

# **COMPREHENSIVE PHASE II WORK PLAN**

Section 4.3 of the Funding and Management Agreement (“FMA”) requires the Implementing Committee to develop a Comprehensive Phase II Work Plan (the “Comprehensive Plan”). The Comprehensive Plan must include descriptions, schedules, and cost estimates for ongoing Phase I Conservation Measures, Phase II Conservation Measures, and all Edwards Aquifer Habitat Conservation Plan (“EAHCP”) Program activities conducted or managed by the Parties and Program Manager that are to be funded from the EAHCP Program (“Program”) Account for the Phase II period from January 1, 2020 until the expiration of the Incidental Take Permit #TE63663A-1 (“Permit” or “ITP”). This document is intended to satisfy that requirement. The description, schedules, and cost estimates contained herein are taken largely from Chapters 5, 6, and 7 of the EAHCP and are a continuation of Phase I Conservation Measures. Conservation Measures that were completed during Phase I or determined not pertinent to Phase II implementation, were not included in this Comprehensive Plan. The 2018 Phase II Work Plan Work Group Report details the development of this Comprehensive Plan and provides a description of the updates that were applied to this document. The description of the measures is not intended to reiterate all details in the EAHCP. To the extent this Comprehensive Plan conflicts with the EAHCP, the EAHCP controls.

## **I. Conservation Measures**

### **A. Edwards Aquifer Authority**

#### **1. San Marcos Aquatic Resources Center and Uvalde National Fish Hatchery – Refugia (§ 5.1.1)**

Edwards Aquifer Authority (EAA) will continue to support and coordinate the work of the U.S Fish and Wildlife Service (USFWS) operation and maintenance of a series of off-site refugia at the San Marcos Aquatic Resources Center and the Uvalde National Fish Hatchery. As constructed in contract 16-822-HCP between the EAA and USFWS, a series of refugia will preserve the capacity for the Covered Species identified in the EAHCP and ITP to be re-established in the event of the loss of population due to a catastrophic event such as the unexpected loss of springflow or a chemical spill.

EAA’s support of the refugia will augment the existing financial and physical resources of these facilities, and provide resources for appropriate research activities, as necessary, to house and protect adequate

populations of Covered Species and expanded knowledge of their biology, life histories, and effective reintroduction techniques.

The use of this support is limited to the Covered Species in the EAHCP.

## **2. Voluntary Irrigation Suspension Program Option (§ 5.1.2)**

The Voluntary Irrigation Suspension Program Option (VISPO) is intended to minimize and mitigate the impacts of incidental take from low springflows by suspending the withdrawal of Edwards Aquifer (Aquifer) water for irrigation purposes during drought. This measure will require EAA irrigation permit-holders who voluntarily participate in the program to suspend the use of Aquifer water for irrigation purposes during drought to maintain springflow.

The volume goal for VISPO is to remove 40,000 ac-ft/yr from pumping during periods of drought.

If an irrigation permit-holder desires to enroll less than its full permitted volume, their withdrawals may be monitored by real time automated meters installed by the EAA. The suspension of pumping by the participants in the program will be triggered if the J-17 index well in Bexar County is at or below 635 feet-Mean Sea Level (ft-MSL) on the annual trigger date of October 1.

In 2018, the EAHCP was clarified to reflect that future VISPO payments will be flexible and based on market conditions. Therefore, for Phase II, the five-year agreements will contain the following payment schedule (which will not include a price escalator):

- A standby fee of \$54/acre-foot per year will be paid to the enrollee every year of the term, regardless of Aquifer conditions; and
- A fee of \$160/acre-foot per year will be paid for each year when temporary pumping suspensions are required.

### **3. Regional Water Conservation Program (§ 5.1.3)**

The Regional Water Conservation Program has been fully implemented through agreements with the San Antonio Water System, the City of San Marcos, the City of New Braunfels, and the City of Uvalde. No additional agreements are anticipated during Phase II.

### **4. Critical Period Management – Stage V (§ 5.1.4)**

The EAA's Critical Period Management Program includes an emergency Stage V reduction of 44 percent applicable in both the San Antonio and Uvalde pools. For the San Antonio Pool, Stage V is triggered by a 10 day average of J-17 levels below 625 feet or springflows of either 45 cubic feet per second (cfs) based on a ten-day rolling average at Comal Springs or 40 cfs based on a three-day rolling average. The Uvalde Pool would trigger Stage V using the Uvalde County Index Well (J-27) water level of 840 ft-MSL.

### **5. Expanded Water Quality Monitoring (§ 5.7.2)**

The EAA will continue to manage and oversee the expanded monitoring of water quality around Landa Lake and the Comal River, and Spring Lake and the San Marcos River. Presently, the Water Quality Monitoring Program contains the following components:

- Stormwater runoff sampling
- Surface water passive diffusive sampling
- Fish tissue sampling
- Real-time water quality sampling

### **6. Recharge Monitoring (§ 6.2.3)**

In accordance to Phase I efforts, the EAA will continue to measure the amount of water (in acre-feet) recharging the Edwards Aquifer in the area described in Section 1.2 of the EAHCP. The EAA maintains partnership with the U.S Geological Survey (USGS) to collect and provide recharge estimates from major drainage basins with streams that flow to the Aquifer. EAA will publish this measurement no later than

June 1 of each year for the purposes of guiding the activities in Section 5.5.1 of the EAHCP. EAA will continue to maintain this information for an appropriate publication.

## **7. Biological Monitoring (§ 6.3.1)**

A biological monitoring plan (Variable Flow Study) was established by the EAA in 2000 to gather baseline and critical period data to fill important gaps in the ecological condition of the Comal and San Marcos springs and river ecosystems. The EAA will continue this comprehensive sampling plan in the Biological Monitoring Program for the term of the ITP. Additionally, biological monitoring will provide a means of examining changes to habitat availability and population abundance of the Covered Species that may result from Covered Activities described in the ITP. Presently, the Biological Monitoring Program contains the following components:

- Aquatic vegetation mapping for select reaches
- Fountain darter sampling
- San Marcos salamander sampling
- Texas wild-rice physical observations and annual mapping
- Comal Springs riffle beetle monitoring
- Comal invertebrate sampling
- Comal Springs salamander sampling
- Invasive species monitoring

Monitoring may increase in magnitude, including increased frequency and number of parameters examined, as discharge falls to specific levels.

In addition to long-term monitoring efforts that increase intensity in response to the specified trigger events, a critical period monitoring component is incorporated into the Biological Monitoring Program that initiates full-scale sample efforts at specified trigger levels.

The scope of the Biological Monitoring Program can be modified on a yearly basis through adaptive management, as provided in Article 7 of the FMA with agreement with the USFWS, as may be appropriate.

