Coast Aquifer System | Wharton County	60,021	60,021	60,021	60,021	60,021	60,021
Region P WUG Existing Water Supply Total			**198,667**	**198,667**	**198,667**	**198,667**	**198,667**	**198,667**

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

Appendix 3B. TCEQ Active Water Rights

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
2077	7/3/1981		BOZKA, MATT J	4	AGRICULTURE - IRRIGATION	12/31/1956	Lavaca	LAVACA
2077	7/3/1981		BOZKA, MATT J	61	AGRICULTURE - IRRIGATION	02/28/1949	Lavaca	LAVACA
2078	7/3/1981		FARQUHAR, FRANCES GAYLE, A D JR GAYLE, GEORGE S JR LAWRENCE, VIRGINIA G ORMAN, ELIZABETH L SHOEMATE, CATHERINE L SIMONS, A G SIMONS, LILLIAN H SIMONS, M T JR SIMONS, W C STELL, REGINA E WRIGHT, ELEANOR	450	AGRICULTURE - IRRIGATION	12/10/1938	Lavaca	JACKSON
2078	7/3/1981		FARQUHAR, FRANCES GAYLE, A D JR GAYLE, GEORGE S JR LAWRENCE, VIRGINIA G ORMAN, ELIZABETH L SHOEMATE, CATHERINE L SIMONS, A G SIMONS, LILLIAN H SIMONS, M T JR SIMONS, W C STELL, REGINA E WRIGHT, ELEANOR	1138	AGRICULTURE - IRRIGATION	09/30/1903	Lavaca	JACKSON
2082	7/3/1981		El Rancho De Los Patos, Inc.	932	AGRICULTURE - IRRIGATION	03/31/1929	Lavaca	WHARTON
2083	7/3/1981		RAUN, NORRIS	2400	AGRICULTURE - IRRIGATION	10/27/1969	Lavaca	WHARTON
2083	7/3/1981		RAUN, NORRIS	623.2	AGRICULTURE - IRRIGATION	05/10/1948	Lavaca	WHARTON
2084	7/3/1981		Estate of ET Rose Deceased	400	AGRICULTURE - IRRIGATION	11/10/1950	Lavaca	JACKSON

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
2090	7/3/1981		Ken Rod Melissa Z. Rod	527	AGRICULTURE - IRRIGATION	03/31/1 956	Lavaca	WHARTON
2091	7/3/1981		BIRKNER, JACK BIRKNER, MARY LOU	290	AGRICULTURE - IRRIGATION	03/31/1 953	Lavaca	WHARTON
2092	7/3/1981		DEFRIEND, CHARLOTTE DEFRIEND, MARK	990	AGRICULTURE - IRRIGATION	03/30/1 945	Lavaca	WHARTON
2093	7/3/1981		TUCKER, EVA REIGH	1750	AGRICULTURE - IRRIGATION	07/31/1 964	Lavaca	WHARTON
2094	7/3/1981		ALLEN, GRADY Estate of J.K. Allen	640	AGRICULTURE - IRRIGATION	04/30/1 952	Lavaca	WHARTON
2095	7/3/1981		Lavaca Navidad River Authority	18122	OTHER	10/06/1 993	Lavaca	JACKSON
2095	7/3/1981		Lavaca Navidad River Authority	42518	MUNICIPAL/DOMESTIC NAVIGATION	05/15/1 972	Lavaca	JACKSON
2095	7/3/1981		Lavaca Navidad River Authority	32482	INDUSTRIAL NAVIGATION RECREATION	05/15/1 972	Lavaca	JACKSON
2095	7/3/1981		Lavaca Navidad River Authority	7150	MUNICIPAL/DOMESTIC	05/15/1 972	Lavaca	JACKSON
2095	7/3/1981		Lavaca Navidad River Authority	22850	INDUSTRIAL RECREATION	05/15/1 972	Lavaca	JACKSON
2095	7/3/1981		Lavaca Navidad River Authority	4000	MUNICIPAL/DOMESTIC NAVIGATION	05/24/1 982	Lavaca	JACKSON
2095	7/3/1981		Lavaca Navidad River Authority	7500	INDUSTRIAL MUNICIPAL/DOMESTIC	07/01/2 002	Lavaca	JACKSON
2096	7/3/1981		Frank A. Dodson III Kimberly Shay Dodson	33	AGRICULTURE - IRRIGATION	02/28/1 961	Lavaca	LAVACA
2097	7/3/1981		Gebrueder Viehof Farms OHG	95	AGRICULTURE - IRRIGATION	11/17/1 939	Lavaca	JACKSON
2098	7/3/1981		STAFFORD, BURR JED STAFFORD, HARRISON STAFFORD, HARRISON II	452.5	AGRICULTURE - IRRIGATION	11/17/1 939	Lavaca	JACKSON
2098	7/3/1981		STAFFORD, BURR JED STAFFORD, HARRISON STAFFORD, HARRISON II	747.5	AGRICULTURE - IRRIGATION	11/22/1 982	Lavaca	JACKSON
2099	7/3/1981		STAFFORD, BURR JED STAFFORD, HARRISON STAFFORD, HARRISON II	226.25	AGRICULTURE - IRRIGATION	11/17/1 939	Lavaca	JACKSON

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
2100	7/3/1981		STAFFORD, BURR JED STAFFORD, HARRISON STAFFORD, HARRISON II	226.25	AGRICULTURE - IRRIGATION	11/17/1939	Lavaca	JACKSON
2101	7/3/1981		KOOP, FRANCIS	1000	AGRICULTURE - IRRIGATION	11/28/1939	Lavaca	JACKSON
3665	4/23/1979		BIRKNER, JACK BIRKNER, MARY LOU	211	AGRICULTURE - IRRIGATION	01/29/1979	Lavaca	WHARTON
3725	4/22/1980		Keith Allen Bain	420	AGRICULTURE - IRRIGATION	01/21/1980	Lavaca	WHARTON
3727	4/23/1980		SCHMIDT, GREGORY PAUL SCHMIDT, ROBERT JOHN	913	AGRICULTURE - IRRIGATION	01/21/1980	Lavaca	WHARTON
3827	8/3/1981		Sharon S. Highnote SWENSON, ALAN P SWENSON, BRIAN M	100	AGRICULTURE - IRRIGATION	05/11/1981	Colorado-Lavaca	JACKSON
3836	10/23/1981		VITERA, HARRY E	550	AGRICULTURE - IRRIGATION	05/26/1981	Lavaca	WHARTON
3876	6/4/1982		MEEK, ALAN WAYNE	235.59	AGRICULTURE - IRRIGATION	05/18/1981	Lavaca	WHARTON
3876	6/4/1982		MEEK, BRIAN NELSON	390.41	AGRICULTURE - IRRIGATION	05/18/1981	Lavaca	WHARTON
3884	6/18/1982		Formosa Plastics Corporation, Texas	9000	AGRICULTURE - IRRIGATION	03/01/1982	Colorado-Lavaca	JACKSON
3903	10/14/1982		Mustang Exploration Co., Ltd.	800	AGRICULTURE - IRRIGATION	11/16/1981	Lavaca	WHARTON
3905	10/14/1982		El Rancho De Los Patos, Inc.	1332	AGRICULTURE - IRRIGATION	11/16/1981	Lavaca	WHARTON
3907	10/14/1982		Estate of J.K. Allen	1800	AGRICULTURE - IRRIGATION	11/16/1981	Lavaca	WHARTON
3909	10/14/1982		HALAMICEK, KATHLEEN	350	AGRICULTURE - IRRIGATION	11/16/1981	Lavaca	WHARTON
3910	10/14/1982		Wilbert O. Dernehl, Jr	1000	AGRICULTURE - IRRIGATION	11/16/1981	Lavaca	WHARTON
3911	10/14/1982		WIGGINTON, ELAINE WIGGINTON, GAYNARD	400	AGRICULTURE - IRRIGATION	12/07/1981	Lavaca	WHARTON
3912	10/14/1982		JULIE LEAVESLEY WEHMAN FATHERS TRUST JULIE LEAVESLEY WEHMAN TRUST	340	AGRICULTURE - IRRIGATION	02/08/1982	Lavaca	LAVACA

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
3978	5/19/1983		Rogers Hoyt Rogers Hoyt Jr. TOMMY LEE HOYT ESTATE TRUST	1200	AGRICULTURE - IRRIGATION	01/03/1983	Lavaca	JACKSON
3978	5/19/1983		Kemp Properties, LP	600	AGRICULTURE - IRRIGATION	01/03/1983	Lavaca	JACKSON
4085	3/14/1984		ROLAND CARLSON LLC	500	AGRICULTURE - IRRIGATION	04/18/1983	Lavaca	JACKSON
4102	4/19/1984		T-Bar-D, L.L.C.	57	AGRICULTURE - IRRIGATION	02/22/1983	Lavaca	LAVACA
4241	8/1/1985		WEINHEIMER, EDMUND A JR	272.63	AGRICULTURE - IRRIGATION	04/30/1985	Lavaca	WHARTON
4243	9/17/1985		Gale Miller Mary Beth Miller		DOMESTIC AND LIVESTOCK RECREATION	05/07/1985	Colorado-Lavaca	WHARTON
4243	9/17/1985		Gale Miller Mary Beth Miller	110.51	RECREATION	05/07/1985	Colorado-Lavaca	WHARTON
4252	10/3/1985		RAUN, NORRIS RAUN, RICHARD T RAUN, TRAVIS NORRIS	5500	AGRICULTURE - IRRIGATION	04/16/1985	Lavaca	WHARTON
4773	1/20/1987		HOLUB, EDMUND	160	AGRICULTURE - IRRIGATION	12/31/1951	Colorado-Lavaca	WHARTON
4774	1/20/1987		GANN, JOHN T JR	63	AGRICULTURE - IRRIGATION	06/30/1948	Colorado-Lavaca	WHARTON
4775	1/20/1987		ALLEN, KATHRYN	640	AGRICULTURE - IRRIGATION	12/31/1941	Colorado-Lavaca	WHARTON
4776	1/20/1987		GANN, JOHN T JR	227.5	AGRICULTURE - IRRIGATION	12/31/1941	Colorado-Lavaca	WHARTON
4777	1/20/1987		Patsy Ruth Cox Family Limited Partnership	640	AGRICULTURE - IRRIGATION	04/30/1944	Colorado-Lavaca	WHARTON
4778	1/20/1987		HLAVINKA, JAMES R	1093	AGRICULTURE - IRRIGATION	03/31/1953	Colorado-Lavaca	WHARTON
4779	1/20/1987		South Texas Rice Inc	347.25	AGRICULTURE - IRRIGATION	04/30/1923	Colorado-Lavaca	WHARTON
4779	1/20/1987		Elias R. Callahan	115.75	AGRICULTURE - IRRIGATION	04/30/1923	Colorado-Lavaca	WHARTON
4784	1/20/1987		South Texas Land Limited Partnership	324	AGRICULTURE - IRRIGATION	04/30/1944	Colorado-Lavaca	WHARTON
4785	1/20/1987		Troy Malek	26	AGRICULTURE - IRRIGATION	04/30/1944	Colorado-Lavaca	WHARTON

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
4791	1/20/1987		Formosa Plastics Corporation, Texas	11035	AGRICULTURE - IRRIGATION	12/20/1976	Colorado-Lavaca	JACKSON
5120	6/10/1987		BABB, MURIEL MARTIN, CHARLES D MARTIN, DOROTHY MCCARTER MARTIN, ROBERT T J Babb Heirs Revocable Trust YATES, ELEANOR V	2500	AGRICULTURE - IRRIGATION	02/19/1987	Lavaca-Guadalupe	JACKSON
5130	7/15/1987		City of Moulton		RECREATION	04/24/1987	Lavaca	LAVACA
5168	6/17/1988	B	Richards Brothers Company	1092	AGRICULTURE - IRRIGATION	02/02/1988	Lavaca	WHARTON
5168	6/17/1988	B	Richards Brothers Company	651	RECREATION	02/02/1988	Lavaca	WHARTON
5263	3/8/1990		WEINHEIMER, EDMUND A JR	90	AGRICULTURE - IRRIGATION	11/21/1989	Lavaca	WHARTON
5370	10/15/1991		Paula Louise Robinson Trust	900	AGRICULTURE - IRRIGATION	07/01/1991	Lavaca	LAVACA
5487	8/8/1994		SWENSON, ALAN P SWENSON, BRIAN M SWENSON, SHARON	35	AGRICULTURE - IRRIGATION WETLANDS	05/20/1994	Colorado-Lavaca	JACKSON
5579	3/18/2003		Rancho El Campo LLC	200	AGRICULTURE - IRRIGATION	03/07/1997	Lavaca	WHARTON
5584	10/27/1997		Jackson County	1.52	INDUSTRIAL	04/24/1997	Lavaca	JACKSON
5595	9/27/2000		Adrienne Goff GOFF, JAN GOFF, KENNETH Shanna Goff-Sulak	1550	AGRICULTURE - IRRIGATION	09/27/2000	Lavaca	WHARTON
5678	11/14/2000	A	Richards Brothers Company	120	AGRICULTURE - IRRIGATION RECREATION		Lavaca	WHARTON
5706	3/27/2002		BRANDL, ANTON JR BRANDL, DOROTHY	104.4	AGRICULTURE - IRRIGATION	10/01/2000	Lavaca	WHARTON

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
13112	3/23/2017	A	Thomas J. Turner	232.5	AGRICULTURE - IRRIGATION AGRICULTURE - WILDLIFE MANAGEMENT DOMESTIC AND LIVESTOCK	12/30/2015	Lavaca	WHARTON
13920	8/22/2024		BAROS FAMILY INVESTMENTS	410	MINING		Lavaca	LAVACA

INITIALLY PREPARED PLAN

CHAPTER 4: IDENTIFICATION OF WATER NEEDS

Lavaca Regional Water Plan

BV PROJECT NO. 410083

PREPARED FOR

Lavaca Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

Table of Contents

LIST OF APPENDICES

List of Abbreviations

ac-ft/yr	Acre-Feet per Year
LNRA	Lavaca-Navidad River Authority
LRWPA	Lavaca Regional Water Planning Area
MWP	Major Water Provider
RWP	Regional Water Plan
WUG	Water User Group

4.0 Identification of Water Needs

This chapter describes the analysis performed to identify water user groups (WUGs) and major water providers (MWPs) with water shortages, also known as water needs. In Chapter 5, water management strategies have been defined for each of the identified future water shortages within the Lavaca Regional Water Planning Area (LRWPA) as required by the regional water planning process.

4.1 Identification of Needs

In Chapter 2, water demands were identified for all WUGs. In Chapter 3, water supplies available to the LRWPA were identified and allocated to WUGs and MWPs based on current usage and contracts. Projected surpluses and shortages were determined by comparing the supplies and the demands. The WUG Needs Report in Appendix 4A lists all WUGs within the LRWPA with shortages.

Total water demands in the LRWPA are expected to be 209,920 acre-feet per year (ac-ft/yr) in the year 2030 and are projected to increase to 211,905 ac-ft/yr in the year 2070 and then decrease to 209,653 ac-ft/yr in the year 2080. Total water supplies allocated to WUGs in the region were estimated at 198,872 ac-ft/yr for all decades between the years 2030 and 2080.

The sum of the projected shortages in the WUG Needs Report in Appendix 4A is projected to be 13,010 ac-ft/yr for the 2030 decade, increasing each decade to a maximum of 13,732 ac-ft/yr in 2080. Needs have been identified for manufacturing in Jackson County, and irrigation in Jackson, Lavaca, and Wharton counties. Municipal shortages are not anticipated for the LRWPA through the year 2080.

The Lavaca-Navidad River Authority (LNRA), the MWP in the region, has up to 4,401 ac-ft/yr of projected water needs through 2080 in the 2026 Lavaca Regional Water Plan (RWP). Needs data for the LNRA by category of use and by county/basin, is provided in Appendix 4A in Tables 4A-1 and 4A-2.

A second-tier needs analysis is performed by the Texas Water Development Board that looks at remaining needs after accounting for any conservation and direct reuse strategies that are recommended. Within the Lavaca Region, the second-tier needs analysis shows remaining needs for manufacturing in Jackson County and is provided in Appendix 4A. There are no remaining second-tier needs for irrigation in Jackson, Lavaca, and Wharton counties, as the strategies identified to meet those needs are all conservation strategies. In addition, needs for the LNRA are identified after the second-tier needs analysis, based on the needs for manufacturing in Jackson County mentioned above, and shown in Appendix 4A, Table 4A-3.

Appendix 4A. WUG Needs Report, Second-Tier Needs, and MWP Data

WUG Needs Report

Region P			Split WUG Needs (acre-feet per year) *Surpluses Updated to Zero					
County	Basin	WUG	2030	2040	2050	2060	2070	2080
JACKSON	COLORADO-LAVACA	COUNTY-OTHER	0	0	0	0	0	0
JACKSON	COLORADO-LAVACA	QUADVEST	0	0	0	0	0	0
JACKSON	COLORADO-LAVACA	IRRIGATION	0	0	0	0	0	0
JACKSON	COLORADO-LAVACA	LIVESTOCK	0	0	0	0	0	0
JACKSON	COLORADO-LAVACA	MANUFACTURING	3,679	4,313	4,334	4,355	4,377	4,401
JACKSON	LAVACA	COUNTY-OTHER	0	0	0	0	0	0
JACKSON	LAVACA	EDNA	0	0	0	0	0	0
JACKSON	LAVACA	GANADO	0	0	0	0	0	0
JACKSON	LAVACA	IRRIGATION	1,115	1,115	1,115	1,115	1,115	1,115
JACKSON	LAVACA	LIVESTOCK	0	0	0	0	0	0
JACKSON	LAVACA	MANUFACTURING	0	0	0	0	0	0
JACKSON	LAVACA-GUADALUPE	COUNTY-OTHER	0	0	0	0	0	0
JACKSON	LAVACA-GUADALUPE	IRRIGATION	0	0	0	0	0	0
JACKSON	LAVACA-GUADALUPE	LIVESTOCK	0	0	0	0	0	0
JACKSON	LAVACA-GUADALUPE	MANUFACTURING	0	0	0	0	0	0
LAVACA	GUADALUPE	COUNTY-OTHER	0	0	0	0	0	0
LAVACA	GUADALUPE	LIVESTOCK	0	0	0	0	0	0
LAVACA	LAVACA	COUNTY-OTHER	0	0	0	0	0	0
LAVACA	LAVACA	HALLETTSVILLE	0	0	0	0	0	0
LAVACA	LAVACA	IRRIGATION	500	500	500	500	500	500
LAVACA	LAVACA	LIVESTOCK	0	0	0	0	0	0
LAVACA	LAVACA	MANUFACTURING	0	0	0	0	0	0
LAVACA	LAVACA	MINING	0	0	0	0	0	0
LAVACA	LAVACA	MOULTON	0	0	0	0	0	0
LAVACA	LAVACA	SHINER	0	0	0	0	0	0
LAVACA	LAVACA	YOAKUM	0	0	0	0	0	0
LAVACA	LAVACA-GUADALUPE	COUNTY-OTHER	0	0	0	0	0	0
LAVACA	LAVACA-GUADALUPE	LIVESTOCK	0	0	0	0	0	0

Region P			Split WUG Needs (acre-feet per year) *Surpluses Updated to Zero					
County	Basin	WUG	2030	2040	2050	2060	2070	2080
WHARTON	COLORADO	COUNTY-OTHER	0	0	0	0	0	0
WHARTON	COLORADO	EL CAMPO	0	0	0	0	0	0
WHARTON	COLORADO	LIVESTOCK	0	0	0	0	0	0
WHARTON	COLORADO-LAVACA	COUNTY-OTHER	0	0	0	0	0	0
WHARTON	COLORADO-LAVACA	EL CAMPO	0	0	0	0	0	0
WHARTON	COLORADO-LAVACA	IRRIGATION	0	0	0	0	0	0
WHARTON	COLORADO-LAVACA	LIVESTOCK	0	0	0	0	0	0
WHARTON	COLORADO-LAVACA	MANUFACTURING	0	0	0	0	0	0
WHARTON	LAVACA	COUNTY-OTHER	0	0	0	0	0	0
WHARTON	LAVACA	EL CAMPO	0	0	0	0	0	0
WHARTON	LAVACA	IRRIGATION	7,716	7,716	7,716	7,716	7,716	7,716
WHARTON	LAVACA	LIVESTOCK	0	0	0	0	0	0
WHARTON	LAVACA	STEAM-ELECTRIC POWER	0	0	0	0	0	0
WHARTON	LAVACA	WHARTON COUNTY WCID 1	0	0	0	0	0	0
Region P Total Needs			**13,010**	**13,644**	**13,665**	**13,686**	**13,708**	**13,732**

WUG Second-Tier Needs Report

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Jackson County WUG Total	**2,806**	**3,377**	**3,396**	**3,415**	**3,434**	**3,456**
Jackson County / Colorado-Lavaca Basin WUG	**2,806**	**3,377**	**3,396**	**3,415**	**3,434**	**3,456**
Quadvest*	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	2,806	3,377	3,396	3,415	3,434	3,456
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Jackson County / Lavaca Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
Edna	0	0	0	0	0	0
Ganado	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Jackson County / Lavaca-Guadalupe Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
County-Other	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Lavaca County WUG Total	**0**	**0**	**0**	**0**	**0**	**0**
Lavaca County / Guadalupe Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Lavaca County / Lavaca Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
Hallettsville	0	0	0	0	0	0
Moulton	0	0	0	0	0	0
Shiner	0	0	0	0	0	0
Yoakum*	0	0	0	0	0	0
County-Other	0	0	0	0	0	0

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Lavaca County / Lavaca-Guadalupe Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Wharton County WUG Total	**0**	**0**	**0**	**0**	**0**	**0**
Wharton County / Colorado Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
El Campo*	0	0	0	0	0	0
County-Other*	0	0	0	0	0	0
Livestock*	0	0	0	0	0	0
Wharton County / Colorado-Lavaca Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
El Campo*	0	0	0	0	0	0
County-Other*	0	0	0	0	0	0
Manufacturing*	0	0	0	0	0	0
Livestock*	0	0	0	0	0	0
Irrigation*	0	0	0	0	0	0
Wharton County / Lavaca Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
El Campo*	0	0	0	0	0	0
Wharton County WCID 1	0	0	0	0	0	0
County-Other*	0	0	0	0	0	0
Steam Electric Power*	0	0	0	0	0	0
Livestock*	0	0	0	0	0	0
Irrigation*	0	0	0	0	0	0
Region P Second-Tier Needs Total	**2,806**	**3,377**	**3,396**	**3,415**	**3,434**	**3,456**

Table 4A-1 Major Water Provider Needs by Category of Use

Region P Major Water Provider	Buyer Entity	Buyer Entity Region	Buyer WUG Category	Contract Demand Needs/Surplus by Planning Decade (acre-feet/year)					
				CNS 2030	CNS 2040	CNS 2050	CNS 2060	CNS 2070	CNS 2080
LNRA	Corpus Christi	N	Municipal	0	0	0	0	0	0
LNRA	Manufacturing, Calhoun	L	Manufacturing	0	0	0	0	0	0
LNRA	Manufacturing, Jackson	P	Manufacturing	(3,679)	(4,313)	(4,334)	(4,355)	(4,377)	(4,401)
LNRA	Point Comfort	L	Municipal	0	0	0	0	0	0

Table 4A-2 Major Water Provider Needs by County and Basin

Region P Major Water Provider	Buyer Entity	Buyer Entity Region	Buyer Entity Split County	Buyer Entity Split Basin	Contract Demand Needs/Surplus by Planning Decade (acre-feet/year)					
					CNS 2030	CNS 2040	CNS 2050	CNS 2060	CNS 2070	CNS 2080
LNRA	Corpus Christi	N	Nueces	Nueces	0	0	0	0	0	0
LNRA	Corpus Christi	N	Nueces	Nueces-Rio Grande	0	0	0	0	0	0
LNRA	Manufacturing, Calhoun	L	Calhoun	Colorado-Lavaca	0	0	0	0	0	0
LNRA	Manufacturing, Calhoun	L	Calhoun	Lavaca-Guadalupe	0	0	0	0	0	0
LNRA	Manufacturing, Jackson	P	Jackson	Colorado-Lavaca	(3,679)	(4,313)	(4,334)	(4,355)	(4,377)	(4,401)
LNRA	Point Comfort	L	Calhoun	Colorado-Lavaca	0	0	0	0	0	0

Table 4A-3 Major Water Provider Second-Tier Needs

Major Water Provider	MWP Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
LNRA	**2,806**	**3,377**	**3,396**	**3,415**	**3,434**	**3,456**

INITIALLY PREPARED PLAN

CHAPTER 5: EVALUATION AND SELECTION OF WATER MANAGEMENT STRATEGIES

Lavaca Regional Water Plan

B&V PROJECT NO. 410083

PREPARED FOR

Lavaca Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

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ac-ft/yr	Acre-Feet per Year
ASR	Aquifer Storage and Recovery
AWD	Alternate Wetting and Drying
BMP	Best Management Practices
cy	Cubic Yard
DFC	Desired Future Condition
DO	Dissolved Oxygen
DOR	Drought of Record
EQIP	Environmental Quality Incentive Program
ET	Evapotranspiration
GCD	Groundwater Conservation District
GLO	General Land Office
GMA	Groundwater Management Area
GPCD	Gallons of Water per Capita, per Day
gpm	Gallons per Minute
LNRA	Lavaca-Navidad River Authority
LRWPA	Lavaca Regional Water Planning Area
LTYEP	Lake Texana Yield Enhancement Project
MAG	Modeled Available Groundwater
MG	Million Gallons
MGD	Million Gallons per Day
mg/L	Milligrams per Liter
msl	Mean Sea Level
NRCS	Natural Resources Conservation Service
RO	Reverse Osmosis
RWPG	Regional Water Planning Group
SB	Senate Bill
SJR	Senate Joint Resolution
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission
TWDB	Texas Water Development Board
WAM	Water Availability Model
WCID	Water Control and Improvement District
WMS	Water Management Strategy
WUG	Water User Group
WWP	Wholesale Water Provider

5.0 Evaluation and Selection of Water Management Strategies

Chapter 4 identified the Water User Groups (WUGs) in the region with water needs. Appendix 4A lists all WUGs within the Lavaca Region with shortages. This chapter (Chapter 5) describes the analysis regarding the evaluation and selection of appropriate water management strategies (WMSs) for the Lavaca Region. WMSs have been defined for each of the identified future water shortages within the Lavaca Region as required by the regional water planning process. Included within this chapter are the following:

- Description of the potentially feasible WMSs.
- Definition of the recommended and alternative WMSs.
- Allocation of selected strategies to specific WUGs.

In addition to the above, this chapter has a subsection specifically to address water conservation – including any recommended water conservation management strategies.

5.1 Selection and Application of Water Management Strategies

The Lavaca Regional Water Planning Group (Lavaca RWPG) presented its process for identifying potentially feasible WMSs for public comment at the October 23, 2023, Region P meeting.

The approved documented process is as follows:

1. Current water planning information, including specific WMS of interest, will be solicited from WUGs and Wholesale Water Providers (WWPs) in Fall 2023.
    a. Solicitation of planning information will include the recommended WMSs in the 2021 Regional Water Plan.
    b. WUGs/WWPs will be encouraged to classify each WMS on their 2021 Plan list as included or rejected for the 2026 Planning Cycle and provide comments, and to list additional WMS that will be new for the 2026 Planning Cycle.
2. A list of potential WMSs will be prepared based on an initial technical evaluation and needs analysis and the comments received, which will be available for consideration by the RWPG by early 2024.
3. Additional WMSs may be brought forth to the RWPG for consideration until March 2024.
4. The list of potential WMSs will be further considered to identify "potentially feasible" or "not potentially feasible" WMSs for WUGs and WWPs with identified water needs.

5.1.1 Potential Water Management Strategies

The potential WMSs considered in the 2026 RWP are as follows:

- Municipal Drought Management.
- Manufacturing Drought Management.
- Municipal Conservation.
- Irrigation Conservation.

- Manufacturing Conservation.
- Expand Use of Groundwater.
- Reuse.
- Lake Texana Yield Enhancement Project.
- Lavaca-Navidad River Authority (LNRA) Desalination.
- LNRA Aquifer Storage and Recovery (ASR).
- Lake Texana Dredging.

Several of the strategies mentioned above were considered and evaluated for meeting Irrigation and Manufacturing water needs. Appendix 5A provides a table that lists which strategies are potentially feasible for meeting the Irrigation and Manufacturing water needs. Several other strategies were considered and evaluated at the request of the project sponsor. If a project sponsor wishes to be considered for certain types of State funding, the project that the funding is requested for must be included in the Regional and State Water Plan.

In accordance with 31 TAC Section 357.34(h), if a Regional Water Planning Area has significant identified water needs, the RWPG shall provide a specific assessment of the potential for ASR projects to meet those needs. At the August 12, 2024, RWPG meeting, the Lavaca RWPG defined the threshold of significant water needs to be any WUG with an identified need of 10,000 acre-feet per year (ac-ft/yr) or greater. No WUGs meet this definition in the 2026 RWP. During this planning cycle, LNRA requested to carry over an ASR Project from the 2021 Plan, and no new ASR projects were requested. Because LNRA is currently looking at other options they consider more feasible, the LNRA ASR Project is included in the 2026 RWP as an alternative WMS, which is further described in Subsection 5.1.6.3.

Part of the evaluation of each WMS includes looking at environmental impacts made up of several factors including environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico.

Water management strategies, projects, and management supply factor reports can all be found by linking to https://www3.twdb.texas.gov/apps/SARA/reports/list and entering '2026 Regional Water Plan' into the "Report Name" field to filter to all DB27 reports associated with the 2026 Regional Water Plans. Reports associated with this chapter include:

- Recommended WUG Water Management Strategies (WMS).
- Recommended Projects Associated with WMSs.
- Alternative WUG WMSs.
- Alternative Projects Associated with WMSs.
- WUG Management Supply Factor.

5.1.2 Recommended Strategies to Meet Irrigation Water Needs

A major factor considered by Lavaca RWPG when selecting management strategies to meet Irrigation water needs is the cost of the proposed strategy. As farmers are the only users in the region with an anticipated shortage, they would bear the costs of any WMS. Irrigators would not be able to financially support strategies above a certain cost as higher rates for water would become economically prohibitive.

5.1.2.1 Irrigation Conservation

Several methods of conservation for agriculture were considered in the 2026 Lavaca Regional Water Plan to help meet irrigation needs. The recommended conservation measures for irrigation include On-Farm Conservation and Tail Water Recovery. On-Farm Conservation is recommended as a WMS in Lavaca, Jackson, and Wharton Counties. Tail Water Recovery focuses on Wharton County (within the Lavaca Basin), where irrigation needs are identified in larger amounts than the other two counties, but the Lavaca RWPG supports conservation for irrigation in the whole region.

There are issues with irrigation conservation in the region; on the agricultural side, conservation savings would not result in a reduction of capital expenditures but a forced expenditure of funding to garner any savings. A finite upper limit to the amount of money can be spent to conserve agricultural water and still be supported by on-farm income. The high cost of conservation and the lack of funds to pay for it make large scale conservation projects unlikely. Implementation largely depends on funding from the Natural Resources Conservation Service (NRCS). Programs such as the Environmental Quality Incentive Program (EQIP) have made the costs of improvements more reasonable for farmers with some success. However, the way in which agricultural operations in the Lavaca Region are managed prevent such programs from having substantial effects. A large portion of the irrigated acreage within the Lavaca Region is farmed by tenant farmers who have only year-to-year leases. These farmers have a limited incentive for investing in conservation measures without financial backing from the owner of the property. Having the landowner spend the capital to increase the longevity and sustainability of rice/irrigated farming in the region would benefit the local community and could potentially increase the value of the land itself. Working with the local governments to apply for conservation grant funding could increase the potential that this would occur.

Increased conservation in agricultural irrigation would have a potentially negative impact on streamflows in the area. During dry months, return flows from agricultural operations represent nearly all the streamflow seen in the region. Therefore, additional conservation during these times could have adverse effects on wildlife habitat. The more efficient usage of available supply may reduce habitat if canals with current plant growth and wildlife harborage are converted to pipelines or are lined to reduce seepage and plant growth. There should be zero impacts to cultural resources.

Irrigation Conservation is also discussed in Subsection 5.2.3.

5.1.2.1.1 On-Farm Conservation

On-farm conservation measures include a combination of land leveling, multiple inlets, irrigation well meters, and replacement of canal ditches with pipeline. These measures increase water efficiency and reduce water loss. All measures focused on rice production, with the exception of irrigation well meters, which could also be applied for rice production, but focused on non-rice crops in this analysis.

Total water savings from on-farm conservation measures is 14,697 ac-ft/yr in the Lavaca Regional Water Planning Area for all planning decades. These savings assume 50 percent of unimproved land will be improved with land-leveling and multiple inlets, 25 percent of unimproved land will be improved with irrigation pipelines, and that 5 percent of non-rice acreage will be improved with irrigation well meters. It is assumed that 20 percent of the total rice acreage has already been improved and 25 percent of non-rice acreage has already been improved. For land with combined multiple inlets and land leveling, conservation savings would be 1.23 ac-ft/ac. For conversion from canal ditch to irrigation pipeline, the assumed conservation savings from Region H report by James Stansel "Potential Rice Irrigation Conservation Measures" was used for a water savings of 38 ac-ft per ditch mile. An assumed length of pipeline per acre of field of 25 feet was used, as recommended by L. G. Raun, Jr. Irrigation well meters were assumed to provide a water savings of 10 percent due to leak detection.

Table 5-1 Irrigation Conservation – On-Farm Conservation

WUG	County	Basin	Acreage Improved	Water Savings (ac-ft/yr)
IRRIGATION	LAVACA	LAVACA	972	860
IRRIGATION	JACKSON	MULTIPLE	7,076	5,585
IRRIGATION	WHARTON	LAVACA	6,649	5,890

The following table provides the estimated costs for on-farm conservation. The capital costs shown are associated with the full demand reduction volume listed. The Texas Water Development Board (TWDB) Costing Tool Cost Summary is provided in Appendix 5C.

Table 5-2 Irrigation Conservation – On-Farm Conservation Costs

WUG	County	Basin	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/ac-ft)
IRRIGATION	LAVACA	LAVACA	$693,000	$968,000	$116,000	$13
IRRIGATION	JACKSON	MULTIPLE	$4,772,000	$6,651,000	$800,000	$143
IRRIGATION	WHARTON	LAVACA	$5,315,000	$7,408,000	$891,000	$151

Local information on agricultural water conservation practices was provided by Dennis Mueck (USDA-NRCS, Ronald Gertson (Coastal Bend Groundwater Conservation District), and Glen Minzenmeyer (USDA-NRCS) for the 2011 Regional Water Plan. Updates to irrigation well meters were provided by Roland Ruiz (Edwards Aquifer Authority) for the 2026 Regional Water Plan. Costs have been updated to September 2023 dollars. Table 5-3 lists a summary of current local conservation costs. In general, costs without grant funding or low-interest loans are prohibitive to implementation.

Table 5-3 Estimated Unit Cost of On-Farm Conservation Improvements

Improvement	Improvement Cost per Acre
Land Leveling	$649
Multiple Inlets	$122
Irrigation Pipeline	$290
Irrigation Well Meter	$76

5.1.2.1.2 Tail Water Recovery

Tail water recovery is also recommended as a WMS. Tail water recovery is defined by the NRCS as a planned irrigation system in which all facilities utilized for the collection, storage, and transportation of irrigation tail water and/or rainfall runoff for reuse have been installed. The system allows for the capture of a portion of the irrigation field return flows, stores them until needed, and then conveys the water from the storage facility to a point of entry back into the irrigation system.

Total water savings from tail water recovery measures is 1,910 ac-ft/yr in Wharton County for all planning decades. These savings assume 12 percent of rice farm acreage within the region, or 1,186 acres, will be improved with tail water recovery systems.

Unit costs for tail water recovery are $409/ac-ft of water savings. The costs were determined using the LCRA Water Supply for Agriculture report, a supplement to the LCRA Water Supply Resource Plan. The report’s 2010 construction cost was updated to September 2023 dollars and converted using the acreage amount of for the Lavaca Region. Total facilities costs are $7.2 million, with total project costs of $10.1 million. Annual costs are approximately $782,000. The TWDB Costing Tool Cost Summary is provided in Appendix 5C. The capital costs mentioned are associated with the full demand reduction volume listed.

5.1.2.1.3 Impacts of Irrigation Return Flows

An analysis was performed as part of the 2006 RWP to determine whether there is a significant impact upon in stream flows in the Lavaca Region from rice return flows. The analysis showed that an impact does exist, and that the impact is positive in terms of the presence of additional flow that would otherwise not be in the stream during dry weather periods, although it may be minimal and of short duration. It should be noted further that the estimate of contribution is a conservative estimate in that only the 2000 survey acreages were used, instead of the higher acreages that are likely during times of good price and demand for rice when acreages increase. It is further noted that the estimates of contribution are conservative. Some additional flow from the rice fields can be expected from rainfall that would otherwise soak into the soil and produce no runoff during dry weather conditions. Where the rice fields are saturated, runoff will be produced even during dry times. Finally, all the water that will be applied to the land is produced from groundwater. The Lavaca Region does not have any springs, and there is no reduction of flow from the streams or from any springs as a result of the production of the groundwater. The additional water flowing in the streams as a result of rice return flow is a net increase. Additional conservation in the rice industry diminishes that additional flow as a consequence of more efficient water use and may reduce or impair existing aquatic and riparian habitat.

5.1.3 Recommended Strategies to Meet Manufacturing Water Needs

For the 2026 planning cycle, the Lavaca Region is showing needs for Manufacturing in Jackson County of up to 4,401 ac-ft/yr through 2080. These needs are proposed to be met through Conservation for Manufacturing, which is discussed below as well as mentioned in Subsection 5.2.2, and through the LNRA Lake Texana Yield Enhancement Project (LTYEP), which is described in Subsection 5.1.4.1.

5.1.3.1 Conservation for Manufacturing

Water for manufacturing can be used for a large number of purposes: the product manufacturing process, cooling (either removing heat from a process or air conditioning the facility), conveyance, rinsing or cleaning, and landscape irrigation.

Because of the variations in facilities and water uses, it is difficult to determine a specific plan for each facility for regional water planning purposes. While water needs (shortages) for Manufacturing in Jackson County have been identified, the Lavaca RWPG would like to encourage all water users in the region to reduce water wasting where possible.

The TWDB Water Conservation Implementation Task Force recommended strategies for industrial users to conserve water in the "Best Management Practices for Industrial Water Users" guidance.[1] The guide provides best management practices (BMPs) for specific industries, as well as general BMPs that are recommended for any type of industrial user. The BMPs provided include the following:

- Conservation Analysis and Planning
  - Cost Effectiveness Analysis.
  - Industrial Site-Specific Conservation.
  - Industrial Water Audit.
- Educational Practices
  - Management and Employee Programs.
- System Operations
  - Boiler and Stream Systems.
  - Industrial Alternative Sources and Reuse of Process Water.
  - Industrial Submetering.
  - Industrial Water Waste Reduction.
  - Refrigeration.
  - Rinsing/Cleaning.
  - Water Treatment.
- Cooling Systems Management
  - Cooling Systems (other than Cooling Towers).
  - Cooling Towers.
  - Once-Through Cooling.
- Landscaping
  - Industrial Facility Landscaping.

The BMP guidance describes water audits as the initial way for industrial water users to increase water efficiency. It is assumed that all of the users for which this strategy is recommended will, at a minimum, perform a water audit. On average, the range of water savings from implementing water audits is between 10 to 35 percent. Therefore, 10 percent of the water demand of each manufacturing WUG is

[1] Water Conservation Implementation Task Force, "Water Conservation Best Management Practices: Best Management Practices for Industrial Water Users," February 2013.

used to estimate the amount of water conserved per decade by implementing BMPs. Manufacturing water conservation values are summarized in Table 5-4 .

If a water audit has not been previously performed, water savings from implementing recommendations from the audit can range from 10 to 35 percent. For regional water planning purposes, water savings for each county and basin is determined to be 10 percent of the manufacturing water demand and is assumed to be implemented by 2030. Table 5-4 shows the water savings in ac-ft/yr.

Table 5-4 Conservation for Manufacturing Water Demand Reductions

WUG	County	Basin	Demand Reduction (ac-ft/yr)					
			2030	2040	2050	2060	2070	2080
MANUFACTURING	JACKSON	COLORADO-LAVACA	873	936	938	940	943	945
MANUFACTURING	JACKSON	LAVACA	11	11	11	12	12	12
MANUFACTURING	JACKSON	LAVACA-GUADALUPE	639	685	687	688	690	691
MANUFACTURING	LAVACA	LAVACA	53	55	57	59	61	63
MANUFACTURING	WHARTON	COLORADO-LAVACA	3	3	4	4	4	4

Costs

Development of costs for industrial water conservation assume that only cost-positive measures will be implemented, or the costs to implement the BMPs are less than the cost of water saved. Costs also assume that an average water demand of 1,000 ac-ft/yr would equate to a $10,000 water audit cost, with a minimum cost of $2,000; that one audit will occur every 5 years, and implementation will occur by 2030. Estimated total annual costs are summarized in Table 5-5.

Table 5-5 Annual Costs from Conservation of Manufacturing

WUG	County	Basin	Annual Cost ($)					
			2030	2040	2050	2060	2070	2080
MANUFACTURING	JACKSON	COLORADO-LAVACA	$17,454	$18,722	$18,764	$18,806	$18,850	$18,898
MANUFACTURING	JACKSON	LAVACA	$400	$400	$400	$400	$400	$400
MANUFACTURING	JACKSON	LAVACA-GUADALUPE	$12,770	$13,700	$13,730	$13,760	$13,794	$13,826
MANUFACTURING	LAVACA	LAVACA	$1,056	$1,096	$1,136	$1,178	$1,222	$1,268
MANUFACTURING	WHARTON	COLORADO-LAVACA	$400	$400	$400	$400	$400	$400

Environmental and Other Impacts

Negligible impacts to environmental factors such as instream flows and bay and estuary inflows are expected based on the low amount of water savings, as well as to cultural resources and wildlife habitat.

Impacts to Agriculture

Agricultural and natural resource impacts are expected to be negligible.

5.1.4 Recommended Strategies for Major Water Providers

LNRA has existing and potential future customers that will require additional water beyond LNRA's existing supplies. LNRA is currently looking at different options for meeting those water demands. The WMSs recommended by the Lavaca RWPG include the LTYEP and LNRA Desalination, discussed in detail in this subsection. The management supply factor for LNRA, by decade, is 1.3 in 2030, and 1.5 in 2040-2080. These factors are based on demands and supplies within the region only. Future strategy implementation may be used to meet future demands inside or outside of the region.

5.1.4.1 Lake Texana Yield Enhancement Project

The LNRA has previously considered multiple scenarios for construction of new reservoir storage, including both on- and off-channel reservoirs. The *Lavaca River Water Supply Project Feasibility Study*, completed in 2011 by Freese & Nichols, Inc., compared a variety of these configuration options and recommended the most feasible scenarios. In the 2016 Lavaca Regional Water Plan, two of the scenarios were discussed. In the 2021 Plan, LNRA narrowed down the general location to east of Lake Texana delivery system pipeline and determined that a two-phase implementation process may be the most feasible. The strategy evaluation for the 2026 Plan carries the 2021 Plan project forward.

LNRA is still determining reservoir storage capacity configurations and pump station flow rates, but the minimum facility requirements would include a channel dam of less than or equal to 6 feet in height that will impound up to 240 ac-ft and associated pump station to deliver water from the river through a pipeline to Lake Texana in the first phase, and then to the proposed 50,000 ac-ft reservoir in the second phase. A second pump station would be required with the new off-channel reservoir to deliver raw water to the existing LNRA East Delivery System pipeline.

The associated pump station would turn on when there is sufficient storage in Lake Texana in the first phase and in the off-channel reservoir in the second phase, and when there is sufficient depth of water covering the inlet pipe. The amount of water pumped is limited primarily to flow conditions in the river and would likely be restricted to short-duration, high flow events. Thus, the associated river pump would be required to pump at significantly high rates in order to capture flood flows. For yield and costing purposes, the pump station is assumed to have a 200 million gallons per day (MGD) maximum flow rate, although the LNRA has considered flow rates up to 500 MGD. The diversion dam to increase the in-channel storage and optimize pumping opportunities is also included in order to increase firm yield. A relatively small amount of in-channel storage (240 ac-ft) could increase the project yield at minimal cost compared to the cost of increasing the size of the off-channel reservoir in order to store more water.

The two-phase project includes the following:

- Phase One
  - South Diversion Dam on the Lavaca River.
  - Raw water diversion pump station on the Lavaca River.
  - Pipeline from the diversion pump station to Lake Texana.

- Phase Two
  - Pipeline from the diversion pump station to the off-channel reservoir.
  - Off-channel reservoir and associated intake pump station.
  - Pipeline from off-channel reservoir to the existing LNRA East Delivery System pipeline serving customers to the south.

For both Phases 1 and 2, the project yield was provided by consultants for LNRA, based on its modeling efforts. While the modeling was performed in 2020, the Water Availability Model (WAM) incorporated all of the Texas Commission on Environmental Quality (TCEQ) environmental flow standards that are included in the current (October 2023) TCEQ Lavaca WAM.

The Phase 1 yield involving diversion to Lake Texana was determined to be 23,500 ac-ft/yr and is assumed to be online by 2030. For Phase 2, the firm yield of the project due to the new off-channel reservoir increases to 30,600 ac-ft/yr and is assumed to come online by 2040. This firm yield would increase LNRA's supply as a WWP and would be available to meet potential water needs for municipal, industrial, or other water users within the Lavaca Region or neighboring Region L, as needed. Because water needs for Manufacturing in Jackson County (Region P) and Calhoun County (Region L) have been identified, portions of the firm yield are specifically allocated to meet those needs. Water losses associated with evaporation from the reservoir are included in the modeling analysis. Water losses from the transmission pipeline are considered negligible.

Costs

The costs were initially taken from the Lavaca River Water Supply Project Feasibility Study.

For Phase 1, the diversion dam, 200 MGD intake and pump station, and 2.5-mile, 108 inch transmission line costs were determined using the TWDB Uniform Costing Model tool, which represents the costs in September 2023 dollars. Because costs have increased significantly in the last several years, updating the costs using CCI or PPI conversions did not seem sufficient. Facility costs were estimated to be $110 million, with total project costs being approximately $151.5 million. Annual costs were determined to be $14 million, with a unit cost of $594. The TWDB Costing Tool Cost Summary is provided in Appendix 5C.

For Phase 2, the remaining study cost components for the project that were not included in Phase 1 were added to the TWDB Uniform Costing Model tool. This includes a 50,000 ac-ft reservoir, a 10-mile, 108 inch transmission line from the diversion dam to the off-channel reservoir, a 30 MGD intake and pump station at the reservoir, and a 3.5 mile, 42 inch transmission line to take the water from the reservoir to the existing LNRA East Delivery System pipeline. Actual costs could vary significantly due to project implementation requirements. Facility costs were estimated to be $262.7 million, with total project costs being approximately $392.6 million. Annual costs were determined to be $29.6 million, with a unit cost of $967. The TWDB Costing Tool Cost Summary is provided in Appendix 5C.

If Phase 1 comes online in 2030 and Phase 2 comes online in 2040, debt service costs will combine for the two phases during the 2040 decade.

Issues and Considerations

The off-channel reservoir minimizes challenges to implementation as compared to an on-channel scenario. Water rights, land acquisition, and relocation of infrastructure are considerations in the feasibility of this strategy. The evaluation of this strategy assumes that a new water right permit to construct and maintain a dam and reservoir impounding up to 240 acre-feet of water on the Lavaca River would be obtained for the project. As of October 2024, LNRA is currently in the process of obtaining the new water right permit, where TCEQ has approved its draft permit. As such, the TCEQ-adopted, Senate Bill (SB) 3-developed environmental flow standards, effective August 30, 2012, would need to be met in order for TCEQ to approve the permit.

Environmental and Other Impacts

The proposed off-channel reservoir would have substantially less impacts on valuable habitat than an on-channel reservoir option. In the off-channel scenario, some habitat would be altered or lost as a result of temporary flooding and the area impacted would be smaller than that of the on-channel reservoir. The impact of the proposed off-channel reservoir appears to have minimal or no impact on threatened and endangered species. It is assumed that the project will have negligible impacts on cultural resources, but coordination with the THC will need to occur before construction begins.

The proposed location of the off-channel reservoir is such that it is downstream of all TCEQ adopted environmental flow standard instream flow measurement points along the Lavaca River. The only TCEQ standard flows that needs to be met are the Bay and Estuary Freshwater Inflow standards for the Lavaca Bay System.

As a result of obtaining the new water right permit and developing a reservoir to capture and store flow from the river, up to 96,022 ac-ft/yr would be diverted to storage in any given year. Additionally, the new reservoir could provide up to 2,000 acres of new waterfowl habitat.

Impacts to Agriculture

The proposed off-channel reservoir scenarios would have a marginal impact on local agricultural activities. Siting of the project and inundation of the off-channel reservoir would remove approximately 2,500 acres of agricultural land from production but would have minimal influence given the large quantity of agricultural land in the area.

Impacts to Navigation

The proposed off-channel reservoir scenarios would have no impact on navigation. Any diversion dam structure would need to consider navigation impacts.

5.1.4.2 Lavaca-Navidad River Authority Desalination

LNRA has been evaluating water supply sources to provide raw water to industry and other possible raw water and potable water users along FM 1593 from Lolita to Point Comfort. Given that the largest single raw water user in the area, Formosa Plastics, shows future demands totaling more than 10,000 ac-ft/yr, LNRA engaged NRS Engineers to develop water supply strategies for these sources. A preliminary engineering feasibility study was prepared for LNRA by NRS Engineers in January 2013. Water supply sources identified include brackish groundwater and brackish surface water from the Lavaca River downstream of Lake Texana.

At a November 2012 LNRA Board Meeting, NRS Engineers presented three options of site locations. Two options were based on desalination of the brackish groundwater supply in the vicinity of the Formosa Plastics owned property and one option was based on desalination of a combination of brackish groundwater and surface water located on LNRA property just south of Lake Texana. The options evaluated used a variety of water supply volumes due to the uncertainty of the development and production of brackish groundwater in Jackson County, and the unknown quantity of brackish surface water that would be available.

For the 2021 and 2026 Regional Water Plans, the Lavaca RWPG evaluated desalination using a combination of brackish groundwater and brackish surface water. For the 2026 Plan, the focus shifted to an emphasis on brackish surface water, using brackish groundwater in smaller amounts during wet and average months and years, and in larger amounts during drier months and years. WAM modeling was performed to determine the amount of surface water available for diversion and the amount of groundwater availability remaining under the Modeled Available Groundwater (MAG) was examined. This strategy is dependent upon the receipt of a groundwater pumping contract from the Texana Groundwater Conservation District (GCD) and a permit from the TCEQ.

For the brackish surface water component, a WAM was performed using a version of the current TCEQ Lavaca River WAM Run 3 that included an assumption that the LTYEP was already in place. The model assumed a 25,000 ac-ft/yr authorized diversion and a 20 MGD river intake. The following results were determined:

- Average available diversion over Period of Record (1940 to 1996): 19,426 ac-ft/yr.
- Average available diversion over Drought of Record (DOR) (1952 to 1957): 13,682 ac-ft/yr.
- Minimum year available diversion (1956): 6,406 ac-ft/yr.

Table 5-6 Details for Hydrologic Model Used for Recommended Strategies

Model Name	Version Date	Input/Output Files Used	Date Model Used	Comments
Modified TCEQ Lavaca WAM Run 3	10/1/23	lav3.dat	12/16/24 -BV	Added coding from FNI for LTYEP project and then added coding for new diversion

From this analysis, it was determined that while the minimum year would provide only 6,400 ac-ft/yr, a conjunctive use scenario would allow a diversion of brackish surface water of 12,000 ac-ft/yr most years, with groundwater supplementing in the limited months and years where the diversions are lower.

For the brackish groundwater component, the proposed well field site is located in the Colorado-Lavaca Basin in Jackson County. After accounting for existing groundwater supplies being used, the available yield for groundwater in this basin is approximately 3,300 ac-ft/yr. In most years, this strategy would pump 2,100 ac-ft/yr from the aquifer. In drought years, the pumping would increase temporarily to make up for the lower quantities of surface water. The average groundwater pumped over the DOR would be 3,133 ac-ft/yr, which keeps the strategy within the MAG. Table 5-7 shows how the conjunctive use scenario would work under DOR conditions. The TDS levels of the combined resources are assumed to be 7,000 mg/L and it is assumed that the reverse osmosis (RO) efficiency to treat the water is 71 percent. This results in a firm yield for the strategy of 10,000 ac-ft/yr.

Table 5-7 Lavaca-Navidad River Authority Desalination Yield Volumes over the Drought of Record (ac-ft/yr)

DOR Year	Surface Water Diversion	Ground Water Pumping	Total Water	Firm Yield After Treatment
1952	12,000	2,100	14,100	10,000
1953	12,000	2,100	14,100	10,000
1954	11,400	2,700	14,100	10,000
1955	12,000	2,100	14,100	10,000
1956	6,400	7,700	14,100	10,000
1957	12,000	2,100	14,100	10,000
DOR Average	**10,967**	**3,133**	**14,100**	**10,000**

This strategy is expected to be online by 2040. This supply could be used to meet existing or future LNRA customers, but specific recipients have not been identified at this time.

Costs

The infrastructure required for this strategy was determined by NRS Engineers as presented at the November 2012 LNRA Board Meeting. The quantity and sizing of the infrastructure was modified to match the groundwater and surface water yield projected for the Colorado-Lavaca Basin in Jackson County.

The following infrastructure was proposed:

- 20 MGD River Intake and Pump Station.
- Four 2,000 gallons per minute (gpm) Water Supply Wells and a Pump Station.
- 9 MGD Brackish Desalination Water Treatment Plant (RO for groundwater and microfiltration for surface Water).
- Approximately 4.5 miles of well field transmission piping.
- Approximately 7.1 miles of transmission piping and appurtenances.
- Six injection wells for concentrate.
- Finished Water Pump Station.
- One ground storage tank (1 MG) for finished water.

The facility cost for this strategy is primarily driven by the cost of a water treatment facility and the well field. In September 2023 values, the probable facility cost for LNRA needs is approximately $142 million, with the project cost being $199 million. This would result in a total annual cost (including operations and maintenance of approximately $32 million. The resulting unit cost of water is $3,202/ac-ft. The TWDB Costing Tool Cost Summary is provided in Appendix 5C.

Environmental and Other Impacts

The LNRA desalination strategy will require extensive permitting to ensure it complies with all environmental considerations. The primary regulatory agencies and permitting requirements include the TCEQ's administration of surface water diversion permitting and Texana GCD's regulation of pumping of groundwater.

The advantage of this strategy is dependent on the status of the sustainable yield of the aquifer. Having a groundwater withdrawal rate higher than the recharge rate will create water shortages in the future as well as affect the groundwater sustainability. This proposed well field would be within the Texana GCD and the groundwater use could be limited to an amount that can be replenished on an average annual basis. LNRA customers are currently surface water users, so the increased use from groundwater would increase return flows to the streams.

Permitting would also be required to pump brackish surface water from the tidal stream of the Navidad River. Capturing surface water that spills over the Palmetto Dam would be subject to the TCEQ SB3 environmental flow standards for bay and estuary inflows. It was determined that the yield used in this evaluation would be available while meeting or exceeding the SB3 bay and estuary requirements. The Lavaca RWPG acknowledges the importance of pulse flows reaching Lavaca Bay, and that capturing pulse flow volumes that otherwise would have made it to Lavaca Bay may have some impact on salinity levels.

While it is assumed that this strategy would have negligible impacts to cultural resources and wildlife habitat, coordination with the THC will need to occur and proper environmental field studies will need to be performed before construction begins.

Impacts to Agriculture

As agricultural demands have been met in this basin in Jackson County and the project site will occur on either Formosa or LNRA property, there should be no impacts to agriculture (zero impacted acres) from this strategy.

5.1.5 Recommended Strategies for Municipal Utilities

The municipalities in the region have no identified water needs, as all their projected water demands are met. Even so, the Lavaca RWPG is recommending drought management, municipal conservation, expand use of groundwater, and reuse as WMSs in the 2026 Regional Water Plan.

5.1.5.1 Drought Management

Drought management is considered as a WMS for all municipal WUGs, regardless of water needs. The purpose for the drought management strategy is to encourage utilities to maintain and implement their Drought Contingency Plans during times of reduced water availability, as well as to prepare for potential emergency situations that may occur. Chapter 7 discusses drought response for the region in more detail.

Drought management was evaluated by considering each municipal WUG's Drought Contingency Plan (as available), including drought triggers and responses, and projected water demands. Demand reductions were considered individually with respect to the type of trigger, and how often that trigger might be reached. The TWDB Drought Management Costing Tool was used to develop both the demand reductions and the costs associated with those demand reductions. Table 5-8 and Table 5-9 show the potential demand reductions for each utility and the annual costs/lost revenue associated with those reductions, respectively.

Table 5-8 Drought Management Municipal Water Demand Reductions

WUG	County	Basin	Percent Reduction	Demand Reduction (ac-ft/yr)					
				2030	2040	2050	2060	2070	2080
EDNA	JACKSON	LAVACA	15%	67	71	75	78	81	84
GANADO	JACKSON	LAVACA	20%	29	28	28	28	27	26
QUADVEST*	JACKSON	COLORADO-LAVACA	15%	1	1	1	1	2	2
HALLETTSVILLE	LAVACA	LAVACA	30%	70	76	81	87	94	100
MOULTON	LAVACA	LAVACA	20%	15	15	14	14	13	13
SHINER	LAVACA	LAVACA	10%	17	18	20	21	22	24
YOAKUM	LAVACA	LAVACA	30%	83	87	92	96	100	105
EL CAMPO	WHARTON	COLORADO	15%	23	23	23	23	23	23
EL CAMPO	WHARTON	COLORADO-LAVACA	15%	140	141	141	141	141	141
EL CAMPO	WHARTON	LAVACA	15%	7	7	7	7	7	7
WHARTON COUNTY WCID 1*	WHARTON	LAVACA	15%	8	8	8	9	9	9
*No Drought Contingency Plan was made available. Demand reductions were assumed proportional to the demands for the other utilities.									

Table 5-9 Drought Management Annual Costs/Lost Revenue

WUG	County	Basin	Annual Cost/Lost Revenue ($/YR)					
			2030	2040	2050	2060	2070	2080
EDNA	JACKSON	LAVACA	29,341	31,172	32,782	34,152	35,567	37,032
GANADO	JACKSON	LAVACA	21,387	20,959	21,006	20,497	19,965	19,375
QUADVEST	JACKSON	COLORADO-LAVACA	280	382	453	545	631	723
HALLETTSVILLE	LAVACA	LAVACA	56,420	60,670	64,845	69,914	75,133	80,501
MOULTON	LAVACA	LAVACA	11,395	10,954	10,529	10,117	9,721	9,339
SHINER	LAVACA	LAVACA	2,761	2,953	3,143	3,364	3,593	3,830
YOAKUM	LAVACA	LAVACA	83,075	87,497	91,681	95,865	100,243	104,815
EL CAMPO	WHARTON	COLORADO	9,480	9,576	9,582	9,576	9,570	9,565

WUG	County	Basin	Annual Cost/Lost Revenue ($/YR)					
			2030	2040	2050	2060	2070	2080
EL CAMPO	WHARTON	COLORADO-LAVACA	57,788	58,386	58,408	58,374	58,352	58,329
EL CAMPO	WHARTON	LAVACA	2,886	2,914	2,914	2,914	2,914	2,908
WHARTON COUNTY WCID 1	WHARTON	LAVACA	4,046	4,091	4,307	4,473	4,656	4,845

No environmental impacts (all environmental factors) are anticipated from utilities implementing their Drought Contingency Plans. No impacts (zero acres impacted) to agriculture are anticipated, either.

