Memorandum

To:	Scott Storment
From:	ICF Project Team
Date:	December 2, 2025
Re:	**Monitoring and Adaptive Management Framework for the EAHCP Permit Renewal**

1. Introduction

Monitoring, reporting, and adaptive management are mandatory Habitat Conservation Plan (HCP) components (see 50 Code of Federal Regulations §§ 17.22, 17.32, and 222.307; 65 *Federal Register* [FR] 32242, 35253 [June 1, 2000], 81 FR 93702). Properly designed monitoring and adaptive management programs provide the information necessary to ensure:

- The plan is making progress towards meeting the HCP's Biological Goals and Objectives
- The Conservation Measures are effectively delivering the minimization and/or mitigation results expected for the Covered Species
- Adaptive management improves the Conservation Strategy
- The HCP remains in compliance with the terms and conditions of the Incidental Take Permit (ITP)

As part of the existing Edwards Aquifer HCP (EAHCP), the Permittees have implemented a monitoring and adaptive management program that verifies progress toward the Biological Goals and Objectives, evaluates effectiveness of Conservation Measures, and provides the information necessary to assess compliance and project impacts over the 15-year Permit Term.

This memorandum proposes updates and revisions to the monitoring and adaptive management framework to consider in the EAHCP Permit Renewal Process. These proposed updates are based on HCP Handbook guidance (U.S. Fish & Wildlife Service and National Marine Fisheries Service 2016), lessons learned during the current EAHCP, stakeholder input, revisions to the Biological Goals and Objectives, and the proposed 30-year ITP duration for the EAHCP renewal.

The first proposed change is to rename the chapter from "Adaptive Management" to "Monitoring and Adaptive Management," for alignment with U.S. Fish & Wildlife Service (USFWS) guidance and to better reflect its contents. This memorandum proposes that some sections of the Monitoring and Adaptive Management chapter of the EAHCP be completely restructured or removed, while others would only receive minor editing. Table 1 presents a summary of proposed changes and the rationale behind each recommendation. The sections following Table 1 provide a monitoring and adaptive management framework organized to reflect what is anticipated for Chapter 6, *Monitoring and Adaptive Management*, in the renewed EAHCP.

Table 1. Summary of Proposed Changes to Monitoring and Adaptive Management

Current EAHCP Section	Current EAHCP Section Name	Proposed Change	Rationale
6.1	Adaptive Management Process	Reorganize section. Will be addressed in the adaptive management section to follow the monitoring section.	Chapter should outline monitoring first, then adaptive management.
6.2	Monitoring	Reorganize and substantively revise to explain monitoring and its relationship to compliance and effectiveness.	Restructure to fit the guidance presented in the USFWS HCP Handbook. Adjust monitoring components to align with proposed changes to the Conservation Strategy, including Biological Objectives, Conservation Measures, and Measures that Contribute to Recovery.
N/A	N/A	Add recreation monitoring to the General Condition Monitoring program.	Monitoring of recreation activities will inform adaptive management to avoid and minimize impacts on Covered Species from this Covered Activity.
6.2.1	Compliance Monitoring	Reword and add Section 6.2.4, *Monitoring Reports*, to this section. Update to include compliance monitoring for newly proposed Conservation Measures.	The compliance monitoring process for the permit renewal will continue to consist of the preparation and submittal of Annual Reports by the Permittees to USFWS for review. A section of the Annual Report will focus on Measures that Contribute to Recovery, as described in the EAHCP. To consolidate guidance on reporting, combine Section 6.2.4, *Monitoring Reports*, with Section 6.2.1, *Compliance Monitoring*.
6.2.2	Effects and Effectiveness Monitoring	Restructure. Add new tables demonstrating the relationship between effects and effectiveness monitoring	Reflects new Biological Goals and Objectives.

Current EAHCP Section	Current EAHCP Section Name	Proposed Change	Rationale
		components and Covered Species influence.	
6.3	Adaptive Management Research and Modeling	Restructure and clarify. Separate adaptive management framework into two categories: routine adjustments and adaptive management. Streamline the adaptive management decision process. Provide flexibility to identify applied research opportunities through the adaptive management decision process.	This structure provides clearer pathways for decision-making in the face of uncertainty. It creates a feedback loop of monitoring, evaluating, and adjusting management strategies according to what is learned through the implementation of the HCP and allows the plan to be efficiently adjusted as the needs of the plan evolve over time.
N/A	N/A	Add the process for making routine adjustments to the Monitoring and Adaptive Management chapter.	Rename routine adaptive management to routine adjustments to clarify and differentiate this decision process from the adaptive management decision process with a more appropriate name.
6.4	Core Adaptive Management Actions	Restructure. Rename to "Adaptive Management." Propose a more streamlined decision process for adaptive management that is flexible and can address issues as they are raised by the Permittees, Program Manager, or USFWS. Address several key uncertainties that were identified during the permit renewal process. Establish a process for addressing new uncertainties.	Provides a process for addressing uncertainties and making decisions relating to the Conservation Strategy that are not routine adjustments. Some research and monitoring activities originally presented in Sections 6.3, *Adaptive Management Research and Modeling*, and 6.4, *Core Adaptive Management Action*, are complete, some never happened, and some are no longer relevant. The proposed changes would remove outdated or irrelevant adaptive management activities.