The National Academies of Sciences' Consensus report was unable to determine whether riparian management related Conservation Measures will contribute to achieving the Biological Objectives of the Comal Springs riffle beetle (CSRB). This finding was directly related to the lack of quantitative population and aquatic sedimentation monitoring undertaken as part of the Biological Monitoring Program. In 2018, the EAHCP formed the Comal Springs Riffle Beetle Work Group to examine the methodology surrounding the CSRB biological monitoring in addition to other CSRB management issues. The Work Group is anticipated to conclude in 2019, and the final product will likely result in changes to the monitoring methodology of the CSRB conducted during biological monitoring surveys.

## **8. Coal Tar Sealants (§ 5.7.6)**

The EAA will continue to regulate the use of coal tar sealants in Comal and Hays counties as directed by Chapter H Section 713.703 Prohibition on the Use of Coal Tar-Based Pavement Sealant Products of the EAA rules.

### **B. City of New Braunfels**

#### **1. Flow-Split Management in the Old and New Channel (§ 5.2.1)**

City of New Braunfels staff will continue to manage the valves and culverts to the Old Channel and New Channel of the Comal River for the protection of existing and restored native aquatic vegetation that was established during Phase I. Additionally, staff will continue to monitor real-time streamflow conditions at USGS gauges in the Comal River system and adjust the flow-control gates to meet streamflow targets. A flow-split management schedule of the Old and New Channels is provided in Table 5-3 of the *Submerged Aquatic Vegetation Analysis and Recommendations Report* (BIO-WEST, Watershed Systems Group, Inc, 2016). Maintenance activities to exercise the system will be conducted, as necessary, to ensure operability of the flow-control gate. Under Section 5.2.10 Litter and Floating Vegetation Management of the EAHCP, floating vegetation will be dislodged from the intake structure, as necessary.

Table 5-3. Flow-Split Management Schedule of the Old and New Channels of the Comal River

**TABLE 5-3  
FLOW-SPLIT MANAGEMENT FOR OLD AND NEW CHANNELS**

Total Comal Springflow (cfs)	Old Channel (cfs)		New Channel (cfs)	
	Fall, Winter	Spring, Summer	Fall, Winter	Spring, Summer
350+	80	60	270+	290+
300	80	60	220	240
250	80	60	170	190
200	70	60	130	140
150		60		90
100		60		40
80		50		30
70		50		20
60		40		20
50		40		10
40		30		10
30		20		10

**2. Native Aquatic Vegetation Restoration and Maintenance (§§ 5.2.2; 6.3.4.3)**

Phase II implementation of native aquatic vegetation restoration within key reaches of the Comal River will continue to include planting native vegetation in unoccupied areas and in areas previously occupied by non-native aquatic vegetation, with the latter preceded by non-native vegetation removal. In 2016, the EAHCP implemented nonroutine adaptive management of submerged aquatic vegetation maintenance to modify specific planting goals used to achieve native aquatic vegetation restoration within the Comal River (BIO-WEST, Watershed Systems Group, Inc, 2016).

The quantity and location of areas restored in this program are provided in Table 26 of the *Submerged Aquatic Vegetation Analysis and Recommendations Report* (BIO-WEST and Watershed Systems Group, Inc, 2016) are a guideline for plantings. Specific species by location are determined by site specific conditions and vegetation planting success. To sustain the restored native aquatic vegetation within the Comal system, the City of New Braunfels will continue to conduct yearly maintenance of restoration sites in Landa Lake and the Old Channel.

Table 26. Native Aquatic Vegetation Restoration Timeline in the Comal System.

REACHES	SPECIES	Meters squared of aquatic vegetation (m <sup>2</sup> )			HCP TERM TIMELINE *											TOTAL
		Current (2016)	Goal	Needed	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
<b>LTBG Reaches</b>																
Landa Lake	<i>Ludwigia</i>	474	900	426	75	75	75	105	35	35	30					430
	<i>Cabomba</i>	240	500	260	50	50	50	30	30	25	25					260
	<i>Sagittaria</i>	2,759	2,250	0												0
	<i>Vallisneria</i>	12,012	12,500	488	100	100	75	75	75	50	15					490
	<i>Potamogeton</i>	0	25	25	5	5	5	5	5							25
Old Channel	<i>Ludwigia</i>	7	425	418	75	75	75	75	50	50	20					420
	<i>Cabomba</i>	0	180	180	50	30	30	25	15	15	15					180
	<i>Sagittaria</i>	0	450	450	150	75	75	50	50	25	25					450
New Channel	<i>Ludwigia</i>	31	100	69		15	15	15	15	5	5					70
	<i>Cabomba</i>	2,397	2,500	103		20	20	20	20	15	10					105
	<i>Sagittaria</i>	0	0	0												0
Upper Spring Run	<i>Ludwigia</i>	1	25	24		5	5	5	5	5						25
	<i>Cabomba</i>	2	25	23		5	5	5	5	5						25
	<i>Sagittaria</i>	825	850	25		5	5	5	5	5						25
<b>Restoration Reaches</b>																
Landa Upper	<i>Ludwigia</i>	0	25	25			25									25
	<i>Cabomba</i>	150	250	100			25	35	20	10	10					100
	<i>Sagittaria</i>	50	250	200			50	50	50	25	25					200
Landa Lake Lower	<i>Ludwigia</i>	5	50	45			15	10	10	5	5					45
	<i>Cabomba</i>	100	125	25			10	10	5							25
	<i>Sagittaria</i>	7	100	93			25	25	25	10	10					95
	<i>Vallisneria</i>	24,500	22,500	0												0
Old Channel ERPA	<i>Ludwigia</i>	618	850	232	100	75			30	15	15					235
	<i>Cabomba</i>	119	200	81	25	25			25	10	5					90
	<i>Sagittaria</i>	591	750	159	75	25			35	15	10					160
	<i>Vallisneria</i>	715	750	0												0
	<i>Potamogeton</i>	73	100	27	10	10				5	5					30
* Light grey shaded boxes with no numbers will still require aquatic gardening, plant propagation and supplemental plantings to support maintaining the goals and management objective over time. It is estimated that approximately 1/2 of the HCP annual budget for this mitigation measure would be needed each year to maintain these conditions from 2024 through 2027.																

**ASSUMPTIONS:**

- 1) Restoration efforts will proceed smoothly with no major setbacks or resets such as floods, culvert repairs, etc.
- 2) Anthropogenic factors such as recreational disturbances (swimming, wading and paddle boats), turbidity from swimming pools and urban runoff can be managed to provide the suitable water quality for aquatic plant growth.
- 3) Concurrent aquatic plant propagation, gardening, and maintenance will occur throughout the HCP timeline.
- 4) Non-native vegetation removal (and replacement with natives) will occur in certain areas (i.e. spring fed swimming pool, confluence with Blieder's creek, etc.) outside of the LTBG and Restoration reaches in order to assure that non-native plants don't reestablish.
- 5) Riparian restoration in the Old Channel is mandatory to accomplish the proposed goals.
- 6) No significant interruptions due to HCP Provision M.
- 7) Mapping to compare against goals will be conducted annually each Fall.