5.1.5.2 Municipal Conservation

Conservation is a combination of strategies for reducing the consumption of water, improving the efficiency in the use of water, or reducing the loss or waste of water. With no anticipated projected municipal water needs, there is not a large incentive for municipalities in the region to implement conservation. However, the Lavaca RWPG feels it is important to recommend municipal conservation as a WMS to encourage conservation in the region and to aid municipalities in obtaining funding to perform conservation measures. For the purposes of planning, municipal conservation is distinguished by two approaches: water loss mitigation and water use reduction.

A methodology was developed to determine the anticipated municipal water conservation savings for the WUGs within the Lavaca Region. First, WUGs were required to meet the following criteria to be chosen for conservation measures:

- Be a municipal WUG.
- Have a year 2030 per capita water usage of greater than 140 gallons of water per capita, per day (GPCD), indicating a potential for savings through conservation.

Conservation was considered, regardless of whether a municipality had a water need.

Per capita water demands were determined from the measured or projected population and water demands for each WUG during each decade. The following methodology was used in calculating water demand reductions:

- If the 2030 GPCD is greater than 140,
  - 5 percent GPCD reduction per decade until 140 GPCD is reached.
- If the 2030 GPCD is less than 140,
  - No conservation considered.

This method is slightly higher than the recommendation of a 0.5 percent per year reduction in per capita water demand until the target demand of 140 GPCD was reached, as proposed by the Water Conservation Implementation Task Force. Conservation was applied beginning in 2030.

This strategy is recommended using the criteria above, with the potential target GPCDs as shown in Table 5-10.

Table 5-10 Municipal Conservation Target GPCDs

WUG	County	Basin	Base GPCD (2011)	Target GPCD					
				2030	2040	2050	2060	2070	2080
QUADVEST	JACKSON	COLORADO-LAVACA	199	185	176	167	159	151	143
HALLETTSVILLE	LAVACA	LAVACA	204	189	180	171	162	154	146
MOULTON	LAVACA	LAVACA	184	170	162	154	146	140	140
SHINER	LAVACA	LAVACA	212	197	187	177	169	160	152
YOAKUM	LAVACA	LAVACA	160	148	140	140	140	140	140
EL CAMPO	WHARTON	COLORADO	170	157	149	142	140	140	140
EL CAMPO	WHARTON	COLORADO-LAVACA	170	157	149	142	140	140	140
EL CAMPO	WHARTON	LAVACA	170	157	149	142	140	140	140
WHARTON COUNTY WCID 1	WHARTON	LAVACA	153	141	140	140	140	140	140

The new GPCD for each decade was used along with the WUG population to determine the revised water demands for each decade. These values were subtracted from the original water demands to determine the amount of water conserved in each decade. Two strategies – water loss mitigation and water use reduction – are recommended to reach the target GPCDs. Water loss mitigation involves the detection and repair of leaking pipelines and utility water audits, whereas water use reduction involves customers using less water through means such as installation of advanced metering infrastructure and non-capital efforts to reduce the consumption of water. The respective yields are shown in Table 5-11 and Table 5-12.

Table 5-11 Municipal Conservation (Water Loss Mitigation) Yield

WUG	County	Basin	Demand Reduction (ac-ft/yr)					
			2030	2040	2050	2060	2070	2080
QUADVEST	JACKSON	COLORADO-LAVACA	0	0	1	1	1	1
HALLETTSVILLE	LAVACA	LAVACA	20	22	23	25	27	29
MOULTON	LAVACA	LAVACA	5	4	4	4	4	4
SHINER	LAVACA	LAVACA	16	17	18	19	21	22
YOAKUM	LAVACA	LAVACA	20	21	22	23	24	25
EL CAMPO	WHARTON	COLORADO	9	9	9	9	9	9

WUG	County	Basin	Demand Reduction (ac-ft/yr)					
			2030	2040	2050	2060	2070	2080
EL CAMPO	WHARTON	COLORADO-LAVACA	57	57	57	57	57	57
EL CAMPO	WHARTON	LAVACA	3	3	3	3	3	3
WHARTON COUNTY WCID 1	WHARTON	LAVACA	4	4	4	4	4	4

Table 5-12 Municipal Conservation (Water Use Reduction) Yield

WUG	County	Basin	Demand Reduction (ac-ft/yr)					
			2030	2040	2050	2060	2070	2080
QUADVEST	JACKSON	COLORADO-LAVACA	1	1	1	3	5	7
HALLETTSVILLE	LAVACA	LAVACA	14	46	85	127	172	222
MOULTON	LAVACA	LAVACA	3	10	15	21	24	23
SHINER	LAVACA	LAVACA	10	36	67	99	133	170
YOAKUM	LAVACA	LAVACA	14	45	47	50	52	55
EL CAMPO	WHARTON	COLORADO	7	21	35	38	38	38
EL CAMPO	WHARTON	COLORADO-LAVACA	38	123	210	230	230	230
EL CAMPO	WHARTON	LAVACA	2	6	10	11	11	11
WHARTON COUNTY WCID 1	WHARTON	LAVACA	2	2	3	3	3	4

Costs were calculated to include a variety of conservation measures. The TWDB Cost Estimating Tool methodology was used to determine project costs, annual costs, and unit costs, once the facility costs were developed. The Lavaca Region encourages the TWDB to provide funding for all types of conservation measures for WUGs and WWPs within the region and around the state. Costing backup information is located in Appendix 5C.

As deteriorating infrastructure can have high rates of water loss, water loss mitigation is recommended through leak detection and repair and utility water audits. It is assumed that none of the distribution line replacements for this water conservation strategy are subject to adopted utility standard minimum size requirements that exceed two standard pipe diameters. Costs for leak detection and repair were estimated assuming 10 percent of the individual WUG's pipeline is replaced over the planning horizon. Implementing this conservation strategy would reduce approximately 3 percent of the WUG's demand. Water loss is discussed further in Chapter 1.

Table 5-13 provides the estimated costs for municipal conservation (water loss mitigation). The high unit cost reflects the cost of water main replacement.

Table 5-13 Municipal Conservation (Water Loss Mitigation) Costs

WUG	County	Basin	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/ac-ft)
QUADVEST	JACKSON	COLORADO-LAVACA	$461,000	$616,000	$12,000	$12,000
HALLETTSVILLE	LAVACA	LAVACA	$3,784,000	$5,055,000	$101,000	$3,511
MOULTON	LAVACA	LAVACA	$1,015,000	$1,357,000	$27,000	$7,087
SHINER	LAVACA	LAVACA	$1,938,000	$2,589,000	$52,000	$2,368
YOAKUM	LAVACA	LAVACA	$3,877,000	$5,179,000	$104,000	$4,117
EL CAMPO	WHARTON	MULTIPLE	$7,845,000	$10,480,000	$210,000	$3,020
WHARTON COUNTY WCID 1	WHARTON	LAVACA	$1,754,000	$2,343,000	$47,000	$10,805

Water use reduction includes installation of advanced metering infrastructure and non-capital efforts to reduce the consumption of water.

Smart meters were assumed a cost of $540 per home, with the assumption that 100 percent of homes would implement this strategy over the planning horizon. Implementing this conservation strategy would reduce approximately 5 percent of the demand. These assumptions were modified as needed if they caused the demand reduction to be higher than the assumed water savings based on the RWPG’s target GPCD methodology.

Remaining conservation measures were assumed to be non-capital approaches, which could include both labor and materials associated with implementing standards, incentives, and outreach. Many of the non-capital cost measures include, but are not limited to, drought tolerant landscape, public education and outreach – including school programs, rebate and incentive programs – local ordinances that increase water efficiency by customers, support of legislation that increases water efficiency in plumbing products and appliances at both the State and Federal level, increased water efficiency in utility operations, and conservation-oriented rate structures. Conservation measures for non-capital approaches were included in the annual costs at an average of $305/ac-ft of water savings.

Table 5-14 provides the estimated costs for municipal conservation (water use reduction). The unit cost is presented as an average, with some conservation measures being more expensive and some being less.

Table 5-14 Municipal Conservation (Water Use Reduction) Costs

WUG	County	Basin	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/ac-ft)
QUADVEST	JACKSON	COLORADO-LAVACA	$25,000	$33,000	$4,000	$554
HALLETTSVILLE	LAVACA	LAVACA	$980,000	$1,310,000	$145,000	$652
MOULTON	LAVACA	LAVACA	$160,000	$214,000	$20,000	$853
SHINER	LAVACA	LAVACA	$701,000	$937,000	$107,000	$627
YOAKUM	LAVACA	LAVACA	$1,025,000	$1,370,000	$100,000	$1,832
EL CAMPO	WHARTON	MULTIPLE	$2,449,000	$3,272,000	$280,000	$1,005
WHARTON COUNTY WCID 1	WHARTON	LAVACA	$77,000	$103,000	$7,000	$1,950

Environmental (including all environmental factors) and other impacts (including agricultural) are expected to be negligible.

5.1.5.3 Reuse

El Campo is currently planning to produce a Type 1 wastewater effluent that could be used by the utility or sold to potential customers. As such, it requested to continue to have its reuse project as a recommended WMS in the 2026 Lavaca Regional Water Plan.

El Campo currently produces 1 MGD of treated wastewater effluent that is discharged to the Tres Palacios Creek. The proposed yield from the strategy is 0.5 MGD or 560 ac-ft/yr, beginning in 2040. The methodology used to calculate the future reuse supplies was to coordinate with El Campo and conservatively estimate that 50 percent of its effluent would be sold to a future customer. Currently, the utility has no identified users of the effluent, but is moving forward with installing a sand filtration system. The water may be used by another WUG in the region, such as Manufacturing.

For costing purposes, the sand filtration system and 5 miles of 12 inch transmission pipeline were assumed. Costs were developed using the TWDB Cost Estimating Tool in September 2023 dollars. Capital costs were calculated to be approximately $7.3 million, with total project costs of approximately $10.2 million. Annual costs were calculated at $1.1 million per year, for a unit cost of $2,041/ac-ft. Annual unit cost after 20-year debt service is $763/ac-ft. The TWDB Costing Tool Cost Summary is provided in Appendix 5C.

Water that is currently discharged into streams in the basin would be consumed instead, up to 560 ac-ft/yr. In addition, if effluent is used for agricultural purpose, it would start with higher dissolved solids levels than either groundwater or surface water in the area. Agricultural use would further increase dissolved solids levels. Agricultural demands would continue to be met, with associated discharges to the watercourses of agricultural return flows.

Stress on the groundwater in the area would be reduced. However, return flows to the streams in the area would also be reduced and dissolved solids concentrations would increase slightly. The overall effect would be minimal because of the limited amount of effluent available, although during drought, return flows can at times be the only flows in the creeks.

If water is used for irrigation purposes, it would provide up to an additional 560 ac-ft/yr of water supply, and as noted previously, provides for wildlife habitat as well. If it is used for municipal or manufacturing purposes, it would have no impact on agriculture, including zero agricultural acres impacted.

It is assumed the pipeline construction would have negligible impacts on cultural resources and wildlife habitat, but coordination with the THC will need to occur and proper environmental field studies will need to be performed before construction begins.

5.1.5.4 Expand Use of Groundwater

Two municipal utilities requested to include a strategy that would expand their access to groundwater for the 2026 planning cycle: Edna and Hallettsville. The two sections below describe their strategies.

5.1.5.4.1 Expand Use of Groundwater - Edna

Groundwater availability is limited to the MAG volumes as calculated based on the Desired Future Conditions (DFCs) as established by the Groundwater Management Area (GMA) process. The Lavaca Regional Water Planning Area (LRWPA) is within GMA 15. The GCDs within GMA 15 collaborated to determine the DFC for the Gulf Coast Aquifer System. The DFC, adopted October 14, 2021, states that no more than 15 feet of average drawdown can occur by 2080 relative to year 2000 conditions in Jackson County.

Edna plans to install a new well, pump, transmission line, storage tank, and tower to provide additional groundwater supply from the Gulf Coast Aquifer System in Jackson County, Lavaca Basin, by 2030. This additional water, referred to as remaining supply, was determined by subtracting the water that is currently allocated from the available water under the MAG. Because the irrigation demands in the plan are based on severe drought conditions (2011 to 2013 drought years), the remaining supply available for strategies in the plan for Jackson County, Lavaca Basin is only 217 ac-ft/yr. This is the regional water planning amount that would be available for Edna during severe drought conditions, without overallocation of the aquifer. In most other years, its full planned yield from the well (968 ac-ft/yr) would be available.

For costing purposes, a 750 gpm well was assumed, with 80 percent efficiency, at a depth of 1,150 feet, along with a 5,000-foot 10 inch transmission line, a 500,000-gallon groundwater storage tank, and a 500,000-gallon elevated storage tank. Additional disinfection treatment is also assumed.

A facility cost estimate was developed using the TWDB Cost Estimating Tool in September 2023 dollars. The facility cost is $8,667,000. The Cost Estimating Tool was also used to determine total project costs and operating costs.

In September 2023 values, the total project cost for this strategy is $12,219,000. This would result in a total annual cost (including operations and maintenance) of approximately $1,034,000. The unit cost of water is $4,765/ac-ft. The unit cost based on the full use of the well in non-drought years is closer to $1,068/ac-ft. The TWDB Costing Tool Cost Summary is provided in Appendix 5C.

Environmental Impacts

The small increase in groundwater use (217 ac-ft/yr) would have the environmental benefit of a small amount of additional flow being discharged to the local stream. There are no springs, so diminished springflow from reduced aquifer levels is not a concern. Because this project will use all of the water in the basin available under the MAG, up to 15 feet of average drawdown in the Gulf Coast Aquifer could occur.

Impacts on other Water Resources of the State

The Gulf Coast Aquifer underlying Jackson County has sufficient water in storage to meet short-term demands in DOR conditions, so the localized impacts of increased use would be unlikely to impact other water resources of the state. However, in a widespread drought, the adjacent regions are likely to be increasing groundwater use as well, with some potential for additional drawdown. Additionally, prolonged drought-level use within the LRWPA could create increased drawdowns in adjacent counties and regions. Assuming pumping remains within the MAG, impacts should be limited.

Impacts on Threats to Agriculture and other Natural Resources of the State

The volume of water planned for this project contributes to a small shortage (1,115 ac-ft/yr) for Irrigation in Jackson County, Lavaca Basin during DOR conditions. Conservation has been recommended as a WMS to address that shortage. The Edna project does not impact any agricultural acreage or other natural resources of the State.

5.1.5.4.2 Expand Use of Groundwater - Hallettsville

The majority of water supplies in the LRWPA are provided by groundwater supplies, notably from the Gulf Coast Aquifer. Groundwater in the region is pumped for domestic, agricultural, municipal, and industrial purposes.

Groundwater availability is limited to the MAG volumes as calculated based on the DFCs as established by the GMA process. The LRWPA is within GMA 15. The GCD within GMA 15 collaborated to determine the DFC for the Gulf Coast Aquifer System. The DFC, adopted October 14, 2021, states that no more than 18 feet of average drawdown can occur by 2080 relative to year 2000 conditions in Lavaca County.

Hallettsville plans to install a new well and expand its groundwater storage tank at an existing location to provide additional groundwater supply from the Gulf Coast Aquifer System in Lavaca County, Lavaca Basin, by 2030. This additional water, referred to as remaining supply, was determined by subtracting the water that is currently allocated from the available water under the MAG. Because the irrigation demands in the plan are based on severe drought conditions (2011-2013 drought years), the remaining supply available for strategies in the plan for Lavaca County, Lavaca Basin is only 294 ac-ft/yr. This is the regional water planning amount that would be available for Hallettsville during severe drought conditions, without overallocation of the aquifer. In most other years, its full planned yield from the well (1,676 ac-ft/yr) would be available.

For costing purposes, a 1,300 gpm well was assumed, with 80 percent efficiency, at a depth of 1,200 feet, along with a 500,000-gallon groundwater storage tank and 60 feet of 12 inch transmission line. Additional disinfection treatment is also assumed. No land acquisition was assumed because the project is planned at an existing site owned by the utility.

A facility cost estimate was developed using the TWDB Cost Estimating Tool in September 2023 dollars. The facility cost is $3,507,000. The Cost Estimating Tool was also used to determine total project costs and operating costs.

In September 2023 values, the project cost for this strategy is approximately $4,888,000 This would result in a total annual cost (including operations and maintenance) of approximately $565,000. The unit cost of water is $1,922/ac-ft. The unit cost based on the full use of the well in non-drought years is closer to $337/ac-ft. The TWDB Costing Tool Cost Summary is provided in Appendix 5C.

Environmental Impacts

The small increase in groundwater use (294 ac-ft/yr) would have the environmental benefit of a small amount of additional flow being discharged to the local stream. There are no springs, so diminished springflow from reduced aquifer levels is not a concern. Because this project will use all of the water in the basin available under the MAG, up to 18 feet of average drawdown in the Gulf Coast Aquifer could occur.

Impacts on other Water Resources of the State

The Gulf Coast Aquifer underlying Lavaca County has sufficient water in storage to meet short-term demands in DOR conditions, so the localized impacts of increased use would be unlikely to impact other water resources of the state. However, in a widespread drought, the adjacent regions are likely to be increasing groundwater use as well, with some potential for additional drawdown. Additionally, prolonged drought-level use within the LRWPA could create increased drawdowns in adjacent counties and regions. Assuming pumping remains within the MAG, impacts should be limited.

Impacts on Threats to Agriculture and other Natural Resources of the State

The volume of water planned for this project contributes to a small shortage (500 ac-ft/yr) for Irrigation in Lavaca County, Lavaca Basin during DOR conditions. Conservation has been recommended as a WMS to address that shortage. The Hallettsville project does not impact any agricultural acreage or other natural resources of the State.

5.1.6 Alternative Strategies

The Lavaca RWPG included five alternative strategies in the 2026 Lavaca Regional Water Plan.

5.1.6.1 Expand Use of Groundwater (Alternative Strategy)

The majority of water supplies in the Lavaca Region are provided by groundwater supplies, notably from the Gulf Coast Aquifer. Groundwater in the region is pumped for domestic, agricultural, municipal, and industrial purposes.

Groundwater availability is limited to the MAG volumes as calculated based on the DFCs as established by the GMA process. The Lavaca Region is within GMA 15. The GCD within GMA 15 collaborated to determine the DFC for the Gulf Coast Aquifer System. The DFC, adopted October 14, 2021, states that no more than 15 feet of average drawdown can occur by 2080 relative to year 2000 conditions in Jackson County and Wharton County, and no more than 18 feet of average drawdown for Lavaca County.

The planning requirements do allow use of a MAG peak factor, which is a percentage (e.g., greater than 100 percent) applied to a MAG value reflecting annual groundwater availability that, for planning purposes, shall be considered temporarily available for pumping consistent with DFCs. The Lavaca Regional Water Planning Group considered, but ultimately decided against, implementing a MAG peak factor in the Gulf Coast Aquifer during the 2021 planning cycle and did not revisit the idea during the 2026 planning cycle.

This strategy proposes to pump additional groundwater from existing wells during drier years only, beginning in 2030, to meet irrigation needs in Jackson County (1,000 ac-ft/yr in the Lavaca Basin), Lavaca County (500 ac-ft/yr in the Lavaca Basin), and Wharton County (7,716 ac-ft/yr in the Lavaca Basin).

Costs

A unit cost of $82/ac-ft was calculated as the additional pumping cost for estimated additional drawdown using the TWDB Costing Tool. No capital costs were assumed. This cost would only be assessed when needed. It is further assumed that the aquifer would recover between droughts.

Environmental and Other Impacts

The continued use of current levels of irrigation water would have the environmental benefit of ensuring that current or near-current volumes of agricultural return flows will continue to be discharged to the streams in the region. Additionally, wildlife habitats benefit from sustained return flows in drought. There are no springs, so diminished springflow from reduced aquifer levels is not a concern. If increased use continues over a long period of time, there is a potential for land subsidence with attendant environmental effects. There are zero anticipated impacts to cultural resources.

The Gulf Coast Aquifer underlying Jackson, Lavaca, and Wharton counties has sufficient water in storage to meet short-term demands in DOR conditions, so the localized impacts of increased use would be unlikely to impact other water resources of the state. However, in a widespread drought, the adjacent regions are likely to be increasing groundwater use as well, with some potential for additional drawdown. Additionally, prolonged drought-level use within the LRWPA could create increased drawdowns in adjacent counties and regions.

Impacts to Agriculture

Availability of water for irrigation purposes reduces the threats to agriculture by providing an additional supply of 1,000 ac-ft/yr in Jackson County, 500 ac-ft/yr in Lavaca County, and 7,716 ac-ft/yr in Wharton County.

5.1.6.2 Lake Texana Dredging (Alternative Strategy)

The LNRA is considering the dredging of Lake Texana as a strategy to improve the capacity of an existing water supply. Dredging is defined by the National Oceanic and Atmospheric Administration as the removal of sediment and debris from the bottom of a body of water such as a port, bay, river, channel, or lake.

In August 2024, Anchor QEA completed a study for the Texas General Land Office (GLO) called the *Assessment of Reservoir-Impounded Sediment as a Sediment Source for Coastal Resiliency Projects*. In accordance with the language provided in the study, this study looked at the possibility of using reservoir-impounded sediment as a sediment source for coastal resiliency projects. One of the reservoirs analyzed was Lake Texana. The paired coastal resiliency project is the Harbor of Refuge Protection and Restoration project, located near the City of Port Lavaca. The Harbor of Refuge Protection and Restoration project would provide wetland restoration, construction of living shoreline breakwaters, and a shoreline revetment. The wetland restoration component of this project is aligned with the sediment characteristics within Lake Texana. Available information on sediment accumulation and material quality was compiled for Lake Texana, and generalized cost projections were prepared for the reservoir-coastal resiliency project pairing. The project-pairing cost projections were then compared to estimated costs for import of new material to the coastal resiliency projects to evaluate economic feasibility.

The TWDB conducted a *Volumetric Survey of Lake Texana, January-March 2010 Survey (Volumetric Survey*), dated August 2011, in order to calculate the lost storage of the reservoir due to sediment accrual. The report estimates Lake Texana's storage volume to have decreased from 171,307 ac-ft pre-impoundment in 1980 to 159,845 ac-ft in 2010. Projected sedimentation used in evaluating the firm yield of Lake Texana, as determined by the TCEQ Lavaca River WAM Run 3, shows that by 2040, the storage volume will have decreased further to 152,179 ac-ft.

The TWDB conducted a *Volumetric and Sedimentation Survey of Lake Texana,* dated August 2020, in order to calculate the lost storage of the reservoir due to sediment accrual. As stated in the GLO study, "as of 2020, TWDB estimated that the reservoir contains a total of 11,523 acre-feet (18.6M cubic yard [cy]) of accumulated sediment, which reflects an average annual sedimentation rate of 288 acre-feet (465,000 cy) per year, below the conservation pool elevation. These sedimentation estimates, developed by the TWDB, were based on comparisons between the bathymetric survey at the time of the TWDB study and the pre-impoundment surface. Sediment deposition thicknesses are variable in the upstream portion of the reservoir but become somewhat more uniform near the dam. – Extensive deposits exist near shorelines along the southern portion of the reservoir, with thicknesses ranging from approximately 1.5 to 3 feet thick. These deposits could be targeted for dredging for increasing storage capacity."

Selection of end-use for dredged material is largely dependent on sediment characteristics. According to the TWDB *Volumetric Survey*, the sediments to be dredged consist of fine silty loam soils with high water content. Additional sediment testing of Lake Texana will be required to determine percent composition of clay, organic matter, nutrients, regulated contaminants, oil, and grease. If sand content is high, favorable end-uses include beach restoration and repurposing of dredged material for construction. For higher silt and mud contents, favorable end-uses include: riparian buffer zone augmentation, wetland restoration or creation, and agricultural/field application. If contaminants are present, confined disposal is required.

Dredging methods may be categorized broadly as either mechanical or hydraulic (suction). Mechanical dredging is accomplished by lifting material via "clamshells" or buckets; material is then loaded and trucked to end use. Mechanical dredging is especially economically favorable when drought conditions lead to low lake levels, exposing and drying sediment for removal by heavy equipment. Hydraulic dredging involves the use of water jets or a suction head to take up lake sediment and a floating pipeline system to deliver material to its end use.

Transportation methods to move the sediment to its project location include a slurry pipeline, trucks, barges, rail, and intermodal, which means a combination of methods. The GLO study considered methods of transportation and included them in the costing of the project. Slurry pipelines, barges, and rail (through intermodal transportation) were all methods that were not identified as feasible for the Lake Texana – Harbor of Refuge Protection and Restoration project. The distance a truck would need to travel one-way is 29 miles, which the GLO study identified as the most feasible method.

The GLO study looked at the removal of 100,000 cy of sediment. Because the amount of sediment needed for the wetland restoration is not known at this time, the sediment amount can be scaled as needed. For the purposes of this report, the sediment removal is assumed to occur within the southern portion of Lake Texana. According to Figure 9 in the TWDB *Volumetric Survey*, the portion of Lake Texana south of Texas State Highway 111 has accrued the most sediment since the reservoir was impounded.

100,000 cy of sediment is equal to approximately 62 ac-ft, which is a relatively small amount to have an impact on the firm yield of Lake Texana. For purposes of this planning report, it is assumed that the removal of 62 ac-ft of sediment would increase the firm yield of Lake Texana by 2 ac-ft/yr. The yield for this strategy is shown in Table 5-15.

Table 5-15 LNRA Lake Texana Dredging Yield

Lake Texana Dredging Firm Yield (ac-ft/yr)					
2030	2040	2050	2060	2070	2080
0	2	2	2	2	2

This strategy would provide yield within the existing water rights of the LNRA by restoring the reservoir to its original design capacity.

Costs

Costs for this strategy were taken from the GLO study. Because the report was finalized in August 2024, the costs were converted back to September 2023 dollars to include in the TWDB Uniform Costing Model tool using the CCI index. Because the sediment will be used for a beneficial purpose by the GLO, it is assumed that at least 50 percent of the costs will be paid for by the GLO, although that assumption does not impact the cost calculations.

Costs were pulled from the GLO study and entered as external costs in the Costing Tool.

The calculated costs assume that:

- The volume of dredging was assumed to be 100,000 cy.
- Dredging is assumed to be performed using a hydraulic cutterhead dredge.
- Conceptual locations were selected for dredging and sediment processing in areas that appear constructible and feasible.
- Sediment processing is assumed to be conducted using temporary constructed impoundment areas.
- Land rental costs are included to represent the use of private property for equipment staging and sediment processing.
- Trucked transport of dredged material is assumed to occur as a baseline transportation condition. Distance from Lake Texana to project site is 29 miles.
- After transportation, it is assumed that the dredged sediment will be stockpiled at a location near the coastal resiliency project.

The major capital costs for this strategy include the following:

- Land procurement and site preparation.

- Hydraulic dredging equipment.
- Dewatering and site restoration.
- Transportation (trucked) and off-loading.

Cost of facilities was calculated to be $3,289,000, with total project costs calculated at $4,586,000. Annual costs including debt service over 20 years is $323,000, and with a low project yield of 2 ac-ft/yr, the unit cost comes out to $161,500. The TWDB Costing Tool Cost Summary is provided in Appendix 5C.

Environmental and Other Impacts

Dredging often requires a combination of environmental permits due to its invasive mechanism and varied pathways to end use. Conventional dredging methods destroy lake floor habitat, increase turbidity, decrease dissolved oxygen levels, and can volatilize contaminants. In combination, these effects lead to the death of aquatic life and reduced quality of raw water supply. Dredging must be performed during non-spawning seasons for aquatic life and may be prohibited if endangered species are present. Refer to *Chapter 1, Table 1-5,* for the complete list by county of threatened and endangered species in the Lavaca Regional Water Planning Area.

Contemporary suction dredging methods can minimize undesired turbidity increases and reduce impact on aquatic life by using adaptive auger heads. Use of this technology can help preserve the water quality of the reservoir, prevent aquatic organism and fish population decline, and ensure compliance with environmental regulations. Additionally, sediment removal may reduce nutrients and sediment transport to the bay.

If dredged material contains high levels of contaminants, the material must be properly treated and disposed of in regulated Confined Disposal Facilities. Additionally, effluent from dewatering facilities is regulated as a discharge to the waters of the United States, and subject to permitting requirements as defined by the Clean Water Act.

Table 5-16 shows potential applicable regulations, as reported in the TWDB's *Dredging vs. New Reservoirs* report, dated December 2005.

Table 5-16 Potential Applicable Regulations for Dredging Activities

Statute	Regulation	Agency	Remarks
Clean Water Act Section 401	40 CFR 121	TCEQ	Dredge and fill discharges to waters of US
Section 402	40 CFR 122	TCEQ	Stormwater discharges
Section 404	33 CFR 320-30	USACE	Dredge and fill discharges to waters of US
R&H Act 1899	33 CFR 403	USACE	Navigable waters of the US
Coastal Zone Management Act	15 CFR 923	Texas	Dredging, disposal of solids in water in coastal zone
NEPA	40 CFR 1500-1508	USEPA	Federal action or permit issuance
Fish & Wildlife Coordination Act	16 CFR 661-667e	USFWS	Federal agency projects and federal permits
Endangered Species Act	16 CFR 1531-1544	USFWS	Activities that could impact threatened or endangered species
RCRA	40 CFR 257-258	USEPA	Storage, treatment and disposal of hazardous waste
TSCA	40CFR 761	USEPA	Handling or disposal of PCB-contaminated sediments
National Historic Preservation Act	36 CFR 800	THC	Requires survey and investigation for pre- and historic sites

This project should have zero impacts to cultural resources. It will provide a benefit to natural resources by restoring wetlands near Port Lavaca.

Impacts to Agriculture

This project should have zero impacts to agricultural acreage.

5.1.6.3 LNRA Aquifer Storage and Recovery (Alternative Strategy)

LNRA participated with the City of Victoria, the Victoria County Groundwater Conservation District, the Guadalupe-Blanco River Authority, and the Port of Victoria on the *Victoria Area Aquifer Storage and Recovery (ASR) Feasibility Study*, prepared in 2014 by Naismith Engineering Inc., for a study area consisting of Victoria, Jackson, and Calhoun counties. The Jackson County portion of the study was limited to assessing potential locations and feasibility and did not include any modeling or cost determination efforts. Information from the feasibility study related to location and permitting issues is included in this report.

The feasibility study suggested that there are numerous suitable sites for ASR in southern Jackson County, specifically near Carancahua Bay. The site area suggested by the feasibility study was used for costing purposes. This area is in the vicinity of Highway 35 and Highway 172. The targeted interval for ASR wells in this area is between -300 feet mean sea level (msl) and -1,050 feet msl, which intersects the Lissie and Willis formation of the Chicot aquifer and the Upper Goliad formation of the Evangeline aquifer. For regional water planning purposes, these are all considered part of the Gulf Coast aquifer. Sand beds are common in the area, with estimated hydraulic conductivity ranging from 5 feet/day to 18 feet/day, depending on the formation. The estimated migration rate from the ASR wells would be less than 2 feet/yr. Fresh water is expected to occur down to approximately -500 feet msl. Below -600 feet msl, TDS concentrations may range from 1,500 to 5,000 mg/L.

The source of water for the ASR project is assumed to be the Lavaca River, downstream of Lake Texana. A water right permit for a junior water right would need to be obtained from TCEQ. The firm yield of the ASR project was analyzed, using an unmodified version of the TCEQ Lavaca River WAM Run 3, to have no negative impacts to the freshwater inflows to Lavaca Bay, as dictated by the latest TCEQ environmental flow standards, adopted August 2012. An authorized diversion of 25,000 ac-ft/yr was assumed, using a 20 MGD river intake structure and pump station to divert excess flows from the river.

Table 5-17 Details for Hydrologic Model Used for Alternative Strategies

Model Name	Version Date	Input/Output Files Used	Date Model Used	Comments
Modified TCEQ Lavaca WAM Run 3	10/1/23	lav3.dat	12/16/24 -BV	Added coding from FNI for LTYEP project and then added coding for new diversion

Due to the nature of the strategy where excess flows are stored in the aquifer for later use, the available diversions over the DOR were averaged to provide an annual yield of 13,600 ac-ft/yr, although additional water is available for diversion in non-drought years and the infrastructure was sized to reflect this. This yield then had an 80 percent ASR recovery rate applied to it. The resulting firm yield for this project is 10,880 ac-ft/yr, to be implemented for the 2050 planning decade. Modifications to the assumptions, such as authorized diversion and infrastructure size, could modify the resulting yield. The ASR modeling assumed that the Lavaca Off-Channel Reservoir strategy had already been implemented.

ASR reduces the water losses associated with evaporation from a reservoir, but there can be water losses due to recovery efficiency from the aquifer. Migration rates are estimated at less than 2 feet/yr, so impacts will depend on how long the stored water remains in the aquifer.

This yield would increase LNRA's supply as a major water provider and would be available to meet potential water needs for existing and future customers either within or outside of the region.

Costs

The following infrastructure was proposed:

- 20 MGD River Intake Structure and Pump Station.
- Ten 1,000 gpm aquifer storage and recovery wells and well transmission piping.
- 15 MGD Water Treatment Plant.
- Approximately 15 miles of raw water transmission piping and appurtenances and 7 miles of treated water transmission piping and appurtenances.

- One 20 MG raw water storage tank (to handle peak flows to reduce water treatment plant size).

A facility cost estimate was developed using the TWDB Cost Estimating Tool in September 2023 dollars. The facility cost is $234 million. The Cost Estimating Tool was also used to determine total project costs and operating costs.

In September 2023 values, the project cost for this strategy is approximately $326.8 million. This would result in a total annual cost (including operations and maintenance) of approximately $32.8 million. The unit cost of water is $3,016/ac-ft. The TWDB Costing Tool Cost Summary is provided in Appendix 5C.

Environmental and Other Impacts

The aquifer storage and recovery strategy will require extensive permitting to ensure it complies with all environmental considerations. The primary regulatory agencies would be the TCEQ and the Texana Groundwater Conservation District. ASR wells used for both recharge and recovery are subject to permitting requirements based on the source of the water being injected and the aquifer in which the water is stored. The primary regulatory requirements include TCEQ's administration of underground injection of water and surface water diversion permitting; and the regulation of recharge and recovery of water by the GCD.

Surface water from the Lavaca River contains more dissolved oxygen (DO) than groundwater. When DO is present in the water introduced to an aquifer, a chain of oxygen reduction reactions results in selective leaching and/or mineral dissolution, releasing metals such as arsenic.

The proposed location of the assumed diversion point is such that it is downstream of all TCEQ adopted environmental flow standard instream flow measurement points along the Lavaca River. The only TCEQ standard that needs to be met is the Bay and Estuary Freshwater Inflow standards for the Lavaca Bay System. Because the current version of the TCEQ Lavaca WAM Run 3 incorporates the environmental flow standards in the model, and the diversion for the ASR was modeled using a junior water right priority date, diversions to the ASR are made only after the environmental flow standard is met.

As described, this project could remove up to 25,000 ac-ft/yr of streamflow from the Lavaca River in any given year. Flows may ultimately be returned to river after use.

It is assumed the pipeline construction would have negligible impacts on cultural resources and wildlife habitat, but coordination with the THC will need to occur and proper environmental field studies will need to be performed before construction begins.

Impacts to Agriculture

The proposed strategy would have a negligible impact on local agricultural activities. Siting of the project would remove approximately 130 acres of total agricultural land from production but would have negligible influence given the large quantity of agricultural land in the area.

5.1.6.4 Irrigation Conservation – Alternate Wetting and Drying (Alternative Strategy)

Conservation via irrigation techniques – such as alternate wetting and drying (AWD) – was considered as a strategy in all counties. AWD is the implementation of intermittent irrigation. Though monitoring of soil moisture, the field is left to dry to a point when sufficient water is still in the soil for sustained plant growth before it is re-flooded. This cycle is done repeatedly except during flowering stage of crop growth when the plants are sensitive to dry conditions and field is kept in flooded conditions. It is assumed that implementation of AWD can result in a water savings of 38 percent.

The strategy assumes AWD will be applied to 10 percent of non-rice acreage, or 1,927 acres. Water savings from this strategy were calculated to be 592 ac-ft/yr. For the implementation of this strategy, it is assumed that one moisture meter node is installed per 10 acres. These sensors cost about $1,000 each; however, as the sensors have a life of about 10 years, the capital cost recurs every decade.

Table 5-18 Irrigation Conservation – Alternate Wetting and Drying

WUG	County	Basin	Acreage Applied	Water Savings (ac-ft/yr)	Capital Cost (Per decade)
IRRIGATION	LAVACA	LAVACA	14	4	$6,000
IRRIGATION	JACKSON	MULTIPLE	1,197	368	$720,000
IRRIGATION	WHARTON	MULTIPLE	716	220	$432,000

Additionally, AWD may increase nitrous oxide emissions, but should have zero other environmental impacts (impacts to environmental streamflow and bay needs, wildlife habitat, and cultural resources) and benefits agriculture by extending the available water supply by 592 ac-ft/yr.

5.1.6.5 Drought Management for Manufacturing (Alternative Strategy)

Drought management is considered as a WMS for the portion of the Manufacturing water use category in Jackson County that relies on surface water. The purpose for the drought management strategy is to acknowledge that surface water may be restricted in accordance with LNRA's Drought Contingency Plan during times of severe drought, as well as to prepare for potential emergency situations that may occur. Chapter 7 discusses drought response for the region in more detail.

Drought management was evaluated by reviewing LNRA's Drought Contingency Plan and applying the severe drought trigger response for demand reduction. Under severe drought, LNRA customers will be required to reduce demand by 10 percent. Since a small portion of the Manufacturing water use category in Jackson County utilizes groundwater, only the demands relying on surface water are considered for reduction. The following table shows the potential demand reductions for each WUG:

Table 5-19 Drought Management for Manufacturing Water Demand Reductions

WUG	County	Basin	Demand Reduction (ac-ft/yr)					
			2030	2040	2050	2060	2070	2080
MANUFACTURING	JACKSON	COLORADO-LAVACA	856	919	921	923	926	928
MANUFACTURING	JACKSON	LAVACA	0	0	0	0	0	0
MANUFACTURING	JACKSON	LAVACA-GUADALUPE	627	674	675	677	678	680

Costs

To determine the costs of restricted water use during drought, the TWDB's 2024 *Socioeconomic Impacts of Projected Water Shortages* will be used. This document will be provided by TWDB and included with the final regional water plan and identifies the social and economic costs of not meeting the identified water needs in the plans.

The analysis from the 2021 Plan showed that Manufacturing in the Lavaca Region provided $255.0 million to the economy. Manufacturing in the Lavaca Region is projected to use 15,779 ac-ft of water in 2030. This equates to a unit cost of $16,161/ac-ft of unavailable water. For Jackson County, this would give an annual cost of $23,967,000 if drought restrictions were put in place. These costs will be updated for the final regional water plan.

Capital costs are not associated with this strategy. The costs reflect income losses to the facilities based on the anticipated reduced output of product due to the water restrictions.

Zero environmental impacts (all environmental factors) are anticipated from this strategy. Zero impacts to agriculture are also anticipated.

5.1.7 Strategies Considered but Not Recommended

These strategies were evaluated and considered by the Lavaca RWPG, but ultimately not recommended.

5.1.7.1 Drought Management for Irrigation (Considered)

Polypipe irrigation, implemented during periods of drought, acts as an alternative to furrow irrigation or field inundation. The strategy involves the installation of flexible polyethylene resin pipes. These pipe systems provide a higher irrigation efficiency and better irrigation control but can only last up to one season and may require replacement throughout the growing season. It is assumed that using flexible polypipe can result in a water savings of 25 percent.

The strategy was initially evaluated during the 2021 planning cycle to meet irrigation needs. The original evaluation assumed polypipe would be applied to 20 percent of planted cotton in Wharton County, Lavaca Basin, during periods of drought (4,919 acres). Water savings from this strategy were calculated to be 1,180 ac-ft/yr for Wharton County. After much discussion, because this strategy was determined to be not as viable as other considered strategies to meet irrigation demands, the Lavaca RWPG decided not to recommend drought management as a strategy in the 2021 Lavaca Regional Water Plan.

For the 2026 planning cycle, the strategy was considered again, and again the Lavaca RWPG decided not to include it as either a recommended or an alternative strategy.

5.1.8 Implementation of Certain Water Management Strategies

This subsection is a new requirement for inclusion in the 2026 Regional Water Plans. The purpose of this new subsection is to document the implementation status of certain WMSs that are recommended in the plan to demonstrate the feasibility of each recommended strategy to be fully implemented by the online decade documented in the Regional Water Plan.

The implementation status must be documented for the following types of recommended WMSs with any online planning decade:

- All reservoir strategies (including major and minor reservoirs);

- All seawater desalination strategies;
- Direct potable reuse strategies that provide greater than 5,000 ac-ft/yr of supply;
- Brackish groundwater strategies that provide greater than 10,000 ac-ft/yr of supply;
- Aquifer storage and recovery strategies that provide greater than 10,000 ac-ft/yr;
- All water transfers from out of state; and
- Any other innovative technology projects the RWPG considers appropriate.

The status includes key milestones achieved, such as when a WMS sponsor took an affirmative vote or other action to make expenditures necessary to apply for permits and/or perform planning, design, or construction. A table is included in Appendix 5D, which documents these key milestones. The appendix also includes a graphic that display the full planning horizon (2030 to 2080) and a separate graphical timeline for each project that includes major anticipated, future implementation milestones. The project that meets the above requirements is:

- LNRA – Lake Texana Yield Enhancement Project

5.2 Water Conservation

The 2026 Lavaca Regional Water Plan is required to have a subsection of Chapter 5 that discusses all recommended conservation strategies. Conservation is recommended as a WMS for Irrigation, Manufacturing, and for several municipal utilities in the region. The LAVACA RWPG recognizes the need for financial assistance in rural and agricultural areas for implementing conservation requiring infrastructure improvements.

Recent and Recommended Water Conservation Legislation and Policies

Since the last “Water Conservation Advisory Council Report to the 88th Texas Legislature (2022),” the Texas State Legislature made a significant investment in water infrastructure through the passage of Senate Bill (SB) 28 and Senate Joint Resolution (SJR) 75 providing for the creation of the Texas Water Fund. In addition, SB 30 authorized a one-time, $1 billion supplemental appropriation of general revenue to the Texas Water Fund, contingent on enactment of SB 28 and approval of SJR 75 by voters. Proposition 6 (the proposition for SJR 75), creating the Texas Water Fund to assist in financing water projects in Texas, passed on November 7, 2023, with more than 77 percent in favor. The Texas Water Fund, managed by TWDB, prioritizes investment in water loss mitigation and other water strategies. The 88th Legislative Session also established the TexMesonet Hydrometeorology Network and created the TexMesonet Advisory Committee through House Bill 2759 to support a statewide evapotranspiration (ET) network.

The recent report, “Water Conservation Advisory Council Report to the 89th Texas Legislature (2024),” has recommended the following two additional legislations:

1. The Council recommends that the Texas Legislature replenish funding in the Agricultural Water Conservation Fund sufficient to support the TWDB’s grant and loan program for a total of $15,000,000 for the next 10 years.
2. Increase appropriations by $1,200,000 for the biennium to the TWDB to develop and support a statewide ET network within the TexMesonet. Funding will be used for the following:
    - Up to 2.5 new full-time equivalent staff positions;

- Contracting a study on existing TexMesonet weather stations regarding siting requirements to calculate ET (study of fetch);
- Resources to update existing sites to accommodate ET measurements; and
- Grants and/or contracts with agencies to provide technical assistance.

5.2.1 Municipal Conservation

Conservation is a combination of strategies for reducing the consumption of water, improving the efficiency in the use of water, or reducing the loss or waste of water. With no anticipated projected municipal water needs, municipalities in the region do not have a large incentive to implement conservation. However, the Lavaca RWPG feels it is important to recommend municipal conservation as a water management strategy to encourage conservation in the region and to aid municipalities in obtaining funding to perform conservation measures. For the purposes of planning, municipal conservation is distinguished by two approaches: water loss mitigation and water use reduction.

A methodology was developed to determine the anticipated municipal water conservation savings for the WUGs within the Lavaca Region. First, WUGs were required to meet the following criteria to be chosen for conservation measures:

- Be a municipal WUG.
- Have a year 2030 per capita water usage of greater than 140 GPCD, indicating a potential for savings through conservation.

Conservation was considered, regardless of whether a municipality had a water need.

Specific details related to Municipal Conservation are included in Subsection 5.1.5.2.

5.2.2 Conservation for Manufacturing

While there are identified water needs (shortages) for Manufacturing in Jackson County, the Lavaca RWPG would like to encourage all water users in the region to reduce water wasting where possible.

The TWDB Water Conservation Implementation Task Force recommended strategies for industrial users to conserve water in the "Best Management Practices for Industrial Water Users" guidance. The guide provides BMPs for specific industries, as well as general BMPs that are recommended for any type of industrial user.

Specific details related to the recommended Conservation for Manufacturing WMS are included in Subsection 5.1.3.1.

5.2.3 Irrigation Conservation

Several methods of conservation for agriculture were considered in the 2026 Lavaca Regional Water Plan to help meet irrigation needs. The recommended conservation measures for irrigation include On-Farm Conservation and Tail Water Recovery. On-Farm Conservation is recommended as a water management strategy in Lavaca, Jackson, and Wharton Counties. Tail Water Recovery focuses on Wharton County (within the Lavaca Basin), where irrigation needs are identified, but the Lavaca RWPG supports conservation for irrigation in the whole region.

Irrigation conservation in the region is an issue; on the agricultural side, conservation savings would not result in a reduction of capital expenditures but a forced expenditure of funding to garner any savings. A finite upper limit to the amount of money can be spent to conserve agricultural water and still be supported by on-farm income. The high cost of conservation and the lack of funds to pay for it make large scale conservation projects unlikely. Implementation largely depends on funding from the NRCS. Programs such as the EQIP have made the costs of improvements more reasonable for farmers with some success. However, the way in which agricultural operations in the Lavaca Region are managed prevent such programs from having substantial effects. A large portion of the irrigated acreage within the Lavaca Region is farmed by tenant farmers who have only year-to-year leases. These farmers have a limited incentive for investing in conservation measures without financial backing from the owner of the property.

Increased conservation in agricultural irrigation would have a potentially negative impact on streamflows in the area. During dry months, return flows from agricultural operations represent nearly all the streamflow seen in the region. Therefore, additional conservation during these times could have adverse effects on wildlife habitat. The more efficient usage of available supply may reduce habitat if canals with current plant growth and wildlife harborage are converted to pipelines or are lined to reduce seepage and plant growth. There should be zero impacts to cultural resources.

WMSs related to Irrigation Conservation are discussed in detail in Subsection 5.1.2.1.

5.2.3.1 On-Farm Conservation

On-farm conservation measures include a combination of land leveling, multiple inlets, irrigation well meters, and replacement of canal ditches with pipeline. These measures increase water efficiency and reduce water loss. All measures focused on rice production, with the exception of irrigation well meters, which could also be applied for rice production, but focused on non-rice crops in this analysis.

Specific details related to On-Farm Conservation are included in Subsection 5.1.2.1.1.

5.2.3.2 Tail Water Recovery

Tail water recovery is also recommended as a water management strategy. Tail water recovery is defined by the Natural Resources Conservation Service as a planned irrigation system in which all facilities utilized for the collection, storage, and transportation of irrigation tail water and/or rainfall runoff for reuse have been installed. The system allows for the capture of a portion of the irrigation field return flows, stores them until needed, and then conveys the water from the storage facility to a point of entry back into the irrigation system.

Specific details related to Tail Water Recovery are included in Subsection 5.1.2.1.2.

5.2.4 Model Water Conservation Plans

Pursuant to Texas Water Code § 11.1271 and TWDB Exhibit C, each region is required to include model conservation plans for the region in the plan. Model conservation plans are available on the TCEQ website using the link below. The link contains model water conservation plans for the following types of water users:

- Municipal Water Use by Public Water Supplier.
- Wholesale Public Water Suppliers.
- Industrial Use.
- Mining Use.

- Agricultural Uses.

https://www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/conserve.html#whattoinclude

While the existing municipal water conservations in the region have varying formats, one of the municipal water conservation plans in the region that could be used as an example is the El Campo Water Conservation and Drought Contingency Plan, located here: City of El Campo Water Conservation and Drought Contingency Plan Report.

Appendix 5A. Consideration of Strategies that are Potentially Feasible for Meeting Water Needs

Appendix 5A: Potentially Feasible Water Management Strategies Considered

Every WUG Entity with an Identified Need		**WMSs to be considered by statute**[1]												**Additional WMSs to be considered by rule**								
WUG Name	Maximum need 2030-2080 (af/yr)	conservation - water use reduction	conservation - water loss mitigation	drought management	reuse	management of existing supplies	development of large-scale marine seawater or brackish groundwater	conjunctive use	acquisition of available existing supplies	development of new supplies	development of regional water supply or regional management of water supply facilities	voluntary transfer of water (including regional water banks, sales, leases, options, subordination agreements, and financing agreements)	emergency transfer of water under Section 11.139	system optimization, reallocation of reservoir storage to new uses, contracts, water marketing, enhancement of yield, improvement of water quality	new surface water supply	new groundwater supply	brush management; precipitation enhancement	interbasin transfers of surface water	aquifer storage and recovery	cancellation of water rights	rainwater harvesting	other
Irrigation, Jackson County	1,115	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Irrigation, Lavaca County	500	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Irrigation, Wharton County	7,716	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Manufacturing, Jackson County	4,401	PF	PF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	PF	PF	nPF	nPF	

[1] Texas Water Code §16.053(e)(5)

nPF = considered but determined 'not potentially feasible' (may include WMSs that were initially identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

(all pertinent information for WMS evaluations must be presented in the regional water plan, including for WMSs considered potentially feasible but not recommended)

Appendix 5B. Recommended and Alternative Water Management Strategy Summaries

WUG Name	County	River Basin	Water Management Strategy Name	Region of Source	Source County Name	Source Name	Recommended Water Management Strategies (ac-ft/yr) 2030	2040	2050	2060	2070	2080
Shortage/Surplus							(1,115)	(1,115)	(1,115)	(1,115)	(1,115)	(1,115)
IRRIGATION	JACKSON	LAVACA	Conservation (On-Farm, including land-leveling, multipe inlets, well meters, and irrigation pipeline)	P	Jackson	Demand Reduction	3,722	3,722	3,722	3,722	3,722	3,722
Remaining Surplus/Shortage							**2,607**	**2,607**	**2,607**	**2,607**	**2,607**	**2,607**
Shortage/Surplus							(500)	(500)	(500)	(500)	(500)	(500)
IRRIGATION	LAVACA	LAVACA	Conservation (On-Farm, including land-leveling, multipe inlets, well meters, and irrigation pipeline)	P	Lavaca	Demand Reduction	860	860	860	860	860	860
Remaining Surplus/Shortage							**360**	**360**	**360**	**360**	**360**	**360**
Shortage/Surplus							(7,716)	(7,716)	(7,716)	(7,716)	(7,716)	(7,716)
IRRIGATION	WHARTON	LAVACA	Conservation (On-Farm, including land-leveling, multipe inlets, well meters, and irrigation pipeline)	P	Wharton	Demand Reduction	5,890	5,890	5,890	5,890	5,890	5,890
IRRIGATION	WHARTON	LAVACA	Conservation (Tail Water Recovery)	P	Wharton	Demand Reduction	1,910	1,910	1,910	1,910	1,910	1,910
Remaining Surplus/Shortage							**84**	**84**	**84**	**84**	**84**	**84**
Shortage/Surplus							(3,679)	(4,313)	(4,334)	(4,355)	(4,377)	(4,401)
MANUFACTURING	JACKSON	COLORADO-LAVACA	Conservation (Water Audit and Implementation of BMPs)	P	Jackson	Demand Reduction	873	936	938	940	943	945
MANUFACTURING	JACKSON	COLORADO-LAVACA	Lake Texana Yield Enhancment Project	P	Jackson	Lake Texana/ New Reservoir	3,878	4,950	4,950	4,950	4,950	4,950
Remaining Surplus/Shortage							**1,072**	**1,573**	**1,554**	**1,535**	**1,516**	**1,494**

APPENDIX 5B - RECOMMENDED WATER MANAGEMENT STRATEGY SUMMARY TABLE

Region	ID	Recommended Water Management Strategy	Total Capital Costs ($)	Estimated Annual Average Unit Cost ($/ac-ft/yr)	Water Supply Volume (ac-ft/yr) 2030	2040	2050	2060	2070	2080
P	P1	Municipal Conservation - Water Loss Mitigation	$27,619,000	$2,368 - $12,000	134	137	141	145	150	154
P	P2	Municipal Conservation - Water Use Reduction	$7,239,000	$554 - $1,950	91	290	473	582	668	760
P	P3	Reuse of Municipal Effluent - El Campo	$10,179,000	$2,041	0	560	560	560	560	560
P	P4	Expand Use of Groundwater - Edna	$12,219,000	$4,765	217	217	217	217	217	217
P	P5	Expand Use of Groundwater - Hallettsville	$4,888,000	$1,922	294	294	294	294	294	294
P	P6	Drought Management - Municipalities	$0	$414 - $1,001	460	475	490	505	519	534
P	P7	Irrigation Conservation - On-farm Conservation	$15,027,000	$13 - $151	12,335	12,335	12,335	12,335	12,335	12,335
P	P8	Irrigation Conservation - Tail water Recovery	$7,241,000	$409	1,910	1,910	1,910	1,910	1,910	1,910
P	P9	Conservation for Manufacturing	$0	$20 - $121	1,579	1,690	1,697	1,703	1,710	1,715
P	P10	Lake Texana Yield Enhancement Project	$544,066,000	$594 - $1,561	23,500	30,600	30,600	30,600	30,600	30,600
P	P11	LNRA Desalination	$198,982,000	$3,202	0	10,000	10,000	10,000	10,000	10,000

APPENDIX 5B - ALTERNATIVE WATER MANAGEMENT STRATEGY SUMMARY TABLE

Region	ID	Alternative Water Management Strategy	Total Capital Costs ($)	Estimated Annual Average Unit Cost ($/ac-ft/yr)	Water Supply Volume (ac-ft/yr)					
					2030	2040	2050	2060	2070	2080
P	PA1	LNRA Aquifer Storage and Recovery	$326,767,000	$3,016	0	0	10,880	10,880	10,880	10,880
P	PA2	Lake Texana Dredging	$4,586,000	$161,500	0	2	2	2	2	2
P	PA3	Drought Management - Manufacturing	$0	$16,161	1,483	1,593	1,596	1,600	1,604	1,608
P	PA4	Irrigation Conservation - Alternate Wetting and Drying	$1,158,000	$1,956	592	592	592	592	592	592
P	PA5	Expand Use of the Gulf Coast Aquifer	$0	$82	9,216	9,216	9,216	9,216	9,216	9,216

Appendix 5C. Water Management Strategy Cost Tables

Appendix 5C. Water Management Strategy Cost Estimate Summaries

Recommended Water Management Strategies

Alternative Water Management Strategies

County	WUG Name	Basin	Conservation applied? (2030 GPCD > 140)	Conservation Total Yield (AFY)						Water Loss Mitigation Yield (AFY)						Water Use Reduction Yield (AFY)					
				2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
JACKSON	COUNTY-OTHER, JACKSON	COLORADO-LAVACA	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JACKSON	COUNTY-OTHER, JACKSON	LAVACA	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JACKSON	COUNTY-OTHER, JACKSON	LAVACA-GUADALUPE	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JACKSON	EDNA	LAVACA	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JACKSON	GANADO	LAVACA	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JACKSON	QUADVEST	COLORADO-LAVACA	Yes	1	1	2	4	6	8	-	-	1	1	1	1	1	1	1	3	5	7
LAVACA	COUNTY-OTHER, LAVACA	GUADALUPE	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LAVACA	COUNTY-OTHER, LAVACA	LAVACA	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LAVACA	COUNTY-OTHER, LAVACA	LAVACA-GUADALUPE	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LAVACA	HALLETTSVILLE	LAVACA	Yes	34	68	108	152	199	251	20	22	23	25	27	29	14	46	85	127	172	222
LAVACA	MOULTON	LAVACA	Yes	8	14	19	25	28	27	5	4	4	4	4	4	3	10	15	21	24	23
LAVACA	SHINER	LAVACA	Yes	26	53	85	118	154	192	16	17	18	19	21	22	10	36	67	99	133	170
LAVACA	YOAKUM	LAVACA	Yes	34	66	69	73	76	80	20	21	22	23	24	25	14	45	47	50	52	55
WHARTON	COUNTY-OTHER, WHARTON	COLORADO	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WHARTON	COUNTY-OTHER, WHARTON	COLORADO-LAVACA	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WHARTON	COUNTY-OTHER, WHARTON	LAVACA	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WHARTON	EL CAMPO	MULTIPLE	Yes	115	218	324	348	348	348	69	70	70	70	70	70	46	148	254	278	278	278
WHARTON	WHARTON COUNTY WCID 1	LAVACA	Yes	6	6	7	7	7	8	4	4	4	4	4	4	2	2	3	3	3	4

County	WUG Name	Basin	Water Loss Mitigation Yield (AFY)								Water Use Reduction Yield (AFY)									
			Pipe Replaced (Miles)	WLM Capital Cost	Engineering, Legal Costs and Contingencies (30%)	Construction Interest (3%, 0.5 ROI)	Debt Service (3.5%, 10 Years)	Total Project Costs	Largest Annual Cost	Annual Cost ($ per acft)	Actual Smart Meters Installed	2080 Savings from Installation of Smart Meters (acft/yr)	2080 Savings from Non-Capital Improvements (acft/yr)	WUR Capital Cost	Engineering, Legal Costs and Contingencies (30%)	Construction Interest (3%, 0.5 ROI)	Debt Service (3.5%, 20 Years)	Total Project Costs	Largest Annual Cost	Annual Cost ($ per acft)
JACKSON	COUNTY-OTHER, JACKSON	COLORADO-LAVACA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JACKSON	COUNTY-OTHER, JACKSON	LAVACA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JACKSON	COUNTY-OTHER, JACKSON	LAVACA-GUADALUPE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JACKSON	EDNA	LAVACA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JACKSON	GANADO	LAVACA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JACKSON	QUADVEST	COLORADO-LAVACA	0.5	$ 461,472	$ 138,442	$ 17,000	$ 74,179	$ 616,000	$ 12,000	$ 12,000	46	2	5	$ 24,977	$ 7,493	$ 1,000	$ 2,355	$ 33,000	$ 4,000	$ 554
LAVACA	COUNTY-OTHER, LAVACA	GUADALUPE	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-
LAVACA	COUNTY-OTHER, LAVACA	LAVACA	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-
LAVACA	COUNTY-OTHER, LAVACA	LAVACA-GUADALUPE	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-
LAVACA	HALLETTSVILLE	LAVACA	4.1	$ 3,784,070	$ 1,135,221	$ 136,000	$ 607,855	$ 5,055,000	$ 101,000	$ 3,511	1,815	48	174	$ 979,941	$ 293,982	$ 36,000	$ 92,168	$ 1,310,000	$ 145,000	$ 652
LAVACA	MOULTON	LAVACA	1.1	$ 1,015,238	$ 304,572	$ 37,000	$ 163,145	$ 1,357,000	$ 27,000	$ 7,087	296	6	17	$ 159,740	$ 47,922	$ 6,000	$ 15,033	$ 214,000	$ 20,000	$ 853
LAVACA	SHINER	LAVACA	2.1	$ 1,938,182	$ 581,455	$ 70,000	$ 311,382	$ 2,589,000	$ 52,000	$ 2,368	1,298	36	134	$ 700,672	$ 210,202	$ 26,000	$ 65,919	$ 937,000	$ 107,000	$ 627
LAVACA	YOAKUM	LAVACA	4.2	$ 3,877,195	$ 1,163,159	$ 139,000	$ 622,773	$ 5,179,000	$ 104,000	$ 4,117	1,898	42	13	$ 1,025,156	$ 307,547	$ 37,000	$ 96,374	$ 1,370,000	$ 100,000	$ 1,832
WHARTON	COUNTY-OTHER, WHARTON	COLORADO	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-
WHARTON	COUNTY-OTHER, WHARTON	COLORADO-LAVACA	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-
WHARTON	COUNTY-OTHER, WHARTON	LAVACA	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-
WHARTON	EL CAMPO	MULTIPLE	8.5	$ 7,845,024	$ 2,353,507	$ 281,000	$ 1,260,073	$ 10,480,000	$ 210,000	$ 3,020	4,535	115	163	$ 2,448,910	$ 734,673	$ 88,000	$ 230,192	$ 3,272,000	$ 280,000	$ 1,005
WHARTON	WHARTON COUNTY WCID 1	LAVACA	1.9	$ 1,753,594	$ 526,078	$ 63,000	$ 281,686	$ 2,343,000	$ 47,000	$ 10,805	143	4	0	$ 77,220	$ 23,166	$ 3,000	$ 7,274	$ 103,000	$ 7,000	$ 1,950

WLM Assumptions: Assumes 3% of 2030 demand is reduced by replacement of 10% of the pipe. 80% of the replaced pipeline is 8”, 20% is 12”. As leak detection and repair is a constant effort, annual costs remain the same throughout the planning cycle.

