Conservation Measures Subcommittee

Report

2024

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Report

To:	EAHCP Implementing Committee and Permit Renewal Contractor – ICF
From:	EAHCP Conservation Measures Subcommittee
Date:	October 4, 2024
Re:	EAHCP Conservation Measures Subcommittee Report – 2024

Introduction

The Edwards Aquifer Habitat Conservation Plan (EAHCP) is currently renewing its Incidental Take Permit (ITP) with the U.S. Fish and Wildlife Service (USFWS). This process, referred to as the permit renewal, involves evaluating the existing components of the EAHCP conservation strategy and recommending new approaches and potential modifications to the conservation measures comprising the strategy. A key aspect of Habitat Conservation Plans (HCPs), as outlined in the joint 2016 U.S. Fish and Wildlife Service and National Marine Fisheries Service "Habitat Conservation Planning and Incidental Take Permit Processing Handbook" (HCP Handbook), is the development of conservation measures. These measures describe the specific actions that Permittees will implement to achieve biological objectives and support the overall goals of the HCP consistent with applicable state and federal requirements.

Conservation Measures Subcommittee Overview:

The purpose of the Conservation Measures Subcommittee (Subcommittee) was to review, discuss, and develop recommendations for conservation measures that should be considered for inclusion in the next EAHCP. The Subcommittee's recommendations are intended to help guide EAHCP staff and the permit renewal consultant, ICF, through the permit renewal process. The Subcommittee charge was approved by the EAHCP Implementing Committee on December 14, 2023 (Appendix A). From March through October 2024, nine Subcommittee meetings (Appendix B – *Subcommittee Timeline*) were conducted in-person with a virtual Microsoft Teams option for remote participation. Meeting recordings were posted on the EAHCP website and on the EAHCP Vimeo account. Meeting agendas are in captured in Appendix C.

Members of the Conservation Measures Subcommittee:

- **Subcommittee Chair:** San Antonio Water System: Represented by Linda Bevis
- Texas State University: Represented by Kimberly Meitzen

- City of San Marcos: Represented by Mark Enders
- City of New Braunfels: Represented by Phillip Quast
- Edwards Aquifer Authority: Represented by Marc Friberg
- Guadalupe-Blanco River Authority: Represented by Daniel Large
- EAHCP Stakeholder Committee Member (Bexar County Interest): Kerim Jacaman
- EAHCP Stakeholder Committee Member (Recreational Interest): Melani Howard
- EAHCP Stakeholder Committee Member (Agricultural Interest): Adam Yablonski
- EAHCP Stakeholder Committee Member (Environmental Interest): Myron Hess

The Subcommittee recognizes that the recommendations presented in this report will continue to be evaluated and refined throughout the permit renewal process. This process will involve collaboration between the Permittees, EAHCP staff, and the permit renewal consultant (ICF), with input from USFWS and all EAHCP Committee members. The Subcommittee fully supports this collaborative, transparent, and iterative approach to ensure that all interests are appropriately considered, the diverse expertise of participating scientists and stakeholders is leveraged, and decisions are grounded in the best available science.

The Subcommittee's review of the current conservation measures was not intended to determine whether the proposed modifications are sufficient to fully offset the take resulting from covered activities or meet the EAHCP's recovery goals. Rather than directly addressing adequacy, the recommendations in this report focus on improving efficiency, feasibility, and basic effectiveness, while promoting a more comprehensive and streamlined approach. This focus reflects the available information and the collective expertise of the Subcommittee members.

Under Section 10 of the ESA, the criteria for issuing an ITP require applicants to demonstrate that the proposed measures "minimize and mitigate take to the maximum extent practicable." Assessing the adequacy of the Subcommittee's recommended measures, relative to this regulatory requirement and the EAHCP's additional recovery considerations, is beyond the capacity of the Subcommittee and will have to be considered during subsequent steps of the process.

Furthermore, the Subcommittee notes that the Aquifer Storage and Recovery (ASR) measure involves extensive coordination between the Edwards Aquifer Authority (EAA) and San Antonio Water System (SAWS) that must be defined through the negotiation and

renewal of one or more contracts. The Subcommittee recognizes that its recommendations regarding the ASR are one of many considerations for these negotiations.

Conservation Measures Subcommittee Recommendations:

The EAHCP's current conservation measures are detailed in HCP Chapter 5 "Minimization and Mitigation Measures; Measures Specifically Intended to Contribute to Recovery." These measures were originally organized based on the entity responsible for their implementation. However, because multiple entities are involved in various conservation efforts, this structure led to redundant and inconsistent language throughout the chapter. This redundancy and inconsistency can create confusion, making it more difficult for stakeholders to clearly understand the responsibilities of the Permittees and for decision-makers to ensure alignment across all conservation activities.

To address these issues, the Subcommittee recommends reorganizing the revised conservation measures into the following five categories: Springflow Protection (Figure 1), Comal Springs System (Figure 2), San Marcos Springs System (Figure 3), Refugia, and Measures that Contribute to Recovery (Figure 4). These new categories will better reflect the focus of each group of measures, align more closely with the overall conservation strategy, and be more concise, providing a more cohesive presentation of the measures for achieving the Biological Goals and Objectives.

Springflow Protection Measures are activities implemented to minimize flow impacts to the Covered Species associated with permitted groundwater pumping from the Edwards Aquifer. Proposed *Springflow Protection Measures* are intended to be implemented by the Edwards Aquifer Authority (EAA) and San Antonio Water System (SAWS); however, all Permittees are encouraged, throughout the permit term, to evaluate additional or alternative potential springflow protection options for implementation east of Cibolo Creek, closer to the springs. Pumping closer to the springs may have a more direct impact to springflow.

The *Comal and San Marcos springs systems* habitat conservation measures, also known as *Habitat Protection Measures*, are activities implemented within the spring runs, lakes, rivers, and adjacent riparian zones of the springs systems to minimize the impacts from Covered Activities and enhance the habitat of the Covered Species. These measures are intended to be implemented by the City of New Braunfels (CONB) in the Comal Springs System and by the City of San Marcos (COSM) and Texas State University (TXST) in the San

Marcos Springs System, with the participation of the EAA and, especially for state scientific area (SSA) implementation, support from the Texas Parks and Wildlife Department (TPWD).

The *Refugia Measure* describes the off-site refugia that house, research, and maintain populations of the Covered Species to support re-establishment in the wild if wild populations are extirpated due to catastrophic events such as a chemical spill or exceptional drought. This conservation measure is managed by EAA and implemented under contract by USFWS.

Measures that Contribute to Recovery are measures that go beyond minimum mitigation requirements to contribute to the likelihood of downlisting (reclassification of endangered to threatened) or delisting of the listed Covered Species. Compared to the other mitigation measures, benefits from these measures may be more difficult to quantify because benefits to the Covered Species are likely to be more indirect, harder to measure, and more uncertain in their implementation due to funding or other constraints. Consistent with state legislative directives and the status of the EAHCP as a Recovery Implementation Program, these measures align with the recovery actions included by USFWS in the recently released *Draft Recovery Plan for the Southern Edwards Aquifer Springs and Associated Aquatic Ecosystems* (USFWS, 2024) and with Goal 7 of the *Revised Recommended Biological Goals and Objectives for the Permit Renewal Memorandum* (BIO-WEST and ICF, 2024).

This report, organized according to the proposed new structure described above, summarizes the modifications to conservation measures recommended by the Subcommittee. Each existing measure that corresponds to a recommended modified measure is listed after the description of the recommended modified measure for reference. In addition to the recommended re-organization and modifications to conservation measures, the report includes specific comments for further consideration for various conservation measures, a glossary of the key terms used throughout this report, and a detailed table of the native and non-native species addressed in the recommended measures identified by common and scientific name. The Subcommittee recommends that the *Comments for Consideration* included in this report be fully integrated into the process of finalizing the conservation strategy for the ITP renewal, recognizing that further evaluation, analysis, and coordination will be necessary for assessing the manner and extent that these comments are reflected in specific conservation measures.

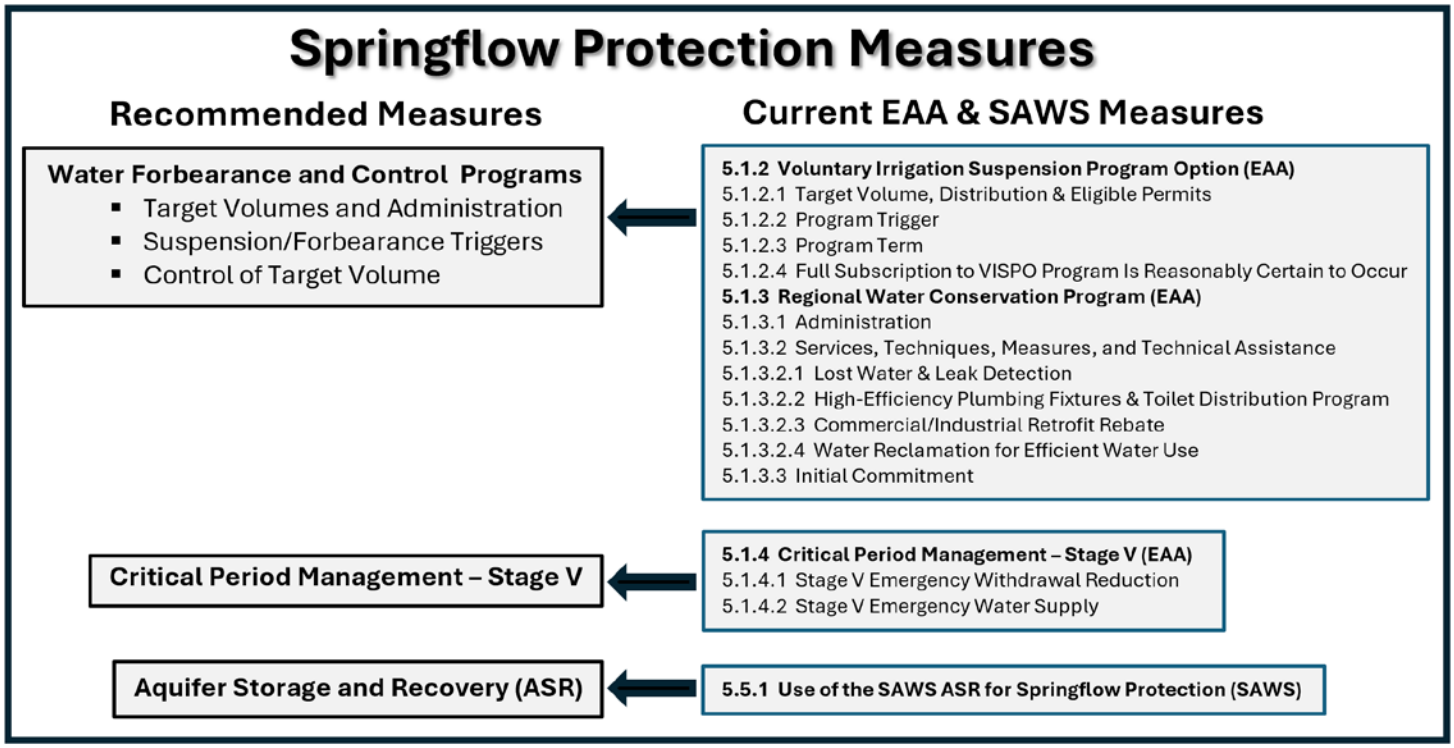


Figure 1. Structure of current and recommended Springflow Protection Measures.

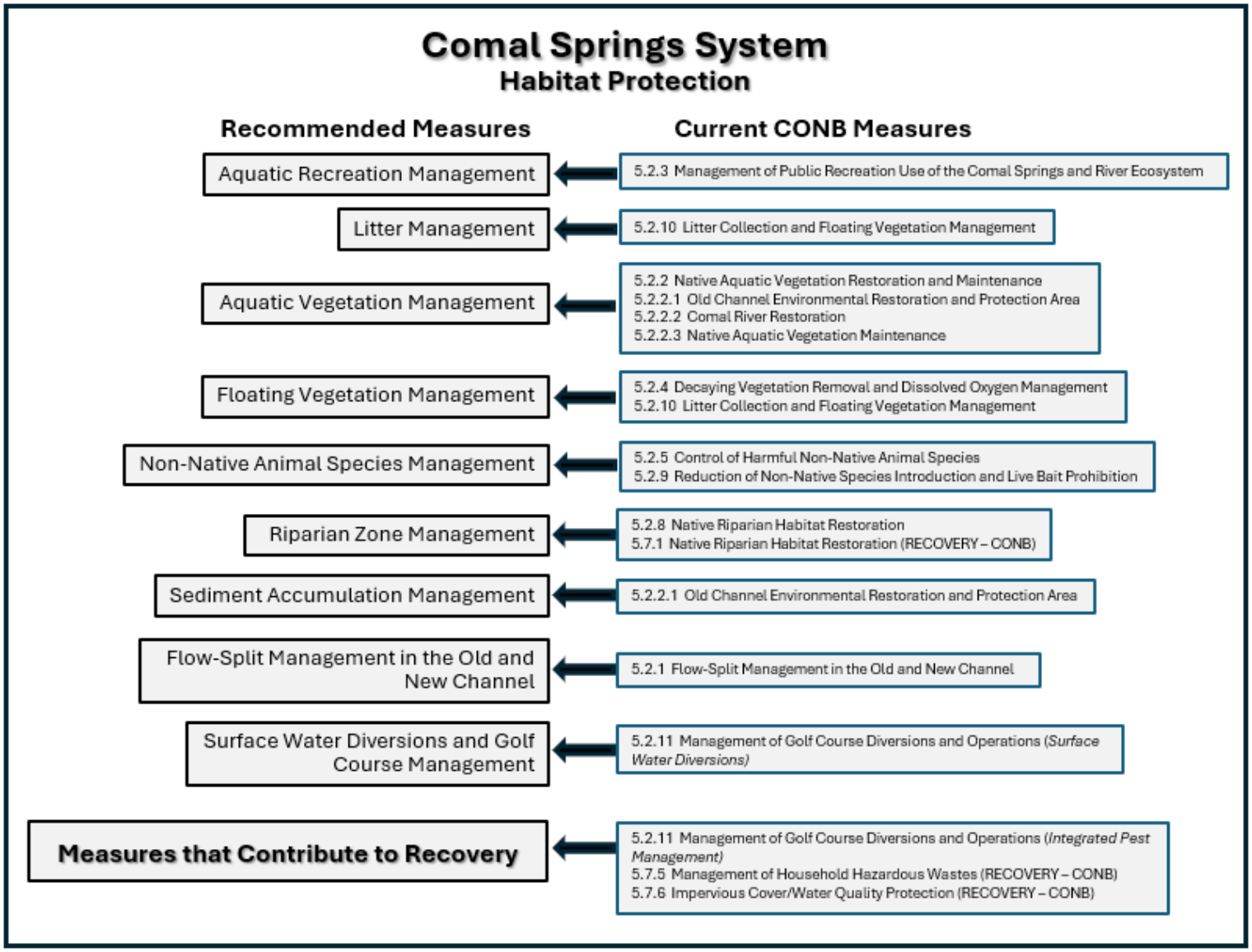


Figure 2. Structure of current and recommended Comal Springs System Habitat Protection Measures.