City of New Braunfels staff will continue to monitor and maintain planted stands of native aquatic vegetation. Temporal monitoring includes a quantitative measurement system to assess whether plantings are increasing, decreasing, or remaining stable. Additionally, intensive non-native aquatic vegetation removal in the adjacent areas will continue to be implemented until the native vegetation is well-established. This includes additional activities following natural disturbances such as floods, periods of limited recharge, and/or herbivory, as well as anthropogenic disturbances such as recreation or vandalism. Anytime a disturbance is observed, the monitoring and maintenance schedule will be modified temporarily to provide stability for the native vegetation re-establishment.

### **3. Management of Public Recreational Use of Comal Springs and River Ecosystems (§ 5.2.3)**

Phase II efforts to minimize and mitigate the impacts of recreation will continue to include the management of recreational use of the Comal Springs and Comal River ecosystem by the City of New Braunfels through two methods:

- 1) The City of New Braunfels will not reduce current protections provided by City Ordinance or Policy and will continue to enforce local regulations, including:
  - a. Limiting recreation on Landa Lake to Paddle Boats;
  - b. Prohibiting recreational access to the Spring Runs in Landa Park and to the Wading Pool in Spring Run 2; and
  - c. Prohibiting on water recreation on the Old Channel, with the exception of Schlitterbahn operations within its present location.
  
- 2) Pursuant to Resolution and Order No. 08-12-001 adopted by the Implementing Committee on August 16, 2012, the City of New Braunfels will issue, on a volunteer basis, Certificates of Inclusion (COIs) to those commercial outfitting businesses that facilitate recreational activities on the Comal River (Outfitters) that comply with the requirements of the COI program established in Section 5.2.3 of the EAHCP.



#### **4. Decaying Vegetation Removal and Dissolved Oxygen Management (§ 5.2.4)**

In 2017, the City of New Braunfels adopted the *Landa Lake and Dissolved Oxygen Management Plan* to be implemented during low-flow conditions (<100cfs) and/or when dissolved oxygen data indicates a potential threat to fountain darter populations (AquaStrategies, BIO-WEST, 2017). Dissolved oxygen (DO) management strategies include continuous monitoring of DO concentrations during low-flow conditions and displacement and/or removal of decaying vegetation and algal mats within Landa Lake. During low-flow conditions, nine additional DO sensors will be installed throughout Landa Lake, Upper Spring Run, Old Channel Environmental Restoration and Protection Area (ERPA) and near Spring Island to collect continuous DO data. Additionally, floating vegetation, decaying vegetation and algal mats will be removed, as necessary, to prevent vegetation impacts on fountain darter habitat.

#### **5. Control of Harmful Non-Native Animal Species (§ 5.2.5)**

In accordance to Phase I efforts, the City of New Braunfels will continue to implement various methods of removal to reduce and control non-native animal species populations within the Comal River system on an annual basis. Methods of removal include gill nets, fyke nets, spearfishing and box traps.

The targeted non-native animal species include, but are not limited to, the suckermouth catfish, tilapia, nutria and ramshorn snail.

Routine biological monitoring will be conducted by EAA and EAHCP contractors (EAHCP § 6.3.1) to monitor and assess the distribution of new or existing harmful non-native and invasive species. If a threat is identified, EAHCP staff will work with the contractor to identify areas of concern and potential methods for removal.

#### **6. Monitoring and Reduction of Gill Parasites (§ 5.2.6)**

Research indicates that gill parasites (*C. formosanus*) are not a significant threat to fountain darter populations (BIO-WEST, 2017). Pursuant to the EAHCP, the City of New Braunfels will continue to conduct water column concentration monitoring of the gill parasite cercariae within the Comal River system.

During low-flow conditions (<100 cfs), water column monitoring for gill parasite cercariae will be implemented at three established transect sampling locations within Landa Lake, the Old Channel and New Channel.

## **7. Prohibition of Hazardous Materials Transport Across the Comal River and Its Tributaries (§ 5.2.7)**

In accordance to Phase I efforts, the City of New Braunfels will continue to restrict the transportation of hazardous materials on routes that cross the Comal River and its tributaries. This effort may include legislation, City of New Braunfels ordinances, additional signage, and Texas Department of Transportation (TxDOT) approval.

## **8. Native Riparian Habitat Restoration (Comal Springs riffle beetle) (§ 5.2.8)**

The City of New Braunfels will continue to restore native riparian zones, where appropriate, to benefit the Comal Springs riffle beetle by increasing the amount of usable habitat and food sources (*i.e.*, root structures and associated biofilms). Methods for riparian zone establishment include the removal of non-natives and replanting of native vegetation representative of a healthy, functioning riparian zone. Trees and other riparian vegetation with extensive root systems are given preference to create maximum riffle beetle habitat. In coordination with the Texas Parks and Wildlife Department (TPWD), fine sediment covering springs will also be removed, as necessary. The riparian zones will be monitored (at least annually) for continued success and removal of reestablished non-native vegetation.

Additionally, the City of New Braunfels will continue to monitor and maintain riparian habitat zones established during Phase I and work to establish new riparian habitat zones within the Comal watershed for the benefit of the Comal Springs riffle beetle.

## **9. Reduction of Non-Native Species Introduction and Live Bait Prohibition (§ 5.2.9)**

In accordance to Phase I efforts, the City of New Braunfels will continue to undertake measures to stop or substantially reduce the introduction of non-native species from aquarium dumps and prohibit the use of live bait species.

Additionally, the City of New Braunfels will continue to prohibit, by Ordinance, the introduction of domestic and non-native aquatic organisms, targeting specifically bait species and aquarium trade species into the Comal system. This action may include outreach, education and signage at key entrance points to parks on Landa Lake and the Comal River.

## **10. Litter Collection and Floating Vegetation Management (§ 5.2.10)**

The City of New Braunfels will continue to remove litter and dislodge floating vegetation mats from the Comal Springs, Landa Lake, and Old and New Channels of the Comal River. Litter found within floating vegetation mats will be removed before dislodging. In the event of low-flow conditions, increased efforts to dislodge floating vegetation mats will be implemented. Collection and removal of litter and debris may include diving within the Comal River and Landa Lake.

## **11. Management of Golf Course Diversions and Operations (§ 5.2.11)**

The City of New Braunfels will continue to implement a golf course management plan that will document current practices following their Integrated Pest Management Plan (IPMP) for the Landa Park Golf Course. The golf course management plan and IPMP incorporate environmentally sensitive techniques to minimize chemical application, improve water quality, and reduce negative effects to the Covered Species. Additionally, the IPMP is reviewed annually and revised as needed. Expanded water quality sampling targeted at golf course operations will continue to be conducted per Section of 5.7.2 of the EAHCP.

