

# **Edwards Aquifer Authority 2017 Work Plan**

### **5.5.1 Edwards Aquifer Authority and San Antonio Water System Aquifer Storage and Recovery Work Plan**

Section 5.5.1 of the Edwards Aquifer Habitat Conservation Plan (EAHCP) assigns acquiring leases and options of water permits for use in the San Antonio Water System (SAWS) Aquifer Storage and Recovery (ASR) to the Edwards Aquifer Authority (EAA). SAWS will operate the ASR infrastructure and retain control of day-to-day operations of the ASR facility related to EAHCP water injection and recovery. The EAA will ensure compliance with EAHCP requirements through management of the Interlocal Contract between the EAA and SAWS for the Use of the Twin Oaks Aquifer Storage and Recovery Project for Contribution to Springflow Protection, which became effective August 14, 2013. The contract outlines the responsibilities of both parties, including administration and implementation.

#### **Long-term Objective:**

To acquire 50,000 acre-feet of Edwards Aquifer unrestricted agricultural, municipal, and industrial permits to be made available to SAWS for the purposes of physical storing or crediting the Regional ASR balance; or as forbearance options.

#### **Target for 2017:**

The ASR contract between EAA and SAWS will continue to be implemented. EAA is the leasing agent for ASR leases and will continue providing SAWS with notices of availability of HCP groundwater. To encourage greater participation, EAA staff pursued two initiatives in 2015. First, EAA secured a rate adjustment and then worked aggressively to inform permit holders of the new prices and determine interest; even scheduling targeted small group meetings. Second, EAA staff closely reviewed 2013 and 2014 authorization and annual groundwater use reporting to identify additional leasing opportunities, and debuted a program to enlist permit holders to pool together un-pumped authorization to make additional ASR regional contributions. The 10-year recharge average triggered Tier 2 acquisition situation for 2016. The EAA began development of a Tier 2 product in 2015; however, the vagaries of triggering and payment conditions limited acceptance of the Tier 2 and Tier 3 agreements. The success of 2015 and 2016 in acquiring ASR leases merits consideration of a different strategy that still includes a goal of 50,000 acre-feet, but may include utilization of forbearance options.

#### **ASR Program:**

*Description of the SAWS ASR:* The SAWS Twin Oaks ASR is an underground storage reserve in the Carrizo sand aquifer in southern Bexar County. As a SAWS water management project, it is designed to store Edwards water when demand is less than available supply. The stored water is returned to San Antonio for use when demand is high and Edwards supply is restricted by Critical Period Management and other drought-related limitations.

The capacity and capabilities of the SAWS ASR are such that it can be used to meet SAWS ratepayer expectations and, if operated as described in the EAHCP, will play a significant role as a Phase I activity to protecting the Covered Species at Comal and San Marcos Springs.

*Operations:* The significant action of approval of the Edwards Aquifer Habitat Conservation Plan Program Interlocal Contract between the Edwards Aquifer Authority and The San Antonio Water

System for the Use of the Twin Oaks Aquifer Storage and Recovery Project for contribution to Springflow Protection Interlocal Contract effective August 14, 2013 takes elements of the HCP's ASR flow protection strategy into an operations contract.

*Injection:* Storage of HCP groundwater shall be at the discretion of SAWS and will be dependent on operating conditions. All HCP groundwater made available to SAWS before June 30<sup>th</sup>, 2016 will be physically stored or credited as in storage, with the accompanying forbearance from the Aquifer, should triggers defined in the Interlocal Contract occur in 2017.

*Forbearance and Recovery:* Forbearance, and possible recovery from ASR, of Edwards Aquifer pumping from certain wells will occur when the ten-year rolling recharge average is less than 500,000 acre-feet and the ten-day average of aquifer levels measured at the J-17 index well drop below 630 feet mean sea level (MSL). The annual amount of water recovered during a repeat of the drought of record is outlined in Exhibits E & F of the Interlocal Contract. Changes to the Presumptive Forbearance Schedule outlined in Exhibit E may be approved as outlined in Section 5.3 of the Interlocal Contract.

*Leasing:* The EAA will continue to acquire Tier 1 leases for the ASR program in 2017. with the acquisition goal of aggressively filling the ASR. As the ASR storage goal nears fulfillment, and current market conditions are assessed, operational strategies will be developed and discussed with the Implementing Committee for the remaining acre-feet required by the HCP; either as leases or forbearance options.

**Monitoring:**

The EAA will actively manage the Interlocal Contract with SAWS. Status reports and updates will be provided regularly to the Implementing Committee.

*ASR Regional Advisory Group:* Per section 5.5.1 of the HCP, a 12-person SAWS ASR Regional Advisory Group will meet to advise SAWS as it makes decisions relating to the operation of the ASR facility relevant to the EAHCP. Membership on the Regional Advisory Group will include: four representatives from the San Antonio Water System, the EAHCP Program Manager; one representative each from the EAA, EAA permit holder for irrigation purposes, small municipal pumpers, the spring cities, environmental interests, industrial pumpers, and downstream interests.

**Budget:**

Table 7.1

\$4,759,000 – lease options

\$2,194,000 – O&M

\$6,953,000 – total

Estimated 2017 budget\*

\$ 4,000,000– leases

\$ 800,000 – O&M (this amount may vary)

\$ 4,800,000 – total

\*Actual expenditures for 2017 will be determined by the terms of the Interlocal Contract depending on the quantity of HCP groundwater physically stored, the amount of active water leases, and the cost of eligible operation and maintenance activities. Budgeted money that is not spent will be placed in the reserve fund.

### 5.1.3 Regional Water Conservation Program

#### Long Term Objective:

To reduce withdrawals from the Edwards Aquifer by 10,000 acre-feet, realized through implementation of conservation measures that will conserve 20,000 acre-feet of water.