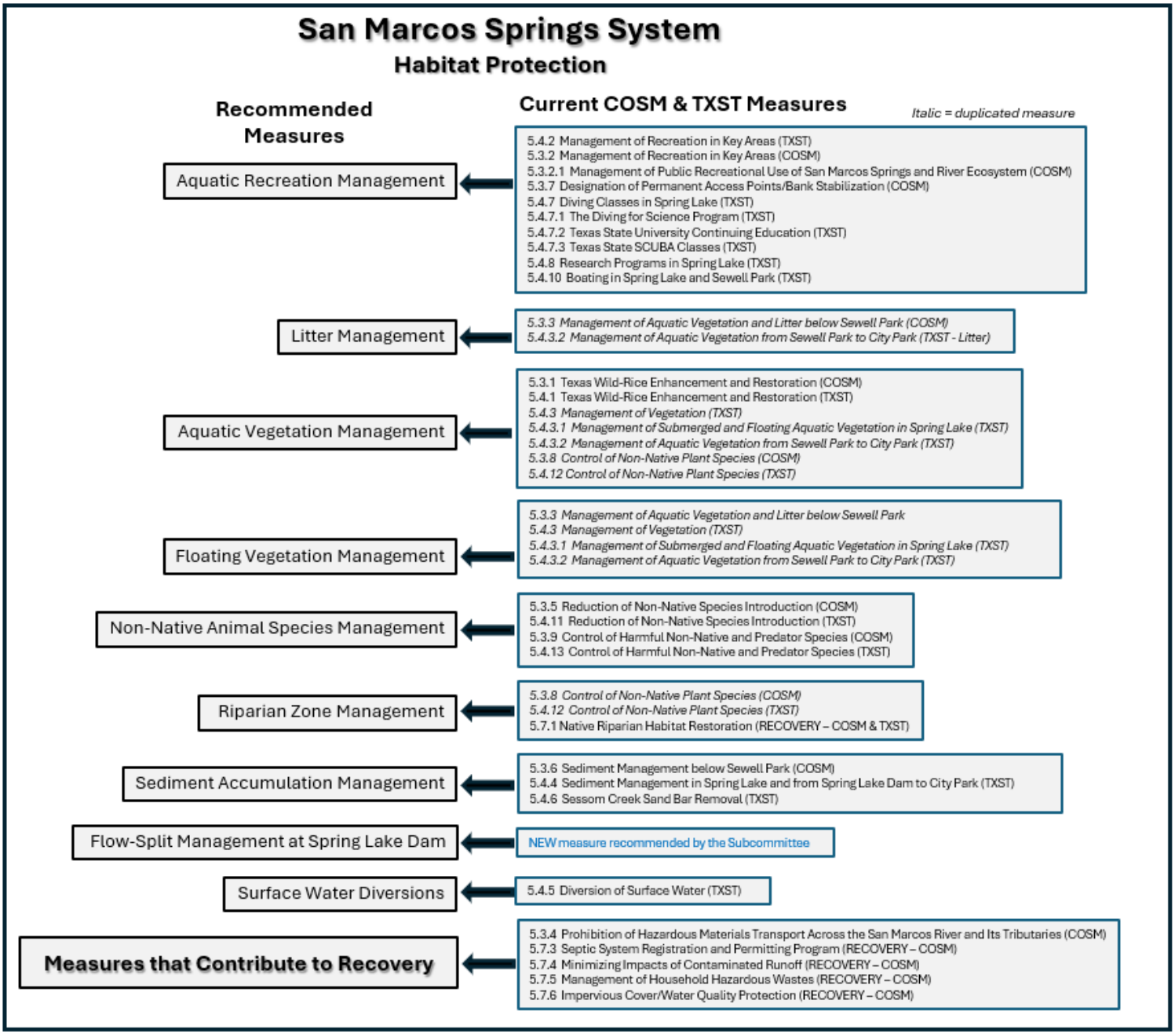


Figure 3. Structure of current and recommended San Marcos Springs System Habitat Protection Measures.

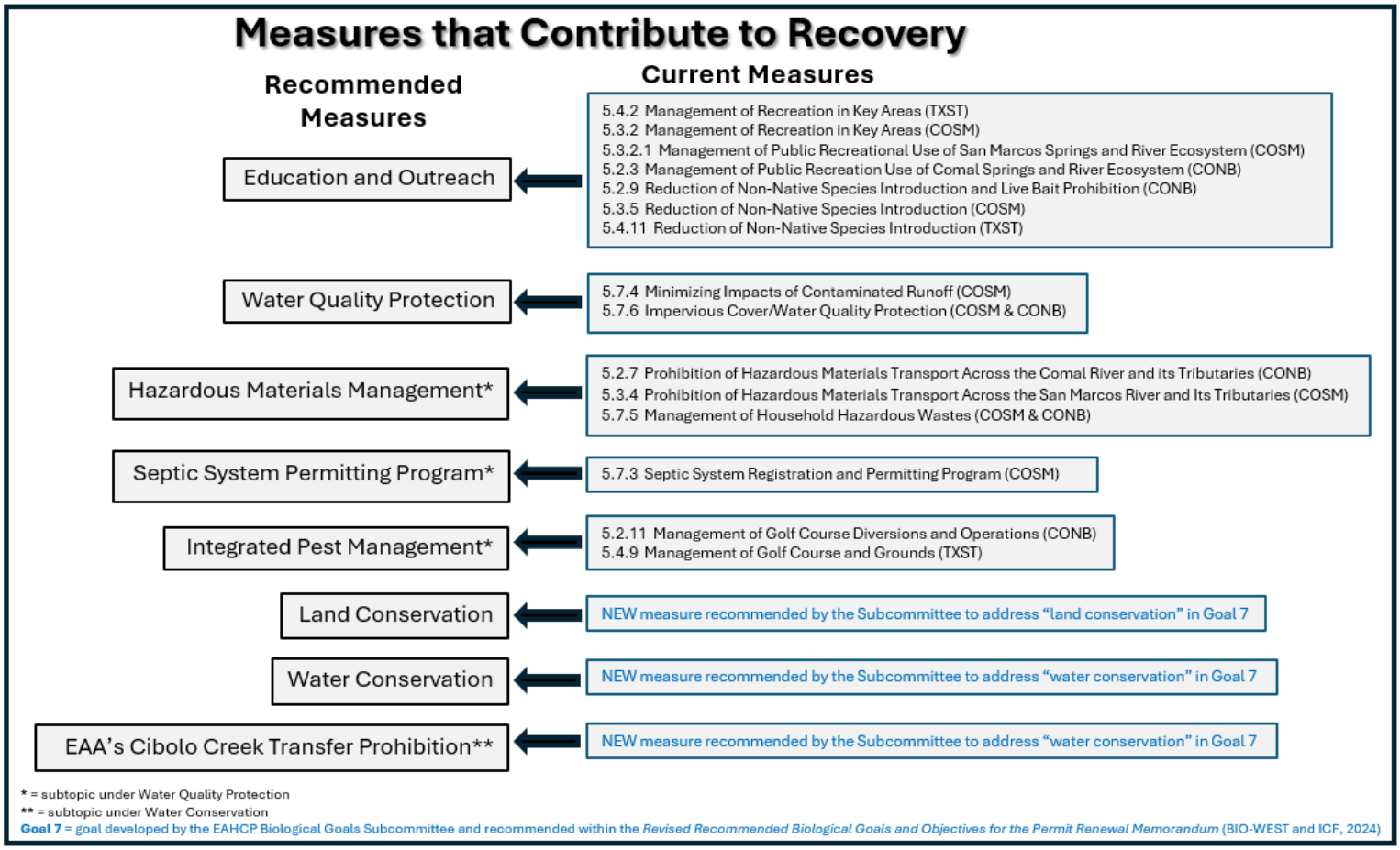


Figure 4. Structure of current and recommended Measures that Contribute to Recovery.

Springflow Protection Measures

The current Springflow Protection Measures include the Voluntary Irrigation Suspension Program Option (VISPO), Aquifer Storage and Recovery (ASR), Critical Period Management (CPM) – Stage V, and the Regional Water Conservation Program (RWCP). While VISPO and ASR have been effective under the current implementation of the EAHCP, there is a growing need for administrative flexibility to ensure these programs can adapt to the increasingly competitive and evolving Edwards Aquifer groundwater market, that is likely to change over the permit term. This administrative flexibility is intended to reduce the administrative challenges that were encountered during the initial term of the EAHCP, particularly in implementing the VISPO, ASR, and RWCP.

RWCP requirements were fulfilled in 2020 and no additional water conservation efforts have been implemented through the RWCP since that time. The Subcommittee recommends a reconceptualization of the RWCP primarily as a component of the proposed Water Forbearance and Control Programs. Accordingly, the 10,000 ac-ft of water conservation achieved through the current RWCP and previously designated for allocation to flow protection has been added below to the volumetric goal for the Water Forbearance and Control programs.

Water Forbearance and Control Programs

The EAA will administer a combination of programs to control sufficient water rights to ensure pumping from the Edwards Aquifer is reduced in adequate amounts, and at appropriate times, to achieve minimum springflow objectives for the Comal and San Marcos springs as set forth in the *Revised Recommended Biological Goals and Objectives for the Permit Renewal* memorandum (BIO-WEST and ICF, 2024). These programs are intended to minimize incidental take from low springflows resulting from groundwater withdrawals primarily by suspending, or forbearing, the withdrawal of specified volumes of Edwards Aquifer water during drought conditions.

Target Volumes and Administration

The total volumetric goal for the water forbearance and control programs is 101,795 acre-feet/year (ac-ft/yr.). Holders of irrigation, industrial, and municipal permits in Atascosa, Bexar, Comal, Hays, Medina, and Uvalde counties will be approached for enrollment in various control programs and/or lease agreements. Within that total annual volume, control of at least 10,000 ac-ft will be pursued to the maximum extent practicable in Atascosa, Bexar, Comal, and Hays counties because these counties are closest to the springs where temporary suspension of pumping is likely to be the most effective.

All strategies utilized by the EAA for control of the rights will be pooled together and implemented to meet forbearance and control requirements as specified triggers occur. Strategies implemented to control rights will include, but not be limited to:

- Long-term leases of groundwater withdrawal rights;
- Purchases of groundwater withdrawal rights;
- Forbearance agreements for groundwater withdrawal rights;
- Placement of groundwater withdrawal rights in the EAA's Groundwater Trust; and
- Acquisition of groundwater conservation easements.

Suspension/Forbearance Triggers

Suspension Increment One

Suspension of pumping of 41,795 ac-ft of Edwards Aquifer Groundwater Withdrawal Rights will occur during the calendar year following a year during when the Bexar County Index Well (J-17) is at or below 635 feet-mean sea level (ft-MSL) on the annual trigger date of October 1. This date provides affected permit holders ample time to make decisions to mitigate impacts resulting from the loss of the ability to access the suspended groundwater rights. Announcing implementation of the program after that date will result in a complete suspension of the associated withdrawals for the following calendar year beginning on January 1.

Suspension Increment Two

Suspension of pumping of 50,000 ac-ft of Edwards Aquifer Groundwater Withdrawal Rights will be triggered in any year when the most currently available 10-year moving annual average of Edwards Aquifer recharge is at or below 500,000 ac-ft/yr, as determined by the EAA. Announcing the triggering of the program will result in a complete suspension of the associated withdrawals the following calendar year beginning on January 1.

Supplementary Suspension Increment Three

Suspension of pumping of the additional 10,000 ac-ft/yr will occur in any year during which either Suspension Increment One or Suspension Increment Two is implemented.

Control of Target Volume

The EAA has consistently controlled over 90,000 ac-ft of groundwater rights through leases and forbearance agreements under the predecessor components of this program for the past ten years. This experience in the Edwards Aquifer water market, coupled with the added flexibility of multiple vehicles for control provided by this modified measure, indicates a reasonable likelihood of achieving control of the full target volume of Edwards Aquifer Groundwater Withdrawal Rights once funding is available and contracting begins.

Original EAHCP Conservation Measure:

- Section 5.1.2: Voluntary Irrigation Suspension Program Option
- Section 5.1.3: Regional Water Conservation Program

Comments for Consideration:

- It would be beneficial to explore long-term options for controlling more than the proposed minimum of 10,000 ac-ft/yr east of Cibolo Creek, closer to the Comal and San Marcos springs systems.
- For Suspension Increment Two, consider adding triggers for minimum springflows of 30 cfs for Comal and/or 45 cfs for San Marcos, over a 30-day duration.
- The Suspension Increment Two forbearance trigger should be further evaluated and may need to be more "sensitive" to triggering. The trigger should be based on achieving the minimum flows for Comal and San Marcos as set forth in the Biological Objectives for the "low-end" MODFLOW projection model runs. Applicable trigger adjustments could be in the form of a lesser rolling average period (i.e. 5- or 7-yr rolling recharge average), a higher recharge value (i.e. trigger when the 10-yr rolling average decreases below 550,000 or 600,000 ac-ft/yr) and/or a springflow trigger.
- Ongoing scientific evaluations during the permit term should consider relevant, new information that may improve springflow protection such as refined climate modeling and improved understanding of Edwards Aquifer recharge characteristics, inter-formational recharge (e.g., Trinity Aquifer levels and inter-formational connections), and/or surface water recharge (e.g., Medina Lake water levels and surface water flow changes).
- Routine adaptive management evaluations, or "check-ins", should occur during the 30-year ITP at either defined temporal intervals (e.g., every 10 years) and/or after extreme droughts if the Biological Objectives are not met, as outlined in the *Revised Recommended Biological Goals and Objectives for the Permit Renewal Memorandum* (BIO-WEST and ICF, 2024). These evaluations could assess the effectiveness of forbearance programs and their triggers, updating them based on climate change impacts, recharge, pumping, aquifer levels, and springflow.
- Adaptive management ought to be reserved for specific response to environmental changes, helping to ensure the long-term success of conservation efforts within the HCP and should not be included in the conservation measures section of the HCP.
- The target volume of 101,795 ac-ft/yr for water forbearance and control programs should continue to be evaluated during the 30-year ITP through future MODFLOW modeling to determine if the target volume meets the minimum and long-term

springflow objectives for Comal and San Marcos springs, with adjustments made as needed based on additional modeling runs.

Critical Period Management – Stage V

The EAA will continue to implement a Stage V reduction of 44 percent below authorized pumping levels applicable in both the San Antonio and Uvalde pools. Stage V reductions for the San Antonio pool will be triggered when (1) the 10-day rolling average of the J-17 index well levels is below 625 ft-MSL, or (2) springflows at Comal Springs are less than 45 cubic feet per second (cfs) as calculated as a ten-day rolling average, or less than 40 cfs as calculated as a three-day rolling average. Stage V reductions for the Uvalde pool will be triggered at any time when the 10-day rolling average for the J-27 Index Well water level is below 840 ft MSL. It is possible that some of the smaller municipal water providers who are entirely dependent on the Edwards Aquifer may not have sufficient water supplies to meet public health and safety needs when subject to Stage V critical period reductions. In such cases, municipal water providers will not be denied the use of groundwater from the Edwards Aquifer to meet public health and safety needs, but if they do not achieve the mandated reductions, they will incur substantial fines and penalties as determined by the EAA, pursuant to its enforcement rules and policies.

Original EAHCP Conservation Measure:

- Section 5.1.4: Critical Period Management – Stage V

Comments for Consideration:

- In the current version of the EAHCP, Stage V cutbacks greater than 44% are discussed in the transition to Phase II. Something similar could be included for the renewed EAHCP through adaptive management evaluations.

Aquifer Storage and Recovery (ASR)

The SAWS ASR can be used to help maintain springflow in the Comal and San Marcos springs by offsetting Edwards Aquifer demand during a drought-of-record conditions as described below. The SAWS ASR facility will be used for storage and delivery of groundwater leased by the EAA. When triggers are reached, as described below, SAWS may use water stored in the ASR to serve as a baseload supply in its service area nearest to the springs. As described below, an amount equivalent to the water recovered from the ASR may be used to offset SAWS's Edwards Aquifer demand.

The trigger condition for implementation of ASR springflow protection in accordance with the EAHCP will be an aquifer level of 630 ft MSL or less at the J-17 index well during a repeat

of drought conditions similar to the drought of record as indicated by a ten-year rolling average of Edwards recharge of 500,000 ac-ft or less, as determined by the EAA. When the trigger condition is met, the ASR or other non-Edwards supplies capable of utilizing shared infrastructure will be activated by SAWS to deliver up to 60 million gallons per day to the SAWS distribution system. When the trigger condition, as described above, is met, pumping of selected SAWS wells, including those on the northeast side of SAWS water distribution system—i.e., those nearer the springs–will be reduced in an amount that on a monthly basis equals the amount of water returned from the ASR or other non-Edwards supplies capable of utilizing shared infrastructure. The total reduction will be limited to the extent of the Edwards Aquifer water provided by the EAA for storage in the ASR. SAWS will use up to 100 percent of the conveyance capacity of existing SAWS ASR facilities to recover water made available by EAA to offset SAWS's Edwards Aquifer demand.

In recovering water from the ASR and/or offsetting pumping in response to the trigger condition being met, SAWS will attempt, to the extent practicable or necessary, to mimic the pattern of delivery and recovery developed by HDR (HDR 2011). That pattern of delivery, however, was intended to represent how the water in the ASR would have been managed in response to the drought of record that occurred in the 1950s. Future droughts of similar duration and magnitude undoubtedly will differ in the timing and pattern of recharge in a given year. Thus, the actual pattern of delivery of water from the ASR or of offsetting pumping may differ from what HDR used in its modeling simulations depending on the actual course of the drought (see HDR 2011) to achieve the intended level of springflow protection. Decisions as to the actual pattern of delivery will be determined by SAWS in conjunction with the Regional Advisory Group described below.

The use of the SAWS ASR is predicated on an assumption, informed by the groundwater modeling undertaken by HDR, that the SAWS ASR will be utilized to deliver approximately 126,000 ac-ft of water to SAWS' distribution system during a decadal drought similar to the drought of record. It is further predicated on the assumption from HDR (2011) that the maximum amount of water that will be delivered in a given year is 46,300 ac-ft. SAWS retains the option to use other non-Edwards supplies in lieu of ASR recovery to achieve the same levels of springflow protection.

The management of the ASR to protect springflow involves some judgment and flexibility. SAWS will make decisions necessary to fulfill the ASR commitment consistent with the EAHCP. A Regional Advisory Group consisting of representatives from SAWS, the EAHCP program, the EAA, and key stakeholders including EAA irrigation permit holders, small municipal pumpers, the Spring cities (New Braunfels and San Marcos), environmental interests (inclusive of the Texas Parks and Wildlife Department), industrial pumpers, and

downstream interests, will provide advice to SAWS regarding the implementation of the program. If different from representation on the EAHCP Stakeholder Committee, each entity or group will designate its representative(s). The Regional Advisory Group will meet as needed, generally once annually, and more frequently as significant implementation decisions are under consideration, with SAWS organizing and facilitating the meetings.

