

2020 EFFECTIVENESS REPORT OF THE EDWARDS AQUIFER AUTHORITY

Submitted by:
SOUTH CENTRAL TEXAS WATER ADVISORY COMMITTEE
OCTOBER 2020



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TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	1
Effectiveness Measures for 2020 Report	2
Regional Resource.....	2
Water Conservation and Reuse	2
Water Quality	2
Regulatory	2
Planning, Research, and Partnership Development	2
Financing	2
Education	2
Implementation of EAHCP	2
Effectiveness Measures for the 2022 Report	
Regulatory	3
Financing	4
Planning, Research, and Partnership Development.....	4
Water Quality.....	5
Water Conservation and Reuse.....	6
Education.....	6
1. INTRODUCTION.....	7
2.0 SOUTH CENTRAL WATER ADVISORY COMMITTEE.....	9
2.1 Background.....	9
2.2 Membership of the SCTWAC.....	9
2.3 Statutory Requirements for the Edwards Aquifer Authority Effectiveness Report.....	10
2.31 Relationship of the Edwards Aquifer to the Boundaries of the Edwards Aquifer Authority.....	12
2.3.2 Relationship of the Edwards Aquifer Authority to the Guadalupe, Nueces, and San Antonio River Basins.....	12
2.3.3 Guadalupe River Basin.....	15
2.3.4 San Antonio River Basin.....	16
2.3.5 Nueces River Basin.....	18
3.0 STATUS OF MEETING EFFECTIVENESS MEASURES	

ESTABLISHED IN THE 2020 REPORT.....	21
3.1 Become a Regional Resource.....	22
3.2 Water Conservation and Reuse.....	23
3.2.1 Water Reuse for Small Communities.....	23
3.2.2 Assist Smaller Utilities to Reduce Water Loss.....	24
3.2.3 Develop Partnerships with Other Funding Agencies.....	24
3.3 Water Quality.....	25
3.4 Regulatory.....	27
3.5 Planning, Research, and Partnership Development.....	28
3.6 Financing.....	30
3.7 Education.....	30
3.8 Implementation of EAHCP.....	31
4.0 EFFECTIVENESS MEASURES FOR THE 2022 REPORT.....	34
4.1 Regulatory.....	35
4.2 Financing	37
4.3 Planning, Research, and Partnership Development.....	38
4.4 Water Quality.....	40
4.5 Water Conservation and Reuse.....	41
4.6 Education.....	42
4.7 Continued Implementation of EAHCP.....	43

List of Figures

FIGURE 1 Edwards Aquifer Authority/South Central Water Advisory Committee Region.....	13
FIGURE 2 Edwards Aquifer Authority, Guadalupe, Nueces and San Antonio River Basins.....	14
FIGURE 3 Edwards Aquifer Authority and Major River Basins in Texas.....	15

List of Tables

Table ES-1 2020 Effectiveness Measures.....	2
Table 2-1 SCTWAC Membership.....	10
Table 2-2 Guadalupe River Basin Population Projections.....	15
Table 2-3 Guadalupe River Basin Water Demand Projections.....	16
Table 2-4 San Antonio River Basin Population Projections.....	17

Table 2-5	San Antonio River Basin Water Demand Projections.....	18
Table 2-6	Nueces River Basin Population Projections.....	19
Table 2-7	Nueces River Basin Water Demand Projections.....	20
Table 3-1	2020 Effectiveness Measures.....	32
Table 4-1	Groundwater Districts within EAA Jurisdiction.....	36

LIST OF FIGURES

FIGURE1: EDWARDS AQUIFER AUTHORITY/SOUTH CENTRAL WATER ADVISORY COMMITTEE REGION	19
FIGURE 2: EDWARDS AQUIFER AUTHORITY, GUADALUPE, NUECES AND SAN ANTONIO RIVER BASINS	23
FIGURE 3: EDWARDS AQUIFER AUTHORITY AND MAJOR RIVER BASINS IN TEXAS.....	24

LIST OF TABLES

TABLE ES-1: 2016 EFFECTIVENESS MEASURE	8
TABLE 2-1: 2018 SOUTH CENTRAL TEXAS WATER ADVISORY COUNCIL MEMBERSHIP ...	18
TABLE 2-2: GUADALUPE RIVER BASIN CITY POPULATION PROJECTIONS 2020-2070	25
TABLE 2-3: GUADALUPE RIVER BASIN WATER DEMAND PROJECTIONS 2020-2070	26
TABLE 2-4: SAN ANTONIO RIVER BASIN CITY POPULATION PROJECTIONS 2020-2070.....	26
TABLE 2-5: SAN ANTONIO RIVER BASIN WATER DEMAND PROJECTIONS 2020-2070	27
TABLE 2-6: NUECES RIVER BASIN CITY POPULATION PROJECTIONS 2020-2070	27
TABLE 2-7: NUECES RIVER BASIN WATER DEMAND PROJECTIONS 2020-2070	28

LIST OF APPENDICES

A. EDWARDS AQUIFER AUTHORITY ACCOMPLISHMENTS 2016-2018	
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List of Abbreviations:

1. EAA- Edwards Aquifer Authority
2. SCTWAC- South Central Texas Water Advisory Committee
3. EAHCP- Edwards Aquifer Habitat Conservation Plan
4. ITP- Incidental Take Permit
5. TCEQ- Texas Commission on Environmental Quality
6. TWDB- Texas Water Development Board
7. USFWS- United States Fish and Wildlife Service
8. ASR- Aquifer Storage and Recovery
9. EARZ- Edwards Aquifer Recharge Zone
10. MODFLOW- A finite difference groundwater model

EXECUTIVE SUMMARY

The Texas Legislature established the South-Central Texas Water Advisory Committee (SCTWAC) as part of the enabling legislation for the Edwards Aquifer Authority (EAA). The role of the SCTWAC is to represent downstream interests in the Guadalupe, San Antonio, and Nueces River basins. The SCTWAC is charged with developing an Effectiveness Report on the EAA every even numbered year and submit the report to the Texas Commission on Environmental Quality (TCEQ). The Effectiveness Report is required to assess the following:

- The effectiveness of the EAA.
- The effect of EAA management of the Edwards Aquifer on downstream interests.

Specific points considered in this evaluation include:

- Whether the EAA has functioned as an effective organization;
- Whether the EAA has provided leadership in the protection of springflows and water quality;
- Whether the EAA has played a significant role in regional planning activities;
- Whether the EAA has complied with statutory mandates and deadlines provided in the EAA Act;
- Whether the EAA has provided for effective protection of water quality in the aquifer and in contributing streams;
- Whether the EAA has achieved its water conservation goals; and
- Whether the EAA has provided effective protection of aquatic and wildlife habitat, endangered and threatened species, in-stream uses, and bays and estuaries that depend on the aquifer.

In order to perform this evaluation, the SCTWAC establishes effectiveness measures which are used to evaluate if the EAA has met its legislative mandates and assess the impact of EAA actions on downstream interests. Past reports have focused on the regulatory, research and planning efforts of the EAA. The EAA's first 20 years focused on developing a regulatory framework to meet the legislative mandate to issue permits for aquifer water users. This permitting system was designed to meet legislative directives and to protect spring flows from Comal and San Marcos springs. The development of the Edwards Aquifer Habitat Conservation Plan (EAHCP) and the issuance of the Incidental Take Permit (ITP) changed the role of the EAA from primarily being a regulatory and research agency to becoming a major player in implementing the water management strategies detailed in the EAHCP.

As the role of the EAA has evolved its impacts on downstream interests have also changed. The Effectiveness Measures for this report and Effectiveness Measures for the next report have focused on the following areas:

- Regulatory
- Financial
- Planning, Research, and Partnership Development
- Water Quality
- Water Conservation and Reuse
- Education
- Continued Implementation of the Edwards Aquifer Habitat Conservation Plan and Incidental Take Permit compliance

Detailed analysis of meeting the Effectiveness Measures for this report are detailed in the report and can be summarized in the following chart:

1. Table ES-1

2. 2018 Effectiveness Measures

EFFECTIVENESS MEASURE	In Progress/ Completed	Not Completed
Regional Resource		
Explore the potential for hosting regional meetings	✓	
Continue coordination and assistance for water protection	✓	
Water Conservation and Reuse		
Promoting and assist water reuse among smaller utilities		✓
Provide funding for leak detection for smaller utilities		✓
Regional resource to provide technical assistance for small utilities		✓
Water Quality		
Continue riparian restoration of Comal and San Marcos Springs	✓	
Continue plugging of abandoned wells	✓	
Cooperative efforts with San Antonio		
Work with others on water quality efforts	✓	
Implementation strategies for invasive species control	✓	
Be a resource for water quality information	✓	
Begin planning for transition from regulation to water quality and availability	✓	
Continue farm related hazardous substance pickup	✓	
Regulatory	✓	
How to regulate use of ASR within the brackish zone	✓	
Coordination with other Ground Water Districts	✓	

Coordination of permitting process with other Districts for well development in underlying aquifers	✓	
Develop policy on how water wells drilled into underlying aquifers will protect the Edwards Aquifer	✓	
Resolve issues for implementation of BIG rules	✓	
Continue registration of exempt wells	✓	
Planning, Research, and Partnership Development	✓	
Research on interrelationship between Edwards Aquifer and other aquifers	✓	
Complete the ASR study with New Braunfels	✓	
Continue EAHCP research including sampling in Springs	✓	
Refine and improve existing water and ecologic modeling	✓	
Data Integration of all databases	✓	
Support research into riparian restoration	✓	
Promote research partnerships	✓	
Financing	✓	
Partner with local governments to provide matching funds for water conservation efforts	✓	
Identify financing for Phase 2 of the ITP	✓	
Education	✓	
Continue educational efforts and funding for additional programs	✓	
Continued Implementation of EAHCP	✓	
Complete construction of refugia facilities	✓	

Effectiveness Measures for the 2022 Report are summarized as follows:

REGULATORY

Effectiveness Measure:

- **Clarify that the brackish zone of the Edwards Aquifer can be used for ASR development with no penalty for storing and withdrawing the water.**

Effectiveness Measure

- **Currently any utility asking to use the brackish zone for ASR have to get specific legislative approval for each project. It is recommended that the EAA establish a policy supporting use of the brackish zone for ASR development and develop rules to regulate the use of the brackish zone for ASR development.**

Effectiveness Measure:

- **Begin groundwork with the legislature to educate them on the relationship of the brackish zone and its potential for use in ASR projects and potentially for treating and/or blending water. As part of this process develop options for use of the brackish zone and how these uses could be permitted.**

Effectiveness Measure:

- **Enter into formal working agreements with other groundwater districts to assure that the permitting process for each District is consistent and transparent in protecting the Edwards Aquifer and springflows.**

FINANCING

Effectiveness Measure:

- **The EAA should begin a process with permit holders to begin to explain the need for the increased fees and how the increase revenues will be used.**

Effectiveness Measure:

- **EAA seems to have been put in the position of taking over the conservation easement program by default with the City of San Antonio beginning to wind down their program. The EAA should clarify how much money is to be dedicated to this future program and an estimate of available funding at the termination of the City of San Antonio's conservation acquisition program.**

Effectiveness Measure:

- **The establishment of the EAC has the potential of providing additional resources for education and research. The relationship between the EAA and EAC should be clarified to provide a long-term plan where it is clear when the EAC will be self-sufficient and the EAA in-kind assistance can be reduced.**

PLANNING, RESEARCH, AND PARTNERSHIP DEVELOPMENT

Effectiveness Measure:

- **Continue research into the interrelationship between the Edwards and Trinity aquifers and how stream flow in the contributing and recharge zones.**

Effectiveness Measure:

- **Continue support of riparian restoration as part of the EAHCP and for the contributing and recharge zones.**

Effectiveness Measure:

- **Continue working with the Region L Planning Group in the development of the 2021 State Water Plan.**

Effectiveness Measure:

- **Work with conservation groups to identify strategic properties to acquire for conservation easements.**

Effectiveness Measure:

- **With the loss of funding from the City of San Antonio for conservation easement acquisition the EAA should develop a comprehensive plan detailing how funds collect through aquifer fees will be used for acquisition of conservation easements.**