WUR Assumptions: 3 people per household; 100% of household will install smart meters by 2080; Installation of smart meters saves ~ 5% of demand. As meters require regular replacement, annual costs remain the same throughout the planning cycle.

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Irrigation, Lavaca - On-Farm Conservation*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Integration, Relocations, Backup Generator & Other	$693,000
TOTAL COST OF FACILITIES	**$693,000**
- Planning (3%)	$21,000
- Design (7%)	$49,000
- Construction Engineering (1%)	$7,000
Legal Assistance (2%)	$14,000
Fiscal Services (2%)	$14,000
All Other Facilities Contingency (20%)	$139,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$31,000
TOTAL COST OF PROJECT	**$968,000**
ANNUAL COST	
Debt Service (3.5 percent, 10 years)	$116,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (0% of Cost of Facilities)	$0
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$116,000**
Available Project Yield (acft/yr)	860
Annual Cost of Water ($ per acft), based on PF=0	$135
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$0
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.41
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.00
Note: One or more cost element has been calculated externally	
A. Smiley	*10/30/2024*

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***Irrigation, Jackson - On-Farm Conservation***	
Cost based on ENR CCI 13485.67 for September 2023 and ***a PPI of 278.502 for September 2023***	
Item	***Estimated Costs for Facilities***
Integration, Relocations, Backup Generator & Other	$4,772,000
TOTAL COST OF FACILITIES	**$4,772,000**
- Planning (3%)	$143,000
- Design (7%)	$334,000
- Construction Engineering (1%)	$48,000
Legal Assistance (2%)	$95,000
Fiscal Services (2%)	$95,000
All Other Facilities Contingency (20%)	$954,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$210,000
TOTAL COST OF PROJECT	**$6,651,000**
ANNUAL COST	
Debt Service (3.5 percent, 10 years)	$800,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (0% of Cost of Facilities)	$0
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$800,000**
Available Project Yield (acft/yr)	5,585
Annual Cost of Water ($ per acft), based on PF=0	$143
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$0
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.44
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.00
Note: One or more cost element has been calculated externally	
A. Smiley	*10/30/2024*

Cost Estimate Summary	
Water Supply Project Option	
September 2023 Prices	
Irrigation, Wharton - On-Farm Conservation	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Integration, Relocations, Backup Generator & Other	$5,315,000
TOTAL COST OF FACILITIES	**$5,315,000**
- Planning (3%)	$159,000
- Design (7%)	$372,000
- Construction Engineering (1%)	$53,000
Legal Assistance (2%)	$106,000
Fiscal Services (2%)	$106,000
All Other Facilities Contingency (20%)	$1,063,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$234,000
TOTAL COST OF PROJECT	**$7,408,000**
ANNUAL COST	
Debt Service (3.5 percent, 10 years)	$891,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (0% of Cost of Facilities)	$0
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$891,000**
Available Project Yield (acft/yr)	5,890
Annual Cost of Water ($ per acft), based on PF=0	$151
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$0
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.46
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.00
Note: One or more cost element has been calculated externally	
A. Smiley	*10/30/2024*

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Irrigation - Wharton County, Lavaca Basin - Tail Water Recovery*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Integration, Relocations, Backup Generator & Other	$7,241,000
TOTAL COST OF FACILITIES	**$7,241,000**
- Planning (3%)	$217,000
- Design (7%)	$507,000
- Construction Engineering (1%)	$72,000
Legal Assistance (2%)	$145,000
Fiscal Services (2%)	$145,000
All Other Facilities Contingency (20%)	$1,448,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$318,000
TOTAL COST OF PROJECT	**$10,093,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$710,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$72,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$782,000**
Available Project Yield (acft/yr)	1,910
Annual Cost of Water ($ per acft), based on PF=0	$409
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$38
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.26
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.12
Note: One or more cost element has been calculated externally	
A. Smiley	*11/18/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
LNRA - Lake Texana Yield Enhancement Project - Phase 1

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Intake Pump Stations (199.7 MGD)	$69,124,000
Transmission Pipeline (108 in. dia., 2.5 miles)	$40,000,000
Integration, Relocations, Backup Generator & Other	$835,000
TOTAL COST OF FACILITIES	**$109,959,000**
- Planning (3%)	$3,299,000
- Design (7%)	$7,697,000
- Construction Engineering (1%)	$1,100,000
Legal Assistance (2%)	$2,199,000
Fiscal Services (2%)	$2,199,000
Pipeline Contingency (15%)	$6,000,000
All Other Facilities Contingency (20%)	$13,992,000
Environmental & Archaeology Studies and Mitigation	$108,000
Land Acquisition and Surveying (29 acres)	$209,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$4,743,000
TOTAL COST OF PROJECT	**$151,505,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$10,601,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$408,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$1,728,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (13693134 kW-hr @ 0.09 $/kW-hr)	$1,232,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$13,969,000**
Available Project Yield (acft/yr)	23,500
Annual Cost of Water ($ per acft), based on PF=2.33	$594
Annual Cost of Water After Debt Service ($ per acft), based on PF=2.33	$143
Annual Cost of Water ($ per 1,000 gallons), based on PF=2.33	$1.82
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2.33	$0.44

Jaime Burke *10/7/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
LNRA - Lake Texana Yield Enhancement Project - Phase 2

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Off-Channel Storage/Ring Dike (Conservation Pool 50000 acft, 2500 acres)	$58,535,000
Intake Pump Stations (28.8 MGD)	$26,932,000
Transmission Pipeline (42-108 in. dia., 13.3 miles)	$171,306,000
Integration, Relocations, Backup Generator & Other	$5,960,000
TOTAL COST OF FACILITIES	**$262,733,000**
- Planning (3%)	$7,882,000
- Design (7%)	$18,391,000
- Construction Engineering (1%)	$2,627,000
Legal Assistance (2%)	$5,255,000
Fiscal Services (2%)	$5,255,000
Pipeline Contingency (15%)	$25,696,000
All Other Facilities Contingency (20%)	$18,285,000
Environmental & Archaeology Studies and Mitigation	$16,714,000
Land Acquisition and Surveying (2639 acres)	$17,395,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$12,328,000
TOTAL COST OF PROJECT	**$392,561,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$19,441,000
Reservoir Debt Service (3.5 percent, 40 years)	$5,399,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,773,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$673,000
Dam and Reservoir (1.5% of Cost of Facilities)	$878,000
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (15753654 kW-hr @ 0.09 $/kW-hr)	$1,418,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$29,582,000**
Available Project Yield (acft/yr)	30,600
Annual Cost of Water ($ per acft), based on PF=2.33	$967
Annual Cost of Water After Debt Service ($ per acft), based on PF=2.33	$155
Annual Cost of Water ($ per 1,000 gallons), based on PF=2.33	$2.97
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2.33	$0.48

Note: One or more cost element has been calculated externally

Jaime Burke *10/7/2024*

Cost Estimate Summary Water Supply Project Option September 2023 Prices LNRA - Desalination	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Intake Pump Stations (7.2 MGD)	$23,665,000
Transmission Pipeline (24-30 in. dia., 7.1 miles)	$15,959,000
Well Fields (Wells, Pumps, and Piping)	$22,672,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Water Treatment Plant (9 MGD)	$77,693,000
Integration, Relocations, Backup Generator & Other	$256,000
TOTAL COST OF FACILITIES	**$142,029,000**
- Planning (3%)	$4,261,000
- Design (7%)	$9,942,000
- Construction Engineering (1%)	$1,420,000
Legal Assistance (2%)	$2,841,000
Fiscal Services (2%)	$2,841,000
Pipeline Contingency (15%)	$2,394,000
All Other Facilities Contingency (20%)	$25,214,000
Environmental & Archaeology Studies and Mitigation	$797,000
Land Acquisition and Surveying (138 acres)	$987,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$6,256,000
TOTAL COST OF PROJECT	**$198,982,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$13,983,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$407,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$592,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$16,148,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (9907629 kW-hr @ 0.09 $/kW-hr)	$892,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$32,022,000**
Available Project Yield (acft/yr)	10,000
Annual Cost of Water ($ per acft), based on PF=1.85	$3,202
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.85	$1,804
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.85	$9.83
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.85	$5.54
Note: One or more cost element has been calculated externally	
Jaime Burke	*12/18/2024*

Cost Estimate Summary	
Water Supply Project Option	
September 2023 Prices	
El Campo - Water Reuse	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$936,000
Transmission Pipeline (12 in. dia., 5 miles)	$5,834,000
Water Treatment Plant (0.5 MGD)	$499,000
Integration, Relocations, Backup Generator & Other	$6,000
TOTAL COST OF FACILITIES	**$7,275,000**
- Planning (3%)	$218,000
- Design (7%)	$509,000
- Construction Engineering (1%)	$73,000
Legal Assistance (2%)	$145,000
Fiscal Services (2%)	$145,000
Pipeline Contingency (15%)	$875,000
All Other Facilities Contingency (20%)	$288,000
Environmental & Archaeology Studies and Mitigation	$184,000
Land Acquisition and Surveying (20 acres)	$146,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$321,000
TOTAL COST OF PROJECT	**$10,179,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$716,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$58,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$23,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$338,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (91526 kW-hr @ 0.09 $/kW-hr)	$8,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,143,000**
Available Project Yield (acft/yr)	560
Annual Cost of Water ($ per acft), based on PF=2	$2,041
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$763
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$6.26
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$2.34
Note: One or more cost element has been calculated externally	
Jaime Burke	*7/31/2024*

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Edna - Expand Use of Groundwater*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$836,000
Transmission Pipeline (10 in. dia., 0.9 miles)	$988,000
Well Fields (Wells, Pumps, and Piping)	$1,758,000
Storage Tanks (Other Than at Booster Pump Stations)	$4,987,000
Water Treatment Plant (0.9 MGD)	$94,000
Integration, Relocations, Backup Generator & Other	$4,000
TOTAL COST OF FACILITIES	**$8,667,000**
- Planning (3%)	$260,000
- Design (7%)	$607,000
- Construction Engineering (1%)	$87,000
Legal Assistance (2%)	$173,000
Fiscal Services (2%)	$173,000
Pipeline Contingency (15%)	$148,000
All Other Facilities Contingency (20%)	$1,536,000
Environmental & Archaeology Studies and Mitigation	$102,000
Land Acquisition and Surveying (11 acres)	$81,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$385,000
TOTAL COST OF PROJECT	**$12,219,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$860,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$77,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$21,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$57,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (208459 kW-hr @ 0.09 $/kW-hr)	$19,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,034,000**
Available Project Yield (acft/yr)	217
Annual Cost of Water ($ per acft), based on PF=1.5	$4,765
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$802
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$14.62
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$2.46
JB	*8/5/2024*

Cost Estimate Summary Water Supply Project Option September 2023 Prices Halletsville - Expand Use of Groundwater	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Transmission Pipeline (12 in. dia., 0 miles)	$13,000
Well Fields (Wells, Pumps, and Piping)	$1,943,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,404,000
Water Treatment Plant (1.5 MGD)	$135,000
Integration, Relocations, Backup Generator & Other	$12,000
TOTAL COST OF FACILITIES	**$3,507,000**
- Planning (3%)	$105,000
- Design (7%)	$245,000
- Construction Engineering (1%)	$35,000
Legal Assistance (2%)	$70,000
Fiscal Services (2%)	$70,000
Pipeline Contingency (15%)	$2,000
All Other Facilities Contingency (20%)	$699,000
Environmental & Archaeology Studies and Mitigation	$1,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$154,000
TOTAL COST OF PROJECT	**$4,888,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$343,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$34,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$81,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (1185062 kW-hr @ 0.09 $/kW-hr)	$107,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$565,000**
Available Project Yield (acft/yr)	294
Annual Cost of Water ($ per acft), based on PF=1	$1,922
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$755
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$5.90
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$2.32
JB	*7/22/2024*

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***Irrigation, Jackson, Lavaca, and Wharton County - Expand Use of Groundwater***	
Cost based on ENR CCI 13485.67 for September 2023 and ***a PPI of 278.502 for September 2023***	
Item	***Estimated Costs for Facilities***
Interest During Construction (3.5% for 0 years with a 0.5% ROI)	$0
TOTAL COST OF PROJECT	**$0**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$0
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$0
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (8423934 kW-hr @ 0.09 $/kW-hr)	$758,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$758,000**
Available Project Yield (acft/yr)	9,216
Annual Cost of Water ($ per acft), based on PF=1	$82
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$82
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.25
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.25
Jaime Burke	*10/9/2024*

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***LNRA - Lake Texana Dredging***	
Cost based on ENR CCI 13485.67 for September 2023 and ***a PPI of 278.502 for September 2023***	
Item	***Estimated Costs for Facilities***
Integration, Relocations, Backup Generator & Other	$3,289,000
TOTAL COST OF FACILITIES	**$3,289,000**
- Planning (3%)	$99,000
- Design (7%)	$230,000
- Construction Engineering (1%)	$33,000
Legal Assistance (2%)	$66,000
Fiscal Services (2%)	$66,000
All Other Facilities Contingency (20%)	$658,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$145,000
TOTAL COST OF PROJECT	**$4,586,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$323,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (0% of Cost of Facilities)	$0
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$323,000**
Available Project Yield (acft/yr)	2
Annual Cost of Water ($ per acft), based on PF=0	$161,500
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$0
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$495.55
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.00
Note: One or more cost element has been calculated externally	
Jaime Burke	*10/24/2024*

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *LNRA - Aquifer Storage and Recovery*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Intake Pump Stations (19.4 MGD)	$39,206,000
Transmission Pipeline (30-36 in. dia., 21.6 miles)	$62,585,000
Well Fields (Wells, Pumps, and Piping)	$23,921,000
Storage Tanks (Other Than at Booster Pump Stations)	$16,241,000
Water Treatment Plant (15 MGD)	$91,768,000
Integration, Relocations, Backup Generator & Other	$310,000
TOTAL COST OF FACILITIES	**$234,031,000**
- Planning (3%)	$7,021,000
- Design (7%)	$16,382,000
- Construction Engineering (1%)	$2,340,000
Legal Assistance (2%)	$4,681,000
Fiscal Services (2%)	$4,681,000
Pipeline Contingency (15%)	$9,388,000
All Other Facilities Contingency (20%)	$34,289,000
Environmental & Archaeology Studies and Mitigation	$1,494,000
Land Acquisition and Surveying (305 acres)	$2,184,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$10,276,000
TOTAL COST OF PROJECT	**$326,767,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$22,970,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,031,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$980,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$6,424,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (15663106 kW-hr @ 0.09 $/kW-hr)	$1,410,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$32,815,000**
Available Project Yield (acft/yr)	10,880
Annual Cost of Water ($ per acft), based on PF=1.6	$3,016
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.6	$905
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.6	$9.25
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.6	$2.78
Jaime Burke	*10/8/2024*

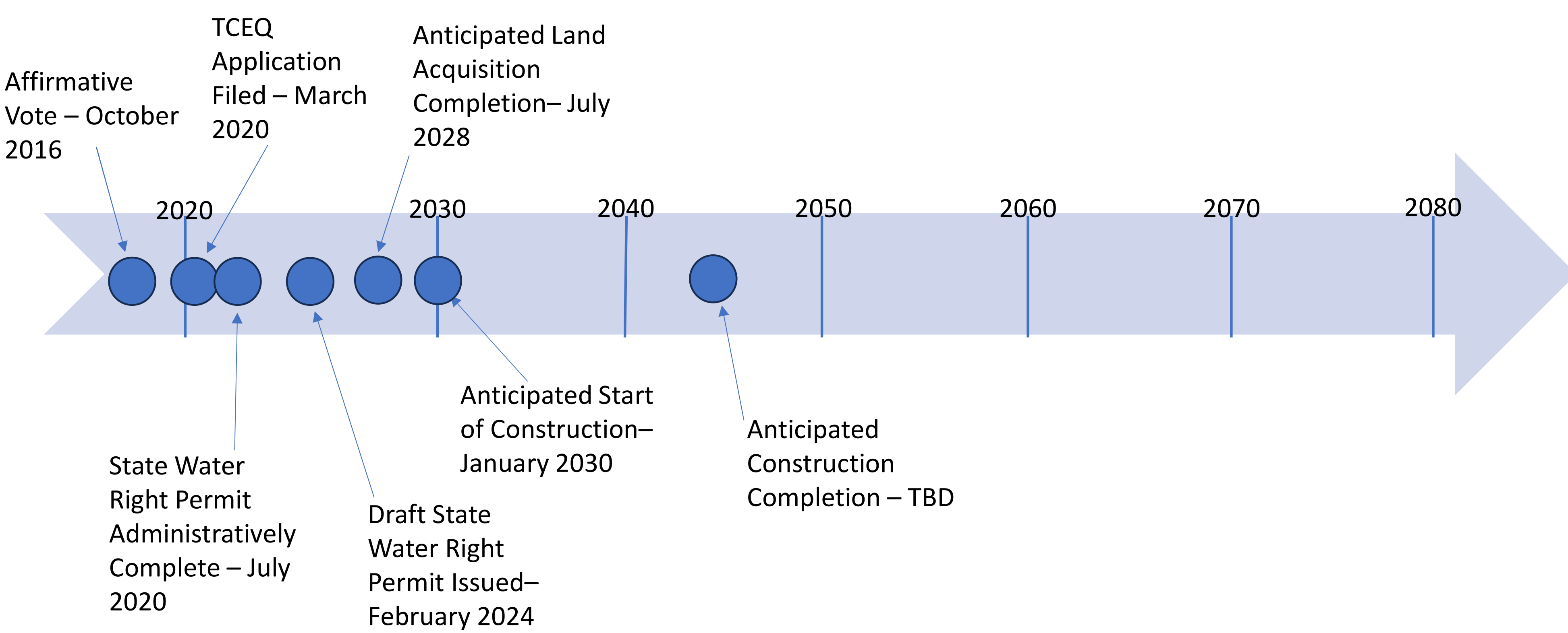
Appendix 5D. Implementation of Certain Water Management Strategies

Appendix 5D - Documentation of the Implementation Status of Certain WMSs (see Exhibit C Section 2.5.2.7)

REGIONAL WATER PLAN WMS/PROJECT DATA						ANTICIPATED/ESTIMATED (OR ACTUAL[1]) IMPLEMENTATION ACTIVITIES AND DATES																	
						SPONSOR AUTHORIZATION	PERMITTING STATUS (as applicable)									PLANNING, DESIGN, AND CONSTRUCTION STATUS						TOTAL FUNDS EXPENDED TO DATE	Other significant activities completed (summary)
							STATE WATER RIGHT STATUS				FEDERAL 404 PERMIT STATUS (if applicable)		DESALINATION PERMIT STATUS		OTHER KEY PERMITS	GEOTECH/DESIGN	LAND ACQUISITION		CONSTRUCTION				
Water Management Strategy/Project Name	Project Sponsor	WMS Project Sponsor Region	Online Decade	Capital Cost	Anticipated Footprint Acreage (acres)	Date(s) that the sponsor took an affirmative vote or other action to make expenditures necessary to construct or file applications for state or federal permits (date(s))	Anticipated (or actual) TCEQ application filed (date)	Anticipated (or actual) State Water Right Permit Administratively Complete (date)	Anticipated (or actual) Draft State Water Right Permit Issued (date)	Anticipated (or actual) Date Final State Water Right Permit Issued (date)	Anticipated (or actual) application for permit filed (date)	Anticipated (or actual) permit issuance (date)	Anticipated (or actual) diversion permit issued (date)	Anticipated (or actual) Discharge/Disposal Permit Issued (date)	Summary of other permits and status (summary)	Generally describe the types and amount (as %s) of geotechnical/ reconnaissance/ engineering feasibility or other technical, testing, and/or design work etc. performed to date (summary)	Percent Land Acquisition Completed (%)	Anticiptated land acquisition completion (date)	Anticipated start of construction (Date)	Percent construction completed (%)	Anticipated construction completion (date)	Rough approximation of the total expenditures, to date, on ALL activities related to project implementation to date (millions of $s)	
LNRA Lake Texana Yield Enhancement Project	LNRA	P	2030	$544,066,000	2500	10/19/2016	3/23/2020	7/10/2020	2/23/2024	Unknown						In addition to the modeling efforts associated with the water rights permitting process, LNRA engaged a consultant engineer to perform feasibility grade engineering, geotechnical, environmental and cultural resources investigations on the proposed off-channel reservoir site. The engineering study provided data needed in the land acquisition process, showing the chosen property would support development of a water supply reservoir. The study also identified potential issues with the reservoir site to be addressed in the permitting, design and construction phases of the project. LNRA engaged a consultant engineer to perform reconnaissance of the planned diversion location on the Lavaca River. The work provided data to identify the diversion "reach" for use in the permitting process. LNRA engaged a consultant engineer to develop a conceptual mitigation plan for the Lake Texana Yield Enhancement Project.	Reservoir Site 80%; Diversion Location 5%	Jul-28	2030	0	N/A	$0.87	

FOOTNOTE 1 : ANY DATE ENTERED THAT IS PRIOR TO ADOPTION OF THE REGIONAL WATER PLAN IS ASSUMED TO BE AN 'ACTUAL' DATE

Lake Texana Yield Enhancement Project Implementation Timeline



INITIALLY PREPARED PLAN

CHAPTER 6: IMPACTS OF THE REGIONAL WATER PLAN

Lavaca Regional Water Plan

B&V PROJECT NO. 410083

PREPARED FOR

Lavaca Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

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LIST OF TABLES

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List of Abbreviations

ac-ft/yr	Acre-Feet per Year
DO	Dissolved Oxygen
DOR	Drought of Record
LRWPA	Lavaca Regional Water Planning Area
LTYEP	Lake Texana Yield Enhancement Project
MAG	Modeled Available Groundwater
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SB	Senate Bill
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TWDB	Texas Water Development Board
WAM	Water Availability Model
WMS	Water Management Strategy
WUG	Water User Group

6.0 Impacts of the Regional Water Plan

6.1 Scope of Work

The overall project scope consists of preparing a regional water supply plan for the Lavaca Regional Water Planning Group (Lavaca RWPG), representing all of Lavaca and Jackson Counties as well as the Precinct 3 and El Campo portions of Wharton County. The Lavaca RWPG is one of 16 state water supply planning groups defined by TWDB. Regional Water Plans (RWP) prepared by each RWPG will be combined into a comprehensive state water plan.

This activity is part of a consensus-based planning effort to include local concerns in the statewide water supply planning process. This chapter presents the results of Task 6 of the Project Scope, which addresses the following:

- Evaluation of the estimated cumulative impacts of the RWP, for example on groundwater levels, spring discharges, bay and estuary inflows, and instream flows.
- Description of the impacts of the RWP regarding:
  - Agricultural resources;
  - Other water resources of the State including other water management strategies (WMSs) and groundwater and surface water interrelationships;
  - Threats to agricultural and natural resources;
  - Third-party social and economic impacts resulting from voluntary redistributions of water including analysis of third-party impacts of moving water from rural and agricultural areas;
  - Major impacts of recommended WMSs on key parameters of water quality, and;
  - Effects on navigation.
- Protection of Resources.
- Summarization of the identified water needs that remain unmet by the RWP and the socioeconomic impacts of not meeting the identified water needs.

6.2 Cumulative Impacts of the Regional Water Plan

The cumulative impacts of the recommended WMSs are discussed in this section. Overall, the recommended strategies keep the groundwater levels at a sustainable level and have no impact on spring flows. Instream flows and bay and estuary inflows are slightly reduced during times of drought as a result of drought management, conservation, and reuse strategies being implemented.

The cumulative impacts to the Lavaca Bay from the recommended strategies are shown in the following tables. Specifically, the Lake Texana Yield Enhancement Project (LTYEP) and LNRA Desalination strategies were modeled. Because the locations of the two strategies are downstream of all of the instream flow measurement points, only the impacts to Lavaca Bay were evaluated.

Impacts to Lavaca Bay are evaluated by looking at four different inflow level conditions for three separate periods of the year. The first period is Spring, which includes 3 consecutive months starting in any month from January to May. The second period is Fall, which includes 3 consecutive months starting in any month from August to October. The third period is the Intervening 6 Months that counts the months not used for the Spring and Fall periods. Table 6-1 shows the target inflow goals in acre-feet (ac-ft) for Subsistence, Base Dry, Base Average, and Base Wet conditions, and the associated target frequency goals.

Table 6-1 Lavaca Bay Freshwater Inflow Targets (acre-feet)

Inflow Level	Study Target Frequency	Spring (3 Month Total)	Fall (3 Month Total)	Intervening (6 Month Total)
SUBSISTENCE	96%	13,500	9,600	6,900
BASE DRY	82%	55,080	39,168	28,152
BASE AVG	46%	127,980	91,080	65,412
BASE WET	28%	223,650	158,976	114,264

Table 6-2 through Table 6-4 show how often the SB3 environmental flow standards are met for both the unmodified base TCEQ model (no strategies) and a model with the WMSs included. The last column shows the impact the strategies have on the frequency with which the environmental flow standards are met.

Table 6-2 SB3 Environmental Flow Standard Frequency Attainment for Spring Onset

Spring Onset Flow Criteria Met (3 Consecutive Months Beginning Jan – May)						
	Target	TCEQ Base Model		Strategy Model		Difference
Criteria	(ac-ft)	# years	%	# years	%	%
SUBSISTENCE	13,500	51	89%	52	91%	2.0%
BASE DRY	55,080	44	77%	45	79%	2.0%
BASE AVG	127,980	35	61%	35	61%	0.0%
BASE WET	223,650	25	44%	25	44%	0.0%

Table 6-3 SB3 Environmental Flow Standard Frequency Attainment for Fall Onset

Fall Onset Flow Criteria Met (3 Consecutive Months Beginning Aug – Oct)						
	Target	TCEQ Base Model		Strategy Model		Difference
Criteria	(ac-ft)	# years	%	# years	%	%
SUBSISTENCE	9,600	40	70%	46	81%	11.0%
BASE DRY	39,168	30	53%	31	54%	1.0%
BASE AVG	91,080	18	32%	20	35%	3.0%
BASE WET	158,976	14	25%	14	25%	0.0%

Table 6-4 SB3 Environmental Flow Standard Frequency Attainment for Intervening Period

Intervening 6 Months Flow Criteria Met						
	Target	TCEQ Base Model		Strategy Model		Difference
Criteria	(ac-ft)	# years	%	# years	%	%
SUBSISTENCE	6,900	53	93%	55	96%	3.0%
BASE DRY	28,152	48	84%	51	89%	5.0%
BASE AVG	65,412	46	81%	47	82%	1.0%
BASE WET	114,264	40	70%	41	72%	2.0%
Note: Intervening 6 Months includes the remaining Spring Onset and Fall Onset months that are not used for the 3 consecutive month calculation.						

The tables above show that the recommended strategies cause a small positive increase in the number of times the flow targets are met under Base Average and Base Wet conditions (Fall Onset and Intervening 6 Months). The recommended strategies also show positive impacts to the number of times the flow targets are met under Base Dry and Subsistence conditions. The removal of high flows for storage may allow for additional environmental flow releases beyond what can occur with the strategies in place.

6.3 Impacts of Water Management Strategies on Agricultural Resources, Water Resources, and Natural Resources

The Lavaca RWPG balanced meeting water needs with good stewardship of the water, agricultural, and natural resources within the Region. However, the Lavaca RWPG recognized the importance of recommending WMSs that were of a realistic cost to Irrigation, the major water user in the region, and the category expected to experience the majority of the potential water shortages.

The general categories of the strategies examined include: Drought Management, Conservation, Off-Channel Reservoir, Expanded Aquifer Use, Effluent Reuse, Groundwater and Surface Water Desalination, Aquifer Storage and Recovery, and Dredging. Not all of these strategies were recommended in the plan. The effects of the recommended WMSs on specific resources are discussed in further detail within this section.

6.3.1 Agricultural

The Lavaca Regional Water Planning Area (LRWPA) currently has nearly 97,000 acres of irrigated agricultural land that requires a projected 175,636 ac-ft/yr of water for irrigation under Drought-of-Record (DOR) conditions. This demand is expected to remain relatively constant through 2080. The majority of this water is used for growing rice and represents the greatest water demand in the area. Due to the strong dependency of rice production on water supplies, Irrigation demand will be the most significant driver of water demands for the Region over the next 50 years.

The WMSs introduced in Chapter 5 of this RWP were created to meet the needs of all WUGs including agricultural needs. Due to the strong dependency of rice production on water supplies and the sensitivity of agriculture to increased costs in water, the Lavaca RWPG focused on economical and practical strategies for meeting water demands under DOR conditions.

The WMS Expanded Use of the Gulf Coast Aquifer would increase the availability of water for irrigation purposes, which would reduce the threat to agriculture. This strategy would be the most favorable for agriculture. However, the Expanded Use of the Gulf Coast Aquifer strategy is currently not recommended for Irrigation due to Modeled Available Groundwater (MAG) restrictions but is included as an Alternative strategy in the RWP.

The WMSs recommended by the Lavaca RWPG to meet irrigation needs are water Irrigation Conservation (On-farm) and Irrigation Conservation (Tail Water Recovery). On-farm conservation methods such as land leveling, well meters, conversion of irrigation ditches to pipelines, and others would reduce demand for irrigation water while supporting agriculture. Tail Water Recovery from irrigation field return flows may be cost prohibitive to agriculture.

The LTYEP and LNRA Desalination strategies would have minimal impacts on agriculture given that the projects would remove only a small portion of land from agricultural production relative to the large quantity of agricultural land in the area.

Drought Management and Conservation for municipal water user groups would have very little positive impact to the amount of water available to meet irrigation needs in Wharton County. Conservation for Manufacturing would have no impact on agriculture. Reuse by El Campo could potentially reduce the return flows that downstream irrigators could use. With Edna and Hallettsville expanding their use of groundwater in Jackson and Lavaca counties, respectively, it slightly reduces the available groundwater for Irrigation during a drought.

6.3.2 Other Water Management Strategies on Agricultural Resources, Water Resources, and Natural Resources

Water resources available by basin within the LRWPA are discussed in further detail below. Note that the surface water basins listed below do not necessarily coincide with groundwater divides but are used for accounting purposes in the RWP.

6.3.2.1 Colorado River Basin

The Colorado River Basin contains a portion of the Gulf Coast Aquifer that is shared with Region K. The amount of water available from this source is sufficient to meet the municipal demands of a portion of El Campo located in this basin. This basin in Region K is also the source of water for a portion of the Garwood Irrigation Division in the Lavaca Region, located in Wharton County.

6.3.2.2 Colorado - Lavaca Coastal River Basin

The sustainable yield of the portion of the Gulf Coast Aquifer located in the Colorado-Lavaca River Basin of Wharton County was found to be sufficient to meet the demands of irrigators under DOR conditions. During drought conditions, the irrigation return flows from groundwater irrigation will provide an important resource for stream habitat.

The recommended conservation strategies for Irrigation in this basin would help to extend water supplies from the Gulf Coast aquifer during times of drought.

The only contracted surface water supply used within the Colorado-Lavaca River Basin of the LRWPA is up to 9,449 ac-ft/yr contract from LNRA for manufacturing use within the Colorado-Lavaca River Basin. This water is supplied from Lake Texana and potential future LNRA projects and represents the only water supply allocated within this basin that does not originate from the Gulf Coast Aquifer. Water needs are identified for Manufacturing in this basin in Jackson County. The recommended LTYEP and LNRA Desalination strategies would increase the available surface water in the region for use by LNRA customers.

6.3.2.3 Lavaca River Basin

Groundwater resources were found to be inadequate to meet the demands of irrigation WUGs in Jackson County, Lavaca County, and Wharton County in the Lavaca Basin. Expanding the use of the aquifer during times of drought was not recommended as a strategy in this planning cycle but is included as an alternative strategy in the plan. During drought conditions, the irrigation return flows from groundwater irrigation will provide an important resource for stream habitat. During average conditions, the reduced usage of groundwater would allow aquifer conditions to recover to normal levels.

The recommended conservation strategies for Irrigation in this basin would help to extend water supplies from the Gulf Coast aquifer during times of drought.

Lake Texana has a firm yield of 79,000 ac-ft/yr in 2030-2080, or 74,500 ac-ft/yr after 4,500 ac-ft/yr of environmental flows are accounted for. Approximately 31,000 ac-ft of this volume continues to be an important supply for the City of Corpus Christi in the Coastal Bend Region. Contracts to manufacturing users make up close to an additional 43,000 ac-ft/yr. The manufacturing contracts mentioned above in the Colorado-Lavaca River Basin and below in the Lavaca-Guadalupe River Basin are included in these contracts.

The recommended LTYEP and LNRA Desalination strategies would increase the available surface water in the region for use by LNRA customers.

6.3.2.4 Lavaca - Guadalupe Coastal Basin

The Lavaca-Guadalupe Coastal Basin has sufficient water supplies in the Gulf Coast Aquifer to meet the municipal, agricultural, and industrial demands of the basin.

The recommended conservation strategies for Irrigation in this basin would help to extend water supplies from the Gulf Coast aquifer during times of drought.

The only contracted surface water supply used within the Colorado-Lavaca River Basin of the LRWPA is up to 6,913 ac-ft/yr contract from LNRA for manufacturing use within the Lavaca-Guadalupe River Basin. This water is supplied from Lake Texana and potential future LNRA projects and represents the only water supply allocated within this basin that does not originate from the Gulf Coast Aquifer.

6.3.2.5 Guadalupe River Basin

A small portion of the Guadalupe River Basin is present within Lavaca County. The minor domestic and agricultural demands in this basin are met with groundwater supplies from the Gulf Coast Aquifer.

6.3.3 Third-Party Social and Economic Impacts Resulting from Voluntary Redistributions of Water

The 2026 Lavaca Regional Water Plan has no WMSs involving voluntary redistributions of water.

6.3.3.1 Moving Water from Rural and Agricultural Areas

Water demand is generally constant over the planning period with estimated water usage for rural (livestock) and agricultural representing 86 percent of the total water used in the LRWPA in 2080.

The potential impacts of moving water from rural and agricultural areas are mainly associated with socio-economic impacts to these third parties. As noted previously, much of the water demand for Irrigation in the LRWPA is associated with rice production. While other crops such as corn, cotton, milo, and similar row crops can be grown either with or without irrigation, no such option exists for rice. In addition, the type of land that is suitable for rice is such that it is often difficult for rice producers to find an alternative crop for those years when the land is being rested from rice production. This results in more intensive economic pressure since the production from this land for any other crop is marginal at best.

In much of the LRWPA, the marginal quality land has already been forced out of rice production because of economic conditions. It is further noted that for most agricultural commodities, the price is highly variable. For this reason, the farmers need the flexibility to plant additional acreages during periods of higher-than-normal prices to try to recover from years with marginal economics. If the water needed to produce additional acreage is no longer there because it has been sold to a municipality, the economics of farming is further impacted.

One additional area of concern from an economic standpoint is the current decline in the infrastructure to support the rice industry. Further decreases in rice production of even a temporary nature further threaten the economic picture for the support industries of milling, hauling, etc. Once infrastructure for milling is taken out of service, it increases the cost of doing business for the remaining producers in the area.

6.4 Impacts of Water Management Strategies on Key Parameters of Water Quality

The potential impacts that WMSs may have on water quality are discussed in this section, including the identified water quality parameters which are deemed important to the use of the water resources within the LRWPA.

Under the Clean Water Act, the State of Texas must define designated uses for all major water bodies and, consequently, the water quality standards that are appropriate for that designated water use.

Key water parameters identified within the LRWPA are as follows:

- Bacteria
- pH
- Dissolved oxygen (DO)
- Total dissolved solids (TDS)
- Total suspended solids (TSS)
- Chlorides
- Nutrients (nitrogen, phosphorus)
- Salinity

The water quality parameters and WMSs selected by the Lavaca RWPG were evaluated to determine the impacts on water quality as a result of these recommended strategies. This evaluation used the data available to compare current conditions to future conditions with the recommended WMSs in place.

For the LRWPA, the predominant water use is for agricultural purposes, with 86 percent of the water used for irrigation and livestock watering. As a result of the predominance of agricultural water use, the Lavaca Region is very price sensitive, and the review of WMSs tends to focus heavily on cost. If the price is too high, the strategy will not be implemented because the users will be unable to afford it.

6.4.1 Water Quality Overview

Water quality records were obtained from the TWDB for wells completed in the Chicot, Evangeline, and Jasper Aquifers in the LRWPA. Records available from the TWDB include water quality data dating back to the 1930s through 2005, with limited data available for 2009 through 2021. Updates for this cycle looked at the 2020 and 2021 data. Of the key water parameters identified in the LRWPA, the TWDB includes records for pH, TDS, and chloride for groundwater. Irrigation, domestic, municipal, manufacturing, and steam-electric supplies are the main uses for water in the LRWPA.

The most recent TWDB water chemistry results available are from 2021. Data from the TWDB show that the groundwater in the Lavaca Region continues to be of generally good quality and that the quality has not changed significantly throughout the years. Recent data indicate TDS levels generally range from about 370 to 850 mg/L in wells within the Lavaca Region. The principal constituents are generally bicarbonate with smaller amounts of calcium, sodium, chloride, and sulfate. The chloride values generally range from about 55 to 250 mg/L in wells sampled in 2020 and 2021. This range has contracted somewhat since the last planning cycle. The pH of the water ranges from 7.0 to 8.2 in the samples taken in 2020 and 2021.

Analysis of the TWDB water quality data does not indicate substantial areas where the groundwater quality is changing. A few industrial wells are located in the very southern part of Jackson County along SH 35 that have chloride levels that have increased some over the years. The wells are located near Carancahua Bay where fresh groundwater is of limited thickness.

Comparison of available water quality records for periods of high use in the LRWPA during the 1980s to the recent 2020 to 2021 TWDB water quality records do not indicate a significant change in the water quality. Available data for wells sampled in the 1980s and more recent years have water quality constituents with mostly similar values with only some minor differences noted. Samples taken from wells in 2020 through 2021 that are located near wells sampled in the late 1970s through late 1990s also tend to have similar reported values for the water quality constituents.

Chemical analyses available for wells within the LRWPA portion of Wharton County show TDS that averaged about 495 mg/L in the period of the early 1980s and averaged about 370 mg/L for samples collected in 2021. The data shows a small decrease in the overall mineralization of the water over this time period. The Chicot and Evangeline Aquifers provide a prolific water source within most of the LRWPA, and the Jasper Aquifer provides groundwater in the northern and central parts of Lavaca County.

6.4.2 Conservation Impacts

While conservation strategies are recommended in this plan for meeting Irrigation needs, it should be noted that there may be implementation issues. Conservation works well as a strategy for those farms which are family owned and operated and for as long as matching grants are available through EQIP. EQIP provides funding for conservation in the rice industry through grants for precision leveling and multiple inlets as well as canal lining. Additional support to further reduce the out-of-pocket costs to the farmer is also needed to ensure more widespread implementation of water conserving practices. While the EQIP grants are helpful, it is still difficult for farmers to justify the expense of the remaining 50 percent matching share. SWIFT and other types of funding from the TWDB may be an option for farmers, by providing low-interest loans or grants for funding conservation measures, although a political subdivision would need to apply for the funds on their behalf.

It is also noted that much of the region relies upon tenant farmers who have only a year-to-year contract with a landowner. Typically, tenant farmers are unwilling to put up any money for conservation purposes since they may not be able to gain the benefit of the improvements beyond the year in which they are built. In addition, since there is an agricultural shortage and not a municipal shortage in the region, there is not an incentive for any of the municipalities to pay for on-farm conservation in exchange for the water saved. Whoever pays for the conservation will have to take less water than the amount of water saved in order for there to be any additional water for resolving the shortages.

Water conservation, including municipal, industrial, and agricultural, can have a positive impact on water quality under some conditions but a negative impact during other conditions. Conventional municipal and industrial wastewater treatment plants are strictly regulated with regard to suspended solids and oxygen demanding materials. A wastewater treatment plant that provides lower flows with the same limits on suspended solids and oxygen demanding materials will put fewer pounds of these materials in the waters of the state. However, these plants face much less regulation on dissolved solids in the effluent if, in fact, dissolved solids are regulated at all. Municipal and industrial conservation will likely cause increases in dissolved solids concentrations because the dilution with freshwater is less. As a result, discharge of more concentrated effluent from a dissolved solids standpoint during dry weather conditions may have a negative effect on water quality.

Water that is applied to irrigated acreage carries nutrients, sediments, salts, and other pollutants from the farmland. While it is intuitive that reduced flow could have a positive impact on water quality, it is possible that the same dissolved solids loadings noted above could also provide a potential negative impact. In the case of irrigation return flows, however, the discharge of these flows tends to occur during low streamflow conditions, and the water from this discharge provides additional needed streamflow for environmental purposes during these times.

A review of the TCEQ Water Availability Model (WAM) for the Lavaca River Basin identified a number of stream segments that have no streamflow during the driest months of prolonged drought. Since all of the municipal water, some of the manufacturing water, and 80 percent or more of the irrigation water is derived from groundwater, the reduction of the return flows through conservation will have a negative impact on stream flows during the DOR.

Municipal and manufacturing return flows are returned to the stream throughout the year, except for the surface water that is sent to water users outside of the region, but they are more or less constant in both the wetter and drier months depending upon the condition of the individual wastewater collection systems. The agricultural return flows occur primarily in early spring and then again in July. The July return flows are particularly important since July is a historically dry month, and the return flows can often be the only flow moving in a stream reach at that time.

Dry land agriculture would also have a similar effect on stream habitat by denying return flows to stream segments in the lower basin. The land in the LRWPA is also of such a type that makes it of limited value for economically producing large volumes of crops other than rice, and the infrastructure in place for rice production could not be easily converted for other crops.

6.4.3 Impacts of Water Management Strategies on Water Quality

The water quality parameters and WMSs were evaluated to determine the impacts on water quality as a result of these recommended strategies. This evaluation used the data available to compare current conditions to future conditions with management strategies in place. The recommended management strategies, as described in Chapter 5 and used in this evaluation, are as follows:

- Drought Management (Municipal Utilities Only)
- Irrigation Conservation (On-farm and Tail Water Recovery)
- Municipal Conservation
- Manufacturing Conservation
- Reuse of Municipal Effluent (El Campo)
- Expansion of Groundwater Use (Edna and Hallettsville)
- Lake Texana Yield Enhancement Project
- LNRA Desalination

The following paragraphs discuss the impacts of each management strategy on the chosen water quality parameters.

Drought Management (Municipal Utilities Only) would have little to no impact on other water sources of the State.

Irrigation, Municipal, and Manufacturing Conservation can have both positive and negative impacts on water quality. Water that is being processed through a wastewater treatment plant typically has acquired additional dissolved solids prior to discharge to the waters of the State. Conventional wastewater treatment reduces suspended solids but does not reduce dissolved solids in the effluent. Water conservation measures will reduce the volume of water passing through the wastewater treatment plants without reducing the mass loading rates (a 1.6-gallon flush carries the same waste mass to the treatment plant that a 6-gallon flush once carried). This may result in increased constituent loads to the wastewater treatment plants. In the event that, over time, water conservation causes changes to wastewater concentrations, treatment processes may need to be adjusted to maintain permitted discharge parameters. It should be noted that during low flow conditions, the wastewater effluent in a stream may represent water that helps to augment and maintain the minimum stream flows.

For irrigation conservation, reduced stream flow will be reduced from irrigation return flows which may reduce habitat for migratory birds. Tail water may carry nutrients, sediments, salts, and other pollutants from the farmland. This return flow can have a negative impact on water quality, and by implementing conservation measures which reduce tail water losses, the nutrient and sediment loading can be reduced. However, this return flow tends to be introduced into the receiving stream during normally dry periods so it may have a net beneficial effect in terms of maintaining minimum stream flow conditions.

Reuse of Municipal Effluent (El Campo) is a strategy to help meet future growth and subsequent water supply shortages. The yield amounts are relatively low, so impacts would be low. The municipality anticipates using direct reuse with piping to move water to the location of shortage. However, reusing the treated effluent rather than discharging it to the creek would reduce return flows to the local creeks.

Expansion of Groundwater Use (Edna and Hallettsville) is a strategy to help meet future growth and subsequent water supply shortages. The yield amounts are relatively low, so impacts would be low. The municipalities use of additional groundwater would provide additional effluent to the streams throughout the year, which can benefit water quality.

Lake Texana Yield Enhancement Project potentially will have a positive impact on water quality since it will operate as a "scalping reservoir." The water that is diverted and stored in reservoirs would allow some sediment to settle out, so that water released from the reservoir would be of higher quality. However, instream flows along with bay and estuary freshwater inflows would slightly decrease. A schedule for freshwater releases would be established during permitting of the project to meet TCEQ environmental flow standards. In general, increased return flows will occur in this Region as demands increase, and this increase in return flows will continue to occur during low flow events, thus, potentially increasing instream flows during DOR conditions.

LNRA Desalination will provide a usable water supply with a level of dissolved solids low enough for multi-use purposes. A significant side effect of this strategy is the disposal of wastes generated from the desalination process. A permit would be required for disposing the brine, which would likely be injected into the ground. LNRA customers are currently surface water users, so the increased use from groundwater would increase return flows to the streams.

6.5 Impacts of Water Management Strategies on Navigation

Due to the nature of the strategies recommended in the 2026 Lavaca Regional Water Plan, impacts to navigation are not anticipated.

The conservation, drought management, and reuse strategies recommended in the RWP may reduce some return flows to the streams but should not impact navigation. The LTYEP that is recommended in the RWP will not impact navigation as it is off-channel.

6.6 Protection of Resources

The WMSs recommended in this RWP are intended to protect natural resources while still meeting the projected water needs of the region. The quantitative environmental impacts of the individual WMSs discussed in Chapter 5 varied from positive impact to minimal or no impact to negative impact. A discussion of the individual environmental impacts can be found in Chapter 5.

The most common impact for the conservation strategies is reduced stream flow from irrigation return flows and a possible reduction of habitat of migratory birds. In addition, implementation of some of these strategies will reduce reliance on groundwater pumping which will alleviate stress on the groundwater in the area.

The LTYEP would capture a portion of pulse flows. While the SB3 environmental flow requirements are implemented, the Lavaca RWPG acknowledges that the reservoir would have some impact in the pulse flow volume of water reaching the bay. A permitted freshwater release schedule would provide an opportunity to return water to creeks during times of drought, benefiting wildlife habitat. Although siting of the project will remove a portion of total agricultural land from production, it is minimal given the large quantity of agricultural land in the area. In addition, the reservoirs would provide wildlife habitat.

Effluent Reuse by El Campo would reduce the amount of water being returned to the stream. During dry times when there is little flow, this strategy would have a greater impact.

Expansion of Groundwater Use by Edna and Hallettsville would increase the amount of water being returned to the stream year-round, which would be of greater benefit during dry times. The amount of groundwater pumped would remain within the Modeled Available Groundwater (MAG), so should not have a negative impact on the Desired Future Condition of the aquifer.

LNRA Desalination would require increased permitting and would remove a portion of total agricultural land in the area, but the groundwater and treated brackish surface water may ultimately make it into the river and bay as return flows.

6.7 Unmet Needs in the 2026 Plan

For the 2026 planning cycle, the Lavaca RWPG has recommended WMSs to meet all needs in the region, so there are no unmet needs.

6.8 Socioeconomic Impact of Projected Water Shortages

For the 2026 Lavaca RWP, TWDB will prepare the report Socioeconomic Impacts of Projected Water Shortages for the Lavaca (Region P) Regional Water Planning Area, along with corresponding reports for each of the other 15 regional water planning areas after the Initially Prepared Plans are submitted. A copy of the report will be included in Appendix 6A as part of the final plan.

Appendix 6A. Socioeconomic Impacts of Projected Water Shortages for the Lavaca (Region P) Regional Water Planning Area

To be provided as part of the final plan.

INITIALLY PREPARED PLAN

CHAPTER 7: DROUGHT RESPONSE INFORMATION, ACTIVITIES, AND RECOMMENDATIONS

Lavaca Regional Water Plan

BV PROJECT NO. 410083

PREPARED FOR

Lavaca Regional Water Planning Group

1 MARCH 2025

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DCP	Drought Contingency Plan
DOR	Drought of Record
DWDOR	Drought Worse than the Drought of Record
GMA	Groundwater Management Area
LRWPA	Lavaca Regional Water Planning Area
LNRA	Lavaca-Navidad River Authority
RWPG	Regional Water Planning Groups
TCEQ	Texas Commission on Environmental Quality
TAC	Texas Administrative Code
TWDB	Texas Water Development Board
WAM	Water Availability Model
WCID	Water Control and Improvement District
WUG	Water User Group
WWP	Wholesale Water Provider

7.0 Drought Response Information, Activities and Recommendations

This chapter presents all necessary requirements for drought management and contingency plans, as well as a summary of information provided by water systems in the Lavaca Regional Water Planning Area regarding drought, including preparations and response throughout the Region.

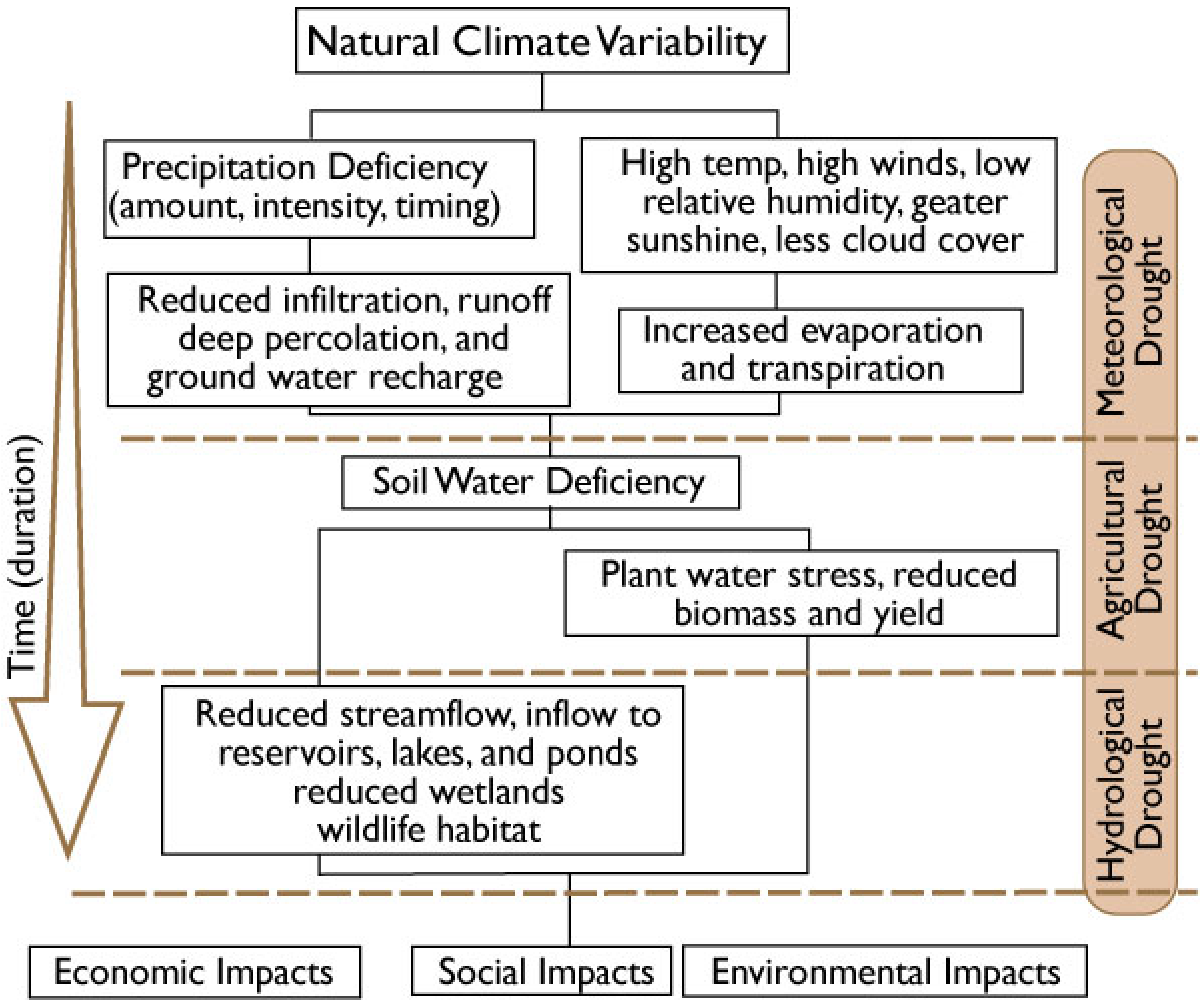
7.1 Drought Definitions

Drought is often referred to as a slow-moving emergency. The impact of droughts can be far-reaching but can be challenging to define due to the gradual and sometimes subtle progression of severity, as well as the tendency for temporal and geographic variations as isolated rain events shift perception of the drought severity. The types of droughts are sometimes characterized as meteorological, agricultural, and hydrological, which are leading events to the recognized socioeconomic impacts of drought. These drought terms are integrated and ordered such that as one type of drought intensifies it may lead to the development of another category of drought. The following definitions of categories of drought are taken from the State of Texas Drought Preparedness Plan and are further reflected on Figure 7-1 on the next page:

- A meteorological drought is often defined as a period of substantially diminished precipitation duration and/or intensity that persists long enough to produce a significant hydrologic imbalance. The commonly used definition of meteorological drought is an interval of time, generally of the order of months or years, during which the actual moisture supply of a given place consistently falls below the climatologically-appropriate moisture supply.
- Agricultural drought occurs when there is an inadequate precipitation and/or soil moisture to sustain crop or forage production systems. The water deficit results in serious damage and economic loss to plant or animal agriculture. Agricultural drought usually begins after meteorological drought but before hydrological drought and can also affect livestock and other agricultural operations.
- Hydrological drought refers to deficiencies in surface and subsurface water supplies. It is measured as streamflow, and as lake, reservoir, and groundwater levels. Usually a time lag occurs between a lack of rain or snow and less measurable water in streams, lakes, and reservoirs, making hydrological measurements not the earliest indicator of drought.
- Socioeconomic drought occurs when physical water shortages start to affect the health, well-being, and quality of life of the people, or when the drought starts to affect the supply and demand of an economic product.

Determining if a dry weather pattern substantiates a meteorological drought requires an area-specific analysis that is first typically signified by dry meteorological patterns. Short intervals of dry patterns are considered within the norm of meteorological variation (seasonally and annually), so it is important to note that a true meteorological drought is dependent on the area in which it occurs.

In areas where surface and/or groundwater supplies are full at the start of a dry pattern, there is often minimal impact in residential lifestyle or economic and agricultural activity. However, as dry pattern intensities deepen and duration of the meteorological drought continues and water supplies are stressed, the impacts of meteorological drought transition and begin to indicate other drought categories.



Source: National Drought Mitigation Center website "What is Drought?"

Figure 7-1 Categories of Drought and Natural Climate Variability

7.2 Drought of Record in Regional Water Planning Area

The definition of Drought of Record (DOR) is "the period of time when historical records indicate that natural hydrological conditions would have provided the least amount of water supply," according to Texas Administrative Code (TAC) Title 31, Part 10, Chapter 357, Subchapter A, Rule 357.10.

Hydrological droughts are established using Water Availability Models (WAM) developed by the Texas Commission on Environmental Quality (TCEQ). The Lavaca River Basin WAM is the model used for determining the DOR in the Lavaca Region.

7.2.1 Current Drought of Record

Within the Lavaca Regional Water Planning Area, the DOR is most specifically associated with the hydrologic conditions of the Lake Texana. While Lake Texana was not yet constructed in the 1950s, the lake's performance under a repeat of DOR conditions can be analyzed using the TCEQ Lavaca River Basin WAM. The current DOR for Lake Texana is defined as beginning in December 1952 and lasting through April 1957.

7.2.2 Potential New Drought of Record

While the 2011 to 2013 period was extremely dry throughout the state and the lake levels in Lake Texana fell dramatically, the region recovered in such a way as to remove the potential for a new drought of record. Similarly, 2022 was a dry year as well, but Lake Texana has since recovered.

7.3 Uncertainty and Drought Worse Than the Drought of Record

While regional water plans must address water supply needs during a repeat of the DOR, regional water planning groups (RWPGs) may choose to consider scenarios and/or qualitatively address uncertainty and a drought worse than the drought of record (DWDOR) in their region. For the 2026 Regional Water Plans, RWPGs must include a separate subsection that addresses planning for uncertainty and DWDOR. Specifically, the Texas Water Development Board (TWDB) identified three items that must be addressed; the following subsections describe the three TWDB items and the Lavaca Regional Water Planning Group's (Lavaca RWPG) responses to each.

7.3.1 Planning Factors Associated with Uncertainty

For the 2026 RWP, the TWDB requires a summary of how the region incorporated planning for uncertainty in its RWP and the region's basis, or policy, for inclusion. This could include general discussion on planning factors, any drivers of uncertainty associated with those factors, and how the RWPG made planning decisions to acknowledge or address that uncertainty. If the RWP does not include any measures to address uncertainty, this subsection must include a statement to that effect.

The Lavaca RWPG recognizes that there is known, unquantified uncertainty associated with estimating population, water demands, hydrologic conditions, and firm yields. On a regionwide basis, the Lavaca RWPG considered planning for uncertainty and DWDOR by analyzing the impacts to the Lake Texana firm yield when applying an increase to reservoir evaporation and decrease to streamflow of 5%, 10%, and 20% during the DOR . The impacts were discussed by the Lavaca RWPG at a RWPG meeting where the impacts to groundwater were also discussed, as most of the region uses groundwater rather than surface water. Consideration to assuming only 90% of the modeled available groundwater is available for use was given. After much discussion, the Lavaca RWPG chose not to plan for uncertainty or DWDOR on a regional scale through either of the mentioned methods at this time. In the future, if better forecasting tools are made available, the Lavaca RWPG will revisit.

7.3.2 Measures to Plan Beyond Meeting Needs During Drought of Record

For the 2026 RWP, the TWDB requires a summary of the key assumptions, analyses, strategies, and projects that are already included in the 2026 RWP calculations and recommendations (if applicable) that go beyond just meeting identified water needs anticipated under a DOR (i.e., those things that will provide some additional measure of protection to withstand a DWDOR such as use of safe-yield or inclusion of strategies that provide water volumes in excess of the identified water need, such as management supply factor, etc.).

The Lavaca RWPG recognizes that supplies are understood best by the water suppliers and suggests that water user groups (WUGs) consider their demand projections, along with water supply volumes and reliability, to determine whether a safety factor or other planning measure would be appropriate to incorporate as a WUG-specific planning measure. Therefore, the Lavaca RWPG chose not to incorporate regionwide planning measures to address a DWDOR at this time, other than recommending municipal conservation and drought management for most municipal WUGs. Because no identified municipal

WUG needs are in the plan, these additional demand reductions would help stretch existing supplies in the case of a DWDOR.