With a 30-year permit term, the potential, although presumably slight, exists for experiencing more than one drought similar to the drought of record or of beginning the new term without full ASR storage available for offsetting pumping. Accordingly, it may be necessary to refill storage in the ASR emptied pursuant to this provision and the EAA will ensure that pumping rights controlled pursuant to the Water Forbearance and Control Programs are available to refill that storage as needed, consistent with forbearance, critical period management, and pumping reduction commitments.

Original EAHCP Conservation Measure:

- Section 5.5.1: Use of the SAWS ASR for Springflow Protection

Comments for Consideration:

- ASR implementation agreements between EAA and SAWS for the next EAHCP are ongoing, therefore, the ASR program administrative structure described above is subject to change.
- The annual USGS recharge estimations may not accurately account for changes in the inter-formational flows between the Trinity and the Edwards aquifers, more information is needed to better understand that relationship. Drought impacts and increases in Trinity Aquifer withdrawals may appreciably reduce recharge to the Edwards Aquifer through reduced subsurface contributions and reduced baseflow of creeks and rivers that provide recharge to the Edwards. Ongoing research about the Trinity and Edwards Aquifer inter-formational flows relationship is needed to evaluate the effect of climate change on the ten-year rolling recharge triggers.
- The adequacy of the ASR recovery/offset trigger should be re-evaluated during the 30-year ITP based on a defined temporal interval (e.g., every 10 or 15 years), to assess how observed effects of climate change and updated modeling efforts, if such updated modeling is needed to reflect significant advances in science, match the results of current modeling efforts, particularly as it relates to recharge, pumping, aquifer level, and springflow. The trigger should be adjusted, as appropriate, based on those evaluations.

Comal Springs System

The Comal Springs System, located in New Braunfels, Texas, encompasses Comal Springs and Spring Runs, Landa Lake, and the Old and New Channels of the Comal River. This system originates from the Edwards Aquifer, with four major springs and several spring runs, notably Spring Runs 1, 2, and 3, forming its headwaters. The headwater springs, including the spring runs and the subsurface area surrounding the springs, provide essential habitat for several endangered species, including the Comal Springs riffle beetle, Comal Springs dryopid beetle, and Peck's cave amphipod. The headwaters are impounded by a dam originally constructed in 1860, creating Landa Lake, that provides critical habitat for the fountain darter. Water from Landa Lake flows into two channels of the Comal River: the Old Channel and the New Channel. The New Channel, that was excavated in 1847 to divert water to a saw and grist mill, is a modified waterway that includes several dams and recreational areas. The Old Channel of the Comal River merges with the New Channel approximately 1.3 miles upstream of the confluence with the Guadalupe River. The Old Channel and the New Channel provide essential habitat for the fountain darter, that is also found in the Comal River downstream of the confluence of those two channels. As part of biological monitoring, trends in river discharge are evaluated using U.S. Geological Survey (USGS) mean daily flow data in the Comal River (gage #08169000). Springflow is also monitored by the USGS station in the New Channel (gage #08168932), and one USGS station in the Old Channel (gage #08168913).

In terms of the control and management of property and structures implicated in the Comal Springs System, the land along the upper portion of Landa Lake near the headwaters of the Comal Springs System falls under the jurisdiction of Comal County Water Recreation District No. 1 (CCWRD No. 1) a political subdivision of the State of Texas, established by the state legislature in 1937. CCWRD No. 1 is responsible for managing Spring Island, as well as all the smaller islands, bridges, and riverbeds within its jurisdiction. The City of New Braunfels owns and manages the parks and areas of Landa Lake outside the boundaries of CCWRD No. 1, extending downstream to the Landa Lake Dam. A substantial portion of the property bordering the Old and New Channels is privately owned although the Landa Park Golf Course, owned by the City of New Braunfels, borders a significant portion of the Old Channel.

Fountain darters are commonly found throughout the Comal Springs system. Species located closer to the spring orifices, particularly in and around Landa Lake and the Spring Runs, include the Peck's cave amphipod, Comal Springs dryopid beetle, Edwards Aquifer diving beetle, and Comal Springs riffle beetle.

Beyond its ecological importance, the Comal Springs System is a popular recreational area, attracting visitors for water recreation activities including swimming, fishing, tubing

and kayaking. Historically, the springs have been a vital water source for indigenous peoples and early settlers, contributing to the establishment of New Braunfels. Today, through ongoing implementation of the EAHCP, conservation efforts are in place to protect the threatened and endangered species, water quality, and ecosystem.

Habitat conservation measures will be implemented by the City of New Braunfels in the Comal Springs System, extending from the headwaters of the Comal Springs downstream of Blieders Creek to the confluence of the Old and New channels of the Comal River.

Aquatic Recreation Management

Aquatic recreation can have significant negative impacts on Covered Species habitats by increasing disturbance and degrading habitat quality in both aquatic and riparian systems. The implementation of appropriate recreational management measures is necessary to mitigate these impacts and protect Covered Species and their habitats.

Recreation in the Comal River is primarily centered on tubing specifically, at a recreational entry point along a small section of the New Channel of the Comal River, just before it merges with the Old Channel. Schlitterbahn Waterpark & Resort operates a popular tube chute ride that flows into the Old Channel of the Comal River. Future plans for Schlitterbahn rides and operations, as shared by Schlitterbahn management, do not include any activities in the Comal River. Additionally, within Landa Park, water from Spring Run 2 feeds into a small wading pool, offering limited recreational opportunities for park visitors.

While the City of New Braunfels prohibits recreation in Landa Lake at Landa Park, the Comal County Water Recreation District No. 1 (CCWRD No. 1) oversees Spring Island, along with the smaller islands, bridges, and riverbeds within its jurisdiction, including areas where recreation still occurs in the upper part of Landa Lake, upstream of Landa Park.

To minimize and mitigate the impacts of recreation, the City of New Braunfels will enforce City Ordinances and Policies in Chapter 86 – Parks and Recreation and Chapter 142 – Waterways. The City of New Braunfels will not reduce the levels of protections provided below, and will continue to manage recreational use of the Comal Springs System, by:

a. Providing educational resources, including maps of the river with public access points and signage about park rules, the Covered Species, their Critical Habitat, and efforts to protect the Covered Species.
b. Limiting recreation on Landa Lake in Landa Park to paddle boats.
c. Limiting recreational access to the Spring Runs in Landa Park solely to the Wading Pool in Spring Run 2.

d. Restricting access to the Old Channel; except for the continuation of current levels of Schlitterbahn operations within its present location.
e. Prohibiting the use of disposable containers on the Comal River.
f. Prohibiting the use of cast nets and non-native live bait for fishing.
g. Prohibiting the release of non-native aquatic animals in waterways.
h. Restricting access to the Mill Channel portion of the New Channel.

Original EAHCP Conservation Measure:

- Section 5.2.3 – Management of Public Recreation Use of the Comal Springs and River Ecosystem.

Comments for Consideration:

- The City of New Braunfels already implements recreation management by restricting public access to Landa Lake through Landa Park, the Old Channel, and portions of the New Channel of the Comal River so that recreation occurs outside of the habitat conservation efforts.
- There was discussion of the potential value of additional limitation on recreational access to portions of the New Channel during periods of extreme low flows. However, in the absence of specific information about the nature of the potential adverse impacts from recreation in those areas (e.g., water depth, co-occurrence of recreation and Covered Species, and likely recreational impact on aquatic vegetation) during extreme low flows, no recommendations were developed for additional recreational limitations in the New Channel.
- The questions about ownership and/or control of portions of lake bottom, river bottom, and frontage, particularly related to vegetation management, seem to require further consideration and, ideally, clarification through contractual arrangements.

Litter Management

Litter refers to any form of waste or discarded material that is improperly disposed of in the environment, particularly in public spaces such as parks and waterways. Litter has wide-ranging negative impacts on aquatic organisms and their habitat, including water pollution and habitat degradation and direct harm to the organism. Preventing litter and promoting sustainable waste management practices are essential for protecting the Covered Species.

The City of New Braunfels will be responsible for the collection and removal of litter throughout the Comal Springs System and surrounding park areas. Litter prevention efforts will include educating park and river users on the negative effects of litter on the

environment, including the Covered Species, and may include broader education efforts aimed at minimizing litter in areas throughout the Comal River watershed.

The City of New Braunfels will continue to implement its prohibition of disposable food and beverage containers on the Comal River.

Original EAHCP Conservation Measure:

- Section 5.2.10: Litter Collection and Floating Vegetation Management

Comments for Consideration:

- The City of New Braunfels disposable container ordinance includes prohibitions for the Comal and Guadalupe rivers within the city limits.

Aquatic Vegetation Management

Submerged aquatic vegetation is essential natural habitat for fountain darters, providing them with ecological resources and shelter necessary for healthy population resiliency. Aquatic recreation, exposure of wetted habitat during severe drought, competition from non-native aquatic vegetation, scouring from flood events, floating vegetation accumulations, and reduced diversity of native aquatic vegetation can negatively impact fountain darters and the submerged aquatic vegetation they utilize as habitat. The presence of diverse aquatic vegetation contributes to maintaining quality habitat crucial for the survival and resilience of the fountain darters and other aquatic organisms.

To mitigate the impacts of low-flow and recreation, the City of New Braunfels will implement aquatic vegetation management strategies within the Long-Term Biological Monitoring Reaches and Restoration Reaches of the Comal Springs System, shown in Figure 5 and to the extent possible, within other high priority areas of the Old and New Channels. Strategies include the monitoring, planting, and maintenance of native aquatic vegetation and removal of non-native aquatic vegetation in those reaches. Removal efforts will be accompanied by timely planting of native aquatic vegetation. Culling of submerged aquatic vegetation, undertaken with due care to minimize adverse impacts to Covered Species, may be implemented to aid in the reduction of floating vegetation.

Aquatic vegetation used for planting should be sourced and propagated within the Comal Springs System or, if necessary, may be obtained from sources that meet locality and disease-free criteria. Management and maintenance efforts will be designed and implemented to achieve areal coverage using simple (*Potamogeton*, *Sagittaria*, and *Vallisneria*) and complex (*Bryophyte*, *Cabomba*, and *Ludwigia*) aquatic vegetation as set forth in the fountain darter habitat biological objectives for the Comal Springs System.

With appropriate care to minimize adverse impacts to all Covered Species, aquatic vegetation that is removed in order to conduct covered activities such as pumping equipment maintenance, USGS gage measurement, or construction projects will be replanted at favorable locations within the Comal Springs System, as appropriate.

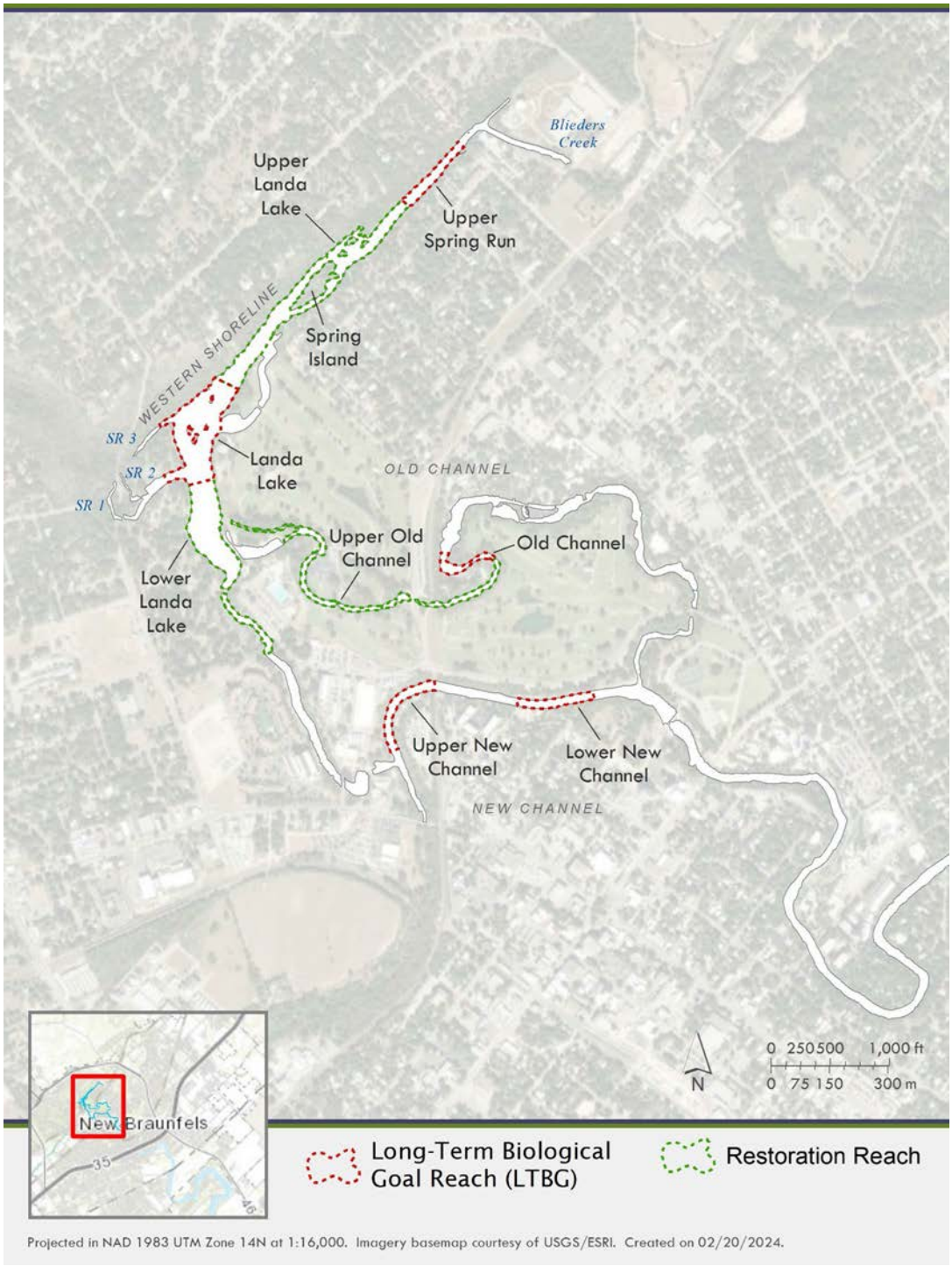


Figure 5. Comal Springs System Long-term Biological Goal/Restoration Reaches.

Original EAHCP Conservation Measures:

- Section 5.2.2: Native Aquatic Vegetation Restoration and Maintenance
- Section 5.2.2.1: Old Channel Environmental Restoration and Protection Area
- Section 5.2.2.2: Comal River Restoration
- Section 5.2.2.3: Native Aquatic Vegetation Maintenance

Comments for Consideration:

- Aquatic vegetation management should be considered for implementation downstream of the Old and New Channel confluence of the Comal River. Although this area is recognized as fountain darter habitat, previous efforts to implement aquatic vegetation strategies have been unsuccessful due to challenges such as sediment composition, limited public access to the Comal River, water depth, changes in velocities, and the impact of recreational activities. Conservation efforts may include small-scale aquatic vegetation management activities such as the removal of non-native vegetation to improve fountain darter habitat. Planting may also occur in this area if a large scouring event results in substantial denuding of vegetation.
- Aquatic vegetation management should be extended to portions of the Old and New Channels outside of the Long-term Biological Goal and Restoration reaches to the extent reasonably practicable. These areas provide important habitat for the fountain darter. The current EAHCP anticipates additional habitat being protected through aquatic vegetation management outside of those specific reaches, particularly downstream of the confluence of the Old and New Channels. That work has not occurred and areas upstream of the confluence may present greater opportunity to improve habitat conditions.
- Removal and planting methodologies of aquatic vegetation will be reevaluated when Comal springflow decreases below 130 cfs.
- The questions about ownership and/or control of portions of lake bottom, river bottom, and frontage, particularly related to vegetation management, seem to require further consideration and, ideally, clarification through contractual arrangements.

Floating Vegetation Management

Floating vegetation mats have been demonstrated to negatively impact submerged aquatic vegetation that serves as fountain darter habitat. The mats block sunlight, reduce water

velocity, and generally interfere with the health of aquatic vegetation. Reducing floating vegetation mats increases the resilience of submerged aquatic vegetation.

The City of New Braunfels will manage floating vegetation by dislodging accumulations of floating vegetation utilizing methods that result in only minimal disturbances to the Covered Species and their habitat throughout Landa Lake and the Old Channel of the Comal River. Litter and aquatic organisms will be removed from floating vegetation prior to dislodging it.

Original EAHCP Conservation Measure(s):

- Section 5.2.4: Decaying Vegetation Removal and Dissolved Oxygen Management
- Section 5.2.10: Litter Collection and Floating Vegetation Management

Comments for Consideration:

- Removal and dislodgement efforts during low flow conditions could potentially be harmful instead of beneficial due to fountain darter habitat impacts (i.e. disturbance of substrate and rooted aquatic vegetation) that can occur as a result of operating canoes, kayaks, barges or other vessels in relatively shallow water.