Effectiveness Measure:

- **With the limitation of funds through aquifer fees the EAA should partner with conservation groups, foundations, non-profits, and state and federal agencies to leverage EAA funding to continue with land acquisition and determine what group is to operate and maintain the properties.**

Effectiveness Measure:

- **Continue to facilitate meetings with groups that are active in planning in the Region.**

WATER QUALITY

Effectiveness Measure:

- **The EAA has worked with major players in the region to share water quality data. The EAA is encouraged to place Water Quality Best Management Practices on its website that can be used by communities and private interests in implementing water quality improvements.**

Effectiveness Measure:

- **Identification of priority areas for water quality protection in the contributing and recharge zones that would impact water quality in the aquifer or would impact water quality in Comal and San Marcos Springs.**

Effectiveness Measure:

- **Continue to provide staff support to the City of San Antonio for water quality field work in conservation areas.**

Effectiveness Measure:

- **Continue cooperative work with other partners to share water quality data and information.**

Effectiveness Measure:

- **Continue well registration and well plugging activities.**

Effectiveness Measures:

- **Continue bi-annual collection events to collect hazardous waste and providing financial assistance for obtaining secondary containment for regulated above ground storage tanks.**

Effectiveness Measure:

- **EAA should monitor existing and proposed municipal wastewater discharges and permit parameters on the contributing and recharge zones to assure that there are no impacts on water quality in the spring flows.**

WATER CONSERVATION AND REUSE

Effectiveness Measure:

- **EAA is encouraged to consider funding smaller utilities efforts to reduce water loss through leak detection. An implementation plan showing a schedule for fixing leaks based on water loss should be considered as part of any financial assistance.**

Effectiveness Measure:

- **EAA should provide leadership in promoting water reuse among smaller utilities and assist those communities in identifying resources to examine the feasibility of water reuse.**

Effectiveness Measure:

- **Develop partnerships with other funding agencies to leverage EAA and local resources for conservation and reuse efforts.**

Effectiveness Measure:

- **EAA should consider acting as a coordinator between local utilities and regional and state agencies to help implement these conservation and reuse objectives.**
- **EAA should encourage reuse or land application for municipal wastewater discharges.**

EDUCATION

Effectiveness Measure:

- **Complete implementation of the partnership with Morgan’s Wonderland Camp and consider outreach to local public and private schools to bring more students in for the experience.**

Effectiveness Measure:

- **Integrate the educational programs of the Edwards Aquifer Conservancy and EAA programs so that public and private donations can help support these efforts.**

Effectiveness Measure:

- **Continue the newsletters, social media and You Tube presentations and programs. These forums can be used for promoting the goals of the EAA and continue to provide a variety of public outreach.**

CONTINUED IMPLEMENTATION OF THE EDWARDS AQUIFER HABITAT CONSERVATION PLAN AND INCIDENTAL TAKE PERMIT COMPLIANCE

Effectiveness Measure:

- **Continue to implement the EAHCP and use the adaptive management process to address issues as they arise.**

The SCTWAC has supported and continues to support the EAA in its mission to protect springflows and water quality in the Edwards Aquifer. The continued protection of this resource is critical for the EAA jurisdiction but has a direct impact on water rights and water quantity and quality that directly impact downstream interests. The inclusion of all

stakeholders in the EAHCP process and in its operations has been a model for cooperation and success.

1.0 INTRODUCTION

The Edwards Aquifer Authority (EAA) was established by act of the Texas Legislature in SB 1477 in 1993 as a result of a federal law suit brought against the state for protection of endangered species that only exist in Comal and San Marcos Springs. Comal and San Marcos Springs are the largest natural springs in Texas. The Texas Legislature recognized the importance of the Edwards Aquifer and its impact on:

- Springflows to protect endangered species;
- The springflows provides the base flow for several rivers, most notably the Guadalupe River;
- Replenishment of both major and minor aquifers in the region;
- The springs receive water from groundwater movement in both the Nueces and San Antonio River basins.

The creation of the EAA took into consideration both municipal and agriculture users of the Edwards Aquifer in the areas that impact the springflows. The EAA covers over 8,000 square miles across eight counties including all of Uvalde, Medina, and Bexar counties as well as portions of Atascosa, Caldwell, Guadalupe, Comal, and Hays counties. As part of the EAA enabling legislation, the South-Central Texas Water Advisory Committee (SCTWAC) was created to represent downstream interests in the Guadalupe, San Antonio, and Nueces River basins. The legislation made the SCTWAC responsible for developing an Effectiveness Report which reviews EAA actions for the previous two years and the impact those decisions have had on Comal and San Marcos springflows as well as on downstream interests. Once adopted by the SCTWAC, the report is submitted to the Texas Commission on Environmental Quality (TCEQ) for review.

The EAA has faced significant legal, fiscal, and administrative challenges in fulfilling its legislative mandates. The EAA was able to develop a permitting system over legal challenges, developed a functioning water market for permitted water within its jurisdiction, and scientific expertise. Over time, the Texas Legislature has identified and addressed many of the contentious political and policy issues surrounding water resource management and protection of the endangered species dependent on springflows from Comal and San Marcos springs. In response to this legislative direction the EAA has developed some of the most successful water management strategies in Texas. The EAA has also been an active participant in the Texas Water Development Board (TWDB) Regional Water Planning process and has assumed a leadership role in directing research dealing with the Edwards Aquifer, Comal and San Marcos springs, and protection of the endangered species that live within the springs.

In reviewing the actions of the EAA the SCTWAC has adopted the use of Effectiveness Measures

in the report for each biennium. These Effectiveness Measures include making suggestions to the EAA on policy matters that could affect springflows or have an effect on downstream interests. These Effectiveness Measures have evolved to reflect the expanded role of the EAA from a regulatory and research agency to include being the coordinating agency to implement the Edwards Aquifer Habitat Conservation Plan (EAHCP). The SCTWAC has viewed these Effectiveness Reports as being supportive of the EAA in successfully accomplishing its mission.

2.0 SOUTH CENTRAL TEXAS WATER ADVISORY COMMITTEE

2.1 BACKGROUND

As part of the EAA enabling legislation the SCTWAC was formed in recognition of the hydrologic interdependence of the Edwards Aquifer and the Guadalupe, San Antonio, and Nueces River basins. The interdependence impacts both surface and groundwater rights within the river basins as well as recharge of the Edwards Aquifer and minor aquifers affected by the Edwards Aquifer. The SCTWAC recognizes the need for an effective EAA in order to implement water resource strategies that protect EAA permit holders, springflows and downstream water interests.

This report reflects the perspective of downstream interests within the three affected river basins. The SCTWAC has used this report to comment on specific actions and policies adopted by the EAA and make policy suggestions that would be mutually beneficial for both the EAA and downstream interests. While the SCTWAC has commented and in some cases critical of specific actions and/or policies of the EAA it should be noted that the SCTWAC fully supports the EAA and its mission of protecting the Edwards Aquifer and those dependent on it for water supply.

2.2. MEMBERSHIP OF THE SOUTH CENTRAL TEXAS WATER ADVISORY COMMITTEE

The SCTWAC has 20 appointed members representing affected downstream interests from seventeen counties within the region (See Figure 1). The EAA legislation identifies that members should represent the identified counties and cities with the exception of Atascosa County which may not have a representative on the SCTWAC when the County has a representative on the EAA Board of Directors. Table 2-1 lists the 2020 SCTWAC members and who they represent. Ten members represent interests in the Guadalupe River basin, five represent interests in the San Antonio River basin, and five represent interests in the Nueces River basin.

Table 2-1
2020 South Central Texas Water Advisory Committee Membership

Representing	Member
City of Victoria	Gary Middleton- Chairman/EAA Representative
Guadalupe County	David Davenport- Secretary
Atascosa County	Robert Ulrich
Caldwell County	Tom Goynes
Calhoun County	Richard Barton
Comal County	Carl Englerth
DeWitt County	Bill Braden
Goliad County	Ray Bednorz
Gonzales County	Craig Hines
Hays County	Judge Ruben Becerra
Karnes County	Punch Humphries
Medina County	Fred Yanta
Nueces County	Joe McComb
Refugio County	Larry Aduddell
San Patricio County	Brian Williams
Uvalde County	Vic Hildebran
Victoria County	Tim Andruss
Wilson County	Steve Snider
City of Corpus Christi	Steve Klepper
City of San Antonio	Gregory Hudspeth

The SCTWAC designates one of its members to serve on the EAA Board of Directors. The appointee is granted full rights of participation in EAA deliberations but is not allowed to vote on issues before the Board of Directors. The SCTWAC reports to the Texas Commission on Environmental Quality (TCEQ) and the EAA Board of Directors. The SCTWAC, by resolution, may request that the EAA Board of Directors reconsider any EAA Board action that the SCTWAC members considers prejudicial to downstream water interests. The EAA Board of Directors reviews the request and if the result does not satisfy the SCTWAC a request can be made for the TCEQ to review the action and make a recommendation to the EAA Board of Directors. If the EAA Board of Directors determines that the EAA action is contrary to that of TCEQ recommendation the EAA Board of Directors is required to reverse itself.

2.3 STATUTORY REQUIREMENTS FOR THE EDWARDS AQUIFER AUTHORITY EFFECTIVENESS REPORT

The presiding officer of the SCTWAC is mandated to submit an Effectiveness Report on the EAA to the TCEQ and EAA Board of Directors by October 31st of each even numbered year. The first report was issued in 1998 and reports have been filed every two years since that time.

The EAA enabling legislation requires that the report assess:

1. The effectiveness of the EAA;
2. The effect on downstream water rights by the EAA management of the aquifer.

Specific points that are to be considered in evaluation include:

- Whether the EAA has functioned as an effective organization;
- Whether the EAA has played a significant role in regional planning activities;
- Whether the EAA has complied with statutory mandates and deadlines provided in the EAA act;
- Whether the EAA has provided for effective protection of water quality in the aquifer and contributing streams;
- Whether the EAA has achieved its water conservation goals; and
- Whether the EAA has provided effective protection of aquatic and wildlife habitat, endangered and threatened species, in stream uses, and bays and estuaries that depend on the aquifer.

The SCTWAC has relied upon specific Effectiveness Measures that have been developed in each of the Effectiveness Reports to assess the EAA effectiveness. The role and responsibilities of the EAA have evolved due to legislation and events. These changes have expanded the EAA mission and the Effectiveness Measures have changed to reflect these changes.

In general, the effectiveness measures are grouped into the following areas:

- Regulatory
- Research
- Financial
- Planning
- Administrative
- Education
- Implementation of the Edwards Aquifer Habitat Conservation Plan

It is important to note that the Effectiveness Measures reflect the issues and priorities of downstream interests. The SCTWAC has always maintained that the actions of the EAA should be to meet legislative mandates which are not mutually exclusive from downstream interests.

2.3.1 Relationship of the Edwards Aquifer to the Boundaries of the Edwards Aquifer Authority

The Edwards Aquifer is the primary water source for much of South Central Texas. The western edge of the aquifer begins in Kinney County and runs in a generally northeastern direction into Bell County. While the aquifer and its contributing zone covers multiple counties, the EAA jurisdiction is based on county boundaries and areas that affect Comal and San Marcos Springs. Portions of the transition, recharge, and artesian zones of the Edwards Aquifer lie outside the jurisdiction of the EAA. The EAA boundaries encompass the greatest usage within the aquifer from agricultural and municipal users. Water use in the western counties of Uvalde and Medina are primarily agricultural while the counties west of the Knippa Gap, Bexar, Comal, and Hays counties. Figure 2 illustrates the relationship between the river basins and the different zones affecting the Edwards Aquifer.