*Background:* Conservation is one of four springflow protection measures of the Edwards Aquifer Habitat Conservation Plan (EAHCP) intended to reduce aquifer withdrawals, and subsequently increase aquifer level and springflow. The concept is to reduce aquifer withdrawals by 10,000 acre-feet and the EAHCP contemplates using a Regional Water Conservation Program (RWCP) to achieve the goal in the following manner:

- An Initial Commitment of 10,000 acre-feet was solicited from EAA permit holders to remain in the EAA Groundwater Trust for a period of ten years.
- The Initial Commitment is returned to the permit holders through the implementation of conservation initiatives and technical assistance provided by the EAHCP. As conservation savings accrue, one-half of the savings are realized by the party participating in the RWCP and the other half is placed in the Groundwater Trust for the remaining term of the EAHCP ITP; allowing the original donors to have their donated water returned on a pro-rata basis. Consequently, 20,000 acre-feet of conservation savings are necessary for full return of the Initial Commitments.

In order to provide an immediate benefit to the aquifer and springflow, several entities within the EAA jurisdictional area have agreed to make Initial Commitments to the EAA Groundwater Trust. As of January 2015, the initial donations to the program were 8,400 acre-feet. The initial contribution of water rights was placed in the Groundwater Trust for a period of ten years (see Table below):

Table 1: Initial Commitment Contracts.

Entity	Acre-Feet of Water Donated
San Antonio Water System	8,000
City of San Marcos	300
Texas State University	100
TOTAL	8,400

These Initial Commitments are to be returned to the permit holder at the end of 10 years or when an equal amount is identified as conserved and in reserve by the RWCP. Initial Commitments will be returned to the permit holder in a proportion equal to their contribution.

At the September 18, 2014, Implementing Committee, a RWCP work group was appointed to review the progress of conservation initiatives and make recommendations to achieve the goal of reducing aquifer withdrawals by 10,000 acre-feet. The work group had an initial meeting on October 15 and met five times, concluding on December 11. A final report was presented to the January 15, 2015, Implementing Committee with nine recommendations:

1. Implement an outreach program to ensure all permit holders are aware of the RWCP.
2. Look for opportunities to pay permit holders for permanent conservation of historically unused permitted water.
3. Expand the search for reuse and industrial technology opportunities in the EA Region and offer incentives for their excess capacity.
4. Look for opportunities to create flexible agreements with program participants (i.e. varying terms).
5. Provide settlement opportunities for permit holders who over-pump their permit.
6. Offer incentives and assistance to encourage municipalities to promote landscape conservation, especially during peak demand.
7. Create a conservation incentive program for exempt well owners.
8. Explore partnerships with land trusts.
9. Target conservation measures to producers that use flood irrigation.

In 2013 and 2014, twenty communities and utilities within the EAA jurisdiction were ranked, based on Gallons per Capita per Day, and thirteen were contacted about potential participation in the RWCP. Only two agreed to participate with the EAHCP and their total savings, and commitment to the Groundwater Trust reached approximately 200 acre-feet.

In late 2015, a leak repair program with SAWS was negotiated and executed, that will fulfill the goal of the 10,000 acre-feet in the EAA Groundwater Trust by 2020. The contract covers the remainder of the ITP and is estimated to conserve almost 20,000 acre-feet accrued over the first five years.

Table 2: SAWS – EAA 5-year water savings commitment and fiscal obligation.

Water	2016	2017	2018	2019	2020	Total
Estimated Savings (AF)	4,745	4,745	4,745	4,745	632	19,612
Commitment to the Groundwater Trust (AF)	2,372.5	2,375.5	2,372.5	2,372.5	316	9,806
Payment	\$4,507,750	\$4,507,750	\$4,507,750	\$4,507,750	\$600,400	\$18,631,400

With the payment of \$950 per acre-foot of water conserved that has been used as a standard for other RWCP participants, the contract will cost \$18,631,400 while sharing the remaining 9,800 acre-feet into the Groundwater Trust necessary to complete the 10,000 acre-foot goal.

**Target for 2017:**

With the execution and implementation of the contract with SAWS in 2016, the RWCP will have effectively met its conservation goal by 2020. Nevertheless, with approximately \$280,000 remaining in the RWCP budget, the EAA will evaluate conservation initiatives that could result in additional water saved above and beyond what is required by the EAHCP within the funds available, if it is deemed beneficial within the overall EAHCP program goals.

Accordingly, six performance measures and/or activities have been identified for 2017, as follows:

1. Convene a meeting of the RWCP monitoring committee.
2. Explore measures that could further reduce aquifer withdrawals.
3. Explore improved communication with the US Department of Defense to effectuate improved and measurable conservation results on local military installations.
4. Continue to explore conservation opportunities with industrial users.
5. Continue to explore ways to leverage existing EAA conservation efforts with EAHCP springflow conservation programs for enhanced results.
6. Maintain and administer EAHCP water conserved in the EAA Groundwater Trust.

**Methodology:**

This work plan will be implemented by EAA staff with limited assistance from other contractors as needed.

**Monitoring:**

As part of this contact, SAWS is obligated to transfer to the EAA groundwater trust half of the water saved under this program. SAWS will provide a total of three summary reports capturing and quantifying yearly milestones.

**Budget:**

Table 7.1:

\$1,973,000

Estimated 2017 budget:

\$4,533,174.55

\*The requested budget for the Regional Water Conservation work plan is \$4,533,174.55 (see Table 3). The increase in funds from Table 7.1 of the EAHCP for this effort will be provided from the EAHCP fund balance for 2013-2015 as well as redistributing the program budget for the remainder of the ITP (to 2027). There will be approximately \$25,000 per year remaining to be utilized for other RWCP initiatives after the funding obligation to SAWS and others is fulfilled.