Non-Native Animal Species Management

Non-native species are organisms that do not naturally occur in a particular area and are often introduced by human activities. Non-native animal species can pose serious threats to the Covered Species through competition, predation, disease transmission, habitat alteration, and ecosystem disruption. Effective management strategies, such as prevention, eradication, and control of problematic non-native species, are essential for minimizing negative impacts to Covered Species.

Management of non-native animal species will include the removal of non-native armored catfish, sailfin catfish, tilapia, nutria, and other species that are deemed a threat, from the Comal Springs System. Parasite monitoring will occur under the EAHCP Biological Monitoring Program. The City of New Braunfels will be responsible for managing the removal of potentially harmful non-native animals through the use of spearfishing, spear guns, or other approved methods designed to facilitate efficient removal of target non-native animals while minimizing adverse impacts to Covered Species and the ecosystem. Non-native species introduction will be reduced by the City of New Braunfels through maintaining and enforcing its prohibitions on aquarium dumping, the release of non-native aquatic animals in waterways, and the use of non-native live bait species for fishing. The City of New Braunfels will provide and maintain educational resources and signage about the importance of preventing the introduction of non-native animals and controlling them

where they have been introduced. In addition, if monitoring indicates problematic levels of parasites, the City of New Braunfels, in collaboration with EAA staff, will develop and implement responsive measures.

Original EAHCP Conservation Measure(s):

- Section 5.2.5: Control of Harmful Non-Native Animal Species
- Section 5.2.9: Reduction of Non-Native Species Introduction and Live Bait Prohibition

Comments for Consideration:

- Consider citing the following City of New Braunfels Code of Ordinances: Sec. 142-6.- Control of Non-native Organism Introduction into Waterways and Sec. 142-4 – Methods of Fishing.

Riparian Zone Management

Vegetated riparian zones are essential for maintaining good water quality in the Comal Springs System because they stabilize the banks, prevent erosion, and filter runoff before it enters the aquatic system. Additionally, managing and maintaining vegetated riparian zones provides essential habitat and food sources for the Comal Springs riffle beetle and the Comal Springs dryopid beetle.

The City of New Braunfels will implement riparian restoration and maintenance strategies to increase the extent and health of the riparian zone within the Comal Springs System. Restoration efforts will include the removal of non-native riparian vegetation and the timely planting of native riparian vegetation. Deer-resistant and drought-tolerant native riparian vegetation will be prioritized for planting within the riparian habitat zones. Plantings will also consider use of native species that discourage potentially harmful public access or fences may be used for that purpose. Restoration efforts may also include more intensive bank stabilization and erosion control projects to reduce riparian degradation where necessary, but use of hardened structures will be minimized.

Original EAHCP Conservation Measure(s):

- Section 5.2.8: Native Riparian Habitat Restoration
- Section 5.7.1: Native Riparian Habitat Restoration

Comments for Consideration:

- The questions about ownership and/or control of portions of lake bottom, river bottom, and frontage, particularly related to vegetation management, seem to

require further consideration and, ideally, clarification through contractual arrangements.

Sediment Accumulation Management

Managing accumulations of excessive sediment is important to maintaining the health and functionality of aquatic ecosystems. Detrimental effects of excessive sediment accumulation for the Covered Species include increased turbidity, reduced water quality, Comal Springs riffle beetle habitat degradation, and reduced flow from spring orifices.

In addition to efforts designed to minimize sediment inputs (see Riparian Zone Management), measures such as dredging, suction, or fanning of sediment will be implemented to mitigate the impacts of sedimentation, as needed, and in a manner designed to minimize direct adverse impacts on the Covered Species.

Original EAHCP Conservation Measure:

- Section 5.2.2.1: Old Channel Environmental Restoration and Protection Area (the portion addressing removal of sediment island in Old Channel)

Comments for Consideration:

- None.

Flow-Split Management in the Old and New Channel

Flow-split management involves manually partitioning springflow from Landa Lake into the Old and New Channels of the Comal River. Flow-split management is intended to protect habitat for fountain darters in the Old Channel by reducing disturbance from elevated base flows and high-flow scouring events and by helping to ensure adequate flows during drought conditions. Flow-split management also contributes to maintaining water temperatures in the Old Channel necessary for the fountain darter life cycle.

The City of New Braunfels will adjust the amount of flow entering the Old Channel during low, average, and high flow conditions by adjusting the gates that control flow from Landa Lake into the Old Channel. In order to maintain the potential for proper flow-split management operations, the City will also ensure maintenance and repair of: a) the gates and culverts connecting Landa Lake and the Old Channel, and b) the dam on Landa Lake. In addition, the City will periodically assess and, as necessary, maintain a flow path adequate to convey water from Landa Lake to the Old Channel during low flow conditions.

The flow-split strategy will be based on USGS real-time flow gages in the Comal River (gage #08169000), Old Channel (gage #08168913), and New Channel (gage #08168932) as

illustrated in Table 1. When total Comal springflow is less than 50 cubic feet per second (cfs), priority in managing the flow-split will be placed on maintaining suitable conditions in the Old Channel.

Table 1. Flow-split management for Old and New channels of the Comal River.

FLOW-SPLIT MANAGEMENT FOR OLD AND NEW CHANNELS				
Total Comal Springflow (cfs) Gage #08169000	Old Channel (cfs) Gage #08168913		New Channel (cfs) Gage #08168932	
	Fall, Winter	Spring, Summer	Fall, Winter	Spring, Summer
350+	65	60	280+	290+
300	65	60	235	240
250	60	55	190	195
200	60	55	140	145
150	55		95	
100	50		50	
80	45		35	
70	40		30	
60	35		25	
50	35		-	
40	30		-	
30	20		-	

Original EAHCP Conservation Measure(s):

- Section 5.2.1: Flow-Split Management in the Old and New Channel

Comments for Consideration:

- Due to infrastructure on the New Channel, the flow-split management plan cannot reliably achieve flows that equal the previously specified combined values of the Old and New Channel at total flows less than 50 cfs.

Surface Water Diversions and Golf Course Management

The diversion of surface water from the Old Channel of the Comal River is diverted to irrigate the Landa Park Golf Course. Pursuant to TCEQ Certificates of Adjudication Nos. 18-3824, 18-3824A, 18-3824B, 18-3824C, and 18-3826, and 18-3826A, the City of New Braunfels is authorized to divert a combined total of 300 ac-ft/yr of water for irrigation use within a diversion segment along the Old Channel of the Comal River. The combined total instantaneous diversion rate authorized is 3 cfs.

Currently, two pumps capable of diverting at a combined rate of 1.32 cfs, are used for irrigation diversions. Historically, the City of New Braunfels has not utilized its full permitted surface water rights for irrigation. In accordance with surface water right authorizations, the City will use intake pumps equipped with a mesh screen of 0.25 inches or less and a maximum flow-through velocity of 0.5 cfs to minimize potential entrainment and impingement of aquatic organisms by surface water diversions from the Old Channel. The City of New Braunfels also will limit its combined diversion rate for those irrigation diversions to no greater than 1.32 cfs. Pursuant to the EAHCP, the City of New Braunfels has installed piping to facilitate use of reclaimed water for irrigation of the golf course as a mechanism for reducing diversions from the Old Channel.

Original EAHCP Conservation Measure:

- Section 5.2.11: Management of Golf Course Diversions and Operations

Comments for Consideration:

- The City's water rights already mandate that intake screens have a mesh size of 0.25 inches or less and a maximum flow-through velocity of 0.5 cfs to minimize impingement and entrainment of aquatic organisms. Additional commitments under consideration by the City include developing an alternate water supply, likely reclaimed water, that would allow for the suspension of diversions when flows in the Old Channel are at or below 30 cfs, consistent with an unrealized commitment in the current HCP. These additional commitments would represent specific minimization and mitigation measures designed to address incidental take associated with irrigation surface water diversions.

San Marcos Springs System

Approximately 17.5 miles northeast of the Comal Springs System, the San Marcos Springs System flows from the Edwards Aquifer in San Marcos, Texas. The San Marcos Springs System includes Spring Lake, the lower segment of Sessom Creek, and the Upper San Marcos River. Spring Lake has a surface area of approximately 20 acres and contains the major and most of the minor artesian springs that discharge into the San Marcos River.

In addition to Spring Lake, a few smaller springs occur in the lower segment of Sessom Creek, a major tributary of the San Marcos River that joins the river immediately downstream of Spring Lake Dam. Collectively, these artesian springs provide the baseflow for the Upper San Marcos River that extends 4.5 miles to its confluence with the Blanco River tributary. Downstream of that confluence, the Lower San Marcos River continues for 75.5 more miles, eventually flowing into the Guadalupe River a short distance upstream of Gonzales, Texas. The Upper San Marcos River within the EAHCP area is influenced by surface water runoff inputs from Sessom, Sink, Purgatory, and Willow Spring creeks, primarily during and immediately following storm events.

Spring Lake Dam, originally constructed around 1849, is located at the southwestern end of Spring Lake. The dam splits flow into two channels, the Western and Eastern spillways. The flows converge a short distance downstream of the dam and upstream of the Aquarena Springs Drive bridge. The USGS gage #08170500 is affixed to the river left side of the Aquarena Springs Drive bridge at Sewell Park. This gage is the primary gage for assessing the stage-discharge rating curve streamflow data used in calculating springflow reported for USGS gage #08170000. Texas State University owns and manages the property surrounding Spring Lake, Spring Lake Dam, and the San Marcos River between Spring Lake Dam and the downstream end of Sewell Park. The City of San Marcos owns and manages parkland immediately adjacent to the San Marcos River in the reach from the downstream end of Sewell Park to Stokes Park, located approximately 1 mile downstream of IH-35. Stokes Park is owned by the Texas Parks and Wildlife Department (TPWD) but is managed by the City of San Marcos (COSM) through an agreement between TPWD and COSM. COSM parkland comprises a substantial portion of the total riverfront property along the San Marcos River between the lower limit of Sewell Park and Stokes Park. Downstream of Stokes Park and to the city limit, the riparian land on river right is owned in part by Hays County, Texas Parks and Wildlife Department (A.E. Wood Fish Hatchery), and private property. On river left, the land immediately downstream of Stokes Park is privately owned and COSM owns the remainder to the COSM city limit. The riparian land between the city limit and the Blanco River confluence is privately owned. Any river access from private property is authorized only with permission from the landowner.

Covered Species within Spring Lake include the Texas blind salamander, San Marcos salamander, fountain darter, Texas wild-rice, and Comal Springs riffle beetle. Covered Species in the Upper San Marcos River below Spring Lake Dam include the San Marcos salamander, fountain darter, and Texas wild-rice. Comal Springs dryopid beetles and Texas blind salamanders have been documented in the springs within the lower segment of Sessom Creek, but their occurrence in Sessom Creek is rare. Similarly, Texas blind salamanders do not persist in Spring Lake but briefly appear there when expelled through a spring.

Habitat conservation measures will be implemented by the City of San Marcos and Texas State University in the San Marcos Springs System, including Spring Lake, the Upper San Marcos River, and lower segments of major tributaries.

Aquatic Recreation Management

Aquatic recreation can have significant negative impacts on the Covered Species, especially Texas wild-rice, fountain darter, and San Marcos salamanders, by increasing disturbance and degrading habitat quality. The implementation of appropriate recreational management measures is a critical component of minimizing adverse impacts to Covered Species and their habitats.

In 2012, the Texas Parks and Wildlife Commission designated the San Marcos River between Spring Lake Dam and the San Marcos Wastewater Treatment Plant as the San Marcos River State Scientific Area (31 TAC § 57.910). The San Marcos River State Scientific Area designation prohibits the uprooting or disturbance of Texas wild-rice and authorizes restrictions on access to areas of the river clearly marked by signage, booms, ropes, and buoys installed to protect flora and fauna. Texas Game Wardens are responsible for enforcing state regulations on public waters, including Spring Lake and the San Marcos River. Collaborative enforcement efforts, involving the Texas Parks and Wildlife Department, City of San Marcos, and Texas State University, will be pursued, particularly during future low-flow periods, to implement and enforce the protections afforded through the state scientific area designation.

Texas State University owns and manages the property surrounding Spring Lake and the San Marcos River downstream through Sewell Park. Access to the public waters of Spring Lake is restricted to university approved activities (COSM § 58.067). The Meadows Center for Water and the Environment is an affiliated institute of Texas State University that, among other duties, manages access within and around Spring Lake for research and recreational activities. University approved activities and the process for requesting access to Spring

Lake are defined in the Spring Lake Management Plan. Sewell Park is owned by Texas State University and is managed by TXST's Department of Campus Recreation.

The City of San Marcos owns and manages parkland immediately adjacent to the San Marcos River from the downstream end of Sewell Park to downstream of IH-35 at Stokes Park. City police, marshals, and park rangers are responsible for monitoring and enforcing city ordinances in the riverfront parks.

To minimize and mitigate the impacts of recreation, the City of San Marcos will enforce City Ordinances and Policies in Chapter 58 – Parks and Recreation in City parks and Texas State University will enforce University Policies and Procedures (UPPS) in university parks. COSM and Texas State University will coordinate with staff, park rangers, city and university police, EAHCP contractors, and Texas Game Wardens to minimize the impacts from recreational use of Spring Lake and the San Marcos River and will:

a. Provide educational resources and signage about park rules, including maps with Texas State University and City of San Marcos river access points and information about the Covered Species, their Critical Habitat, and efforts to protect them.
b. Install and maintain signage and protective barriers around sensitive habitat within the river and around adjacent riparian areas to restrict public access and minimize disturbance of aquatic flora and fauna in the San Marcos River State Scientific Area (31 TAC § 57.910). Those efforts will include evaluating effectiveness of existing protective barriers and need for additional barriers to be installed in sensitive habitat areas based on varied low-flow conditions and recreational use patterns.
c. Install and maintain riparian fencing within pertinent areas of riverfront parks to prevent riparian and aquatic habitat degradation and to direct river access to stabilized river access points.
d. Maintain designated river recreation access points within Texas State University and City of San Marcos parks to minimize habitat degradation in areas not immediately adjacent to the access points.
e. Restrict access to the public waters of Spring Lake to Texas State University approved activities in accordance with the Spring Lake Management Plan (COSM § 58.067 and the Spring Lake Management Plan).
f. Prohibit the removal, destruction, or disturbance of artifacts or cultural features without authorization from the Texas Historical Commission (COSM § 58.030 and Antiquities Code of Texas §§ 191.092-0.93, 191.171).
g. Prohibit the release or introduction of any fish, plant, or aquatic organisms without authorization from the City of San Marcos and Texas Parks and Wildlife Department (COSM § 58.037 and TPWC § 66.015).

h. Prohibit the removal or harm of plants and animals without authorization from the City of San Marcos and Texas Parks and Wildlife Department (COSM § 58.030, § 58.037, TXST UPPS No. 08.01.07, and 31 TAC Ch.57L).
i. Prohibit the possession or shooting of spears or spearguns on City-owned property without prior authorization from the City of San Marcos (COSM § 58.068, TPWC § 66.115)
j. Prohibit fishing in areas where fishing is prohibited by signage (COSM § 58.037 and UPPS No. 08.01.07).
k. Prohibit the use of smoking or vapor devices, alcohol, glass, Styrofoam, disposable beverage containers, and coolers larger than 30 quarts in park areas adjacent to the river (COSM § 58.026, § 58.034, § 58.042; UPPS No. 04.05.02, No. 08.01.07).
l. Prohibit the usage of tents, tarps, shade structures, umbrellas, portable tables and barbeque pits in park areas immediately adjacent to the river and within the river (COSM § 58.039 & UPPS No. 08.01.07).
m. Prohibit jumping or diving from bridges crossing the San Marcos River (COSM § 58.069, UPPS No. 08.01.07).
n. Control and reduce visitor access to pertinent riverfront parks, and river access through riverfront parks, during periods of extreme low flow (< 60 cfs) and/or when habitat has been demonstrated to be significantly degraded (i.e. significantly reduced aquatic vegetation coverage) and/or when a high density of river users is expected for given dates or events. Access control methods may include a combination of measures: gated fencing, paid parking, riverfront park access fees, etc. Implementation of the selected measures will be evaluated when flows approach 65 cfs.