2. Monitoring

The proposed monitoring program is organized into three main categories: (1) **general condition monitoring** for on-going documentation of conditions and to assess progress towards meeting the EAHCP's updated Biological Goals and Objectives, (2) **effectiveness monitoring** to support on-going conservation decisions and inform adaptive management needs, and (3) **compliance monitoring** with respect to adhering to ITP terms and conditions.

The Edwards Aquifer system has a long history of robust biological sampling from the pre-EAHCP comprehensive biological monitoring program established in 2000, known as the Edwards Aquifer

Authority (EAA) Variable Flow Study. The original purpose of the monitoring program was to evaluate the effects of variable flow on the biological resources of these ecosystems, with an emphasis on threatened and endangered species. Since the start of EAHCP implementation, the data collected through the monitoring program has been integral to improving the understanding of the Comal and San Marcos springs systems and informing multiple permit renewal components, including the revised Conservation Measures and the take assessment methodology. The monitoring program was and continues to be designed to provide a comprehensive understanding of the ecology of the Comal and San Marcos springs systems and as a result collects sufficient information needed to determine whether the Biological Goals and Objectives are being met. Under the permit renewal, monitoring data will continue to be essential for: (1) monitoring the condition of Covered Species and their habitat, (2) assessing progress towards the Biological Goals and Objectives, (3) assessing the effectiveness and efficiency of mitigation and restoration activities, (4) providing the foundation for adaptive management, and (5) facilitating the calculation of take amounts for annual ITP reporting.

The proposed monitoring program is presented below at a high level, to allow for flexibility during implementation. If the monitoring data indicates that the Biological Goals and Objectives are not being met, then adaptive management is used to enhance the monitoring program and/or Conservation Measures, with concurrence with USFWS. See *Adaptive Management* below for more information.

2.1 General Condition Monitoring

2.1.1 Water, Sediment, and Fish Tissue Sampling

The EAHCP Expanded Water Quality Monitoring Program was developed to monitor surface water and groundwater quality of the San Marcos and Comal springs systems, and act as an early detection mechanism for water quality impairments that may negatively affect EAHCP Covered Species. This sampling program has been reviewed by EAHCP staff, the National Academy of Sciences, the EAHCP Science Committee, and the EAHCP Biological and Water Quality Work Groups, and revised as needed. The current sampling types and activities are provided in Table 2. Sampling locations and activities are displayed in Figure 1 for the San Marcos system and Figure 2 for the Comal Springs system.

Table 2. EAHCP Expanded Water Quality Monitoring Program Sampling Activities

Sample Type	Activities
Surface Water	Sampling occurs during fixed time periods (not flow related) in the spring and fall and is focused on nutrients and contaminants.
Groundwater	Sampling occurs during fixed time periods (not flow related) in the spring and fall and is focused on geochemical analytes, nutrients, and contaminants.
Real-Time Network	Sampling occurs continuously at multiple locations of importance through each of the systems.
Sediment	Sampled discretely a minimum of every other year, in multiple locations, focused on contaminants.

Sample Type	Activities
Fish Tissue	Sampled discretely a minimum of every other year, in multiple locations, focused on contaminants.

Surface Water Sampling

Monthly surface water sampling for contaminant analyses occurs at one location in each spring system (i.e., Hotel Spring in San Marcos and Spring Run 3 in Comal).

Additionally, surface water samples for nutrient analyses are collected on a biannual basis under normal flow conditions in conjunction with the biological sampling program (spring and fall). Sampling locations consist of upper and lower river stations in both systems. For the Comal Springs system, Landa Lake near Spring Island is the upper sampling location, and the lower station is located at the last public river takeout just upstream of the confluence with the Guadalupe River. In San Marcos, Hotel Spring in Spring Lake serves as the upper location, and the downstream location is located at Texas Parks & Wildlife Department hatchery.

Real-Time Network

Real-time water quality (RTWQ) stations are designed to track water quality conditions within the San Marcos and Comal springs systems to monitor whether river conditions remain within tolerance levels for Covered Species. Measurements are taken every 15 minutes. Presently, three RTWQ sites are located in the San Marcos system: Aquarena Springs Drive, Texas Parks & Wildlife Department hatchery, and Sessom Creek (Figure 1). Three RTWQ sites are located in the Comal system: two locations in Landa Lake (i.e., Spring Run 3 and Spring Run 7), and one site in the Old Channel (Figure 2).

Groundwater Sampling

Groundwater sampling is conducted by the EAA Aquifer Science Division and is part of their water quality monitoring of streams, wells, and springs in the Edwards Aquifer region. Two spring sources in the San Marcos system (i.e., Hotel Spring and Deep Hole) and three springs in the Comal Springs system (i.e., Spring Run 1, Spring Run 3, and Spring Run 7) are sampled twice a year in conjunction with the EAHCP biological sampling program (i.e., spring and fall). These efforts include testing for a wide range of contaminants—such as nutrients, metals, volatile organic compounds, pesticides, and pharmaceuticals—alongside field measurements like pH, temperature, and dissolved oxygen.