## **12. Management of Household Hazardous Wastes (§ 5.7.5)**

To reduce the potential of water quality pollution, the City of New Braunfels will continue the Household Hazardous Waste Program established in Phase I. The City of New Braunfels, in collaboration with Comal County and New Braunfels Utilities, will continue to collect household hazardous wastes and unwanted medications that will be disposed of at four collection events held throughout the year.

## **13. Impervious Cover/Water Quality Protection (§ 5.7.6)**

The City of New Braunfels will continue to implement the strategies for impervious cover and water quality management identified in the 2017 *Water Quality Protection Plan (WQPP): Phase I* report. Utilizing low impact development and best management practices, the WQPP recommends seven potential water quality retrofit projects to be established within the Comal River watershed. Potential impervious cover and water quality protection projects include the design and installation of bioretention basins, an underground storm drain vault, rain gardens and permeable pavers. These measures, in addition to the City of New Braunfels' Municipal Separate Storm Sewer System (MS4) and Stormwater Management programs, will aid in reducing pollutant contributions to the Comal River system.

## **14. Native Riparian Habitat Restoration (§ 5.7.1)**

The City of New Braunfels will continue the efforts achieved in Phase I to increase the area of the riparian zone along Landa Lake and the Old Channel. Plans to increase coverage and density of native vegetation include removal of non-native riparian vegetation, planting of native vegetation and maintenance of restoration zones to prevent re-establishment of non-natives and promote growth of native vegetation. Candidate riparian species are selected based on the success of previous restoration efforts.

If non-native riparian vegetation treatment is needed on private property, the City of New Braunfels will work with private landowners to coordinate methods for removal and planting of native species. Participation and coordination with private landowners will occur on a volunteer basis. Areas that need more riparian planting will be planted with drought-tolerant, native species, as needed.

## **C. City of San Marcos and Texas State University**

### **1. Texas Wild-Rice Enhancement and Restoration (§§ 5.3.1, 5.4.1)**

Phase II implementation for Texas wild-rice enhancement and restoration will continue to include activities such as removal of non-native aquatic plant species, propagation of Texas wild-rice plants, and planting of Texas wild-rice plants. The quantity and location of areas restored in this program are provided in Table 34 of the *Submerged Aquatic Vegetation Analysis and Recommendations Report* (BIO-WEST and Watershed Systems Group, Inc, 2016) are a guideline for plantings. Specific species by location are determined by site specific conditions and vegetation planting success.

Table 34. Native Aquatic Vegetation Restoration Timeline in the San Marcos System.

Reaches	Species	Meters squared of aquatic vegetation (m <sup>2</sup> )			HCP Term Timeline*												Total
		Current (Dec 2015)	Goal	Needed	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
<b>LTBG Reaches</b>																	
Spring Lake Dam	<i>Ludwigia</i>	0	100	100	10	10	10	10	10	10	10	10	10	10	5	5	100
	<i>Cabomba</i>	0	50	50	5	5	5	5	5	5	5	5	5	5			50
	<i>Potamogeton</i>	0	200	200	25	25	25	25	25	15	15	15	15	15	10	5	200
	<i>Sagittaria</i>	7	200	193	25	20	20	20	20	20	20	20	20	20	5	5	195
	<i>Hydrocotyle</i>	7	50	43			5	5	5	5	5	5	5	5	5	5	45
	<i>Zizania</i>	598	700	102	25	25	15	15	15	10							105
City Park	<i>Ludwigia</i>	1	150	149	25	25	20	20	10	10	10	10	10	5	5	150	
	<i>Cabomba</i>	0	90	90	5	5	10	10	10	10	10	10	10	10		90	
	<i>Potamogeton</i>	54	1,450	1,396	150	100	100	100	100	100	100	125	125	125	125	150	1400
	<i>Sagittaria</i>	92	300	208	15	15	15	15	25	25	25	25	25	15	10	210	
	<i>Hydrocotyle</i>	0	10	10									5	5		10	
	<i>Zizania</i>	1,261	1,750	489	40	75	75	75	75	50	50	50				490	
I35	<i>Ludwigia</i>	0	50	50	5	5	5	5	5	5	5	5	5	5		50	
	<i>Cabomba</i>	0	50	50	5	5	5	5	5	5	5	5	5	5		50	
	<i>Potamogeton</i>	0	250	250	25	25	25	25	25	25	25	25	25	15	10	250	
	<i>Sagittaria</i>	0	150	150	30	10	10	10	10	10	10	10	25	15	10	150	
	<i>Hydrocotyle</i>	0	50	50			10	5	5	5	5	5	5	5	5	50	
	<i>Zizania</i>	28	600	572	75	75	75	75	75	75	75	50				575	
<p>* Light grey shaded boxes with no numbers will still require aquatic gardening, plant propagation and supplemental plantings to support maintaining the LTBG reach goals over time.</p> <p>Additionally, the ENTIRE HCP BUDGET for this mitigation measure is anticipated to be use each year to strive towards accomplishing the proportional expansion goal as it is presently undefined.</p>																	

Reaches	Species	Meters squared of aquatic vegetation (m <sup>2</sup> )			HCP Term Timeline*												Total
		Current (Dec 2015)	Goal	Needed	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
<b>Restoration Reaches</b>																	
Sewell Park	<i>Ludwigia</i>	0	25	25												25	25
	<i>Cabomba</i>	14	25	11												15	15
	<i>Potamogeton</i>	116	150	34	40												40
	<i>Sagittaria</i>	2	25	23						10	15						25
	<i>Hydrocotyle</i>	0	10	10						5	5						10
Below Sewell to City Park	<i>Zizania</i>	1,169	1,100	0													0
	<i>Ludwigia</i>	0	50	50							15	15	15	5			50
	<i>Cabomba</i>	0	50	50							15	15	15	5			50
	<i>Potamogeton</i>	172	500	328							50	75	75	75	55		330
	<i>Sagittaria</i>	727	700	0													0
Hopkins St - Snake Island	<i>Hydrocotyle</i>	5	20	15							5	5	5				15
	<i>Zizania</i>	2,247	2,300	53							25		15	15			55
	<i>Ludwigia</i>	0	50	50								10	10	15	15		50
	<i>Cabomba</i>	0	50	50								10	10	15	15		50
	<i>Potamogeton</i>	269	475	206	50							20	20	55	65		210
Cypress Island - Rio Vista Dam	<i>Sagittaria</i>	620	750	130	50							20	20	20	20		130
	<i>Hydrocotyle</i>	0	10	10								5	5				10
	<i>Zizania</i>	693	950	257	35						50	35	35	35	35	35	260
	<i>Ludwigia</i>	0	50	50	10	10	10	10	10								50
	<i>Cabomba</i>	0	50	50	10	5	5	5	5	5	5	5	5				50
I35 expanded	<i>Potamogeton</i>	0	150	150	15	10	10	25	10	20	20			25	15		150
	<i>Sagittaria</i>	5	50	45	15	5	5	5	5	5	5						45
	<i>Hydrocotyle</i>	0	0	0													0
	<i>Zizania</i>	122	350	228	50	50	50	25	25	25	5						230
	<i>Ludwigia</i>	8	50	42		10	10	10	12								42
Additional Texas wild-rice Reaches	<i>Cabomba</i>	33	100	67		25	25	10	10								70
	<i>Potamogeton</i>	0	250	250		30	25	25	25	50	20			25	25	25	250
	<i>Sagittaria</i>	355	450	95		25	25	10	10	10	15						95
	<i>Hydrocotyle</i>	0	50	50					10	10	5			10	10	5	50
	<i>Zizania</i>	57	450	393		50	50	50	50	50	50	50	45				395
<b>Spring Lake</b>	<i>Zizania</i>	31	1,000	969	50	100	100	100	100	100	100	100	100	100	20		970
<b>Below I35</b>	<i>Zizania</i>	0	280	280		20	20	30	30	30	30	30	30	30	30		280