Table 3: Final 2017 Budget Breakdown

Table 7.1	SAWS Year-2 Contract Costs	2017 Budget for Additional Performance Measures	Total 2017 Budget
\$1,973,000	\$4,507,750	\$25,424.55	\$4,533,174.55

### 5.1.2 Voluntary Irrigation Suspension Program Option

#### Long-term Objective:

The goal of VISPO is to enroll 40,000 acre-feet (AF) of permitted irrigation rights (base and/or unrestricted) that will remain unused in years of severe drought. Permit holders have the option of enrolling in a five – year or ten – year program and will be compensated based on the amount of water enrolled and the program selected. Table 1 below shows the payments for the five and ten year VISPO programs. If the water level at the J-17 index well in San Antonio is at or below 635 feet on October 1 of any year, program participants are contractually obligated to suspend the use of their enrolled water for the following year - beginning on January 1.

Table 1: VISPO Enrollment Options

Years	Fee	1	2	3	4	5
5*	Stand-by	50.00	50.75	51.51	52.28	53.06
	Suspension**	150.00	152.25	154.53	156.84	159.18
10	Stand-by	57.50	57.50	57.50	57.50	57.50
	Suspension**	172.50	172.50	172.50	172.50	172.50

Years	Fee	6	7	8	9	10
5*	Stand-by	N/A	N/A	N/A	N/A	N/A
	Suspension**	N/A	N/A	N/A	N/A	N/A
10	Stand-by	70.20	70.20	70.20	70.20	70.20
	Suspension**	210.60	210.60	210.60	210.60	210.60

\*The amount of each payment escalates at 1.5% annually over the five years of the program.

\*\*Suspension payment is made in addition to stand-by payment.

Table 2: Enrollment concluded on October 6, 2014, with a total enrollment of 40,921 acre-feet.

Program	Atascosa (AF)	Bexar (AF)	Comal (AF)	Hays (AF)	Medina (AF)	Uvalde (AF)	Total (AF)
<b>5-year</b>	354	884	0	123	3,693	20,417	25,471
<b>10-year</b>	0	1,573	0	0	7,803	6,074	15,450
<b>Total</b>	354	2,457	0	123	11,496	26,491	40,921

Table 3: VISPO did not trigger for 2016; therefore, all enrolled water can be used by the permit holders, requiring only standby payments.

Enrollment Year	5 – year	10 – year	Total
<b>2013</b>	\$496,516	\$632,142	\$1,128,658
<b>2014</b>	\$803,480	\$256,237	\$1,059,717
		<b>Grand Total</b>	<b>\$2,188,375</b>

#### Target for 2017:

Enrollment is complete and will not need to be addressed until the end of 2018 when the term will expire for 2013 enrollees that selected the five-year option. For 2017 staff will observe J-17 on

October 1, 2016 and respond by making payments in a timely fashion and monitor pumping to confirm compliance.

**Budget:**

Table 7.1:

\$4,172,000

Estimated 2017 budget\*:

\$4,172,000

\*Since VISPO enrollment is full, expenses for 2017 will be determined by whether or not a trigger condition exists on October 1, 2016.

Table 4: If VISPO does not trigger, the 2017 expenses will be standby only:

<b>Enrollment Year</b>	<b>5 – year</b>	<b>10 – year</b>	<b>Total</b>
<b>2013</b>	\$503,963 .74	\$632,142	\$1,136,105.74
<b>2014</b>	\$815,532.20	\$256,237	\$1,071,769.20
		<b>Grand Total</b>	<b>\$2,207,874.94</b>

Table 5: If VISPO does trigger, the 2017 expenses will include standby and suspension payments as follows:

<b>Enrollment Year</b>	<b>5 – year</b>	<b>10 – year</b>	<b>Total</b>
<b>2013</b>	\$2,015,854.96	\$2,528,568	\$4,544,422.96
<b>2014</b>	\$3,262,128.80	\$1,024,948	\$4,287,076.80
		<b>Grand Total</b>	<b>\$8,831,499.76</b>

#### **5.1.4 Edwards Aquifer Authority Stage V Critical Period Management**

Stage V Critical Period Management was developed and included in the Edwards Aquifer Habitat Conservation Plan to help decrease withdrawals and maintain adequate spring flows at both Comal and San Marcos Springs during times of drought. On February 14, 2012, the Edwards Aquifer Authority (EAA) Board of Directors voted to amend its Critical Period Management (CPM) Program to include the new emergency Stage V. Implementation of Stage V results in a reduction of 44% to municipal, industrial and irrigation permit holders in both pools of the Edwards Aquifer who are authorized to withdraw more than 3 acre-feet per year. Stage V became effective as a rule on March 18, 2013 when the Incidental Take Permit was issued by the U.S. Fish and Wildlife Service. Stage V was first triggered in the Uvalde Pool on March 28, 2013, when the 10-day average at the J-27 index well dropped below 840 feet mean sea level. Stage V reductions remained in effect for 798 days and expired on June 4, 2015.

##### **Target for 2017:**

EAA staff monitors daily aquifer levels in both the San Antonio and Uvalde Pools of the Edwards Aquifer region. If the 10-day average for J-27 or J-17 and Comal springflow levels in reaches the designated trigger for Stage V, the EAA General Manager will issue a Notice of Commencement for implementation in five newspapers within the EAA jurisdiction. Notice will also be posted at the EAA's office and on the EAA website. All affected permit holders will also be provided written notice of implementation of Stage V and the requirement to reduce pumping by 44%.

*Permit Holder Assistance:* The EAA provides an online Critical Period Calculator to assist permit holders in calculating CPM reductions as they apply to each individual permit holder's total authorized withdrawal amount throughout the year. EAA staff also assists permit holders through "one-on-one" customer service offerings as may be necessary.

*Triggers:* The triggers for Stage V in the San Antonio Pool are as follows: the 10-day average at the J-17 index well in San Antonio falls below 625 mean sea level (msl) and the 10-day average at Comal Springs falls below 45 cubic feet per second (cfs); or the 3-day average at Comal Springs falls below 40 cfs. In the Uvalde Pool, Stage V is triggered when the 10-day average at the J-27 index well falls below 840 msl (see attachment I Critical Period Triggers Chart).