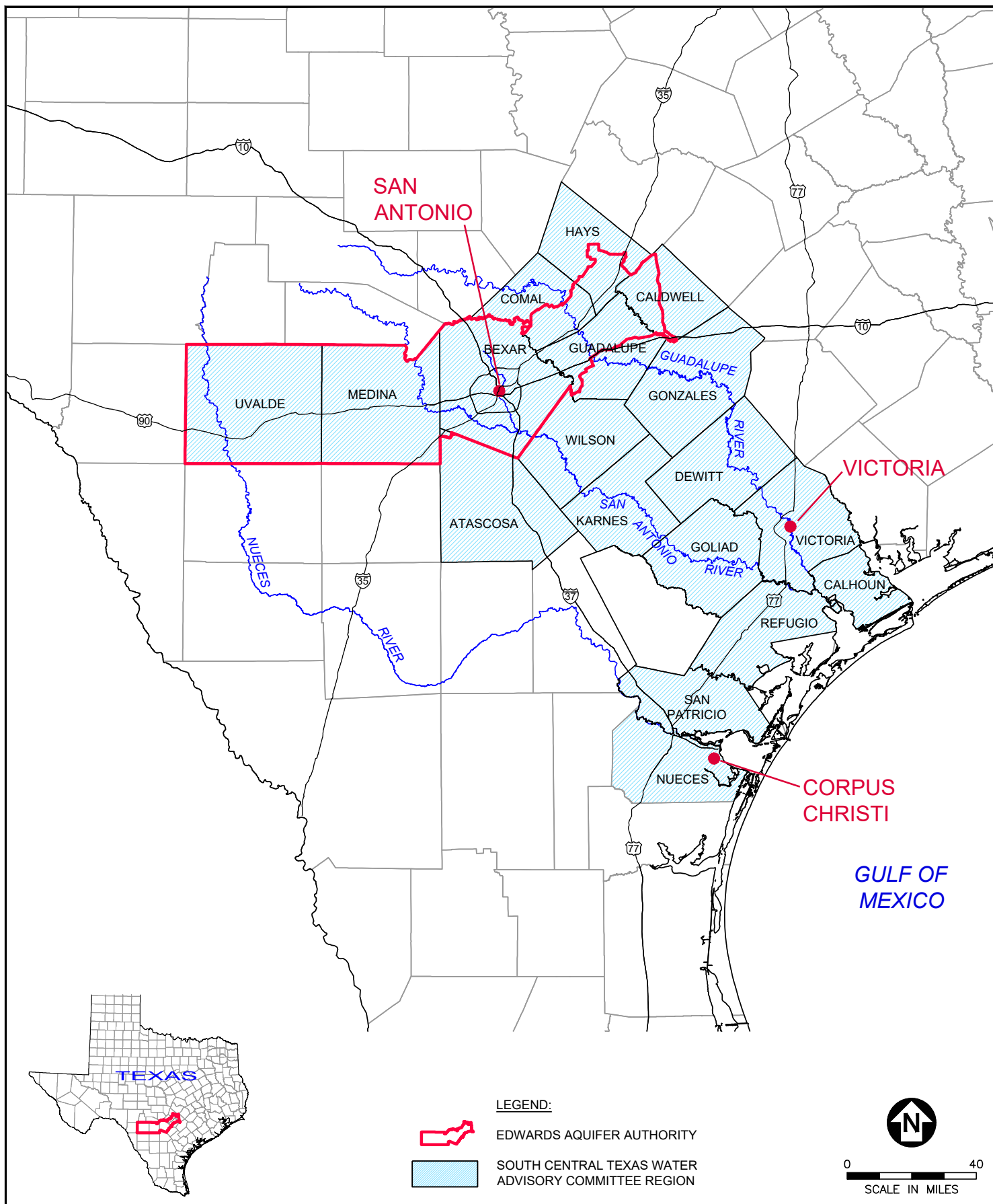
2.3.2 Relationship of the Edwards Aquifer Authority to the Guadalupe, Nueces and San Antonio River Basins

The Edwards Aquifer crosses the upper reaches of the Guadalupe, Nueces and San Antonio River Basins. The Edwards formation consists of a contributing zone of approximately 4,400 square miles, a recharge zone of 1,500 square miles and a confined zone of 2,100 square miles for a total of approximately 8,100 square miles. Rainfall across the region averages 22 inches in the west to 36 inches in the east. Significant recharge occurs in the western portion of the aquifer in the Balcones Fault Zone where the Edwards limestone is still at land surface and has not been faulted deep into the sub-surface. (See Figure 3).

The Edwards Aquifer is the primary source of water for the Cities of San Antonio, New Braunfels, and San Marcos. Many of the smaller cities within the EAA are solely dependent on the aquifer for their water supply. Comal and San Marcos Springs, which are the largest natural springs in Texas are dependent on aquifer water, and provide significant surface water flows to both the Guadalupe and San Antonio River basins. Smaller springs in the western portion of the Edwards Aquifer are the source of much of the surface water for the upper Nueces River basin.

The total volume of water in the Edwards Aquifer has been estimated at 45 million acre feet. (Note: 1-acre foot of water contains 325,851 gallons). The aquifer is predominantly composed of porous limestone, which provides for rapid recharge during storm events that collect in streams and rivers of the Guadalupe, Nueces and San Antonio River Basins. The flow of water is generally south/southeast across the recharge zone where the water comes into direct contact with the porous Edwards limestone. The hydraulic gradient lowers as water generally moves east and northeast to

the major springs in New Braunfels, San Marcos and San Antonio. As water flows from the western counties toward the east irrigation and municipal water wells intercept a substantial portion of the aquifer's annual recharge. Water is recharged in all three river basins and is discharged through water wells and natural springs in all three river basins.



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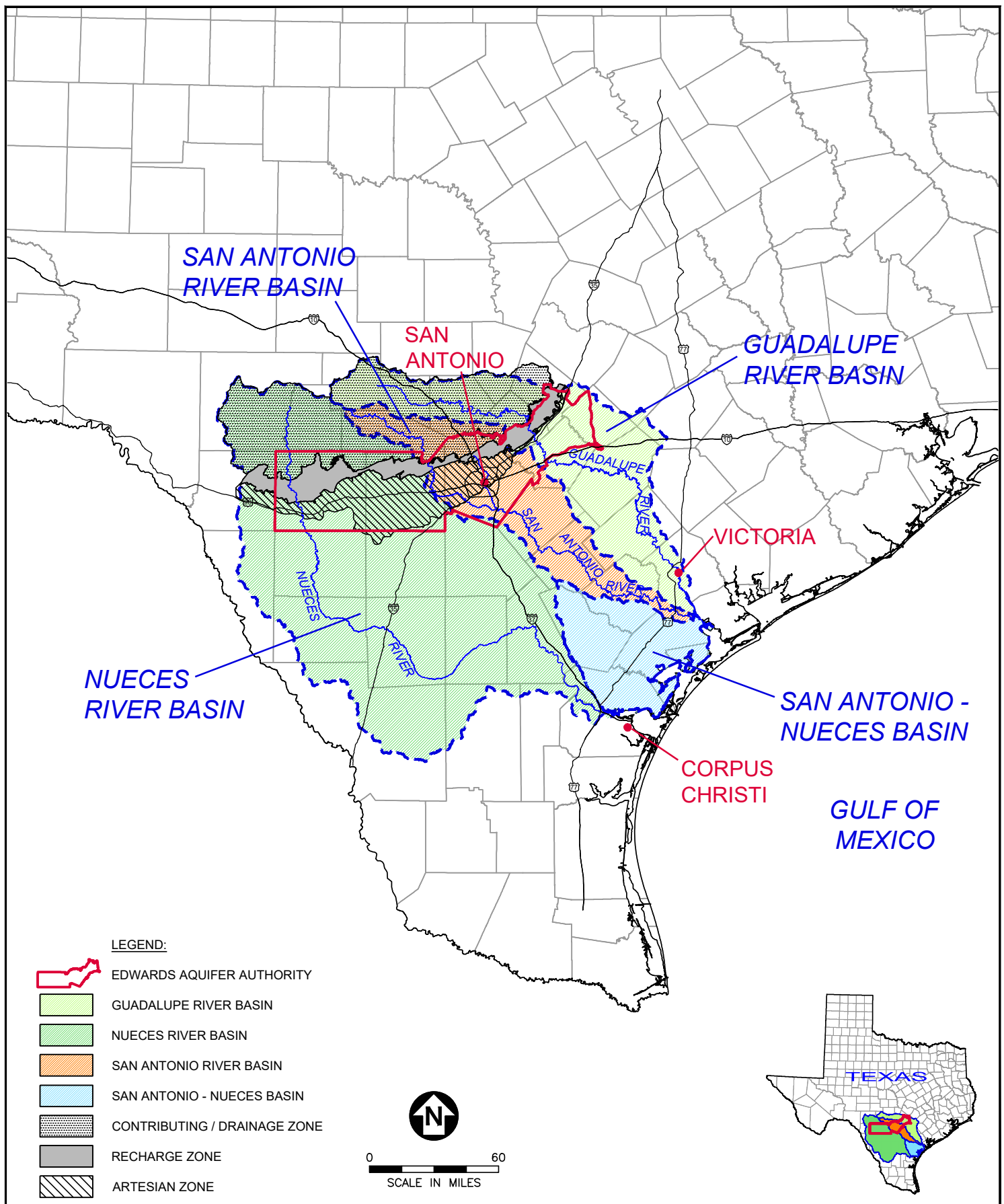
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EDWARDS AQUIFER AUTHORITY
AND SCTWAC REGION
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WATER ADVISORY COMMITTEE
2020 EFFECTIVENESS REPORT OF THE
EDWARDS AQUIFER AUTHORITY

FIGURE 1

Drawing No.	3112.20001 Fig 1
Project No.	3112.20001.000
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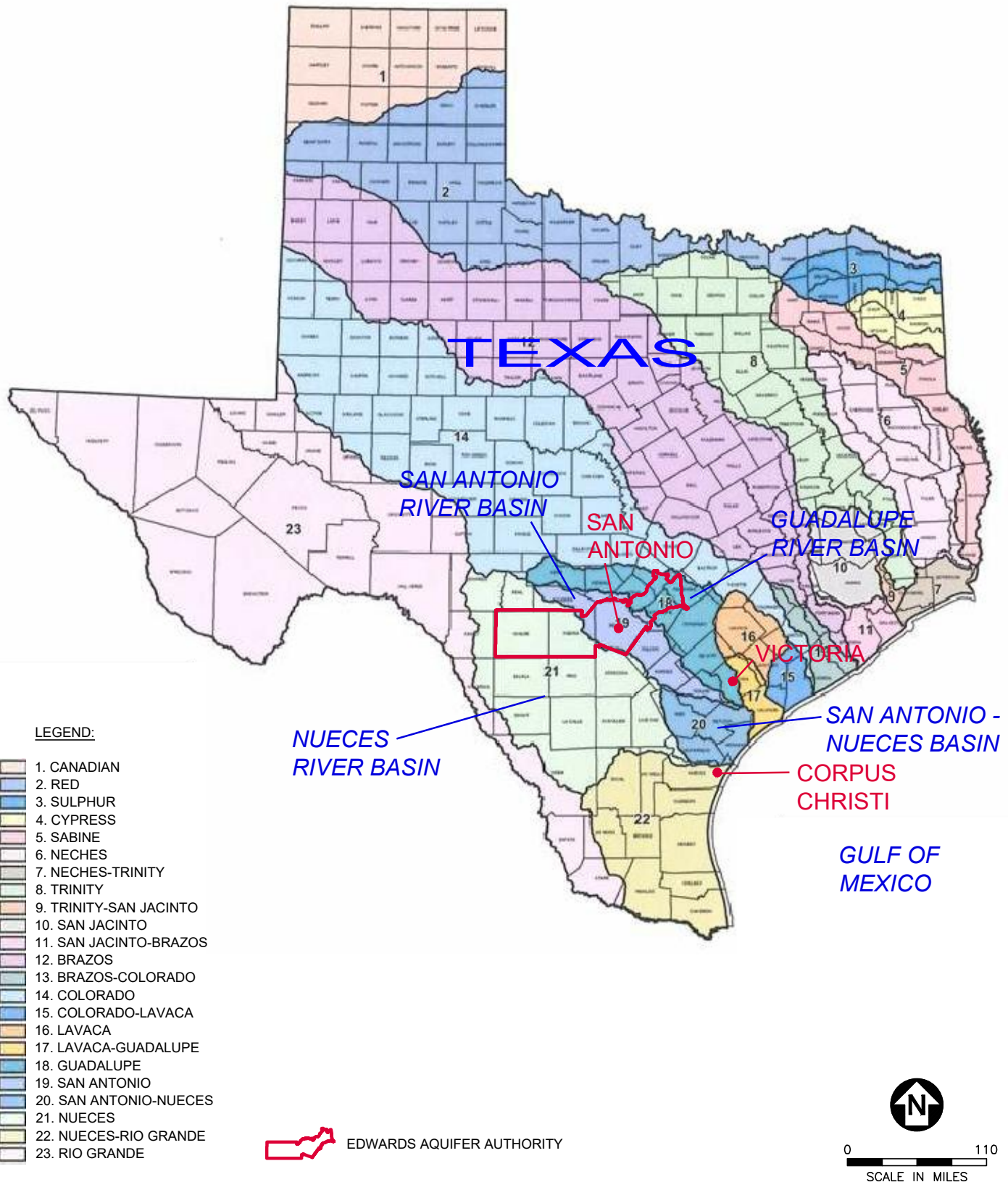
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EDWARDS AQUIFER AUTHORITY, GUADALUPE,
 NUECES AND SAN ANTONIO RIVER BASINS
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 WATER ADVISORY COMMITTEE
 2020 EFFECTIVENESS REPORT OF THE
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FIGURE 2