\* Light grey shaded boxes with no numbers will still require aquatic gardening, plant propagation and supplemental plantings to support maintaining the goals over time.

**ASSUMPTIONS:**

- 1) Restoration efforts will proceed smoothly with no major setbacks or resets such as floods, dam repairs, etc.
- 2) Anthropogenic factors such as recreational disturbances and urban runoff are managed.
- 3) Concurrent aquatic plant propagation, gardening, and maintenance will occur throughout the HCP timeline.
- 4) Non-native vegetation removal (and replacement with natives) will occur in certain areas outside of the LTBG and Restoration reaches in order to mitigate reestablishment on non-natives.
- 5) No significant interruptions due to HCP Provision M.
- 6) Propagation rates remain sufficient to replace denuded area of non-native aquatic vegetation
- 7) Mapping to compare against goals will be conducted annually each Fall.

## **2. Management of Recreation in Key Areas (§§ 5.3.2, 5.4.2)**

Texas State University and the City of San Marcos will continue to control access and recreation in Spring Lake and the San Marcos River.

To minimize the impacts from recreation, Texas State University restricts access to Spring Lake to authorized and permitted activities and may establish and manage recreation access points on the west bank of the San Marcos River between Spring Lake Dam and the Aquarena Drive bridge, or other areas, as needed. Riparian areas between access points will be maintained with dense vegetation to discourage streamside access.

The City of San Marcos has established and will continue to manage permanent access points along the San Marcos River. Permanent access point locations include portions of the banks of the San Marcos River across from Lions Club Tube Rental (City Park), an area downstream of the first pedestrian bridge connecting San Marcos Plaza and City Park, beneath the Hopkins Street bridge, Bicentennial Park, Rio Vista Park, and Ramon Lucio Park (EAHCP § 5.3.7). Riparian areas between access points have undergone native vegetation restoration and will be maintained to discourage streamside access.

To support the TPWD's creation of a State Scientific Area in the San Marcos River (EAHCP § 5.6.1), the City of San Marcos and Texas State University will establish exclusion zones in critical areas to protect Texas wild-rice and San Marcos salamander habitat from recreational impacts, as well as continue to maintain kiosks at key areas along the river that locate access points, exclusion zones, and associated educational components at key locations.

The City of San Marcos will continue to employ a group called the Conservation Crew to help educate visitors, monitor recreational use, and other activities, as needed, in the San Marcos River. Activities include, but are not limited to, collecting trash, educating recreationists about the threatened and endangered species that inhabit the river, installing and maintaining exclusion barriers, as well as monitoring vulnerable stands of Texas wild-rice and San Marcos salamander habitat to reduce adverse impacts from recreation.



### **3. Native Riparian Habitat Restoration (§ 5.7.1)**

The City of San Marcos will continue to undertake a program to increase and maintain the area of the riparian zone on public lands along the banks of the river using native vegetation. Texas State University will continue to restore the riparian zone with native vegetation in upper Sewell Park and Spring Lake. Phase I activities focused on non-native removal and planting of native riparian species. While some areas may require new riparian plants over time, Phase II riparian activities will be focused more on non-native removal and maintenance. If non-native plant treatment is needed on riparian private property, the City of San Marcos will work with private landowners, on a voluntary basis, to coordinate methods for removal and planting of native species. Areas that need more riparian planting will be planted with drought-tolerant, native species, as needed.

### **4. Control of Non-Native Plant Species (§§ 5.3.8, 5.4.12)**

Texas State University and the City of San Marcos will continue to implement a non-native plant replacement program from Spring Lake to the city limits. Non-native species of aquatic, littoral, and small caliper riparian plants (less than four inches) will be replaced with native species to enhance Covered Species habitat. The quantity and location of areas restored in this program are provided in Table 34 of the *Submerged Aquatic Vegetation Analysis and Recommendations Report* (BIO-WEST and Watershed Systems Group, Inc, 2016) are a guideline for plantings. Specific species by location are determined by site specific conditions and vegetation planting success. The non-native aquatic plants will be shaken, checked for aquatic fauna, and transported to the Texas State University composting facility. Aquatic fauna that are recovered will be documented and returned to the system. Areas will be “weeded” until the area is suitable to plant native aquatic vegetation.

### **5. Control of Harmful Non-Native and Predator Species (§§ 5.3.9, 5.4.13)**

In accordance to Phase I efforts, the City of San Marcos and Texas State University will continue to implement non-native and predator species control for the San Marcos River and Spring Lake on a periodic basis with expanded effort of control, if needed, at low flows. The targeted species include, but are not limited to, suckermouth catfish, tilapia, nutria, zebra mussels, ramshorn and red-rimmed melania snails.

Routine biological monitoring will be conducted by EAA and EAHCP contractors (EAHCP § 6.3.1) to monitor and assess the distribution of new or existing harmful non-native and invasive species. If a threat is identified, EAHCP staff will work with the contractor to identify areas of concern and potential methods for removal.

## **6. Reduction of Non-Native Species Introduction (§§ 5.3.5, 5.4.11)**

Dumping aquariums into the San Marcos River and its tributaries will continue to be minimized through education, including signage and brochures, and offering alternative disposal to citizens wanting to get rid of unwanted aquatic pets. The City of San Marcos will continue to operate a fish drop-off pond at their Discovery Center where residents can donate unwanted fish and aquatic animals. Outreach efforts will continue through education events, flyers, advertisements, and partnering with Texas State University to educate current and future students.