Sediment and Fish Tissue Sampling

Sediment and fish tissue sampling occurs every other year during the EAHCP biological monitoring surveys. Sediment sampling occurs in even years and fish tissue sampling occurs in odd years.

Collection of sediment samples within each spring system helps determine the potential effects on EAHCP Covered Species via direct or indirect exposure to sediment contaminants. Sediment samples are collected from six locations in the San Marcos system and four locations in the Comal system (Figures 1 and 2). Sediment samples are analyzed for contaminants. The results of this analysis can be found in the annual reports.

Fish tissue sampling in each spring system serves as a direct link between water quality impairments and their potential effects on EAHCP Covered Species. Surrogate species are used to represent EAHCP Covered Species. In the San Marcos system, fish are collected in Spring Lake (i.e., upper section) and in the San Marcos River near IH35 (i.e., lower section). For the Comal system, fish are collected from Landa Lake (i.e., upper section) and in the Comal River near the last public takeout (i.e., lower section). Samples are analyzed for metals and contaminants. The results of this analysis can be found in the annual reports.

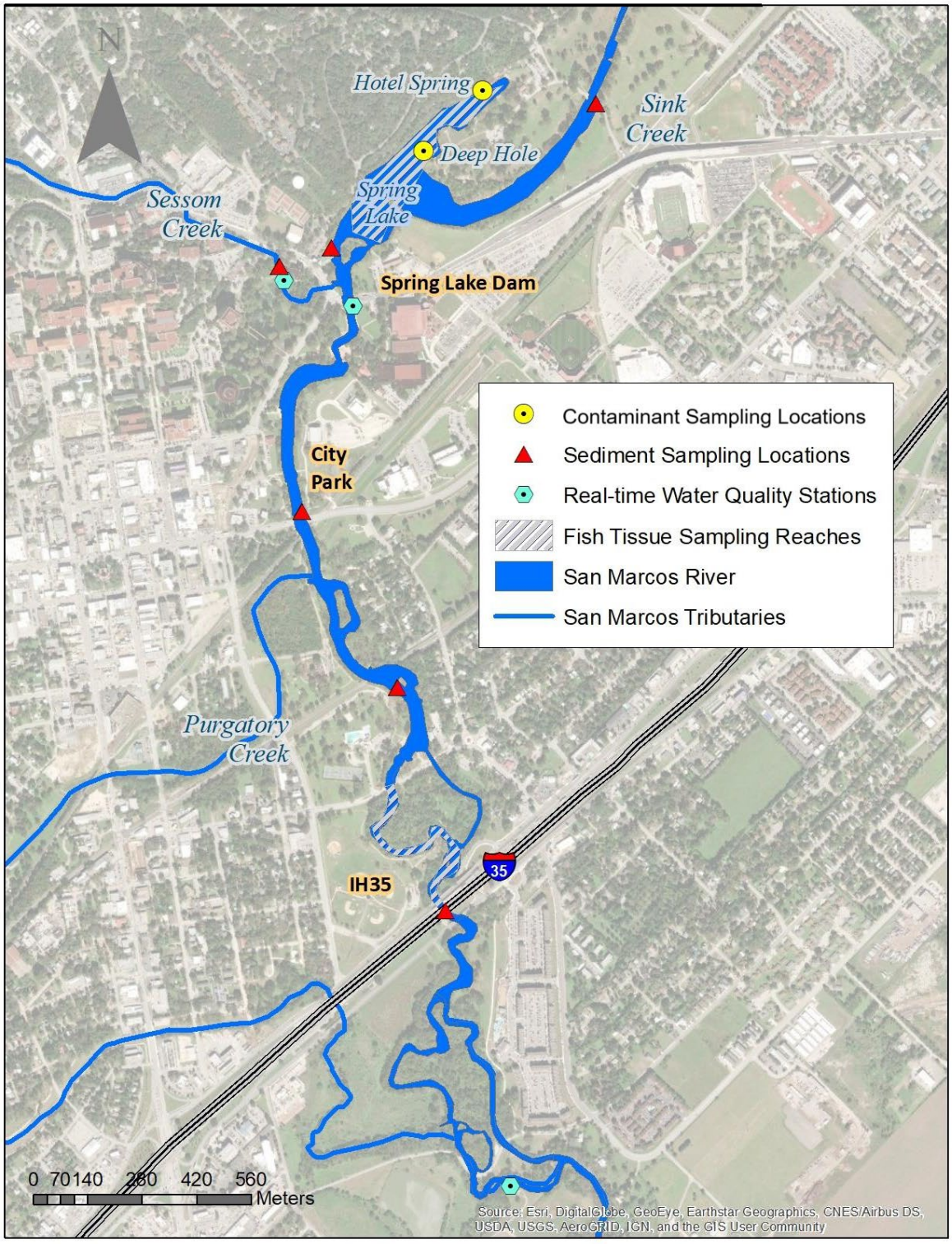

Figure 1. Current HCP Water Quality Sampling Locations in the San Marcos System.