*Reporting:* By rule, permit holders are required to report their annual groundwater use to the EAA by January 31 for all groundwater used the preceding year. Permit holders who use more Edwards groundwater than authorized annually are subject to enforcement action.

##### **Budget:**

No budget allocated in Table 7.1

### **6.3.1 Biological Monitoring Program for the Comal and San Marcos Aquatic Ecosystems**

Since 2000, the Edwards Aquifer Authority (EAA) has conducted an extensive biological monitoring program in the Comal and San Marcos spring systems. This program was referred to as the Variable Flow Study (VFS). In 2013, the elements of the VFS were incorporated into the Biological Monitoring Program (BioMP) for the Edwards Aquifer Habitat Conservation Plan.

The purpose of the BioMP is “to monitor changes to habitat availability and population abundance of the Covered Species that may result from Covered Activities” (EAHCP § 6.3.1). Another benefit of the BioMP is to collect data that can be used in the applied environmental research studies (EAHCP § 6.3.4) and provide data and information for the ecological model development described in EAHCP § 6.3.3. The BioMP includes: (1) Comprehensive Sampling, (2) any triggered Critical Period monitoring, (3) any high flow triggered monitoring (4) and any EAHCP-specific sampling required by Section 6.4.

In 2016, the Expanded Water Quality Monitoring Program Work Group and the Biological Monitoring Program Work Group were created by the Implementing Committee to carry out a holistic review of the EAHCP monitoring programs and make changes based on the recommendations of National Academy of Sciences (NAS), the NAS Work Group, the input of the Science Committee, the Permittees, and subject matter experts. The Work Groups’ final report – ***“Report of the 2016 Expanded Water Quality Monitoring Program Work Group and Report of the 2016 Biological Monitoring Program Work Group”***<sup>1</sup> (Report) - was presented to the Implementing Committee for approval in June 2016. This work plan reflects the recommendations found in that report.

#### **Target for 2017:**

In 2017, the BioMP will continue as established with the following modifications:

1. Replace the previously conducted macroinvertebrate food source monitoring with Texas Commission on Environmental Quality/Texas Parks & Wildlife Rapid Bio-Assessment (RBA) protocols for macroinvertebrate community health, to be conducted the same time as fixed drop-net sampling for fountain darters at five reaches in the Comal system and four reaches in the San Marcos system.
2. Flow-partitioning within Landa Lake will be conducted by the EAA, but not through the EAHCP.
3. During the “Water Quality Grab Sampling” component of the BioMP, the method detection limit (MDL) for soluble reactive phosphorus will be reduced from 50 µg/l to at least 5 µg/l.

Also, the EAA will conduct a collective analysis of data with other programs conducting monitoring within the spring systems, such as the Clean Rivers Program, currently conducted by GBRA and TCEQ in the Comal and San Marcos rivers, the EAHCP Biological and Water Quality

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<sup>1</sup> Edwards Aquifer Habitat Conservation Plan (2016). *Report of the 2016 Expanded Water Quality Monitoring Work Group and Report of the 2016 Biological Monitoring Program*. San Antonio, TX: Edwards Aquifer Habitat Conservation Plan.

Monitoring Programs and the EAA Aquifer Science Department's groundwater and spring orifice-sampling programs.

**Budget:**

Table 7.1:

\$400,000

Estimated 2017 budget:

\$437,000\*

\*2017 EAHCP BioMP will be performed by an outside contractor; estimated annual costs for the biological monitoring program is \$437,000. The cost of any Critical Period monitoring component of the BioMP, as established by the former EAA Variable Flow Study, will continue to be paid by the EAA.

### **5.7.2 Water Quality Monitoring Program Strategy for Comal Springs and San Marcos Springs**

The goal of the Water Quality Monitoring Program (WQMP), first implemented in 2013, is (1) provide early detection of water quality impairments associated with the San Marcos and Comal Spring and River systems that may negatively impact the Covered Species, and (2) identify the point and nonpoint sources of those impairments, supporting Covered Species protection by allowing for investigation and adoption of any necessary measures through the Adaptive Management Process to address the source(s) of the concerning indicators ( *EAHCP Section, 5.7.2*).

In 2016, the Expanded Water Quality Monitoring Program Work Group and the Biological Monitoring Program Work Group were created by the Implementing Committee to carry out a holistic review of the EAHCP monitoring programs and make changes based on the recommendations of National Academy of Sciences (NAS), the NAS Work Group, the input of the Science Committee, the Permittees, and subject matter experts. The Work Groups' final report – *“Report of the 2016 Expanded Water Quality Monitoring Program Work Group and Report of the 2016 Biological Monitoring Program Work Group”*<sup>2</sup> (Report) - was presented to the Implementing Committee for approval in June 2016. This work plan reflects the recommendations found in that report.

#### **Target for 2017:**

In 2017, the WQMP in both the Comal and San Marcos spring systems will continue as established, but with the following modifications:

1. Surface water (base flow) water quality sampling be removed from the WQMP.
2. Sediment sampling to be conducted once per year, only in even-numbered years.
3. One real-time monitoring data sonde will be added to each spring system and maintained by the EAA.
4. Reduce stormwater sampling to one event each year. Test only for herbicide and pesticide compounds included in the City of San Marcos and City of New Braunfels Integrated Pest Management Plans for golf courses plus atrazine in odd years; test full suite of parameters in even years. Add two additional samples per each event at each site, with priority given to locations at tributary outflows.
5. Passive diffusion sampling will include adding a pharmaceutical and personal care product (PPCP) diffusion sampler at the most downstream sampling site.
6. Groundwater (well) sampling will be conducted by the EAA, but not through the EAHCP.
7. Tissue (fish or clam) sampling will be conducted once a year, in odd-numbered years in each spring system. The tissue sampling will include a pelagic, fish apex predator, a covered benthic fish species (such as the fountain darter), and a sediment dwelling filter feeder (such as the Asian Clam).