Original EAHCP Conservation Measures:

- Section 5.3.2: Management of Recreation in Key Areas
- Section 5.3.2.1: Management of Public Recreational Use of San Marcos Springs and River Ecosystem
- Section 5.3.7: Designation of Permanent Access Points/Bank Stabilization
- Section 5.4.2: Management of Recreation in Key Areas
- Section 5.4.7: Diving Classes in Spring Lake
- Section 5.4.7.1: The Diving for Science Program
- Section 5.4.7.2: Texas State University Continuing Education
- Section 5.4.7.3: Texas State SCUBA Classes
- Section 5.4.8: Research Programs in Spring Lake
- Section 5.4.10: Boating in Spring Lake and Sewell Park

Comments for Consideration:

- Issues related to enforcement of city ordinances and university policies within the San Marcos River remain unresolved and need clarification. Evaluate potential enforcement structure and methodologies. Staff and members will assess the current enforcement options and the feasibility of an interlocal agreement between Texas Parks and Wildlife Department, City of San Marcos, and Texas State University to ensure reasonable enforcement levels, with a particular emphasis on periods of high recreational use and low flows.
- Prioritize the evaluation of potential control methods and triggers (listed above in item n) for reducing public access and the feasibility of locations or access points that would be restricted. If access were restricted, members discussed potential triggers that would either be flow-related (<60 cfs) and/or based on biological monitoring data such as reduced coverage of aquatic vegetation. To ensure availability of actionable monitoring data on a timely basis, the need for regular full system vegetation mapping beginning when flows drop to 65 cfs was noted. Members discussed that as flows decrease below 60 cfs, the potential for exceeding take thresholds increases and recommended that the City of San Marcos and Texas State University develop procedures for further controlling recreation access under those conditions.
- In helping to inform development of control methods listed above in item n, the City of San Marcos and Texas State University should consider analyzing a "carrying capacity" of river recreation that considers varying low-flow conditions, peak recreation periods (i.e. summer holidays) and habitat impacts. Include a further evaluation of number of visitors in City/Texas State University parks and within the river during peak recreational periods.
- Evaluate TPWD rules related to the introduction and removal of fish, plants, aquatic organisms (Chapter 57, Subchapter C) and identify the process for permitting the potential removal of Texas wild-rice.
- University policies related to recreational conduct are listed in the Sewell Park rules, that do not specifically include the riverbank areas between Aquarena Springs bridge and the Spring Lake Dam, and area around Spring Lake. Clarification of policies and coordination between university entities is needed to improve management of aquatic recreation.
- The current Spring Lake Management Plan was last amended in 2012, revisions are needed to reflect current practices and recommended protocols in Spring Lake. Staff and members will work with the Meadows Center for Water and the

Environment to revise and update the Spring Lake Management Plan. Once a revised plan is developed, it should be explicitly referenced in order to establish a baseline level of protections to be maintained in Spring Lake.

- Assessment of recreational impacts is required by the ITP for annual take assessments. Members have requested that routine assessments of available recreation management enforcement strategies are also considered by EAHCP administration.
- The use of motorized watercraft, except for motorized watercraft listed in the proposed Covered Activities, should be prohibited in Spring Lake and the San Marcos River.
- Climbing and jumping from riparian trees could reduce the strength of the tree and its ability to stabilize the riverbank. Sewell Park Rules (UPPS No. 08.01.07) prohibit hanging from trees but does not specify climbing or jumping from trees. Climbing and jumping from riparian trees should be prohibited by university policies and city park rules.
- Recreation access to the Eastern Spillway is currently restricted to protect flora and fauna, including San Marcos salamander habitat, at flows of 120 cfs or less, consistent with the State Scientific Area designation (31 TAC § 57.910). In recognition of sensitivity to disturbance even during periods of higher flow, prioritization should be given to considering permanently restricting access to the Eastern Spillway, regardless of springflow.

Litter Management

Litter refers to any form of waste or trash that is improperly disposed of, particularly in public spaces such as parks and waterways. Litter has wide-ranging negative impacts on aquatic organisms and their habitat, including disease and death from consumption, water pollution, and habitat reduction. Minimizing litter by promoting sustainable waste management practices and providing accessible recycling and waste receptacles in parks is essential for protecting the Covered Species and their habitat.

City of San Marcos regulations prohibit littering and common sources of recreation-related litter including smoking, vaping , glass, Styrofoam, alcoholic beverages and single-use disposable beverage containers in select zones within parks adjacent to the San Marcos River (COSM § 58.033 & COSM § 58.039). Texas State University prohibits glass, Styrofoam, smoking, vaping and display and consumption of alcoholic beverages in Sewell Park (UPPS 08.01.07).

The City of San Marcos and Texas State University will be responsible for the routine control and removal of litter in Spring Lake, the river from Spring Lake Dam to the San Marcos

Wastewater Treatment Plant, park areas adjacent to Spring Lake and the San Marcos River, and tributaries of the San Marcos River. The City of San Marcos and Texas State University will enforce policies and ordinances related to littering. Prevention efforts undertaken by the City of San Marcos and Texas State University will include providing means for proper disposal of litter in all such areas and educating the community on park rules, proper disposal of litter, and the negative effects of litter on aquatic organisms and their environment.

Original EAHCP Conservation Measures:

- Section 5.3.3: Management of Aquatic Vegetation and Litter below Sewell Park
- Section 5.4.3.2: Management of Aquatic Vegetation from Sewell Park to City Park

Comments for Consideration:

- Clarification and potential changes may be needed for university policies related to littering and prohibited items in Sewell Park and other TXST lands adjacent to the river such as Upper Sewell Park and Spring Lake.

Aquatic Vegetation Management

Submerged aquatic vegetation is essential habitat for fountain darters, providing them with ecological resources and shelter necessary for healthy population resiliency. Aquatic recreation, exposure of wetted habitat during severe drought, competition from non-native aquatic vegetation, scouring from flood events, floating vegetation accumulations, and reduced diversity of native aquatic vegetation can negatively impact fountain darter populations and submerged aquatic vegetation they utilize as habitat. The presence of diverse aquatic vegetation contributes to maintaining quality habitat crucial for the survival and resilience of the fountain darters and other aquatic organisms.

To minimize the impacts of low-flow and recreation, Texas State University and the City of San Marcos will implement aquatic vegetation maintenance strategies in Spring Lake and the San Marcos River. Strategies include the monitoring and maintenance of aquatic vegetation, removal of non-native and/or aggressive, non-preferred native aquatic vegetation, as needed, and planting of native aquatic vegetation. Culling of aquatic vegetation in Spring Lake, undertaken with due care to minimize adverse impacts to Covered Species, may be implemented to aid in the reduction of floating vegetation and to prevent shading and other negative impacts to underlying aquatic vegetation.

Aquatic vegetation used for planting should be sourced from Spring Lake or the Upper San Marcos River, or, as necessary, may be obtained from sources that meet locality and disease-free criteria. Aquatic vegetation propagation may occur in raceways sourced with

Edwards Aquifer water from artesian wells at Freeman Aquatic Biology Building, managed by Texas State University, or at the San Marcos Aquatic Resources Center, managed by USFWS.

San Marcos salamanders occupy limited habitat areas within Spring Lake and the Spring Lake Dam reach and prefer silt-free rocky substrate that is free of rooted aquatic vegetation. Habitat maintenance for the San Marcos salamander involves the routine removal of aquatic vegetation in occupied habitat designated as quality habitat in Biological Objective 4.1 to support the San Marcos salamander habitat objective.

Outside of areas managed for salamander habitat, aquatic vegetation management and maintenance efforts will be designed and implemented to achieve areal coverages for Texas wild-rice consistent with relevant objectives (Objectives 5.1 and 5.2) and areal coverages for complex (*Cabomba, Heteranthera, Hydrocotyle, Ludwigia, and Myriophyllum*) and simple (*Potamogeton, Sagittaria*, and *Zizania*) aquatic vegetation as defined in the San Marcos fountain darter habitat objective (Objective 6.6). The locations of the Long-term Biological Goal and Restoration reaches referenced in those objectives are shown in Figure 6. Aquatic vegetation management may also occur in Spring Lake and in portions of the river outside of the LTBG and Restoration reaches, as needed, to control non-native vegetation and increase the coverage of aquatic vegetation and quality fountain darter habitat. The native aquatic vegetation species listed may be amended through the EAHCP Adaptive Management Process and upon USFWS approval to include additional native vegetation types.

With appropriate care to minimize adverse impacts to all Covered Species, aquatic vegetation that is removed in order to conduct covered activities such as pumping equipment maintenance, USGS gage measurement, or construction projects will be replanted at favorable locations within the Upper San Marcos River, if appropriate.

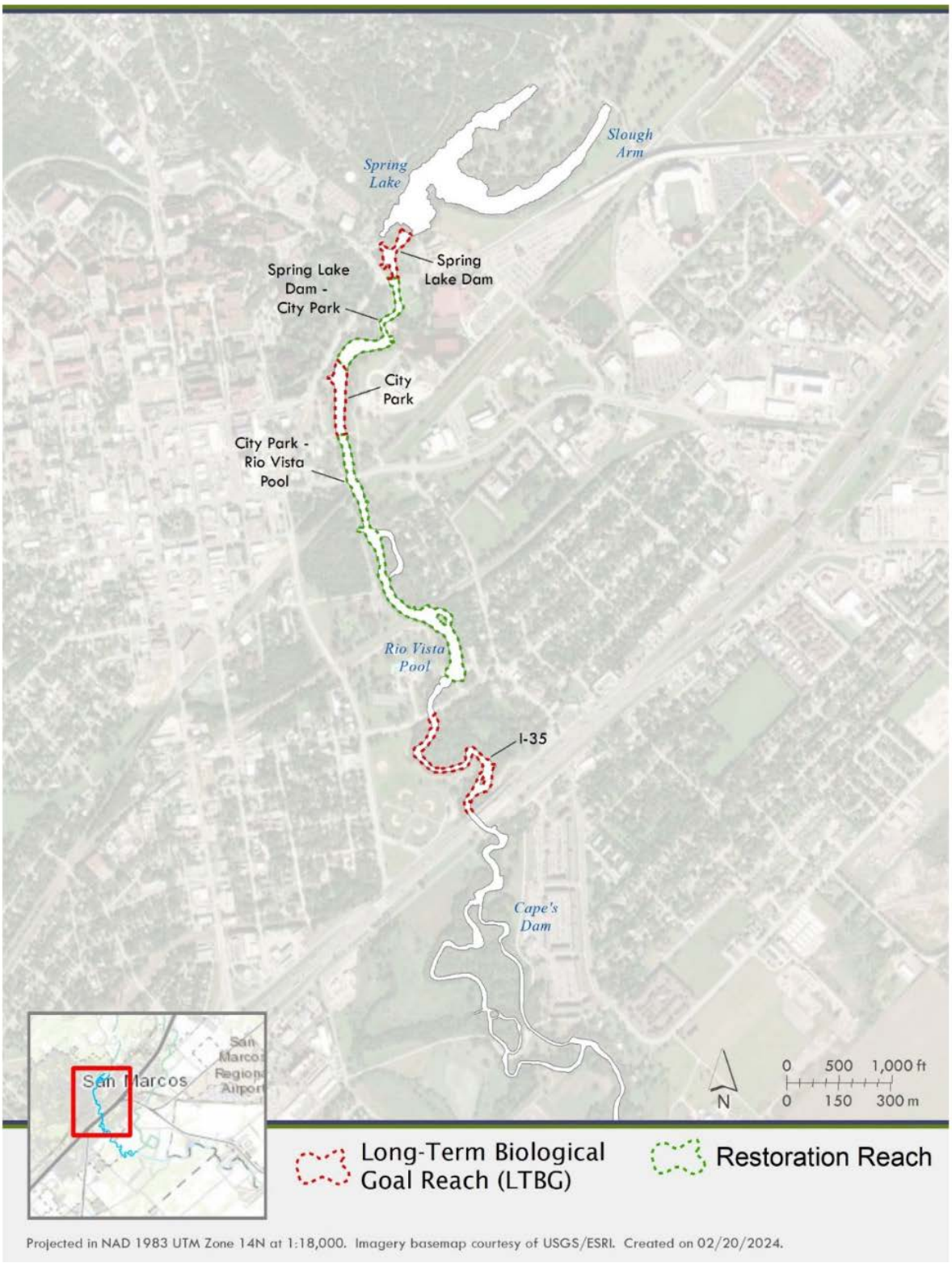


Figure 6. San Marcos Springs System Long-term Biological Goal/Restoration Reaches.

Original EAHCP Conservation Measures:

- Section 5.3.1: Texas Wild-Rice Enhancement and Restoration
- Section 5.3.8: Control of Non-Native Plant Species
- Section 5.4.1: Texas Wild-Rice Enhancement and Restoration
- Section 5.4.3: Management of Vegetation
- Section 5.4.3.1: Management of Submerged and Floating Aquatic Vegetation in Spring Lake
- Section 5.4.3.2: Management of Aquatic Vegetation from Sewell Park to City Park
- Section 5.4.12: Control of Non-Native Plant Species

Comments for Consideration:

- The current Spring Lake Management Plan was last amended in 2012. Revisions are needed to reflect current practices and recommended protocols. Staff and members will work with the Meadows Center for Water and the Environment to revise and update the Spring Lake Management Plan. The updated plan, when available, will be referenced to establish a baseline for protections in Spring Lake.
- Evaluate Texas Parks and Wildlife Departments rules and statutes related to the introduction and removal of fish, plants, aquatic organisms (Chapter 57, Subchapter C) and identify the process for permitting the potential removal of Texas wild-rice.
- The proposed Biological Objective that addresses aquatic vegetation coverage in Spring Lake only covers the removal of vegetation for San Marcos salamander habitat. A Biological Objective for fountain darter habitat in Spring Lake is needed.
- The Spring Lake Dam reach is habitat for the San Marcos salamander, fountain darter, and Texas wild-rice. Members noted a need to better understand the balance between removal of aquatic vegetation for San Marcos salamander in the Eastern Spillway, the aggressive expansion of Texas wild-rice, and maintaining diverse aquatic vegetation habitat for fountain darter.
- Removal and planting methodologies of aquatic vegetation will be reevaluated when San Marcos springflow decreases below 90 cfs.

Floating Vegetation Management

Floating vegetation mats can negatively impact Texas wild-rice and fountain darter habitat because the mats block sunlight, reduce water velocity, and can spread invasive vegetation. Additionally, floating vegetation mats that accumulate on emergent Texas wild-rice and aquatic vegetation may lead to their uprooting. As floating vegetation decays and

decomposes, it consumes oxygen reducing the amount of dissolved oxygen in the water. Management, via reduction, of floating vegetation accumulations increases the health and resilience of submerged aquatic vegetation in Spring Lake and the Upper San Marcos River.

The City of San Marcos and Texas State University will manage floating vegetation mats by reducing/preventing source propagule inputs and dislodging and/or removing accumulations of floating vegetation in Spring Lake and the San Marcos River upstream of IH-35. Litter and aquatic organisms will be removed from floating vegetation during removal from Spring Lake and the river and native organisms will be returned to the water.

Original EAHCP Conservation Measures:

- Section 5.3.3: Management of Aquatic Vegetation and Litter below Sewell Park
- Section 5.4.3: Management of Vegetation
- Section 5.4.3.1: Management of Submerged and Floating Aquatic Vegetation in Spring Lake
- Section 5.4.3.2: Management of Aquatic Vegetation from Sewell Park to City Park

Comments for Consideration:

- The current Spring Lake Management Plan was last amended in 2012, revisions are needed to reflect current practices and recommended protocols. Staff and members will work with the Meadows Center for Water and the Environment to revise and update the Spring Lake Management Plan. The updated plan, when available, will be referenced to establish a baseline for protections in Spring Lake.

Non-Native Animal Species Management

Non-native species are organisms that do not naturally occur in a particular area and are often introduced by human activities. Non-native species can pose serious threats to all Covered Species and their habitats through competition, predation, disease transmission, habitat alteration, and ecosystem disruption. Effective management strategies, such as prevention and removal of problematic non-native species, are essential for minimizing these impacts and conserving native biodiversity.

Management of non-native animal species includes the removal of non-native armored catfish, sailfin catfish, tilapia, nutria, and other species that may negatively impact Covered Species and the San Marcos Springs ecosystem. Contractors and program participants authorized by the City of San Marcos will remove non-native animals with the use of pole spears, spear guns, or other methods chosen to remove large quantities of such animal species with minimal impact to the habitat or to non-target species.

Non-native species introduction will be reduced by the prohibition of the release of any fish, plant, or other aquatic organisms in public parks and waterways (COSM § 58.037 & UPPS 08.01.07). The City of San Marcos will offer a donation program to receive unwanted aquatic animals and will provide and maintain signage educating park visitors about park rules related to non-native species and negative impacts to the ecosystem.

Original EAHCP Conservation Measures:

- Section 5.3.5: Reduction of Non-Native Species Introduction
- Section 5.3.9: Control of Harmful Non-Native and Predator Species
- Section 5.4.11: Reduction of Non-Native Species Introduction
- Section 5.4.13: Control of Harmful Non-Native and Predator Species

Comments for Consideration:

- None.

Riparian Zone Management

Healthy riparian zones are essential for maintaining good water quality in the San Marcos Springs System by stabilizing riverbanks, preventing erosion, storing alluvial water, providing shade for temperature moderation, and filtering runoff before it enters the aquatic system. Managing and maintaining healthy riparian zones is essential for maintaining the quality of habitat for the protection of fountain darter, Texas wild-rice, San Marcos salamander, and Comal Springs riffle beetle.

The City of San Marcos and Texas State University previously installed fences within portions of riverfront parks to prevent disturbance and degradation of the riparian zone and adjacent aquatic vegetation. Existing riparian fencing in parks adjacent to the river will remain in place and be maintained to protect the riparian corridor. Additional fencing may be put in place to protect riparian areas being degraded through overuse.