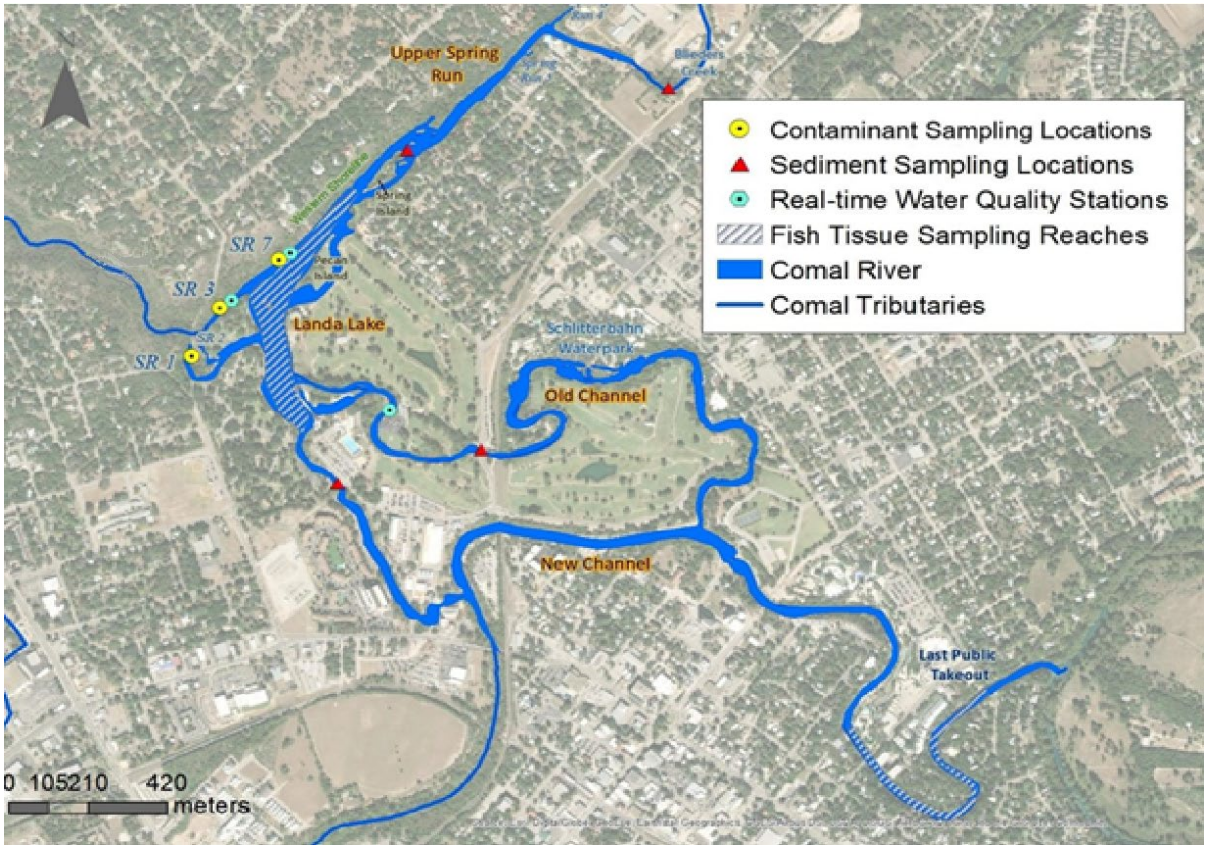

Figure 2. Current HCP Water Quality Sampling Locations in the Comal System.

2.1.2 Recreation

Recreational use of the Comal and San Marcos springs systems can degrade habitats critical to endangered and threatened aquatic species. Proposed Conservation Measures include managing recreational use to minimize or avoid impacts on Covered Species. To complement these efforts to manage public recreation, the EAHCP renewal is considering new monitoring of recreation patterns—such as location, activity type, frequency, and access point use—which could be analyzed alongside biological and hydrological data to assess potential species and habitat impacts. Adaptive management will be used as needed to address adverse effects, with potential responses including possible expansion of recreation management during low-flow conditions or when habitat quality declines.

The purpose of recreation monitoring is to identify priority areas where recreational activities may pose the greatest risk to sensitive native aquatic vegetation and open substrate areas, especially during low-flow conditions. By understanding the intensity and location of recreation, targeted protections could reduce impacts on critical habitat areas.

Recreation monitoring may include identifying ecologically sensitive locations, based on existing biological monitoring data (e.g., presence and density of Covered Species, submerged aquatic vegetation [SAV], hydrological data) and recreation access points in the Comal and San Marcos

systems, to assess seasonal use patterns and identify areas of overlap that may require enhanced monitoring and/or protection. In both these instances, ecological sensitivity and recreation access are susceptible to impacts from recreational disturbance depending on factors such as depth.

Permittees responsible for take coverage from recreation (cities of New Braunfels and San Marcos and Texas State University) have begun initial conversations to identify sources of monitoring data. Potential sources of monitoring data include, but are not limited to:

- Estimates of in-river recreation levels from tube outfitter records.
- Geospatial user density data from periodic drone-based surveys.
- Direct observational counts of river users at ecologically sensitive sites during ecologically sensitive times (e.g., low water levels).
- Visitor frequency data from automated counters at controlled recreation access points.
- Flow-dependent monitoring intensity and frequency schedules based on hydrological conditions.