Drawing No.	3112.20001 Fig 2
Project No.	3112.20001.000
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EDWARDS AQUIFER AUTHORITY
AND MAJOR RIVER BASINS IN TEXAS
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FIGURE 3

Drawing No. 3112.20001 Fig 3

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However, recharge is not balanced. Approximately 51% of recharge occurs in the Nueces River Basin, 37% in the San Antonio River Basin and 12% in the Guadalupe River Basin.

The following sections outline population and water demand projections for the Guadalupe, Nueces and San Antonio River Basins as identified in the draft 2021 Texas Water Plan. It is important to note that these river basins contribute surface water supplies to areas located outside the boundaries of the Edwards Aquifer Authority and are heavily dependent on spring flows to provide base water flow for each of these rivers.

2.3.3 Guadalupe River Basin

The Guadalupe River Basin is bounded on the north by the Colorado River Basin and on the south by the San Antonio and Nueces River Basins. The total drainage area of the basin is 6,700 square miles. Table 2-2 identifies cities that are south of the Comal and San Marcos Springs and their population estimates and projections from the Texas Water Development Board.

**Table 2-2
Guadalupe River Basin
City Population Projections for 2020-2070**

City Name	2020	2030	2040	2050	2060	2070
Cuero	6,892	7,122	7,236	7,341	7,410	7,458
Gonzales	8,304	9,132	9,912	10,816	11,734	12,695
Kyle	48,269	77,050	92,000	92,000	92,000	92,000
Lockhart	15,726	19,254	22,734	26,176	29,654	33,038
Luling ¹	6,723	8,231	9,718	11,190	12,677	14,123
New Braunfels ²	91,010	114,969	138,462	162,597	185,964	208,763
Port Lavaca	14,196	15,867	17,494	19,062	20,614	22,120
San Marcos ³	71,135	84,861	101,235	120,769	144,072	171,872
Seguin	27,874	33,511	39,279	44,921	50,664	56,302
Victoria	45,688	48,862	51,359	53,583	55,410	56,923

Source: Texas Water Development Board, 2021 Draft Texas Water Plan

¹ Includes data from Guadalupe and Caldwell Counties

² Includes data from Guadalupe and Comal Counties

³ Includes data from Caldwell and Hays Counties

Table 2-3
Guadalupe River Basin
Water Demand Projections for 2020-2070 (in ac-ft*)

City Name	2020	2030	2040	2050	2060	2070
Cuero	1,826	1,854	1,857	1,870	1,885	1,897
Gonzales	2,059	2,223	2,381	2,581	2,796	3,024
Kyle	4,898	7,680	9,133	9,118	9,108	9,104
Lockhart	2,258	2,683	3,114	3,557	4,021	4,477
Luling ⁴	959	1,135	1,313	1,498	1,694	1,885
New Braunfels ⁵	18,588	23,079	27,538	32,193	36,772	41,262
Port Lavaca	1,986	2,144	2,306	2,482	2,678	2,871
San Marcos ⁶	10,902	12,715	14,971	17,750	21,141	25,199
Seguin	4,276	4,992	5,748	6,519	7,338	8,150
Victoria	11,532	12,108	12,556	13,007	13,433	13,797

Source: Texas Water Development Board, 2021 Draft Texas Water Plan

*An ac-ft is equal to 325,851 gallons and is the amount of water required to cover one acre with a foot of water.

2.3.4 San Antonio River Basin

The San Antonio River Basin drains a land area of 4,180 square miles. The basin extends from Kerr and Medina counties in the Texas Hill Country southeast toward the Gulf of Mexico. It drains approximately half of Medina County to the far northwest; the majority of Bexar, Wilson and Karnes counties, which comprise the central portion of the basin; approximately one third of Goliad County to the southeast; and parts of Bandera, Kendall, Comal, Guadalupe, DeWitt, Kerr, Atascosa, Victoria and Refugio counties.

The basin's major watersheds are:

- Medina River Watershed
- Leon Creek Watershed
- Upper San Antonio River Watershed
- Salado Creek Watershed
- Cibolo Creek Watershed

⁴ Includes data from Guadalupe and Caldwell Counties

⁵ Includes data from Comal and Guadalupe Counties

⁶ Includes data from Hays and Caldwell Counties

- Lower San Antonio River Watershed

Source: San Antonio River Authority

Table 2-4
San Antonio River Basin
City Population Projections for 2020-2070

City Name	2020	2030	2040	2050	2060	2070
Alamo Heights	8,073	8,400	8,400	8,400	8,400	8,400
Converse	23,458	26,125	28,398	28,398	28,398	28,398
Floresville	8,123	10,005	11,833	13,476	15,031	16,432
Goliad	2,289	2,586	2,781	2,863	2,923	2,956
Karnes City	3,242	3,343	3,349	3,349	3,349	3,349
Kenedy	3,587	3,699	3,706	3,706	3,706	3,706
Kirby	9,096	10,282	10,364	10,365	10,365	10,365
Leon Valley	8,200	8,750	9,256	11,713	12,249	12,738
Live Oak	9,322	9,545	9,545	9,545	9,545	9,545
San Antonio ⁷	1,809,454	2,052,237	2,283,495	2,495,918	2,691,193	2,869,595
Schertz ⁸	39,245	52,326	61,741	71,017	80,527	89,799
Universal City	21,072	21,702	21,702	21,702	21,702	21,702

Source: Texas Water Development Board, 2021 Draft Texas Water Plan

Table 2-5
San Antonio River Basin
Water Demand Projections for 2020-2070 (in ac-ft*)

City Name	P2020	P2030	P2040	P2050	P2060	2070
Alamo Heights	2,210	2,261	2,233	2,221	2,218	2,218
Converse	2,554	2,764	2,951	2,925	2,919	2,917
Floresville	1,933	2,335	2,731	3,094	3,447	3,767
Goliad	460	506	535	548	558	565
Karnes City	608	611	599	593	592	592
Kenedy	1,411	1,436	1,424	1,422	1,421	1,421

⁷ Includes Bexar, Comal, and Medina County SAWS data

⁸ Includes Bexar, Comal, and Guadalupe County data

Kirby	930	999	973	964	962	961
Leon Valley	1,401	1,454	1,507	1,886	1,968	2,046
Live Oak	1,650	1,657	1,633	1,619	1,616	1,616
San Antonio ⁹	238,425	261,645	284,776	307,851	331,122	352,846
Schertz ¹⁰	6,321	8,271	9,681	11,091	12,558	13,996
Universal City	3,155	3,170	3,112	3,080	3,073	3,072

Source: Texas Water Development Board, 2021 Draft Texas Water Plan

*An ac-ft is equal to 325,851 gallons and is the amount of water required to cover one acre with a foot of water.

2.3.5 *Nueces River Basin*

The Nueces River basin, associated coastal basins, bays and estuaries comprise about 31,500 square miles of South Texas with its headwaters in Edwards County and discharging into Nueces Bay. The area stretches from the Texas Hill Country to the Gulf of Mexico. Within the Upper Nueces Basin groundwater provides water for agricultural and municipal purposes while surface water from Lake Corpus Christi and Choke Canyon reservoir provide a surface water source for Corpus Christi and the Coastal Bend region of Texas. It is important to note that the use of surface water is predominantly in the adjacent coastal basins of the Nueces River.

Table 2-6
Nueces River Basin
City Population Projections for 2020-2070

City Name	P2020	P2030	P2040	P2050	P2060	P2070
Aransas Pass ¹¹	10,541	11,033	11,301	11,503	11,637	11,726
Beeville	15,418	16,063	16,343	16,369	16,385	16,391
Carrizo Springs	5,994	6,462	6,765	7,069	7,301	7,487
Corpus Christi ¹²	332,002	361,618	380,284	391,134	399,244	404,674
Cotulla	4,138	4,532	4,901	5,314	5,671	6,002
Crystal City	8,063	9,022	9,880	10,711	11,484	12,199
Devine	4,425	4,639	4,822	8,981	5,125	5,250
Gregory	2,024	2,123	2,179	2,221	2,249	2,268
Hondo	9,805	10,767	11,585	12,298	12,942	13,502
Ingleside	9,610	10,078	10,348	10,545	10,678	10,768
Kingsville	28,892	31,651	34,282	36,817	39,194	41,419
Pearsall	10,192	11,233	12,137	13,009	13,795	14,505

⁹ Includes Bexar, Comal, and Medina County SAWS data

¹⁰ Includes Bexar, Comal, and Guadalupe County data

¹¹ Includes San Antonio-Nueces River basin data from Aransas, Nueces, and San Patricio Counties

¹² Includes data from the Nueces and Nueces-Rio Grande basins in Nueces Co.

Pleasanton	11,142	12,875	14,454	15,996	17,446	18,792
Port Aransas ¹³	4,416	4,510	4,500	4,530	4,529	4,530
Portland	20,646	21,654	22,233	22,655	22,941	23,136
Robstown ¹⁴	11,218	12,667	13,688	13,995	13,997	13,651
Rockport	19,120	19,533	19,491	19,620	19,622	19,622
Taft	3,768	3,951	4,057	4,133	4,186	4,221
Uvalde	18,623	20,366	21,860	23,407	24,883	26,797

Source: Texas Water Development Board, 2021 Draft Texas Water Plan

Table 2-7
Nueces River Basin
Water Demand Projections for 2020-2070 (in ac-ft*)

City Name	P2020	P2030	P2040	P2050	P2060	2070
Aransas Pass ¹⁵	1,504	1,524	1,521	1,527	1,542	1,553
Beeville	3,336	3,397	3,394	3,377	3,375	3,376
Carrizo Springs	1,623	1,717	1,773	1,846	1,904	1,952
Corpus Christi ¹⁶	64,110	68,180	70,493	71,885	73,258	74,240
Cotulla	1,291	1,392	1,488	1,605	1,711	1,811
Crystal City	1,702	1,857	1,999	2,159	2,312	2,455
Devine	648	658	667	680	697	714
Gregory	339	344	348	354	357	360
Hondo	2,074	2,181	2,323	2,471	2,616	2,750
Ingleside	1,013	1,024	1,023	1,026	1,036	1,044
Kingsville	4,205	4,453	4,706	4,992	5,301	5,599
Pearsall	2,021	2,181	2,323	2,471	2,616	2,750
Pleasanton	2,432	2,750	3,045	3,347	3,645	3,925
Port Aransas ¹⁷	1,474	1,603	1,694	1,712	1,707	1,666
Portland	3,389	3,458	3,477	3,503	3,359	3,569
Robstown ¹⁸	1,474	1,603	1,694	1,712	1,707	1,666
Rockport	3,462	3,469	3,410	3,404	3,398	3,398
Taft	540	546	545	552	558	563

¹³ Includes data from the Nueces and Nueces-Rio Grande basins in Nueces Co.—Other region

¹⁴ Includes data from the Nueces and Nueces Rio Grande basins in Nueces Co.