The City of San Marcos and Texas State University will continue to implement riparian zone restoration and maintenance strategies to protect, enhance, and widen the riparian zone along Spring Lake, the San Marcos River, and major tributaries within city limits. Riparian management and maintenance strategies include routine monitoring, removal of non-native vegetation and the planting of diverse native riparian vegetation. Deer resistant and drought-tolerant native vegetation will be prioritized for planting in the riparian zones. Riparian management and maintenance strategies may also include bank stabilization, installation of additional fencing, and erosion control projects to minimize degradation of the riparian zone and adjacent aquatic vegetation.

Original EAHCP Conservation Measures:

- Section 5.3.8: Control of Non-Native Plant Species
- Section 5.4.12: Control of Non-Native Plant Species
- Section 5.7.1: Native Riparian Habitat Restoration

Comments for Consideration:

- Members noted that future park improvement projects may modify the existing fence line, thus reducing riparian establishment in areas currently protected with fencing. The members want to ensure that future projects have flexibility, but also maintain protections for areas previously restored.
- Members noted that climbing and jumping from riparian trees should be prohibited by university policies and city park rules. This comment is also listed in the San Marcos Springs System Aquatic Recreation Management comments for consideration.

Sediment Accumulation Management

Managing excessive sediment accumulation is important to maintaining the health and functionality of aquatic ecosystems. Detrimental effects of sediment accumulation include increased turbidity, pollutant retention, reduced habitat, and reduced outflow from spring orifices. Deposition and accumulation of sediment can smother and displace stands of Texas wild-rice, reduce or alter fountain darter habitat, fill in open spaces between larger substrate components that are utilized by San Marcos salamander, and cover spring orifices utilized by Comal Springs riffle beetle.

In addition to Riparian Zone Management efforts designed to limit sediment inputs, to mitigate these impacts, active and passive sediment removal techniques will be implemented as needed, and in a manner designed to minimize direct adverse impacts on Covered Species, in Spring Lake and the San Marcos River. Any sediment management activities to be undertaken must first be demonstrated to provide a significant benefit to Texas wild-rice and/or other Covered Species habitat and outweigh any anticipated negative impacts that might be caused by these activities.

Original EAHCP Conservation Measures:

- Section 5.3.6: Sediment Management below Sewell Park
- Section 5.4.4: Sediment Management in Spring Lake and from Spring Lake Dam to City Park
- Section 5.4.6: Sessom Creek Sand Bar Removal

Comments for Consideration:

- None.

Flow-Split Management at Spring Lake Dam

The Spring Lake Dam bifurcates flow from Spring Lake into two channels, the Western and Eastern spillways. Both spillways represent important habitat for the San Marcos salamander and the fountain darter. The Western Spillway generally receives more water than the Eastern Spillway and, as a result, habitat in the Eastern Spillway can become shallow and more susceptible to dewatering during low springflow conditions. Flow-split management is intended to better protect wetted habitat for San Marcos salamanders and fountain darters in the Eastern Spillway.

Texas State University will use boards, barriers, or new infrastructure to adjust the amount of water that flows over the Western Spillway during low flow periods as needed to protect wetted habitat in the Eastern Spillway, while also maintaining flow and wetted habitat in the Western Spillway. Due to the lack of flow and bathymetry data for the spillways, and the lack of infrastructure to precisely control flow over the Western Spillway, no specific flow allocations currently are defined for implementation. Additional flow and bathymetry data are needed for both spillways, in conjunction with biological sampling, to evaluate habitat conditions of the Western and Eastern Spillways and develop, in coordination with the Science Committee, recommended flow-split allocations for use in implementing flow-split management at Spring Lake Dam. This work will continue be undertaken by Texas State University, the City of San Marcos, and the EAA, in coordination with the Science Committee and Texas Parks and Wildlife Department.

Original EAHCP Conservation Measure:

- Not applicable (this is a new conservation measure recommended by the Subcommittee)

Comments for Consideration:

- Additional information is needed to assess flow characteristics between the Western and Eastern spillways. Future coordination between university facilities staff (install boards), Spring Lake Manager, San Marcos HCP Manager, EAHCP and EAA staff, EAHCP Biological Monitoring contractor, and USFWS Refugia staff is needed for collecting flow data and assessing biological data (salamander counts and collection trends), at various flows, before and after board placement.

- Future modifications or repairs to the Spring Lake Dam, should consider potential installation of new infrastructure to enhance control and refinement of the flow-split management of the Eastern and Western spillways.

Surface Water Diversions

Under TCEQ Certificates of Adjudication Nos. 18-3865 and 18-3866, Texas State University's surface water appropriation from the upper San Marcos River, designated as consumptive use, is 200 acre-feet per year. A full description of the surface water rights is included in the Covered Activities chapter of the EAHCP.

Certificate No. 18-3865 authorizes Texas State University to divert and use 100 ac-ft/yr from Spring Lake for the purpose of irrigation. The existing diversion point is located along the Slough Arm of Spring Lake near the intersection of San Marcos Springs Drive and Aquarena Springs Drive. The certificate authorizes a maximum instantaneous diversion rate from Spring Lake of 1.33 cfs (600 gpm).

Certificate No. 18-3866 authorizes Texas State University to divert and use 100 ac-ft/yr from the San Marcos River for the purpose of irrigation (40 ac-ft/yr) and biological/educational purposes (60 ac-ft/yr). The 40 ac-ft authorized for irrigation purposes is currently used to irrigate Sewell Park and is only available to be diverted when the streamflow of the San Marcos River at the diversion point is equal to or greater than 128 cfs. The maximum instantaneous diversion rate for this portion of the certificate is 1.00 cfs (450 gpm). The 60 ac-ft authorized for biological/educational purposes is currently used to fill and maintain the level of seven off-channel reservoirs ("Old Fish Hatchery Ponds") located approximately between the Texas State University JC Kellam Administration Building and University Drive. The existing diversion point is located immediately upstream of City Park. The maximum instantaneous diversion rate for this portion of the certificate is 2.22 cfs (1,000 gpm).

To minimize the impacts of these diversions, Texas State University will limit surface water diversions from Spring Lake to a rate not to exceed 0.75 cfs (340 gpm) and cease diversions from the San Marcos River when San Marcos River streamflow, as measured at USGS gage #08170500, declines below 60 cfs. When San Marcos River streamflow declines below 50 cfs, Texas State University will continue cease the San Marcos River surface water diversions and reduce surface water diversions from Spring Lake to a rate not to exceed 0.50 cfs (225 gpm). When San Marcos River streamflow decreases below 45 cfs, Texas State University will suspend all surface water diversions.

The reductions in Texas State University's total diversion rate for consumptive use is summarized in Table 2 below.

Table 2. Texas State University curtailment of surface water diversions by San Marcos River streamflow levels.

San Marcos River Streamflow as measured at USGS gage #08170500 (cfs)	Spring Lake Diversion: Cert. No. 18-3865	San Marcos River Diversion: Cert. No. 18-3866	Maximum Allowable Diversion Rate
128+	1.33 cfs (600 gpm)	3.22 (1,450 gpm)	4.55 cfs (2,050 gpm)
127 - 60	1.33 cfs (600 gpm)	2.22 cfs (1,000 gpm)	3.55 cfs (1,600 gpm)
59 - 50	0.75 cfs (340 gpm)	0	0.75 cfs (340 gpm)
49 - 45	0.50 cfs (225 gpm)	0	0.50 cfs (225 gpm)
<45	0	0	0

Texas State University uses, and will maintain, a 0.25-inch mesh screen to cover the intake for surface water diversions. These screens are routinely inspected and cleaned. Fountain darters have not been observed when the screen is cleaned; however, there is a possibility for capture of adults against the screen, but not pulled into the pipeline. To avoid or minimize the impacts of the surface water diversions, Texas State University will routinely monitor the screens to determine if any impingement occurs and will make any necessary modifications to the screens to minimize incidental take from the operation of the diversions.

Original EAHCP Conservation Measure:

- Section 5.4.5: Diversion of Surface Water

Comments for Consideration:

- None.

Refugia

The Edwards Aquifer Authority will support off-site refugia for EAHCP Covered Species. The limited geographic distribution of these species leaves their populations vulnerable to extirpation throughout all or a significant part of their range. A series of refugia will house and maintain adequate populations of Covered Species to support re-establishment in the

wild if the wild populations are lost due to catastrophic events such as the cessation of springflow or an unexpected chemical spill. Additionally, the refugia operations will include appropriate research activities focused on the Covered Species. These activities are restricted to species included in this HCP and are designed to inform efforts to maintain healthy populations, through propagation and assessment of genetic diversity, that also supports management measures for wild populations of these species.

Original EAHCP Conservation Measure:

- Section 5.1.1: Refugia

Comments for Consideration:

- None.

Measures that Contribute to Recovery

Measures that Contribute to Recovery go beyond minimizing and mitigating impacts from Covered Activities and include avoidance measures that contribute to the likelihood of downlisting and delisting of listed Covered Species. Recovery of a listed species is a regulatory determination by USFWS that a threatened species is recovered and can survive long-term in the wild without protections afforded by the Endangered Species Act (ESA). USFWS creates Recovery Plans for all listed species to define criteria for downlisting and delisting listed species and recovery actions to achieve those criteria. All listed Covered Species are endangered, except for the San Marcos salamander, that is listed as threatened.

USFWS cannot require that HCPs meet the recovery criteria of listed Covered Species, but applicants are encouraged to develop HCPs that provide a net benefit to the listed species while minimizing and mitigating Covered Activities (USFWS, 2016). Consistency with Recovery Plans is often considered by USFWS when determining issuance of an incidental take permit (ITP), and in order to issue an ITP, USFWS must find that issuance of the permit will not preclude the recovery of any listed species. The current EAHCP was established pursuant to the Edwards Aquifer Recovery Implementation Program (EARIP). As directed by the Texas Legislature, the EARIP Permittees committed to implement strategies specifically intended to aid in the recovery of the Covered Species, exceeding the minimum requirements for obtaining an ITP. Recovery actions and criteria for EAHCP listed species are described in the recently updated *Draft Recovery Plan for the Southern Edwards Aquifer Springs and Associated Aquatic Ecosystems*, hereafter referred to as the Draft Recovery

Plan, released by USFWS on September 10, 2024, for public review and comment (USFWS, 2024).

Strategies within the proposed measures included in this section align with USFWS's recommended recovery actions of the Draft Recovery Plan and the proposed Goal 7 of the *Recommended Biological Goals and Objectives Memorandum* (BIO-WEST and ICF, 2024). Goal 7 is a goal proposed by the EAHCP Biological Goals Subcommittee and seeks to "promote community engagement and awareness of the EAHCP, support land and water conservation, and mitigate anthropogenic stressors and natural disturbances within the Plan Area that will benefit the Covered Species." Proposed Measures that Contribute to Recovery that address Goal 7 and support recovery actions include: Education and Outreach, Water Quality Protection, Water Conservation, and Land Conservation.

The proposed Measures that Contribute to Recovery address the current Measures that Specifically Contribute to Recovery (EAHCP § 5.7), support proposed recovery actions in the Draft Recovery Plan (USFWS, 2024), and address topics listed in the proposed Goal 7 (BIO-WEST and ICF, 2024). Measures may be implemented through available and appropriate mechanisms including existing programs and may be funded through partnerships, other external funding, grant funding, in-kind contributions, or negotiation of requisite interlocal and other agreements.

Education and Outreach

To increase public support for the EAHCP and associated conservation measures, it is crucial to enhance the public's understanding of the Covered Species, their habitat, threats they face, and the protection efforts in place. Additional outreach topics may include water conservation, non-native species control, and rules regarding recreational use of the spring systems. The Permittees will implement outreach and education initiatives beyond those directly associated with the individual spring and river systems addressed in other specific conservation measures. These initiatives will include a combination of signage, brochures, events, workshops, promotional items, educational programs, newsletters, and social media postings.

Original EAHCP Conservation Measure That Include Education and Outreach:

- Section 5.2.3: Management of Public Recreation Use of Comal Springs and River Ecosystem
- Section 5.2.9: Reduction of Non-Native Species Introduction and Live Bait Prohibition
- Section 5.3.5: Reduction of Non-Native Species Introduction
- Section 5.4.11: Reduction of Non-Native Species Introduction

- Section 5.3.2: Management of Recreation in Key Areas
- Section 5.3.2.1: Management of Public Recreational Use of San Marcos Springs and River Ecosystem
- Section 5.4.2: Management of Recreation in Key Areas

Comments for Consideration:

- Outreach is a component of the original Habitat Protection Measures listed above and is included in various proposed Habitat Protection Measures.
- This measure addresses the "community engagement and awareness" component of the proposed Goal 7.

Water Quality Protection

The Edwards Aquifer is a karst aquifer characterized by an abundance of fractures, caves, and recharge features that enhance the rate of recharge but also increase the exposure of the aquifer to stormwater-borne pollutants or chemical spills. The City of New Braunfels, City of San Marcos, and Texas State University are highly urbanized areas with significant amounts of impervious cover near the habitat of the Covered Species, thus increasing the likelihood of nonpoint source pollutants within stormwater runoff directly affecting that habitat. A base level of the programs described below is currently required by municipal, state, or federal law to provide water quality protection and are either implemented by or in collaboration with the Permittees within their jurisdictional boundaries.

The Edwards Aquifer Protection Program (EAPP), administered by the Texas Commission on Environmental Quality (TCEQ), regulates activities that have the potential to contaminate the Edwards Aquifer, such as construction and aboveground or underground storage tank facilities. EAPP plans submitted to TCEQ for review and approval must include a water pollution abatement component.

Urbanized areas with populations greater than 50,000, and universities located within these areas, are required to obtain coverage under TCEQ's Municipal Separate Storm Sewer System (MS4) permitting program. They must develop and implement a Storm Water Management Plan aimed at reducing the introduction of nonpoint source pollutants to surface waters. Storm Water Management Plans associated with MS4 programs focus on reducing stormwater pollution through the implementation of the following measures:

- Public Education, Outreach, and Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Stormwater Runoff Control
- Post-Construction Stormwater Management in Areas of New Development or Redevelopment

- Pollution Prevention and Good Housekeeping for Municipal Operations
- Industrial Stormwater Sources (cities with populations greater than 100,000)

The City of San Marcos Land Development Code (LDC) includes environmental regulations and development criteria that are specific to providing enhanced protection for the San Marcos River. The development standards set forth in Chapter 6 of the LDC include more robust protection standards for development within the Edwards Aquifer Recharge Zone, San Marcos River Protection Zone and San Marcos River Corridor inside the San Marcos city limits. These standards include impervious cover limitations, stormwater quality treatment requirements and stream buffer requirements. These requirements will remain in effect to help protect water quality of the San Marcos River.

The Permittees will continue to implement programs, projects, and strategies that build on the requirements of their respective MS4 programs and collaborate with TCEQ's EAPP to protect Edwards Aquifer groundwater and the water quality of the Comal Springs and San Marcos Springs ecosystems.

Permittees will consider opportunities for water quality protection within the Plan Area. In particular, the City of New Braunfels, the City of San Marcos, and Texas State University will periodically evaluate water quality and runoff patterns from developed areas in close proximity to, and directly affecting, the Comal and San Marcos springs systems. Based on these evaluations, Permittees will prioritize sources of runoff that could pose significant threats to habitat for any Covered Species within those systems for corrective action and planning efforts related to proposed public development.

Original EAHCP Conservation Measure:

- Section 5.7.4: Minimizing Impacts of Contaminated Runoff
- Section 5.7.6: Impervious Cover/Water Quality Protection

Comments for Consideration:

- Include language to encourage pursuing best management practices to benefit water quality, such as implementing more green infrastructure and nature-based solutions to reduce non-point source pollutants and enhance recharge. While implementation at the watershed scale would be beneficial, this scope may be too large for the EAHCP. Therefore, the focus here should be more on sensitive areas, like a buffer zone proximal to urban drainages and the river corridor. This could also involve re-evaluating existing infrastructure or recommending improvements for new infrastructure to enhance stormwater detention capacity, bio-infiltration, and replacing impervious cover with pervious cover. Funding for these efforts could

include minor contributions from HCP funds and cost-sharing with municipalities, Texas State University, and pursuing other funding using HCP costs as matching funds.
- This measure addresses the "anthropogenic stressors" component of the proposed Goal 7.

Hazardous Materials Management

Improper disposal, handling, treatment, and transportation of hazardous materials increases the likelihood of contamination and spread of hazardous chemicals that may be fatal to the Covered Species. Due to the limited geographic distribution of the Covered Species, they are particularly vulnerable to spills and contamination across the Edwards Aquifer, and, particularly, the Comal and San Marcos watersheds and their tributaries. To reduce the likelihood of improper disposal of hazardous materials, the Cities of San Antonio, New Braunfels, and San Marcos will maintain their respective household hazardous waste (HHW) collection programs. City of New Braunfels and City of San Marcos, with support from Texas State University, will coordinate with the Texas Department of Transportation (TxDOT) regarding the transportation of hazardous materials on routes crossing the Comal and San Marcos springs systems and their major tributaries. Implementation efforts to reduce risk from the transportation of hazardous materials may include coordination with city council, TxDOT review and approval, installation of signage, etc. If a spill or contamination does occur, there are currently few options available to mitigate and remove hazardous chemicals. Collectively, Permittees will evaluate and refine the methods and technologies to improve hazardous response readiness. Water quality data collected through the EAHCP monitoring program will be evaluated to assess potential water quality degradation and inform specific responses.