7.3.3 Potential Measures and Responses Available During Droughts Worse than the Drought of Record

For the 2026 RWP, the TWDB requires a summary of the potential additional types of measures and responses, that are not part of the recommendations in the 2026 RWP, but that would likely be available to certain water providers or users in the event of the near-term onset of a DWDOR.

In the event of a near-term onset of a DWDOR, WUGs and wholesale water providers (WWPs) without adequate management supplies could potentially implement various measures and responses that would likely be available and capable of providing additional demand reductions or additional water supply capacities to withstand a DWDOR. The following provides examples of demand management and water supply measures that WUGs or WWPs could implement during a DWDOR:

- Demand Management Measures:
  - For WUGs and WWPs that do not already have the Drought Management WMS included as a recommended strategy in the RWP: Implement drought management reductions associated with outdoor watering restrictions, conversion of irrigated crops to dry farming, or temporary suspension of water use.
  - For WUGs and WWPs with the Drought Management WMS included as a recommended strategy in the RWP: Implement additional drought management measures beyond those in the plan.
- Water Supply Measures:
  - Pursue new direct potable reuse to extend existing supplies.
  - Pursue new groundwater well.
  - Pursue new brackish groundwater well with desalination.
  - Pursue new plan to blend brackish groundwater with existing water supply without additional desalination.
  - Implement efforts to mitigate water loss or non-revenue water.
  - Purchase hauled water via trucked water systems.

7.4 Current Drought Preparations and Response

In addition to regional or statewide droughts, entities may be subject to localized drought conditions or loss of existing water supplies due to infrastructure failure, temporary water quality impairment, or other unforeseen conditions. Loss of existing supplies, while relatively uncommon, is particularly challenging to address as the causes are often difficult to anticipate. Numerous entities within the Lavaca Region have drought contingency plans (DCPs) which include an emergency response stage and corresponding measures for droughts exceeding the DOR or for other emergency water supply conditions.

DCPs were obtained from the municipal water providers in the LRWPA during previous planning cycles to serve as a summary of existing drought planning within the LRWPA. The majority of DCPs for municipal water providers are included in their city ordinances. Those ordinances were reviewed again this cycle for any changes. El Campo approved a 2024 version of their DCP. The 2024 version of the DCP for the only Major Water Provider in the region, Lavaca-Navidad River Authority (LNRA), was also compiled into this regional summary. Drought conditions in the region are rarely so bad that drought management measures need to be implemented.

The DCPs show that a variety of triggers have been specified by the different water supplies as initiators of water shortage conditions. These triggers include a threshold level of total water use, well levels, and conditions caused by mechanical failure of water service systems. Strategies planned for dealing with drought conditions included restrictions on water use for irrigation, vehicle washing, and construction. The amount of water saved for each drought response condition varied by community. The Lavaca RWPG did not identify any unnecessary or counterproductive variations in specific drought response strategies that may confuse the public or otherwise impede drought response efforts.

Table 7-1 provides the drought triggers for a Severe Water Shortage and the Critical/Emergency Water Shortage for water users in the region, as available from the DCPs. The water reduction goals for the triggers are also included. Municipal water users exclusively rely on the Gulf Coast aquifer. Some manufacturing water users in Jackson County follow LNRA’s triggers.

Table 7-1 Summary of Current Drought Triggers in the Lavaca Region

Water User Group Name	County	Basin	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
				Trigger	Goal	Trigger	Goal
EDNA	JACKSON	LAVACA	GULF COAST AQUIFER	Total daily water demand >= 1.75 MGD for 3 consecutive days or 2.0 MGD for 1 day.	Total demand reduction of 15%	Total daily water demand >= 2.0 MGD for 3 consecutive days or 2.25 MGD for 1 day.	Total demand reduction of 20%
EDNA	JACKSON	LAVACA	GULF COAST AQUIFER	Water supply is equal or less than 70% of storage; pumping in wells is equal or less than 370 feet in Well 4 or 180 feet in Well 5; total daily demand equals or exceeds 250,000 gallons for 3 days or 500,000 gallons on a single day.	Total demand reduction of 20%	Mayor determines the existence of a water supply shortage or water pressure deficit.	Limited lawn watering schedules or the elimination of all lawn watering
GANADO	JACKSON	LAVACA	GULF COAST AQUIFER	NA	NA	NA	NA
QUADVEST	JACKSON	COLORADO-LAVACA	GULF COAST AQUIFER	NA	NA	NA	NA
COUNTY-OTHER	JACKSON	COLORADO-LAVACA, LAVACA, LAVACA-GUADALUPE	GULF COAST AQUIFER	NA	NA	NA	NA

Water User Group Name	County	Basin	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
				Trigger	Goal	Trigger	Goal
MANUFACTURING	JACKSON	COLORADO-LAVACA AND LAVACA-GUADALUPE	TEXANA LAKE/ RESERVOIR	Reservoir Conservation Pool elevation equal to or less than 34.09 feet msl, in accordance with the LNRA DCP; or, the LNRA Board declares a drought worse than the DOR or other water supply emergency and orders the mandatory curtailment of firm water supplies; or, upon notification from LNRA that it is implementing Stage 3 of the LNRA DCP.	Pro-rata water use reduction based on reservoir capacity: 50% capacity - 10% reduction; 40% capacity - 20% reduction; 30% capacity - 35% reduction; 20% capacity - 50% reduction	Contamination of water supply source; or catastrophic event causing failure or damage to structures; or causing emergency evacuation of reservoir; or any other emergency conditions determined by LNRA Board.	Water supply reduction target as determined by the LNRA Board and Management
MANUFACTURING	JACKSON	LAVACA	GULF COAST AQUIFER	NA	NA	NA	NA
IRRIGATION	JACKSON	COLORADO-LAVACA, LAVACA, LAVACA-GUADALUPE	GULF COAST AQUIFER	NA	NA	NA	NA
LIVESTOCK	JACKSON	COLORADO-LAVACA, LAVACA, LAVACA-GUADALUPE	GULF COAST AQUIFER	NA	NA	NA	NA
HALLETTSVILLE	LAVACA	LAVACA	GULF COAST AQUIFER	When pumpage of the City wells is equal to or greater than 1.5 mgd per day for 3 consecutive days.	30% reduction in total water use.	When pumpage of the City wells is equal to or greater than 1.75 mgd per day for 3 consecutive days.	40% reduction in total water use.

Water User Group Name	County	Basin	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
				Trigger	Goal	Trigger	Goal
MOULTON	LAVACA	LAVACA	GULF COAST AQUIFER	Static water level in Well 1, two drops to 250 ft belowground level; Well 3 drops to 205 ft belowground level; Well 4 drops to 165 ft belowground level and/or capacity of pumpage output is <= 70% of original capacity and/or loss of two or more wells due to mechanical failure.	Total demand reduction of 20%	Static water level in well #1, 2 drops to 260 ft below ground level; well #3 drops to 215 ft below ground level; well #4 drops to 175 ft below ground level and/or capacity of pumpage output is <= 60% of original capacity and/or loss of two or more wells due to mechanical failure	Total demand reduction of 25%
SHINER	LAVACA	LAVACA	GULF COAST AQUIFER	Emergency Water Demand Management Program, based on weather conditions or 90% of City's plant capacity.	Limit all consumption by citizens either using a fixed percentage of prior month usage or a maximum number of gallons per meter per week.	Emergency Water Demand Management Program, based on weather conditions or 90% of City's plant capacity.	Limit all consumption by citizens either using a fixed percentage of prior month usage or a maximum number of gallons per meter per week.
YOAKUM	LAVACA	LAVACA	GULF COAST AQUIFER	Daily usage equals or exceeds 3.42 mgd, or 100% of the current safe production capacity of the water system for 2 consecutive days.	Achieve 30% reduction in total water use.	Daily usage equals or exceeds 3.6 mgd, or 95% of the current safe production capacity of the water system for 2 consecutive days.	Achieve 40% reduction in total water use.

Water User Group Name	County	Basin	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
				Trigger	Goal	Trigger	Goal
COUNTY-OTHER	LAVACA	GUADALUPE, LAVACA, LAVACA-GUADALUPE	GULF COAST AQUIFER	NA	NA	NA	NA
MANUFACTURING	LAVACA	LAVACA	GULF COAST AQUIFER	NA	NA	NA	NA
MINING	LAVACA	LAVACA	GULF COAST AQUIFER	NA	NA	NA	NA
IRRIGATION	LAVACA	LAVACA	GULF COAST AQUIFER	NA	NA	NA	NA
LIVESTOCK	LAVACA	GUADALUPE, LAVACA, LAVACA-GUADALUPE	GULF COAST AQUIFER	NA	NA	NA	NA
EL CAMPO	WHARTON	COLORADO, COLORADO-LAVACA, LAVACA	GULF COAST AQUIFER	Total daily demand equals or exceeds 4.5 MGD for 3 consecutive days or 5.0 MGD on a single day.	Achieve a 15% reduction in daily water pumpage	Total daily demand equals or exceeds 5.0 MGD for 3 consecutive days or 5.5 MGD on a single day.	Achieve a 20% reduction in daily water pumpage
WHARTON COUNTY Water Control and Improvement District (WCID) 1	WHARTON	LAVACA	GULF COAST AQUIFER	NA	NA	NA	NA
COUNTY-OTHER	WHARTON	COLORADO, COLORADO-LAVACA, LAVACA	GULF COAST AQUIFER	NA	NA	NA	NA
MANUFACTURING	WHARTON	COLORADO-LAVACA	GULF COAST AQUIFER	NA	NA	NA	NA

Water User Group Name	County	Basin	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
				Trigger	Goal	Trigger	Goal
IRRIGATION	WHARTON	COLORADO-LAVACA, LAVACA	GULF COAST AQUIFER	NA	NA	NA	NA
IRRIGATION	WHARTON	COLORADO-LAVACA	LCRA - GARWOOD (ROR)	NA	NA	NA	NA
LIVESTOCK	WHARTON	COLORADO, COLORADO-LAVACA, LAVACA	GULF COAST AQUIFER	NA	NA	NA	NA
STEAM-ELECTRIC*	WHARTON	LAVACA	GULF COAST AQUIFER	NA	NA	NA	NA

*Steam-Electric responses to drought may be subject to the Electric Reliability Council of Texas requirements.

7.5 Existing and Potential Emergency Interconnects

The guidance provided by the TWDB states that "RWPGs must collect and summarize information on existing and potential major water infrastructure facilities that may be used for interconnections in event of an emergency shortage of water. RWP must include a description of the RWPG methodology used to collect emergency interconnects information and present the number of existing and potential emergency interconnects in the RWPA, including a table of who is connected to whom. If the RWPG collects additional information regarding the location or description of facilities, this information should be excluded from the plan and may be submitted to the TWDB's Executive Administrator separately and confidentially."

During the 2016 planning cycle, in order for the Lavaca Regional Water Planning Group to comply with this requirement, a request letter was mailed to seven major water infrastructure facilities within the region. The intent of the letter was to obtain information on whether the facilities' water system currently have access to, or the ability to provide, an emergency water supply through an interconnect with another water system.

The RWPG received six responses to the seven request letters. Each response stated that the municipality had no emergency interconnect. It has been confirmed that no emergency interconnect data exists within the Region. The Lavaca Region is extremely rural where utility service areas do not connect and it is unlikely that emergency interconnects will be implemented in the future.

As no emergency interconnect data exists within the region, no data was passed along confidentially to the TWDB Executive Administrator. As no emergency interconnects exist in the region, no mention of emergency interconnects in the various DCPs were reviewed.

7.6 Emergency Responses to Local Drought Conditions or Loss of Municipal Supply

Emergency preparedness is of particular importance for entities that rely on a sole-source of water for supply purposes. In instances where water systems rely exclusively on a single source, the state of Texas has identified a need to develop emergency preparedness protocols should source availability be significantly and suddenly reduced for any reason, including drought, equipment failure, or accidental or deliberate source contamination. The 31 TAC §357.42 requires that regional planning groups evaluate potential emergency responses to drought conditions or loss of existing water supplies for municipal WUGs with a 2020 population of less than 7,500 and with a sole-source of water (regardless of whether that water is provided by a WWP), as well as all county-other WUGs. A list of identified single-source WUGs with population of less than 7,500 and all county-other WUGs is included in Table 7-2, with potential emergency supply options and implementation requirements identified as applicable. Due to limited water sources, individual rural well owners, and large distances between municipalities in the region, the emergency supply options are reduced to trucking in water and drilling a new well. The entities evaluated were assumed to have 180 days or less of remaining supply.

Table 7-2 Potential Emergency Supplies for Sole-Source Municipal WUGs under 7,500 in Population and all County-Other

Entity					Potential Emergency Water Supply Source(s)								Implementation Requirements				
Water User Group Name (*Lavaca Region Portion)	County	2020 Census Population	2030 Population	2030 Demand (AF/year)	Release from Upstream Reservoir	Curtailment of Upstream/ Downstream Water Rights	Local Groundwater Well	Brackish Groundwater Limited Treatment	Brackish Groundwater Desalination	Emergency Interconnect	Other Named Local Supply	Trucked-In Water	Type Of Infrastructure Required	Entity Providing Supply	Other Local Entities Required To Participate/ Coordinate	Emergency Agreements/ Arrangements Already In Place?	Other
EDNA	JACKSON	5,561	5,848	866			X					X	well				
GANADO	JACKSON	1,913	1,850	204			X					X	well				
QUADVEST*	JACKSON	35	55	12			X					X	well				
COUNTY-OTHER	JACKSON	7,479	8,016	810			X					X	well				
HALLETTSVILLE	LAVACA	2,842	3,027	675			X					X	well				
MOULTON	LAVACA	808	776	156			X					X	well				
SHINER	LAVACA	2,154	2,282	529			X					X	well				
YOAKUM*	LAVACA	3,698	3,852	670			X					X	well				
COUNTY-OTHER	LAVACA	10,835	11,482	1,431			X					X	well				
WHARTON COUNTY WCID 1	WHARTON	719	730	121			X					X	well				
COUNTY-OTHER*	WHARTON	N/A	3,434	440			X					X	well				

7.7 Region-Specific Drought Response Recommendations and Model Drought Contingency Plans

7.7.1 Region-Specific Drought Response Recommendations

The Lavaca RWPG acknowledges that the DCP for the LNRA is the best drought management tool for surface water supplies in the Lavaca Region. LNRA uses multiple triggers at each stage that include water surface elevations of the lake as well as a broad trigger that allows for any additional scenario that would cause the LNRA to notify its customers that a drought stage has been triggered. Refer to Table 7-1 for severe and critical/emergency triggers and responses associated with LNRA customers.

The majority of the region uses groundwater as their main source of supply. Throughout the region, the DCPs for groundwater users are developed specifically to their use and location. Aquifer properties can vary across the region and it can be difficult to require the same triggers for all users of a particular groundwater source that covers several counties. The Lavaca RWPG acknowledges that the municipalities that use groundwater have the best knowledge to develop their DCP triggers and responses. Refer to Table 7-1 for severe and critical/emergency triggers and responses associated with groundwater users in the region. Even so, the Lavaca RWPG encourages ongoing coordination between groundwater users, Groundwater Conservation Districts, and the Groundwater Management Areas to monitor local conditions for necessary modifications to the DCPs.

7.7.2 Region-Specific Model Drought Contingency Plans

Model DCPs addressing the requirements of 30 TAC §288(b) were developed for the Lavaca Region and are available in Appendix 7A**.** Model plans were developed for WWPs, water utilities, and irrigation users. The Drought Preparedness Council recommendations from a previous cycle included developing a region-specific model drought contingency plan for all water use categories in the region that account for more than 10% of water demands in any decade over the 50-year planning horizon. The only water use category that meets that requirement in the Lavaca Region is the Irrigation water use category. The model plans were developed by starting with the TCEQ's template and making modifications to the template to acknowledge coordination with the Lavaca RWPG and to make the template more source-specific to the region.

7.8 Drought Management Strategies

Drought management can be implemented as a water management strategy to reduce water demands during times of drought. While no identified municipal water needs were in the region, drought management was considered by the RWPG as a potential strategy for municipal WUGs based on identified water reduction goals in the DCPs. For the WUGs in the region with identified water needs, which included Manufacturing in Jackson County and irrigation in all counties, it was determined that reducing water demands during times of drought could potentially help meet those needs. This was done by looking at reducing water use for manufacturing and rolling out polypipe temporarily to reduce irrigation water use during times of drought. Refer to Chapter 5 for additional details.

7.8.1 Recommended Drought Management Strategies

Drought Management is recommended as a strategy for the municipal utility WUGs in the region. While no water needs exist, the Lavaca RWPG supports municipalities following their DCPs and the responses to the various drought triggers identified in their DCPs. Drought Management is recommended for Edna, Ganado, Quadvest, Hallettsville, Moulton, Shiner, Yoakum, El Campo, and Wharton County WCID 1.

7.8.2 Alternative Drought Management Strategies

Drought Management is included as an alternative strategy for Manufacturing in Jackson County. This strategy identifies that a portion of the manufacturing sector in Jackson County purchases surface water from the LNRA. Under drought conditions, LNRA may pose restrictions on surface water use, based on its DCP. If the manufacturing sector is unable to find additional water to meet its manufacturing demands, it may be forced to cut back, and having to do so will likely have impacts economically.

7.8.3 Potential Drought Management Strategies Considered

Drought Management was considered and evaluated as a potentially feasible water management strategy for those municipal utility WUGs that do not include County-Other, for Manufacturing in Jackson County, and for Irrigation in Jackson, Lavaca, and Wharton counties. Drought management for irrigation has been included in the 2026 Plan neither as a recommended strategy nor as an alternative strategy because it was not deemed as viable as other strategies to meet irrigation water needs.

7.9 Other Drought Recommendations

Housed within the Office of Emergency Management within the Texas Department of Public Safety, the Drought Preparedness Council was authorized and established by the 76th legislature (HB-2660) in 1999, subsequent to the establishment of the Drought Monitoring and Response Committee (75th Legislature, Senate Bill 1). The Council is composed of representatives of state agencies and appointees by the governor. As defined by the Texas Water Code, the Council is responsible for the monitoring and assessing drought conditions and advising elected and planning officials about drought-related topics.

In February 2024, the Drought Preparedness Council recommended that RWPGs identify utilities within their boundaries that reported to the TCEQ having less than 180 days of available water supply during the current or preceding planning cycle. The Lavaca Region has not had any utilities report to the TCEQ having less than 180 days of available water supply between 2016 and 2023.

The Drought Preparedness Council also encouraged regional water planning groups to incorporate projected future reservoir evaporation rates in their assessments of future surface water availability. Historical reservoir evaporation rates are incorporated into WAMs that the Lavaca RWPG uses to determine surface water availability. The Lavaca RWPG considered incorporating evaporation rate increases of 5 to 20% into the WAM modeling, but ultimately decided not to. The Lavaca RWPG understands that incorporation of down scaled climate models is being considered for inclusion in WAMs, which would incorporate projected future reservoir evaporation rates.

Finally, the Drought Preparedness Council encourages RWPGs to consider planning for drought conditions worse than the drought of record, including scenarios that reflect greater rainfall deficits and/or higher surface temperatures. The Lavaca RWPG's response to this item is discussed in Section 7.2.

The Lavaca RWPG recognizes that the most valuable contingency will be completed at a local level. Further guidance and regional cooperation would be valuable in producing meaningful plans with clear trigger definition and implementation guidance. Communication of these between state, regional, and local levels would also further facilitate necessary emergency responses when drought measures need to be implemented. The following recommendations are made to support development and implementation of meaningful DCPs during times of drought:

- Coordination by water providers with local Groundwater Conservation Districts, in order to consider more uniform triggers and responses from a particular source within the district, as applicable.
- Coordination with wholesale providers regarding drought conditions and potential implementation of drought stages, particularly during times of limited precipitation.
- Communication with customers during times of decreased supply or precipitation in order to facilitate potential implementation of drought measures and reinforce the importance of compliance with any voluntary measures.
- Designation of appropriate resources to allow for consistent application of enforcement procedures as established in the DCPs.

Appendix 7A. Region-Specific Model Drought Contingency Plans

Model Lavaca Region Drought Contingency Plan Template
Utility/Water Supplier

Model Drought Contingency Plan Template (Utility / Water Supplier)

Brief Introduction and Background

Include information such as

- Name of Utility
- Address, City, Zip Code
- CCN#
- PWS #s

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the _____________ (name of your water supplier) hereby adopts the following regulations and restrictions on the delivery and consumption of water through an ordinance/or resolution.

Water uses regulated or prohibited under this Drought Contingency Plan (the Plan) are considered to be non-essential and continuation of such uses during times of water shortage or other emergency water supply condition are deemed to constitute a waste of water which subjects the offender(s) to penalties as defined in Section XI of this Plan.

Section II: Public Involvement

Opportunity for the public to provide input into the preparation of the Plan was provided by the _____________ (name of your water supplier) by means of _________________ (describe methods used to inform the public about the preparation of the plan and provide opportunities for input; for example, scheduling and providing public notice of a public meeting to accept input on the Plan).

Section III: Public Education

The __________ (name of your water supplier) will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of ___________________ (describe methods to be used to provide information to the public about the Plan; for example, public events, press releases or utility bill inserts).

Section IV: Coordination with the Lavaca Regional Water Planning Group

The service area of the ______________ (name of your water supplier) is located within the Lavaca Regional Water Planning Area and ___________ (name of your water supplier) has provided a copy of this Plan to the Lavaca Regional Water Planning Group.

Section V: Authorization

The _________________ (designated official; for example, the mayor, city manager, utility director, general manager, etc.), or his/her designee is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The _______________, (designated official) or his/her designee shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by the _________________ (name of your water supplier). The terms person and customer as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Definitions

For the purposes of this Plan, the following definitions shall apply:

Aesthetic water use: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

Commercial and institutional water use: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

Conservation: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

Customer: any person, company, or organization using water supplied by ____________________ (name of your water supplier).

Domestic water use: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

Even number address: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.

Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

Landscape irrigation use: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, and rights-of-way and medians.

Non-essential water use: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

(a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;
(b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
(c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
(d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
(e) flushing gutters or permitting water to run or accumulate in any gutter or street;
(f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or Jacuzzi-type pools;
(g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
(h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
(i) use of water from hydrants for construction purposes or any other purposes other than fire fighting.

Odd numbered address: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

Section VIII: Criteria for Initiation and Termination of Drought Response Stages

The _________________ (designated official) or his/her designee shall monitor water supply and/or demand conditions on a _____________ (example: daily, weekly, monthly) basis and shall determine when conditions warrant initiation or termination of each stage of the Plan, that is, when the specified triggers are reached.

The triggering criteria described below are based on ____

____

(provide a brief description of the rationale for the triggering criteria; for example, triggering criteria / trigger levels based on a statistical analysis of the vulnerability of the water source under drought of record conditions, or based on known system capacity limits).

Stage 1 Triggers -- MILD Water Shortage Conditions

Requirements for initiation
Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on certain water uses, defined in Section VII Definitions, when

____

(Describe triggering criteria / trigger levels; see examples below).

Following are examples of the types of triggering criteria that might be used <u>in one or more</u> <u>successive stages</u> of a drought contingency plan. One or a combination of such criteria must be defined for each drought response stage, but usually <u>not all will apply</u>. Select those appropriate to your system:

Example 1: *Annually, beginning on May 1 through September 30.*

Example 2: *When the water supply available to the ______________ (name of your water supplier) is equal to or less than _ (acre-feet, percentage of storage, etc.).*

Example 3: *When, pursuant to requirements specified in the ____________________ (name of your water supplier) wholesale water purchase contract with ______________ (name of your wholesale water supplier), notification is received requesting initiation of Stage 1 of the Drought Contingency Plan.*

Example 4: *When flows in the _____ (name of stream or river) are equal to or less than _____ cubic feet per second.*

Example 5: *When the static water level in the ____________ (name of your water supplier) well(s) is equal to or less than __________ feet above/below mean sea level.*

Example 6: *When the specific capacity of the _____________ (name of your water supplier) well(s) is equal to or less than __________ percent of the well=s original specific capacity.*

Example 7: *When total daily water demand equals or exceeds ____________ million gallons for _______ consecutive days of __________ million gallons on a single day (example: based on the safe operating capacity of water supply facilities).*

Example 8: *Continually falling treated water reservoir levels which do not refill above ______ percent overnight (example: based on an evaluation of minimum treated water storage required to avoid system outage).*

The public water supplier may devise other triggering criteria which are tailored to its system.

<u>Requirements for termination</u>
Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of _ (e.g. 3) consecutive days.

Stage 2 Triggers -- MODERATE Water Shortage Conditions

<u>Requirements for initiation</u>
Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section IX of this Plan when __________________ (*describe triggering criteria; see examples in Stage 1*).

<u>Requirements for termination</u>
Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ________ (example: 3) consecutive days. Upon termination of Stage 2, Stage 1 becomes operative.

Stage 3 Triggers -- SEVERE Water Shortage Conditions

Requirements for initiation
Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 3 of this Plan when _____________ (*describe triggering criteria; see examples in Stage 1*).

Requirements for termination
Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ________ (example: 3) consecutive days. Upon termination of Stage 3, Stage 2 becomes operative.

Stage 4 Triggers -- CRITICAL Water Shortage Conditions

Requirements for initiation
Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 4 of this Plan when _____________ (describe triggering criteria; see examples in Stage 1).

Requirements for termination
Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ________ (example: 3) consecutive days. Upon termination of Stage 4, Stage 3 becomes operative.

Stage 5 Triggers -- EMERGENCY Water Shortage Conditions

Requirements for initiation
Customers shall be required to comply with the requirements and restrictions for Stage 5 of this Plan when _______________ (designated official), or his/her designee, determines that a water supply emergency exists based on:

1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or

2. Natural or man-made contamination of the water supply source(s).

Requirements for termination
Stage 5 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ________ (example: 3) consecutive days.

Stage 6 Triggers -- WATER ALLOCATION

Requirements for initiation
Customers shall be required to comply with the water allocation plan prescribed in Section IX of this Plan and comply with the requirements and restrictions for Stage 5 of this Plan when ________________ (describe triggering criteria, see examples in Stage 1).

Requirements for termination - Water allocation may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of _________ (example: 3) consecutive days.

Note: The inclusion of WATER ALLOCATION as part of a drought contingency plan may not be required in all cases. For example, for a given water supplier, an analysis of water supply availability under drought of record conditions may indicate that there is essentially no risk of water supply shortage. Hence, a drought contingency plan for such a water supplier might only address facility capacity limitations and emergency conditions (example: supply source contamination and system capacity limitations).

Section IX: Drought Response Stages

The ________________ (designated official), or his/her designee, shall monitor water supply and/or demand conditions on a daily basis and, in accordance with the triggering criteria set forth in Section VIII of this Plan, shall determine that a mild, moderate, severe, critical, emergency or water shortage condition exists and shall implement the following notification procedures:

Notification

Notification of the Public:
The __________ (designated official) or his/ her designee shall notify the public by means of:

Examples:
publication in a newspaper of general circulation,
direct mail to each customer,
public service announcements,
signs posted in public places,
take-home fliers at schools.

Additional Notification:
The __________ (designated official) or his/ her designee shall notify directly, or cause to be notified directly, the following individuals and entities:

Examples:
Mayor / Chairman and members of the City Council / Utility Board
Fire Chief(s)
City and/or County Emergency Management Coordinator(s)
County Judge & Commissioner(s)
State Disaster District / Department of Public Safety
TCEQ (required when mandatory restrictions are imposed)
Major water users
Critical water users, i.e. hospitals
Parks / street superintendents & public facilities managers

Note: The plan should specify direct notice only as appropriate to respective drought stages.

Stage 1 Response -- MILD Water Shortage Conditions

Target: Achieve a voluntary ___ percent reduction in _______________(example: total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, activation and use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

Voluntary Water Use Restrictions for Reducing Demand:

(a) Water customers are requested to voluntarily limit the irrigation of landscaped areas to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and to irrigate landscapes only between the hours of midnight and 10:00 a.m. and 8:00 p.m. to midnight on designated watering days.

(b) All operations of the ________________ (name of your water supplier) shall adhere to water use restrictions prescribed for Stage 2 of the Plan.

(c) Water customers are requested to practice water conservation and to minimize or discontinue water use for non-essential purposes.

Stage 2 Response -- MODERATE Water Shortage Conditions

Target: Achieve a _____ percent reduction in _______________ (example: total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ______________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

Water Use Restrictions for Demand Reduction:
Under threat of penalty for violation, the following water use restrictions shall apply to all persons:

(a) Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and irrigation of landscaped areas is further limited to the hours of 12:00 midnight until 10:00 a.m. and between 8:00 p.m. and 12:00 midnight on designated watering days. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or drip irrigation system.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle for quick rises. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.

(c) Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or Jacuzzi-type pools is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight.

(d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.

(e) Use of water from hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare, except that use of water from designated fire hydrants for construction purposes may be allowed under special permit from the ____________________ (name of your water supplier).

(f) Use of water for the irrigation of golf course greens, tees, and fairways is prohibited except on designated watering days between the hours 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight. However, if the golf course utilizes a water source other than that provided by the ______________ (name of your water supplier), the facility shall not be subject to these regulations.

(g) All restaurants are prohibited from serving water to patrons except upon request of the patron.

(h) The following uses of water are defined as non-essential and are prohibited:

1. wash down of any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
2. use of water to wash down buildings or structures for purposes other than immediate fire protection;
3. use of water for dust control;
4. flushing gutters or permitting water to run or accumulate in any gutter or street; and
5. failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 3 Response -- SEVERE Water Shortage Conditions

<u>Target</u>: Achieve a _____ percent reduction in _______________ (example: total water use, daily water demand, etc.).

<u>Best Management Practices for Supply Management</u>:

Describe additional measures, if any, to be implemented directly by ______________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

<u>Water Use Restrictions for Demand Reduction</u>:
All requirements of Stage 2 shall remain in effect during Stage 3 except:

(a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, drip irrigation, or permanently installed automatic sprinkler system only. The use of hose-end sprinklers is prohibited at all times.

(b) The watering of golf course tees is prohibited unless the golf course utilizes a water source other than that provided by the ____________________ (name of your water supplier).

(c) The use of water for construction purposes from designated fire hydrants under special permit is to be discontinued.

Stage 4 Response -- CRITICAL Water Shortage Conditions

<u>Target</u>: Achieve a _____ percent reduction in _______________ (example: total water use, daily water demand, etc.).

<u>Best Management Practices for Supply Management</u>:

Describe additional measures, if any, to be implemented directly by ______________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

<u>Water Use Restrictions for Reducing Demand:</u> All requirements of Stage 2 and 3 shall remain in effect during Stage 4 except:

(a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 6:00 a.m. and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, or drip irrigation only. The use of hose-end sprinklers or permanently installed automatic sprinkler systems are prohibited at all times.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash and commercial service stations and not in the immediate interest of public health, safety, and welfare is prohibited. Further, such vehicle washing at commercial car washes and commercial service stations shall occur only between the hours of 6:00 a.m. and 10:00 a.m. and between 6:00 p.m. and 10 p.m.

(c) The filling, refilling, or adding of water to swimming pools, wading pools, and Jacuzzi-type pools is prohibited.

(d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.

(e) No application for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind shall be approved, and time limits for approval of such applications are hereby suspended for such time as this drought response stage or a higher- numbered stage shall be in effect.

Stage 5 Response -- EMERGENCY Water Shortage Conditions

<u>Target</u>: Achieve a _____ percent reduction in _______________ (example: total water use, daily water demand, etc.).

<u>Best Management Practices for Supply Management</u>:

Describe additional measures, if any, to be implemented directly by ______________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

<u>Water Use Restrictions for Reducing Demand</u>. All requirements of Stage 2, 3, and 4 shall remain in effect during Stage 5 except:

(a) Irrigation of landscaped areas is absolutely prohibited.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.

Section X: Enforcement

(a) No person shall knowingly or intentionally allow the use of water from the ___________ (name of your water supplier) for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time pursuant to action taken by _______ (designated official), or his/her designee, in accordance with provisions of this Plan.

(b) Any person who violates this Plan is guilty of a misdemeanor and, upon conviction shall be punished by a fine of not less than ___________ dollars ($_____) and not more than __________ dollars ($_____). Each day that one or more of the provisions in this Plan is violated shall constitute a separate offense. If a person is convicted of three or more distinct violations of this Plan, the __________________ (designated official) shall, upon due notice to the customer, be authorized to discontinue water service to the premises where such violations occur. Services discontinued under such circumstances shall be restored only upon payment of a re-connection charge, hereby established at $________, and any other costs incurred by the ________________ (name of your water supplier) in discontinuing service. In addition, suitable assurance must be given to the ____________ (designated official) that the same action shall not be repeated while the Plan is in effect. Compliance with this plan may also be sought through injunctive relief in the district court.

(c) Any person, including a person classified as a water customer of the _________________ (name of your water supplier), in apparent control of the property where a violation occurs or originates shall be presumed to be the violator, and proof that the violation occurred on the person=s property shall constitute a rebuttable presumption that the person in apparent control of the property committed the violation, but any such person shall have the right to show that he/she did not commit the violation. Parents shall be presumed to be responsible for violations of their minor children and proof that a violation, committed by a child, occurred on property within the parents= control shall constitute a rebuttable presumption that the parent committed the violation, but any such parent may be excused if he/she proves that he/she had previously directed the child not to use the water as it was used in violation of this Plan and that the parent could not have reasonably known of the violation.

(d) Any employee of the ________________ (name of your water supplier), police officer, or other ______________ employee designated by the ________________ (designated official), may issue a citation to a person he/she reasonably believes to be in violation of this Ordinance. The citation shall be prepared in duplicate and shall contain the name and address of the alleged violator, if known, the offense charged, and shall direct him/her to appear in the ____________ (example: municipal court) on the date shown on the citation for which the date shall not be less than 3 days nor more than 5 days from the date the citation was issued. The alleged violator shall be __________________ served a copy of the citation. Service of the citation shall be complete upon delivery of the citation to the alleged violator, to an agent or employee of a violator, or to a person over 14 years of age who is a member of the violator's immediate family or is a resident of the violator's residence. The alleged violator shall appear in ____________ (example: municipal court) to enter a plea of guilty or not guilty for the violation of this Plan. If the alleged violator fails to appear in __________ (example: municipal court), a warrant for his/her arrest may be issued. A summons to appear may be issued in lieu of an arrest warrant. These cases shall be expedited and given preferential setting in ____________________ (example: municipal court) before all other cases.

Section XI: Variances

The _________________ (designated official), or his/her designee, may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the person requesting such variance and if one or more of the following conditions are met:

(a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.

(b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the _____________ (name of your water supplier) within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the _____________ (designated official), or his/her designee, and shall include the following:

(a) Name and address of the petitioner(s).
(b) Purpose of water use.
(c) Specific provision(s) of the Plan from which the petitioner is requesting relief.
(d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
(e) Description of the relief requested.
(f) Period of time for which the variance is sought.
(g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
(h) Other pertinent information.

EXAMPLE RESOLUTION FOR ADOPTION OF A

DROUGHT CONTINGENCY PLAN

RESOLUTION NO. ____________

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE ________________ (name of water supplier) ADOPTING A DROUGHT CONTINGENCY PLAN.

WHEREAS, the Board recognizes that the amount of water available to the ____________ (name of water supplier) and its water utility customers are limited and subject to depletion during periods of extended drought;

WHEREAS, the Board recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 11.1272 of the Texas Water Code and applicable rules of the Texas Commission on Environmental Quality require all public water supply systems in Texas to prepare a drought contingency plan; and

WHEREAS, as authorized under law, and in the best interests of the customers of the

______________ (name of water supply system), the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE _____________ (name of water supplier):

SECTION 1. That the Drought Contingency Plan attached hereto as Exhibit "A" and made part hereof for all purposes be, and the same is hereby, adopted as the official policy of the _________________ (name of water supplier).

SECTION 2. That the _____________ (e.g., general manager) is hereby directed to implement, administer, and enforce the Drought Contingency Plan.

SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE __________, ON THIS day of ______, 20____.

President, Board of Directors
ATTESTED TO:

____
Secretary, Board of Directors

Model Lavaca Region Drought Contingency Plan Template
Irrigation Uses

Model Drought Contingency Plan Template (Irrigation Uses)

DROUGHT CONTINGENCY PLAN
FOR
(Name of irrigation district)
(Address)
(Date)

Section I: Declaration of Policy, Purpose, and Intent

The Board of Directors of the _________ (name of irrigation district) deems it to be in the interest of the District to adopt Rules and Regulations governing the equitable and efficient allocation of limited water supplies during times of shortage. These Rules and Regulations constitute the District's drought contingency plan required under Section 11.1272, Texas Water Code, Vernon's Texas Codes Annotated, and associated administrative rules of the Texas Commission on Environmental Quality (Title 30, Texas Administrative Code, Chapter 288).

Section II: User Involvement

Opportunity for users of water from the _____________ (name of irrigation district) was provided by means of ____________ (describe methods used to inform water users about the preparation of the plan and opportunities for input; for example, scheduling and providing notice of a public meeting to accept user input on the plan).

Section III: User Education

The __________ (name of irrigation district) will periodically provide water users with information about the Plan, including information about the conditions under which water allocation is to be initiated or terminated and the district's policies and procedures for water allocation. This information will be provided by means of _______________ (e.g. describe methods to be used to provide water users with information about the Plan; for example, by providing copies of the Plan and by posting water allocation rules and regulations on the district's public bulletin board).

Section IV: Authorization

The __________ (e.g., general manager) is hereby authorized and directed to implement the applicable provision of the Plan upon determination by the Board that such implementation is necessary to ensure the equitable and efficient allocation of limited water supplies during times of shortage.

Section V: Application

The provisions of the Plan shall apply to all persons utilizing water provided by the ____________ (name of irrigation district). The term "person" as used in the Plan includes individuals, corporations, partnerships, associations, and all other legal entities.

Section VI: Initiation of Water Allocation for Severe or Critical/Emergency Conditions

The __________ (designated official) shall monitor water supply conditions on a _______ (e.g. weekly, monthly) basis and shall make recommendations to the Board regarding irrigation of water allocation. Upon approval of the Board, water allocation will become effective when ____________ (describe the criteria and the basis for the criteria):

Below are examples of the types of triggering criteria that might be used; singly or in combination, in an irrigation district's drought contingency plan:

Example 1: Water in storage in the _______ (name of reservoir) is equal to or less than __________ (acre-feet and/or percentage of storage capacity).

Example 2: Combined storage in the ____________ (name or reservoirs) reservoir system is equal to or less than ______________ (acre-feet and/or percentage of storage capacity).

Example 3: Flows as measured by the U.S. Geological Survey gage on the _______________ (name of reservoir) near ____________ _____________, Texas reaches _______ cubic feet per second (cfs).

Example 4: The storage balance in the district's irrigation water rights account reaches __________ acre-feet.

Example 5: The storage balance in the district's irrigation water rights account reaches an amount equivalent to ________ (number) irrigations for each flat rate acre in which all flat rate assessments are paid and current.

Example 6: The __________ (name of entity supplying water to the irrigation district) notifies the district that water deliveries will be limited to ________ acre-feet per year (i.e. a level below that required for unrestricted irrigation).

Example 7: Water levels in the Gulf Coast Aquifer fall to _________ feet or lower.

Section VII: Termination of Water Allocation

The district's water allocation policies will remain in effect until the conditions defined in Section IV of the Plan no longer exist and the Board deems that the need to allocate water no longer exists.

Section VIII: Notice

Notice of the initiation of water allocation will be given by notice posted on the District's public bulletin board and by mail to each ___________ (e.g. landowner, holders of active irrigation accounts, etc.).

Section IX: Water Allocation

(a) In identifying specific, quantified targets for water allocation to be achieved during periods of water shortages and drought, each irrigation user shall be allocated irrigations or _________ acre-feet of water each flat rate acre on which all taxes, fees, and charges have been paid. The water allotment in each irrigation account will be expressed in acre-feet of water.

Include explanation of water allocation procedure. For example, in the Lower Rio Grande Valley, an "irrigation" is typically considered to be equivalent to eight (8) inches of water per irrigation acre; consisting of six (6) inches of water per acre applied plus two (2) inches of water lost in transporting the water from the river to the land. Thus, three irrigations would be equal to 24 inches of water per acre or an allocation of 2.0 acre-feet of water measured at the diversion from the river.

(b) As additional water supplies become available to the District in an amount reasonably sufficient for allocation to the District's irrigation users, the additional water made available to the District will be equally distributed, on a pro rata basis, to those irrigation users having __________.

Example 1: **An account balance of less than ______ irrigations for each flat rate acre (i.e. ______ acre-feet).**

Example 2: **An account balance of less than ______ acre-feet of water for each flat rate acre.**

Example 3: **An account balance of less than ______ acre-feet of water.**

(c) The amount of water charged against a user's water allocation will be _________ (e.g. eight inches) per irrigation, or one allocation unit, unless water deliveries to the land are metered. Metered water deliveries will be charges based on actual measured use. In order to maintain parity in charging use against a water allocation between non-metered and metered deliveries, a loss factor of _______ percent of the water delivered in a metered situation will be added to the measured use and will be charged against the user's water allocation. Any metered use, with the loss factor applied, that is less than eight (8) inches per acre shall be credited back to the allocation unit and will be available to the user. It shall be a violation of the Rules and Regulations for a water user to use water in excess of the amount of water contained in the users irrigation account.

(d) Acreage in an irrigation account that has not been irrigated for any reason within the last two (2) consecutive years will be considered inactive and will not be allocated water. Any landowner whose land has not been irrigated within the last two (2) consecutive years, may, upon application to the District expressing intent to irrigate the land, receive future allocations. However, irrigation water allocated shall be applied only upon the acreage to which it was allocated and such water allotment cannot be transferred until there have been two consecutive years of use.

Section X: Transfers of Allotments

(a) A water allocation in an active irrigation account may be transferred within the boundaries of the District from one irrigation account to another. The transfer of water can only be made by the landowner's agent who is authorized in writing to act on behalf of the landowner in the transfer of all or part of the water allocation from the described land of the landowner covered by the irrigation account.

(b) A water allocation may not be transferred to land owned by a landowner outside the District boundaries.

or

A water allocation may be transferred to land outside the District's boundaries by paying the current water charge as if the water was actually delivered by the District to the land covered by an irrigation account. The amount of water allowed to be transferred shall be stated in terms of acre-feet and deducted from the landowner's current allocation balance in the irrigation account. Transfers of water outside the District shall not affect the allocation of water under Section VII of these Rules and Regulations.

(c) Water from outside the District may not be transferred by a landowner for use within the District.

or

Water from outside the District may be transferred by a landowner for use within the District. The District will divert and deliver the water on the same basis as District water is delivered, except that a percent conveyance loss will be charged against the amount of water transferred for use in the District as the water is delivered.

Section XI: Penalties

Any person who willfully opens, closes, changes or interferes with any headgate or uses water in violation of these Rules and Regulations, shall be considered in violation of Section 11.0083, Texas Water Code, Vernon's Texas Codes Annotated, which provides for punishment by fine of not less than $10.00 nor more than $200.00 or by confinement in the county jail for not more than thirty (30) days, or both, for each violation, and these penalties provided by the laws of the State and may by enforced by complaints filed in the appropriate court jurisdiction in ________ County, all in accordance with Section 11.083; and in addition, the District may pursue a civil remedy in the way of damages and/or injunction against the violation of any of the foregoing Rules and Regulations.

Section XII: Severability

It is hereby declared to be the intention of the Board of Directors of the _____________________ (name of irrigation district) that the sections, paragraphs, sentences, clauses, and phrases of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the Board without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

Section XIII: Authority

The foregoing rules and regulations are adopted pursuant to and in accordance with Sections 11.039, 11.083, 11.1272; Section 49.004; and Section 58.127-130 of the Texas Water Code, *Vernon's Texas Codes Annotated*.

Section XIV: Effective Date of Plan

The effective date of this Rule shall be five (5) days following the date of Publication hereof and ignorance of the Rules and Regulations is not a defense for a prosecution for enforcement of the violation of the Rules and Regulations.

EXAMPLE RESOLUTION FOR ADOPTION OF A DROUGHT CONTINGENCY PLAN

RESOLUTION NO. ____________

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE ________________ (name of water supplier) ADOPTING A DROUGHT CONTINGENCY PLAN.

WHEREAS, the Board recognizes that the amount of water available to the ____________ (name of water supplier) and its water utility customers is limited and subject to depletion during periods of extended drought;

WHEREAS, the Board recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 11.1272 of the Texas Water Code and applicable rules of the Texas Commission on Environmental Quality require all public water supply systems in Texas to prepare a drought contingency plan; and

WHEREAS, as authorized under law, and in the best interests of the customers of the ________________ (name of water supply system), the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE ____________________ (name of water supplier):

SECTION 1. That the Drought Contingency Plan attached hereto as Exhibit A and made part hereof for all purposes be, and the same is hereby, adopted as the official policy of the _______________ (name of water supplier).

SECTION 2. That the ____________________ (e.g., general manager) is hereby directed to implement, administer, and enforce the Drought Contingency Plan.

SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE _________________, ON THIS ____________ day of ________, 20____.

____
President, Board of Directors

ATTESTED TO:

____
Secretary, Board of Director

Model Lavaca Region Drought Contingency Plan Template
Wholesale Water Providers

Model Drought Contingency Plan Template (Wholesale Public Water Suppliers)

DROUGHT CONTINGENCY PLAN
FOR THE
(Name of wholesale water supplier)
(address)
(CCN)
(PWS)
(Date)

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and/or to protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the ___________________ (name of your water supplier) adopts the following Drought Contingency Plan (the Plan).

Section II: Public Involvement

Opportunity for the public and wholesale water customers to provide input into the preparation of the Plan was provided by _______________ (name of your water supplier) by means of _________________ (describe methods used to inform the public and wholesale customers about the preparation of the plan and opportunities for input; for example, scheduling and proving public notice of a public meeting to accept input on the Plan).

Section III: Wholesale Water Customer Education

The ________________ (name of your water supplier) will periodically provide wholesale water customers with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of __________________ (e.g., describe methods to be used to provide customers with information about the Plan; for example, providing a copy of the Plan or periodically including information about the Plan with invoices for water sales).

Section IV: Coordination with the Lavaca Regional Water Planning Group

The service area of the ______________ (name of your water supplier) is located within the Lavaca Regional Water Planning Area and ___________ (name of your water supplier) has provided a copy of this Plan to the Lavaca Regional Water Planning Group.

Section V: Authorization

The ________________ (designated official; for example, the general manager or executive director), or his/her designee, is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare.

The __________, or his/her designee, shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all customers utilizing water provided by the ________________ (name of your water supplier). The terms person and customer as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Criteria for Initiation and Termination of Drought Response Stages

The _________________ (designated official), or his/her designee, shall monitor water supply and/or demand conditions on a (e.g., weekly, monthly) basis and shall determine when conditions warrant initiation or termination of each stage of the Plan. Customer notification of the initiation or termination of drought response stages will be made by mail or telephone. The news media will also be informed.

The triggering criteria described below are based on:

____
____ (provide a brief description of the rationale for the triggering criteria; for example, triggering criteria are based on a statistical analysis of the vulnerability *of the water source under drought of record conditions)*.

Stage 1 Triggers -- MILD Water Shortage Conditions

Requirements for initiation: The _____________ (name of your water supplier) will recognize that a mild water shortage condition exists when________________ (*describe triggering criteria, see examples below*).

> ***Below are examples of the types of triggering criteria that might be used in a wholesale water suppliers drought contingency plan. One or a combination of such criteria may be defined for each drought response stage:***
>
> ***Example 1:*** ***Water in storage in the _____________ (name of reservoir) is equal to or less than _________ (acre-feet and/or percentage of storage capacity).***
>
> ***Example 2:*** ***When the combined storage in the __________ (name of reservoirs) is equal to or less than __________ (acre-feet and/or percentage of storage capacity).***
>
> ***Example 3:*** ***Flows as measured by the U.S. Geological Survey gage on the ________ (name of river) near ________, Texas reaches cubic feet per second (cfs).***
>
> ***Example 4:*** ***When total daily water demand equals or exceeds __________ million gallons for consecutive days or million gallons on a single day.***
>
> ***Example 5:*** ***When total daily water demand equals or exceeds percent of the safe operating capacity of ________ million gallons per day for __________ consecutive days or __________ percent on a single day.***

Requirements for termination: Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. The _____________ (name of water supplier) will notify its wholesale customers and the media of the termination of Stage 1 in the same manner as the notification of initiation of Stage 1 of the Plan.

Stage 2 Triggers -- MODERATE Water Shortage Conditions

Requirements for initiation: The _____________ (name of your water supplier) will recognize that a moderate water shortage condition exists when______________ (describe triggering criteria).

Requirements for termination: Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. Upon termination of Stage 2, Stage 1 becomes operative. The ___________ (name of your water supplier) will notify its wholesale customers and the media of the termination of Stage 2 in the same manner as the notification of initiation of Stage 1 of the Plan.

Stage 3 Triggers -- SEVERE Water Shortage Conditions

Requirements for initiation: The ____________________ (name of your water supplier) will recognize that a severe water shortage condition exists when __________________(*describe triggering criteria; see examples in Stage 1*).

Requirements for termination: Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. Upon termination of Stage 3, Stage 2 becomes operative. The ___________ (name of your water supplier) will notify its wholesale customers and the media of the termination of Stage 2 in the same manner as the notification of initiation of Stage 3 of the Plan.

Stage 4 Triggers -- CRITICAL Water Shortage Conditions

Requirements for initiation: The ____________________ (name of your water supplier) will recognize that an emergency water shortage condition exists when____________________ (*describe triggering criteria; see examples below*).

Example 1. ***Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or***

Example 2. ***Natural or man-made contamination of the water supply source(s).***

Requirements for termination: Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. The _____________ (name of your water supplier) will notify its wholesale customers and the media of the termination of Stage 4.

Section VIII: Drought Response Stages

The _________________ (designated official), or his/her designee, shall monitor water supply and/or demand conditions and, in accordance with the triggering criteria set forth in Section VI, shall determine that mild, moderate, or severe water shortage conditions exist or that an emergency condition exists and shall implement the following actions:

Stage 1 Response -- MILD Water Shortage Conditions

Target: Achieve a voluntary ____ percent reduction in __ (e.g., total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by _________________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:

(a) The _________________ (designated official), or his/her designee(s), will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale water customers initiate voluntary measures to reduce water use (e.g., implement Stage 1 of the customer=s drought contingency plan).

(b) The _________________ (designated official), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 2 Response -- MODERATE Water Shortage Conditions

Target: Achieve a _____ percent reduction in _________ (e.g., total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ___________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:

(a) The __________ (designated official), or his/her designee(s), will initiate weekly contact with wholesale water customers to discuss water supply and/or demand conditions and the possibility of pro rata curtailment of water diversions and/or deliveries.

(b) The __________ (designated official), or his/her designee(s), will request wholesale water customers to initiate mandatory measures to reduce non-essential water use (e.g., implement Stage 2 of the customer=s drought contingency plan).

(c) The __________ (designated official), or his/her designee(s), will initiate preparations for the implementation of pro rata curtailment of water diversions and/or deliveries by preparing a monthly water usage allocation baseline for each wholesale customer according to the procedures specified in Section VI of the Plan.

(d) The __________ (designated official), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 3 Response -- SEVERE Water Shortage Conditions

Target: Achieve a _____ percent reduction in ________ (e.g., total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ___________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:

(a) The __________ (designated official), or his/her designee(s), will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale water customers initiate additional mandatory measures to reduce non-essential water use (e.g., implement Stage 2 of the customer=s drought contingency plan).

(b) The __________ (designated official), or his/her designee(s), will initiate pro rata curtailment of water diversions and/or deliveries for each wholesale customer according to the procedures specified in Section VI of the Plan.

(c) The __________ (designated official), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 4 Response -- EMERGENCY Water Shortage Conditions

Whenever emergency water shortage conditions exist as defined in Section VII of the Plan, the ____________________ (designated official) shall:

1. Assess the severity of the problem and identify the actions needed and time required to solve the problem.

2. Inform the utility director or other responsible official of each wholesale water customer by telephone or in person and suggest actions, as appropriate, to alleviate problems (e.g., notification of the public to reduce water use until service is restored).

3. If appropriate, notify city, county, and/or state emergency response officials for assistance.

4. Undertake necessary actions, including repairs and/or clean-up as needed.

5. Prepare a post-event assessment report on the incident and critique of emergency response procedures and actions.

Section IX: Pro Rata Water Allocation

In the event that the triggering criteria specified in Section VII of the Plan for Stage 3 Severe Water Shortage Conditions have been met, the _____________ (designated official) is hereby authorized initiate allocation of water supplies on a pro rata basis in accordance with Texas Water Code Section 11.039.

Section X: Enforcement

During any period when pro rata allocation of available water supplies is in effect, wholesale customers shall pay the following surcharges on excess water diversions and/or deliveries:

_______ times the normal water charge per acre-foot for water diversions and/or deliveries in excess of the monthly allocation up through 5 percent above the monthly allocation.

_______ times the normal water charge per acre-foot for water diversions and/or deliveries in excess of the monthly allocation from 5 percent through 10 percent above the monthly allocation.

_______ times the normal water charge per acre-foot for water diversions and/or deliveries in excess of the monthly allocation from 10 percent through 15 percent above the monthly allocation.

_______ times the normal water charge per acre-foot for water diversions and/or deliveries more than 15 percent above the monthly allocation.

The above surcharges shall be cumulative.

Section XI: Variances

The _________________ (designated official), or his/her designee, may, in writing, grant a temporary variance to the pro rata water allocation policies provided by this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the public health, welfare, or safety and if one or more of the following conditions are met:

(a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.

(b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Plan shall file a petition for variance with the _________________ (designated official) within 5 days after pro rata allocation has been invoked.

All petitions for variances shall be reviewed by the ___________ (governing body), and shall include the following:

(a) Name and address of the petitioner(s).
(b) Detailed statement with supporting data and information as to how the pro rata allocation of water under the policies and procedures established in the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
(c) Description of the relief requested.
(d) Period of time for which the variance is sought.
(e) Alternative measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
(f) Other pertinent information.

Variances granted by the ___________________ (governing body) shall be subject to the following conditions, unless waived or modified by the ________________ (governing body) or its designee:

(a) Variances granted shall include a timetable for compliance.
(b) Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

Section XII: Severability

It is hereby declared to be the intention of the _______________ (governing body of your water supplier) that the sections, paragraphs, sentences, clauses, and phrases of this Plan are severable and, if any phrase, clause, sentence, paragraph, or section of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the _________ (governing body of your water supplier) without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

EXAMPLE RESOLUTION FOR ADOPTION OF A

DROUGHT CONTINGENCY PLAN

RESOLUTION NO. _____

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE ______________________ (name of water supplier) ADOPTING A DROUGHT CONTINGENCY PLAN.

WHEREAS, the Board recognizes that the amount of water available to the __________________ (name of water supplier) and its water utility customers is limited and subject to depletion during periods of extended drought;

WHEREAS, the Board recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 11.1272 of the Texas Water Code and applicable rules of the Texas Commission on Environmental Quality require all public water supply systems in Texas to prepare a drought contingency plan; and

WHEREAS, as authorized under law, and in the best interests of the customers of the ________________ (name of water supply system), the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE ___________________ (name of water supplier):

SECTION 1. That the Drought Contingency Plan attached hereto as “Exhibit A” and made part hereof for all purposes be, and the same is hereby, adopted as the official policy of the ________ (name of water supplier).

SECTION 2. That the ________________ (e.g., general manager) is hereby directed to implement, administer, and enforce the Drought Contingency Plan.

SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE ________________, ON THIS _____ day of _____________, 20____.

____
President, Board of Directors

ATTESTED TO:

____
Secretary, Board of Directors

INITIALLY PREPARED PLAN

CHAPTER 8: UNIQUE STREAM SEGMENTS, RESERVOIR SITES, AND LEGISLATIVE RECOMMENDATIONS

Lavaca Regional Water Plan

B&V PROJECT NO. 410083

PREPARED FOR

Lavaca Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

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AMI	Advanced Metering Infrastructure
EQIP	Environmental Quality Incentives Program
GCD	Groundwater Conservation District
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SRF	State Revolving Fund
SWIFT	State Water Implementation Fund for Texas
TPWD	Texas Parks and Wildlife
URS	Unique Reservoir Sites
USDA	United States Department of Agriculture
USS	Unique Stream Segments

8.0 Unique Stream Segments, Reservoir Sites, and Legislative Recommendations

The Lavaca RWPG has made the following recommendations regarding unique stream segments (USS) and unique reservoir sites (URS.) Additionally, the group has considered the creation of regulatory entities in accordance with legislative and regional water policy issues.

8.1 Unique Stream Segments and Reservoir Sites

In 1999, the Texas Parks and Wildlife Department (TPWD) identified Ecologically Significant Stream Segments for the Lavaca Regional Water Planning Area using criteria in accordance with TWDB rules.

The Lavaca RWPG may recommend these ecologically significant segments or other identified segments to be classified as unique in the regional water plan (RWP). When recommending these segments, the RWPG may develop special provisions to ensure no unintended consequences occur from designation. Once recommended, the TPWD provides a written evaluation of the recommendation. The recommendation is then sent to Texas State Legislature for approval.

A planning group may also recommend a site as unique for reservoir construction based upon several criteria:

- Site-specific reservoir development is recommended as a specific water management strategy or in an alternative long-term scenario in an adopted RWP.
- Location; hydrology; geology; topography; water availability; water quality; environmental, cultural, and current development characteristics; or other pertinent factors make the site.
- Uniquely suited for: (a) reservoir development to provide water supply for the current planning period; or (b) to meet needs beyond the 50-year planning period.

The proposed Palmetto Bend Stage II Reservoir had been designated as a unique reservoir site (URS). It was one of 19 sites (17 major and 2 minor) recommended by the 2007 SWP and designated by the 80th Texas Legislature as sites of unique value. The designation of this unique reservoir site ended on September 1, 2015, as LNRA made the decision not to move forward with construction expenditures or permitting by that time. No other unique reservoir sites have been recommended by the Lavaca RWPG.

LNRA is currently evaluating an off-channel option as the desired future treatment of the Lavaca River. Development of an off-channel alternative would necessitate alteration of the Certificate of Adjudication or cancellation of the Certificate and development and application for a new water right. In 2020, LNRA submitted an application for a new water right on the Lavaca River. Once approved by TCEQ and finalized, LNRA will cancel the certificate authorizing Stage II.

Appendix 8A includes information from TPWD concerning potential USSs within the LRWPA from the 2006 RWP. TPWD-recommended segments are illustrated on Figure 8-1. Note that subsequent to the publication of TPWD recommendations, conditions along stream segments in the LRWPA may have changed. Since the TPWD study, much of West Carancahua Creek has been channelized for drainage improvement. The Lavaca RWPG has elected not to recommend any USS for the current round of regional water planning.