## **7. Sediment Removal below Sewell Park (§§ 5.3.6, 5.4.4)**

The removal of sediment in support of native aquatic planting activities has proved to be both unnecessary and overly expensive. In Fall 2017, a non-routine adaptive management proposal to amend this conservation measure in the EAHCP was approved. The Sediment Removal (EAHCP §§ 5.3.6, 5.4.4) and Impervious Cover/Water Quality Protection (EAHCP § 5.7.6) are combined into one conservation measure that addresses sediment control within the upper San Marcos River watershed to minimize sediment and contaminated runoff. The primary focus is the Sessom Creek watershed, which contributes loads of sediment during rain events and increases sediment deposition on Texas wild-rice stands and other native plant stands near the Sessom Creek confluence to City Park. The City of San Marcos and Texas State University will oversee the design and construction of best management practices that control erosion, minimize sedimentation, and reduce pollutants in the San Marcos River watershed.

## **D. City of San Marcos**

### **1. Minimizing Impacts of Contaminated Runoff (§ 5.7.4)**

In Spring 2017, this conservation measure was revised through non-routine adaptive management to cover two new sedimentation ponds as identified by City of San Marcos staff and the San Marcos Water Quality Protection Plan staff (John Gleason LLC, 2017).

The first pond, located adjacent to the City Park, was designed to remove sediment and street pollutants from runoff prior to entering the river. The size, shape, and depth were determined based on an analysis of the volume of water discharging from the storm drains. The City Park biofiltration pond was completed in 2018. The City of San Marcos will undertake required maintenance of the sedimentation pond on a regular basis.

The second pond, located next to C.M. Allen Street parking lot near the San Marcos Plaza, is referred to as the Downtown Pond. The City of San Marcos is updating the Downtown Pond as part of a larger Capital Improvements Project under construction in 2019. Upon completion of the Downtown sediment retention pond, the City of San Marcos will assume financial responsibility of maintenance of the both ponds, as this measure is no longer funded as part of Phase II.

### **2. Management of Public Recreational Use of San Marcos Springs and River Ecosystem (§ 5.3.2.1)**

Public recreational use of the San Marcos Spring and River ecosystems include, but are not limited to swimming, wading, tubing, boating, canoeing, kayaking, golfing, scuba diving, snorkeling and fishing. In accordance to Phase I efforts, the City of San Marcos will continue to implement the Recreation Mitigation Measures adopted by the San Marcos City Council on February 1, 2011 (Resolution 2011-21) (Appendix P of the EAHCP). In addition, pursuant to Resolution and Order No. 08-12-001 adopted by the Implementing Committee on August 16, 2012, the City of San Marcos will issue COIs to those commercial outfitting businesses (businesses and nonprofit entities that rent tubes, canoes, kayaks, or similar equipment to facilitate recreational activities on the San Marcos River) (Outfitters) that comply with the requirements of the COI program established in Section 5.3.2.1 of the EAHCP.

### **3. Management of Aquatic Vegetation and Litter below Sewell Park (§ 5.3.3)**

In accordance to Phase I efforts, the City of San Marcos will continue to perform activities to manage floating vegetation and litter to enhance habitats for the Covered Species. Management activities include removal of vegetation mats that form on top of the water surface as well as on top of Texas wild-rice and native plants, particularly during low flows, and litter removal.

The City of San Marcos will continue to dislodge, monitor and remove floating vegetation near and/or on top of any Texas wild-rice and native aquatic plant stands in the San Marcos River.

Inorganic litter will continue to be removed from the San Marcos River from City Park to IH-35 during the recreational season (May through September) and less often during offseason.

### **4. Prohibition of Hazardous Materials Transport Across the San Marcos River and Its Tributaries (§ 5.3.4)**

Hazardous materials transported by truck across the watershed of the San Marcos River and its tributaries present the possibility of accidental spills or releases into the environment. The limited geographic distribution of the endangered species at San Marcos Springs could cause the species to be highly impacted by such a spill.

The City of San Marcos will continue to coordinate with TxDOT to designate hazardous materials routes which minimize the potential for spills entering the San Marcos River. This effort may include legislation, if necessary, and additional signage.

### **5. Designation of Permanent Access Points/Bank Stabilization (§ 5.3.7)**

To minimize the impacts of recreation, permanent access points were established in an effort to increase bank stabilization at various locations along the San Marcos River during Phase I. Access points serve as

entry and exit ways that are intended to be used by canoeists, tubers, swimmers, etc., while stabilizing highly eroded banks and preventing erosion along riparian restoration reaches.

Permanent access point locations include portions of the banks of the San Marcos River across from City Park, an area downstream of the first pedestrian bridge connecting Plaza Park and City Park, beneath the Hopkins Street bridge, Bicentennial Park, Rio Vista Park, and Ramon Lucio Park.

Natural rocks were used to create a stone terrace for access and bank stabilization with the bank on either side restored with riparian vegetation. Native riparian vegetation was planted in areas adjacent to the access/stabilization areas to discourage river users from entering the river in places other than the access point. Phase II activities will include upkeep of these access points. If additional repairs or maintenance are needed, the City of San Marcos will cover the financial responsibilities of construction costs.

## **6. Septic System Registration and Permitting Program (§ 5.7.3)**

The City of San Marcos will continue the septic system registration and permitting program to prevent subsurface pollutant loadings from potentially being introduced to the San Marcos Springs ecosystem within its city limits.

## **7. Management of Household Hazardous Wastes (§ 5.7.5)**

In accordance to Phase I efforts, the City of San Marcos will continue to maintain a Household Hazardous Waste (HHW) Program that involves the periodic collection of HHW and its disposal.

## **8. Impervious Cover/Water Quality Protection (§ 5.7.6)**

In 2017, the City of San Marcos approved the San Marcos Water Quality Protection Plan (WQPP), a comprehensive program to protect water quality and reduce the impacts of impervious cover (John Gleason LLC., 2017). Criteria and incentives for the program were based upon the WQPP and the EAHCP LID/Water Quality Work Group Final Report (Appendix Q of the EAHCP) recommendations for implementation strategies and best management practices. The WQPP has identified Sessom Creek tributary as a priority watershed (John Gleason LLC, 2017). Erosion prevention and stormwater

management designs will be implemented in this watershed during Phase II. Efficacy of the erosion prevention and stormwater management designs may be assessed through water quality sampling, funded through grants and other sources.

## **E. Texas State University**

### **1. Management of Submerged and Floating Aquatic Vegetation in Spring Lake (§ 5.4.3.1)**

Texas State University will continue to manage aquatic vegetation in Spring Lake through use of its harvester boat and through hand cutting of vegetation by divers authorized to dive in Spring Lake. Vegetation restoration activities around the spring openings will be monitored by trained divers and documented through various methods.

Each week, hand cutting of vegetation around five springs within Spring Lake will occur. Routine maintenance will occur every two to three weeks following initial vegetation maintenance. During summer algal blooms, the springs will be managed more frequently (up to four springs per day), but mostly to remove algae. Texas State employees and supervised volunteers clear a 1.5-meter radius around each spring opening in Spring Lake with a scythe, when needed. Over the next 1.5-meter radius around the spring opening, they will shear vegetation to a height of 30 centimeters, and then to one meter over the following three-meter radius. Plant material will be collected and removed from the site or downstream. Cumulatively, about six meters of vegetation around each spring opening will be modified. Mosses will not be cut. The volume of plant material to be removed will vary by the amount of time between cuttings, and season.