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<sup>2</sup> Edwards Aquifer Habitat Conservation Plan (2016). *Report of the 2016 Expanded Water Quality Monitoring Work Group and Report of the 2016 Biological Monitoring Program*. San Antonio, TX: Edwards Aquifer Habitat Conservation Plan.

Also, the EAA will conduct a collective analysis of data with other programs conducting monitoring within the spring systems, such as the Clean Rivers Program, currently conducted by GBRA and TCEQ in the Comal and San Marcos rivers, the EAHCP Biological and Water Quality Monitoring Programs and the EAA Aquifer Science Department's groundwater and spring orifice-sampling programs.

Additionally, the EAA will analyze data from the WQMP as follows:

1. Compare surface (base flow) and stormwater sampling data to Texas Surface Water Quality Standards Aquatic Life Protection, (*30 TAC Ch. 307 Section 307.6*),
2. Compare real time monitoring data to historical long-term averages,
3. Continue to compare sediment data to MacDonald, Ingersoll, and Berger (2000) and TCEQ (2104),
4. Create baseline criteria for the PDS and tissue sampling methods.

**Budget:**

Table 7.1:

\$200,000

Estimated 2017 budget:

\$343,750\*

\*2017 EAHCP Sampling will be performed by an outside contractor; estimated annual costs \$300,000. Real Time Instruments (RTI): \$43,750.

### 6.3.3 Ecological Modeling

The development of a mechanistic ecological model (Ecomodel) is assigned to the Edwards Aquifer Authority (EAA) per section 6.3.3 of the Edwards Aquifer Habitat Conservation Plan (EAHCP). The purpose of the Ecomodel is to evaluate potential adverse effects to Covered Species and their critical habitat, and to the extent such effects are determined to occur, quantify their magnitude and develop alternate strategies. The Ecomodel Contract ~~will be scheduled to be~~ completed and all deliverables transferred to the EAA by ~~December 31, 2016~~ April 30, 2017.

#### **Target for 2017:**

~~EAHCP Staff will be trained to maintain and operate the Ecomodel to identify and describe ecological responses to predict specific ecological responses of the Comal and San Marcos aquatic ecosystems, and associated Covered Species, to various environmental factors. This will assist in understanding the interrelationships between various ecological factors that affect the dynamics of the two aquatic ecosystems and their Covered Species. In addition, the Ecomodel will allow consideration of potential threshold levels for the two aquatic ecosystems relative to potential environmental stressors, and to quantify impacts. This information will help with management decisions and with mitigation design, implementation and monitoring while aiding with Phase II biological goals and strategies for achievement.~~

~~The EAA will train staff to operate the Ecomodel. The Ecomodel operator should be able to predict specific ecological responses of the Comal and San Marcos aquatic ecosystems, and associated Covered Species, to various environmental factors in order to assist in understanding the interrelationships between various ecological factors affecting the dynamics of these ecosystems and covered species. In addition, the Ecomodel will allow consideration of potential threshold levels for the two aquatic ecosystems relative to potential environmental stressors, and quantify impacts. This information will help with management decisions and with mitigation design, implementation and monitoring, while aiding with Phase II biological goals and strategies for achievement.~~

~~The Ecological Modeling Contract has been extended to from December 31, 2016 to April 30, 2017 to allow for training, development of a “User Guide”, and completion of the final Ecomodel Report.~~

~~The Ecological Modeling Contract is scheduled to be completed and all deliverables transferred to the EAA by December 31, 2016. There are no contractor work products or expenditures scheduled for 2017.~~

#### **Budget:**

~~There is no proposed budget for 2017 at this time.~~

~~Table 7.1:~~

~~\$0~~

~~Estimated 2017 Budget:~~

~~\$30,000\*~~

~~\*User guide and Training to maintain and operate the Ecomodel (\$25,000), and Final Ecomodel Report (\$5,000).~~



### 6.3.4 Applied Research

Section 6.3.4 of the Edwards Aquifer Habitat Conservation Plan (EAHCP) includes Applied Research as a “valuable” component of the Phase I package and states that the “Edwards Aquifer Authority (EAA) will contract for the research activities.”

#### **Long Term Objective:**

The experimentation done through the Applied Research program of the EAHCP will continue the study of the Comal Springs riffle beetle life history, submerged aquatic vegetation as fountain darter habitat, the effects of sedimentation on submerged aquatic vegetation, fountain darters and Comal Springs riffle beetle. The information gathered through this program may be utilized in the ecological model and will subsequently be used to inform the Adaptive Management Process and identify strategies for improved mitigation.

In early 2015, the first review of the EAHCP conducted the National Academy of Sciences (NAS) provided recommendations for the Applied Research. From these recommendations, a robust list of possible projects was presented to the NAS Recommendation Review Work Group (RRWG). Based on the recommendation of the RRWG, the Implementing Committee created the Applied Research Work Group at their August 20, 2015 meeting.

*Assumptions:* Completion of all 2016 approved Applied Research projects.

#### **Methodology:**

The purpose of the 2015 Implementing Committee Applied Research Work Group (ARWG) was to evaluate Covered Species research needs to recommend a holistic Applied Research Project Schedule that takes into account the research necessary to better understand the Covered Species in order to achieve the EAHCP’s Biological Goals and Objectives. The applied research schedule developed by the ARWG was reviewed and accepted by the EAHCP Science Committee and the Implementing Committee. This schedule will be used to develop the Work Plans for the Applied Research program in 2016 through 2019 ([http://www.eahcp.org/files/uploads/Final\\_IC-Approved\\_ARWG\\_Report.pdf](http://www.eahcp.org/files/uploads/Final_IC-Approved_ARWG_Report.pdf)).