¹⁵ Includes data from the San Antonio-Nueces basin in Aransas, Nueces, and San Patricio Co.

¹⁶ Includes data from the Nueces and Nueces-Rio Grande basins in Nueces Co.

¹⁷ Includes data from the Nueces and Nueces-Rio Grande basins in Nueces Co.—Other region

¹⁸ Includes data from the Nueces and Nueces Rio Grande basins in Nueces Co

Uvalde	4,385	4,698	4,970	5,282	5,606	5,923
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Source: Texas Water Development Board, 2021 Draft Texas Water Plan

*An ac-ft is equal to 325,851 gallons and is the amount of water required to cover one acre with a foot of water.

3.0 STATUS OF MEETING EFFECTIVENESS MEASURES ESTABLISHED IN THE 2018 REPORT

The SCTWAC has adopted Effectiveness Measures to provide a benchmark to assess the success of the EAA in meeting its legislatively mandated mission. The 2018 established Effectiveness Measures that were focused on:

- Quantify priority issues that could potentially affect springflows and impact downstream interests;
- Provide feedback to the EAA on their decisions and actions;
- Provide a quantifiable method to determine if the EAA has met its legislative mandates;
- Establish benchmarks for evaluating the EAA during the next two years.

The past twenty years have seen the EAA move from establishing a permit program for Edwards Aquifer water users to successfully obtaining an Incidental Take Permit (ITP), developing and implementing the Edwards Aquifer Habitat Conservation Plan (EAHCP), and working with other permittees to successfully implement the EAHCP.

The SCTWAC recognizes the leadership shown by the EAA and the importance of accomplishing these objectives. The Effectiveness Measures established in the 2018 Report built on the work done by the EAA and also recognized that the EAA must meet future challenges that the region faces. The search for additional water supplies within the region has intensified over the past two years with interest in:

- Water importation from outside the EAA boundaries;
- Use of brackish groundwater from both the Edwards Aquifer and lower aquifers for treatment and/or mixing;
- Use of aquifer storage and recovery as a water management strategy;
- Mixing of Edwards Aquifer water with other sources;
- Reuse of effluent;
- Protection of water quality.

In all cases there is a potential impact on springflows and downstream interests.

The focus of the Effectiveness Measures for this report is on the next series of challenges facing the EAA and looking toward the future role the EAA may play in water resources planning and management.

The Effectiveness Measures targeted the following areas:

- Being a regional resource for effective protection of the Edwards Aquifer;
- Water conservation and reuse;
- Water quality;
- Regulatory;
- Planning, research, and partnership development;
- Financial;
- Public Education;
- Continuation of Implementation of the Edwards Aquifer Habitat Conservation Plan and Incidental Take Permit compliance.

3.1 BECOME A REGIONAL RESOURCE FOR EFFECTIVE PROTECTION OF THE EDWARDS AQUIFER

The EAA has taken the role of a regional resource for the EAHCP providing the research and administrative support to effectively implement the plan. The SCTWAC recommended that the EAA expand this role to include facilitation in the dissemination of information on various subjects including research, water quality, conservation, and inter-governmental cooperation on these issues.

Effectiveness Measure:

- **The EAA should explore the potential for hosting regional meetings for the sharing of information that would affect springflows, water quality, and conservation.**

The EAA has met this measure by hosting meetings with the following:

- *South Central Texas Research Interest Group- the EAA hosts these meeting for researchers to share and collaborate on research impacting the aquifer.*
- *Community Advisory Committee- the EAA uses this committee as a resource for educational, community, and professionals four times a year.*
- *Water Quality Collaboration Group- the EAA is a member of this group that includes the San Antonio Water System, City of San Antonio, San Antonio River Authority, and Nueces River Authority. This group shares information on water quality within the region impacting the Edwards Aquifer*
- *EAA hosts the GMA Region 10 meetings.*

Effectiveness Measure:

- **The EAA should continue its coordination and voluntary assistance for water quality protection within the region.**

The EAA has continued is coordination and voluntary assistance for water quality protection with the areas designated as conservation areas within the recharge and contributing zones.

3.2 WATER CONSERVATION AND REUSE

The SCTWAC has always promoted water conservation and reuse as sustainable water supply strategy that will provide both short term and long term savings. Water conservation has been part of the EAHCP and ITP process. Because of the level of conservation required by the EAHCP and ITP the EAA focused on large, long term conservation efforts. This was accomplished with the San Antonio Water System (SAWS) to pay for leak repairs within their system. In return SAWS dedicated 10,000-acre feet of water to comply with the ITP. Irrigation savings have been targeted to agricultural interests using grant funds to supplement other funding to reduce agricultural irrigation by 1,400 acre feet annually. The focus on agricultural irrigation improvements has reduced funding for any public water utilities to reduce unaccounted for water. The agreement with SAWS has met the water conservation requirements of the ITP but smaller utilities still struggle with identifying ways to reduce their unaccounted for water in improve water efficiencies. As an example, the water use surveys submitted to the Texas Water Development Board show that several of smaller utilities have unaccounted water loss in excess of 10% of water that is pumped with some as high as 30% losses.

3.2.1 WATER REUSE FOR SMALL COMMUNITIES

Water reuse has been a successful water management strategy for SAWS for a number of years to reduce demand for permitted water. The success of the SAWS program has demonstrated significant conservation benefits. EAA support of water reuse for smaller communities would be beneficial for reducing water usage and extending existing supplies of groundwater. While the EAA has limited resources to support such an effort, it could provide leadership in promoting regional cooperation and assist those communities in obtaining funding to examine the feasibility of water reuse.

Effectiveness Measure:

- **EAA should provide leadership in promoting water reuse among smaller utilities and assist those communities in identifying resources to examine the feasibility of water reuse. Any savings accrued from reuse should be considered as future conservation savings under the ITP.**

The EAA has focused its efforts on Aquifer Storage and Recovery (ASR) and has not worked with communities in identifying the potential of water reuse.

3.2.2 ASSIST SMALLER UTILITIES TO REDUCE WATER LOSS

The EAA initially focused its water conservation strategies on leak detection and plumbing retrofits to meet its goal of conservation savings. This strategy was somewhat effective but did not

show the potential of meeting the EAHCP goal of 10,000 acre feet of conservation savings. The EAA and SAWS showed great initiative when the EAA provided funding for SAWS to do leak detection and repairs to meet the 10,000 acre feet conservation goal. The EAA also implemented the SCTWAC recommendation to encourage greater agricultural conservation. The result of this effort netted an additional 1,400 acre feet savings. In the 2018 Effectiveness Report the EAA was encouraged to focus its funding efforts to support smaller local utility efforts to reduce water loss through leak detection and repairs. While the conservation goals established in the EAHCP and ITP have been met it is important that water conservation above this level be encouraged and supported.

Effectiveness Measure:

- **EAA is encouraged to consider funding smaller local utilities efforts to reduce water loss through leak detection. An implementation plan should be considered as part of any financial assistance. Any savings from this program should be included in conservation savings for the EAA.**

The EAA has focused its conservation efforts on funding agricultural interests to reduce flood irrigation. Their funds have been used to supplement other grants that the agricultural interests have received. EAA has provided grants to the City of San Antonio for leak detection and fixing leaks under the EAHCP. There is consideration to provide future grants for reduction of water loss for smaller communities.

3.2.3 DEVELOP PARTNERSHIPS WITH OTHER FUNDING AGENCIES TO LEVERAGE EAA RESOURCES FOR CONSERVATION AND REUSE EFFORTS

The SCTWAC encouraged the EAA to coordinate with other regional water agencies and state agencies to leverage resources for conservation and reuse efforts. The Effectiveness Measure urged the EAA to be proactive in supporting conservation and reuse efforts.

Effectiveness Measures:

- **The SCTWAC understands that the EAA has limited resources to implement many conservation efforts but as a regional resource, the EAA could assist in coordination between local utilities and regional and state agencies to help implement these conservation and reuse goals.**

The EAA has met this effectiveness measure by increasing its VISPO program by 1,795 acre feet to assure minimum springflows at Comal and San Marcos Springs.

3.3 WATER QUALITY

The SCTWAC noted that the EAA has traditionally focused its water quality efforts on regulation of coal tar sealants, and plugging of abandoned wells. With the adoption of the EAHCP and ITP the EAA and other permit holders expanded water quality measures for Comal and San Marcos Springs. When requested, the EAA has assisted in fieldwork to measure water quality in the City

of San Antonio conservation easements and to a lesser extent assisted in water quality measurements in urban areas. As part of the EAHCP and ITP the EAA has supported riparian restoration in Comal and San Marcos Springs as well as providing technical assistance to other agencies involved with riparian restoration and invasive species eradication. As the EAA mission has continued to evolve water quality protection is becoming a greater concern to downstream interests. The Effectiveness Measures recognize the importance of water quality protection and its impacts on springflows and downstream interests.

Effectiveness Measure:

- **Continue with riparian restoration of Comal and San Marcos Springs.**

The EAA has met this effectiveness measure by supporting its co-permittees riparian restoration of Comal and San Marcos Springs.

Effectiveness Measure:

- **Continue with the plugging of abandoned wells.**

The EAA has met this effectiveness measures by plugging 47 wells during the past two years.

Effectiveness Measure:

- **Continue staff assistance to the City of San Antonio in the conservation areas acquired be the City for water quality protection.**

The EAA has met this effectiveness measure with the ongoing water quality monitoring and data sharing with the City of San Antonio in the conservation areas.

Effectiveness Measure:

- **If requested, consider working with local governments in water quality efforts through cooperative agreements that would cover the costs to the EAA.**

The EAA has met this effectiveness measure through its continued water quality programs as well as hazmat materials collection and disposal; providing financial assistance for obtaining secondary containment for regulated above ground storage tanks (ASR). The EAA has also entered into cooperative agreements with the other ITP permittees to improve water quality entering the springs through both riparian restoration and detention ponds.

Effectiveness Measure:

- **Cooperate with local, regional and state agencies to assist in implementing strategies for the control of invasive species in the contributing and recharge zones.**

The EAA has met this measure through the EAHCP with the cities of New Braunfels and San

Marcos to control invasive species in Comal and San Marcos Springs.

Effectiveness Measure:

- Become a resource for water quality information including Best Management Practices for local governments, residential and commercial developments. This can be accomplished by including information on the website and/or hosting conference/meetings on water quality issues within the contributing and recharge zones.

The EAA has met this effectiveness measure through the implementation of the Edwards Aquifer Conservancy and its focus on research and to implement practices that lead to enhanced water quality and quantity for the region.

Effectiveness Measure:

- Begin planning for the continued transition from focusing on regulating water quantity to water quality and availability.

The establishment of the Edwards Aquifer Conservancy has met this effectiveness measure by focusing on protecting and improving water quality within the aquifer and springs through the successful implementation of the EAHCP, well plugging program, farm collection of chemicals, assistance with Above Ground Storage Tanks, and education programs.

Effectiveness Measure:

- Continue the well plugging program for abandoned water wells.

The EAA has continued its well plugging program and have plugged 47 wells during the past two years.

Effectiveness Measure:

- Continue with the farm related hazardous substance pickup event.

The EAA has continued its farm related hazardous substance pickup events that occur twice a year.

3.4 REGULATORY

The EAA has met its legislative mandates to issue groundwater permits and establish a viable water market for Edwards Aquifer water. This accomplishment has included years of litigation and intense legislative oversight. The original cap on available water established by the Texas Legislature primarily focused on high quality water that could be used for irrigation and municipal and industrial uses. However, current interpretation of this mandate for permit issuance within the EAA jurisdiction includes both brackish and fresh water. Based on projected water demands within the region there is a potential for pressure for legislative action to allow additional permits for

brackish water permits that are not tied to the current cap.