Permittee discussions will continue to determine recreation monitoring data that can be collected in a cost- and time-effective way. The monitoring data collected can be used to inform the development of a proactive, flow-triggered recreation access control protocol when flows fall below a certain level. This may include restricting recreation access to high-risk areas during low flows.

2.1.3 Biological and Species-Specific Sampling

Over the course of the EAHCP, the biological and species-specific sampling program has undergone several formal and informal reviews. These reviews were conducted by EAHCP staff, the National Academy of Sciences, the EAHCP Science Committee, and the EAHCP Biological and Water Quality Work Groups. Following each review, the sampling program was revised, as needed. The updates proposed herein will continue to enhance the sampling program and reflect the revised Conservation Strategy considered in the permit renewal.[1]

Sampling Components

The EAHCP biological sampling program has sampling components focused on the Biological Objectives from the Conservation Strategy for each Covered Species.

The sampling components related to the Covered Species are as follows:

- SAV mapping including Texas wild-rice (*Zizania texana*)
- Fountain darter (*Etheostoma fonticola*) sampling (drop-nets and dip nets)
- San Marcos salamander (*Eurycea nana*) sampling (SCUBA and snorkel)

[1] The Biological Goals and Objectives memo is available here: https://www.eahcprenewal.org/wp-content/uploads/2024/04/PREAHCP-Biological-Goals-and-Objectives-Memo.pdf. The Conservation Measures memo is available here: https://www.eahcprenewal.org/wp-content/uploads/2025/05/EAHCP-Permit-Renewal-Conservation-Measures-Memo.pdf.

- Comal Springs riffle beetle (*Heterelmis comalensis*) sampling (cotton lure)
- Comal Springs dryopid beetle (*Stygoparnus comalensis*) sampling (wooden disc)
- Peck's cave amphipod (*Stygobromus pecki*) and Edwards Aquifer diving beetle (*Haideoporus texanus*) sampling (drift net sampling over spring orifices)
- Water quality and continuous water temperature data collection
- Gill parasite evaluations for fountain darter
- Fish community sampling
- Rapid benthic macroinvertebrate community sampling

The biological sampling program also includes collection of community data to provide an analysis of the whole ecosystem. The following subsections provide an overview of the study locations and comprehensive and critical period biological monitoring strategies for the Covered Species' ecosystems.

Sampling Locations and Strategies

San Marcos System

The annual sampling locations for the San Marcos system were designed to cover the extent of Covered Species habitats and allow for holistic ecological interpretation, while maximizing resources for monitoring. More detailed descriptions of the sampling methodologies, frequencies, and maps of reaches and sampling locations are found in the EAHCP Annual Reports. Comprehensive biological sampling within the San Marcos system varies temporally and spatially among Covered Species. The proposed sampling strategy includes five spatial scales (Table 3).

Table 3. Spatial Scale and Timing of Biological Sampling Components for the San Marcos System

Sampling Component	Spatial Scale	Timing
Submerged aquatic vegetation mapping, including Texas wild-rice	System-wide sampling	Annually—Spring
	Reach sampling	Annually—Spring and Fall
	Spring Lake	Every 5 years
Data on impacts on Covered Species when springflow decreases below 80 cubic feet per second	System-wide sampling	Flow-dependent
Fountain darter sampling	Reach sampling	Annually—Spring and Fall
	River section/segment	Annually—Spring
San Marcos salamander sampling	Springs sampling	Annually—Spring
Comal Springs riffle beetle sampling	Springs sampling	Annually—Spring
Fish community sampling	River section/segment	Annually—Spring
Macroinvertebrate community sampling	River section/segment	Annually—Spring

Sampling Component	Spatial Scale	Timing
Water temperature monitoring	Select longitudinal locations	Year-round

Critical period and low-flow sampling for a subset of the components would be conducted when total system discharge declines below 80 cubic feet per second (cfs). These sampling components are discussed further in the *Adaptive Management* section below.

Comal System

Based on the Biological Goals and Objectives, Conservation Measures, and management objectives outlined in the EAHCP, study areas in the Comal Springs system were established to continue long-term monitoring and quantify population trends of the Covered Species. The sampling locations selected are designed to cover the entire extent of Covered Species habitats to allow for holistic ecological interpretation. More detailed descriptions of the sampling methodologies, frequencies, and maps of reaches and sampling locations are found in the EAHCP Biological Monitoring Program Annual Reports (e.g., BIO-WEST 2025a, 2025b). Comprehensive sampling within the Comal Springs system varies temporally and spatially among Covered Species. The proposed sampling strategy includes five spatial scales (Table 4).