All Covered Species collected and utilized for Applied Research may be shared with other Applied Research contractors, within United States Fish & Wildlife Service (FWS) and Texas Parks & Wildlife (TPWD) regulations. The FWS and/or TPWD may require that at the conclusion of the research projects, all Covered Species collected and utilized for Applied Research be delivered to the FWS or the TPWD for Refugia operations.

The Science Committee reviewed the proposed projects from the Applied Research Work Group Report for 2017 at their May 13<sup>th</sup> meeting. The list of projects were prioritized to be pursued as funds are available.

The ARWG developed and recommended, and the Science Committee approved the Applied Research for years 2016 – 2019. The approved approach is committed to fund the “*Evaluation of the Life History of the Comal Springs Riffle Beetle, Egg to Adult – Phase II*” (\$187,499) and to conduct as much of the highest priority research designated for 2017 as the allocated budget

(\$237,507) allows, ensuring necessary research in the time frame allocated prior to EAHCP Phase II decisions.

The Edwards Aquifer Authority will develop an RFP based on the key elements with expected deliverables and experimental design criteria for each study approved by the Implementing Committee. Where possible, all efforts will be made to match similar studies to allow for shared facility and expertise in an effort to promote fiscal stewardship.

These RFPs will each be issued through a competitive procurement process that will include publication in six print regional newspapers and direct distribution to a list of at least sixty potential qualified contractors.

**Monitoring:**

EAHCP staff will receive monthly status reports from selected contractors and will visit with selected contractors on-site to evaluate the progress and methodology compliance of Applied Research projects.

*Research Facility:* In 2016, the Edwards Aquifer Authority is entering the third year of a five-year contract (two, one-year extensions remaining) with Texas State University (TEXAS STATE) to allow researchers to use the Freeman Aquatic Building (FAB) raceways, two concrete ponds and wet lab (with living streams and aquaria) to conduct EAHCP research. The TEXAS STATE facilities meet the needs of providing source water, quarantine capabilities, endangered species handling, and infrastructure/resource needs. The EAA pays the utility costs for use of the facilities.

The FAB facilities are available to potential EAHCP contractors, and terms of use will be included in contracts between EAA and researchers. Additionally, EAHCP staff will coordinate the projects for timing and availability of resource needed (tank, living stream, trough, raceway, or pond).

**Budget:**

Table 7.1:

\$450,000

Estimated 2017 budget:

\$450,000

\*The EAA pays the utility costs for use of the facilities (\$25,000 is budgeted for facility use). There is no annual fee for the use of the FAB for Applied Research.

### 5.1.1 Refugia

#### Long-term Objective:

A series of refugia, with back-up populations at other facilities, will preserve the capacity for the Covered Species to be re-established in the event of the loss of population due to a catastrophic event such as the loss of spring flow or a chemical spill.

*Background:* Section 5.1.1 of the Edwards Aquifer Habitat Conservation Plan (EAHCP) provides for Edwards Aquifer Authority (EAA) to support a series of refugia, with back-up populations, to preserve the capacity for these species to be re-established in the event of the loss of population due to a catastrophic event such as a severe reduction or loss of spring flow, or a chemical spill.

The concept of a Refugia is to house and protect adequate populations of the Covered Species (see Table 1) and to conduct research activities to expand knowledge of their habitat requirements, biology, life histories, and effective reintroduction techniques. The use of this support will be limited to the Covered Species listed in the Edwards Aquifer Habitat Conservation Plan (EAHCP) and those associated species that have significant impact on the covered species such as predators, competitors, pathogens, parasites, food, cover, and shelter.

Table 1: Covered eleven species identified in the Edwards Aquifer Habitat Conservation Plan and listed for coverage under the ITP.

Common Name	Scientific Name	ESA Status
Fountain Darter	<i>Etheostoma fonticola</i>	Endangered
Comal Springs Riffle Beetle	<i>Heterelmis comalensis</i>	Endangered
San Marcos Gambusia	<i>Gambusia georgei</i>	Endangered*
Comal Springs Dryopid Beetle	<i>Stygoparnus comalensis</i>	Endangered
Peck's Cave Amphipod	<i>Stygobromus pecki</i>	Endangered
Texas Wild Rice	<i>Zizania texana</i>	Endangered
Texas Blind Salamander	<i>Eurycea rathbuni</i>	Endangered
San Marcos Salamander	<i>Eurycea nana</i>	Threatened
Edwards Aquifer Diving Beetle	<i>Haideoporus texanus</i>	Petitioned
Comal Springs Salamander	<i>Eurycea</i> sp.	Petitioned
Texas Troglotic Water Slater	<i>Lirceolus smithii</i>	Petitioned

\*The San Marcos gambusia was last collected in the wild in 1983 and may already be extinct.

#### Assumptions:

- A contract with a Long Term Refugia contractor will be executed;
- After contract execution, the budget and refugia workplan will be amended to reflect the actual contractual provisions including the necessary infrastructure costs;
- Information collected by the Salvage Refugia contractor on collection methods and rates will be provided to the Long Term Refugia contractor;
- The Chief Science Officer will serve as refugia program manager, the primary liaison between EAA and USFWS, and the EAA technical expert;
- Long term refugia will be operational and capable of receiving Covered Species by January 1, 2017;

- Salvage refugia contract will be terminate in December 2016 and collected animals will be transferred to the Long Term Refugia contractor.