The success of the SAWS Aquifer Storage and Recovery (ASR) project has other utilities in the region actively looking at ASR projects within the EAA jurisdiction. The development of ASR projects presents an interesting regulatory issue. If permitted Edwards Aquifer water is stored in an ASR within the Edwards Aquifer can it be removed without impacting existing withdrawal permits? How is the water to be accounted for when calculating the permit cap established by the Texas Legislature?

A related issue is that the demand for additional water continues within the Interstate 35 corridor between Austin and the San Antonio. The search for water has led utilities and development to look for additional water in the Edwards, Trinity and minor aquifers within the region. Since the EAA cannot regulate outside of the Edwards Aquifer potential issues dealing with well construction and protection of the water quality in the Edwards Aquifer are certain to occur. An added problem with the development of these water sources is that there are areas within the EAA jurisdiction that do not have a groundwater district that can regulate well development or withdrawals.

The development of the EAHCP included regulatory changes adding a new level of conservation and the issuance of the ITP required close coordination with other signatories and federal and state agencies. Recent proposed rule changes allowing for Base Irrigation rights to be converted to non-irrigation rights if the land use changes from agriculture have been contested by agricultural interests in the western portion of the EAA.

The following Effectiveness Measures are designed to address these issues as they potentially affect springflows and downstream interests.

Effectiveness Measure:

- **Begin consideration of rules that address the potential use of the Edwards Aquifer brackish zone for ASR development. Issues include if water is injected into the Edwards Aquifer from non-Edwards sources be considered as part of an existing permit or exempt from permit conditions. Is non-Edwards Aquifer water stored within the Edwards Aquifer subject to Critical Period rules?**

Working with the New Braunfels Utilities the EAA received specific legislative direction on addressing this issue. This legislative action solves the problem for the New Braunfels Utilities but is an open question for other utilities.

Effectiveness Measure:

- **Coordinate with other groundwater districts within the EAA jurisdiction that regulate non-Edwards Aquifer water withdrawals to assure that well development protects the Edwards Aquifer from incursion from other aquifers.**

The EAA has developed an informal working arrangement with groundwater districts for assuring that permits are acquired to drill through the Edwards Aquifer t

- Coordinate permitting process with other groundwater districts for well development since permits are needed from both the EAA to drill through the Edwards Aquifer and from the groundwater district regulating other aquifers.

The permitting coordination has been done on an informal basis up till this point.

- Develop a policy on how wells drilled outside of existing groundwater districts are to be permitted and the Edwards Aquifer will be protected from incursion from lower aquifers.

The EAA is in the process of developing a policy to address this effectiveness measure

Effectiveness Measure:

- Resolve issues for successful implementation of BIG rules.

This issue was resolved by the legislature in 2019.

- The EAA should continue its registration of exempt wells.

The EAA has continued its registration of exempt wells during the past two years.

3.5 PLANNING, RESEARCH, AND PARTNERSHIP DEVELOPMENT

The EAA has traditionally been a leader in research, modeling and studying the Edwards Aquifer. The EAA has developed both water and ecological modeling. Planning and research continues to be an ongoing effort for the EAA and is an integral part of the EAHCP and ITP. Ongoing research is also necessary to address future issues that will be facing the EAA and will provide the basis for fact based decisions. This effort will be assisted through the integration of all of EAA databases over the next two years. The integration of these databases will make accessing information easier and facilitate use of the information.

Effectiveness Measure:

- Continue research relating to the inter-relationship between the Edwards Aquifer and the Trinity and minor aquifers.

The EAA has continued its ongoing research regarding the inter-relationship between the Edwards Aquifer and the Trinity and minor aquifers. This ongoing research has developed some preliminary data showing the interrelationship between surface water sources and recharge of both aquifers.

Effectiveness Measure:

- Complete the current ASR study with the City of New Braunfels to assess the potential of storing fresh water in the brackish water zone for future use.

The EAA has completed this effectiveness measure with the publication of the ASR report in 2019. This report showed that using the brackish zone of the ASR was feasible and the report

identified appropriate sites for location of the ASR wells and facilities.

Effectiveness Measure:

- Continue research as prescribed in the EAHCP including sampling in Comal and San Marcos Springs.

Research has continued as prescribed in the EAHCP including sampling in Comal and San Marcos Springs

Effectiveness Measure:

- Continue research efforts to refine and improve existing water and ecological modeling.

The EAA has continued its research efforts by updating the MODFLOW water model to reflect changing conditions within the aquifer and integrating these results with ecological modeling on Comal and San Marcos Springs.

Effectiveness Measure:

- Complete data integration of all databases.

The EAA has completed the data integration and continues to update information for these databases.

Effectiveness Measure:

- Continue to support research into riparian restoration.

Research has continued its research and riparian restoration as part of the EAHCP. As part of this effort the EAA will be assessing the success of the effort. Additional research will be occurring as part of the Edwards Aquifer Conservancy programs and EAA direct research.

Effectiveness Measure:

Promote research partnerships with other agencies and institutions

The Edwards Aquifer Conservancy has partnered with the City of San Antonio, John and Florence Newman Foundation, and Morgan's Wonderland Camp to research water quality and provide first ever research facility focused on the Edwards Aquifer. The EAA has also continued its research program under the EAHCP with the U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department, and other ITP permittees.

3.6 FINANCING

The EAA has made financial assistance available to local governments and agricultural producers through its conservation programs and payments through the VISPO program. In order to meet the goals established in the EAHCP and ITP the EAA has focused its resources in obtaining the

greatest water savings in the shortest time. The EAA has also been successful partnering with the NRCS in leveraging funding to implement water conservation efforts.

The EAA has been successful maintaining fees over the past several years while meeting its statutory requirements. The EAA has begun to transition from Phase 1 to Phase 2 of the ITP and the Effectiveness Measures for this report reflect the need to identify the financial resources needed to meet the new ITP application.

Effectiveness Measure:

- **Consider partnering with local governments by providing funding that can be used as matching funds for conservation, reuse or riparian restoration.**

The EAA has begun this effort by beginning to set aside funds to be used for leverage to acquire additional funding for conservation property to protect water quality and for riparian restoration.

Effectiveness Measure:

- **Begin identifying long term financing needs to file the next ITP application.**

The EAA has met all long term financing needs for the second phase of the ITP.

3.7 EDUCATION

The EAA expanded its education programs to include the importance of protecting endangered species and protecting springflows as part of the ITP. With limited resources the EAA has expanded its education outreach to schools and providing educational information and learning about the Edwards Aquifer.

Effectiveness Measure:

- **The EAA should continue its educational efforts and explore funding opportunities to expand its programs.**

The EAA has done a significant amount of work to expand its educational programs through staff efforts and expanding its educational information on its website. The EAA has also obtained significant funding through the Edwards Aquifer Conservancy to expand its research and educational programs. The partnership with the Morgan's Wonderland Camp will provide direct education opportunities for 500 students a year.

3.8 IMPLEMENTATION OF THE EDWARDS AQUIFER HABITAT CONSERVATION PLAN AND INCIDENTAL TAKE PERMIT

The ITP permittees have successfully moved forward with meeting their commitments under the permit. This success has been the result of the close working relationship among the permittees and the efforts of the EAA to coordinate and follow through with implementation. Working within

the established process of committees the adaptive management approach has been very successful in identifying solutions and rapidly changing approach to meet the terms of the permit. As noted in the Blanton & Associates, Inc. report *Edwards Aquifer Conservation Plan Transition from Phase I to Phase II*,” the EAHCP contains a two-phased implementation strategy. Phase I began on the effective date of the ITP (March 18, 2013) and continued for seven years (March 17, 2020). This Phase involved prompt implementation of a package of Conservation Measures to protect the Covered Species and their ecosystems. Phase II of the EAHCP Implementation strategy began on the seventh anniversary of the effective date of the ITP (March 18, 2020) and continues for eight years until expiration of the ITP (March 31, 2028).

The Effectiveness Measures established by the SCTWAC included:

Effectiveness Measure:

- **Complete construction of physical infrastructure used to house the Covered Species as well as continue to collect species.**

This effectiveness measure has been met as the construction of the facilities was completed in 2019.

Effectiveness Measure:

- **Continue to implement the EAHCP and ITP and use the adaptive management process to address issues as they arise.**

This measure has been met by the success of Phase I of the EAHCP and the successful transition into Phase II. Critical to this success is the Strategic Adaptive Management Process (SAMP). This process allows for reviewing and making changes to the program if a particular strategy was not working. The National Academy of Sciences (NAS) Review of the Edwards Aquifer Habitat Conservation Plan Report 3 findings and conclusions identified what strategies were working and what strategies were not meeting the objectives of the EAHCP. For those strategies that were not meeting the EAHCP objectives the SAMP process was used to adjust the strategies for the conservation of the Comal Springs Riffle Beetle. In all other cases it was determined that the conservation strategies in Phase I were meeting the objectives of the EAHCP and ITP. The findings were approved by the Implementation Committee through resolution NO. 05-19-001 passed on May 23rd 2019.

**Table 3-1
2018 Effectiveness Measures**

EFFECTIVENESS MEASURE	In Progress/ Completed	Not Completed
Regional Resource		
Explore the potential for hosting regional meetings	✓	

Continue coordination and assistance for water protection	✓	
Water Conservation and Reuse		
Promoting and assist water reuse among smaller utilities		✓
Provide funding for leak detection for smaller utilities		✓
Regional resource to provide technical assistance for small utilities		✓
Water Quality		
Continue riparian restoration of Comal and San Marcos Springs	✓	
Continue plugging of abandoned wells	✓	
Cooperative efforts with San Antonio		
Work with others on water quality efforts	✓	
Implementation strategies for invasive species control	✓	
Be a resource for water quality information	✓	
Begin planning for transition from regulation to water quality and availability	✓	
Continue farm related hazardous substance pickup	✓	
Regulatory	✓	
How to regulate use of ASR within the brackish zone	✓	
Coordination with other Ground Water Districts	✓	
Coordination of permitting process with other Districts for well development in underlying aquifers	✓	
Develop policy on how water wells drilled into underlying aquifers will protect the Edwards Aquifer	✓	
Resolve issues for implementation of BIG rules	✓	
Continue registration of exempt wells	✓	
Planning, Research, and Partnership Development	✓	
Research on interrelationship between Edwards Aquifer and other aquifers	✓	
Complete the ASR study with New Braunfels	✓	
Continue EAHCP research including sampling in Springs	✓	
Refine and improve existing water and ecologic modeling	✓	
Data Integration of all databases	✓	
Support research into riparian restoration	✓	
Promote research partnerships	✓	
Financing	✓	

Partner with local governments to provide matching funds for water conservation efforts	✓	
Identify financing for Phase 2 of the ITP	✓	
Education	✓	
Continue educational efforts and funding for additional programs	✓	
Continued Implementation of EAHCP	✓	
Complete construction of refugia facilities	✓	

4.0 EFFECTIVENESS MEASURES FOR THE 2022 REPORT

The SCTWAC has established effectiveness measures in each report to evaluate if the EAA has met its legislative mandates and assess the impact on downstream interests. As the mission of the EAA has evolved based on legislative mandate, so have the effectiveness measures. The first 20 years saw the EAA dealing with the development of a permitting system, development of a water market and fending off multiple lawsuits challenging its authority. The Texas Legislature has addressed many of the contentious political and policy issues surrounding water resource management and protection of the endangered species as well allowing the EAA to develop and innovative permitting system designed to protect springflows from Comal and San Marcos Springs. This facilitated the development of the Edwards Aquifer Habitat Conservation Plan (EAHCP) and the issuance of the Incidental Take Permit (ITP). The implementation of the EAHCP and issuance of the ITP changed the role of the EAA from being primarily a regulatory and research agency to becoming a major player in implementing water management strategies within the region. The signatories of the ITP, including the EAA, Cities of San Antonio, San Marcos, New Braunfels, Texas State University, and Texas Parks and Wildlife Department have committed to protecting the threatened and endangered species that are dependent on spring flows within Comal and San Marcos Springs. Actions taken in 2020 have set the stage for the successful transition to the second phase of implementation of the EAHCP. The cooperation and institutional support for this effort is an excellent example for other groups to emulate.