Table 4. Spatial Scale and Timing of Biological Sampling Components for the Comal System

Sampling Component	Spatial Scale	Timing
Submerged aquatic vegetation mapping	System-wide sampling	Annually—Spring
	Reach sampling	Annually—Spring and Fall
Data on impacts on Covered Species when springflow decreases below 80 cubic feet per second	System-wide sampling	Flow-dependent
Fountain darter sampling	Reach sampling	Annually—Spring and Fall
	River section/segment	Annually—Spring
Endangered Comal invertebrate sampling	Springs sampling	Annually—Spring
Gill parasite monitoring	River section/segment	Annually—Summer
Fish community sampling	River section/segment	Annually—Spring
Macroinvertebrate community sampling	River section/segment	Annually—Spring
Water temperature monitoring	Select longitudinal locations	Year-round
Discharge measurements (in addition to U.S. Geological Survey gage data)	Select longitudinal locations	Annually—Spring and Fall

Critical period and low-flow sampling for a subset of the components would be conducted when total system discharge declines below 80 cfs. These sampling components are discussed further in the *Adaptive Management* section below.

2.2 Effectiveness Monitoring

Effectiveness monitoring helps ensure the Conservation Strategy is delivering the intended results. The biological and species-specific sampling data described above, as well as information on minimization and mitigation measures, is compiled for the effectiveness monitoring evaluation.

The biological sampling described above is intended to provide information to determine the extent to which Conservation Measures are making progress towards the Biological Goals and Objectives set forth in the EAHCP. The results of this monitoring evaluation will be included in the Annual Reports to help USFWS fulfill its responsibility to monitor the implementation and success of the HCP. The underlying hypothesis is that a Conservation Measure is effective if it demonstrates progress towards meeting one or more Biological Objectives and we expect that the Biological Objective will be met by the stated deadline (either a specific implementation year or by the end of the new permit term). Table 5 highlights the biological sampling components that will be used to evaluate whether the Conservation Measures are effectively making progress towards achieving the Biological Objectives for the Covered Species.

Table 5. Summary Biological Sampling Components Related to Biological Objectives

Sampling Component	Biological Objective
Submerged aquatic vegetation mapping including Texas wild-rice	Objective 5.1. Texas wild-rice system-wide areal coverage Objective 5.2. Texas wild-rice reach-specific areal coverage Objective 6.5. Comal SAV Areal Coverage Objective 6.6. San Marcos SAV Areal Coverage
Fountain darter sampling	Objective 6.1. Comal fountain darter density Objective 6.2. San Marcos fountain darter density Objective 6.3. Comal fountain darter recruitment Objective 6.4. San Marcos fountain darter recruitment
San Marcos salamander sampling	Objective 4.1. San Marcos salamander habitat
Comal Springs riffle beetle sampling	Objective 3.1. CSRB relative abundance Objective 3.2. CSRB beetle occurrence
Comal Springs dryopid beetle sampling	Objective 1.5. Comal water quality Objective 1.6. San Marcos water quality
Peck's cave amphipod	Objective 1.5. Comal water quality Objective 1.6. San Marcos water quality
Water quality and continuous water temperature monitoring	Objective 1.5. Comal water quality Objective 1.6. San Marcos water quality
Gill parasite evaluations for fountain darter	Goal 6. Fountain darter population

2.3 Compliance Monitoring

The compliance monitoring process for the permit renewal will continue to consist of the collection of data that demonstrates the Permittees' compliance with the terms and conditions of the ITP. Compliance monitoring will continue to provide a public record accessible to all participants, the

public, and USFWS to demonstrate the Permittees' compliance with the terms and conditions of the ITP and HCP. The intention of the compliance monitoring is to ensure that the HCP is fully functioning during the term of the ITP.

2.3.1 EAA Hydrological Data Collection

The EAA will continue its comprehensive hydrological data collection within the EAHCP Plan Area to accurately measure and report groundwater levels and springflow. The EAA will use this information for the purpose of guiding the springflow protection measures in the EAHCP, including forbearance triggers, Critical Period Management, and San Antonio Water System (SAWS) Aquifer Storage and Recovery (ASR), and water conservation. The EAA will publish this information in each Annual Report, available on their website. There are no proposed changes to this hydrological data collection for the permit renewal.

2.3.2 U.S. Geological Survey/EAA Recharge Data Collection

In coordination with the U.S. Geological Survey, the EAA will continue to report the amount of water (in acre-feet) recharging the Edwards Aquifer in the Plan Area. The EAA will publish this measurement on its website, no later than April 30 of each year. This information will be used for the purposes of guiding the springflow protection measures in the EAHCP, including forbearance triggers, Critical Period Management, and SAWS ASR and water conservation. The EAA will maintain and publish this information on an on-going basis in each Annual Report. There are no proposed changes to this recharge monitoring for the permit renewal.

2.3.3 Incidental Take Assessment

Compliance monitoring includes reporting on the annual incidental take assessment. The incidental take assessment involves using specific components of the biological monitoring program to perform this analysis. The biological monitoring components include SAV mapping (both annual full-system and spring and fall in the Long-Term Biological Goals), water temperature data collected via thermistors, and wetted area losses (when they occur) for Comal invertebrates. Additionally, the annual incidental take assessment methodology includes mapping the footprint of impact for any in-water Conservation Measures that occur in a given year. That footprint is then overlaid on Covered Species occupied habitat and calculated in square meters of occupied habitat affected.