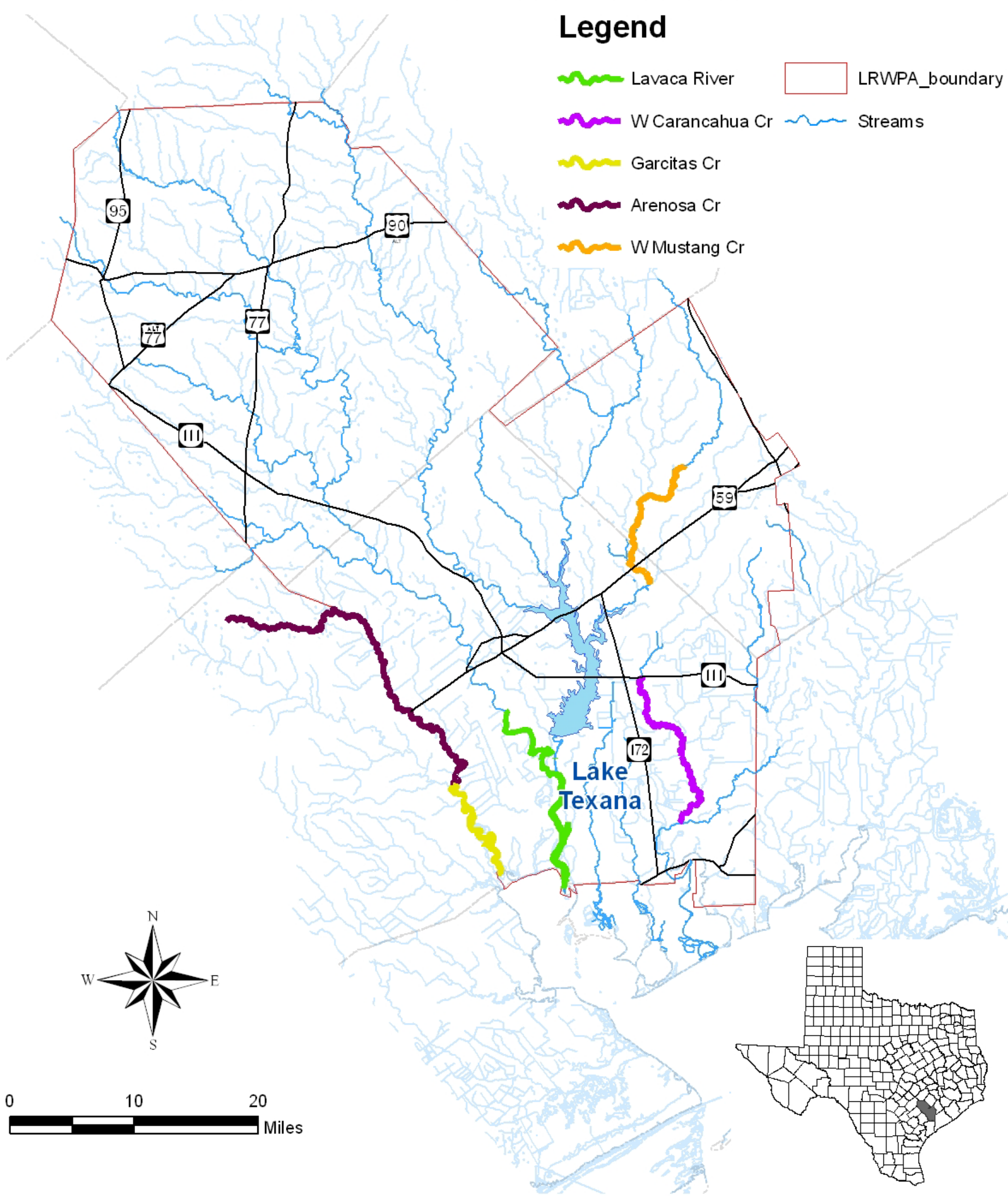

Figure 8-1 TPWD Ecologically Significant Stream Segments

8.2 Proposed Regulatory Changes or Resolutions

The primary concern of the Lavaca RWPG has been the protection of existing groundwater sources to maintain agricultural production because of its direct economic impact to the area. As a result of the planning process, the Lavaca RWPG considered and approved several policy resolutions as originally presented in the 2006 RWP. These policy recommendations and rationales for the proposals are detailed below and have been modified as needed for the current round of planning. Subsection 8.2.2 addresses the HB 807 requirement regarding regional water planning process improvements.

8.2.1 Environmental Issues

The Lavaca RWPG has developed a water plan to address projected water demands within LRWPA. The Lavaca RWPG understands that any water development strategy can have potentially threatening environmental consequences and fully supports efforts to identify and mitigate environmental impacts to the extent feasible.

8.2.2 Ongoing Regional Water Planning Activities

The Lavaca RWPG recommends that the Texas Legislature establish funding through TWDB for the continued existence of the regional planning groups. Duties would include the monitoring of ongoing research needed for planning, environmental flows issues, processing of any amendments to the plan, and monitoring the implementation of new crop varieties and other improvements to the area's primary water user. Provision of funding to pursue the above activities will allow the Lavaca RWPG to continue to perform a vital role as a focal point for communications with the various user groups concerning development of and amendments to the Plan.

8.2.3 Inter-Regional Water Coordination

The Lavaca RWPG recognizes the importance of inter-regional coordination efforts in order to maintain consistency among regional plans in situations where activities in one region may impact water availability or project needs in other regions. As population growth and other development activities increase over time for much of the state, multi-regional issues and the ability of regions to cooperatively use resources will be of increasing importance. The Lavaca RWPG supports the efforts of the Inter-Regional Planning process.

8.2.4 Conservation Policy

The Lavaca RWPG supports existing and continued efforts of agricultural producers to practice good stewardship of surface and groundwater resources of the state of Texas. The group recognizes the economic impact that a voluntary conservation effort has on the viability of agricultural operations on the area. The group also supports state and federally funded programs administered by NRCS, State Soil and Water Conservation Board, and local soil and water conservation districts. These programs provide technical and financial assistance to agricultural producers to install, manage, and maintain structural and vegetative measures for increased irrigation efficiency and overall water conservation. They are important in successfully implementing the RWP.

8.2.5 Sustainable Yield of the Gulf Coast Aquifer

The Lavaca RWPG supports the use of the sustainable yield of the Gulf Coast aquifer as the amount of water that should be included in the State Water Plan for areas using the Gulf Coast aquifer. While the Gulf Coast aquifer has significant amounts of water in storage, the aquifer levels impact regional agricultural, municipal, and manufacturing users directly. Mining of significant quantities of water over and above the sustainable annual yield will result in increasing pumping costs for all users. Increased pumping costs will have a detrimental effect on agricultural production in the area.

8.2.6 Support of the Rule of Capture

The Lavaca RWPG supports the Rule of Capture as the means of allocating groundwater in the state of Texas. The group also supports TWDB in its monitoring activities with regard to well static water levels and groundwater pumpage in the state.

8.2.7 Groundwater Conservation Districts

The Lavaca RWPG supports the control of groundwater resources through local control by groundwater conservation districts (GCDs). The group supported the creation of the Coastal Bend GCD in Wharton County and the Texana GCD in Jackson County. The primary focus of the districts is to preserve and protect groundwater supplies in their respective counties for future generations. The Coastal Bend GCD management plan was updated most recently on November 12, 2024, and the Texana GCD management plan was updated most recently on April 20, 2023. The group supports the further efforts of these districts as a tool in protecting water resources in the Lavaca Regional Water Planning Area.

8.2.8 Establishment of Fees for Groundwater Export

The Lavaca RWPG supports the use of the sustainable yield of the Gulf Coast aquifer as the limit for water development and the use of groundwater conservation and management districts as the appropriate method of retaining local control of groundwater. The Lavaca RWPG understands large scale groundwater mining of the Gulf Coast aquifer is in direct opposition to the concept of sustainable yield for aquifer management. While local entities are encouraged to conserve groundwater for the use of local citizens with attendant impacts on the local economy, the citizens of large municipalities at great distances from the Lavaca area are relatively insulated from the impacts of increasing depth to the water table for the Lavaca area. Use of an export fee may help offset the negative impacts of transferring water out of the basin to other areas of the state. The transfer of water by export would be permitted provided the transfer would not present the possibility of unreasonable interference with the production of water from exempt, existing, or previously permitted wells. This could potentially be administered by the local GCDs through their regulations.

8.2.9 Limits for Groundwater Conservation Districts

The Lavaca RWPG recommends that the sustainable yield of the aquifer be used for all GCDs in the region as the upper limit of groundwater available for all uses. For this region, there is no overall surplus of groundwater and any use of groundwater contemplated outside the region must be subject to the rules of Chapter 36 of the Texas Water Code.

8.2.10 Financial Policy Recommendations

The Lavaca RWPG is directed by the TWDB to propose roles for the State to take in financing the recommended water supply projects. In previous RWPs, recommendations were made regarding policies and programs that directly or indirectly funded water projects and water infrastructure.

8.2.10.1 Summary

The Lavaca RWPG reviewed the existing state and federal programs for funding water supply and infrastructure for their applicability to the Lavaca RWP. Generally, recommendations were classified into two categories: those addressing direct assistance programs (loans and grants) and those addressing indirect actions that impact water infrastructure financing. The Lavaca RWPG recommendations are summarized below and detailed discussions of each program or policy are provided in the following sections.

The Lavaca RWPG recommends the State develops programs to provide matching funds to farmers for implementing water conservation measures. This would include costs for precision leveling and the conversion of irrigation canals to pipelines. These funds would provide a mechanism to leverage federal grant programs by providing the local matching share.

The Lavaca RWPG recommends increased funding of the Agricultural Water Conservation Loan Program and adding a one-time grant or subsidy program to stimulate early adoption of conservation practices by individual irrigators.

The Lavaca RWPG recommends increased funding of the State Revolving Fund (SRF) Programs in future decades. This program will remain important to assist some systems in upgrading their infrastructure to meet future demands and minimum water quality standards. As infrastructure ages and water quality standards increase, the demand for this assistance will grow. The State Loan Program for political subdivisions and water supply corporations offers loans at a cost advantage over many commercial and many public funding options.

The Lavaca RWPG supports the continued and increased funding of the US Department of Agriculture's (USDA's) Rural Utilities Service program at the federal level as well as the state Rural Water Assistance Fund at the state level. These programs offer water and waste disposal loans and grants to rural areas and towns of up to 10,000 people. Certain communities within Texas are specifically targeted for these grants.

The Lavaca RWPG supports financial assistance from the State, in the form of grants and low-interest loans (including SWIFT), for infrastructure improvements including Advanced Metering Infrastructure (AMI) and leak detection technologies. Small municipalities in Texas tend to have older infrastructure and lack the budget needed for improvements.

The Lavaca RWPG has and continues to support desalination as a supply alternative to neighboring regions that will develop shortages in the near future. It is recommended that the State continues to fund programs to promote desalination research and implementation.

The Lavaca RWPG supports provision of increased research grants to study and better develop efficient irrigation practices and to develop varieties of crops that require less water to grow and provide increased first crop yields. Irrigators cannot generally afford the increased cost of water when new supplies are developed. By reducing demand in a cost-efficient manner, small irrigators may be able to continue farming.

The Lavaca RWPG supports the provision of increased research grants to study brush and pasture best management practices, as these might relate to the development or augmentation of water management strategies in the regional water planning process.

8.2.10.2 Agricultural Water Conservation Programs

The Agricultural Water Conservation Loan Program provides loans to soil and water conservation districts, underground water conservation districts, and districts authorized to supply water for irrigation. These districts may further lend the funds to private individuals for equipment and materials, labor, preparation, and installation costs to improve water use efficiency related to irrigation of their private lands. There is also a grant program for equipment purchases by eligible districts for the measurement and evaluation of irrigation systems and agricultural water conservation practices and for efficient irrigation and conservation demonstration projects, among others. However, these grants are not available directly to individual irrigators. The program also includes a linked deposit loan program allowing individuals to access TWDB funding through participant farm credit institutions and local state depository banks.

Environmental Quality Incentives Program (EQIP), available through USDA, provides some limited funding to natural resources issues, including water quantity and availability. In 2008, Texas was allocated over $105 million in EQIP funds for projects including irrigation supply, brush control, water and air quality from livestock operations, wildlife, and invasive species. These funds are typically provided at a 50 percent cost share rate. Jackson, Lavaca, and Wharton Counties were designated within the primary area of concern for irrigation water quantity issues. The implementation of a similar program at the state level would allow additional opportunities for irrigators to receive assistance in implementing conservation practices.

Eligible districts will need to act as conservation brokers, identifying those irrigators with the potential to reduce water demand through equipment improvements, and matching them with available loans. To assist with the immediate adoption of these improved conservation practices, a one-time grant or subsidy program for water efficient equipment purchases may help by reducing the loan amount required by each irrigator. If the requirements of an existing federal loan or grant program could be met, the state could provide all or part of the local matching share. Since the methods used by irrigators vary across the state, such a program would need to be flexible, with local oversight provided by those districts currently eligible for the Agricultural Water Conservation Loan Program. Consistency with the applicable RWP may be included as a prerequisite for this program, as it is for other state grants and loans.

Policy Recommendation: Provide a mechanism to leverage federal grant programs by providing the local matching share. Increase funding of this loan program and consider adding a one-time grant or subsidy component to stimulate early adoption of conservation practices by individual irrigators.

8.2.10.3 Drinking Water State Revolving Fund Program

This program provides loans at subsidized interest rates for the construction of water treatment and distribution systems and for source water protection. As the loans are paid off, the TWDB uses the funds to make new loans (thus, the name revolving fund). State funds for the program receive a federal match through the US Environmental Protection Agency. These loans are intended for projects to bring existing systems into compliance with rules and regulations and are available to political subdivisions, water supply corporations, and privately owned water systems. Applications are collected at the beginning of each year, given a priority ranking, and funded to the extent possible. Projects not funded in a given year may be carried forward into the next year’s ranking.

These programs are important in that they assist substandard water systems in attaining the minimum water quality mandated by federal and state regulations, but they are not intended to fund system expansions due to projected growth. However, the SRF Fund may provide assistance to water providers with aging infrastructure.

Policy Recommendation: Increase the funding of this program in future decades.

8.2.10.4 State Loan Program

The State Loan Program provides loans to political subdivisions and water supply corporations for water, wastewater, flood control, and municipal solid waste projects. The interest rates for this program are not subsidized as they are in the Drinking Water SRF Program. The loan can be used for a number of water system improvements including the improvement or construction of wells, treatment facilities, and transmission and distribution systems. Loans are made on a first come, first served basis. This program will be helpful to regions that are seeking funding alternatives for adding groundwater supply infrastructure.

Policy Recommendation: Increase funding of this program to meet near term infrastructure cost projections.

8.2.10.5 Water and Waste Disposal Loans and Grants from the USDA's Rural Utilities Service

This federal program provides loans and grants in rural areas and communities of up to 10,000 people for water, wastewater, storm water, and municipal solid waste projects. The program is intended for communities that cannot obtain commercial loans at reasonable rates. Loans are made at or below market rates, depending upon the eligibility of the recipient. Grants can cover up to 75 percent of project costs when required to reduce user costs to a reasonable level. A separate program of Emergency Community Water Assistance Grants (up to $500,000 per project) is also available to communities experiencing rapid declines in water quality or quantity.

This program is similar to the state loan and revolving fund programs. It offers another option to small communities and rural areas unable to finance required infrastructure without assistance. However, this is a nationwide program, and the competition for available funds is correspondingly greater. Colonias and border areas are specifically identified as target areas for the grant portion of this program, and it is therefore in the state's interest to support its continued funding.

At the state level, the Rural Water Assistance Fund provides low interest loans to municipalities, water districts, and non-profit water supply corporations. The Lavaca RWPG also promotes the funding of this program in an effort to assist small rural utilities in providing safe, reliable water supplies.

Policy Recommendation: Support continued and increased funding of this program at the federal level and fund the state Rural Water Assistance Fund.

8.2.10.6 Desalination Research and Demonstration Projects

House Bill 1370 of the 78th Texas Legislature directed TWDB to "undertake or participate in research, feasibility and facility planning studies, investigations and surveys as it considers necessary to further the development of cost-effective water supplies from seawater desalination in the state." Funding was appropriated under the 79th Texas Legislature to continue and expand the State's efforts in desalination research. Subsequently, TWDB has participated in two seawater desalination pilot projects and several brackish water desalination demonstration projects.

The Lavaca Region anticipates meeting future shortages through other methods; the Lavaca RWPG recognizes the growing demands of surrounding regions. By supporting programs to promote the research and implementation of desalination, the Lavaca RWPG wishes to promote desalinated water as a strategy to allow regions to meet their future needs without increasing the pressure to transfer supplies from rural areas in other regions.

Policy Recommendation: Provide research grants for the study of current and upcoming desalination technologies available to wholesale and retail water suppliers. Continue to fund appropriate demonstration facilities and subsidize the use of these facilities to develop a customer base.

8.2.10.7 Water Research Program – Agriculture

The TWDB offers research grants to individuals or political subdivisions for water research on topics published in the TWDB's Request for Proposals. Eligible topics include product and process development.

One recommendation to the Legislature is to establish funding for agricultural research in the areas of efficient irrigation practices and the development of new crop varieties that provide more yield with less water. Generally, irrigators cannot afford the increased cost of water when new supplies are developed in today's market. By reducing demand in a cost-efficient manner, small irrigators may be able to continue farming.

Additionally, the Lavaca RWPG recommends that the Legislature funds the Texas State Soil and Conservation Boards sufficiently to continue studies related to brush and pasture management, and to provide grant funding to landowners to implement best practices. These are also potential topics for the Water Research Program.

Policy Recommendation: Provide increased research grants to study and better develop efficient irrigation practices as well as efficient brush and pasture management practices.

Appendix 8A TPWD Ecologically Significant Stream Segments

Area Study: Jackson, Lavaca, and Wharton Counties

Evaluation of Natural Resources in Lavaca Water Planning Area (Region P)

Wetlands in Lake Texana State Park (D.W. Moulton)

TEXAS PARKS & WILDLIFE

**RESOURCE PROTECTION DIVISION:
WATER RESOURCES TEAM**

Evaluation of Natural Resources in Lavaca Water Planning Area (Region P)

**By: Albert El-Hage
Peter D. Sorensen
Daniel W. Moulton**

October 1999

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Acknowledgments

The authors wish to thank those individuals who cooperated in providing information on the selected natural resources in the study area. Additional thanks are given to those individuals whose comments and proofreading allowed us to produce this report. We appreciate and acknowledge the help and expertise of Gordon Linam, Cindy Loeffler, and David Bradsby.

EXECUTIVE SUMMARY

The study area is located in the mid-coastal region of Texas and includes Jackson and Lavaca counties, and part of Wharton County. It is located within the Lavaca, Colorado-Lavaca, Guadalupe, and Lavaca-Guadalupe river basins.

Drainage of the study area is by the Lavaca and Navidad rivers and their tributaries. Elevations range from sea level in Jackson County to about 503 feet in Lavaca County. The study area is entirely within the Upland Prairie and Woods natural subregion. The land surface of the area is generally rolling to prairie.

The economy of the area consists primarily of petroleum production and operations, agribusiness and tourism. Agricultural production is varied. It consists of cattle, poultry, corn, cotton, and rice with rice being the principal crop for Wharton County. The market value for the agriculture in the study area is around $192.4 million. Outdoor recreational facilities also contribute to the area's economy. The Lavaca-Navidad estuary, the estuarine wetlands along the east side of Garcitas Creek and Lake Texana provide opportunities for bird watching, fishing, waterfowl hunting, boating, and other water sports. All these areas are located in Jackson County.

The natural regions of Texas were delineated largely on the basis of soil types and major vegetation types. Soils in the study area vary from alluvial, sandy soils with loamy surface to black waxy soils with loamy or sandy surface. Most of the region is on the Beaumont and Lissie Geological Formations.

There are seven major vegetation types found in the study area (Figure 4). The main vegetation types are Crops, and Post Oak Woods/Forest, followed closely by Post Oak Woods, Forest and Grassland Mosaic. The Pecan-Elm Forest, Other Native or Introduced Grasses, Bluestem Grassland, and Marsh/Barrier Island types are also found with decreasing distributions, respectively, in the study area.

Region P has a variety of valuable aquatic, wetland, riparian, and estuarine habitats. The estuary of the Lavaca and Navidad Rivers, in Jackson County, provides habitats for economically important marine and estuarine animals as well as for freshwater and terrestrial animals.

The region has 5 rivers or stream segments that satisfy one or more of the criteria defined in Senate Bill 1 for ecologically unique river and stream segments. These are in Jackson and Wharton Counties.

INTRODUCTION

Location and Extent

The study area is located in the mid-coastal region of Texas and includes Jackson and Lavaca counties, and part of Wharton County (Figure 1). It is located within the Lavaca, Colorado-Lavaca, Guadalupe, and Lavaca-Guadalupe river basins (Figure 2).

Geography and Ecology

Drainage of the study area is by the Lavaca and Navidad rivers and their tributaries. Elevations range from about sea level in Jackson County to about 503 feet in Lavaca County (Dallas Morning News 1997). The study area includes the Uplands Prairie and Woods natural subregion (Lyndon B. Johnson School of Public Affairs 1978). The land surface of the area is generally rolling to prairie (Dallas Morning News 1997).

Long, hot summers and short, mild winters characterize the study area's climate. The average daily minimum temperature for January is about 41.5?F and the average daily maximum temperature for July is about 93.7?F. The average annual precipitation is 40 inches (Dallas Morning News 1997).

Population

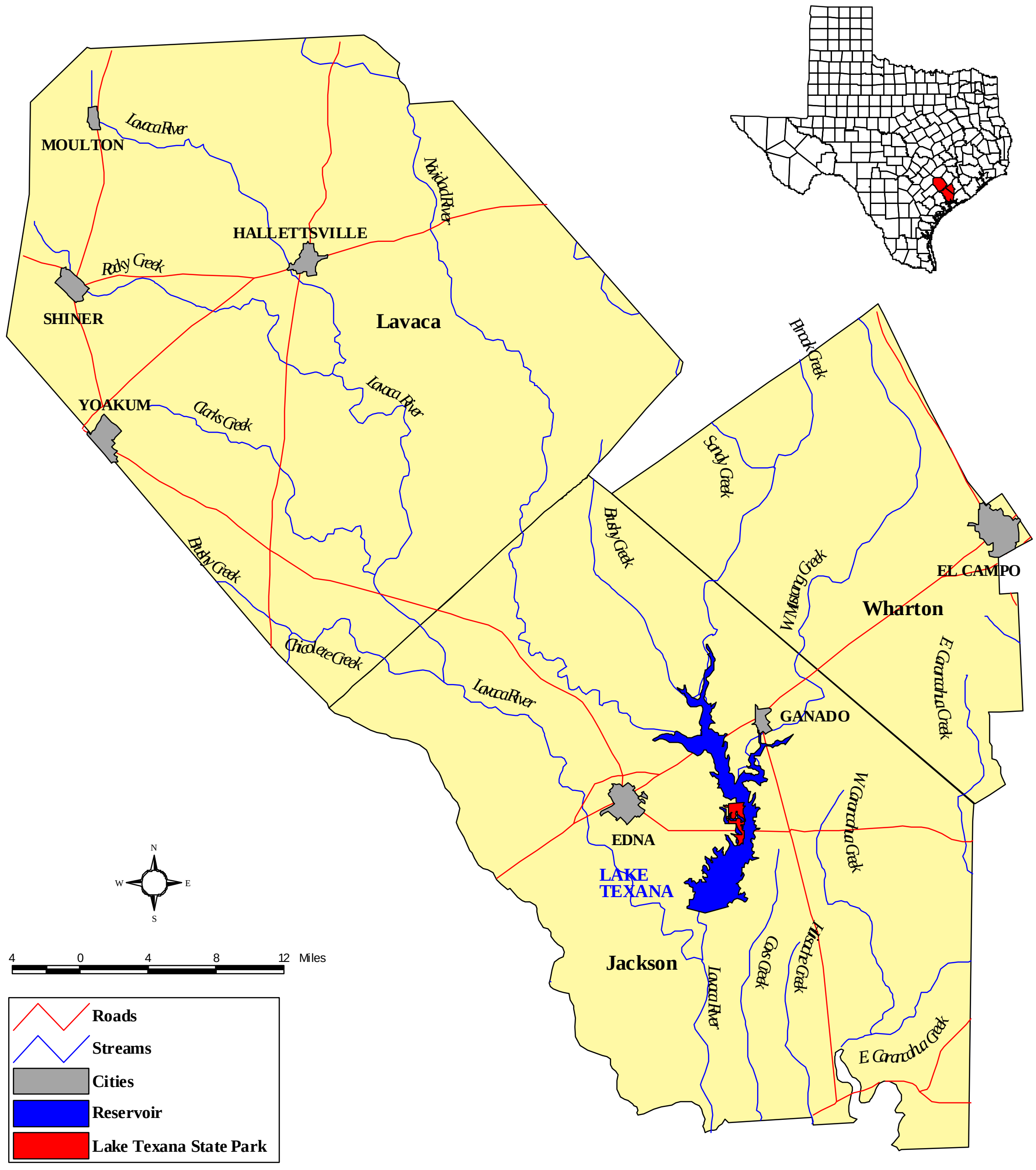
The 1990 census estimated the population of the study area to be 45,039 (Table 1, TWDB 1998). TWDB (1998) predicted a 2050 population of 58,958. Moderate increase in population is projected for all three counties, Jackson, Lavaca, and Wharton.

Table 1. Projections for Population Growth in the Study Area (TWDB 1998)

County ?	Year ? City ?	1990	2000	2010	2020	2030	2040	2050
Jackson		13,039	14,748	14,984	15,040	15,058	15,076	15,085
Jackson	Edna	5,343	6,193	6,324	6,355	6,365	6,375	6,385
Jackson	Ganado	1,701	1,892	1,922	1,928	1,930	1,932	1,934
Jackson	County-other	5,995	6,663	6,738	6,757	6,763	6,769	6,766
Lavaca		18,690	20,764	21,507	22,193	23,264	24,398	25,648
Lavaca	Hallettsville	2,718	3,052	3,257	3,413	3,626	3,828	4,041
Lavaca	Moulton	923	936	950	963	977	991	1,005
Lavaca	Shiner	2,074	2,348	2,432	2,510	2,631	2,759	2,901
Lavaca	Yoakum (P)	3,457	3,919	4,059	4,188	4,390	4,604	4,840
Lavaca	County-other	9,518	10,509	10,809	11,119	11,640	12,216	12,861
Wharton	(P)	13,310	13,830	14,615	15,501	16,325	17,241	18,225
Wharton	El Campo	10,511	10,851	11,355	11,961	12,486	13,100	13,744
Wharton	County-other	2,799	2,979	3,260	3,540	3,839	4,141	4,481
	Total	45,039	49,342	51,106	52,734	54,647	56,715	58,958

**P- partial*

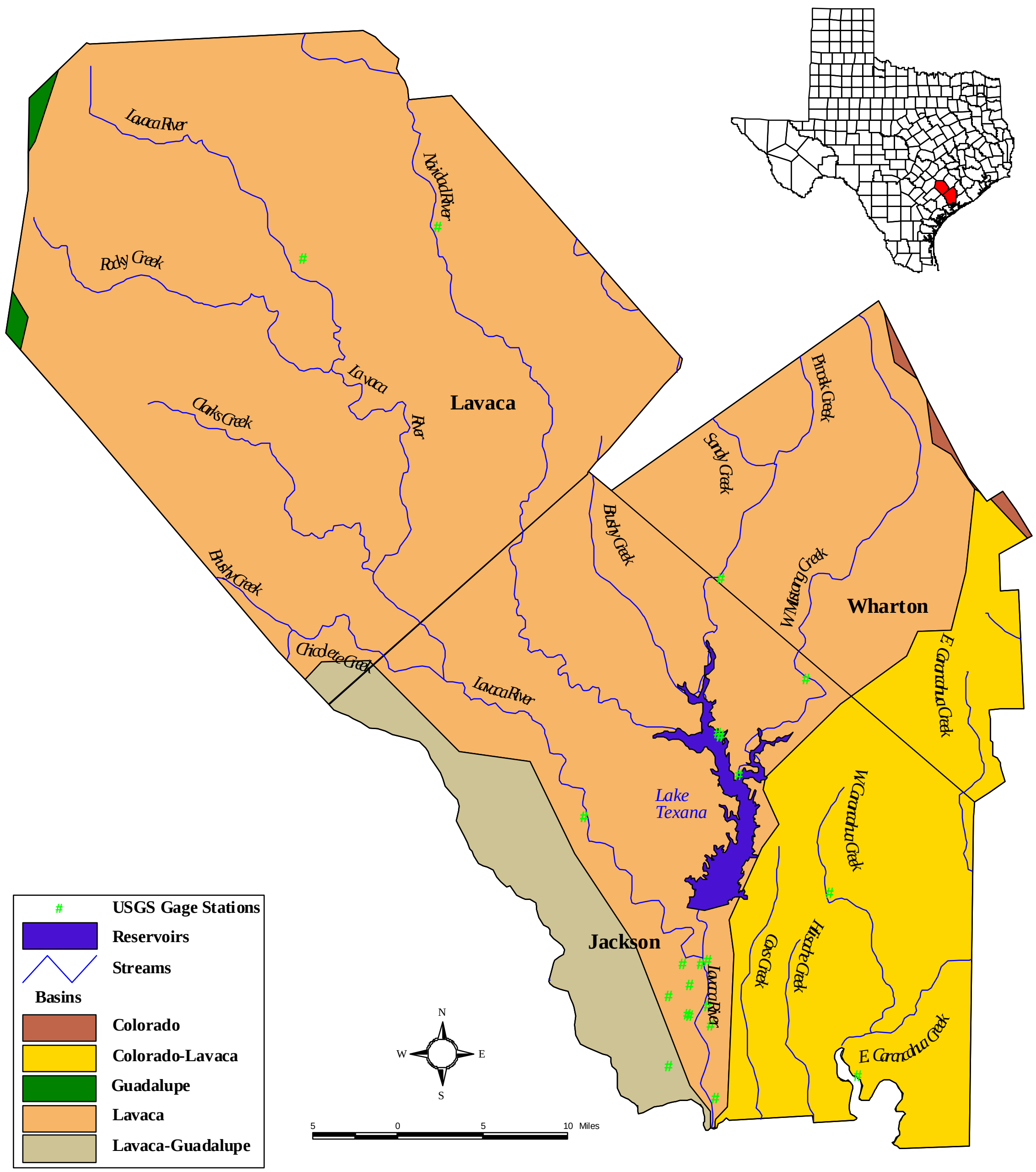
Figure 1. Location of the Study Area



Produced by the TPWD Water Resources Team, June 1999. No claims are made to the accuracy of the data or the suitability of the data for a particular use.

Sources:
TPWD GIS lab archives 1998.
Texas Water Development Board
Texas Natural Resources Information System
Projection:
Texas Statewide Projection

Figure 2. Water Resources of the Study Area



TEXAS PARKS & WILDLIFE

Produced by the TPWD Water Resources Team, June 1999. No claims are made to the accuracy of the data or the suitability of the data for a particular use.

Sources:
TPWD GIS Lab archives data 1998.
Texas Water Development Board
EPA-823-C-98-008
Projection:
Texas Statewide Projection

Economy and Land Use

The economy of the area consists primarily of petroleum production and operation, agribusiness and tourism. Agricultural production is varied. It consists of cattle, poultry, corn, cotton, and rice, with rice being the principal crop for Wharton County. The market value for the agriculture in the study area is around $192.4 million (Dallas Morning News 1997).

Outdoor recreational facilities also contribute to the area's economy. Lake Texana, the estuarine areas of the Lavaca River, and Garcitas Creek provide opportunities for bird watching, fishing, waterfowl hunting, boating, and other water sports. All these areas are located in Jackson County.

The Texana Loop of the Great Texas Coastal Birding Trail (Central Texas Coast) includes 9 sites (Sites 17-25), all in Jackson County, on Lake Texana, the Lavaca/Navidad estuary, and on Arenosa/Garcitas Creek. Lake Texana SP alone contributes $ 5-6 million per year to the local economy in Jackson County (see Appendix B).

SELECTED NATURAL RESOURCES

Soils

The natural regions of Texas were delineated largely on the basis of soil types and major vegetation types. Soils in the study area vary from alluvial, sandy soils with loamy surface to black waxy soils with loamy or sandy surface (Godfrey et al. 1973). Soil associations found in the area are described as follows:

1. Level soils of the coast Prairie and Marsh

    (a) Somewhat poorly to moderatly well drained cracking clayey soils; and mostly poorly drained soils with loamy surface layers and cracking clayey subsoils: Vertisols.
    (b) Cracking clayey soil and friable loamy soils of the Brazos and Colorado River flood plains: Mollisols.
    (c) Soils with loamy surface layers and mottled clayey or mottled to gray loamy subsoils: Alfisols.

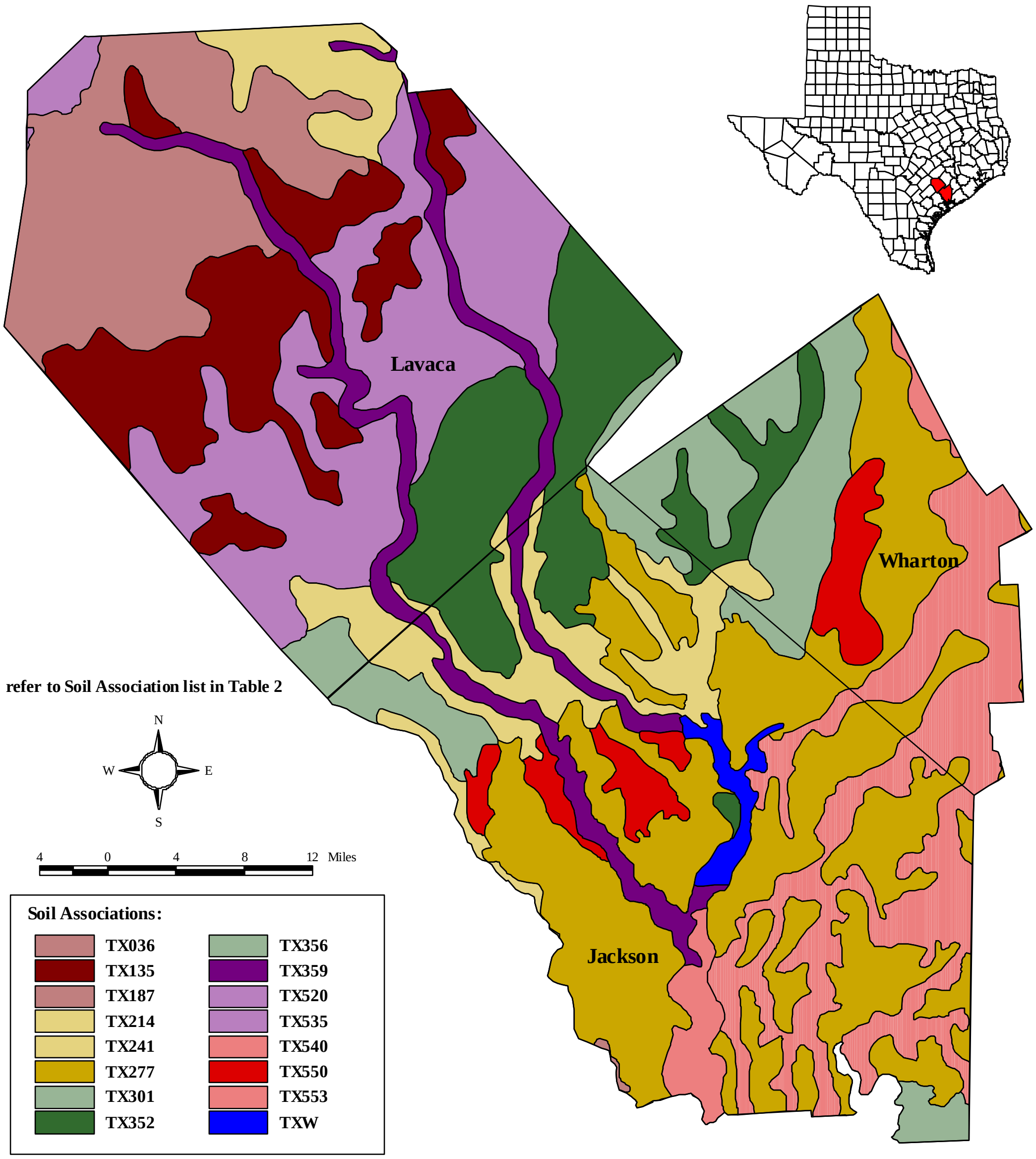
2. Undulating alkaline to slightly acid soils of the Blackland Prairie

    (a) Slightly acid soils with loamy surface layers and cracking clayey subsoils; and noncalcareous cracking clayey soils: Alfisols
    (b) Noncalcareous and calcareous cracking clayey soils; and slightly acid soils with loamy surface layers: Vertisols.
    (c) Soils with loamy surface layers and mottled gray and red or yellow cracking clayey subsoils: Alfisols.

Table 2. Soil Associations of the study area

Soil Association	Soil Name
TX036	Austwell-Aransas-Placedo
TX135	Denhawken-Elmendorf-Hallettsville
TX187	Frelsburg-Carbengle-Hallettsville
TX214	Hallettsville-Dubina-Straber
TX241	Inez-Milby-Kuy
TX277	Lake Charles-Dacosta-Contee
TX301	Livia-Palacios-Francitas
TX352	Morales-Cieno-Inez
TX356	Nada-Telferner-Cieno
TX359	Lavaca-Navidad-Ganado
TX520	Singleton-Burlewash-Shiro
TX535	Straber-Tremona-Catilla
TX540	Swan-Aransas-Placedo
TX550	Telferner-Edna-Cieno
TX553	Texana-Edna-Cieno
TXW	Water

Figure 3. Soil Types of the Study Area



Produced by the TPWD Water Resources Team, June 1999. No claims are made to the accuracy of the data or the suitability of the data for a particular use.

Source:
TPWD Gis lab archives data 1998.
Projection:
Texas Statewide Projection

Vegetation

As stated in the introduction, the study area includes parts of the following natural subregions: Blackland Prairie, and the Upland Prairies and Woods subregions (Lyndon B. Johnson School of Public Affairs 1978).

There are seven major vegetation types found in the study area (Figure 4). The main vegetation types are Crops, and Post Oak Woods/Forest, followed closely by Post Oak Woods, Forest and Grassland Mosaic, Pecan-Elm Forest, Other Native or Introduced Grasses, Bluestem Grassland, and Marsh/Barrier Island are also found with decreasing distributions, respectively, in the study area. The scientific names for the plants mentioned below can be found in Appendix A (McMahan et al. 1984).

Commonly associated plants of the Crops type are: cultivated cover crops or row crops providing food and/or fiber for either man or domestic animals. This type also includes grassland associated with crop rotation.

Commonly associated plants of the Post Oak Woods/Forest, and Post Oak Woods, Forest, and Grassland Mosaic vegetation types are: Post oak, blackjack oak, eastern redcedar, mesquite, black hickory, live oak, sandjack oak, cedar elm, hackberry, yaupon, poison oak, American beautyberry, hawthorn, supplejack, trumpet creeper, dewberry, coral-berry, little bluestem, silver bluestem, sand lovegrass, beaked panicum, three-awn, sprangle-grass, and tickclover. These vegetation types are most apparent on the sandy soils of the Post Oak Savannah.

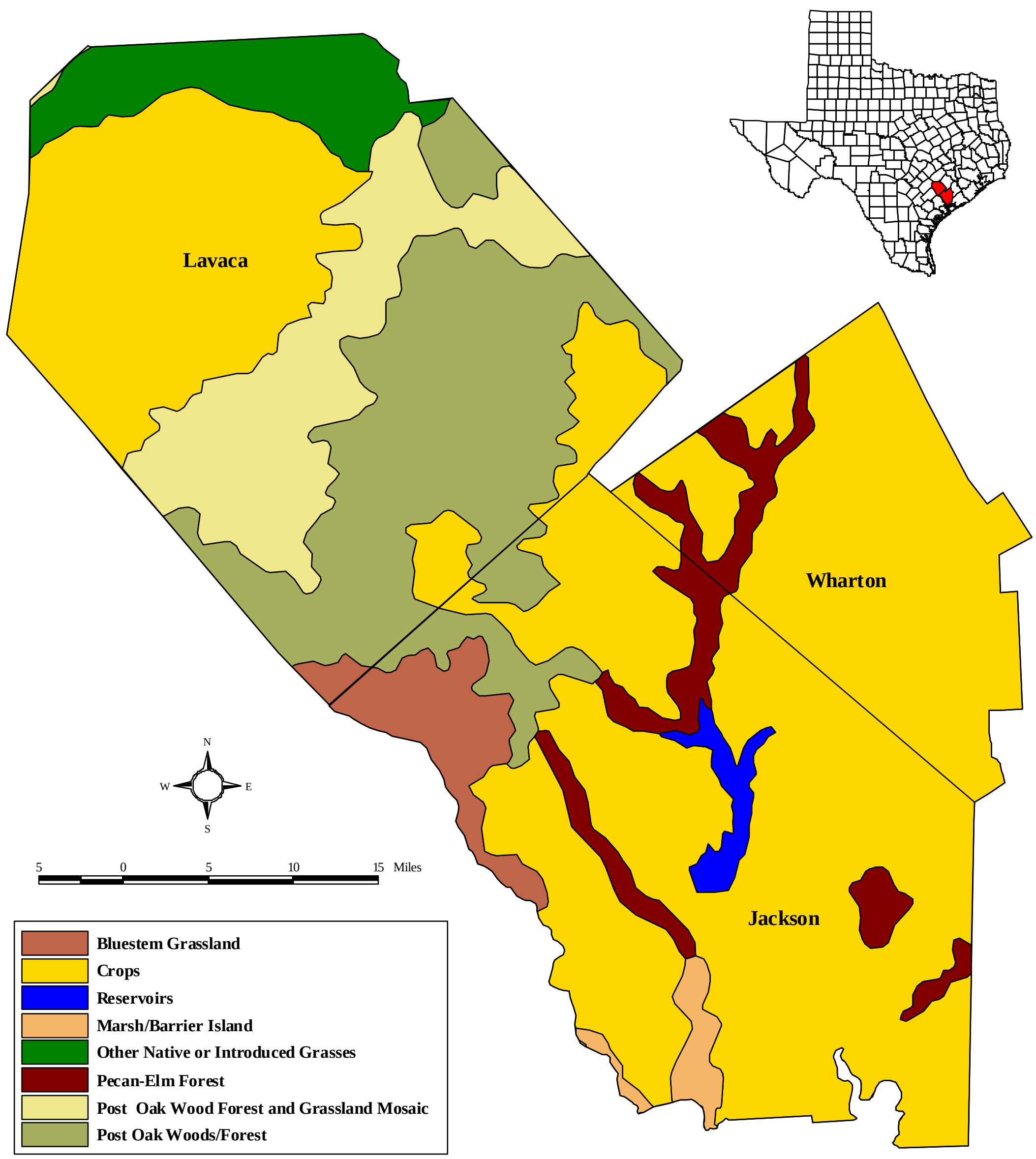
Pecan-Elm Forest includes: Pecan, American elm, cedar elm, cottonwood, sycamore, black willow, live oak, green ash, bald cypress, water oak, hackberry, virgin's bower, yaupon, greenbrair, mustang grape, poison oak, Johnsongrass, Virginia wildrye, Canada wildrye, rescuegrass, frostweed, and western ragweed.

Other Native or Introduced Grasses include: mixed native or introduced grasses and forbs on grassland sites or mixed herbaceous communities resulting from the clearing of woody vegetation. This type is associated with the clearing of forests and may portray early stages of Young Forest.

Bluestem Grassland includes: bushy bluestem, slender bluestem, little bluestem, silver bluestem, three-awn, buffalograss, bermudagrass, brownseed paspalum, single-spike paspalum, smutgrass, Gulf cordgrass, windmillgrass, southern dewberry, live oak, mesquite, huisache, baccharis, and Macartney rose.

Marsh/Barrier Island includes: marshhay cordgrass, Olney's bulrush, saltmarsh bulrush, widgeongrass, California bulrush, seashore paspalum, Gulf cordgrass, and common reed.

Figure 4. Vegetation Types of the Study Area



Produced by the TPWD Water Resources Team, June 1999. No claims are made to the accuracy of the data or the suitability of the data for a particular use.

Source: TPWD GIS lab archives. The vegetation represents a general summary of previously produced larger scale maps. Delineation of the vegetation occurs only where the actuall vegetation exhibit adequate resolution for delineation.
Projection:
Texas Statewide Projection

Rivers and Reservoirs

The study area includes four river basins: Lavaca, Colorado-Lavaca, Guadalupe, and Lavaca-Guadalupe river basins (Figure 2). Two major rivers run through the study area (Figure 1): the Lavaca River, in the northwest portion of the study area, and the Navidad River, in the northeast portion of the study area. The Navidad River flows into Lake Texana, the only lake in the study area. Lake Texana covers 11,000 surface acres, with approximately 125 miles of shoreline.

Texas Parks and Wildlife Department drafted a list (See Appendix C for Region P List) of Texas streams and rivers (Figure 2) satisfying at least one of the criteria (See Appendix D) for ecologically unique river and stream segments. Four (Table 3); streams met the high water quality/exceptional aquatic life/high aesthetic value criteria, while the threatened or endangered species/unique communities criteria was met by 2 streams (Table 4). Two stream segments, the Lavaca River and Garcitas Creek, were found to meet the biological function criteria (Appendix C).

Table 3. Streams that meet the high water quality/exceptional aquatic life/high aesthetic value criteria (31 TAC §357.8 (b) (4)); (Bayer et al. 1992; Davis, J.R. 1998) Refer to Appendix C.

River or Stream Segment	County	Criteria
Arenosa Creek	Jackson	Ecoregion Stream; Benthic macroinvertebrates
Garcitas Creek	Jackson	Ecoregion Stream, Dissolved oxygen; Benthic macroinvertebrates
West Carancahua Creek	Jackson	Ecoregion Stream, Dissolved oxygen; Benthic macroinvertebrates
West Mustang Creek	Jackson	Ecoregion Stream; Benthic macroinvertebrates
West Mustang Creek	Wharton	Ecoregion Stream; Benthic macroinvertebrates

Table 4. Streams that meet the threatened or endangered species/unique community criteria (31 TAC §357.8 (b) (5); (Ortego, B. 1999))

River or Stream Segment	County	Threatened/endangered species
Garcitas Creek	Jackson	Texas palmetto; Diamondback terrapin
Lavaca River	Jackson	Diamondback terrapin

Wetlands

The study area has significant wetland resources. There are extensive forested wetlands (pecan-elm bottomland forests) occurring along the Lower Lavaca River in Jackson County (Figure 4); north of Lake Texana along Sandy Creek and its tributaries in Jackson and western Wharton counties, along the Navidad River west of Lake Texana; and along West and East Carancahua Creeks in southeastern Jackson County.

Rather extensive estuarine wetlands occur in southwestern Jackson County (Figures 4 & 5). The Lavaca/Navidad estuary wetlands extend from the juncture of the two rivers at FM 616 about 10 miles downstream to Lavaca Bay. The lakes, marshes, and flats of this area (Figure 5) provide habitat for estuarine fish and shellfish, freshwater river fishes, birds, mammals, reptiles, and amphibians. The same is true for the estuarine wetlands along Garcitas Creek, which forms part of the western Jackson County line.

Lake Texana supports fringing freshwater wetlands including emergent marshes, pecan-elm bottomlands, and beds of floating aquatic plants. Lake Texana State Park (575 acres), located on the west-central shore of the lake, has all these wetland types (See cover photo).

There are nine sites on the Great Texas Coastal Birding Trail (the Texana Loop) in Jackson County. Six of these are associated with forested riparian habitats fringing Lake Texana as well as the Lake itself. The other three are associated with the estuarine and riparian habitats of the Lavaca/Navidad estuary and Garcitas/Arenosa Creeks.

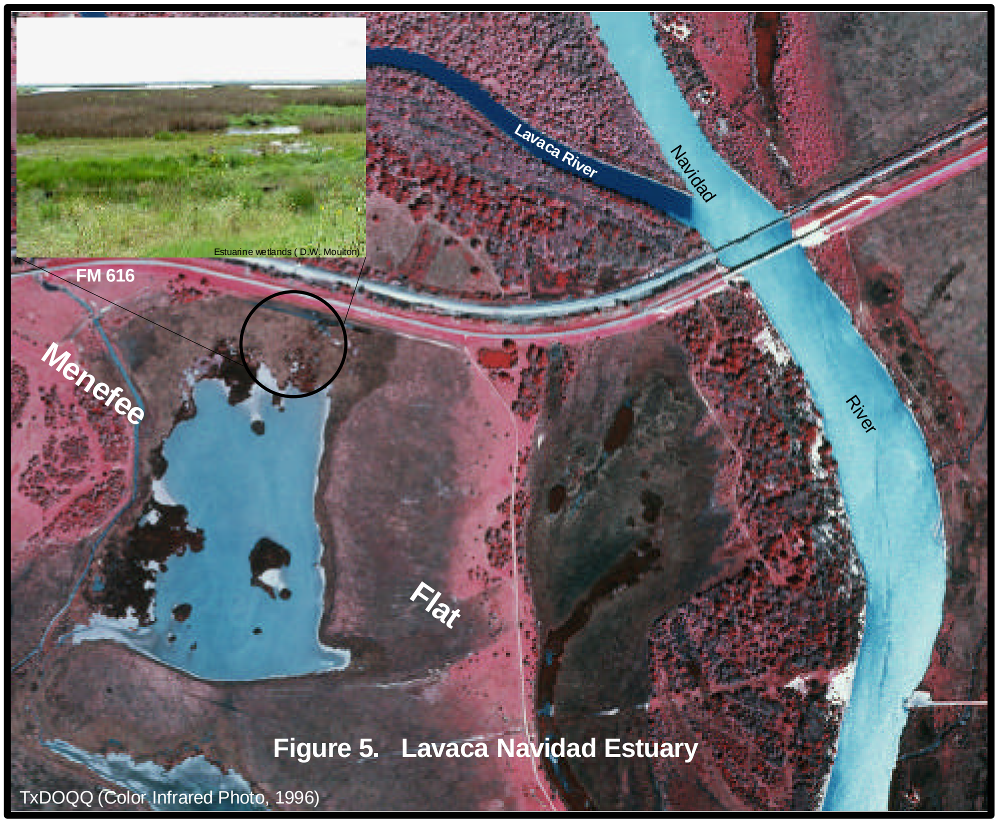


Figure 5. Lavaca Navidad Estuary

Springs

The distribution and size, as of 1980, of springs and seeps in the area are given by county, in Table 5 (Brune 1981). Brune conducted most of the fieldwork, which produced the following information, during the period of February 11-17, 1977. Information on Lavaca County springs was not available at the time.

Jackson and Wharton Counties springs are not numerous or large due to the relatively flat topography of the Counties. Spring waters in the county are generally of the sodium bicarbonate type, hard, and alkaline (Brune 1981).

Table 5. Distribution and Estimated Size (in 1980) of Springs and Seeps in the Study Area (Brune 1981)

County	Large	Moderately large	Medium	Small	Very small	Seep	Former
Jackson	0	0	0	1	0	0	5
Lavaca	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wharton	0	0	0	0	0	1	3

The numbers above are a reflection of either a spring or a group of springs.
Codes:
Large = 280 to 2,800 cfs
Moderately large = 28 to 280 cfs
Medium = 2.8 to 28 cfs
Former = no flow or inundated
Small = 0.28 to 2.8 cfs
Very Small = 0.028 to 0.28 cfs
Seep = less than 0.028 cfs

Gulf Coast Aquifer

The Gulf Coast Aquifer forms an irregular shaped belt along the Gulf of Mexico from Florida to Mexico. In Texas, the aquifer provides water to all or parts of 54 counties and extends from the Rio Grande northeastward to the Louisiana-Texas border. Total pumpage was approximately 1.1 million acre-feet in 1994. Municipal pumpage accounted for 51 percent of the total, irrigation accounted for 36 percent, and industrial accounted for 12 percent. The Greater Houston Metropolitan Area is the largest user (Texas Water Development Board 1997).

Water quality is generally good in the shallower portion of the aquifer. Groundwater containing less than 500 mg/l dissolved solids is usually encountered to a maximum depth of 3,200 feet in the aquifer from San Antonio River Basin northeastward to Louisiana. From the San Antonio River Basin southward to Mexico, quality deterioration is evident in the form of increased chloride concentration and salt-water encroachment along the coast (Texas Water Development Board 1997).

Freshwater Mussels

Freshwater mussels (Family Unionidae) are sensitive biological indicators of environmental quality and are often the first organisms to decline when environmental quality of aquatic ecosystems begins to degrade (Howells et al. 1996). Consequently, freshwater mussels have become important elements of environmental impact considerations. Surveys of mussels in Texas show many of the 52 species recognized in the state have declined greatly in recent years. These population declines probably reflect poor land and water management practices and subsequent loss of mussel habitat (Howells et al. 1997). Over-grazing, the clearing of native vegetation, the design and construction of highways and bridges, and general land clearing and development have contributed to the increase of runoff and scouring floods. Scouring in upstream reaches often results in excessive deposits of soft silt or deep shifting sand on downstream substrates, eliminating mussel habitat. Mussels with reported occurrence in the study area are shown in Table 6.

Table 6. Freshwater Mussels (Howells et al. 1996)

Scientific Name	Common Name
Amblema plicata	Threeridge
Anodonta grandis	Giant floater
Anodonta imbecillis	Paper pondshell
Arcidens confragosus	Rock-pocket book
Cyrtonais tampicoensis	Tampico pearlymussel
Glebula rotundata	Round pearlshell
Lampsilis bracteata	Texas fatmucket
Lampsilis teres	Yellow sandshell
Leptodea fragilis	Fragile papershell
Ligumaia subrostrata	Pond mussel
Potamilus ohiensis	Pink papershell
Potamilus purpuratus	Bleufer
Quadrula apiculata	Southern Mapleleaf
Quadrula houstonensis	Smooth pimpleback
Toxolasma texasensis	Texas lilliput
Truncilla macrodon	Texas fawnsfoot
Uniomerus declivis	Tapered pondhorn
Uniomerus tetralasmus	Pondhorn

Fish

Most Texas estuaries that receive freshwater inflow from rivers provide habitats for over 200 species of fish and shellfish. Many of these are important to the commercial and recreational fishing industries. Species such as brown, white and pink shrimp, oysters, blue crab, redfish, sea trout, and flounder are very important to the economy of the Texas coast. The estuarine habitats of Jackson County contribute to this economy.

One of the species of fish reported in the area (Table 7) is included on the Special Species List (Table 8) produced by the Texas Parks and Wildlife Department (1998a). This species is Guadalupe bass, it is the official state fish of Texas (Hubbs et. al 1991). The Guadalupe bass is endemic to the streams of the northern and eastern Edwards Plateau including portions of the Brazos, Colorado, Guadalupe, and San Antonio basins.

Table 7. Fish Species Reported in the Study Area
(Lee et al. 1980; Hubbs et al. 1991)

Species	Common Name
Ameiurus melas	Black bullhead
Ameiurus natalis	Yellow bullhead
Anguilla rostrata	American eel
Aplodinotus grunniens	Freshwater drum
Astyanax mexicanus	Mexican tetra
Campostoma anomalum	Central stoneroller
Carassius auratus	Goldfish
Carpiodes carpio	River carpsucker
Cycleptus elongatus	Blue sucker
Cyprinella lutrensis	Red shiner
Cyprinella venusta	Blacktail shiner
Cyprinodon variegatus	Sheepshead minnow
Cyprinus carpio	Common carp
Dorosoma cepedianum	Gizzard shad
Dorosoma petenense	Threadfin shad
Etheostoma gracile	Slough darter
Fundulus chrysotus	Golden topminnow
Fundulus grandis	Gulf killifish
Fundulus notatus	Blackstripe topminnow
Fundulus pulvereus	Bayou killifish
Gambusia affinis	Western mosquitofish
Ictalurus furcatus	Blue catfish
Ictalurus punctatus	Channel catfish
Ictiobus bubalus	Smallmouth buffalo
Lepisosteus oculatus	Spotted gar

Table 7 cont'd.

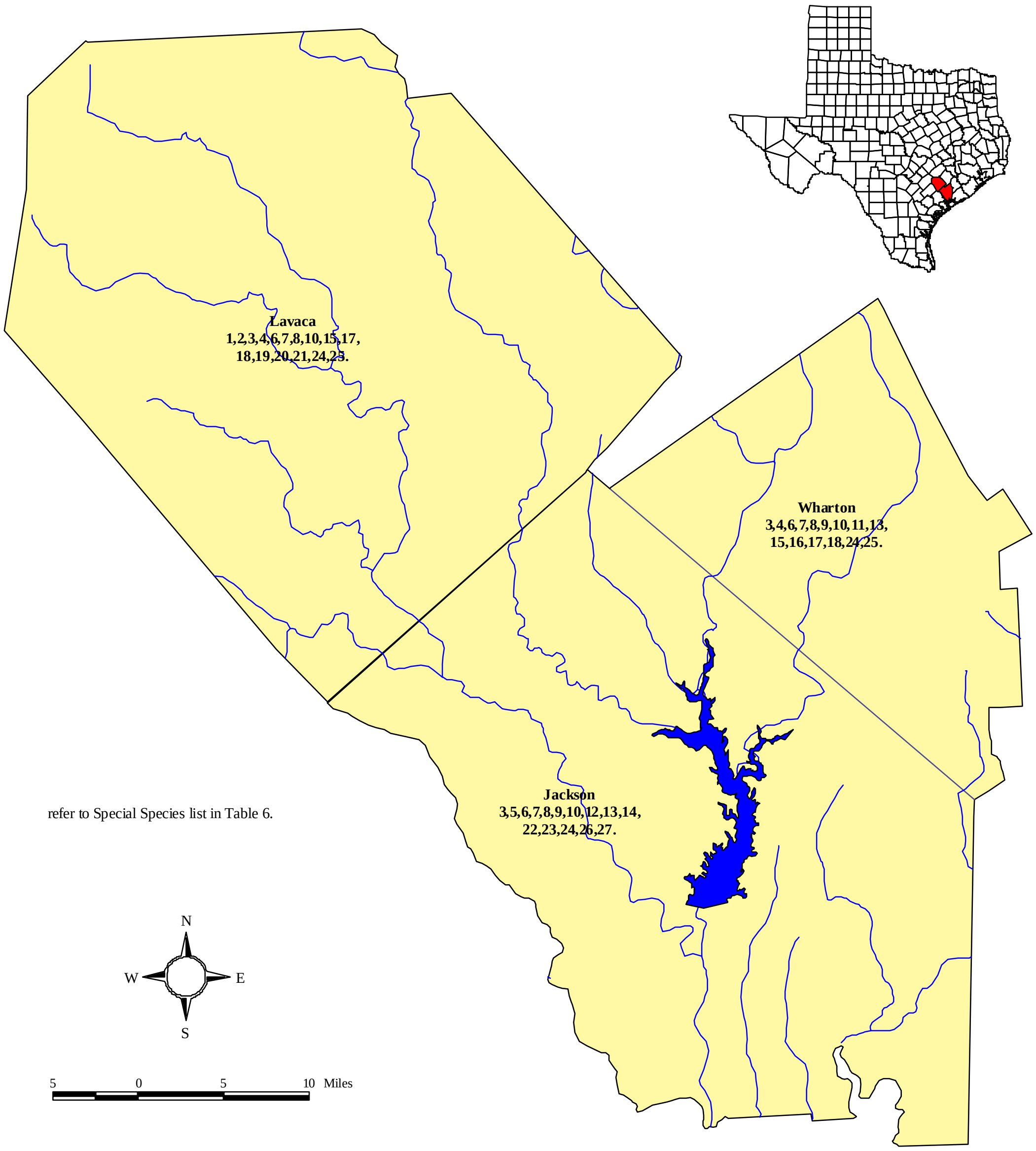
Lepisosteus osseus	Longnose gar
Lepisosteus spatula	Alligator gar
Lepomis auritus	Redbreast sunfish
Lepomis cyanellus	Green sunfish
Lepomis gulosus	Warmouth
Lepomis humilis	Orangespotted sunfish
Lepomis macrochirus	Bluegill
Lepomis megalotis	Longear sunfish
Lepomis microlophus	Redear sunfish
Lepomis punctatus	Spotted sunfish
Lythrurus fumeus	Ribbon shiner
Macrhybopsis aestivalis	Speckled chub
Menidia beryllina	Inland silverside
Micropterus treculi	Guadalupe bass
Micropterus salmoides	Largemouth bass
Morone chrysops	White bass
Mugil cephalus	Stiped mullet
Notemigonus crysoleucas	Golden shiner
Notropis amnis	Pallid shiner
Notropis buchanani	Ghost shiner
Notropis shumardi	Silverband shiner
Notropis texanus	Weed shiner
Notropis volucellus	Mimic shiner
Noturus gyrinus	Tadpole madtom
Opsopoeodus emiliae	Pugnose minnow
Percina macrolepida	Bigscale logperch
Pimephales promelas	Fathead minnow
Pimephales vigilax	Bullhead minnow
Pomoxis annularis	White crappie
Pomoxis nigromaculatus	Black crappie
Pylodictis olivaris	Flathead catfish
Syngnathus scovelli	Gulf pipefish

Table 8. Species of Special Concern in the Study Area (Texas Parks and Wildlife Department 1998a)

Map code*	Scientific name	Common name	Fed. Status	State Status
	AMPHIBIANS			
1	*Bufo houstonensis*	Houston toad	LE	E
	BIRDS			
2	*Ammodramus henslowii*	Henslow's sparrow		
3	*Buteo albicaudatus*	White-tailed hawk		T
4	*Charadrius montanus*	Mountain plover	PT	
5	*Egretta rufescens*	Reddish egret		T
6	*Falco peregrinus anatum*	American peregrine falcon	LE	E
7	*Falco peregrinus tundrius*	Arctic peregrine falcon	E/SA	T
8	*Grus americana*	Whooping crane	LE	E
9	*Haliaeetus leucocephalus*	Bald eagle	LT	T
10	*Mycteria americana*	Wood stork		T
11	*Numenius borealis*	Eskimo curlew	LE	E
12	*Pelecanus occidentalis*	Brown pelican	LE	E
13	*Plegadis chihi*	White-faced ibis		T
14	*Sterna antillarum athalassos*	Interior least tern	LE	E
15	*Tympanuchus cupido attwateri*	Attwater's greater prairie-chicken	LE	E
	FISHES			
16	*Micropterus treculi*	Guadalupe bass		
	MAMMALS			
17	*Spilogale putorius interrupta*	Plains spotted skunk		
	REPTILES			
18	*Crotalus horridus*	Timber/Canebrake rattlesnake		T
19	*Gopherus berlandieri*	Texas tortoise		T
20	*Graptemys caglei*	Cagle's map turtle	C1	
21	*Liochlorophis vernalis*	Smooth green snake		T
22	*Malaclemys terrapin littoralis*	Texas diamondback terrapin		
23	*Nerodia clarkii*	Gulf saltmarsh snake		
24	*Phrynosoma cornutum*	Texas horned lizard		T
25	*Thamnophis sirtalis annectens*	Texas garter snake		
	VASCULAR PLANTS			
26	*Psilactis heterocarpa*	Welder machaeranthera		
27	*Thurovia triflora*	Threeflower broomweed		

* Lookup code for map of Figure 6.
Status Code: LE, LT – Federally Listed Endangered/Threatened; E/SA – Federally Endangered by Similarity of Appearance; E, T – State Endangered/Threatened; PT – Federally Proposed Threatened;
C1 – Federal Candidate, Category 1, information supports proposing to list as endangered/threatened.