The EAA has accomplished a great deal during the past biennium in meeting the challenges facing the agency including continued implementation of the EAHCP, working to expand its research capabilities, successfully working with New Braunfels Utilities in developing an Aquifer Storage and Recovery (ASR) project using the brackish groundwater zone of the Edwards Aquifer as the storage reservoir and significantly expanding its educational outreach. The EAA also formed the Edwards Aquifer Conservancy (EAC) to be a non-profit that can apply and receive funding from both public and private sources that will help the EAA accomplish its mission. The EAA and EAC received a 150 acre donation from the City of San Antonio and have partnered with Morgan's Wonderland Camp to develop an educational/research center. This partnership allows the EAA to be a tenant of the educational building to be used for both education and research.

The EAA has met or is in the process of meeting the effectiveness measures for this report. The focus of the Effectiveness Measures for the 2022 report will focus on looking toward the future and anticipating upcoming challenges that will be facing the EAA and its role in protecting water resources in their jurisdiction.

The 2022 Effectiveness Measures target the following areas:

- Regulatory
- Financial
- Planning, Research, and Partnership Development
- Water Quality
- Water Conservation and Reuse
- Education
- Continued Implementation of the Edwards Aquifer Habitat Conservation Plan and Incidental Take Permit compliance

4.1 Regulatory

The EAA's regulatory authority has been linked to the development of permitting of water use within the Edwards Aquifer and a limited role in regulating water quality. This regulation was based on the theory that only the fresh water zone of the Edwards Aquifer would be developed. Over time technology has been developed that can store fresh water within the brackish zone and in lower aquifers using Aquifer Storage and Recovery (ASR). The use of membrane technology also has made treating of slightly brackish groundwater feasible. However, these issues were not practical at the time the Texas Legislature capped the permitted water use at 572,000 acre feet per year. This usage cap pertains to the entire aquifer, both fresh and saline portions. Over the past year the Texas Water Development Board (TWDB), EAA and New Braunfels Utilities (NBU) completed a study that determined that fresh water from the Edwards Aquifer could be successfully stored in the brackish zone of the aquifer in an ASR project. In order to address the cap limitations and allow the utility to store the water and not have it counted against the NBU permit limitations the Texas Legislature allow a specific exemption for the project.

Water planning and particularly groundwater planning and permitting has changed dramatically over the past 20 years with regional planning groups developing water plans which are incorporated into the Texas Water Plan and the ability of groundwater districts to regulate water withdrawals within their districts to meet desired future conditions. The overlap of these districts with the EAA is in most of the counties within the EAA jurisdiction. While the EAA has responsibility for regulating the Edwards Aquifer the other district's regulatory roles could impact the EAA as well as the EAA regulation could impact other groundwater districts. Table 4-1 lists each of the groundwater districts and the counties and aquifers that they regulate.

Table 4-1
Groundwater Districts within the EAA Jurisdiction

County	District(s)	Aquifers Regulated
Hays	Hays Trinity GCD	Trinity
	Barton Springs/Edwards Aquifer CD	Edwards/Trinity
	Plum Creek CD	Carrizo-Wilcox
Guadalupe	Guadalupe County GCD	Carrizo-Wilcox
Bexar	Trinity Glen Rose GCD	Trinity
Comal	Comal Trinity GCD	Trinity
Caldwell	Plum Creek CD	Carrizo-Wilcox
	Gonzalez County UWCD	Carrizo-Wilcox
	Barton Springs/Edwards Aquifer CD	Edwards/Trinity
Medina	Medina County GCD	Edwards/Trinity
Uvalde	Uvalde County UWCD	Edwards (BFZ)/Edwards Trinity (Plateau)/Carrizo- Wilcox/Trinity

The I-35 corridor between Austin and San Antonio is experiencing significant growth which is putting pressure on utilities to obtain additional water supplies and become innovative and more efficient in using existing supplies. Part of this effort is to develop water sources in the Trinity and Carrizo-Wilcox aquifers as well as examining the use of ASR within these aquifers for storage as a water management strategy. The following are the effectiveness measures dealing with regulatory matters.

Effectiveness Measure:

- **Clarify that the brackish zone of the Edwards Aquifer can be used for ASR development with no penalty for storing and withdrawing the water.**

Effectiveness Measure

- **Currently any utility asking to use the brackish zone for ASR have to get specific legislative approval for each project. It is recommended that the EAA establish a policy supporting use of the brackish zone for ASR development and develop rules to regulate the use of the brackish zone for ASR development.**

Effectiveness Measure:

- **Begin groundwork with the legislature to educate them on the relationship of the brackish zone and its potential for use in ASR projects and potentially for treating and/or blending water. As part of this process develop options for use of the brackish zone and how these uses could be permitted.**

Effectiveness Measure:

- **Enter into formal working agreements with other groundwater districts to assure that the permitting process for each District is consistent and transparent in protecting the Edwards Aquifer and springflows.**

4.2 *Financing*

The EAA has relied on funding through permit fees and grants to fund their operations. The EAA has let permit holder know that a fee increase will be needed in Fiscal Year 2022. This would be the first fee increase in 9 years. It will be important the EAA be transparent in why the fee increase is needed and how it is to be used. Looking at the future it will be important for the EAA and detail how their programs are to be funded. The increased presence of the EAA in water quality protection and education it will be important to identify ongoing resources to support these efforts. The City of San Antonio has traditionally used sales tax revenue, authorized by the voters, to fund land acquisition over the recharge zone for the past several years. The Mayor has announced that it is the City's position to use this sales tax revenue primarily to fund transit improvements. The City has indicated that they intend to issue \$100 million in revenue bonds supported by water utility revenues to continue the program for the next 10 years. At that point the City hopes to acquire a total of 295,000 acres and pass the program to the EAA for continuation. The EAA has indicated that there will be a small set aside each year for this purpose. However, it is doubtful that the EAA will be able to accumulate sufficient funding to fully take on the land acquisition at the same scale as the City of San Antonio.

The Edwards Aquifer Conservancy was established to compliment the work of the EAA and become a vehicle to access private funding that the EAA could not access. To date the EAA has provided in-kind assistance to the EAC to facilitate its mission. It is the intent that at some point the EAC should be self-funded and be a stand-alone entity.

Effectiveness Measure:

- **The EAA should begin a process with permit holders to begin to explain the need for the increased fees and how the increase revenues will be used.**

Effectiveness Measure:

- **EAA seems to have been put in the position of taking over the conservation easement program by default with the City of San Antonio beginning to wind down their program. The EAA should clarify how much money is to be dedicated to this future program and an estimate of available funding at the termination of the City of San Antonio's conservation acquisition program.**

Effectiveness Measure:

- **The establishment of the EAC has the potential of providing additional resources for education and research. The relationship between the EAA and EAC should be clarified to provide a long term plan where it is clear when the EAC will be self sufficient and the EAA in-kind assistance can be reduced.**

4.3 Planning, Research, and Partnership Development

The EAA has been actively involved in continuing and expanding its planning, research, and partnership development during the past two years. This activity has been associated with both the EAHCP and other initiatives with various groups including the San Antonio Fire Department, Morgan's Wonderland Camp, the City of San Antonio, working with Historically Underutilized Businesses to understand how to do business with the EAA, establishing a Community Advisory Committee to be a sounding board for the EAA activities, and the establishment of the Edwards Aquifer Conservancy. These are important initiatives that are incorporating the EAA's three I's:

- Inclusion
- Imagination
- Innovation

The establishment of the Edwards Aquifer Conservancy (EAC) and donation of 150 acres of land from the City of San Antonio provides a location for continued research into various initiatives including recharge, riparian restoration, and the interrelationship between surface and ground water. The City of San Antonio announced that it would be ending its use of sales tax for the acquisition of conservation easements and property acquisition for protection of the recharge zone in 2021. The City of San Antonio has capped its contribution at \$100 million for conservation efforts and issue \$100 million in bonds secured by water revenues for future acquisitions. In response the EAA announced that it would begin setting aside \$3-\$5 million over the next 3-5 years to money from aquifer fees that would allow the EAC to begin acquiring easements and

property to protect the recharge zone.

The working relationship with the San Antonio Fire Department, Texas A&M and the EAA has yielded a plan that documents best management practices and improvements in fire suppression on the recharge zone. The successful completion of the New Braunfels ASR study has verified that ASR projects within the Edwards Aquifer are feasible and can be implemented. The partnership with Morgan's Wonderland Partnership is both a research and educational opportunity for the EAA. The Education Center provides the EAA with facilities that can be used to further the EAA objectives.

The effectiveness measures represent a recognition of the EAA's initiatives and the potential for significant benefit to the region.

Effectiveness Measure:

- **Continue research into the interrelationship between the Edwards and Trinity aquifers and how stream flow in the contributing and recharge zones.**

Effectiveness Measure:

- **Continue support of riparian restoration as part of the EAHCP and for the contributing and recharge zones.**

Effectiveness Measure:

- **Continue working with the Region L Planning Group in the development of the 2021 State Water Plan.**

Effectiveness Measure:

- **Work with conservation groups to identify strategic properties to acquire for conservation easements.**

Effectiveness Measure:

- **With the loss of funding from the City of San Antonio for conservation easement acquisition the EAA should develop a comprehensive plan detailing how funds collected through aquifer fees will be used for acquisition of conservation easements.**

Effectiveness Measure:

- **With the limitation of funds through aquifer fees the EAA should partner with conservation groups, foundations, non-profits, and state and federal agencies to leverage EAA funding to continue with land acquisition and determine what group is to operate and maintain the properties.**

Effectiveness Measure:

- **Continue to facilitate meetings with groups that are active in planning in the Region.**

4.4 Water Quality

The EAA has continued to successfully address water quality issues through the past biennium. These actions include direct programs and partnerships with both the public and private sectors. The water quality initiatives for Comal and San Marcos Springs have continued as part of the EAHCP and have shown success as several improvements have been documented. With the continued urbanization of the region, particularly the I-35 corridor and San Antonio suburban growth the need for water quality protection has increased. The EAA has worked with local governments to provide sampling and water quality research and field work. The EAA has also collaborated with SAWS, City of San Antonio, San Antonio River Authority and the Nueces River Authority sharing information on water quality. The EAA has also hosted the Ground Water Management Area Region 10 meetings.

The EAA has also continued its well registration and well plugging activities. Additionally, the EAA has hosted bi-annual collection events to collect hazardous waste and provided financial assistance for obtaining secondary containment for regulated above ground storage tanks.

Effectiveness Measure:

- **The EAA has worked with major players in the region to share water quality data. The EAA is encouraged to place Water Quality Best Management Practices on its website that can be used by communities and private interests in implementing water quality improvements.**

Effectiveness Measure:

- **Identification of priority areas for water quality protection in the contributing and recharge zones that would impact water quality in the aquifer or would impact water quality in Comal and San Marcos Springs.**

Effectiveness Measure:

- **Continue to provide staff support to the City of San Antonio for water quality field work in conservation areas.**

Effectiveness Measure:

- **Continue cooperative work with other partners to share water quality data and information.**

Effectiveness Measure:

- **Continue well registration and well plugging activities.**

Effectiveness Measure:

- **EAA should monitor existing and proposed municipal wastewater discharges and permit parameters on the contributing and recharge zones to assure that there are no impacts on water quality in the spring flows.**

Effectiveness Measures:

- **Continue bi-annual collection events to collect hazardous waste and providing financial assistance for obtaining secondary containment for regulated above ground storage tanks.**

4.5 Water Conservation and Reuse

The SCTWAC has supported water conservation efforts over the past reports as a measure to help assure both short and long term sustainability of the resource. The EAA conservation efforts were limited by available resources and initially focused on plumbing retrofits and municipal leak detection. With the adoption of the EAHCP additional resources were made available and the EAA entered into agreements with SAWS to pay for leak detection within their system and with agricultural interests to reduce water use. In return SAWS dedicated 10,000 acre feet of water to comply with the Incidental Take Permit and agricultural interests have reduced irrigation usage by 1400 acre feet. In addition to these savings the VISPO program was expanded by 1,795 acre feet to 41,795 acre feet to address concerns that additional water savings were needed to assure minimum springflows.