Original EAHCP Conservation Measure:

- Section 5.2.7: Prohibition of Hazardous Materials Transport Across the Comal River and its Tributaries
- Section 5.3.4: Prohibition of Hazardous Materials Transport Across the San Marcos River and Its Tributaries
- Section 5.7.5: Management of Household Hazardous Wastes

Comments for Consideration:

- City of San Antonio, City of New Braunfels, City of San Marcos are required to offer Household Hazardous Wastes (HHW) collection programs as part of their Municipal Separate Storm Sewer System (MS4) programs.

- This measure is intended to support efforts that exceed minimum levels required pursuant to other regulatory programs.
- This measure addresses the "anthropogenic stressors" component of the proposed Goal 7.

Septic System Permitting Program

Septic systems are underground wastewater treatment structures that collect, treat, and disperse wastewater generated by a home or business. The wastewater is treated on-site rather than collected and transported to a wastewater treatment plant. Septic systems can contaminate groundwater and/or surface water due to improper installation, lack of maintenance, location, or faulty operation. The City of New Braunfels and City of San Marcos will maintain an aerobic and anaerobic septic system registration and permitting program to authorize, inspect and track the construction and locations of new septic systems within their respective jurisdictions. The City of New Braunfels and City of San Marcos will respond to complaints regarding faulty systems and identify systems that have significant potential to contribute subsurface pollutant loadings likely to affect the relevant spring system. Based on that information, both cities will prioritize efforts to minimize those loadings, including through efforts to arrange for connection of those septic systems to the municipal wastewater treatment system.

Original EAHCP Conservation Measure:

- Section 5.7.3: Septic System Registration and Permitting Program

Comments for Consideration:

- This measure could include the actions Hays and Comal counties are taking to regulate septic systems.
- This measure could reference an existing septic system database for the Plan Area, if available.
- This measure addresses the "anthropogenic stressors" component of Goal 7.

Integrated Pest Management

To minimize impacts of the use of fertilizers, herbicides, and pesticides used to maintain the Landa Park Golf Course and other open spaces and parklands, the City of New Braunfels, City of San Marcos, and Texas State University will continue to implement, and periodically refine, the Integrated Pest Management Plan (IPMP) for the Landa Park Golf Course, and other IPMPs applicable to parkland in both communities immediately adjacent to the Comal and San Marcos springs systems. The IPMPs will continue to incorporate environmentally sensitive techniques to minimize chemical applications, avoid the introduction of chemicals into the Comal and San Marcos springs systems, and

minimize negative effects to the Covered Species. Any chemicals used will be applied by an applicator licensed by the Texas Department of Agriculture in a manner consistent with the label directions and adhere to U.S. Environmental Protection Agency standards.

Original EAHCP Conservation Measures:

- Section 5.2.11: Management of Golf Course Diversions and Operations
- Section 5.4.9: Management of Golf Course and Grounds

Comments for Consideration:

- The Texas State University Golf Course adjacent to Spring Lake has been closed for years and is no longer maintained as a Golf Course. EAHCP staff will coordinate with the San Marcos HCP Manager to inquire about current Texas State University and City of San Marcos IPMPs for maintaining parkland immediately adjacent to the San Marcos Springs System.
- This measure addresses the "anthropogenic stressors" component of the proposed Goal 7.

Land Conservation

Although the Covered Species are primarily aquatic and reside mainly within the Comal Springs and San Marcos springs systems, the land affecting the quality and quantity of springflows spans several counties and parts of counties in South-Central Texas. This region is among the fastest-growing areas in the country, with changes in land use and cover impacting the quantity and quality of the underlying groundwater and spring systems. Implementing conservation strategies to protect land immediately adjacent to the Comal and San Marcos springs systems, within the Edwards Aquifer Recharge and Contributing zones, and other land with recharge features or otherwise deemed ecologically valuable by the Permittees, could help maintain the groundwater and surface water quality and quantity essential for the Comal Springs and San Marcos springs ecosystems. The Permittees will periodically assess opportunities for land conservation based on potential benefits for the quality and quantity of Comal and San Marcos springflows and will advocate for and support land conservation measures consistent with those assessments.

Original EAHCP Conservation Measure:

- Not applicable (this is a new conservation measure recommended by the Subcommittee).

Comments for Consideration:

- This measure addresses the "land conservation" component of the proposed Goal 7.

Water Conservation

This measure provides for additional non-regulatory efforts to reduce per capita pumping and enhance recharge. Pursuant to this measure, Permittees will assess, on an ongoing basis, the availability and feasibility of additional non-regulatory water conservation strategies to increase Edwards Aquifer groundwater. Strategies assessed should include:

- implementing specific land and vegetation management activities to increase Edwards Aquifer recharge;
- reducing per capita surface water use and/or altering surface water management in order to increase Edwards Aquifer recharge;
- encouraging responsible water usage and conservation practices for aquifers that contribute significant recharge to the Edwards Aquifer; and
- assisting users of Edwards Aquifer water, including exempt users, in reducing water use, particularly during drought periods.

To the extent reasonably practicable, Permittees will promote water conservation and implement strategies identified as having significant potential benefits.

Original EAHCP Conservation Measure:

- Not applicable (this is a new conservation measure recommended by the Subcommittee).

Comments for Consideration:

- In addition to the Springflow Protection Measures, this measure addresses the "water conservation" component of the proposed Goal 7.
- While modeling, including climate modeling, made available to date appears generally consistent with a determination that implementation of the Springflow Protection Measures likely would be sufficient for maintaining identified minimum levels of Comal and San Marcos springflow, there is significant uncertainty and this measure calls for Permittees to keep evaluating and, to the extent reasonably practicable, implement additional water conservation strategies.

EAA's Cibolo Creek Transfer Prohibition

EAA Rule § 711.329 prohibits transferring groundwater withdrawal permits located west of Cibolo Creek to east of Cibolo Creek, without approval from the EAA Board of Directors and

EAA General Manager. This rule benefits Comal and San Marcos springflows by limiting the amount of available permitted groundwater east of Cibolo Creek. Prior to the rulemaking, transfers from west of Cibolo Creek to east of Cibolo Creek were generally made in small amounts, but concern over future cumulative impacts on both Comal and San Marcos springs led to the implementation of a prohibition of such transfers. The EAA will maintain in effect EAA Rule § 711.329 prohibiting transferring groundwater withdrawal permits located west of Cibolo Creek to east of Cibolo Creek.

Original EAHCP Conservation Measure:

- Not applicable (this is a new conservation measure recommended by the Subcommittee).

Comments for Consideration:

- In addition to the Springflow Protection Measures, this measure addresses the "water conservation" component of the proposed Goal 7.

Glossary

ac-ft/yr: acre foot per year, a measurement unit of water volume

cfs: cubic feet per second, a measurement unit of water discharge or flow rate.

Comal discharge: The volume of water passing a defined location in the Comal River; in the EAHCP, this location is often referenced at the USGS gage #08169000, that is below the confluence of the Old and New channels of the Comal River.

Comal River: A two-mile natural watercourse originating from the Comal Springs in New Braunfels, Texas, beginning at Landa Lake and terminating at its confluence with the Guadalupe River in New Braunfels, Texas.

Comal Springs: A collection of artesian springs in New Braunfels, Texas, emanating from the Edwards Aquifer and creating the headwaters of the Comal River, including areas of Landa Lake and the spring runs that feed Landa Lake.

Comal Springs System: The aquatic area and associated riparian zones encompassing the Comal Springs, Landa Lake, Old Channel, New Channel, and Comal River.

CONB: City of New Braunfels. References to "CONB § __" refer to provisions of City of New Braunfels ordinances.

Comments for Consideration: Outstanding issues or questions not addressed in the proposed conservation measures recommendations that did not meet the views of all Subcommittee members, or may require further evaluation, research and data. Some of these comments may not be appropriate for the conservation measures and will be further considered during the permit renewal process.

Conservation Measures: Projects or activities characterized by minimization, mitigation, or avoidance actions, implemented by the Permittees to achieve the Biological Goals and Objectives.

COSM: City of San Marcos. References to "COSM § __" refer to provisions of City of San Marcos ordinances.

Covered Activities: Activities performed by the Permittees within the Permit Area, including management of groundwater pumping from the Edwards Aquifer, aquatic recreation, and restoration, for which incidental take coverage will be provided over the incidental take permit term.

Covered Species: The nine federally listed or petitioned species "covered" by the Incidental Take Permit and EAHCP as recommended in the *Evaluation of Covered Species for the Amended EAHCP Memorandum*.

Goal 7: An HCP management goal developed by the EAHCP Biological Goals Subcommittee and recommended within the *Revised Recommended Biological Goals and Objectives for the Permit Renewal Memorandum*. Goal 7, as written: "Promote community engagement and awareness of the EAHCP, support land and water conservation, and mitigate anthropogenic stressors and natural disturbances within the Plan Area that will benefit the Covered Species."

Groundwater easements: A legal agreement between a groundwater withdrawal permit holder and an entity granting the entity the right to control a specified amount of the permitted groundwater in a specified way for a specified number of years or held in perpetuity as defined within the contract between the original permit holder and the entity.

Groundwater Trust: An account of groundwater withdrawal permits held in trust and administered by the Edwards Aquifer Authority, established in Section 1.22 of the EAA Act.

gpm: gallons per minute, a measurement unit for water discharge or flow rate.

"Incidental take" or "take:" Unintentional taking of a species that results from, but is not the purpose of, carrying out an otherwise lawful activity. *Taking* is defined in the ESA as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting any threatened or endangered species.

Incidental Take Permit: A permit issued by the USFWS under Section 10a(1)(B) of the Endangered Species Act that allows permittees to proceed with an otherwise legal activity that may result in "incidental take" (see above) of a threatened or endangered species.

Long-Term Biological Goal Reach: River segments in both the Comal and San Marcos Springs systems that are specified in the EAHCP and hold quantitative management objectives associated with Covered Species habitat.

Low flow(s), low-flow condition(s): A period of springflow below the long-term average identified in *Revised Recommended Biological Goals and Objectives for the Permit Renewal* (BIO-WEST and ICF, 2024). Low flow may also be specified as 130 cfs or lower at the Comal discharge and 120 cfs or lower at the San Marcos discharge.

Maintenance: To sustain favorable conditions and functionality as part of a conservation measure. For habitat measures, often refers to routine monitoring and minor efforts for removal and planting following initial or major efforts, that are defined below as "management."

Management: To oversee and direct activities to achieve implementation of conservation measures. For habitat measures, often refers to initial or major efforts for removal and planting. Management is typically followed by "maintenance," as defined above.

Negative impacts: Generic term associated with adverse impacts on the Covered Species and their habitat through reduced springflow, flood, contaminated runoff, excess recreation in protected areas, and other potentially threatening activities to the Comal and San Marcos springs ecosystems.

New Channel of the Comal River: From Landa Lake, water flows into two channels, the original "old" channel and a "new" channel created in 1847. New Channel flows are monitored by USGS gage #08168932.

Old Channel of the Comal River: From Landa Lake, water flows into two channels, the original "old" channel and a "new" channel created in 1847. The Old Channel is recognized as an Environmental Restoration and Protection Area (ERPA) in the EAHCP and considered optimal habitat for the fountain darter. For this reason, flow maintenance is prioritized in the Old Channel over the New Channel during low-flow conditions. Old Channel flows are monitored by USGS gage #08168913.

Permittees: The five parties named as co-permittees on the Incidental Take Permit (see above) that are jointly responsible for the EAHCP: Edwards Aquifer Authority, San Antonio Water System, City of New Braunfels, City of San Marcos, and Texas State University.

Permit Renewal: Initiated in 2022 by the Permittees, this multi-year planning process is intended to complete a major amendment of the Incidental Take Permit (see above) to extend the permit duration beyond its expiration in 2028.

Recovery: Determination by USFWS that a listed species has achieved delisting criteria defined in the species Recovery Plan and can survive in the wild long-term without protections afforded by the Endangered Species Act. The first step of recovery of an endangered species is downlisting, or reclassification from endangered to threatened status, defined by downlisting criteria and recovery actions in the species Recovery Plan.

Recovery Plan: A document produced by USFWS for species listed as endangered or threatened that describes downlisting criteria (reclassification from endangered to threatened), delisting criteria (reclassification from threatened to recovered), and recovery actions to achieve criteria that increase the likelihood of the species' long-term survival in the wild.

Restoration Reach: River segments in both the Comal and San Marcos springs systems as defined in the *Revised Recommended Biological Goals and Objectives for the Permit Renewal* (BIO-WEST and ICF, 2024).

Riparian: Land adjacent to a river, creek, or lake.

San Marcos discharge: The rate and volume of water passing a defined location in the San Marcos River; in this HCP, this location is referenced at the USGS gage #08170500, that is located at Aquarena Springs Drive bridge in Sewell Park.

San Marcos River: An 80-mile natural watercourse originating from the San Marcos Springs in San Marcos, Texas, extending from the headwaters of Spring Lake and terminating at its confluence with the Guadalupe River near Gonzales, Texas.

San Marcos River (within city limits): The segment of the Upper San Marcos River extending from Spring Lake Dam to the San Marcos Wastewater Treatment Plant (WWTP). The current city limits end just below the WWTP. The riparian property below the WWTP is private and access requires permission from private landowners.

San Marcos Springs: A collection of artesian springs in San Marcos, Texas, emanating from the Edwards Aquifer and creating the headwaters of the San Marcos River, including areas of Spring Lake, Sink Creek, and springs within lower segment of Sessom Creek; this term generally refers to artesian springs in Spring Lake.

San Marcos Springs System: The aquatic area and associated riparian zones containing the San Marcos Springs, Spring Lake, the lower segment of Sessom Creek, and Upper San Marcos River.

Texas State University (TXST): Includes Texas State University entities: The Meadows Center for Water and the Environment (Spring Lake), Department of Campus Recreation (Sewell Park and Outdoor Center at Sewell Park), Facilities Operations, and University Police Department.

Tributaries (San Marcos): Includes the major creeks that flow into the San Marcos Springs System: Sink Creek, Sessom Creek, Purgatory Creek, and Willow Creek.

Tributaries (Comal): Includes the major creeks that flow into the Comal Springs System: Blieders Creek, Panther Creek, and Dry Comal Creek.

United States Fish and Wildlife Service (USFWS): The USFWS is the federal agency responsible for implementing the Endangered Species Act (ESA), that involves conserving and protecting threatened and endangered species and their habitats.

University Policy and Procedure Statements (UPPS): The Texas State University Policy and Procedure Statements are the policies and procedures that govern various aspects of the university's operations, administrative functions, student affairs, faculty and staff regulations, and institutional practices.

Upper San Marcos River: The 4.5-mile segment of the San Marcos River extending from Spring Lake Dam and terminating at its confluence with the Blanco River. The Upper San Marcos River watershed includes major tributaries, or creeks, that flow into the Upper San Marcos River.

Species of Interest

The species listed in the table below are directly managed by the EAHCP program or otherwise of interest through their relevance to EAHCP implementation activities.

EAHCP Species of Interest

Common Name	Scientific Name	ESA Status
Covered Species		
Comal Springs dryopid beetle	*Stygoparnus comalensis*	Endangered
Comal Springs riffle beetle	*Heterelmis comalensis*	Endangered
Edwards Aquifer diving beetle (or Texas cave diving beetle)	*Haideoporus texanus*	Petitioned
Fountain darter	*Etheostoma fonticola*	Endangered
Peck's cave amphipod	*Stygobromus pecki*	Endangered
San Marcos salamander	*Eurycea nana*	Threatened
Texas blind salamander	*Eurycea rathbuni*	Endangered
Texas wild-rice	*Zizania texana*	Endangered
Submerged Aquatic Vegetation Species for Fountain Darter Habitat		
Carolina fanwort (or Cabomba)	*Cabomba caroliniana*	
Creeping primrose-willow	*Ludwigia repens*	
Delta arrowhead	*Sagittaria platyphylla*	
Potamogeton (or Illinois pondweed)	*Potamogeton illinoensis*	
Mosses, liverworts, and allies	Bryophytes[a]	
Texas wild-rice	*Zizania texana*[b]	
Water celery	*Vallisneria americana*[a]	
Whorled pennywort	*Hydrocotyle verticillata*[b]	
Grassleaf mudplantain	*Heteranthera dubia*	
Hygrophila (or Indian swampweed)	*Hygrophila polysperma*[a]	
Non-Native Animal Species Removed or Monitored		

Giant ramshorn snail	*Marisa cornuarietis*
Nutria	*Myocastor coypus*
Red-rimmed melania	*Melanoides tuberculata*
Suckermouth armored catfishes (suckermouth and sailfin)	Loricariidae: *Hypostomus Plecostomus* and *Pterygoplichthys* spp.
Tilapia (or blue tilapia)	*Oreochromis* spp.
Zebra mussels	*Dreissena polymorpha*
Non-Native Plant Species Removed or Monitored	
Chinaberry	*Melia azedarach*
Chinese privet	*Ligustrum sinense*
Chinese tallow	*Triadica sebifera*
Elephant ear (or coco yam, or taro)	*Colocasia esculenta*
Giant reed	*Arundo donax*
Hydrilla (or water thyme)	*Hydrilla verticillata*
Hygrophila (or Indian swampweed)	*Hygrophila polysperma*
Japanese honeysuckle	*Lonicera japonica*
Japanese privet (or Japanese ligustrum)	*Ligustrum japonicum*
Tapegrass (or eelgrass)	*Vallisneria spiralis*
Water hyacinth	*Eichhornia crassipes or Pontederia crassipes*
Water lettuce	*Pistia stratiotes*
Water sprite	*Ceratopteris thalictroides*
Watercress	*Nasturtium officinale*
White mulberry	*Morus alba*

[a] These species occur as habitat for the fountain darter in the Comal Springs System only.