**Target for 2017:**

Establish a captive propagation program initially focusing on the Comal Springs Riffle Beetle, the Comal Springs Dryopid Beetle, and the Pecks Cave Amphipod to include captive rearing, life history, and environmental requirement needs, as follows:

- Collect, establish, and maintain standing stocks, refugia stocks, and salvage stocks of Covered Species (when triggered);
- Ensure identification and acquisition of all required Federal, State and local permits;
- Conduct research as necessary to expand knowledge of the EAHCP Covered Species for refugia operations including, but not limited to, species’ physiology, environmental requirements, health and disease issues, life histories, genetics and effective reintroduction techniques;
- Develop and refine animal rearing methods and captive propagation techniques for the Covered Species;
- Reintroduce species and monitor recovery in the event of a loss of species in their native environment;
- Submit annual reports describing all activities completed under this project including “lessons learned;”
- Attend meetings and give presentations to the USFWS regulatory division, EAHCP Science Committee, EAHCP Implementing Committee, and EAA Board of Directors as necessary.

**Methodology:**

This work plan will be managed by EAA staff with 100% of the work being completed by Contractors.

**Monitoring:**

Monitoring will be conducted through the use of progress reports and site visits to the refugia as well as through intensive management by the EAHCP Chief Science Officer. who will spend significant time at the refugia.

**Budget:**

Table 7.1:  
\$1,678,597

Estimated 2017 budget:  
\$1,678,597

## **FMA § 2.2 EAHCP Program Management**

Section 2.2 of the Funding and Management Agreement (FMA) assigns “general management and oversight” of the Edwards Aquifer Habitat Conservation Plan (EAHCP) to the Edwards Aquifer Authority (EAA). Section 5.6.5 of the FMA allows the EAA to use EAHCP funds for administrative costs and employee salaries, so long as all incurred costs and salaries are 100% related to “general management and oversight” of the EAHCP.

### **Long-term Objectives:**

Manage and oversee day-to-day operations and administration, in coordination with the Applicants of the EAHCP, resulting in a valid and continued Incidental Take Permit (ITP) from the United States Fish and Wildlife Service (USFWS) for designated Covered Activities. Additionally, prepare for and gather information to be used in the Phase II Strategic Adaptive Management decision-making process.

*Program Management:* In 2017, EAHCP staff will continue to coordinate and monitor the work outlined in the Ecological Modeling, Biological Monitoring, Water Quality Monitoring, Applied Research, ASR, and Regional Water Conservation Program work plans. Under the direction of the Chief Science Officer, EAHCP staff will oversee the continued development and operations of the Long-term Refugia and Salvage Refugia programs. This oversight will also include all Refugia research activities. In 2017, EAHCP staff will continue a comprehensive data management system for storing, maintaining, and securing all EAHCP required data.

Additionally, in 2017, EAHCP staff will continue the following activities:

*Program Manager:* The EAHCP Program Manager will execute duties as assigned in the FMA and:

- Serve on the ASR Regional Advisory Group;
- Facilitate the Adaptive Management process;
- Serve on the Regional Water Conservation Monitoring Committee; and
- Facilitate and coordinate all meetings of the EAHCP Implementing, Science and Stakeholder Committees (and possible Subcommittees and Work Groups as created by the Implementing and Stakeholder Committees) and the meetings of the Science Review Panel – the National Academy of Sciences committee.

*EAHCP Staff:* The EAHCP staff will continue the following activities:

- Procure and execute contracts;
- Track contracted project’s compliance;
- Process and pay all invoices and mitigation reimbursements,
- Oversee City of New Braunfels and San Marcos/Texas State University work plan activities;
- Oversee and coordinate research activities at the Texas State University Freeman Aquatic Building;
- Coordinate 2017 work plan amendments and 2018 work plan development process;
- Draft and submit to the USFWS amendments, informational memorandums, and clarifications to the Incidental Take Permit and EAHCP as may be necessary;

- Participate in public outreach initiatives;
- Publish the EAHCP Steward newsletter;
- Maintain and enhance the EAHCP.org website;
- Prepare and compile all of the Permittees' information for the annual report to USFWS; and
- Track and assist EAHCP Permittees with maintaining compliance with secondary implementation permits, such as: U.S. Army Corps of Engineers, Texas Parks and Wildlife Department, Texas Commission on Environmental Quality, General Land Office, and Texas Historical Commission permits.

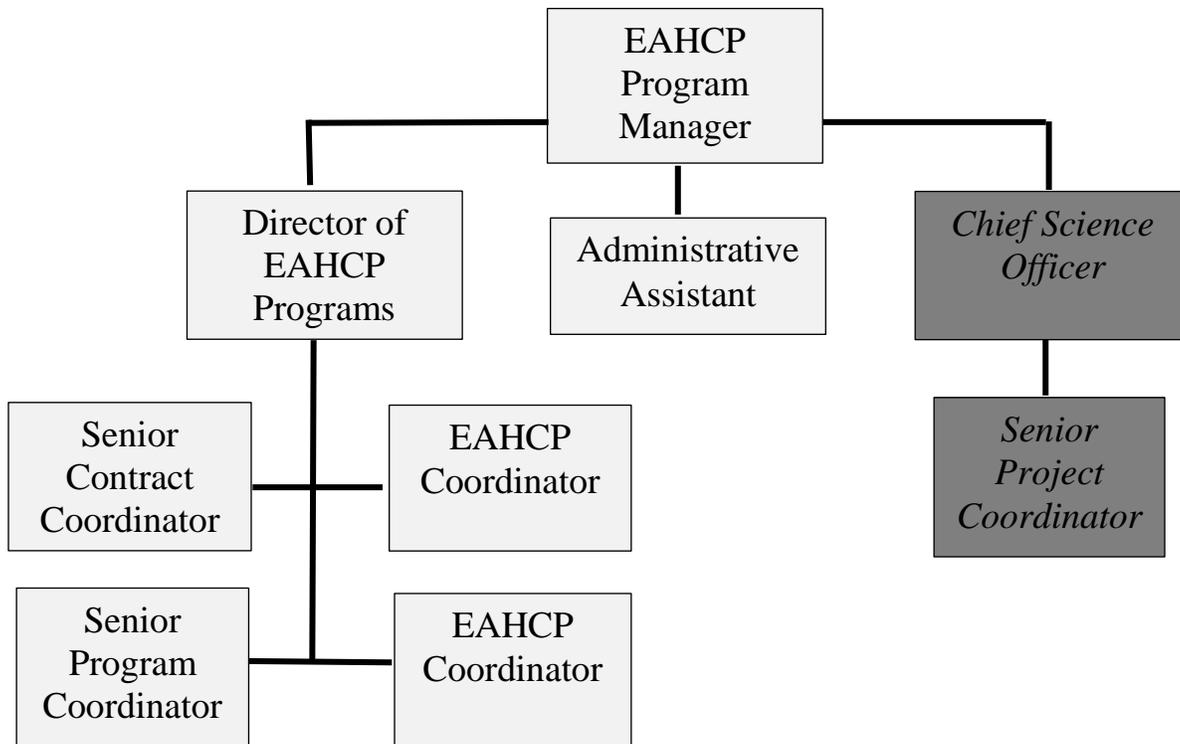
*Adaptive Management Program (AMP):* EAHCP staff, under direction of the Program Manager, will manage the adaptive management decision making process as defined in the Funding and Management Agreement. Specifically, Article 7 defines the procedures for the AMP. In 2017, EAHCP staff will compile all relevant completed research, modeling and other data to be used in the AMP. Also, EAHCP staff will serve as liaison to USFWS in the AMP process.