The EAA has done a commendable job in focusing its water conservation efforts on meeting the requirements of the EAHCP and ITP. By focusing on the major users, the goals have been attained. However, the SCTWAC continues to have concerns that smaller users, who do not have the same available resources as larger users, have not been able to fully address their conservation efforts by reducing unaccounted for water loss within their distribution systems.

Water reuse has been successfully implemented by SAWS for over 20 years to reduce water use from the Edwards Aquifer. The success of the SAWS reuse program has shown a significant conservation savings. EAA should support for water reuse for smaller communities would be beneficial for reducing water use and if implemented, should be considered a conservation savings. With the continued population growth within the EAA jurisdiction smaller communities with no other source of water could use water reuse as a strategy to use their permitted Edwards Aquifer water to meet these increased demands. As noted in previous reports, the EAA has limited resources to support such an effort but could provide leadership in promoting regional cooperation and assist those communities in obtaining funding to examine the feasibility of water reuse on a local and regional basis.

Effectiveness Measure:

- **EAA is encouraged to consider funding smaller utilities efforts to reduce water loss through leak detection. An implementation plan showing a schedule for fixing leaks based on water loss should be considered as part of any financial assistance.**

Effectiveness Measure:

- **EAA should provide leadership in promoting water reuse among smaller utilities and assist those communities in identifying resources to examine the feasibility of water reuse.**
- **EAA should monitor existing and proposed wastewater discharges**

Effectiveness Measure:

- **Develop partnerships with other funding agencies to leverage EAA and local resources for conservation and reuse efforts.**

Effectiveness Measure:

- **EAA should consider acting as a coordinator between local utilities and regional and state agencies to help implement these conservation and reuse objectives.**

Effectiveness Measure:

- **EAA should encourage reuse or land application for municipal wastewater discharges.**

4.6 Education

The EAA has an active and ongoing educational programs and outreach through the EAHCP, Edwards Aquifer Conservancy and its other programs. The EAA and EAC have entered into a cooperative agreement with Morgan's Wonderland Camp to be a tenant in an Education and Research Center. This Center will be able to provide programs and educational opportunities to over 500 students per day and will be open for public visitation and interaction with the staff. EAA staff has also volunteered their time to be active in the Big Brothers and Big Sisters Program working with youth from across San Antonio. EAA has become active on social media, updated its web site to make it easier to use, and produced a significant amount of You Tube video's that focus on the ongoing efforts of the EAA and its research, educational and HCP program.

Effectiveness Measure:

- **Complete implementation of the partnership with Morgan's Wonderland Camp and consider outreach to local public and private schools to bring more students in for the experience.**

Effectiveness Measure:

- **Integrate the educational programs of the Edwards Aquifer Conservancy and EAA programs so that public and private donations can help support these efforts.**

Effectiveness Measure:

- **Continue the newsletters, social media and You Tube presentations and programs. These forums can be used for promoting the goals of the EAA and continue to provide a variety of public outreach.**

4.7 Continued Implementation of the Edwards Aquifer Habitat Conservation Plan and Incidental Take Permit Compliance

The EAA Board of Directors, Committees, and staff deserve a great deal of credit for successfully implementing the EAHCP. The forethought and perseverance of the those involved has shown how to work through a process and successfully complete their charge. The minimal changes that were required to move to the second phase of the program show that the process is working and set the stage for the next phase and renewal of the of the Incidental Take Permit.

Effectiveness Measure:

- **Continue to implement the EAHCP and use the adaptive management process to address issues as they arise.**

APPENDIX A

EAA ACCOMPLISHMENTS



**EDWARDS AQUIFER
AUTHORITY**

**ACCOMPLISHMENTS
2018-20**

**Prepared for MRB Group for:
The Report on the Effectiveness of the Edwards Aquifer Authority**

**To be submitted by:
The South Central Texas Water Advisory Committee**

INTRODUCTION

The Edwards Aquifer Authority (EAA) is pleased to present this overview of accomplishments for calendar years 2018 through 2020. This report is provided to the South Central Texas Water Advisory Committee (SCTWAC) to assist in its biennial report on the effectiveness of the EAA. These accomplishments, which are tied to the major strategic goals originally adopted by the EAA board in November 2015, are intended to depict the more significant achievements of the EAA since SCTWAC's last effectiveness report.

Goal A. Sustain Federally Protected Aquifer-Dependent Species

2018-20 ACCOMPLISHMENTS:

- VISPO Adaptive Management – successfully facilitated the adaptive management process through the EAHCP stakeholder and implementing committees to modify the Voluntary Irrigation Suspension Program Option (VISPO) to achieve target springflow rate at Comal Springs as modeled for drought of record.
- Phase I to Phase II – successfully facilitated the process from Phase I of the EAHCP to Phase II through stakeholder, science, and implementing committees to gain consensus on moving forward with remainder of the time left on the current Incidental Take Permit and Habitat Conservation Plan (until 2028). This transition allows for focus to shift more decidedly to working toward the transition to the next Incidental Take Permit/Habitat Conservation Plan over the next few years.
- Took initial steps toward development of a road map for the renewal of the EAHCP in 2028 with third-party analysis of options available.

Goal B. Ensure Effective Management of the Edwards Aquifer

2018-20 ACCOMPLISHMENTS:

- Base Irrigation Groundwater (BIG) Conversions based on changes in land use – Facilitated a legislative solution to the lawsuit filed by Uvalde County Groundwater Conservation District, the City of Uvalde, and County of Uvalde regarding the EAA's ability to "convert" restricted (base) irrigation groundwater to unrestricted use when farmland is developed and can longer be farmed. The legislative bill that was negotiated by all parties ultimately codified the EAA's ability to convert base irrigation groundwater rights and, as a result, led to the dismissal of the lawsuit.
- EAA Act Clarification/Insulation (from chapter 36) -- facilitated a legislative process to further separate and insulate the EAA Act from general groundwater law in the state of Texas by extracting relevant elements of Chapter 36 of the Texas Water Code (the general law applicable to groundwater conservation districts) and incorporating them into the EAA Act (which is special law), thereby removing reliance of Chapter 36 as source law for EAA operations and greatly diminishing risks of future unintended affects to the EAA that could occur through Chapter 36 changes.

- Completed the first phase of a reengineered, multi-faceted database system for administering EAA permit, well, and regulatory data.
- Maintained compliance with pumping limitations for years 2018 and 2019.

Year	Permitted (acre-feet)	CPM Authorization (acre-feet)	Pumped (acre-feet)	Un-Pumped (acre-feet)	Over-Pumped (acre-feet)	Over-Pumped (% of CPM Authorization)
2018	571,600	528,470	351,140	177,330	1,251	0.24%
2019	571,600	571,600	339,020	232,580	362	0.06%

Goal C. Identify and Address Recharge Initiatives for the Edwards Aquifer

2018-20 ACCOMPLISHMENTS:

- NBU ASR Demonstration Project – facilitated development of this project in technical consultation with New Braunfels Utilities and its consulting specialists to ensure protective measures aimed at the aquifer and springs; also supported efforts to gain legislative clarity associated with project goals.
- Recharge Dam Permitting Updates – continued engagement with TCEQ regarding revisions to recharge dam diversion permits. Achieved “administratively complete” status and now undergoing technical review. Finalized gate design for installation at Seco Sinkhole and awaiting approval from TCEQ.
- Land Restoration Practices – initiated exploration of land management/soil restoration practices as potential long-term approach to enhancing recharge quantity and quality on the recharge and contributing zones. Staff underwent training to begin development of conceptual approach to demonstrating, evaluating, and implementing such practices across region.

Goal D. Prevent the Pollution of the Aquifer

2018-20 ACCOMPLISHMENTS:

- First Responder Program -- launched program aimed at training and equipping first responders with information on sensitive karst features to proactively prevent potential contamination from hazardous material spillages. The initiative gained a \$218k grant from the Edwards Aquifer Protection Program of the City of San Antonio (COSA) awarded in 2019 and is a collaboration of the EAA, COSA, San Antonio Fire Dept. and TX A&M with support from Tx Parks and Wildlife. Highlights of the program include the development of best management practices, a training course for HazMat first responders and a database interface that will put EAA collected data in the hands of first responders to minimize any impacts to the Aquifer from their efforts related to incidents on the recharge zone.
- Abandoned Well Program – fully implemented risk-based assessment and prioritization approach to targeting abandoned wells for closure. This approach utilizes GIS technology

along with a criteria of risk factors such as conditions of the well, geology, surrounding development, etc.

- Critical Issues Management – Leveraged science and data to establish EAA as technical resource to various issues that arise from time to time such as petroleum pipelines, treated wastewater discharges on the contributing zone, etc. Have thus far effectively balanced political pressures with science to inform processes and earn favorable posture with stakeholders gain greater access to wells, properties, etc. to feed data collection and monitoring efforts.
- Facilitated numerous conversations around the very public debate over the future of the City of San Antonio (CoSA) Edwards Aquifer Protection Program (EAPP) and elevated the EAA profile as an expert organization in this regard.
- Developed the framework for a new concept called The Next Generation, whereby the EAA intends to develop its own land conservation easement-type program to complement the existing EAPP and eventually succeed it over the long-term with a focus on protecting and enhancing aquifer water quality and quantity.

Goal E. Conduct Research that Enhances Understanding and Effective Management of the Aquifer

2018-20 ACCOMPLISHMENTS:

- Interinformational Flow (IFF) Study – continued cornerstone data collection and analysis project of research program and leverage this effort by integrating partnership initiatives such as the NBU ASR, wastewater discharges, Medina Lake USGS study, etc. into the fabric of IFF study. This effort will continue for foreseeable future as a foundational underpinning to future research initiatives.
- Field Research Planning – identified and leveraged the opportunity for a potential field research observatory on the recharge zone through participation in the City of San Antonio Edwards Aquifer Protection Program (conservation easement initiative). Acquired ownership of key undeveloped lands along Cibolo Creek and continue to shape the vision for long term research and monitoring of various conservation and land management practices.

Goal F. Develop an Inclusive, Service-Oriented Organization

2018-20 ACCOMPLISHMENTS:

- Inclusion Initiative – launched “business recharge boot camp” targeting small and minority owned business owners with training in how to contract with government entities and improve their business acumen and influence with the EAA and other similar entities.
- Adaptive Leadership Implementation – developed and initiated a new business and management model for the future around the concept of the three “I” words: inclusion, imagination, and innovation as a framework for inviting and engaging with more people

internally and externally, including stakeholders and businesses in ways not before contemplated.

- Internships and Education Partnerships – continued to refine and expand footprint of the EAA’s internship and education-based partnerships, including the Sam Houston High School intern initiative, the CAST Tech partnership that will eventually introduce students at neighboring SAISD technology magnet school to EAA workplace technical expertise and data opportunities for hands-on learning. Also maintained partnership with the Alamo Community Colleges through work study placement program across all areas of the EAA.
- Fostered a better EAA organization, e.g. more flexible, mobile and creative in all respects, including but not limited to becoming a more technologically connected and functional operation.

Goal G. Build Shared Value in the EAA Mission

2018-20 ACCOMPLISHMENTS:

- Community Advisory Committee – established a community advisory committee of local business and community influencers to serve as sounding board for ideas around the concept of engaging the public in new and different ways from the past. Group meets quarterly and serve as ambassadors for the EAA mission, particularly among groups not directly engaged in the past by the EAA.
- Education Outreach Center – identified and developed partnership with Gordon Hartman/Morgan’s Wonderland for the establishment of an education outreach center on the premises of the planned Morgan’s Camp on the recharge zone. This initiative provides a platform for elevating the profile, outreach, and impact of the EAA mission, which can then be leveraged into additional opportunities for partnerships and fundraising.

Goal H. Maintain Fiscal Stability

2018-20 ACCOMPLISHMENTS:

- AMF Sustainability – continued to sustain programs (HCP and general EAA) without need for increased aquifer management fee rate for ninth consecutive year.
- Financial Investment Effectiveness – continued to implement investment “laddering” approach to maximize a competitive return on investments for agency in an increasingly uncertain financial landscape influenced by market forces.