[b] These species occur as habitat for the fountain darter in the San Marcos Springs System only.

References

BIO-WEST and ICF. 2024. Kunkel, C., Sullivan, K., Oborny, E., Littrell, B., Williams, C., Pintar, M., Bare, L. *Revised Recommended Biological Goals and Objectives for the Permit Renewal*. Memorandum prepared for EAHCP Incidental Take Permit Renewal. https://www.eahcprenewal.org/

BIO-WEST and Watershed Services. 2016. *Proposal for nonroutine adaptive management*. https://www.edwardsaquifer.org/wp-content/uploads/2023/06/Proposal-for-Nonroutine-Adaptive-Management-September-2016.pdf

Edwards Aquifer Authority Act. *Edwards Aquifer Authority Act (includes amendments through September 1, 2011 effective date)*, accessed 2024.

Edwards Aquifer Authority Rules. *Edwards Aquifer Authority Rules, effective September 22, 2023,* accessed 2024.

Edwards Aquifer Habitat Conservation Plan (EAHCP). 2012. *Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan, amended 2021*.

HDR Engineering, Inc. (HDR). 2011. *Evaluation of water management programs and alternatives for springflow protection of endangered species at Comal and San Marcos Springs.* Prepared for the Edwards Aquifer Recovery Implementation Program (ERIP).

ICF. Bare, L., & Zippin, D. 2020. *Edwards Aquifer Habitat Conservation Plan Permit Options Report*. September. (ICF 704.19.) Austin, Texas. Report prepared for Edwards Aquifer Authority, San Antonio, Texas.

ICF. Bare, L., Frye, K., & Hitchcock, E. 2023. *Recommended Changes to the EAHCP Covered Activities for the Permit Renewal*. Memorandum prepared for EAHCP Incidental Take Permit Renewal. https://www.eahcprenewal.org/

ICF. Hitchcock, E., & Bare, L. 2023. *Proposed Changes to EAHCP Existing Conditions for the Permit Renewal*. Memorandum prepared for EAHCP Incidental Take Permit Renewal. https://www.eahcprenewal.org/

ICF and BIO-WEST. Bare, L., Oborny, E. & Zippin, D. 2023. *Evaluation of Covered Species for the Amended EAHCP*. Memorandum prepared for EAHCP Incidental Take Permit Renewal. https://www.eahcprenewal.org/

City of New Braunfels Ordinances. *Chapter 86 – PARKS AND RECREATION*, *CHAPTER 142 – WATERWAYS*, accessed 2024.

City of San Marcos Ordinances. *Chapter 58 – PUBLIC FACILITIES AND RECREATION*, accessed 2024.

Texas Parks and Wildlife Code (TPWC). *Title 5. Wildlife and Plant Conservation. Subtitle B. Hunting and Fishing. Chapter 66. Fish and Aquatic Plants*, accessed 2024.

University Policies and Procedures Statements (UPPS). *Texas State University Policies and Procedures Statements*, accessed 2024.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 2016. *Habitat Conservation Planning and Incidental Take Permit Processing Handbook.* Departments of Interior and Commerce.

U.S. Fish and Wildlife Service. 1996. *San Marcos & Comal Springs & Associated Aquatic Ecosystems (Revised) Recovery Plan for the San Marcos gambusia (Gambusia gorgei), fountain darter (Etheostoma fonticola), San Marcos salamander (Eurycea nana), Texas wild-rice (Zizania texana), and Texas blind salamander (Eurycea rathbuni)*. Recovery Plan prepared by The San Marcos/Comal Recovery Team and USFWS Austin Ecological Services Field Office.

U.S. Fish and Wildlife Service. 2019. *Amendment 1, Recovery Plan for Zizania texana (Texas wild-rice), fountain darter (Etheostoma fonticola) and Texas blind salamander (Eurycea rathbuni)*. Recovery Plan Amendment 1, provided delisting criteria for the endangered listed species, but excluded delisting criteria for the San Marcos salamander. Prepared by USFWS Ausin Ecological Services Field Office.

U.S. Fish and Wildlife Service. 2023. *Excerpt of Draft Southern Edwards Aquifer Recovery Plan*. Excerpt of draft Recovery Plan provided by USFWS to EAHCP staff and EAHCP Committee members in fall 2023.

U.S. Fish and Wildlife Service. 2024. *Draft Recovery Plan for the Southern Edwards Aquifer Springs and Associated Aquatic Ecosystems, Second Revision.* Draft Recovery Plan released by USFWS on September 10, 2024 for public review and comment until November 12, 2024, content is subject to change based on comments and edits

received by November 12, 2024. Prepared by USFWS Ausin Ecological Services Field Office.

APPENDIX A: Subcommittee Charge

Conservation Measures Subcommittee Charge

The Edwards Aquifer Habitat Conservation Plan (EAHCP) is in the process of renewing an Incidental Take Permit with the U.S. Fish and Wildlife Service. As part of that process, the existing components of the Habitat Conservation Plan (HCP) conservation strategy will be reassessed, new elements recommended, and modifications discussed. As a required component of HCPs, Conservation Measures describe specific actions that Permittees will implement to achieve biological objectives in support of the biological goals.

The purpose of this Subcommittee is to review and discuss the Conservation Measures that should be considered for inclusion in the next EAHCP.

Specifically, the Subcommittee will:

- Elect a Chair of the Subcommittee.
- Review the HCP Handbook as it pertains to Conservation Measure purpose and structure.
- Receive an overview of the Biological Goals and Biological Objectives Subcommittee recommendations.
- Use the best available science and knowledge of the current HCP experience to determine the needed Conservation Measures.
- Review the current EAHCP Conservation Measures (EAHCP § 5.0).
- Consider the effects of climate change and other potential variables relative to the proposed HCP period.
- Review and provide feedback on draft Conservation Measures developed and provided by EAHCP staff.
- Finalize and approve Conservation Measure recommendations to be provided to the EAHCP Implementing Committee before submission to the EAHCP Permit Renewal contractor (ICF).

Membership:

- Texas State University: *Represented by Kimberly Meitzen*
- City of San Marcos: *Represented by Mark Enders*
- City of New Braunfels: *Represented by Phillip Quast*
- San Antonio Water System: *Represented by Linda Bevis*
- Edwards Aquifer Authority: *Represented by Marc Friberg*
- Guadalupe-Blanco River Authority: *Represented by Daniel Large*
- EAHCP Stakeholder Committee Member (Bexar County Interest): *Kerim Jacaman*

- EAHCP Stakeholder Committee Member (Recreational Interest)*: Melani Howard*
- EAHCP Stakeholder Committee Member (Agricultural Interest)*: Adam Yablonski*
- EAHCP Stakeholder Committee Member (Environmental Interest)*: Myron Hess*

Subcommittee Organization:

The Conservation Measures Subcommittee is authorized to meet through virtual means, or any combination of virtual and in-person meetings, and to finalize previously discussed drafts through email communications.

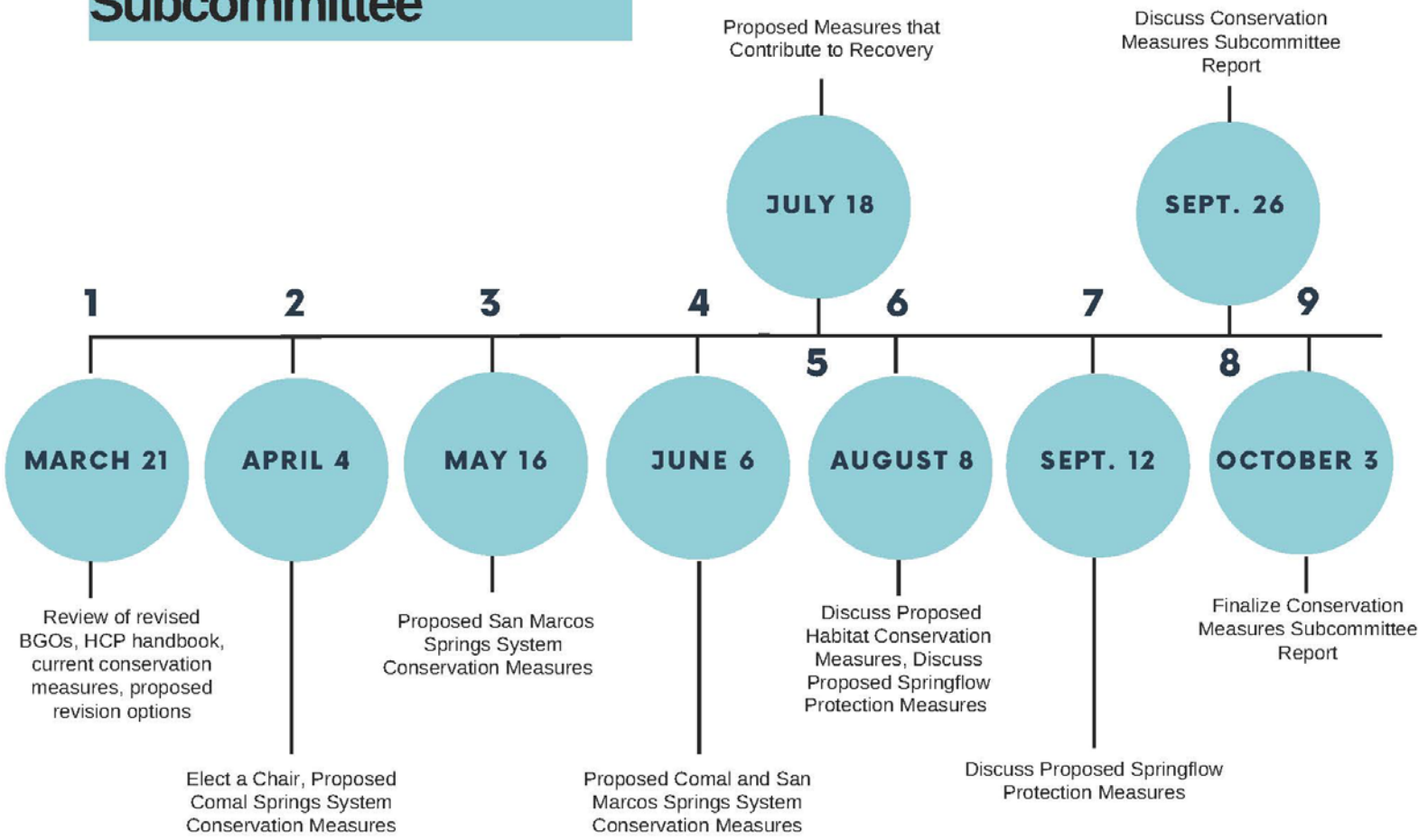
The Subcommittee shall strive to achieve consensus on its recommendations, but, if consensus cannot be achieved by the October 10, 2024 deadline, despite the Subcommittee's best efforts, the recommendations and report may be approved by a 75% vote of the full Subcommittee as long as any member dissenting from approval is provided a reasonable opportunity to provide a succinct summary of the objections to the recommendations, which shall be included in the report.

The purpose of the October 10, 2024, deadline is to finalize a report that can be submitted to the Permit Renewal Contractor prior to the start of the Contractor's preliminary analysis of the EAHCP Conservation Strategy.

APPENDIX B: Subcommittee Timeline

TIMELINE

Conservation Measures Subcommittee



Revised: July 2024

APPENDIX C: Subcommittee Agendas

Conservation Measures Subcommittee

Meeting #1 Agenda

March 21, 2024

1. Call to Order
2. Public Comment
3. Subcommittee member introductions and confirm attendance.
4. Overview of the Conservation Measures Subcommittee Charge.
5. Elect a chair of the Conservation Measures Subcommittee.
   a. Coordinate with EAHCP staff on meeting agendas.
   b. Moderate subcommittee meetings.
6. Overview of the revised Biological Goals and Biological Objectives.
7. Presentation on the USFWS Habitat Conservation Planning and Incidental Take Permit Processing Handbook – Chapter 9.3: Conservation Measures.
8. Examples of Conservation Measures from other HCPs.
9. Proposed plans to revise current Conservation Measures.
10. Public Comment
11. Future meetings
12. Adjourn

Conservation Measures Subcommittee

Meeting #2 Agenda

April 4, 2024

1. Call to Order
2. Public Comment
3. **Action Item:** Elect a Chair of the Subcommittee.
4. Conservation Measures Subcommittee Timeline.
5. Overview of Meeting #1 discussion.
6. Discuss proposed revisions to Conservation Measures implemented in the Comal Springs System.
7. Public Comment
8. Future meetings
9. Adjourn

Conservation Measures Subcommittee

Meeting #3 Agenda

May 16, 2024

1. Call to Order

2. Public Comment

3. Review of revised Comal Springs System Conservation Measures.

4. Discuss proposed revisions to Conservation Measures implemented in the Comal Springs System.

5. Discuss proposed revisions to Conservation Measures implemented in the San Marcos Springs System – Part 1.

6. Public Comment

7. Future meetings

8. Adjourn

Conservation Measures Subcommittee

Meeting #4

June 6, 2024

1. Call to Order
2. Public Comment
3. Action Item: Approve additional Conservation Measures Subcommittee meetings.
   a. Thursday, July 18, 2024 – EAA
   b. Thursday, September 26, 2024 – EAA
4. Discuss proposed revisions to Conservation Measures implemented in the Comal Springs System.
5. Discuss proposed revisions to Conservation Measures implemented in the San Marcos Springs System.
6. Next Steps: Structure and Timeline.
7. Public Comment
8. Future meetings
9. Adjourn

Conservation Measures Subcommittee

Meeting #5

July 18, 2024

1. Call to Order
2. Public Comment
3. Overview of the revised Habitat Conservation Measures for the Comal and San Marcos Springs Systems.
4. Discuss proposed revisions to the Measures that Contribute to Recovery.
5. Next Steps
6. Public Comment
7. Future meetings
8. Adjourn

Conservation Measures Subcommittee

Meeting #6

August 8, 2024

1. Call to Order
2. Public Comment
3. Discuss revisions to the proposed Habitat Conservation Measures
4. Discuss revisions to the proposed Measures that Contribute to Recovery
5. Discuss the proposed Springflow Protection Measures
6. Next Steps
7. Public Comment
8. Future meetings
9. Adjourn

Conservation Measures Subcommittee

Meeting #7

September 12, 2024

1. Call to Order
2. Public Comment
3. Discuss revisions to the draft Subcommittee Report
4. Discuss revisions to the Springflow Protection Measures
5. Next Steps
6. Public Comment
7. Future meetings
8. Adjourn

Conservation Measures Subcommittee

Meeting #8

September 26, 2024

1. Call to Order
2. Public Comment
3. Discuss revisions to the draft Subcommittee Report
4. Next Steps
5. Public Comment
6. Future meetings
7. Adjourn

Microsoft Teams:

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Meeting ID: 230 540 823 050
Passcode: jBcPnZ

Dial in by phone
Phone: 210-729-0064
Conference ID: 119 019 075#

Conservation Measures Subcommittee

Meeting #9

September 26, 2024

1. Call to Order
2. Public Comment
3. Discuss final revisions to the draft Subcommittee Report
4. Action Item: Consider staff recommendation to approve the Conservation Measures Subcommittee Report and submittal to EAHCP Implementing Committee and Permit Renewal Contractor, ICF.
5. Public Comment
6. Adjourn

Microsoft Teams:

https://teams.microsoft.com/l/meetup-join/19%3ameeting_MDZjZWM0ZWMtYTM2MS00OGMzLTgzOWMtMzA3Y2E1ZTM1N2Jk%40thread.v2/0?context=%7b%22Tid%22%3a%225c22012b-e3bb-4a79-903b-5ca9e5027fc5%22%2c%22Oid%22%3a%22e9955ed4-4fd4-4c80-8c5f-0d2258895b13%22%7d
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Passcode: DjhqVm

Dial in by phone
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