Figure 5. Special Species by County



refer to Special Species list in Table 6.

Produced by the TPWD Water Resources Team, June 1999. No claims are made to the accuracy of the data or the suitability of the data for a particular use.

Sources:
TPWD Gis lab archives data 1998.
Projections:
Texas Statewide Projection

Birds and Waterfowl

Many species of neotropical songbirds, wintering shorebirds, and a large number of waterfowl stop-over in the study area to feed and rest along the river banks and creek bottoms. The Special Species List (Texas Parks and Wildlife Department 1998a) for the study area includes 14 birds (Table 8), some of which are riparian and/or wetland dependent. Several of the birds occur in the study area only as migrants (i.g. peregrine falcon, whooping crane). Migrating peregrine falcons utilize wetlands as they prey mostly on ducks and shorebirds. Migrating whooping cranes use wetlands for feeding and roosting. An extensive list of birds observed in Lake Texana State Park can be obtained at the park headquarters (also see http:www.tpwd.state.tx.us/park/laketexa/laketexa.htm).

Mammals, Amphibians, and Reptiles

There are 1,100 vertebrate species in Texas, 60 of which are endemic to the state (Texas Audubon Society 1997). There are at least 87 species of mammals (Table 9), amphibians (Table 10), and reptiles (Table 11), listed in the Texas Parks and Wildlife Biological Conservation Database (BCD), present in the study area.

The plains spotted skunk is the only mammal in Table 9 that is listed in the Special Species List. Table 10 includes one amphibian that is listed in the Special Species List, the Houston toad. Table 11 includes eight reptiles that are listed in the Special Species List (Table 8), the timber rattlesnake, Texas horned lizard, Texas garter snake, Texas tortoise, Cagle's map turtle, smooth green snake, Texas diamondback terrapin, and the Gulf saltmarsh snake. Figure 6 shows the county distribution of those species listed on the Special Species List.

The Houston Toad, a federally and state listed endangered species is found only in a small pocket of southeastern Texas, including Austin, Bastrop, Burleson, Colorado, Lavaca, Leon, Milam, and Robertson Counties. It is found in pine forests and prairies with sandy ridges (Texas Parks and Wildlife 1999).

The Houston Toad is endangered because many small natural breeding ponds have been drained. Clearing natural vegetation and planting pasture grasses such as bermudagrass also eliminates habitat. Also, fire ants may kill young toads as they leave the pond (Texas Parks and Wildlife 1999).

The Texas garter snake is found in wet or moist microhabitats, but not necessarily restricted to them. It hibernates underground or under surface cover. The Timber/Canebrake rattlesnake occurs in swamps, floodplains, upland pine, deciduous woodlands, riparian zones, and abandoned farms.

The Cagle's map turtle is endemic to the Guadalupe River System. It occurs in short stretches of shallow water with swift to moderate flow and gravel or cobble bottom, connected to deeper pools with a slower flow rate and a silt or mud bottom. It nests on gently sloping sand banks within 30 feet of the water.

Table 9. Mammals of the Study Area (Davis and Schmidly 1994; Texas Parks and Wildlife Department 1998a)

Scientific Name	Common Name
Baiomys taylori	Northern pygmy mouse
Canis rufus	Red wolf (extirpated)
Chaetodipus hispidus	Hispid pocket mouse
Didelphis virginiana	Virginia opossum
Geomys attwateri	Attwater's pocket gopher
Lasiurus borealis	Eastern red bat
Lepus californicus	Black-tailed jack rabbit
Mephitis mephitis	Striped skunk
Neotoma floridana	Eastern woodrat
Oryzomys palustris	Marsh rice rat
Peromyscus leucopus	White-footed mouse
Peromyscus maniculatus	Deer mouse
Reithrodontomys fulvescens	Fulvous harvest mouse
Sciurus niger	Eastern fox squirrel
Sigmodon hispidus	Hispid cotton rat
Spermophilus tridecemlineatus	Thirteen-lined ground squirrel
Spilogale putorius interrupta	Plains spotted skunk
Sylvilagus floridanus	Eastern cottontail
Urocyon cinereoargenteus	Gray fox

Table 10. Amphibians of the Study Area (Texas Parks and Wildlife Department 1998a)

Scientific Name	Common Name
Acris crepitans	Northern cricket frog
Ambystoma texanum	Smallmouth salamander
Bufo houstonensis	Houston toad
Bufo speciosus	Texas toad
Bufo valliceps	Gulf coast toad
Bufo woodhousii	Woodhouse's toad
Gastrophryne carolinensis	Eastern narrowmouth toad
Gastrophryne olivacea	Great plains narrowmouth toad
Hyla chrysoscelis	Cope's gray treefrog
Hyla cinerea	Green treefrog
Hyla versicolor	Northern gray treefrog
Notophthalmus viridescens	Eastern newt
Pseudacris clarkii	Spotted chorus frog
Pseudacris streckeri	Strecker's chorus frog
Pseudacris triseriata	Striped chorus frog
Rana catesbeiana	Bullfrog
Rana sphenocephala	Southern leopard frog
Scaphiopus holbrookii	Eastern spadefoot
Siren intermedia	Lesser siren

Table 11. Reptiles of the Study Area (Texas Parks and Wildlife Department 1998a)

Scientific Name	Common Name
Agkistrodon contortrix	Copperhead
Agkistrodon piscivorus	Cottonmouth
Alligator mississippiensis	American alligator
Anolis carolinensis	Green anole
Chelydra serpentina	Snapping turtle
Cnemidophorus gularis	Texas spotted whiptail
Cnemidophorus sexlineatus	Six-lined racerunner
Coluber constrictor	Racer
Crotalus atrox	Western diamondback rattlesnake
Crotalus horridus	Timber (canebrake) rattlesnake
Deirochelys reticularia	Chicken turtle
Elaphe obsoleta	Black rat snake
Eumeces fasciatus	Five-lined skink
Eumeces laticeps	Broadhead skink
Eumeces septentrionalis	Prairie skink
Farancia abacura	Mud snake
Gopherus berlandieri	Texas tortoise
Graptemys caglei	Cagle's map turtle
Hemidactylus turcicus	Mediterranean gecko
Heterodon platirhinos	Eastern hognose snake
Kinosternon flavescens	Yellow mud turtle
Kinosternon subrubrum	Eastern mud turtle
Lampropeltis calligaster	Prairie kingsnake
Lampropeltis getula	Common kingsnake
Liochlorophis aestivus	Rough green snake
Malaclemys terrapin littoralis	Texas diamondback terrapin
Masticophis flagellum	Coachwhip
Micrurus fulvius	Eastern coral snake
Nerodia cyclopion	Green water snake
Nerodia erythrogaster	Plainbelly water snake
Nerodia fasciata	Southern water snake
Nerodia rhombifer	Diamondback water snake
Ophisaurus attenuatus	Slender glass lizard
Phrynosoma cornutum	Texas horned lizard
Pseudemys texana	Texas river cooter
Regina grahamii	Graham's crayfish snake
Sceloporus undulatus	Eastern fence lizard
Scincella lateralis	Ground skink
Sistrurus miliarius	Pigmy rattlesnake
Storeria dekayi	Brown snake
Tantilla gracilis	Flathead snake
Terrapene carolina	Eastern box turtle

Table 11 cont'd.

Terrapene ornata	Western box turtle
Thamnophis marcianus	Checkered garter snake
Thamnophis proximus	Western ribbon snake
Trionyx muticus	Smooth softshell
Trionyx spiniferus	Spiny softshell
Virginia striatula	Rough earth snake

Conclusions

Region P has a variety of valuable aquatic, wetland, riparian, and estuarine habitats. The estuary of the Lavaca and Navidad Rivers provides habitats for economically important and ecologically characteristic marine and estuarine animals as well as for freshwater and terrestrial animals. This is true also for the smaller estuarine reach of Garcitas Creek from Lavaca Bay upstream to the Arenosa Creek confluence. The estuarine habitats are in southern Jackson County.

Extensive pecan-elm type bottomland hardwood forests occur along several rivers and streams in Jackson and Wharton Counties. The Lavaca River, Garcitas Creek, Arenosa Creek, West Carancahua Creek, and West Mustang Creek all satisfy at least one of the criteria for ecologically unique river and stream segments. These include: the Lavaca River from the Navidad river confluence upstream about 20 miles; the Navidad River west of Lake Texana; Sandy Creek and its tributaries north of Lake Texana in Jackson County and Wharton Counties; and West and East Carancahua Creeks in southeastern Jackson County. Arenosa Creek on the Western border of Jackson County and West Mustang Creek in Jackson and Wharton Counties have also been identified as ecologically significant stream segments (see Appendix C & D).

Lake Texana, in Jackson County, also supports fringing wetland and bottomland habitats as well as several recreational areas, including Lake Texana State Park, that are economic assets to the region.

The above habitats include 9 sites on the Texana loop of the Great Texana Coastal Birding Trail, all in Jackson County. These are also of high economic value to the region.

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APPENDIX A

Scientific Names of Plants Mentioned
(from McMahan et al. 1984)

APPENDIX A

Scientific Names of Plants Mentioned

American beautyberry	*Callicarpa americana*
Ash, green	*Fraxinus pennsylvanica*
Baccharis	*Baccharis spp.*
Bermudagrass	*Cynodon dactylon*
Bluestem, bushy	*Andropogon glomeratus*
_______, little	*Schizachyrium scoparium var. frequens*
_______, silver	*Bothriochloa saccharoides*
_______, slender	*Schizachyrium tenerum*
Buffalograss	*Buchloe dactyloides*
Bulrush, California	*Scirpus californicus*
______, Olney's	*S. americanus*
______, saltmarsh	*S. maritimus*
Coral-berry	*Symphoricarpos orbiculatus*
Cordgrass, Gulf	*Spartina spartinae*
________, marshhay	*S. patens*
Cottonwood	*Populus deltoides*
Cypress, bald	*Taxodium distichum*
Dewberry	*Rubus spp.*
Elm, American	*Ulmus americana*
___, cedar	*U. crassifolia*
Frostweed	*Verbesina virginica*
Grape, mustang	*Vitis mustangensis*
Greenbriar	*Smilax spp.*
Hackberry	*Celtis spp.*
Hawthorn	*Crataegus spp.*
Hickory, black	*Carya texana*
Huisache	*Acacia farnesiana*
Johnsongrass	*Sorghum halepense*
Lovegrass, sand	*Eragrostis trichodes*
Mesquite	*Prosopis glandulosa*

Oak, blackjack	*Quercus marilandica*
___, live	*Q. virginiana*
___, post	*Q. stellata*
___, sandjack	*Q. incana*
___, water	*Q. nigra*
Panicum, beaked	*Panicum anceps*
Paspalum , brownseed	*Paspalum plicatulum*
________, seashore	*P. vaginatum*
________, single-spike	*P. monostachyum*
Pecan	*Carya illinoinensis*
Poison oak	*Rhus toxicodendron*
Ragweed, western	*Ambrosia psilostachya*
Reed, common	*Phragmites australis*
Redcedar, eastern	*Juniperus virginiana*
Rescuegrass	*Bromus unioloides*
Rose, Macartney	*Rosa bracteata*
Smutgrass	*Sporobolus indicus*
Sprangle-grass	*Chasmanthium sessiliflorum*
Supplejack	*Berchemia scandens*
Sycamore	*Platanus occidentalis*
Three-awn	*Aristida spp.*
Tickclover	*Desmondium spp.*
Trumpet creeper	*Campsis radicans*
Virgin’s bower	*Clematis virginiana*
Widgeon grass	*Ruppia maritima*
Wildrye, Canada	*Elymus canadensis*
______, Virginia	*E. virginicus*
Willow, black	*Salix nigra*
Windmillgrass	*Chloris spp.*
Yaupon	*Ilex vomitoria*

APPENDIX B

Estimated Economic Importance of Selected TPWD Facilities (from Crompton et al. 1998)

LAKE TEXANA STATE RECREATION AREA
JACKSON COUNTY

AVERAGE PARTY SIZE:
Day Visitors = 3.62
Overnight Visitors = 3.41

AVERAGE DISTANCE TRAVELED TO SITE:
Day Visitors = 72.6 Miles
Overnight Visitors = 100.6 Miles

ACTUAL 1997 VISITATION (Fiscal Year):
Day Visitors = 556,092
Overnight Visitors = 58,659

PERCENT OF OUT-OF-COUNTY VISITORS:
Day Visitors = 80.95
Overnight Visitors = 94.43

PER PERSON PER DAY EXPENDITURES

Sector	Day Visitors*			Overnight Visitors			Visitor
	Adjacent	Enroute	Total	Adjacent	Enroute	Total	Average
Transportation	$1.68	$1.88	$3.56	$1.68	$0.45	$2.12	**$2.84**
Food	2.69	1.47	4.17	4.21	0.65	4.86	**4.51**
Lodging	0.31	0.15	0.46	0.04	0.00	0.04	**0.25**
Other	1.01	0.15	1.16	1.07	0.00	1.07	**1.12**
Total	**5.70**	**3.65**	**9.35**	**6.99**	**1.10**	**8.09**	**8.72**

ESTIMATED ANNUAL ECONOMIC IMPACT ON SALES

Sector	Day Visitors*			Overnight Visitors			Visitor
	Expenditures	Direct Impact	Total Impact	Expenditures	Direct Impact	Total Impact	Total
Transportation	$755,125	$755,125	$1,049,171	$92,918	$92,918	$129,100	**$1,178,271**
Food	1,211,854	1,211,854	2,164,249	233,044	233,044	416,194	**2,580,443**
Lodging	140,063	140,063	237,170	2,248	2,248	3,807	**240,976**
Other	456,729	456,729	882,400	59,198	59,198	114,370	**996,770**
Total	**2,563,771**	**2,563,771**	**4,332,989**	**387,408**	**387,408**	**663,471**	**4,996,460**

ESTIMATED ANNUAL ECONOMIC IMPACT ON PERSONAL INCOME

Sector	Day Visitors*			Overnight Visitors			Visitor
	Expenditures	Direct Impact	Total Impact	Expenditures	Direct Impact	Total Impact	Total
Transportation	$755,125	$330,292	$401,047	$92,918	$40,642	$49,349	**$450,396**
Food	1,211,854	354,588	572,601	233,044	68,189	110,113	**682,714**
Lodging	140,063	38,952	62,090	2,248	625	997	**63,087**
Other	456,729	152,410	253,621	59,198	19,754	32,873	**286,494**
Total	**2,563,771**	**876,242**	**1,289,359**	**387,408**	**129,211**	**193,331**	**1,482,691**

ESTIMATED ANNUAL ECONOMIC IMPACT ON EMPLOYMENT

Sector	Day Visitors*			Overnight Visitors			Visitor
	Expenditures	Direct Impact	Total Impact	Expenditures	Direct Impact	Total Impact	Total
Transportation	$755,125	10.62	15.43	$92,918	1.31	1.90	**17.33**
Food	1,211,854	39.56	55.22	233,044	7.61	10.62	**65.84**
Lodging	140,063	3.27	4.88	2,248	0.05	0.08	**4.96**
Other	456,729	20.11	27.36	59,198	2.61	3.55	**30.90**
Total	**2,563,771**	**73.56**	**102.88**	**387,408**	**11.57**	**16.14**	**119.03**

* Average PPPD expenditure data for Texas State Recreation Areas were used.

LAKE TEXANA STATE RECREATION AREA

JACKSON COUNTY

AVERAGE PARTY SIZE:
Day Visitors = 3.62
Overnight Visitors = 3.41

AVERAGE DISTANCE TRAVELED TO SITE:
Day Visitors = 72.6 miles
Overnight Visitors = 100.6 miles

ACTUAL 1997 VISITATION (Fiscal Year):
Day Visitors = 556,092
Overnight Visitors = 58,659

PERCENT OF OUT-OF-COUNTY VISITORS:
Day Visitors = 80.95
Overnight Visitors = 94.43

PER PERSON PER DAY EXPENDITURES

Sector	Day Visitors*			Overnight Visitors			Visitor
	Adjacent	Enroute	Total	Adjacent	Enroute	Total	Average
Transportation	$1.68	$1.88	$3.56	$1.68	$0.45	$2.12	**$2.84**
Food	2.69	1.47	4.17	4.21	0.65	4.86	**4.51**
Lodging	0.31	0.15	0.46	0.04	0.00	0.04	**0.25**
Other	1.01	0.15	1.16	1.07	0.00	1.07	**1.12**
Total	**5.70**	**3.65**	**9.35**	**6.99**	**1.10**	**8.09**	**8.72**

ESTIMATED ANNUAL ECONOMIC SURGE ON SALES (Including Local Visitors)

Sector	Day Visitors*			Overnight Visitors			Visitor
	Expenditures	Direct Impact	Total Impact	Expenditures	Direct Impact	Total Impact	Total
Transportation	$932,829	$932,829	$1,296,072	$98,399	$98,399	$136,715	**$1,432,788**
Food	1,497,040	1,497,040	2,673,563	246,791	246,791	440,743	**3,114,307**
Lodging	173,025	173,025	292,983	2,381	2,381	4,031	**297,014**
Other	564,211	564,211	1,090,056	62,690	62,690	121,116	**1,211,172**
Total	**3,167,104**	**3,167,104**	**5,352,674**	**410,260**	**410,260**	**702,606**	**6,055,280**

ESTIMATED ANNUAL ECONOMIC SURGE ON PERSONAL INCOME (Including Local Visitors)

Sector	Day Visitors*			Overnight Visitors			Visitor
	Expenditures	Direct Impact	Total Impact	Expenditures	Direct Impact	Total Impact	Total
Transportation	$932,829	$408,019	$495,425	$98,399	$43,040	$52,260	**$547,685**
Food	1,497,040	438,034	707,351	246,791	72,211	116,609	**823,960**
Lodging	173,025	48,118	76,702	2,381	662	1,055	**77,757**
Other	564,211	188,277	313,306	62,690	20,920	34,812	**348,118**
Total	**3,167,104**	**1,082,448**	**1,592,785**	**410,260**	**136,832**	**204,735**	**1,797,520**

ESTIMATED ANNUAL ECONOMIC SURGE ON EMPLOYMENT (Including Local Visitors)

Sector	Day Visitors*			Overnight Visitors			Visitor
	Expenditures	Direct Impact	Total Impact	Expenditures	Direct Impact	Total Impact	Total
Transportation	$932,829	13.12	19.06	$98,399	1.38	2.01	**21.07**
Food	1,497,040	48.87	68.22	246,791	8.06	11.25	**79.46**
Lodging	173,025	4.04	6.03	2,381	0.06	0.08	**6.11**
Other	564,211	24.84	33.80	62,690	2.76	3.76	**37.55**
Total	**3,167,104**	**90.87**	**127.10**	**410,260**	**12.26**	**17.09**	**144.19**

* Average PPPD expenditure data for Texas State Recreation Areas were used.

APPENDIX C

TPWD Information Supporting River and Stream Segment Designations

Texas Parks and Wildlife Department Draft List of Texas streams and rivers satisfying at least one of the criteria defined in Senate Bill 1 for ecologically unique river and stream segments.

REGION P (LAVACA)

Arenosa Creek - From the confluence with Garcitas Creek in Jackson/Victoria County upstream to its headwaters along the northern boundary of Victoria County

Aq. Life: Ecoregion Stream[1]; Benthic macroinvertebrates[1,2]

Garcitas Creek - From the confluence with Lavaca Bay in Jackson/Victoria/Calhoun County upstream to the Arenosa Creek confluence in Jackson/Victoria County

Aq. Life: Ecoregion Stream, Dissolved oxygen[1]; Benthic macroinvertebrates[1,2]

End/Threat: One of only a few locales in Texas where Texas palmetto occurs naturally[32]; Diamondback terrapin[32]

Biol. Function: Extensive estuarine wetland habitat

Lavaca River - From the confluence with Lavaca Bay in Calhoun/Jackson County to a point 5.3 miles downstream of US 59 in Jackson County (TNRCC stream segment 1601)

Biol. Function: Extensive freshwater and estuarine wetland habitat[14]

End/Threat: Diamondback terrapin[32]

Hydrologic Function: Forested riparian habitats perform all hydrologic functions

West Carancahua Creek - From the confluence with Carancahua Creek in Jackson County upstream to the FM 111 crossing east of Edna in Jackson County

Aq. Life: Ecoregion Stream, Dissolved oxygen[1]; Benthic macroinvertebrates[1,2]

Hydrologic Function: Forested riparian habitats perform all hydrologic functions

West Mustang Creek - From the point where East Mustang Creek and West Mustang Creek join to form Mustang Creek in Jackson County upstream to FM 1160 in Wharton County

Aq. Life: Ecoregion Stream[1]; Benthic macroinvertebrates[1,2]

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[1] Bayer, C.W., J.R. Davis, S.R. Twidwell, R. Kleinsasser, G. Linam, K. Mayes, and E. Hornig. 1992. Texas aquatic ecoregion project: an assessment of least disturbed streams (draft). Texas Water Commission, Austin, Texas.

[2] Davis, J.R. 1998. Personal communication. Texas Natural Resource Conservation Commission, Austin, Texas.

[14] Bauer J., R. Frye, and B. Spain. 1991. A Natural Resource Survey for Proposed Reservoir Sites and Selected Stream Segments in Texas. Texas Parks and Wildlife Dept., PWD-BK-0300-06 7/91, Austin, Texas

[32] Ortego, B. 1999. Personal communication. Texas Parks and Wildlife Department, Victoria, Texas.

Appendix D

§357.8 Ecologically Unique River and Stream Segments

Title 31. NATURAL RESOURCES AND CONSERVATION

Part X. TEXAS WATER DEVELOPMENT BOARD

Chapter 357. REGIONAL WATER PLANNING GUIDELINES

§ 357.8 Ecologically Unique River and Stream Segments

(a) Regional water planning groups may include in adopted regional water plans recommendations for all or parts of river and stream segments of unique ecological value located within the regional water planning area by preparing a recommendation package consisting of a physical description giving the location of the stream segment, maps, and photographs of the stream segment and a site characterization of the stream segment documented by supporting literature and data. The recommendation package shall address each of the criteria for designation of river and stream segments of ecological value found in subsection (b) of this section. The regional water planning group shall forward the recommendation package to the Texas Parks and Wildlife Department and allow the Texas Parks and Wildlife Department 30 days for its written evaluation of the recommendation. The adopted regional water plan shall include, if available, Texas Parks and Wildlife Department's written evaluation of each river and stream segment recommended as a river or stream segment of unique ecological value.

(b) A regional water planning group may recommend a river or stream segment as being of unique ecological value based upon the following criteria:

(1) biological function--stream segments which display significant overall habitat value including both quantity and quality considering the degree of biodiversity, age, and uniqueness observed and including terrestrial, wetland, aquatic, or estuarine habitats;

(2) hydrologic function--stream segments which are fringed by habitats that perform valuable hydrologic functions relating to water quality, flood attenuation, flow stabilization, or groundwater recharge and discharge;

(3) riparian conservation areas--stream segments which are fringed by significant areas in public ownership including state and federal refuges, wildlife management areas, preserves, parks, mitigation areas, or other areas held by governmental organizations for conservation purposes, or stream segments which are fringed by other areas managed for conservation purposes under a governmentally approved conservation plan;

(4) high water quality/exceptional aquatic life/high aesthetic value--stream segments and spring resources that are significant due to unique or critical habitats and exceptional aquatic life uses dependent on or associated with high water quality; or

(5) threatened or endangered species/unique communities--sites along streams where water development projects would have significant detrimental effects on state or federally listed

threatened and endangered species, and sites along streams significant due to the presence of unique, exemplary, or unusually extensive natural communities.

Source: The provisions of this § 357.8 adopted to be effective March 11, 1998, 23 TexReg 2338.

INITIALLY PREPARED PLAN

CHAPTER 9: IMPLEMENTATION AND COMPARISON TO THE PREVIOUS REGIONAL WATER PLAN

Lavaca Regional Water Plan

B&V PROJECT NO. 410083

PREPARED FOR

Lavaca Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

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List of Abbreviations

ac-ft/yr	Acre-Feet per Year
LNRA	Lavaca-Navidad River Authority
LRWPA	Lavaca Regional Water Planning Area
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
WAM	Water Availability Model
WMS	Water Management Strategy
WUG	Water User Group

9.0 Implementation and Comparison to the Previous Regional Water Plan

This chapter presents a discussion and survey of water management strategy (WMS) projects that were recommended in the 2021 Regional Water Plan (RWP) and have since been implemented or the sponsors have begun some phase of implementation, as well as providing a summary comparison of the 2026 RWP to the 2021 RWP with respect to population, demands, water availability and supplies, needs, WMSs, and the assessment of progress toward regionalization.

9.1 Implementation

In the 2021 RWP, the only identified water needs were for Irrigation in Wharton County. WMSs involving irrigation conservation were recommended to meet the needs. In addition, strategies for municipal water user groups (WUGs) such as drought management and conservation, and several strategies for Lavaca-Navidad River Authority (LNRA) were recommended, even though needs were not shown in the plan.

The TWDB has developed an implementation survey spreadsheet that the regional water planning groups (RWPGs) are required to fill out as best able based on responses from WMS project sponsors as part of the planning process. Individual surveys were created and sent to the project sponsors. Based on the responses received, the TWDB implementation survey template was filled out and is included as Appendix 9A.

9.2 Comparison to the Previous Regional Water Plan

This section discusses how the 2026 RWP compares to the 2021 RWP, with respect to population, water demands, water supplies, water needs, and WMSs.

9.2.1 Population Projections

Across Region P, the population projections show increases for the 2026 RWP as compared to the 2021 RWP for Region P as a total, and for Jackson County and for Lavaca County. The portion of Wharton County within the Lavaca Regional Water Planning Area (LRWPA) shows a decrease in the population projections for the 2026 RWP as compared to the 2021 RWP. Population growth rates have similar changes to the population numbers. These changes by county are summarized in Table 9-1. Tabular data and bar graphs comparing the two plans can be found in Appendix 9B.

Table 9-1 Population Change by County in Year 2070, from 2021 RWP to 2026 RWP

County	Population in Year 2070 (2021 RWP to 2026 RWP)	Population Growth Rate (2021 RWP to 2026 RWP)
Jackson	Increase	Increase
Lavaca	Increase	Increase
Wharton (partial)	Decrease	Decrease
Total (Region P)	**Increase**	**Increase**

9.2.2 Water Demand Projections

Overall, for Region P, an increase in water demand of approximately 7,600 ac-ft/yr occurred for Year 2070 between the 2021 RWP and the 2026 RWP. Additionally, the water demand rate of growth by planning decade is approximately 0.5 percent less than estimated in the 2021 RWP. Tabular data and bar graphs comparing the two plans can be found in Appendix 9B.

Water demands for each usage category have changed between the 2021 RWP and the 2026 RWP, as compared to the 2021 RWP. The following water usage categories have a higher water demand predicted by Year 2070 in the 2026 RWP: Municipal, Manufacturing, and Mining. Livestock and Steam-Electric are predicted to have a lower water demand, while Irrigation is predicted to have no change in water demand, by Year 2070 in the 2026 RWP, as compared to the 2021 RWP.

Water demand growth rates for each usage category have also changed between the 2021 RWP and the 2026 RWP. The following water usage categories had a faster water demand growth rate in the 2026 RWP: Municipal, Manufacturing, and Mining. The remaining water usage categories had no change in demand growth rate between plans: Livestock, Irrigation, and Steam-Electric. These changes are summarized in Table 9-2.

Table 9-2 Water Demand Change by Water Usage Category in Year 2070, from 2021 RWP to 2026 RWP

Water Usage Category	Demand in Year 2070 (2021 RWP to 2026 RWP)	Demand Growth Rate (2021 RWP to 2026 RWP)
Municipal	Increase	Increase
Livestock	Decrease	No Change
Irrigation	No Change	No Change
Manufacturing	Increase	Increase
Mining	Increase	Increase
Steam-Electric	Decrease	No Change
Total Water Demand	**Increase**	**Increase**

Table 9-3 identifies counties that have a higher water demand by Year 2070 than was shown in the 2021 RWP. In addition, the usage categories that have the greatest growth are shown in Table 9-3.

Table 9-3 Counties with Year 2070 Water Demand Increase, from 2021 RWP to 2026 RWP

County	Total Water Demand Increase in Year 2070 (ac-ft/yr)	Greatest Water Usage Increase
Jackson	5,391	Municipal, Manufacturing
Lavaca	3,486	Municipal, Mining

Table 9-4 identifies counties that have a lower water demand by Year 2070 than was shown in the 2021 RWP. In addition, the usage categories that have the greatest decrease are shown in Table 9-4.

Table 9-4 Counties with Year 2070 Water Demand Decrease, from 2021 RWP to 2026 RWP

County	Total Water Demand Decrease in Year 2060 (ac-ft/yr)	Greatest Water Usage Decrease
Wharton	(1,305)	Municipal, Steam-Electric

9.2.3 Drought of Record and Hydrologic Assumptions

The Drought of Record for the Lavaca Region has had no changes since the 2021 RWP. The hydrologic assumptions for the surface water availability analysis have had changes since the 2021 RWP.

For the 2021 RWP, the model used to determine surface water availability volumes, including the firm yield of the Lake Texana Reservoir, was a modified version of the Texas Commission on Environmental Quality (TCEQ) Lavaca Water Availability Model (WAM) Run 3 Model (version date September 2, 2014) known as the proposed Freese & Nichols Inc., Lavaca WAM Run 3 Model. The modified model was approved for use in evaluating existing water supply availabilities by the TWDB Executive Administrator on July 20, 2018. Projected sedimentation was incorporated into the model runs for 2020 to 2070.

The modifications to the TCEQ Lavaca WAM Run 3 included the following:

1. Several changes to the existing code used to model SB3 pulse flow requirements in the Lavaca WAM.
2. Addition of missing SB3 pulse flow code for the Navidad River at Strane Park near Edna.
3. Revisions to Lake Texana SV SA records:
    a. These records are also updated for 2020 to 2070 sedimentation for regional water planning analysis, as required by TWDB guidelines.
4. Addition of a synthetic primary control point to correct a naturalized flow calculation.
5. Revisions to modeling of Lake Texana interruptible diversions:
    a. Three authorizations split out rather than lumped under one diversion.
    b. Include annual diversion limit (simplifies the coding).
    c. Pattern change to allow more water to be diverted in the last 3 months of the year (if available).
6. Revisions to Stage 2 of the Palmetto Bend Project location and SV SA records to model it as described in COA 16-2095.

For the 2026 RWP, the unmodified TCEQ Lavaca WAM Run 3 Model (version date October 1, 2023) was used for the surface water availability analysis because the WAM had been updated since the 2021 planning cycle and incorporated all of the hydrologic assumptions used in the 2021 RWP modeling.

9.2.4 Groundwater and Surface Water Availability and Water Supplies

Overall, for Region P, the total water source availability, including surface and groundwater, is 263,588 ac-ft/yr in the 2026 RWP. This represents an increase in water source availability of approximately 397 ac-ft/yr for all planning decades when comparing the 2021 RWP and the 2026 RWP. The surface water source availability in Lavaca County has had no change between the 2021 RWP and the 2026 RWP. Table 9-5 shows a comparison of the source availability in Region P between the 2021 RWP and the 2026 RWP.

Table 9-5 Region P Source Availability Comparison from 2021 RWP to 2026 RWP

Region P Source Availability						
Water Source		County	Basin	2021 RWP Plan 2070 Source Availability (ac-ft/yr)	2026 RWP Plan 2070 Source Availability (ac-ft/yr)	Change from 2021 RWP to 2026 Plan (ac-ft/yr)
Groundwater	Gulf Coast Aquifer	Jackson	Colorado – Lavaca	28,025	28,157	132
			Lavaca	49,582	49,484	-98
			Lavaca-Guadalupe	12,875	12,930	55
			County Total	90,482	90,571	89
	Gulf Coast Aquifer	Lavaca	Guadalupe	41	41	0
			Lavaca	19,811	19,908	97
			Lavaca-Guadalupe	401	401	0
			County Total	20,253	20,350	97
	Gulf Coast Aquifer	Wharton	Colorado	873	874	1
			Colorado-Lavaca	14,091	14,100	9
			Lavaca	62,992	63,193	201
			County Total	77,956	78,167	211
Surface Water	Lake Texana/ Reservoir	Jackson	Lavaca	74,500	74,500	0
Region P Total Source Availability				**263,191**	**263,588**	**397**

The current water supplies available to Region P total 198,667 ac-ft/yr in the 2026 RWP. This represents a decrease in existing water supply of approximately 159 ac-ft/yr for all planning decades between the 2021 RWP and the 2026 RWP.

Distributed between water usage categories, Manufacturing, Mining, and Municipal increased in water supply since the 2021 RWP, and Irrigation and Livestock decreased. Table 9-6 shows a comparison of the supplies in Region P between the 2021 RWP and the 2026 RWP.

Table 9-6 Region P 2070 Supply Comparison from 2021 RWP to 2026 RWP by WUG Category

WUG Category	2021 RWP (ac-ft/yr)	2026 RWP (ac-ft/yr)	Change from 2021 RWP to 2026 RWP (ac-ft/yr)
Irrigation	167,569	166,305	-1,264
Livestock	6,479	5,419	-1,060
Manufacturing	11,664	12,748	1,084
Mining	2,636	2,665	29
Municipal	8,418	9,958	1,540
Steam-Electric	2,060	1,572	-488
Total Region P Supplies	**198,926**	**198,667**	**-159**

9.2.5 Water Needs

Water needs in the 2021 RWP were limited to Irrigation WUGs in Wharton County. The 2070 water needs in Wharton County were 8,067 ac-ft/yr in the 2021 RWP.

In the 2026 RWP, water needs were identified for Irrigation in Jackson County (1,115 ac-ft/yr), Lavaca County (500 acre-fee/year), and Wharton County (7,716 ac-ft/yr), and for Manufacturing in Jackson County (4,401 ac-ft/yr in 2080).

As a result, water needs have increased in Region P by 5,665 ac-ft/yr since the 2021 RWP.

9.2.6 Recommended Water Management Strategies and Projects

A variety of strategies were recommended in the 2021 RWP to meet Irrigation water needs in all three counties. Lavaca RWPG recommended additional strategies in order to aid municipalities and wholesale water providers in having the projects included in the RWP, and thus eligible for certain types of State funding, including the State Water Implementation Fund. A number of these strategies continue to be recommended in the 2026 RWP, with minor updates. These include the following:

- Drought Management (Municipal Water Users only)
- Irrigation Conservation – On-farm Conservation
- Irrigation Conservation – Tail Water Recovery
- Municipal Conservation
- Conservation for Manufacturing
- Reuse of Municipal Effluent (El Campo)
- Lake Texana Yield Enhancement Project
- LNRA Desalination

The following strategies were newly recommended by the Lavaca RWPG in the 2026 RWP:

- Expand Use of Groundwater – Edna
- Expand Use of Groundwater - Hallettsville

New recommended associated WMS projects include Municipal Conservation into Water Use Reduction projects and Water Loss Mitigation projects for the relevant municipal WUGs. New projects were also included for the Expand Use of Groundwater projects mentioned above.

9.2.7 Alternative Water Management Strategies and Projects

The following five strategies were included in the 2021 RWP as an alternative strategy and continue to be included as alternative strategies in the 2026 RWP:

- Drought Management – Manufacturing
- Irrigation Conservation – Alternate Wetting and Drying
- Expand Use of the Gulf Coast Aquifer – Wharton County
- LNRA Aquifer Storage and Recovery
- Lake Texana Dredging

The LNRA Aquifer Storage and Recovery strategy and Lake Texana Dredging strategy have associated projects that were in the 2021 RWP and are still included in the 2026 RWP. Both projects are sponsored by LNRA.

9.2.8 Assessment of Progress Toward "Regionalization"

House Bill 807 requires that the RWP shall "assess the progress of the RWPA in encouraging cooperation between WUGs for the purpose of achieving economies of scale and otherwise incentivizing strategies that benefit the entire region."

Due to the dependence of the Lavaca Region on groundwater supplies, regional-level supply infrastructure has not developed in the region, nor is it anticipated to develop or be needed in the near future. WUGs and individual agricultural irrigators predominantly are supplied by their own wells. Municipal WUGs are unlikely to display interest in regional water infrastructure development as they have access to adequate supplies and for a majority of municipal WUGs, limited or no growth is projected. At the same time, irrigated agriculture cannot financially support development of large-scale water infrastructure. LNRA is the Major Water Provider in the region and provides surface water to multiple WUGs in Jackson County and surrounding counties outside of the LRWPA. LNRA's Lake Texana Yield Enhancement Project and Desalination Project are recommended strategies and projects in both the 2021 RWP and the 2026 RWP that will be used to meet water needs on a more regional level.

Appendix 9A. Implementation Survey Template for 2021 RWP Projects

Region P Implementation Survey of 2021 Recommended Projects

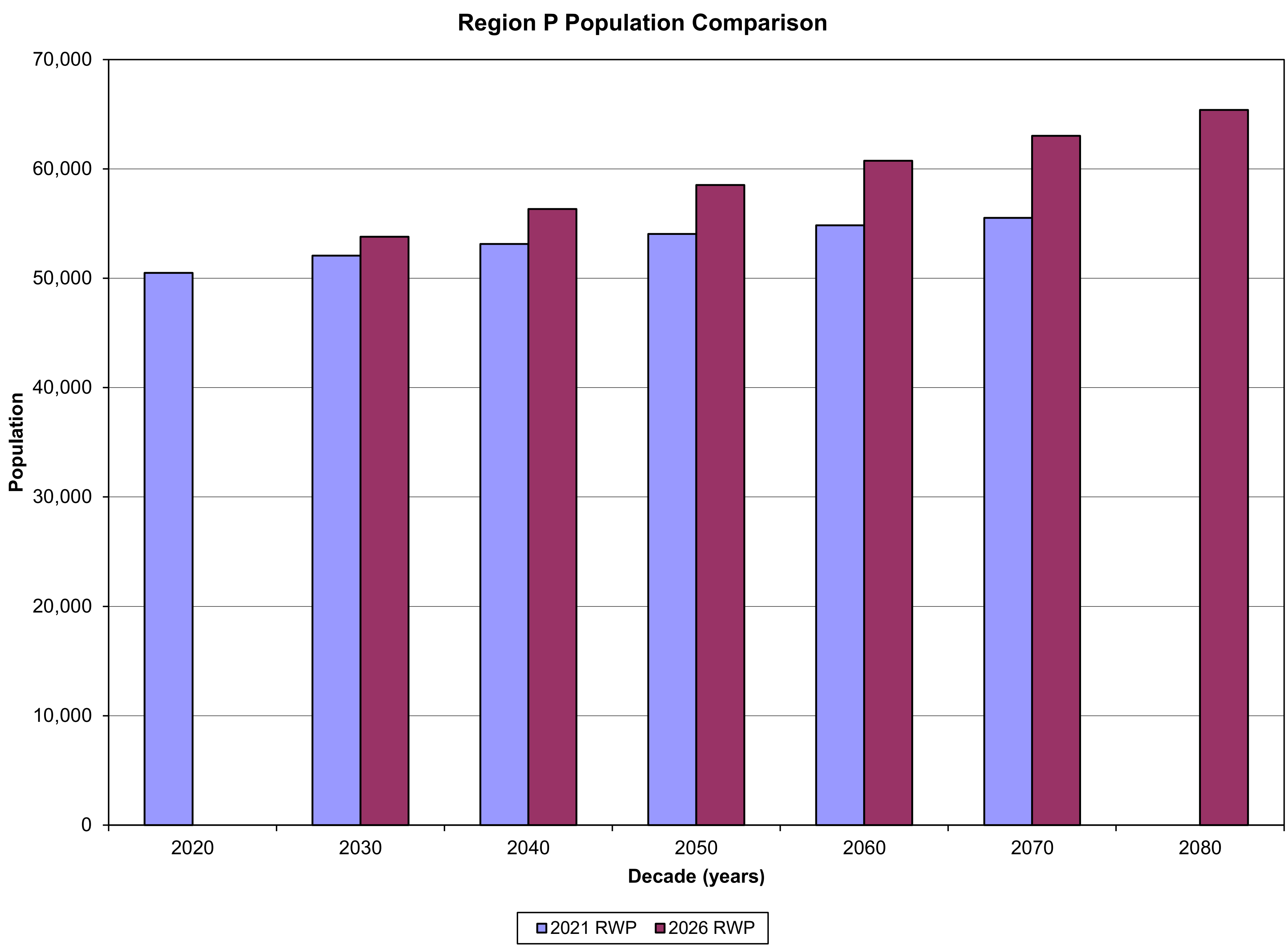
Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Database ID	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why by adding information in this column.	Please select one or more project impediments. If an impediment is not listed, select "Other" and provide information in Column K.	If you selected "Other" in Column J, please provide information about project impediments not shown in the impediment list provided.	What funding type(s) are being used for the project? (Select all that apply)	Optional Comments
P	Conservation for Manufacturing	2030	WUG Reducing Demand: Manufacturing, Jackson	Recommended Demand Reduction Strategy Without WMS Project	27812							
P	Conservation for Manufacturing	2030	WUG Reducing Demand: Manufacturing, Lavaca	Recommended Demand Reduction Strategy Without WMS Project	27814							
P	Drought Management	2020	WUG Reducing Demand: El Campo	Recommended Demand Reduction Strategy Without WMS Project	10951							
P	Drought Management - Municipal	2020	WUG Reducing Demand: Edna	Recommended Demand Reduction Strategy Without WMS Project	2993							
P	Drought Management - Municipal	2020	WUG Reducing Demand: El Campo	Recommended Demand Reduction Strategy Without WMS Project	2997							
P	Drought Management - Municipal	2020	WUG Reducing Demand: Ganado	Recommended Demand Reduction Strategy Without WMS Project	2999							
P	Drought Management - Municipal	2020	WUG Reducing Demand: Hallettsville	Recommended Demand Reduction Strategy Without WMS Project	3001							
P	Drought Management - Municipal	2020	WUG Reducing Demand: Moulton	Recommended Demand Reduction Strategy Without WMS Project	3003							
P	Drought Management - Municipal	2020	WUG Reducing Demand: Shiner	Recommended Demand Reduction Strategy Without WMS Project	3005							
P	Drought Management - Municipal	2020	WUG Reducing Demand: Wharton County WCID 1	Recommended Demand Reduction Strategy Without WMS Project	27783							
P	Drought Management - Municipal	2020	WUG Reducing Demand: Yoakum	Recommended Demand Reduction Strategy Without WMS Project	3007							
P	Irrigation Conservation - On Farm	2020	Project Sponsor(s): Irrigation (Wharton)	Recommended WMS Project	1273							
P	Irrigation Conservation - Tailwater Recovery	2020	Project Sponsor(s): Irrigation (Wharton)	Recommended WMS Project	1274							
P	Lavaca Off-Channel Reservoir - Phase 1	2030	Project Sponsor(s): Lavaca Navidad River Authority	Recommended WMS Project	1162							
P	Lavaca Off-Channel Reservoir - Phase 2	2040	Project Sponsor(s): Lavaca Navidad River Authority	Recommended WMS Project	3834							
P	LNRA Desalination	2040	Project Sponsor(s): Lavaca Navidad River Authority	Recommended WMS Project	1276							
P	Municipal Conservation - El Campo	2030	Project Sponsor(s): El Campo	Recommended WMS Project	1161							
P	Municipal Conservation - Hallettsville	2030	Project Sponsor(s): Hallettsville	Recommended WMS Project	1264							
P	Municipal Conservation - Moulton	2030	Project Sponsor(s): Moulton	Recommended WMS Project	1267							
P	Municipal Conservation - Shiner	2030	Project Sponsor(s): Shiner	Recommended WMS Project	1269							
P	Municipal Conservation - Wharton County WCID 1	2030	Project Sponsor(s): Wharton County WCID 1	Recommended WMS Project	3833							
P	Municipal Conservation - Yoakum	2020	Project Sponsor(s): Yoakum	Recommended WMS Project	1270							
P	Municipal Water Conservation	2020	WUG Reducing Demand: Yoakum	Recommended Demand Reduction Strategy Without WMS Project	14797							
P	Reuse	2030	Project Sponsor(s): El Campo	Recommended WMS Project	1277							

Appendix 9B. Comparison Tables and Graphs for Population and Demand Projects

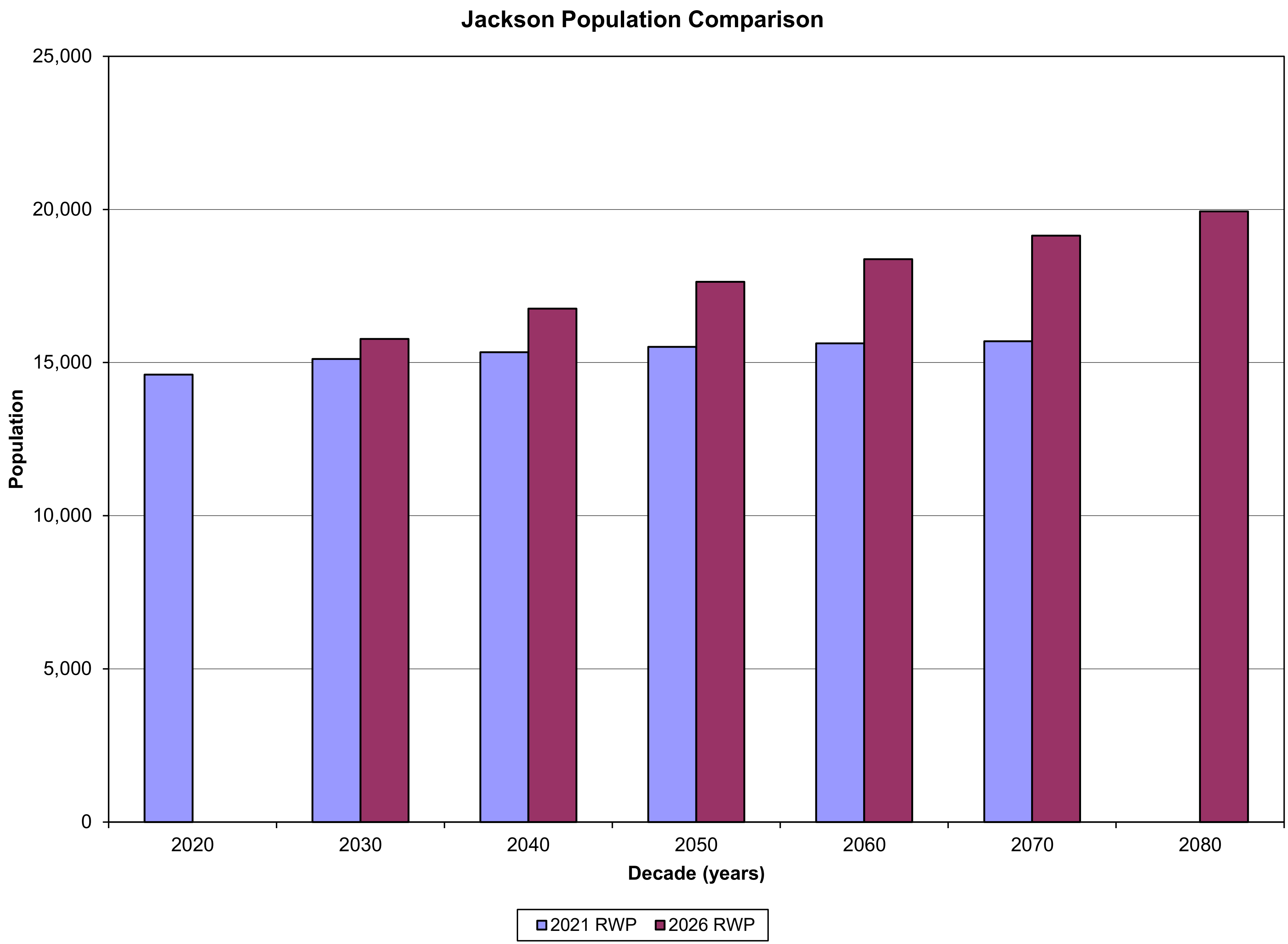
Comparison Between 2021 RWP and 2026 RWP

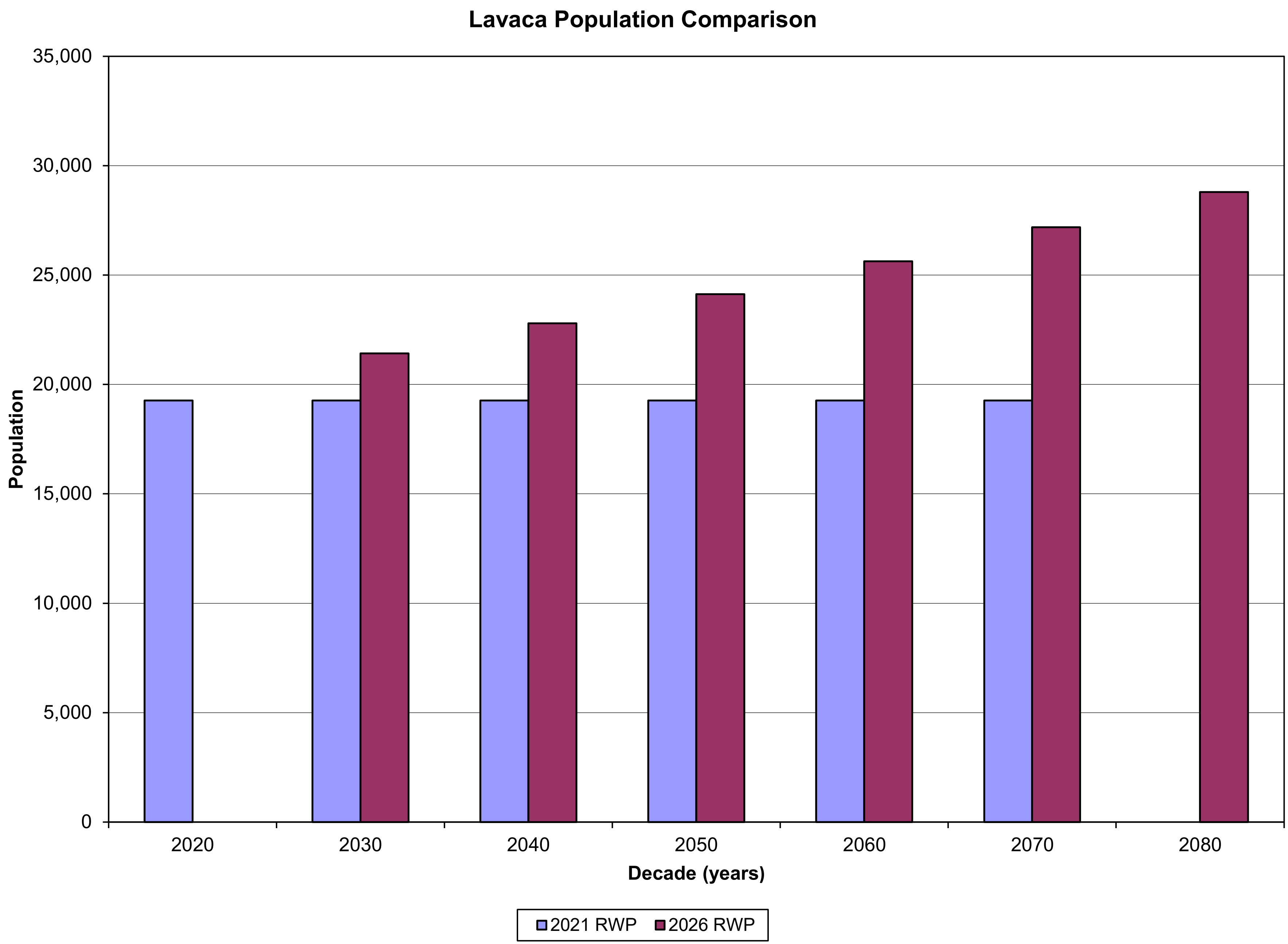
Region P Population

RWP	2020	2030	2040	2050	2060	2070	2080
Region P							
2026 RWP		53,799	56,340	58,525	60,742	63,033	65,399
2021 RWP	50,489	52,068	53,137	54,053	54,846	55,522	
Difference		1,731	3,203	4,472	5,896	7,511	
% Change		3.3	6.0	8.3	10.8	13.5	
Jackson							
2026 RWP		15,769	16,762	17,634	18,376	19,143	19,935
2021 RWP	14,606	15,119	15,336	15,515	15,627	15,699	
Difference		650	1,426	2,119	2,749	3,444	
% Change		4.3	9.3	13.7	17.6	21.9	
Lavaca							
2026 RWP		21,419	22,796	24,127	25,631	27,185	28,790
2021 RWP	19,263	19,263	19,263	19,263	19,263	19,263	
Difference		2,156	3,533	4,864	6,368	7,922	
% Change		11.2	18.3	25.3	33.1	41.1	
Wharton							
2026 RWP		16,611	16,782	16,764	16,735	16,705	16,674
2021 RWP	16,620	17,686	18,538	19,275	19,956	20,560	
Difference		-1,075	-1,756	-2,511	-3,221	-3,855	
% Change		-6.1	-9.5	-13.0	-16.1	-18.8	

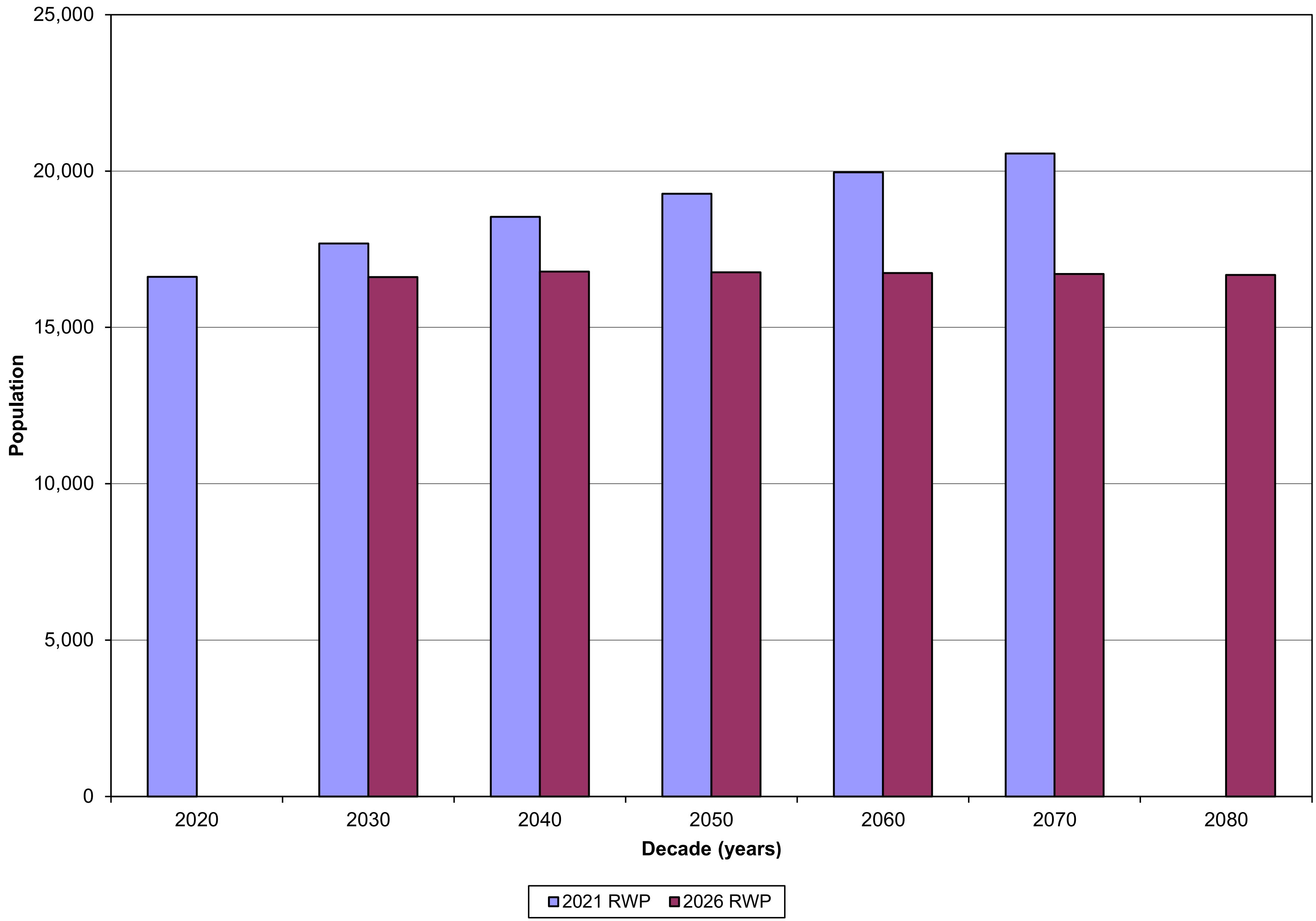


Region P Population Comparison
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Population
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP


Jackson Population Comparison
25,000
20,000
15,000
10,000
5,000
0
Population
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP


Lavaca Population Comparison
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Population
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP

Wharton (Partial) Population Comparison



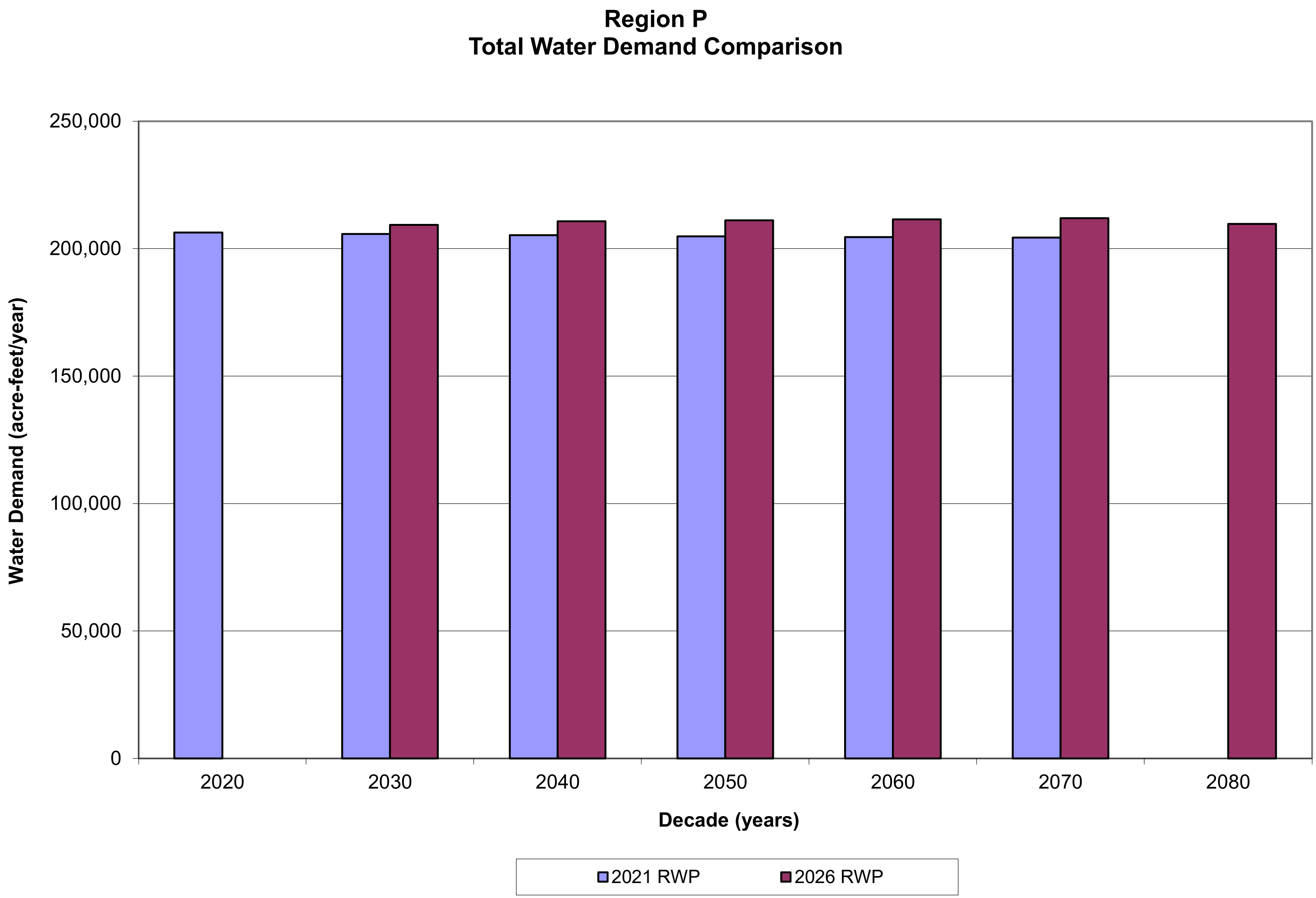
Comparison Between 2021 RWP and 2026 RWP

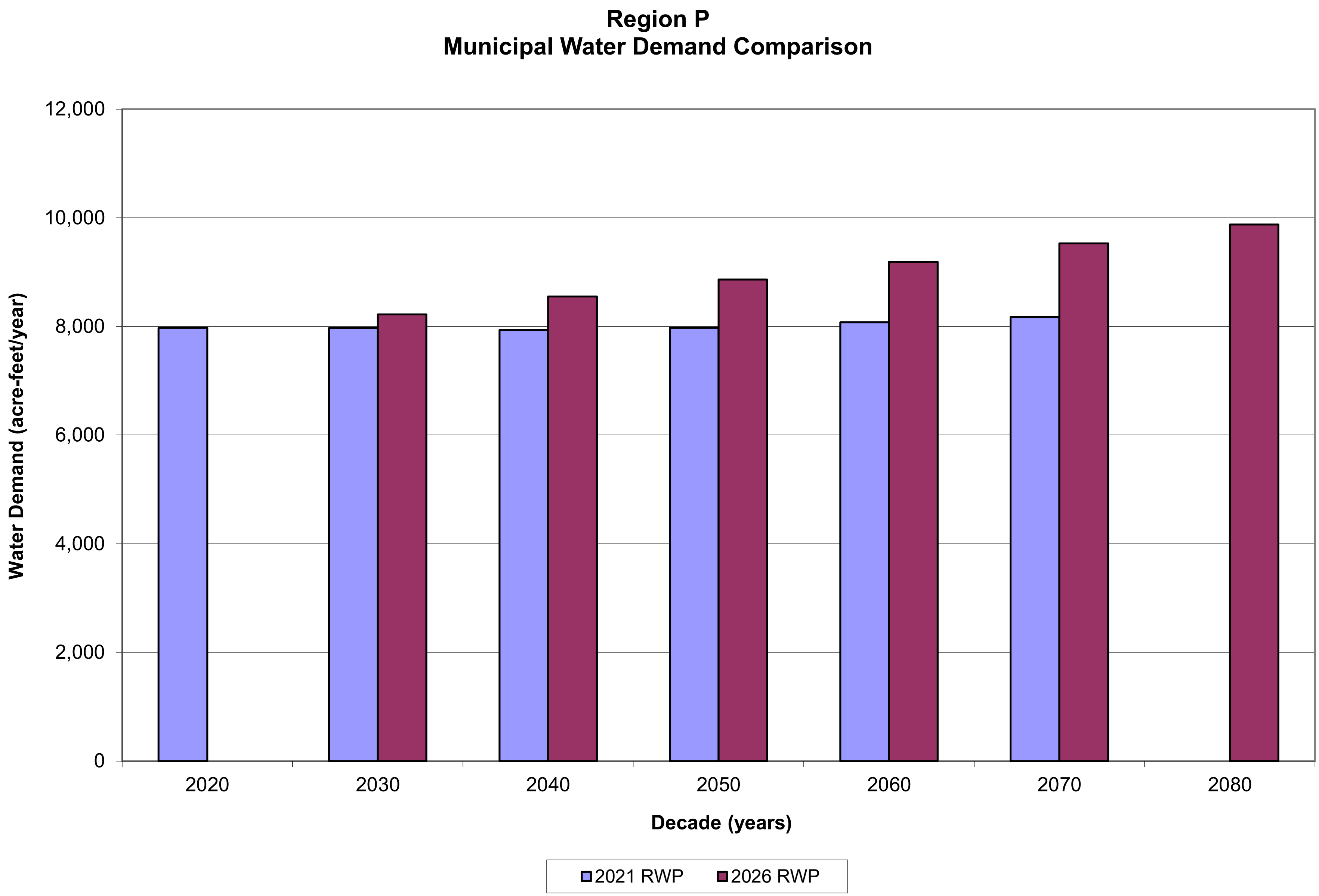
Water Demands* (in acre-feet per year) by WUG Category
Region P

RWP	2020	2030	2040	2050	2060	2070	2080
Municipal							
2026 RWP		8,219	8,549	8,864	9,190	9,528	9,877
2021 RWP	7,976	7,970	7,935	7,976	8,073	8,174	
Difference		249	614	888	1,117	1,354	
% Change		3.1	7.7	11.1	13.8	16.6	
Livestock							
2026 RWP		5,419	5,419	5,419	5,419	5,419	5,419
2021 RWP	6,479	6,479	6,479	6,479	6,479	6,479	
Difference		-1,060	-1,060	-1,060	-1,060	-1,060	
% Change		-16.4	-16.4	-16.4	-16.4	-16.4	
Irrigation							
2026 RWP		175,636	175,636	175,636	175,636	175,636	175,636
2021 RWP	175,636	175,636	175,636	175,636	175,636	175,636	
Difference		0	0	0	0	0	
% Change		0.0	0.0	0.0	0.0	0.0	
Manufacturing							
2026 RWP		15,779	16,907	16,964	17,023	17,085	17,149
2021 RWP	11,521	11,664	11,664	11,664	11,664	11,664	
Difference		4,115	5,243	5,300	5,359	5,421	
% Change		35.3	45.0	45.4	45.9	46.5	
Mining							
2026 RWP		2,665	2,665	2,665	2,665	2,665	0
2021 RWP	2,632	1,952	1,485	1,027	570	320	
Difference		713	1,180	1,638	2,095	2,345	
% Change		36.5	79.5	159.5	367.5	732.8	
Steam-Electric Power Generation							
2026 RWP		1,572	1,572	1,572	1,572	1,572	1,572
2021 RWP	2,060	2,060	2,060	2,060	2,060	2,060	
Difference		-488	-488	-488	-488	-488	
% Change		-23.7	-23.7	-23.7	-23.7	-23.7	

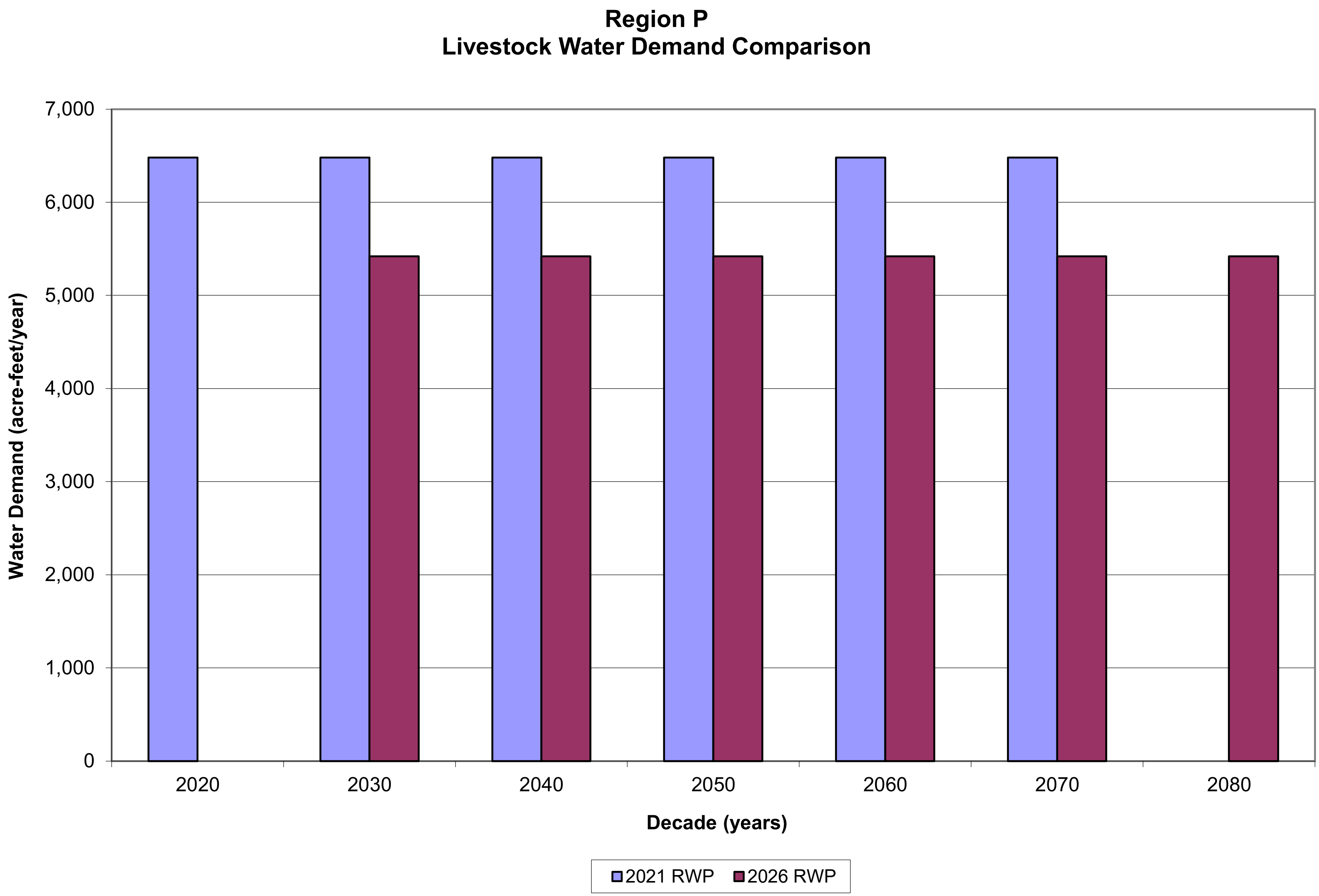
*All values are presented in acre-feet per year

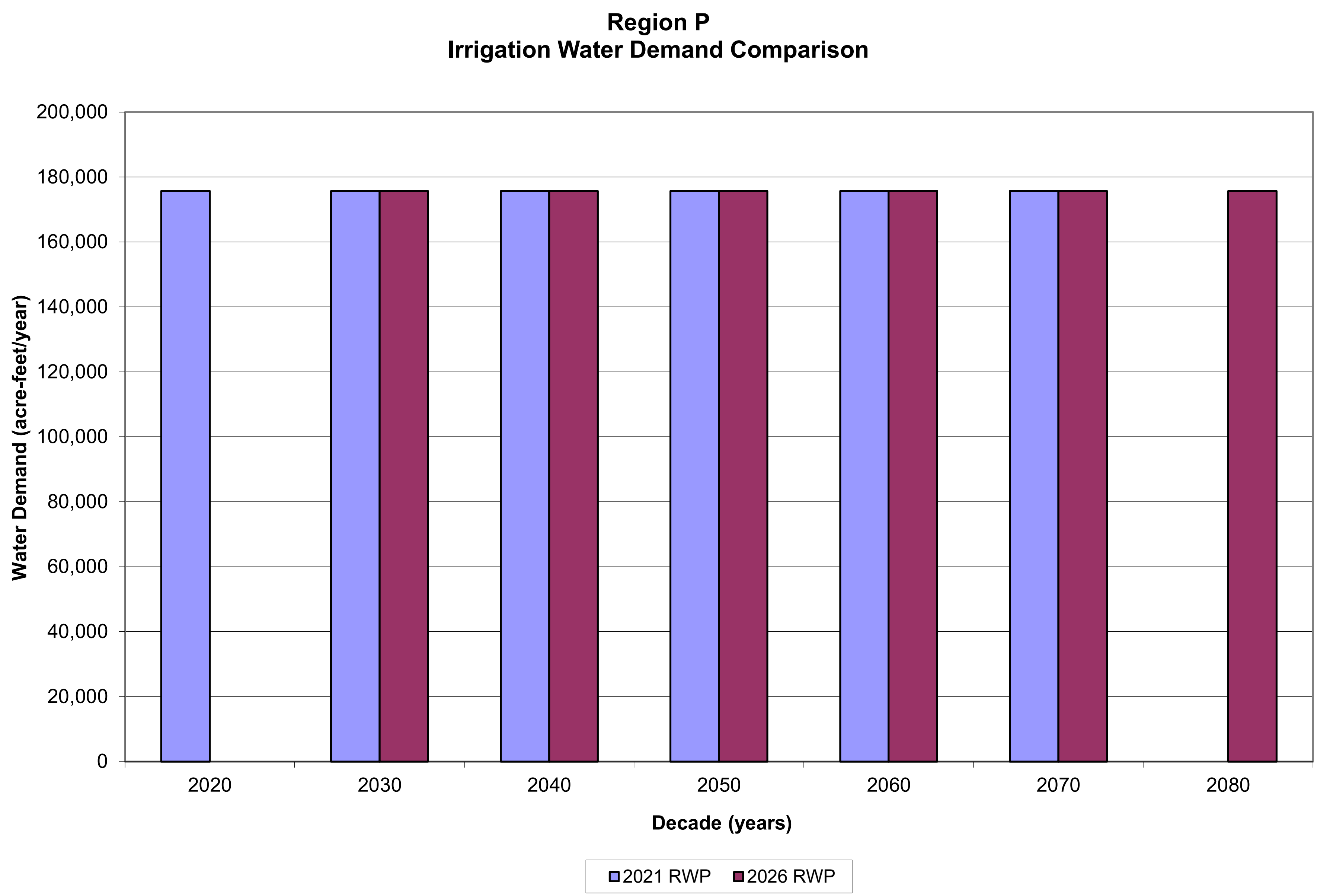
Total Water Demand							
2026 RWP		209,290	210,748	211,120	211,505	211,905	209,653
2021 RWP	206,304	205,761	205,259	204,842	204,482	204,333	
Difference		3,529	5,489	6,278	7,023	7,572	
% Change		1.7	2.7	3.1	3.4	3.7	


Region P
Total Water Demand Comparison
250,000
200,000
150,000
100,000
50,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP

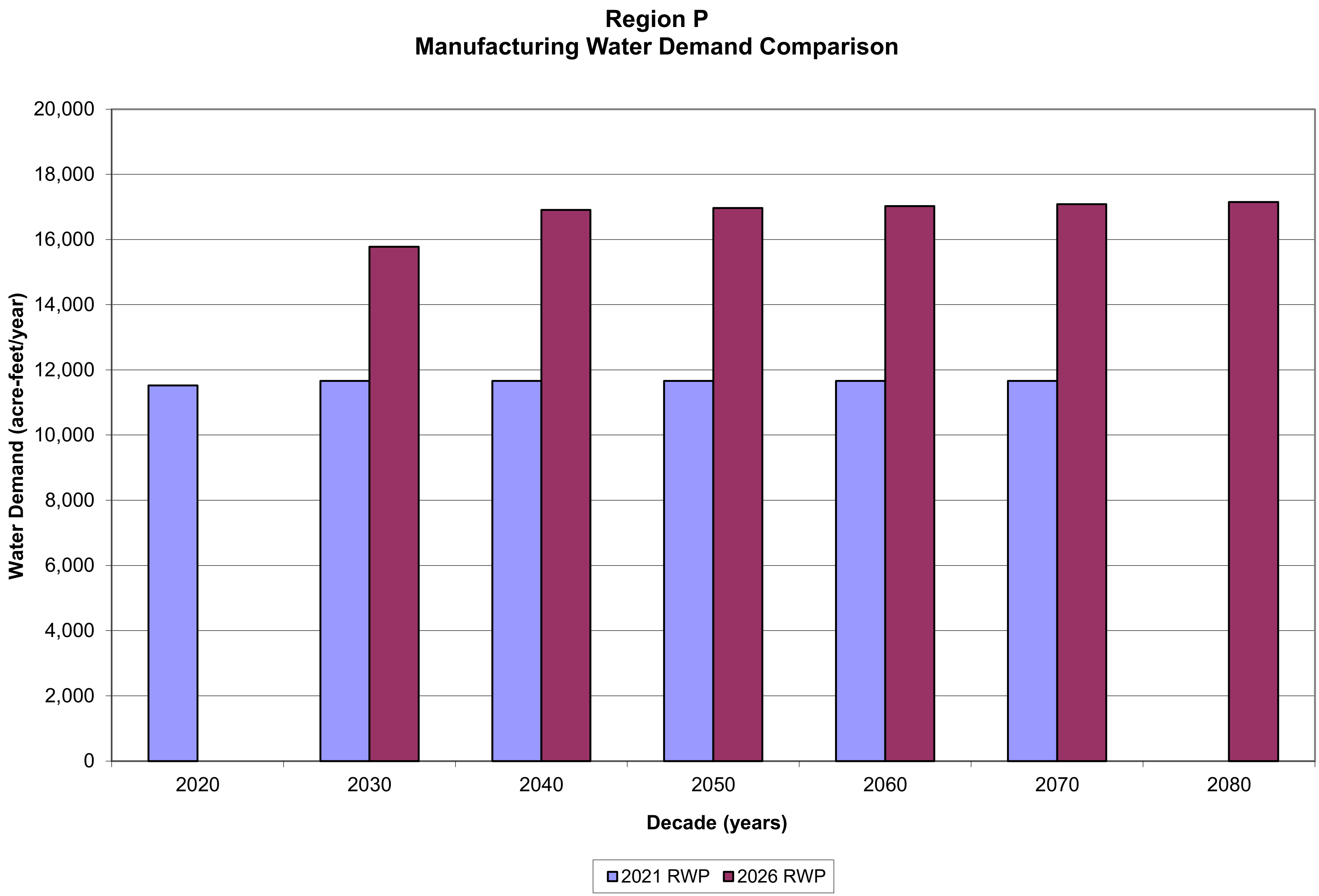


Region P
Municipal Water Demand Comparison
12,000
10,000
8,000
6,000
4,000
2,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP


Region P
Livestock Water Demand Comparison
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP

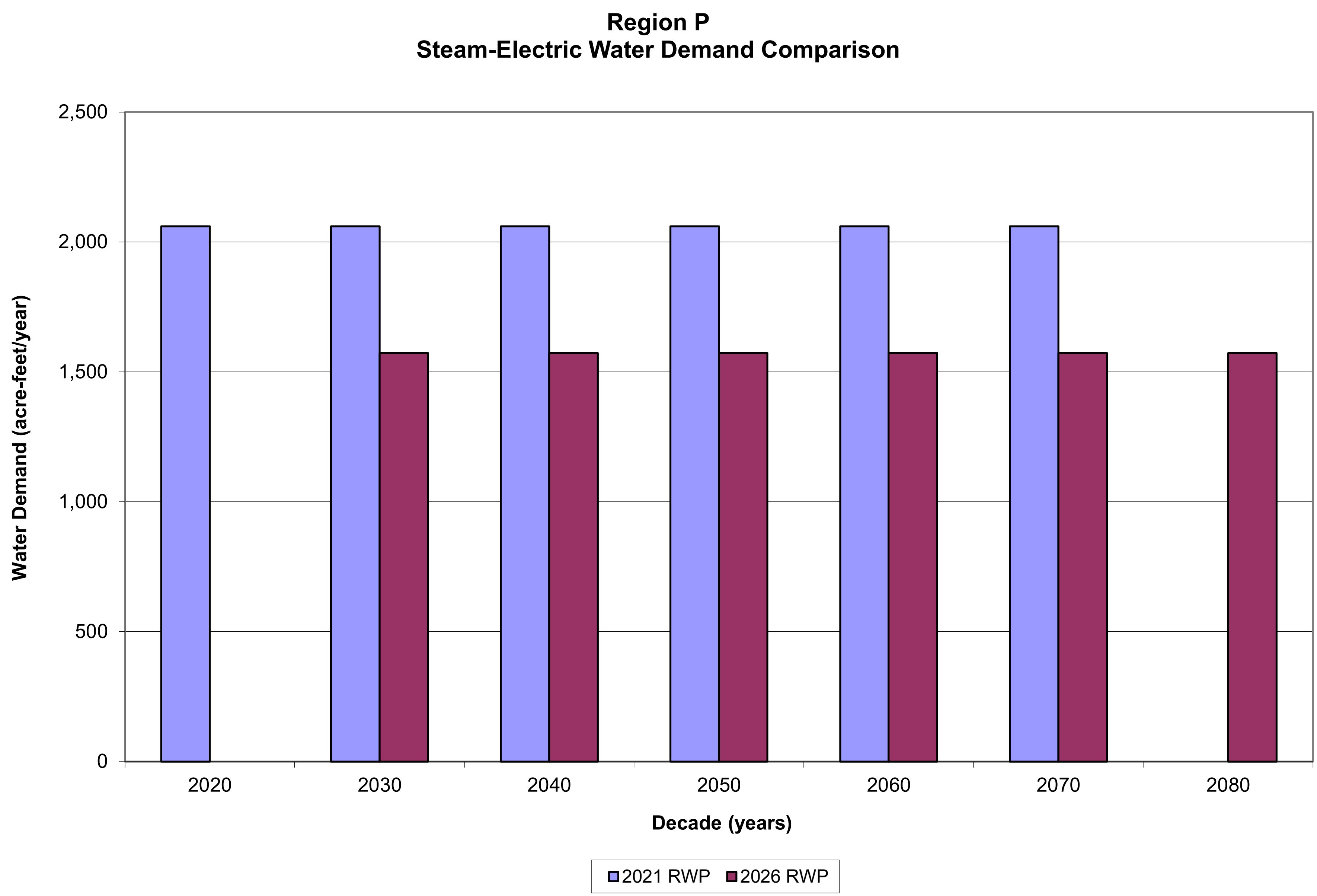


Region P
Irrigation Water Demand Comparison
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP



Region P
Manufacturing Water Demand Comparison
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP


Region P
Mining Water Demand Comparison
Water Demand (acre-feet/year)
3,000
2,500
2,000
1,500
1,000
500
0
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP


Region P
Steam-Electric Water Demand Comparison
Water Demand (acre-feet/year)
2,500
2,000
1,500
1,000
500
0
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP

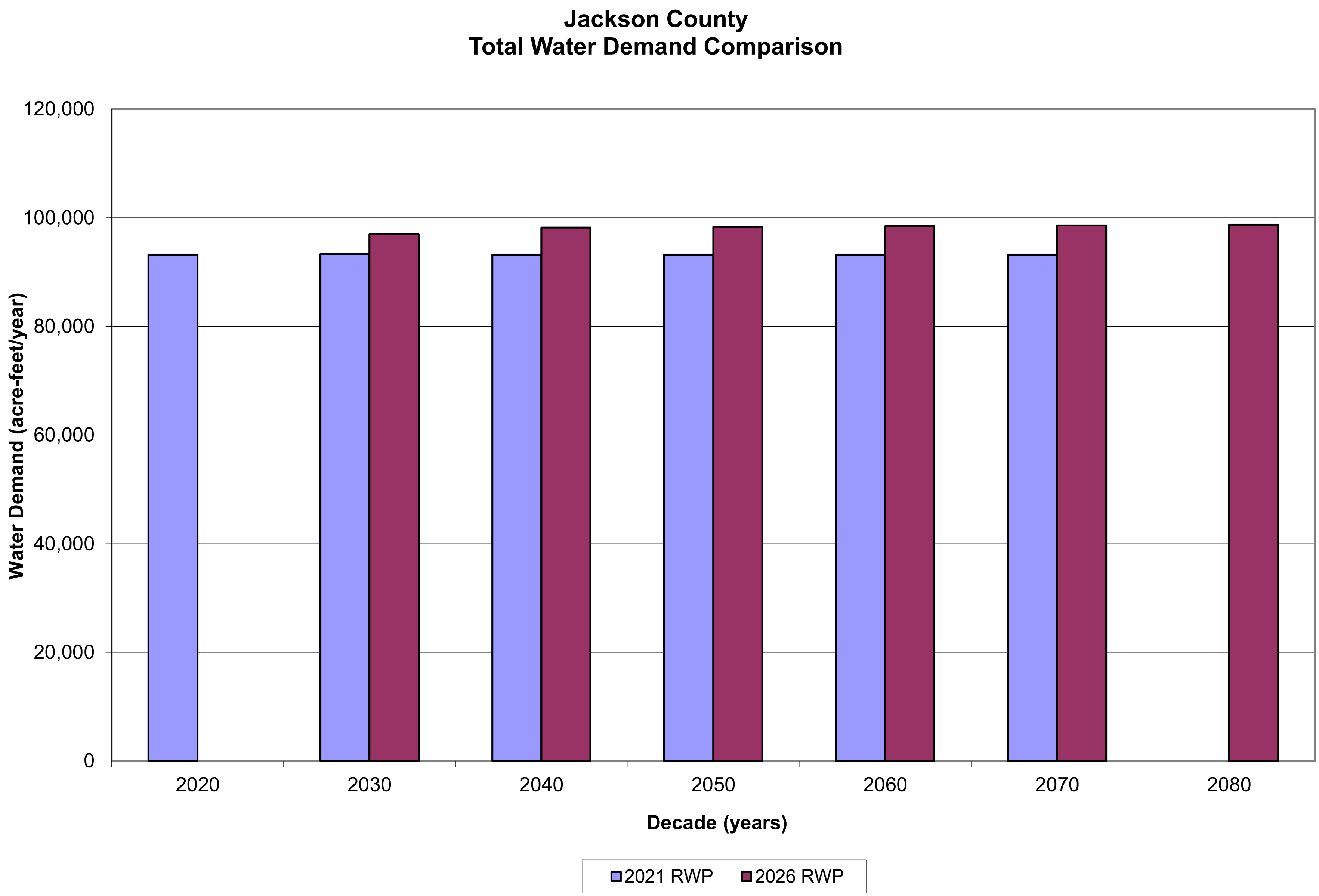
Comparison Between 2021 RWP and 2026 RWP

Water Demands* (in acre-feet per year) by WUG Category
Jackson County

RWP	2020	2030	2040	2050	2060	2070	2080
Municipal							
2026 RWP		1,892	2,001	2,105	2,193	2,286	2,381
2021 RWP	1,825	1,819	1,788	1,782	1,789	1,797	
Difference		73	213	323	404	489	
% Change		4.0	11.9	18.1	22.6	27.2	
Livestock							
2026 RWP		1,371	1,371	1,371	1,371	1,371	1,371
2021 RWP	1,882	1,882	1,882	1,882	1,882	1,882	
Difference		-511	-511	-511	-511	-511	
% Change		-27.2	-27.2	-27.2	-27.2	-27.2	
Irrigation							
2026 RWP		78,498	78,498	78,498	78,498	78,498	78,498
2021 RWP	78,498	78,498	78,498	78,498	78,498	78,498	
Difference		0	0	0	0	0	
% Change		0.0	0.0	0.0	0.0	0.0	
Manufacturing							
2026 RWP		15,218	16,325	16,361	16,398	16,437	16,477
2021 RWP	10,924	11,005	11,005	11,005	11,005	11,005	
Difference		4,213	5,320	5,356	5,393	5,432	
% Change		38.3	48.3	48.7	49.0	49.4	
Mining							
2026 RWP		0	0	0	0	0	0
2021 RWP	70	73	55	40	26	19	
Difference		-73	-55	-40	-26	-19	
% Change		-100.0	-100.0	-100.0	-100.0	-100.0	
Steam-Electric Power Generation							
2026 RWP		0	0	0	0	0	
2021 RWP	0	0	0	0	0	0	
Difference		0	0	0	0	0	
% Change		NA	NA	NA	NA	NA	

*All values are presented in acre-feet per year

Total Water Demand							
2026 RWP		96,979	98,195	98,335	98,460	98,592	98,727
2021 RWP	93,199	93,277	93,228	93,207	93,200	93,201	
Difference		3,702	4,967	5,128	5,260	5,391	
% Change		4.0	5.3	5.5	5.6	5.8	



Jackson County
Total Water Demand Comparison
120,000
100,000
80,000
60,000
40,000
20,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP

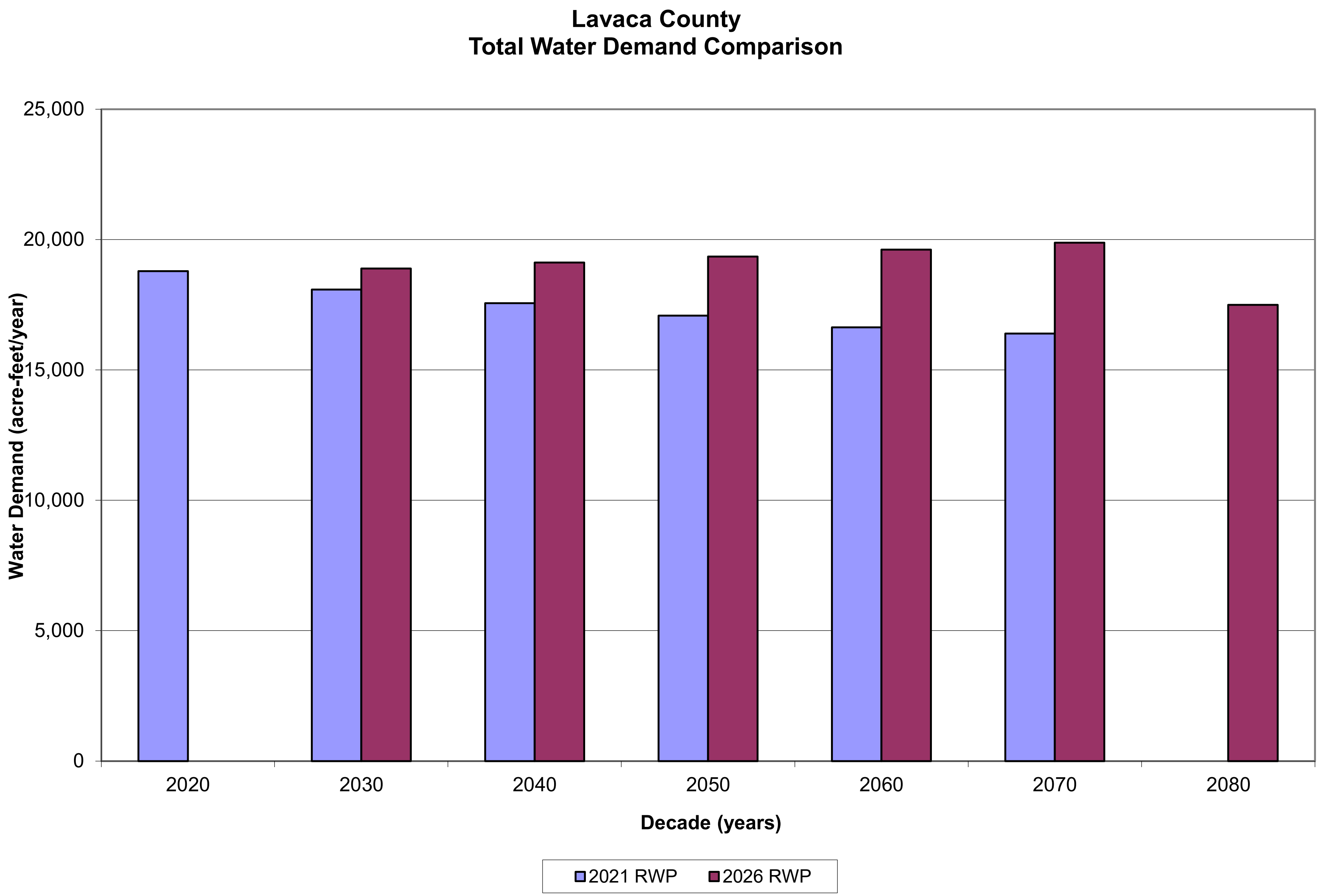
Comparison Between 2021 RWP and 2026 RWP

Water Demands* (in acre-feet per year) by WUG Category
Lavaca County

RWP	2020	2030	2040	2050	2060	2070	2080
Municipal							
2026 RWP		3,461	3,664	3,875	4,116	4,364	4,620
2021 RWP	3,226	3,136	3,061	3,022	3,014	3,014	
Difference		325	603	853	1,102	1,350	
% Change		10.4	19.7	28.2	36.6	44.8	
Livestock							
2026 RWP		3,545	3,545	3,545	3,545	3,545	3,545
2021 RWP	3,763	3,763	3,763	3,763	3,763	3,763	
Difference		-218	-218	-218	-218	-218	
% Change		-5.8	-5.8	-5.8	-5.8	-5.8	
Irrigation							
2026 RWP		8,692	8,692	8,692	8,692	8,692	8,692
2021 RWP	8,692	8,692	8,692	8,692	8,692	8,692	
Difference		0	0	0	0	0	
% Change		0.0	0.0	0.0	0.0	0.0	
Manufacturing							
2026 RWP		528	548	568	589	611	634
2021 RWP	563	625	625	625	625	625	
Difference		-97	-77	-57	-36	-14	
% Change		-15.5	-12.3	-9.1	-5.8	-2.2	
Mining							
2026 RWP		2,665	2,665	2,665	2,665	2,665	0
2021 RWP	2,544	1,860	1,416	977	537	297	
Difference		805	1,249	1,688	2,128	2,368	
% Change		43.3	88.2	172.8	396.3	797.3	
Steam-Electric Power Generation							
2026 RWP		0	0	0	0	0	0
2021 RWP	0	0	0	0	0	0	
Difference		0	0	0	0	0	
% Change		NA	NA	NA	NA	NA	

*All values are presented in acre-feet per year

Total Water Demand							
2026 RWP		18,891	19,114	19,345	19,607	19,877	17,491
2021 RWP	18,788	18,076	17,557	17,079	16,631	16,391	
Difference		815	1,557	2,266	2,976	3,486	
% Change		4.5	8.9	13.3	17.9	21.3	


Lavaca County
Total Water Demand Comparison
25,000
20,000
15,000
10,000
5,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP

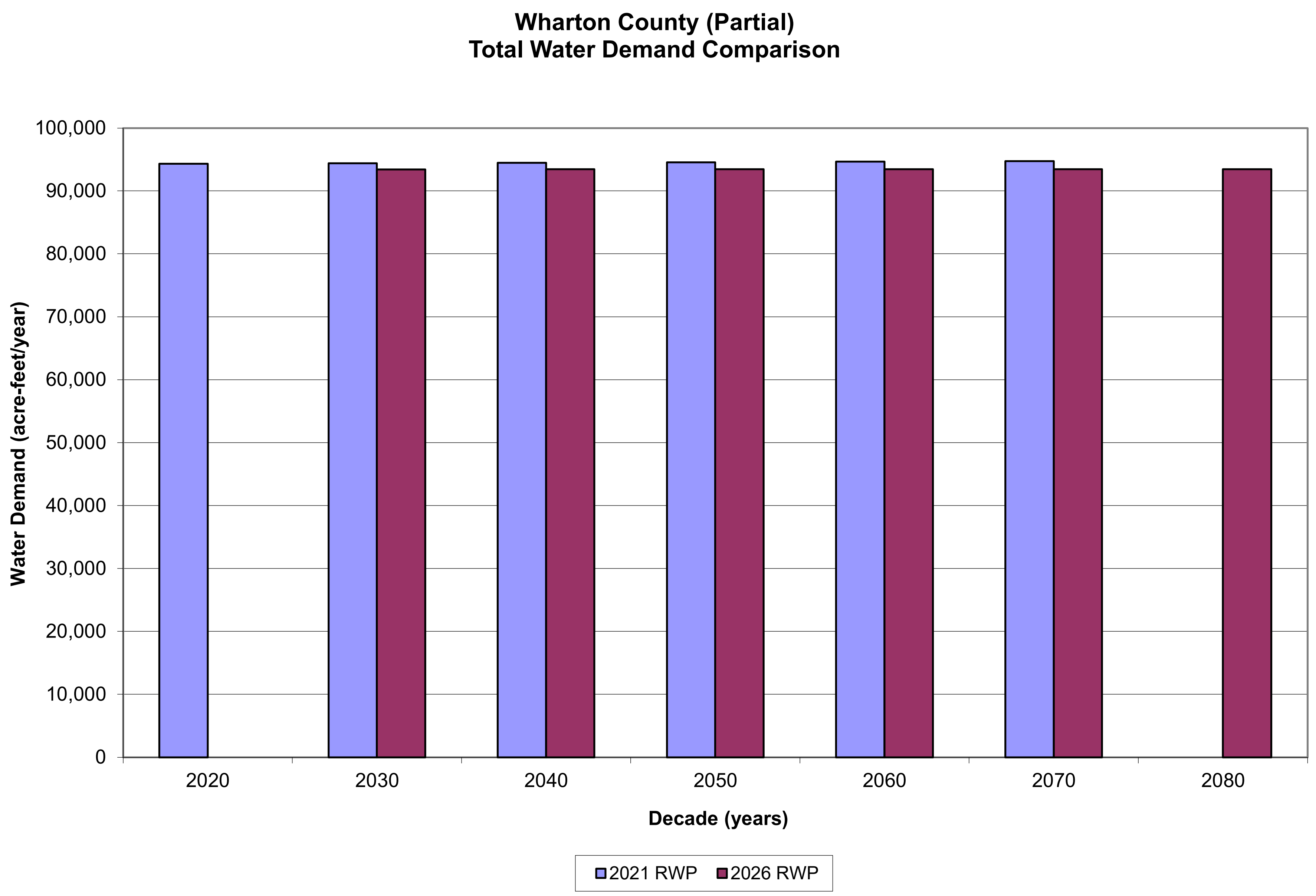
Comparison Between 2021 RWP and 2026 RWP

Water Demands* (in acre-feet per year) by WUG Category
Wharton County (partial)

RWP	2020	2030	2040	2050	2060	2070	2080
Municipal							
2026 RWP		2,866	2,884	2,884	2,881	2,878	2,876
2021 RWP	2,925	3,015	3,086	3,172	3,270	3,363	
Difference		-149	-202	-288	-389	-485	
% Change		-4.9	-6.5	-9.1	-11.9	-14.4	
Livestock							
2026 RWP		503	503	503	503	503	503
2021 RWP	834	834	834	834	834	834	
Difference		-331	-331	-331	-331	-331	
% Change		-39.7	-39.7	-39.7	-39.7	-39.7	
Irrigation							
2026 RWP		88,446	88,446	88,446	88,446	88,446	88,446
2021 RWP	88,446	88,446	88,446	88,446	88,446	88,446	
Difference		0	0	0	0	0	
% Change		0.0	0.0	0.0	0.0	0.0	
Manufacturing							
2026 RWP		33	34	35	36	37	38
2021 RWP	34	34	34	34	34	34	
Difference		-1	0	1	2	3	
% Change		-2.9	0.0	2.9	5.9	8.8	
Mining							
2026 RWP		0	0	0	0	0	0
2021 RWP	18	19	14	10	7	4	
Difference		-19	-14	-10	-7	-4	
% Change		-100.0	-100.0	-100.0	-100.0	-100.0	
Steam-Electric Power Generation							
2026 RWP		1,572	1,572	1,572	1,572	1,572	1,572
2021 RWP	2,060	2,060	2,060	2,060	2,060	2,060	
Difference		-488	-488	-488	-488	-488	
% Change		-23.7	-23.7	-23.7	-23.7	-23.7	

*All values are presented in acre-feet per year

Total Water Demand							
2026 RWP		93,420	93,439	93,440	93,438	93,436	93,435
2021 RWP	94,317	94,408	94,474	94,556	94,651	94,741	
Difference		-988	-1,035	-1,116	-1,213	-1,305	
% Change		-1.0	-1.1	-1.2	-1.3	-1.4	


Wharton County (Partial)
Total Water Demand Comparison
Water Demand (acre-feet/year)
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
2020
2030
2040
2050
2060
2070
2080
Decade (years)
2021 RWP
2026 RWP

INITIALLY PREPARED PLAN

CHAPTER 10: PUBLIC PARTICIPATION

Lavaca Regional Water Plan

B&V PROJECT NO. 410083

PREPARED FOR

Lavaca Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

Table of Contents

LIST OF APPENDICES

List of Abbreviations

HB	House Bill
IPP	Initially Prepared Plan
K	Lower Colorado
L	South Central Texas
LNRA	Lavaca-Navidad River Authority
LRWPA	Lavaca Regional Water Planning Area
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SB	Senate Bill
TWDB	Texas Water Development Board
WAM	Water Availability Model
WUG	Water User Group

10.0 Public Participation

10.1 Introduction

The Lavaca Regional Water Planning Group's (Lavaca RWPG) approach to public involvement has been to secure early participation of interested parties so that concerns could be addressed as the Plan is being developed. From its initial deliberations, the Lavaca RWPG has made a commitment to an open planning process and has actively solicited public input and involvement in developing the elements of the Regional Water Plan (RWP). This has been accomplished by pursuing several avenues to gain public involvement.

The first line of public involvement occurs through the membership of the Lavaca RWPG. As a result of the small geographic area and the relatively small population, the Lavaca RWPG members are highly visible and well-known representatives of the interests of water users in the Lavaca Regional Water Planning Area (LRWPA). The individual group members provide a liaison with identified associations, such as the soil and water conservation districts, the farm service agencies in the counties, the Texas Farm Bureau, and similar organizations. In addition, individual group members, staff members of the Lavaca-Navidad River Authority (LNRA), and members of the consultant team have made themselves available to other regional planning groups and to civic organizations such as the Lions Clubs, Kiwanis Clubs, Rotary Clubs, and Chambers of Commerce throughout the regional planning area and in neighboring regional planning areas where LNRA customers were located. All planning group meetings are open to members of the public in order to welcome public participation in the planning process. The 2026 Lavaca RWP was developed in accordance with the public participation requirements of the Texas Open Meetings Act. The Lavaca RWPG also complied with the Texas Public Information Act by posting proper notices associated with meetings and by recording meeting minutes that are available to the public upon request.

Members of the Lavaca RWPG and personnel from LNRA attended various other regional planning meetings and meetings of community and civic organizations to present findings and decisions made by the group.

10.2 Public Participation

The Lavaca RWPG supports input from all stakeholder groups in the development of this plan. Throughout the planning cycle, the Lavaca RWPG offered hybrid in-person/virtual board meetings. As it is important for stakeholders be able to attend these regular Lavaca RWPG meetings, this model allowed for a greater attendance across the geographic area. Additional outreach efforts by the Lavaca RWPG included the following:

- Contact survey.
- Overview of regional water planning webinar.
- Population and demands survey.
- Supplies and strategy survey.
- Water management strategy project implementation surveys.
- Rural outreach letters.
- Personalized emails to Water User Groups (WUGs) and Wholesale Water Providers regarding needs and the development of individualized strategies.

10.2.1 Rural Outreach

The Lavaca RWPG conducted outreach specifically to rural entities in the planning area to support plan development. In March 2024, the Texas Water Development Board (TWDB) identified and compiled a list of 13 entities within the planning area that meet the rural political subdivision definition in accordance with Texas Water Code 15.001(14). Most of the LRWPA is rural, and eight of these entities are also designated WUGs. These eight entities also received other surveys and outreach as described in Section 10.2; general response rate to surveys was approximately 55 percent. In May 2024, the Lavaca RWPG sent letters to these rural entities providing general information regarding Regional and State Water Planning and how to engage with the planning process. The letter also included TWDB resources providing key water supply planning information for the recipient's county.

10.2.2 Interregional Coordination Efforts

The LRWPA is surrounded by two adjacent planning areas, including Lower Colorado (K) and South Central Texas (L). The 2026 Lavaca RWP includes no recommended WMS with source water originating in other regions. However, coordination with L was required for shared WUGs, such as Yoakum, and for existing water supplies provided by LNRA outside of the region and potential water management strategy supplies in Region L counties. Coordination with K was required for shared WUGs in Wharton County, and for existing water supplies from the Colorado River. To the extent necessary, coordination with each of these regions was accomplished through chair correspondence, RWPG liaisons, and/or technical consultant collaboration. Subjects of coordination, correspondence, or collaboration included projected demands, confirmation of WUG allocations among regions, and specific water management strategies (WMSs) of interest. The Lavaca RWPG is aware of no interregional conflicts involving recommended WMSs included in the 2026 Lavaca RWP.

10.2.3 Public Hearings and Responses to Comments on Initially Prepared Plan

This Initially Prepared Plan (IPP) was approved and certified for submittal by the voting members of the Lavaca RWPG at the regularly scheduled meeting on February 10, 2025. The approved IPP will be submitted to the TWDB and made available for review and comment on March 3, 2025, in accordance with §357.21(h)(7). Hard copies and electronic versions of the IPP will be made available to county clerks and public libraries throughout the region and on the internet. The Lavaca RWPG will provide appropriate notice of and opportunity for public comment on the IPP. As required by TWDB rule, copies of the draft plan will be placed in at least one public library in each county within the regional planning area as well as in the office of the county clerk in each county within the regional planning area.

After submittal of the IPP, a public hearing will be scheduled. TWDB, agency, and public comments and responses will be included in a separate appendix upon final adoption of the RWP.

10.2.4 Final Regional Water Plan Adoption

The 2026 Lavaca RWP will be certified complete and adopted by a majority vote of the Lavaca RWPG in Fall 2025 and submitted to the TWDB by October 20, 2025, for approval and integration into the 2027 State Water Plan.

10.3 Public Meetings

The Lavaca RWPG held the first meeting for the 2026 Planning Cycle in August 2021. All meetings welcomed public participation as elements of RWP were addressed. The Lavaca RWPG met all requirements under the Texas Open Meetings Act and Public Information Act in accordance with 31 TAC

§357.12 and 357.21 during the planning cycle. The following is a summary of the minutes of the public meetings. The complete minutes can be found in Appendix 10A.

10.3.1 August 23, 2021 Meeting

Planning Group held a moment of silence in remembrance of Gary Skalicky, former Group member, who passed on May 31, 2021. At the time of this meeting, the Group had four open positions: Lavaca County, Public; Lavaca County, Small Business; Lavaca County, Municipalities; and Jackson County, Agriculture. Consultant (Black & Veatch) provided pre-planning information, including: a summary of regional water planning in Texas; background information on the LRWPA; and the 2026 Plan Initial scope of work. The Group also discussed the process for interregional coordination. TWDB Board Member Kathleen Jackson addressed and commended the Group. TWDB (Jean Devlin) updated the Group on the 2026 Regional Planning Cycle subcontracting guidance. No public comments received.

10.3.2 February 28, 2022 Meeting

Kathleen Jackson, TWDB, addressed the Group and spoke of TWDB's involvement with the water planning groups, commending the Group for their continued leadership and dedication in the regional planning process. At the time of this meeting, the Group had four open positions: Lavaca County, Public; Lavaca County, Small Business; Lavaca County, Municipalities; and Jackson County, Agriculture. Officers re-elected to current positions: Brzozowski, Secretary; Hudgins, Vice Chairman; and Spenrath, Chairman. Executive Committee members re-elected to current positions: Spenrath, Hudgins, Brzozowski, Coleman, Day, Maloney, and Weinheimer. The Group nominated Marie Day as Region K (Lower Colorado) liaison and Patrick Brzozowski as Region L (South Central Texas) and Region N (Coastal Bend) liaison. To serve on the Interregional Planning Council, the Group nominated Pat Brzozowski as a member and Dick Ottis as an alternate. TWDB (Ron Ellis) briefed group on the second Interregional Planning Council, TWDB's contract with UT Bureau of Economic Geology to assess mining water use and update mining demand projections for 2026 RWPs, draft projections release dates, and updates to the sixth cycle regional water planning web page. TWDB (Katie Dahlberg) presented non-municipal projection methodology. Consultant briefed the Group on projections for livestock, manufacturing, and steam-electric. No additional public comments received.

10.3.3 May 16, 2022 Meeting

The Group carried the motion to approve Vance Mitchell as a Jackson County, Agriculture, voting member. At the time of this meeting, the Group had three open positions: Lavaca County, Public; Lavaca County, Small Business; and Lavaca County, Municipalities. TWDB (Jean Devlin) updated the Group on rulemaking and key rule changes for the sixth cycle. The Group passed the motion to authorize the Region P political subdivision, LNRA, to provide public notice and submit a grant application to the TWDB on behalf of Region P for funding to complete the sixth round of regional water planning, and to negotiate and execute the amendment to the TWDB contract. Consultant briefed the group on draft municipal WUG list; the Group approved WUG list as presented with no changes. The Group was presented copies of the draft projections for livestock, manufacturing, and steam-electric. The Group passed motion to begin discussions with TWDB to increase water use coefficient for livestock. No public comments received.

10.3.4 September 19, 2022 Meeting

At the time of this meeting, the Group had three open positions: Lavaca County, Public; Lavaca County, Small Business; and Lavaca County, Municipalities. TWDB (Lann Bookout) updated the Group on the population and demand projections timeline and discussed data that has been released so far.

Consultant briefed the Group on updates related to livestock, manufacturing, and steam-electric demands, and presented draft projections for irrigation and mining. No public comments received.

10.3.5 December 5, 2022 Meeting

At the time of this meeting, the Group had three open positions: Lavaca County, Public; Lavaca County, Small Business; and Lavaca County, Municipalities. TWDB (Jean Devlin) presented an update to the Group that included the significant new requirements for the 2026 RWP, important reminders, and the projections timeline, as well as some information on the Interregional Planning Council, new education materials that the TWDB has, and information on the TWDB 6th cycle of Regional Water Planning web page. Pat Brzozowski reported to the Group on behalf of the Interregional Planning Council. He presented the Group with information indicating members of the IPC and the Status of 2020 Interregional Planning Council Report Recommendations. Consultant briefed the Group on potential revisions to the draft projections for livestock, manufacturing, steam-electric, irrigation, and mining. Proposed revisions to livestock, manufacturing, and irrigation were approved by the Group for submittal to TWDB. No public comments received.

10.3.6 March 6, 2023 Meeting

At the time of this meeting, the Group had three open positions: Lavaca County, Public; Lavaca County, Small Business; and Lavaca County, Municipalities. Officers re-elected to current positions: Brzozowski, Secretary, Hudgins, Vice Chairman, and Spenrath, Chairman. Executive Committee members re-elected to current positions: Spenrath, Hudgins, Brzozowski, Coleman, Day, Maloney, and Weinheimer. TWDB (Jean Devlin) updated the Group on population and municipal projections, clarifications on Task 4B (Identifying Infeasible Water Management Strategies), Interregional Planning Council, guidance and material, and the web page for the sixth cycle of regional water planning. Consultant briefed the Group on schedule and progress, held additional discussion on any potential revisions to draft mining demands, and presented the draft population and municipal demand projections. No action was taken. No public comments received.

10.3.7 May 15, 2023 Meeting

At the time of this meeting, the Group had three open positions: Lavaca County, Public; Lavaca County, Small Business; and Lavaca County, Municipalities. TWDB (Ron Ellis) updated the Group on updated plumbing code savings, new educational materials for members, one-pager guidance for drought of record and consistency reviews, Interregional Planning Council, and critical upcoming deadlines. Consultant briefed the Group on schedule and progress, held additional discussion on any potential revisions to draft mining demands and the draft population and municipal demand projections, and went through a list of 2021 Plan WMSs for the Group to review and provide feedback on potential infeasibility. The mining demands were approved as-is, but the Group noted concerns that the use of other data sources by the TWDB may have yielded results lowering the mining water demand for Lavaca County. No public comments received.

10.3.8 July 24, 2023 Meeting

At the time of this meeting, the Group had three open positions: Lavaca County, Public; Lavaca County, Small Business; and Lavaca County, Municipalities. TWDB (Ron Ellis) updated the Group on one-pager guidance for population revisions, Interregional Planning Council, critical deadlines, bills of interest that passed in the 88th Legislature (House Bill [HB] 1545, SB [Senate Bill] 28/SJR 75, HB 1), and bills of interest that did not pass in the 88th Legislature (HB 4373/SB 2108). Consultant briefed the Group on draft projections for population and municipal demands. The Group voted to approve the request using

Wharton County WUGs using the 0.5 migration scenario. The Group was also briefed on the potential need for a hydrologic variance request to use a modified surface water availability model (WAM). No public comments received.

10.3.9 October 23, 2023 Meeting

At the time of this meeting, the Group had three open positions: Lavaca County, Public; Lavaca County, Small Business; and Lavaca County, Municipalities. TWDB (Ron Ellis) updated the Group on Interregional Planning Council updates, a one-pager on uncertainty in regional water planning, critical deadlines, and the Marvin Nichols feasibility review. Tim Andruss, Region L liaison and General Manager of Victoria County Groundwater Conservation District, introduced himself to the Group and offered his support to the Lavaca RWPG. Consultant presented information supporting the use of an unmodified TCEQ WAM Run 3 for surface water availability modeling in the 2026 Lavaca RWP development. The Group voted to recognize the Drought Worse than Drought of Record, but to continue planning with Drought of Record. The Group voted to approve the methodology for identifying infeasible water management strategies in the 2021 Plan as well as the process for identifying potentially feasible water management strategies for the 2026 Plan. Public comment from Grace Ward (City of Hallettsville) stated that she was recruiting members from the Hallettsville community for possible membership of the Lavaca RWPG.

10.3.10 February 5, 2024 Meeting

The Group carried the motion to approve James Migl, City of Hallettsville as a Lavaca County, Municipalities voting member. At the time of this meeting, the Group had two open positions: Lavaca County, Small Business, and Lavaca County, Public. The Group was introduced to their new TWDB project manager, John Maurer. TWDB (Ron Ellis) updated the Group on deadlines for Technical Memorandum, TWDB Water Use Survey, Water Service Boundary Editor, and Agricultural Water Conservation Grant application period. Updates were also provided for the RWPG Chairs Call, Texas Water Fund, Conservation/Drought/Drought Preparedness Resources, including Drought Preparedness Council Recommendations to RWPGs, Updated Drought Management Costing Information incorporated into the Uniform Costing Model, and RWP Amendments. Consultant briefed the Group on the Technical Memorandum, which is a compilation of the task work performed to date as part of the regional water planning process to develop the 2026 Lavaca RWP for Region P, prepared for TWDB. The Group voted authorize the Consultant to address DB27 updates and non-substantive revisions and submit the Technical Memorandum to TWDB. The Group was briefed on Task 5B Scope of Work for WMS evaluation. LNRA was authorized to submit a request to the TWDB for a Notice-to-Proceed with the Scope of Work for Task 5B and execute subsequent contract amendments. No public comments received.

10.3.11 May 6, 2024 Meeting

The Group carried the motion to approve Grace Ward, City of Hallettsville as a Lavaca County, Public voting member. At the time of this meeting, the Group had one open position: Lavaca County, Small Business. Officers and executive committee members re-elected to current positions: Brzozowski, Secretary; Hudgins, Vice Chairman; and Spenrath, Chairman. TWDB (John Mauer) updated the Group on County Summary and Rural Entities Documents, Uniform Costing Model, Drought Management Costing Tool, Water Conservation Advisory Council Survey Results, Water Service Boundary Viewer, Technical Memorandum, Texas Water Fund, TCEQ 180-day List, Water Loss Audits, Water Conservation Plans and Annual Reports, Drought Preparedness Council Recommendations, Conservation Resources for Development of the 2026 RWPs, and Interregional Planning Council Report to TWDB. Consultant briefed the Group on Chapters 1-4, sent to RWPG members for review, and irrigation conservation measures. No public comments received.

10.3.12 August 12, 2024 Meeting

At the time of this meeting, the Group had one open position: Lavaca County, Small Business. TWDB (John Mauer) updated the Group on TWDB State Flood Plan, Flood Mitigation Projects with Water Supply Benefit, Informal Comments – Technical Memorandum, Water Supply Needs & Surpluses Map, Rule 357.34(g) Update, List of Projection Revisions from Local Plans, TWDB and GMA Orientation Meeting, Texas Water Fund Implementation Plan. The Group voted to approve LNRA as a Major Water Provider. The Group was tasked with establishing a threshold used to determine whether ASR should be considered as a potential strategy for a WUG. The Group voted to establish this threshold as an identified need of 10,000 acre-feet per year or greater. Consultant briefed the Group on WMS updates. No public comments received.

10.3.13 November 4, 2024 Meeting

Resignation announced for Tom Chandler, Jackson County, Water Utilities. New voting member sought for the same position. At the time of this meeting, the Group had one additional open position: Lavaca County, Small Business. The Group was briefed on LNRA Water Conservation and Drought Contingency Plans and voted to accept the plans as presented. TWDB (John Mauer) updated the Group on the 2021 implementation survey, resources for the IPP and final RWP process, and announcement of new TWDB Executive Administrator (Bryan McMath) and Board Member (Tonya Miller). Consultant presented updated draft water management strategy evaluations, and the Group determined which strategies should be recommended, alternative, or considered. The Group identified updates needed for legislative and policy recommendations (Chapter 8). No public comments received.

10.3.14 January 27, 2025 Meeting

At the time of this meeting, the Group has two additional open positions: Lavaca County, Small Business, and Jackson County, Water Utilities. John Boone from the Texana Groundwater Conservation District was voted in to replace Michael Skalicky. TWDB (John Mauer) updated the Group on the DB27 Water Right Data Collection spreadsheet, the 2025 SWIFT and other funding cycles, the regional water plan accessibility requirements, and the recent TWDB Board changes. The Lavaca RWPG conducted elections of officers and discussed draft chapter edits.

10.3.15 February 10, 2025 Meeting

The Lavaca RWPG voted to adopt the Initially Prepared Plan and associated deliverables for submittal to TWDB.