The harvester boat will remove a range of 15-to-20 boatloads of plant material a month from Spring Lake. The harvester will clear the top meter of the water column, cutting vegetation from sections one, two, and three once a week. The harvested vegetation will be visually checked by driver for fauna caught in the vegetation. If the driver observes fauna, he/she will stop work and put the animal(s) back into Spring Lake, if appropriate. Texas State University employees and supervised volunteers are trained to recognize the Covered Species through the Diving for Science Program and avoid contact with them.

The Spring Lake Area Supervisor will continue to schedule cleanup of nuisance floating species such as water hyacinth and water lettuce from Spring Lake. The floating plants will be collected by hand and shaken prior to removal from the river to dislodge any aquatic species caught in the plant. The plants will be deposited into dump trucks and taken to the Texas State University compost area.

## **2. Management of Aquatic Vegetation from Sewell Park to City Park (§ 5.4.3.2)**

In accordance to Phase I efforts, Texas State University will continue to dislodge and remove floating vegetation on any Texas wild-rice and native aquatic plants. Inorganic litter will be picked up weekly from the San Marcos River from Sewell Park to City Park during the recreational season (Memorial Day to Labor Day) and monthly during offseason.

Texas State University will continue to monitor downstream Texas wild-rice stands to keep the stands clear of drifting vegetation.

Texas State University employees or others will be trained to recognize Texas wild-rice and to protect the plant stand while removing the accumulated floating plant material. Texas State University employees will dislodge and remove the floating material from the top of the Texas wild-rice stands. Downstream accumulations of plant material will be removed to avoid impacts to Texas wild-rice further downstream.

## **3. Diversion of Surface Water (§ 5.4.5)**

Under TCEQ Certificates 18-3865 and 18-3866, Texas State University's total diversion rate from the headwaters of the San Marcos River for consumptive use is limited to 8.1 cfs. The total diversion rate from Spring Lake is limited to 4.88 cfs; the total diversion rate from the San Marcos River at Sewell Park is limited to 3.22 cfs. To minimize the impacts of these diversions, when flow at the USGS gauge #08170500 reach 80 cfs, Texas State University will reduce the total rate of surface water diversion by 2 cfs, i.e., to a total of approximately 6.1 cfs. This reduction in pumping will occur at the pump just below Spring Lake Dam to maximize the benefits to salamanders, Texas wild-rice, and other aquatic resources in the San Marcos River below Spring Lake Dam. Texas State University will reduce the total rate of surface water diversion by an additional 2 cfs when the USGS gauge reaches 60 cfs. The additional 2 cfs reduction will

be made from the pumps located in the slough arm of Spring Lake, and, therefore, maximize the benefits to the aquatic resources within the main stem San Marcos River below Spring Lake Dam. When the USGS gauge reaches 49 cfs, Texas State University will reduce the total diversion rate to 1 cfs. This further reduction will be made by restricting the pumps located in the Sewell Park reach. The diversion of water will be suspended when springflow reaches 45 cfs.

The reductions in Texas State University’s total diversion rate for consumptive use is summarized in Table 5-4.

Table 5-4. Texas State University’s Surface Water Diversion Rates by Streamflow

<b>Streamflow (cfs)</b>	<b>Spring Lake Diversions (cfs) Cert. No. 18-3865</b>	<b>San Marcos River Diversions (cfs) Cert. No. 18-3866</b>	<b>Total Diversion Rate (cfs)</b>
>80	4.88	3.22	8.1
80 – 60	2.9	3.2	6.1
60 – 49	0.9	3.2	4.1
49-45	1.0	0	1.0
<45	0	0	0

To avoid or minimize the impacts of the surface water diversions, Texas State University will routinely monitor the screens to determine if any entrainment occurs and will make any necessary modifications to the screens to minimize any incidental take from the operation of the diversions.

#### **4. Diving Classes in Spring Lake (§ 5.4.7)**

##### **a. The Diving for Science Program**

To minimize the impacts of the Diving for Science Program that trains and authorizes individuals to dive in Spring Lake, individuals authorized through this program must demonstrate a knowledge of listed species found in the lake and their habitat, laws and regulations impacting these species, good buoyancy control, the ability to avoid contact with listed species, the ability to avoid disturbing critical habitat, and the ability to stay off the bottom of the lake. The program is taught as a two-day class with a maximum class size of 20 and is taught in the Dive Training Area. The program averages 350 trainees per year. Upon completion of this class, divers are allowed anywhere in Spring Lake to perform specific volunteer tasks



such as finning spring areas covered with algae and picking up litter. Projects are structured to minimize contact with listed species in an effort to ensure protection of listed species and their habitat. The Diving Supervisor coordinates and supervises all volunteer diving. No more than 20 volunteer divers will be allowed in the lake per day, with no more than ten at one time.

Any individual diving outside of the Dive Training Area must have completed the Diving for Science Program.

**b. Texas State University Continuing Education**

Texas State University Continuing Education classes for check-out dives will continue to be conducted in the Dive Training Area. Class sizes will be limited to 12 students and no more than three classes will be conducted per day to minimize impacts to Covered Species habitat.

**c. Texas State University SCUBA Classes**

Texas State University SCUBA classes will continue to be conducted in the Dive Training Area. Class sizes will be limited to 12 students and no more than three classes will be conducted per day to minimize impacts to Covered Species habitat.

**5. Research Programs in Spring Lake (§ 5.4.8)**

In accordance to Phase I efforts, all proposals to conduct research in Spring Lake will continue to be reviewed by the Meadows Center for Water and the Environment at Texas State University to ensure there is no impact on Covered Species or their habitat. If incidental take cannot be avoided, it will be minimized by educating the researchers as to the area where the listed species are located and by requiring measures to minimize any potential impacts. All diving in support of a research study will be provided by individuals who have completed the Diving for Science Program.

## **6. Boating in Spring Lake and Sewell Park (§ 5.4.10)**

In accordance to Phase I efforts, boats and stand up paddleboards in Spring Lake and Sewell Park will continue to be confined to areas that are mowed by the harvester, thereby not impacting vegetation and specifically avoiding Texas wild-rice stands. Individuals will enter and exit boats and paddleboards at specified access points to avoid impacting the flora and fauna along the bank. All boats and paddleboards launched into Spring Lake will undergo a USFWS-approved process for cleaning.

Further, canoeing/kayaking/paddleboard classes in the lake will be limited to no more than four classes per day and each class will be in the water no more than one hour. Classes will have a maximum of ten students (with two students per canoe). All classes will be supervised.