2.3.4 Measures that Contribute to Recovery

Additional Conservation Measures are included in the EAHCP to contribute to the recovery of the Covered Species. Measures that Contribute to Recovery go beyond the requirement of minimizing and mitigating impacts from Covered Activities to the maximum extent practicable, and include measures that contribute to the likelihood of downlisting and delisting Covered Species. Strategies within the proposed measures align with a technical review of the USFWS's recommended recovery actions from the Final Recovery Plan for the Southern Edwards Aquifer Springs and Associated Aquatic Ecosystems, Second Revision (U.S. Fish & Wildlife Service 2025) and the Renewed EAHCP's Biological Goal 7. This goal 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." These measures are not tied directly to Biological Objectives for Covered Species and therefore do not have measurable targets for effectiveness monitoring. The annual reporting will describe the implementation of these measures. These additional protective measures are designated as contributing to recovery and will be assessed by whether they were implemented in compliance with the EAHCP.

2.3.5 Monitoring Reports

The Annual Reports will describe data collected that demonstrates compliance with the terms and conditions of the ITP, in the context of additional relevant monitoring data. Additional monitoring data includes compliance data from the Texas Commission on Environmental Quality, Texas Pollution Discharge Elimination System dry weather field screening program, best management practice treatment capabilities, and compliance data from the Texas Surface Water Quality Standards. The Annual Reports will also describe the implementation of measures that contribute to recovery, as described in the EAHCP.

The Annual Report will summarize the monitoring data and assess the effectiveness of the Conservation Measures outlined in Table 6.

Table 6. Covered Species, Conservation Measures, and Monitoring Components

Covered Species	EAHCP Conservation Measure	Specific Sampling Components
All Covered Species (surface-dwelling and aquifer)	*Springflow Protection Measures*	Springflow; discharge transects, SAV mapping (habitat) and species and community sampling; real-time water temperature and surface and groundwater sampling.
Surface-dwelling species (fountain darter, San Marcos salamander, Comal invertebrates)	*Flow-split Management* (Comal—Old Channel San Marcos—Eastern Spillway), *Surface Water Diversions*	Springflow; discharge transects, SAV mapping (habitat) and species and community sampling; real-time water temperature and surface and groundwater sampling.
Fountain darter	*Aquatic Vegetation Management*	SAV mapping (habitat) and species and community sampling.
Texas wild-rice	*Aquatic Vegetation Management*	SAV mapping
Fountain darter and Texas wild-rice	*Floating Vegetation Management*	SAV mapping
Surface-dwelling species	*Recreation Management, Litter Management*	SAV mapping; water quality sampling
Fountain darter	*Non-native Animal Species Management*	Fish community sampling; macroinvertebrate community sampling
Fountain darter and Comal invertebrates	*Riparian Zone Management*	SAV mapping (habitat) and species and community sampling; water temperature.
Surface-dwelling species	*Sediment Accumulation Management*	SAV mapping; water quality sampling; macroinvertebrate community sampling; San Marcos salamander sampling.

The Annual Reports will continue to be prepared and submitted to USFWS for review and comment. Final Annual Reports will be posted on the EAHCP website for public access.

3. Adaptive Management

The section first provides background and context for adaptive management in HCPs and then provides an overview of the proposed adaptive management framework for the EAHCP renewal.

3.1 Background and Context

Chapter 6 of the existing EAHCP describes the existing adaptive management program. This description incorporates by reference the Adaptive Management Program found in Article 7 of the Funding and Management Agreement (FMA), which is included in its entirety as an appendix to the EAHCP. The FMA includes detailed requirements, both procedural and substantive, that the Permittees have imposed on themselves to ensure clear and smooth implementation of the EAHCP, including detailed procedures for making all adaptive management decisions. All EAHCP operating documents, including the FMA, will be revised as needed as part of the EAHCP renewal process.

Because the FMA is an appendix to the EAHCP and is incorporated into the EAHCP itself (see EAHCP page 9-2), it is part of the plan and the permit requirements. These detailed protocols and procedures cannot be easily adjusted over time, and they are tied to compliance with the ITP terms and conditions. ICF recommended in the 2020 *Edwards Aquifer Habitat Conservation Plan Permit Options Report* that many of the detailed requirements of the FMA should be removed from the HCP itself (ICF 2020). In addition, ICF recommended that the elements of the FMA needed for permit issuance, including adaptive management, should be incorporated into the relevant HCP chapters.

To facilitate separating the FMA from the EAHCP, this memo proposes an adaptive management framework that incorporates certain elements of the FMA adaptive management into the EAHCP itself. It also proposes certain changes to the existing Adaptive Management Process, summarized in the table below. Additional detail on processes for decisions made during implementation of the EAHCP and the roles of the Permittees, Science Committee, and Stakeholder Committee will be described in the *Implementation* chapter of the EAHCP.