*EAHCP Implementing, Science and Stakeholder Committees and Work Groups and subcommittees:* EAHCP staff, under the direction of the Program Manager, will continue to manage the meetings and activities of all EAHCP Committees and any subcommittees or Work Groups. The Implementing, Science and Stakeholder Committees will meet according to approved schedules.

*Science Review Panel/National Academy of Sciences:* In 2017, EAHCP staff will continue to provide support for the meetings of the National Academy of Sciences (NAS) and will assist NAS in the development of its third report. In December 2016, the NAS committee will produce its second report on its evaluation of the Phase I conservation measures and its identification of the biological and hydrological questions to be evaluated by the ecological and hydrologic models. In 2017, EAHCP staff will evaluate the recommendations from this second report.

**Target for 2017:**

In summary, the staff, supported by EAHCP program funds, consists of the Program Manager, Director of EAHCP programs, Senior Contract Coordinator, Senior Program Coordinator, two EAHCP Coordinators, and the Administrative Assistant. Additionally, the EAA funds the Chief Science Officer and Senior Project Coordinator staff positions. The structure of the existing EAHCP staff positions and EAA-funded positions are illustrated in the chart on the next page.



- Positions Paid from EAA General Budget

**Budget:**

The following table summarizes the estimated EAHCP Program Management budget for 2017.

	<b>Table 7.1</b>	<b>2017</b>
Program Management	\$750,000	\$910,000
Science Review Panel/National Academy of Sciences	\$100,000	\$269,750
<b>Total Budget</b>	<b>\$850,000</b>	<b>\$1,179,750</b>

Specifically, the staffing expenses and operational expenses for 2017 are set out in the tables below.

<b>Staffing Expenses</b>	
Salaries	\$518,735
Fringe/Benefits	\$169,217
<b>Total</b>	<b>\$687,952</b>

<b>Staffing and Operational Expenses</b>	
Staffing	\$687,952
Meeting Expenses <sup>3</sup>	\$20,000
Travel	\$3,000
Office Supplies	\$3,000
Professional Development / Memberships	\$3,000
Printing	\$2,000
Professional Contracted Services (PCS)	
PCS – Other	\$ 87,048
PCS – Historical/Archeological Consultation <sup>4</sup>	\$10,000
PCS – Annual Report	\$40,000
PCS – Permit Oversight <sup>5</sup>	\$19,500
PCS – Science Committee Compensation	\$18,000
PCS – Outreach/Newsletter <sup>6</sup>	\$16,500
<b>Total Expenditure</b>	<b>\$910,000</b>

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<sup>3</sup> Meeting expenses for Implementing, Stakeholder and Science Committees as well as ad-hoc work groups. Also, includes reimbursement expenses for Science Committee members travel costs.

<sup>4</sup> Contract for costs to obtain Texas Historical Commission permits for conservation and mitigation measures activities.

<sup>5</sup> Contract for costs to obtain U.S. Army Corps of Engineers, Texas Parks and Wildlife Department, and Texas Commission on Environmental Quality permits for conservation and mitigation measures activities.

<sup>6</sup> Contract to produce the EAHCP bi-monthly newsletter.

**2017 Edwards Aquifer Authority Work Plan Budget**

<b>HCP Section</b>	<b>Conservation Measure</b>	<b>Table 7.1</b>	<b>Estimated 2017 Budget</b>	<b>Difference</b>
5.5.1	Aquifer Storage and Recovery	\$6,953,000	\$5,500,000	\$1,453,000
5.1.3	Regional Water Conservation Program	\$1,973,000	\$4,533,175	(\$2,560,175)
5.1.2	Voluntary Irrigation Suspension Program Option	\$4,172,000	\$2,208,000	\$1,964,000
5.1.4	Stage V	\$0	\$0	\$0
6.3.1	Biological Monitoring	\$400,000	\$408,275	(\$8,275)
5.7.2	Water Quality Monitoring	\$200,000	\$189,450	\$10,550
6.3.3	Ecological Modeling	\$175,000	<del>\$930,000</del>	\$14575,000
6.3.4	Applied Research	\$450,000	\$450,000	\$0
5.1.1	Refugia	\$1,678,597	\$1,678,597	\$0
FMA	Program Management	\$750,000	\$910,000	(\$160,000)
§2.2	Science Review Panel	\$100,000	\$269,750	(\$169,750)
	<b>Total</b>	<b>\$16,851,597</b>	<b>\$16,1747,247</b>	<b>\$704,350674350</b>