To minimize the impacts of boating on the Covered Species' habitat in Sewell Park, canoeing/kayaking classes in Sewell Park will continue to be confined to the region between Sewell Park and Rio Vista dam. Students will enter and exit canoes/kayaks/paddleboards at specified access points to avoid impacting the flora and fauna along the bank. Classes will be no longer than two hours and up to three classes will be held per day. Classes will have a maximum of ten students. All classes will be supervised by Meadows Center for Water and the Environment at Texas State University.

## **F. San Antonio Water System**

### **1. Use of the SAWS ASR for Springflow Protection (§ 5.5.1)**

The San Antonio Water System (SAWS) Aquifer Storage Recovery (ASR) facility will continue to be used to store and deliver Edwards Aquifer water acquired by the EAA in exchange for actions outlined in an Interlocal Contract between the EAA and SAWS for the purposes of springflow protection. When triggers are reached, SAWS will forbear usage in its northeast service area's large primary groundwater pumping facilities. These facilities, from a regional perspective, are considered nearest to the springs and provide groundwater pumping relief during extreme drought. As described below, an amount equivalent to the water recovered from the ASR may be used by SAWS to offset SAWS's forbearance of its Edwards Aquifer demands.

EAA will continue to acquire, through a combination of leases and forbearance agreements, 50,000 ac-ft/yr of EAA-issued groundwater withdrawal permits. The leases will be used to fill, idle, and maintain a portion of the capacity of the SAWS ASR facility for subsequent use to protect springflows.

The program is comprised of two components. The first will lease approximately 16,667 acre-feet of permits, that will be used for storage in the ASR and ultimately for forbearance purposes. The remaining 33,333 acre-feet will be enrolled into forbearance agreements. Forbearance will be required in years after the ten-year moving annual average as Edwards Aquifer recharge is equal to or less than 500,000 ac-ft/yr, as determined by the EAA.

Trigger levels for implementation of the SAWS forbearance component of ASR management, in accordance with the EAHCP, will be 630 ft-MSL at the J-17 index well during an identified repeat of drought conditions similar to the drought of record as indicated by the ten-year rolling average of Edwards Aquifer recharge of 500,000 ac-ft, as determined by the EAA. When triggered, the ASR or other supplies capable of utilizing shared infrastructure may be activated by SAWS, at its discretion, to deliver up to 60 million gallons per day to SAWS distribution system during a repeat of drought of record-like conditions. When the monthly average groundwater levels at J-17 are below 630 ft-MSL and the ten-year rolling average of Edwards Aquifer recharge is 500,000 ac-ft or less, pumping of selected wells on the northeast side of SAWS water distribution system will be reduced (i.e. forborne) in an amount that on a monthly basis equals the amount of water stated in the applicable forbearance schedule only to the extent of the Edwards Aquifer water provided by the EAA for storage in the ASR. SAWS may use up to 100 percent of the conveyance capacity of existing SAWS ASR facilities to off-set SAWS's Edwards Aquifer demand.

SAWS will attempt, to the extent practicable, to mimic the pattern of delivery and/or forbearance developed by HDR Engineering (HDR, 2011) as provided for in the presumptive forbearance schedule in Exhibit E of the Interlocal Contract between the EAA and SAWS, as such, the schedule may be amended under such contract. However, the actual pattern of delivery of water from the ASR program and/or forbearance may differ from what HDR used in its modeling simulations depending on the actual course of the drought.

The two agencies entered an Interlocal Contract for the use of the ASR capabilities to support springflow protection covering Phase I of the EAHCP Program. From time to time the Interlocal Contract is brought

up to date through the Staff Work Group processes contained therein or through adaptive management and/or necessary contractual amendments to continue to support protections throughout Phase II of the EAHCP Program.

The use of the SAWS ASR is predicated on an assumption informed by HDR Engineers' groundwater modeling that the SAWS ASR will be utilized to deliver approximately 126,000 ac-ft of Edwards Aquifer water during a decadal drought similar to the drought of record. It is further predicated on the assumption (HDR, 2011) that the maximum amount of EAHCP water that must be forborne in a given year is 46,300 ac-ft.

SAWS will make the day-to-day decisions necessary to fulfill the ASR commitment. A 12-person Regional Advisory Group consisting of four representatives of SAWS, the EAHCP Program Manager, and one representative each from EAA, EAA permit holder for irrigation purposes, small municipal pumpers, the Spring cities, environmental (including TPWD), industrial pumpers, and downstream interests will provide advice to SAWS regarding the implementation of the program. SAWS will organize and facilitate these annual meetings of the Regional Advisory Group, as needed.

## **G. Texas Parks and Wildlife Department**

### **1. State Scientific Areas (§ 5.6)**

Texas Parks and Wildlife Department (TPWD) has the authority to establish state "scientific areas" for the purposes of education, scientific research, and preservation of flora and fauna of scientific or educational value (Texas Parks and Wildlife Code § 81.501). To minimize the impacts of recreation, TPWD will continue to pursue creation of State Scientific Areas in the San Marcos River. The scientific areas will be designed to protect Texas wild-rice by limiting recreation in these areas during low flow conditions. The regulations are intended to preserve at least 1,000 square-meters of Texas wild-rice.

Except for the eastern spillway immediately below Spring Lake Dam, none of the protected areas will extend across the entire river channel; thus, allowing longitudinal connectivity for recreation and access to be maintained downstream throughout the river. The National Academies of Sciences 2018 *Review of the Edwards Aquifer Habitat Conservation Plan: Report 3* recommended controlling the footprint of

recreation in the 50-meter reach below Spring Lake Dam. San Marcos salamanders have been found in abundance in the eastern spillway, so the majority of the spillway may be excluded from recreation. Exclusion zones in the remainder of the 50m reach may be established primarily around the Texas wild-rice stands.

Interlocal Agreements between the City of San Marcos, TPWD and Texas State University will be pursued, if necessary, for local in-water enforcement of the protected zones.

In order to protect existing and restored fountain darter habitat, TPWD may pursue the creation of a State Scientific Area in the Comal Springs system. An Interlocal Agreement between the City of New Braunfels and TPWD will be pursued, if necessary, for local in-water enforcement of the protected zones.

## **II. Costs**

The estimated cost of the EAHCP and the schedule by which those costs are expected to be realized are set out in Table 7.1 of the EAHCP and are hereby incorporated by reference in this Comprehensive Plan.

## **References:**

BIO-WEST, Watershed Systems, Group, 2016. *Submerged Aquatic Vegetation Analysis and Recommendations Report*. Prepared for the Edwards Aquifer Authority.

AquaStrategies, BIO-WEST, 2017. *Landa Lake and Dissolved Oxygen Management Plan*. Prepared for the City of New Braunfels

BIO-WEST, 2017. *Gill Parasite Monitoring in the Comal River 2017 Final Report*. Prepared for the City of New Braunfels

John Gleason LLC, 2017. Water Quality Protection Plan for the City of San Marcos and Texas State University. Edwards Aquifer Authority Contract deliverable for EAHCP § 5.7.6