Appendix 10A. Meeting Minutes

Minutes of Lavaca Regional Water Planning Group
August 23, 2021
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, August 23, 2021, at 12:00 p.m. in the O & M Meeting Room of the Lavaca Navidad River Authority Office Complex, 4631 FM 3131, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM 3131 and was also available through video teleconference.

Voting Group Members present were Vice Chariman Neil Hudgins, Secretary Patrick Brzozowski, Tom Chandler, Jim Coleman, Richard Ottis, Robert Shoemate, Michael Skalicky, and Ed Weinheimer. Voting Group members Chairman Phillip Spentrath, Jack Maloney, and Lee Hafernick attended the meeting via video teleconference. Also present was LNRA Board Vice President Jerry Adelman, LNRA Board Members Sandy Johs and Jennifer Storz, LNRA Deputy General Manager Karen Gregory, and LNRA Assistant Operations Manager Scott Hartl, and Jaime Burke, Lauren Gonzalez, and Katie Snyder of Black and Veatch. Attending via video teleconference from Texas Water Development Board was Board Member Kathleen Jackson, Chief of Staff to Jackson, Jennifer White, Manager Sarah Backhouse, and Project Manager Jean Devlin, Mike Rivet of Formosa Plastics, Jamie McCool of Texas Department of Agriculture, Leslie Hartman of Texas Parks and Wildlife, and Jordan Furnans of LRE Water LLC.

Absent Voting Group Members were: Steve Cooper, Marie Day, Bart McBeth, Edward Pustka, and Jill Sklar.

Vice Chairman Hudgins called the meeting to order.

<u>Public Comments</u>

There were no public comments.

Voting Group Member Ottis ask for a moment of silence in remembrance of Gary Skalicky, former Group member, who passed on May 31, 2021.

<u>Minutes</u>

The minutes of the June 14, 2021 meeting were reviewed. Weinheimer moved to approve the minutes as presented. Skalicky seconded the motion. Motion passed.

<u>Nominations for New Voting Members</u>

Brzozowski informed the Group that there are three (3) vacancies in Lavaca County, Small Business, Municipalities, and Public, and one (1) vacancy in Jackson County, Agriculture.

The Group will continue to seek new members to fill the vacancies.

<u>Pre-Planning Meeting</u>

<u>Briefing and Update from Texas Water Development Board</u>

Burke introduced Katie Snyder and Lauren Gonzalez of Black and Veatch.

Burke presented, via Power Point, the following Pre-Planning Meeting Items:

1. Lavaca Region background and initial scope of work.
   Discussion included:
   - A brief history and summary of regional water planning in Texas.
   - Consideration should be given to population and demand growth, drought of record water supply projections, and impacts of water anagement strategies.
   - Lavaca Regional Water Planning Area and 2026 Plan Initial Scope of Work.

2. Receive Public input on issues that should be addressed or included in the 2026 Regional Water Plan or 2027 State Water Plan.
   - Jordan Furnans indicated he was available to give a presentation to the Group at the next scheduled meeting.

3. Discuss process for interregional coordination for water management strategies during development of the 2026 Regional Water Plan.
   - The Group discussed how LRWPG could conduct interregional coordination and collaboration regarding water management strategies during development of the 2026 Water Plans. Brzozowski stated he would make himself available for online discussions with other regions to stay informed and coordinate if there were common interregional water management strategies.

4. Consider the identification of water management strategies which may create opportunities for collaboration and cooperation with other planning regions.
   - The 2021 Lavaca Regional Water Plan had no recommended strategies that involve multiple regions.
   - The Group does not anticipate water management strategies that may involve multiple regions.

5. Consider a course of action for interregional coordination with other regional water planning groups.
   - The Group discussed appointing at the next scheduled meeting, a LRWPG liaison for interregional coordination with other regional water planning groups.

Update from Texas Water Development Board

TWDB Board Member Kathleen Jackson addressed and commended the Group.

Devlin briefed the Group as follows:

- Subcontract Guidance for 2026 Regional Water Planning Contracts
- Groups received an email describing subcontract submittal requirements for the 2026 Regional Water Planning Contracts.
- For specific requirements:
  www.twdb.texas.gov/about/contract_admin/doc/Subcontracting_Guidelines.pdf

  Copy of TWDB Subcontracting Guidelines is attached to the official minutes of this meeting.

Schedule Future Meetings

The Group tentatively scheduled a meeting for February 28, 2022 at noon.

Receive Public Comments

There were no public comments.

Meeting adjourned at 1:07 p.m.

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Phillip Spenrath
Chairman

Minutes of Lavaca Regional Water Planning Group
February 28, 2022
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, February 28, 2022, at 12:00 p.m. in the Board Room of the Lavaca Navidad River Authority Office Complex, 4631 FM 3131, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM 3131 and was also available through audio/video teleconference.

Voting Group Members present were Secretary Patrick Brzozowski, Tom Chandler, Lee Hafernick, Dick Ottis, Robert Shoemate, and Jill Sklar. Voting Group members Marie Day, Neil Hudgins, Jack Maloney, and Michael Skalicky attended the meeting via audio/video teleconference. Also present was LNRA Board President Jerry Adelman and Vice President Sandy Johs, and LNRA Board Members Vance Mitchell and Jennifer Storz, LNRA Deputy General Manager Karen Gregory, LNRA Deputy General Manager Doug Anders, and LNRA Assistant Operations Manager Scott Hartl. Also in attendance was Texas Water Development Board Kathleen Jackson and Jaime Burke and Lauren Gonzalez of Black and Veatch. Others attending via audio/video teleconference were Ron Ellis, Daniel Collazo, and Katie Dahlberg of Texas Water Development Board.

Absent Voting Group Members were: Jim Coleman, Steve Cooper, Bart McBeth, Edward Pustka, Philip Spenrath, and Ed Weinheimer.

Secretary Brzozowski called the meeting to order.

Public Comments

Kathleen Jackson, Texas Water Development Board, addressed the Group and spoke of TWDB's involvement with the water planning groups. Jackson commended the Group for their continued leadership and dedication in the regional planning process. She encouraged all to contact her with questions or assistance.

Minutes

The minutes of the August 23, 2021 meeting were reviewed. Sklar moved to approve the minutes as presented. Ottis seconded the motion. Motion passed.

Nominations for New Voting Members

Brzozowski informed the Group that there are three (3) vacancies in Lavaca County, Small Business, Municipalities, and Public, and one (1) vacancy in Jackson County, Agriculture. Solicitations in local newspapers and conversations with the Counties have not been successful in new member interest.

The Group will continue to seek new members to fill the vacancies.

Election of Officers

Ottis moved to re-elect the current slate of officers of the Lavaca Regional Water Planning Group as follows: Spenrath, Chairman, Hudgins, Vice-Chairman, Brzozowski, Secretary and re-elect the current

Executive Committee as follows: Spenrath, Hudgins, Brzozowski, Coleman, Day, Maloney, and Weinheimer. Hafernick seconded the motion. Motion passed.

Nominations for Regional Water Planning Liaisons

Regional Water Planning Groups (RWPG) shall add members designated by each adjacent RWPG to serve as a liaison. The liasons will be non-voting members. Region K (Lower Colorado) and Region L (South Central Texas) are adjacent regions to Region P. Although Region N (Coastal Bend) is not adjacent to Region P, since water supplies are sent from Region P to Region N, it is recommended to consider a liaison for Region N.

Shoemate moved to nominate Marie Day as Region K liaison and Patrick Brzozowski as Region L and Region N liaison. Sklar seconded the motion. Motion passed.

Interregional Planning Council

The purpose of the Interregional Planning Council is to improve coordination among the RWPGs and between RWPGs and TWDB, facilitate dialogue regarding regional water management strategies, and to share operational best practices of the regional water planning process.

Sklar moved to nominate Brzozowski as a member and Ottis as an alternate to serve on the Interregional Planning Council. Shoemate seconded the motion. Motion passed.

Briefing and Update from Texas Water Development Board

Ellis presented an update to the Group as follows:

RWP Rule Updates
- TWDB developed rulemaking materials to address preliminary stakeholder input on the state water planning guidance principles and regional water planning rule topics.
- TWDB Board approved rulemaking proposal on December 16, 2021.
- The proposal was published in the Texas Register on December 31, 2021, and there was a public comment period through January 31, 2022.
- The final rule package will be presented to the TWDB Board in the Spring.

Interregional Planning Council
- TWDB is soliciting nominations for the 2nd Interregional Planning Council.
- Each RWPG is requested to take action and submit at least one nomination (and alternate for each nomination) to TWDB by April 22, 2022.
- Anticipate TWDB Board appointment of the Council to occur in June, 2022.

Mining Water Use Study
- TWDB is contracting with UT Bureau of Economic Geology to assess mining water use and update mining demand projections for 2026 RWPs.
- Draft technical report and data – March 2022
- Final technical report and data dashboard – June 2022
- Website for updates:
  https://www.twdb.texas.gov/waterplanning/data/projections/miningstudy/index.asp

RWP Contact Amendments

- Upcoming contract amendments:
  Anticipated Summer 2022
  Contract amendment will include anticipated total project cost, full scope of work, and updated contract guidance document (Exhibits C and D)

6th Round Demand Projections

- Draft projections and supporting materials released 1/20 on livestock, manufacturing, and steam-electric power water demands. Data available online, along with intractive dashboards: https://www.twdb.texas.gov/waterplanning/data/projections/2027/projections.asp
- Anticipated release schedule for remaining projections data:
  March 2022: release draft Water User Group list + historical population, net use, and gallons per capita daily
  August 2022: release draft irrigation and mining water demand projections
  February 2023: release draft population projections, plumbing code savings and municipal demand projections.

6th Cycle of Regional Water Planning Web Page

- 6th Cycle of RWP landing page: http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2026/index.asp
- Page includes planning documents such as the 6th cycle plan timeline, BMP Guide, rules pamphlet, contract docs, planning newsletters, and Chairs' Conference Call notes.
- RegionalWaterPlanning@twdb.Texas.gov is now being used for broadcast communications to RWPGs regarding regional water planning.

Presentation from Texas Water Development Board

Katie Dahllberg, Water Supply Planning, TWDB gave a presentation to the Group via power point on Non-Municipal Projections Methodology which included:

- Oveview projections process
- Projections data release schedule
- Non-municipal water demand projections methodologies
  Irrigation
  Livestock
  Manufacturing
  Mining
  Steam-Electric Power

Briefing and Update from Black and Veatch

Jaime Burke, Black and Veatch briefed the Group on the following:

- 2026 Planning Timeline
- Draft Projections for Livestock, Manufacturing, and Steam-Electric
  TWDB released in January: Manufacturing, Steam-Electric, and Livestock for review. Any revision request needs to be coordinated with TWDB by July 2023, but may be submitted any time before then.

Schedule Future Meetings

The Group tentatively scheduled a meeting for May 16, 2022 at noon.

Receive Public Comments

There were no public comments.

Meeting adjourned at 1:44 p.m.

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Phillip Spenrath
Chairman

Minutes of Lavaca Regional Water Planning Group
May 16, 2022
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, May 16, 2022, at 12:00 p.m. in the Board Room of the Lavaca Navidad River Authority Office Complex, 4631 FM 3131, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM 3131 and was also available through audio/video teleconference.

Voting Group Members present were Chairman Spenrath, Secretary Patrick Brzozowski, Tom Chandler, Lee Hafernick, Neil Hudgins, Jack Maloney, Bart McBeth, Robert Shoemate, Jill Sklar, and Ed Weinheimer. Also present was LNRA Board President Jerry Adelman and LNRA Board member Jennifer Storz, LNRA Deputy General Manager Karen Gregory, LNRA Deputy General Manager Doug Anders, and LNRA Assistant Operations Manager Scott Hartl. Also in attendance was Jaime Burke of Black and Veatch, Jami McCool of Texas Department of Agriculture, and Tony Franklin of Texas State Soil & Water Conservation Board. Others attending via audio/video teleconference were Jean Devlin of Texas Water Development Board, Katie Snyder and Alicia Smiley of Black and Veatch, Tim Andruss of Victoria County Groundwater Conservation District, Leslie Hartman of the Texas Parks and Wildlife Department, and Sharon Skoruppa, public citizen.

Absent Voting Group Members were: Jim Coleman, Steve Cooper, Marie Day, Richard Ottis, Edward Pustka, and Michael Sklalicky.

Chairman Spenrath called the meeting to order.

Public Comments

There were no public comments.

Minutes

The minutes of the February 28, 2022 meeting were reviewed. Sklar moved to approve the minutes as presented. Ottis seconded the motion. Motion passed.

Nominations for New Voting Members

Brzozowski informed the Group that there are three (3) vacancies in Lavaca County, Small Business, Municipalities, and Public, and one (1) vacancy in Jackson County, Agriculture. Solicitations in local newspapers and conversations with the Counties have not been successful in new member interest.

Shoemate nominated Vance Mitchell for a new voting member, Jackson County, Agriculture. Brzozowki seconded the motion. Motion passed. Brzozowski stated he would contact Mitchell to confirm his interest in being a member of the LRWPG.

The Group will continue to seek new members to fill the vacancies.

Briefing and Update from Texas Water Development Board

Jean Devlin, Texas Water Development Board presented an update to the Group as follows:

1. Regional Water Planning Rulemaking
   Detailed information is available on the TWDB website:
   https://www.twdb.texas.gov/board/2022/04/Board/Brd04.pdf
2. Key Rule Changes
   Regional Water Planning Rules (31 TAC Chapter 357)
   State Water Planning Rules (31 TAC Chaper 358)
3. Interregional Planning Council
4. Mining Water Use Study
5. RWP Contract Amendments
6. 6th Round Demand Projections
7. 6th Cycle of Regional water Planning Web Page
   http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2026/index.asp

The Group was presented a copy of the power point presentation for their review.

Reports from Regional Liasions and Interregional Planning Council Representative

No reports were given.

Authorize LNRA to Negoitiate and Execute an Amendment to the TWDB Contract

Hudgins moved to authorize Lavaca-Navidad River Authority to negotiate and execute an amendment to the Texas Water Development Board contract to incorporate the full scope of work and total project cost for the 2026 Regional Water Plan. Weinheimer seconded the motion. Motion passed.

Briefing and Update from Black and Veatch

Jaime Burke, Black and Veatch, briefed the Group on the following:

- Schedule and Progress Update
- Draft municipal WUG List and Historial Data
- Update and discussion on draft projections from TWDB for Livestock, Manufacturing, and Steam-Electric.

The Group was presented with handouts with data information and associated links.

Brzozowski moved to approve the draft municipal WUG List as presented with no changes. Maloney seconded the motion. Motion passed.

Brzozowski moved to begin discussions with TWDB staff to request the use coefficient for fed/other cattle increase from 15 (gallons/head/day) to 30 (gallons/head/day). Weinheimer seconded the motion. Motion passed.

Schedule Future Meetings

The Group tentatively scheduled a meeting for September 19, 2022 at noon.

Receive Public Comments

There were no public comments.

Brzozowski informed the Group that LNRA had received the Volumetric and Sedimentation Survey of Lake Texana from the Texas Water Development Board.

Brzozowski moved to adjourn the meeting. Weinheimer seconded the motion. Meeting adjourned at 1:35 p.m.

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Phillip Spenrath
Chairman

Minutes of Lavaca Regional Water Planning Group
September 19, 2022
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, September 19, 2022, at 12:00 p.m. in the Board Room of the Lavaca Navidad River Authority Office Complex, 4631 FM 3131, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM 3131 and was also available through audio/video teleconference.

Voting Group Members present were Chairman Spenrath, Secretary Patrick Brzozowski, Tom Chandler, Steve Cooper, Lee Hafernick, Neil Hudgins, Jack Maloney, Bart McBeth, Dick Ottis, Robert Shoemate, Jill Sklar, and Ed Weinheimer. Also in attendance was Jaime Burke and Lauren Gonzalez of Black and Veatch, Gary Broz, Edna City Manager, Tony Franklin of Texas State Soil & Water Conservation Board, LNRA Board President Jerry Adelman, and LNRA Deputy General Manager Karen Gregory. Others attending via audio/video teleconference were Tim Andruss, South Texas Regional Water Planning Group liaison to LRWPG, Judge Mark Myers of Lavaca County, and Kristin Lambrecht of Texas Department of Agriculture.

Absent Voting Group Members were Jim Coleman, Marie Day, Edward Pustka, and Michael Sklalicky.

Chairman Spenrath called the meeting to order.

Public Comments

There were no public comments.

Minutes

The minutes of the May 19, 2022 meeting were reviewed. Weinheimer moved to approve the minutes as presented. Brzozowski seconded the motion. Motion passed.

Nominations for New Voting Members

Brzozowski informed the Group that there are three (3) vacancies in Lavaca County, Small Business, Municipalities.

The Group will continue to seek new members to fill the vacancies.

Briefing and Update from Texas Water Development Board

Lann Bookout, Texas Water Development Board presented an update to the Group as follows:

- Projections Timeline
  Indicating Draft Water Demand Projections and Timeline

- Important Considerations
  All data released thus far is available online
    - Interactive dashboards
    - Underneath each dashboard is Excel file format + methodology summaries

  - https://www.twdb.texas.gov/waterplanning/data/projections/2027/projections.asp

- Timeframe for reviewing draft population and municipal demand projections is ~6 months
  - Regions should meet soon after release and develop strategy for meeting the deadline
  - Regions are strongly encouraged to submit non-municipal revisions requests before municipal data release
  - Declines in population will be reflected in the draft population projections

- Planning groups must take action to approve submitting revisions requests

- Planning groups encouraged to coordinate with TWDB as early as possible on potential revisions

- Guidance regarding projections revisions provided in RWP contract Exhibit C, Section 2.2

- TWDB staff available for assistance and to provide projections presentations

- RWP grant funds may not be used for revisions to TWDB Board-adopted projections

Reports from Regional Liaisons and Interregional Planning Council Representative

No reports were given.

Authorize LNRA to Negotiate and Execute an Amendment to the TWDB Contract

No discussion or action taken.

Briefing and Update from Black and Veatch

Jaime Burke, Black and Veatch, briefed the Group on the following:

- Schedule and Progress Update
- Draft Projections from TWDB for Livestock, Manufacturing, and Steam-Electric
- Draft projections from TWDB for Irrigation and Mining

The Group was presented with handouts with data information and associated links.

Schedule Future Meetings

The Group tentatively scheduled a meeting for December 5, 2022 at noon.

Receive Public Comments

There were no public comments.

Meeting adjourned at 12:57 p.m.

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Phillip Spenrath
Chairman

Minutes of Lavaca Regional Water Planning Group
December 5, 2022
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, December 5, 2022, at 12:00 p.m. in the Board Room of the Lavaca Navidad River Authority Office Complex, 4631 FM 3131, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM 3131 and was also available through audio/video teleconference.

Voting Group Members present were Chairman Spenrath, Secretary Patrick Brzozowski, Tom Chandler, Jim Coleman, Steve Cooper, Lee Hafernick, Neil Hudgins, Vance Mitchell, Robert Shoemate, and Ed Weinheimer. Also in attendance was Lauren Gonzalez and Alicia Smiley of Black and Veatch, Gary Broz, Edna City Manager, LNRA Board President Jerry Adelman, LNRA Board Vice President Johs, LNRA Deputy General Manager Karen Gregory, and LNRA Assistant Manager Scott Hartl. Others attending via audio/video teleconference were Marie Day, Jack Maloney, and Jean Devlin of Texas Water Development Board.

Absent Voting Group Members were Bart McBeth, Dick Ottis, Edward Pustka, Michael Sklalicky, and Jill Sklar.

Chairman Spenrath called the meeting to order.

Public Comments

There were no public comments.

Minutes

The minutes of the September 19, 2022 meeting were reviewed. Weinheimer moved to approve the minutes as presented. Cooper seconded the motion. Motion passed.

Nominations for New Voting Members

Brzozowski informed the Group that there are three (3) vacancies in Lavaca County, Small Business, Municipalities.

The Group will continue to seek new members to fill the vacancies.

Briefing and Update from Texas Water Development Board

Jean Devlin, Texas Water Development Board, presented an update to the Group as follows:

- Significant New Requirements for the 2026 Regional Water Plans
- Important Reminders
- Projections Timeline

- Important Considerations

Information regarding the above topics is an attachment to these official minutes.

- Interregional Planning Council
    - On July 7, 2022 the Board appointed a member and alternate for each regional water planning group to the Interregional Planning Council.
    - The planning groups were sent an email with a welcome letter from the TWDB's Executive Administrator, a copy of House Bill 807, and a copy of the TWDB Board appointment memorandum.
    - First meeting was held on November 9th.

- New Education Materials
    - New one-pager: Water Supply and Flood Mitigation strategies; Drought of Record
    - New educational materials: Member Guide and Administrative Guidance
    - Both materials are now available on the TWDB website for viewing.

- 6th Cycle of Regional Water Planning Web Page
    - 6th Cycle of RWP landing page: http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2026/index.asp
    - Page includes planning documents such as the 6th Cycle plan timeline, BMP Guide, rules pamphlet, contract docs, planning newsletters, and Chairs' Conference Call notes.
    - RegionalWaterPlanning@twdb.Texas.gov is now being used for broadcast communications to RWPGs regarding regional water planning.

Reports from Regional Liaisons and Interregional Planning Council Representative

Brzozowski reported to the Group on behalf of the Interregional Planning Council. He presented the Group with information indicating members of the IPC and the Status of 2020 Interregional Planning Council Report Recommendations.

No other reports were given.

Briefing and Update from Black and Veatch

Lauren Gonzalez and Alicia Smiley, Black and Veatch, briefed the Group on the following:

- Schedule and Progress Update
- Update and Discussion on Potential Revisions to Draft Projections for Livestock, Manufacturing, Steam-electric, Irrigation, and Mining.

The Group was presented with handouts with data information for each of the potential revisions and discussed each.

Cooper moved to approve the Draft Livestock Water Demand Revisions to amend TWDB livestock water use calculations to assume 30 gal/head/day of fed and other cattle. Day seconded the motion. Motion passed.

Brzozowski moved to approve the Draft Manufacturing Water Demand Revisions to include updated contract amendment between LNRA and Formosa. Shoemate seconded the motion. Motion passed.

Coleman moved to approve the Draft Steam-Electric Water Demands as presented. Hafernick seconded the motion. Motion passed.

Brzozowski moved to approve the Draft Irrigation Water Demand Potential Revisions using the average of the 2011-2013 historical use estimates. Weinheimer seconded the motion. Motion passed.

Day moved to approve the Draft Mining Water Demand Potential Revisions as presented upon Brzozowski's review of the BEG Mining Use Study which was used for the projections. Shoemate seconded the motion. Motion passed.

Schedule Future Meetings

The Group tentatively scheduled a meeting for March 6, 2023 at noon.

Receive Public Comments

There were no public comments.

Meeting adjourned at 1:16 p.m.

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Phillip Spenrath
Chairman

Minutes of Lavaca Regional Water Planning Group
March 6, 2023
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, March 6, 2023, at 12:00 p.m. in the Board Room of the Lavaca Navidad River Authority Office Complex, 4631 FM 3131, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM 3131 and was also available through audio/video teleconference.

Voting Group Members present were Chairman Spenrath, Vice-Chair Neil Hudgins, Secretary Patrick Brzozowski, Tom Chandler, Steve Cooper, Marie Day, Lee Hafernick, Jack Maloney, Bart McBeth, Richard Ottis, Robert Shoemate, and Ed Weinheimer. Also in attendance was Jaime Burke and Alicia Smiley of Black and Veatch, Jean Devlin of Texas Water Development Board, LNRA Board President Jerry Adelman, LNRA Board Vice President Johs, LNRA Deputy General Manager Karen Gregory, LNRA Deputy General Manager Doug Anders, and LNRA Assistant Manager Scott Hartl. Others attending via audio/video teleconference were Lauren Gonzalez of Black and Veatch, Leslie Hartman of Texas Parks and Wildlife, and Tim Andruss of Victoria County Groundwater Conservation District.

Absent Voting Group Members were Jim Coleman, Vance Mitchell, Edward Pustka, Michael Sklalicky, and Jill Sklar.

Chairman Spenrath called the meeting to order.

Public Comments

There were no public comments.

Minutes

The minutes of the December 5, 2022 meeting were reviewed. Ottis moved to approve the minutes as presented. Weinheimer seconded the motion. Motion passed.

Nominations for New Voting Members

Brzozowski informed the Group that there are three (3) vacancies in Lavaca County, Small Business, Municipalities. Day is actively seeking membership from Lavaca County.

The Group will continue to seek new members to fill the vacancies.

Election of Officers

Cooper moved to re-elect the current slate of officers of the Lavaca Regional Water Planning Group as follows: Spenrath, Chairman, Hudgins, Vice-Chairman, Brzozowski, Secretary and re-elect the current Executive Committee as follows: Spenrath, Hudgins, Brzozowski, Coleman, Day, Maloney, and Weinheimer. Ottis seconded the motion. Motion passed.

Briefing and Update from Texas Water Development Board

Jean Devlin, Texas Water Development Board, presented an update to the Group as follows:

- Population and Municipal Projections
- Task 4B: Identifying Infeasible Water Management Strategies Clarification
- Interregional Planning Council
- Guidance and Materials
- 6th Cycle of Regional water Planning Web Page

Information regarding the above topics is an attachment to these official minutes.

Reports from Regional Liaisons and Interregional Planning Council Representative

Brzozowski reported to the Group on behalf of the Interregional Planning Council. He presented the Group with information on the 2022 State Water Projects (SWP).

No other reports were given.

Briefing and Update from Black and Veatch

Jaime Burke, Black and Veatch briefed the Group on the following:

- Schedule and Progress Update
- Discussion of Potential Revisions to the Draft Mining Demand
- Presentation and Discussion on Draft Projections for Population and Municipal Demands

The Group was presented with informational handouts for each of the above and discussed each.

Approve Revisions to Draft Mining Demand Projections

No action taken.

Schedule Future Meetings

The Group tentatively scheduled a meeting for May 15, 2023 at noon.

Receive Public Comments

There were no public comments.

The meeting was adjourned at 1:30 p.m.

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Phillip Spenrath
Chairman

Minutes of Lavaca Regional Water Planning Group
May 15, 2023
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, May 15, 2023, at 12:00 p.m. in the O&M Meeting Room of the Lavaca Navidad River Authority Office Complex, 4631 FM 3131, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM 3131 and was also available through audio/video teleconference.

Voting Group Members present were Chairman Spenrath, Vice-Chair Neil Hudgins, Secretary Patrick Brzozowski, Tom Chandler, Steve Cooper, Lee Hafernick, Vance Mitchell, Robert Shoemate, and Jill Sklar. Also in attendance was Jaime Burke of Black and Veatch, Ron Ellis of Texas Water Development Board, LNRA Board President Jerry Adelman, LNRA Deputy General Manager, Administration Karen Gregory, LNRA Deputy General Manager, Operations Doug Anders, and Jami McCool of Texas Department of Agriculture. Attending via audio/video teleconference were Kimberly Rhodes of Texas Water Development Board, Tony Franklin of Texas State Soil and Water Conservation Board, and Alicia Smiley and Amy Cain of Black & Veatch.

Absent Voting Group Members were Jim Coleman, Marie Day, Jack Maloney, Bart McBeth, Richard Ottis, Edward Pustka, Michael Sklalicky, and Ed Weinheimer.

Chairman Spenrath called the meeting to order.

Public Comments

There were no public comments.

Minutes

The minutes of the March 6, 2023 meeting were reviewed. Sklar moved to approve the minutes as presented. Cooper seconded the motion. Motion passed.

Nominations for New Voting Members

Brzozowski informed the Group that there are three (3) vacancies in Lavaca County, Small Business, Municipalities.

The Group will continue to seek new members to fill the vacancies.

Briefing and Update from Texas Water Development Board

Ron Ellis, Texas Water Development Board, presented an update to the Group as follows:

1. Updated plumbing code savings and revised draft demand projections released on 5/5/2023.

2. New one-pagers: Drought of Record, Consistency Reviews

3. New educational materials: Member Guide and Administrative Guidance

4. Interregional Planning Council update: IPC will meet on 5/30/2023. Resources posted on TWDB IPC web page and emailed to RWPG members on 4/5/2023.

5. Upcoming critical deadlines and upcoming activities (prior to 3/4/2024 tech memo deadline):

    - Approve projections revision requests.
    - Assess availability and supplies.
    - Approve and submit hydrologic variance requests.
    - Present process for identifying potentially feasible strategies for the 2026 regional water plan.
    - Identify infeasible strategies and projects from 2021 regional water plan.

Information regarding the above topics is an attachment to these official minutes.

Reports from Regional Liaisons and Interregional Planning Council Representative

No reports given.

Briefing and Update from Black and Veatch

Jaime Burke, Black and Veatch, briefed the Group on the following:

1. Schedule and Progress Update

2. Discussion of Potential Revisions to the Draft Mining Demands

3. Presentation and Discussion on Draft Projections for Population and Municipal Demands

4. Listing of 2021 Plan Water Management Strategies that RWPG needs to review for potential infeasibility

The Group was presented with informational handouts for each of the above and discussed each.

Information regarding the above topics is an attachment to these official minutes.

Approve Revisions to Draft Mining Demand Projections

Brzozowski moved to include a notice in the Region P Regional Water Plan noting concerns by the LRWPG that the use of other data sources by the TWDB may have yielded results lowering the mining water demand for Lavaca County. Mitchell seconded the motion. Motion passed.

Schedule Future Meetings

The Group tentatively scheduled a meeting for July 24, 2023 at noon.

Receive Public Comments

There were no public comments.

The meeting was adjourned at 1:20 p.m.

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Phillip Spenrath
Chairman

Minutes of Lavaca Regional Water Planning Group
July 24, 2023
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, July 24, 2023, at 12:00 p.m. in the Board Meeting Room of the Lavaca Navidad River Authority Office Complex, 4631 FM 3131, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM 3131 and was also available through audio/video teleconference.

Voting Group Members present were Chairman Spenrath, Vice-Chair Neil Hudgins, Secretary Patrick Brzozowski, Jim Coleman, Steve Cooper, Lee Hafernick, Jack Maloney, Vance Mitchell, Dick Ottis, Robert Shoemate, and Ed Weinheimer. Also in attendance was Jaime Burke and Lauren Gonzalez of Black and Veatch, Ron Ellis of Texas Water Development Board, LNRA Board President Jerry Adelman, LNRA Deputy General Manager, Administration Karen Gregory, and LNRA Deputy General Manager, Operations, Doug Anders. Attending via audio/video teleconference were Jami McCool of Texas Department of Agriculture, Leslie Hartman of Texas Parks and Wildlife, Alicia Smiley of Black and Veatch, and Marie Day, Lavaca Regional Water Planning Group.

Absent Voting Group Members were Tom Chandler, Bart McBeth, Edward Pustka, Michael Sklalicky, and Jill Sklar.

Chairman Spenrath called the meeting to order.

Public Comments

There were no public comments.

Minutes

The minutes of the May 15, 2023 meeting were reviewed. Brzozowski moved to approve the minutes as presented. Cooper seconded the motion. Motion passed.

Nominations for New Voting Members

Brzozowski informed the Group that there are three (3) vacancies in Lavaca County, Small Business, Municipalities.

The Group will continue to seek new members to fill the vacancies.

Briefing and Update from Texas Water Development Board

Ron Ellis, Texas Water Development Board, presented an update to the Group as follows:

1. New one-pager: Population Revision Summary (available on TWDB website)

2. Interregional Planning Council Update: IPC met on 11/19/22, 3/9/23, and 5/30/23. Future meetings are 8/15/23 and 11/30/23. Resources are posted on TWDB IPC web page.

3. Upcoming critical deadlines and upcoming activities (prior to 3/4/2024 tech memo deadline):

- Approve projections revision requests
- Assess availability and supplies
- Approve and submit hydrologic variance requests
- Present process for identifying potentially feasible strategies for the 2026 RWG
- Identify infeasible strategies and projects from 2021 RWG

88th Legislature: Bills of Interest that Passed

- HB 1565 – TWDB Sunset Bill
  - RWPGs will report on implementation of large projects
  - RWPGs may plan for conditions worse than drought of record
  - These provisions are in planning contract

- SB 28/SJR 75 – Texas Water Fund
  - Establishes $1 billion Texas Water Fund, subject to voter approval, which can provide additional funding for existing TWDB financial assistance programs.
  - Can also fund the New Water Supply for Texas Fund for water supply projects from new sources.
    - At least $250 million of funds appropriated to the Texas Water Fund must be used for the New Water Supply for Texas Fund.
  - The Texas Water Fund will take effect January 2, 2024, if SJR 75 is approved by the voters. All other provisions of SB 28 take effect September 1, 2023.
- HB 1 – Budget Bill
  - Passed budget includes additional funding for RWPGs.
  - Specific region amount to be determined and planning contracts amended in Fall 2023.

88th Legislature: Bill of Interest that did NOT Pass

- HB 4373/SB 2108
  - TWDB Legislative priority bills for Regional Water Planning
  - Original bill text would have removed the requirement to place a printed copy of the Initially Prepared Plan (IPP) in each county courthouse and one public library in each county in the planning area.
  - Would have also allowed notice of the IPP hearing to be posted on the planning group's website instead of published in newspapers.

Information regarding the above topics is an attachment to these official minutes.

Reports from Regional Liaisons and Interregional Planning Council Representative

Judge Spenrath read correspondence received from Tim Andruss Region L liaison. A copy of the correspondence is an attachment to these official minutes.

Brzozowski, Interregional Planning Council representative reported that the IPC was reviewing recommendations from the prior IPC, discussing how to proceed, and discussing possible new recommendations.

Briefing and Update from Black and Veatch

Jaime Burke, Black and Veatch, briefed the Group on the following:

A. Schedule and Progress Update

B. Presentation and Discussion on Draft Projections for Population and Municipal Demands and potential revisions. The only request is for the Wharton County WUGs to use the .05 migration scenario.

Hudgins moved to approve the population and municipal demand request and submit to TWDB. Brzozowski seconded the motion. Motion passed.

Brzozowski moved to approve authorizing LRWPG consultant (Black and Veatch) to continue working with TWDB regarding the revisions on behalf of LRWPG. Ottis seconded the motion. Motion passed.

C. Presentation and Discussion on potential assumptions for hydrologic variance for surface water modeling. Consider action to approve assumptions and submit hydrologic variance request to TWDB. No action was taken.

The Group was presented with informational handouts for each of the above and discussed each.

Amendment to TWDB Contract

The Group discussed authorizing LNRA to negotiate and execute an amendment to the TWDB contract.

Weinheimer moved to authorize LNRA to negotiate and execute an amendment to the TWDB contract to increase the total project cost and committed funds for the 2026 Regional Water Plan. Hudgins seconded the motion. Motion passed.

Schedule Future Meetings

The Group tentatively scheduled a meeting for October 23, 2023 at noon (12:00 p.m.)

Receive Public Comments

There were no public comments.

The meeting was adjourned at 1:49 p.m.

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Phillip Spenrath
Chairman

Minutes of Lavaca Regional Water Planning Group
October 23, 2023
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, October 23, 2023 at 12:00 p.m. in the Board Meeting Room of the Lavaca Navidad River Authority Office Complex, 4631 FM 3131, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM 3131 and was also available through audio/video teleconference.

Voting Group Members present were Chairman Spenrath, Vice-Chair Neil Hudgins, Secretary Patrick Brzozowski, Members Tom Chandler, Jim Coleman, Steve Cooper, Jack Maloney, Dick Ottis, Robert Shoemate, Jill Sklar, and Ed Weinheimer. Also in attendance was Jaime Burke and Lauren Gonzalez of Black and Veatch, Ron Ellis of Texas Water Development Board, Jami McCool of Texas Department of Agriculture, Gary Broz of the City of Edna, Tim Andruss of Victoria County Groundwater Conservation District, LNRA Board President Jerry Adelman, and LNRA Deputy General Manager, Administration, Karen Gregory. Joining via audio/video teleconference were Leslie Hartman of Texas Parks and Wildlife, Alicia Smiley of Black and Veatch, Grace Ward of the City of Hallettsville, and Marie Day, Lavaca Regional Water Planning Group.

Absent Voting Group Members were Lee Hafernick, Bart McBeth, Vance Mitchell, Edward Pustka, and Michael Sklalicky.

Chairman Spenrath called the meeting to order.

Public Comments

There were no public comments.

Minutes

The minutes of the July 24, 2023 meeting were reviewed. Ottis moved to approve the minutes as presented. Weinheimer seconded the motion. Motion passed.

Nominations for New Voting Members

Brzozowski informed the Group that there were no nominations for new voting members for the three (3) vacancies in Lavaca County, Small Business and Municipalities.

The Group will continue to seek new members to fill the vacancies.

Briefing and Update from Texas Water Development Board

Ron Ellis, Texas Water Development Board, presented an update to the Group as follows:

1) **Interregional Planning Council Update**: IPC's next meeting is November 30, 2023. Resources are posted on TWDB IPC page: http://www.twdb.texas.gov/waterplanning/rwp/ipc/index.asp

2) **New One-Pager**: Uncertainty in Regional Water Planning
https://www.twdb.texas.gov/waterplanning/rwp/education/Uncertainty_RegionalWaterPlanning.pdf

3) **Upcoming critical deadlines and upcoming activities (prior to 3/4/2024 tech memo deadline):**
   - Approve projections revision requests
   - Assess availability and supplies
   - Approve and submit hydrologic variance requests
   - Present process for identifying potentially feasible strategies for the 2026 regional water plan
   - Identify infeasible strategies and projects from 2021 regional water plan

4) **Marvin Nichols Feasibility Review:** Request for Information published on 9/29/2023; responses requested by 12/1/2023. https://www.twdb.texas.gov/waterplanning/rwp/feasibility/index.asp

Reports from Regional Liaisons and Interregional Planning Council Representative

Tim Andruss, Region L liaison and General Manager of Victoria County Groundwater Conservation District, introduced himself to the Group and offered his support to the Lavaca Regional Water Planning Group.

Briefing and Update from Black and Veatch

Jaime Burke, Black and Veatch, briefed the Group on the following:

7a. Schedule and Progress Update

7b. Presentation and discussion on potential assumptions for hydrologic variance for surface water modeling. Consider action to approve assumptions and submit hydrologic variance request to Texas Water Development Board.

The Group was presented with information regarding Surface Water Modeling, Hydrologic Variance-Last Cycle, Hydrologic Assumptions – Current Cycle, and the Drought Worse than Drought of Record (DWDOR). The Group discussed the assumptions regarding DWDOR.

Brzozowski moved to recognize the Drought Worse than Drought of Record, but to continue with Drought of Record. Cooper seconded the motion. Motion passed.

8. Burke presented the methodology to identify infeasible water management strategies in the 2021 Lavaca Regional Water Plan and the analysis of results.

Chairman Spenrath requested Public Comments. There were no public comments.

Sklar moved to approve the results of the analysis as presented. Ottis seconded the motion. Motion passed.

9. Burke presented the process for identifying potentially feasible water management strategies for the 2026 Lavaca Regional Water Plan.

Chairman Spenrath requested Public Comments. There were no public comments.

Weinheimer moved to approve the process as presented. Brzozowski seconded the motion. Motion passed.

The Group was presented with information (via power point presentation) for each of the above and discussed each.

Schedule Future Meetings

The Group tentatively scheduled a meeting for February 5, 2024 at noon (12:00 p.m.)

Receive Public Comments

Grace Ward of the City of Hallettsville stated that she was working on recruiting members of the Hallettsville community for possible membership of Lavaca Regional Water Planning Group

The meeting was adjourned at 1:30 p.m.

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Phillip Spenrath
Chairman

Minutes of Lavaca Regional Water Planning Group
February 5, 2024
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, February 5, 2024 at 12:00 p.m. in the Board Meeting Room of the Lavaca Navidad River Authority Office Complex, 4631 FM 3131, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM 3131 and was also available through audio/video teleconference.

Voting Group Members present were Chairman Spenrath, Vice-Chair Neil Hudgins, Secretary Patrick Brzozowski, Members Steve Cooper, Lee Hafernick, Jack Maloney, Vance Mitchell, Dick Ottis, Robert Shoemate, and Ed Weinheimer. Also in attendance was Jaime Burke of Black and Veatch, Ron Ellis and John Mauer of Texas Water Development Board, Gary Broz of the City of Edna, Grace Ward and James Migl of the City of Hallettsville, LNRA Board President Jerry Adelman, LNRA Deputy General Manager Karen Gregory, LNRA Deputy General Manager, Operations Doug Anders, and LNRA Assistant Manager Scott Hartl. Joining via audio/video teleconference were Lauren Gonzales and Alicia Smiley of Black and Veatch, Troy Franklin, and Lavaca Regional Water Planning Group voting members, Marie Day, Jim Coleman, and Jill Sklar.

Absent Voting Group Members were Tom Chandler, Bart McBeth, Edward Pustka, and Michael Sklalicky.

Chairman Spenrath called the meeting to order.

<u>Public Comments</u>

There were no public comments.

<u>Minutes</u>

The minutes of the October 23, 2023 meeting were reviewed. Cooper moved to approve the minutes as presented. Weinheimer seconded the motion. Motion carried.

<u>Nominations for New Voting Members</u>

Brzozowski introduced James Migl, City of Hallettsville as a nominee for Lavaca County, Municipalities voting member.

Brzozowski also introduced Grace Ward, City of Hallettsville Administrator.

Ottis moved to approve James Migl as a voting member, Lavaca County, Municipalities. Weinheimer seconded the motion. Motion carried.

The Group will continue to seek new members to fill the remaining two (2) vacancies.

<u>Briefing and Update from Texas Water Development Board</u>

Ron Ellis, Texas Water Development Board, introduced John Maurer as the new water planner for Region P. Ellis presented an update to the Group as follows:

- Technical Memorandum – Due to TWDB on March 4th
  Electronic Submittal Folders will be provided by TWDB in February
- Water Use Survey is open until March 1st

- Water Service Boundary Editor is open until July 1st
- Agricultural Water Conservation Grant app period until April 3rd
  Informational Webinars February 7th, March 6th, and March 27th

- RWPG Chairs Call was held on January 16th
  Next Chairs Call will be scheduled for April 2024

- Interregional Planning Council
  Next meeting is February 8th in Austin with virtual option to attend
  Review of Final Draft of IPC Report (due to TWDB March 4th)
  Resources posted on TWDB IPC web page

- Texas Water Fund
  TWDB to seek public input at Board meetings on February 8th and March 10th and at workshops in Austin (March TBD) and on April 10th in Lubbock
  Updated SB29 FAQ and Issues for Consideration and Request for Feedback document are on the TWDB web page
- Upcoming Materials for RWPGs
  County-Specific Water Supply Planning Info & Resource Documents
  Includes Rural Entities and At-Risk Suppliers
- Conservation Resources
- Drought/Drought Preparedness Resources
  List of Entities Required to Submit Drought Contingency Plans to TCEQ
  Drought Preparedness Council Recommendations to RWPGs
  Updated Drought Management Costing Information
- Updated Uniform Costing Model
- Updated One-pager on TWDB web pager: RWP Amendments

Reports from Regional Liaisons and Interregional Planning Council Representative

There were no report updates from Regional Liaisons. Brzozowski reported that the Interregional Planning Council's next meeting is February 8th and will discuss and adopt the Interregional Planning Council Report to the Texas Water Development Board.

Briefing and Update from Black and Veatch

Jaime Burke, Black and Veatch, briefed the Group on the Region P Schedule and progress since the last meeting. New or ongoing efforts include:

- Begin Drought Contingency Plan (DCP) Outreach and Evaluations for Task 7
- Planning Group responsibilities for all eligible Water User Groups (WUG):
  Gather and request DCPs
  Review DCPs and describe Drought Management Measures

2026 Lavaca Regional Water Planning Technical Memorandum

Burke briefed the Group on the 2026 Lavaca Regional Water Planning Technical Memorandum. She presented the Group with a draft copy of the Technical Memorandum. Task 4C includes development of a mid-cycle deliverable for the 2026 Regional Water Plan with a snapshot of March 2024 data. The data remains in draft form until the submittal of Adopted Regional Water Plans by the RWPGs in October 2025. The draft Technical Memorandum is due to the TWDB on March 4, 2024.

Burke presented information via power point handout to the Group which included:

Population and Water Demand Projections
Source Water Availability
Existing Water Supplies
Identified Water Needs
Infeasible WMSs from 2021 Plan
Documented Process for Identifying Potentially Feasible WMS
Potentially Feasible Water Management Strategies
Interregional Coordination Efforts

Chairman Spenrath requested Public Comments on the Technical Memorandum. There were no public comments.

Weinheimer moved to approve the Technical Memorandum as presented, and to authorize Black and Veatch to submit to the TWDB, to address DB27 updates and non-substantive revisions to the Technical Memorandum, and to address any requests from TWDB associated with processing the Technical Memorandum. Brzozowski seconded the motion. Motion carried.

Task 5B Scope of Work for Evaluating Water Management Strategies

Burke presented to the Group the draft Task 5B Scope of Work via power point handouts for the Group's discussion.

Hudgins moved to approve and authorize Black and Veatch to submit the notice-to-proceed scope of work request to the TWDB, authorize for Black and Veatch and/or LNRA to work with the TWDB on any follow up information that might be required, and authorize for LNRA to negotiate and execute the subsequent TWDB contract amendment that will be issued. Weinheimer seconded the motion. Motion carried.

Schedule Future Meetings

The Group tentatively scheduled a meeting for May 6, 2024 at noon (12:00 p.m.)

Receive Public Comments

There were no public comments.

The meeting was adjourned at 1:43 p.m.

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Phillip Spenrath
Chairman

Minutes of Lavaca Regional Water Planning Group
May 6, 2024
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, May 6, 2024 at 12:00 p.m. at the Texana Community Education Center, located in Texana Park, 344 Park Road 2, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM3131 and was also available through audio/video teleconference.

Voting Group Members present were Chairman Spenrath, Vice-Chair Neil Hudgins, Secretary Patrick Brzozowski, Members Jim Coleman, Steve Cooper, Lee Hafernick, Jack Maloney, James Migl, Vance Mitchell, Robert Shoemate, and Ed Weinheimer. Also in attendance was Jaime Burke and Lauren Gonzalez of Black and Veatch, John Mauer of Texas Water Development Board, Gary Broz of the City of Edna, Grace Ward of the City of Hallettsville, Jami McCool of the Texas Department of Agriculture, LNRA Board President Jerry Adelman, LNRA Deputy General Manager Karen Gregory, LNRA Deputy General Manager, Operations Doug Anders, and LNRA Recreation Manager Liz Stuhrenberg. Joining via audio/video teleconference were Lavaca Regional Water Planning Group voting members, Marie Day and Richard Ottis, Tim Andruss of Victoria County Groundwater Conservation District, and Katie Snyder and Alicia Smiley of Black & Veatch.

Absent Voting Group Members were Tom Chandler, Bart McBeth, Edward Pustka, Michael Sklalicky, and Jill Sklar.

Chairman Spenrath called the meeting to order at 12:10 p.m.

Public Comments

There were no public comments.

Minutes

The minutes of the February 5, 2024 meeting were reviewed. Weinheimer moved to approve the minutes as presented. Brzozowski seconded the motion. Motion carried.

Nominations for New Voting Members

Brzozowski introduced Grace Ward, City of Hallettsville as a nominee for Lavaca County, Public, voting member.

Brzozowski moved to approve Grace Ward as a voting member, Lavaca County, Public. Weinheimer seconded the motion. Motion carried.

The Group will continue to seek a new member to fill the remaining vacancy, Lavaca County, Small Business.

Election of Officers

In accordance with Lavaca Regional Water Planning Group Bylaws, officers are to be elected annually.

Cooper moved to re-elect the current slate of officers of the Lavaca Regional Water Planning Group as follows: Brzozowski, Secretary, Hudgins, Vice Chairman, and Spenrath, Chairman. Hafernick seconded the motion. Motion carried.

Cooper moved to re-elect the current Lavaca Regional Water Planning Group Executive Committee as follows: Spenrath, Hudgins, Brzozowski, Coleman, Day, Maloney, and Weinheimer. Mitchell seconded the motion. Motion carried.

Reports from Regional Liaisons and Interregional Planning Council Representative

There were no report updates from Regional Liaisons. Brzozowski reported that the Interregional Planning Council adopted their final report to Texas Water Development Board on February 8, 2024.

Briefing and Update from Texas Water Development Board

John Mauer, Texas Water Development Board, presented an update to the Group as follows:

- County Summary and Rural Entities Documents
- Uniform Costing Model
- Drought Management Costing Tool
- Water Conservation Advisory Council Survey Results
- Water Service Boundary Viewer
- Technical Memorandum
- RWPG Chairs Call – May 10th at 10:00 a.m.
- Texas Water Fund
- TCEQ 180-day List
- Water Loss Audits, Water Conservation Plans and Annual Reports
- Drought Preparedness Council Recommendations
- Conservation Resources for Development of the 2026 RWPs
- Interregional Planning Council Report to TWDB

A copy of the power point presentation was presented to the Group and made part of these official minutes.

Briefing and Update from Black and Veatch

Jaime Burke, Black and Veatch, briefed the Group on the Region P Schedule and progress since the last meeting. New or ongoing efforts include:

- Beginning water management strategy evaluations
- Sending Communication out to defined “rural entities” within the region to provide information from TWDB and encourage engagement in the regional water planning process
- Review of Drought Contingency Plans and beginning work on Chapter 7
- Beginning updates on policy recommendations for Chapter 8

Burke also briefed the Group as follows:

- Briefing of Summaries of Chapters 1-4:
  Chapter 1 – RWP Area Description
  Chapter 2 – Population and Water Demands
  Chapter 3 – Analysis of Current Water Supplies
  Chapter 4 – Identification of Water Needs

Burke informed the Group that she would be sending out the draft Chapters 1-4 for RWPG members’ review.

- Briefing and Discussion of Irrigation Conservation Measures
  Those considered in the 2021 Plan and which to consider for the 2026 Plan

- Briefing of 2021 Plan Chapter 8 and discussion of the path forward for Legislative and Policy recommendations to be included in Chapter 8 of the 2026 Plan

The Group was presented with a copy of the Black and Veatch power point presentation and made part of these official minutes.

Schedule Future Meetings

The Group tentatively scheduled a meeting for August 12, 2024 at noon (12:00 p.m.)

Receive Public Comments

There were no public comments.

The meeting was adjourned at 1:52 p.m.

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Phillip Spenrath
Chairman

Minutes of Lavaca Regional Water Planning Group
August 12, 2024
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, August 12, 2024 at 12:00 p.m. at the Texana Community Education Center, located in Texana Park, 344 Park Road 2, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM3131 and was also available through audio/video teleconference.

Voting Group Members present were Chairman Spenrath, Vice-Chair Neil Hudgins, Members Jim Coleman, Steve Cooper, Lee Hafernick, Jack Maloney, Robert Shoemate, Jill Sklar, and Ed Weinheimer. Also in attendance was Jaime Burke of Black and Veatch, John Mauer of Texas Water Development Board, Jami McCool of the Texas Department of Agriculture, LNRA Board President Jerry Adelman, LNRA Deputy General Manager Karen Gregory. Joining via audio/video teleconference were Lavaca Regional Water Planning Group voting members, Marie Day, James Migl, Richard Ottis, and Grace Ward, Tim Andruss of Victoria County Groundwater Conservation District, and Lauren Gonzales, Katie Snyder, and Alicia Smiley of Black & Veatch.

Absent Voting Group Members were Secretary Patrick Brzozowski, Tom Chandler, Lee Hafernick, Bart McBeth, Vance Mitchell, Edward Pustka, and Michael Sklalicky.

Vice Chairman Hudgins called the meeting to order at 12:10 p.m.

<u>Public Comments</u>

There were no public comments.

<u>Minutes</u>

The minutes of the May 6, 2024 meeting were reviewed. Weinheimer moved to approve the minutes as presented. Cooper seconded the motion. Motion carried.

<u>Nominations for New Voting Members</u>

There were no new voting member nominations.

The Group will continue to seek a new member to fill the remaining vacancy, Lavaca County, Small Business.

<u>Briefing and Update from Texas Water Development Board</u>

John Mauer, Texas Water Development Board, presented an update to the Group as follows:

- TWDB State Flood Plan
- Flood Mitigation Projects with Water Supply Benefit
- Informal Comments – Technical Memorandum
- Water Supply Needs & Surpluses Map
- Rule 357.34(g) Update
- List of Projection Revisions from Local Plans
- TWDB and GMA Orientation Meeting
- Texas Water Fund

Texas Water Fund Implementation Plan

- Emails, Public Comments, and Responses to Three Surveys

    1) Financial Assistance for Water Infrastructure Projects
    2) New Water Supply for Texas Fund
    3) Statewide Water Public Awareness

- Implementation Plan Released July 23, 2024

- TWF Implementation Plan – Proposed Funding Allocations – Total $1B
    - Rural Water Assistance Fund
    - Water Loan Assistance Fund
    - SWIFT Program Support
    - New Water Supply for Texas Fund
    - Potential bond leveraged funding through existing financial assistance programs
    - Statewide water public awareness program

- TWF Implementation Plan Updates - Timeline

A copy of the power point presentation was presented to the Group and made part of these official minutes.

Reports from Regional Liaisons and Interregional Planning Council Representative

There were no report updates from Regional Liaisons or Interregional Planning Council Representative.

Briefing and Update from Black and Veatch

Jaime Burke, Black and Veatch, briefed the Group on the Region P Schedule and progress since the last meeting. New or ongoing efforts include:

- Review of Drought Contingency Plans and beginning work on Chapter 7
- Water management strategy evaluations
- Chapter edits

Discussion and RWPG Approval of Major Water Providers:

Shoemate moved to approve Lavaca-Navidad River Authority as the major water provider for Region P. Maloney seconded the motion. Motion carried.

The Group discussed the threshold used to determine whether to consider ASR as a potential strategy for a WUG, other than those that have requested it. Burke reminded the Group that last cycle, the threshold was any WUG with an identified need of 10,000 acre-feet per year or greater. For last cycle and this cycle no WUGs meet this threshold.

Cooper moved for the RWPG to continue for the threshold to be any WUG with an identified need of 10,000 acre-feet per year (ac-ft/yr) or greater. Coleman seconded the motion. Motion carried.

Burke also gave a briefing on:

- Water Management Strategy Updates
- Legislative and Policy Recommendations updates to Chapter 8 of the 2026 Plan received through July 31, 2024

The Group was presented with a copy of the Black and Veatch power point presentation and made part of these official minutes.

Schedule Future Meetings

The Group tentatively scheduled a meeting for November 4, 2024 at noon (12:00 p.m.)

Receive Public Comments

There were no public comments.

Cooper moved to adjourn. Coleman seconded the motion. Motion carried.
The meeting was adjourned at 1:45 p.m.

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Phillip Spenrath
Chairman

Minutes of Lavaca Regional Water Planning Group
January 27, 2025
Edna, Texas

A meeting of the Lavaca Regional Water Planning Group was held on Monday, January 27, 2025 at 12:30 p.m. in the Board Meeting Room of the Lavaca Navidad River Authority Office Complex, 4631 FM 3131, located approximately seven (7) miles east of Edna, Jackson County, Texas off FM 3131 and was also available through audio/video teleconference.

Voting Group Members present were Chairman Spenrath, Vice-Chair Neil Hudgins, Secretary Patrick Brzozowski, Members, Steve Cooper, Lee Hafernick, Jack Maloney, Vance Mitchell, Dick Ottis, Robert Shoemate, and Ed Weinheimer. Also in attendance was Jaime Burke of Black and Veatch, John Mauer of Texas Water Development Board, LNRA Board President Jerry Adelman, LNRA Deputy General Manager Karen Gregory, Gary Broz of the City of Edna, Tim Andruss of Victoria County Groundwater Conservation District, and John Boone of the Texana Groundwater Conservation District. Joining via audio/video teleconference were Lavaca Regional Water Planning Group voting members Jim Coleman, Jill Sklar, and Grace Ward, and Alicia Smiley and Katie Snyder of Black and Veatch.

Absent Voting Group Members were Marie Day, Bart McBeth, Edward Pustka, and Michael Skalicky.

Chairman Spenrath called the meeting to order.

Public Comments

There were no public comments.

Minutes

The minutes of the November 4, 2024 meeting were reviewed. Weinheimer moved to approve the minutes as presented. Shoemate seconded the motion. Motion carried.

Nominations for New Voting Members

Andruss informed the Group that the Texana Groundwater Conservation District nominated John Boone to serve on the LRWPG replacing Michael Skalicky, Jackson County Water Districts.

Mitchell nominated John Boone from the Texana Groundwater Conservation District for the LRWPG Jackson County Water Districts to replace Michael Skalicky. Hafernick seconded the motion. Motion carried.

The Group will continue to seek new members to fill two (2) vacancies of Lavaca County Small Business and Jackson County Water Utilities.

Election of Officers

In accordance with Lavaca Regional Water Planning Group Bylaws, officers are to be elected annually.

Cooper moved to re-elect the current slate of officers of the Lavaca Regional Water Planning Group Brzozowski, Secretary, Hudgins, Vice Chairman, and Spenrath, Chairman, and Executive Committee of Spenrath, Hudgins, Brzozowski, Coleman, Day, Maloney, and Weinheimer. Ottis seconded the motion. Motion carried.

Spenrath, Hudgins, Brzozowski, Coleman, Day, Maloney, and Weinheimer. Mitchell seconded the motion. Motion carried.

<u>Briefing and Update from Texas Water Development Board</u>

John Mauer, Texas Water Development Board, presented an update to the Group as follows:

- DB27 Water Right Data Collection Spreadsheet
    - Spreadsheet to list water rights for the regional water plans
    - Due along with the Initially Prepared Plan

- 2025 SWIFT Cycle
    - Abridged applications are due February 3rd.

- Other Funding Cycles
    - Project information forms for the drinking Water and Clean Water State Revolving Funds are due March 7th.
    - Agricultural Water Conservation Grant applications are due March 19th.

- Regional Water Plan Accessibility Requirements
    - Guidance sent October 28th

- Board Member Changes
    - Chairman Paup appointed to chair the TCEQ
    - Director Stepney to be new Chair of TWDB

A copy of the power point presentation was presented to the Group and made part of these official minutes.

<u>Reports from Regional Liaisons and Interregional Planning Council Representative</u>

There were no report updates from Regional Liaisons or Interregional Planning Council Representative.

<u>Briefing and Update from Black and Veatch</u>

Jaime Burke, Black and Veatch, briefed the Group on the Region P Schedule and progress since the last meeting.

Progress Since Last Meeting
- Finalized draft chapter updates and sent to RWPG for review
- DB27 Data Entry

Discussion of Draft Chapter Edits
- Chapter 5 – Water Management Strategy Selection and Evaluation
- Chapter 6 – Impacts of the RWP and Consistency with Protection of Natural Resources
- Chapter 7 – Drought Response, Information, Activities, and Recommendations
- Chapter 9 – Implementation and Comparison to the Previous RWP
- Chapter 10 – Public Participation and Plan Adoption
- Comments and Recommendations received were discussed

- Review of Legislative and Policy Recommendations from 2021 Plan Chapter 8 to identify any updates needed.
- Chapter 8 – Financial Policy Recommendations
  - 5. The LRWPG supports the placement of a five-cent state tax on the sale of all bottled water to be used for the funding of water related projects by TWDB. These would include municipal and agricultural conservation programs. *Spenrath and Cooper asked that #5 be removed*.
  - 7. The LRWPG supports the Legislature reviewing private activity bonds to expand the authority beyond the current ~~$50 million~~ cap. Private activity bonds provide areas with the opportunities to encourage economic growth.
  - New policy suggestion for supporting pasture management best practices. Burke said she would draft some language and send to Vance Mitchell for initial review before providing to the LRWPG.

The Group was presented with a copy of the Black and Veatch power point presentation and made part of these official minutes.

<u>Schedule Future Meetings</u>

The Group will meet on February 10, 2025 at 12:30 p.m.

<u>Receive Public Comments</u>

There were no public comments.

The meeting was adjourned at 2:16 p.m.

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Phillip Spenrath
Chairman