Table 7. Proposed Changes to the Adaptive Management Framework

Existing Adaptive Management Component	Proposed Change	Rationale
Routine Adaptive Management	Change name to "Routine Adjustments" to differentiate it from the adaptive management decision framework.	Routine adjustments are needed to address a variety of day-to-day decisions to use in implementing the EAHCP that do not require an adaptive management decision framework, so long as they remain consistent with the EAHCP and ITP, and any applicable operating agreements amongst the Permittees.

Existing Adaptive Management Component	Proposed Change	Rationale
Strategic Adaptive Management	Replaced Strategic Adaptive Management with Adaptive Management.	Strategic Adaptive Management was included in the existing EAHCP in relation to the selection of Phase II Conservation Measures (the existing EAHCP permit term was divided into Phase I and Phase II). Phasing of the renewed permit term is not proposed—adaptive management would be continually on-going—so this type of adaptive management process is not needed. Please see text below for a detailed explanation.
Implementing Committee	Change the final approval body for the adaptive management framework from the Implementing Committee (Permittees plus non-voting member Guadalupe-Blanco River Authority [GBRA]) to the Permittees only.	The Implementing Committee includes the Permittees and GBRA as the only non-voting member, a decision that was born out of the Edwards Aquifer Recovery Implementation Program process. There is no need to include GBRA as a non-voting member of the decision-making body for the EAHCP, given it is not a co-Permittee.
Science Committee	Clarify that the Program Manager or the Permittees have the discretion of consulting the Science Committee on adaptive management decisions.	Depending on the complexity of the adaptive management decision, convening the Science Committee to review an adaptive management proposal may not be necessary. As such, the Program Manager or the Permittees will make this determination, or the Permittees can direct the Program Manager to consult the Science Committee.
Stakeholder Committee	Clarify that the Program Manager or the Permittees have the discretion of consulting the Stakeholder Committee on adaptive management decisions.	Stakeholder committee review and approval of adaptive management proposals is not necessary to make adaptive management decisions based on their scientific merits and the considerations of permit compliance for the Permittees. A mandated review and approval process by the Stakeholder Committee creates inefficiencies in the process for making adaptive management decisions, making the program less nimble for achieving the Conservation Strategy. As such, the Program Manager or the Permittees will determine whether to consult the Stakeholder Committee, or the Permittees can direct the Program Manager to consult the Stakeholder Committee.

3.2 Proposed Adaptive Management Framework for Inclusion in the EAHCP

Adaptive management is a structured approach to decision-making in the face of uncertainty that makes use of the experience from management and monitoring results, in an embedded feedback loop of monitoring, evaluating, and adjusting management strategies, to ensure the long-term success of conservation efforts within the HCP. The kinds of uncertainties adaptive management is intended to address are related to causes and conditions affecting successful achievement of the HCP's Biological Goals and Objectives, in light of uncertainty in predicting future conditions for the Covered Species and their habitat.

Adaptive management is a key component of HCPs that allows for the incorporation of new information into conservation and mitigation measures during HCP implementation. This approach requires explicit and measurable objectives, and identifies what actions are to be taken and when they are to occur. The Adaptive Management Process is often represented as a cycle of *plan*, *do*, *monitor*, *learn,* and *adjust* (Webb et al. 2017). The following sections describe the two ways that Conservation Measures may be changed—routine adjustments and adaptive management decisions. These represent targeted efforts to address uncertainty and improve the effectiveness of Conservation Measures.

3.2.1 Routine Adjustments

Types of Routine Adjustments

Routine adjustments involve day-to-day matters related to the management and administration of the conservation and monitoring actions. Throughout the year, the Permittees will need to plan and implement simple adjustments to routine activities that are small in size or effect or that need to be implemented rapidly. To qualify as a routine adjustment, the change must not: (1) individually or cumulatively result in deviations from the requirements of the HCP or ITP (i.e., result in non-compliance); or (2) impede timely attainment of Biological Goals and Objectives. Routine adjustments are those that the EAHCP Permittees can make on their own without consulting an EAHCP committee or USFWS.

The following are examples of types of changes that are considered routine. However, this list does not encapsulate all routine adjustments that may occur during HCP implementation.

- Temporary modifications to sampling programs and/or Conservation Measure methods to best support the Covered Species and their habitats.
- Adjusting existing fences to protect the riparian zone and adjacent aquatic vegetation.
- Minor changes to sampling, monitoring, or restoration activities from what was described in the Annual Work Plans.
- Temporary modifications to the Refugia standing stock numbers when environmental conditions are stable.

Routine Adjustment Process

The process for making routine adjustments is outlined below. [***Note**: The detailed process for routine adjustments is most appropriately addressed in the operating agreements among the Permittees; a detailed description of routine adjustments, including specifying how certain decisions are made among the Permittees, is not appropriate to include in the HCP. This memo includes a more detailed description than what is likely to appear in the HCP to provide additional context to reviewers.*]

1. **Routine Adjustment Decisions Made by Permittees That Do Not Affect Other Permittees or Involve an Increase in the Annual Program Budget.** Permittees may make routine adjustment decisions that do not increase the annual budget or affect other Permittees. Permittees will inform the Program Manager of routine adjustment decisions.
2. **Decisions Made by the Program Manager.** The Program Manager has the authority to make routine adjustment decisions unless the decision:
    - Affects Permittee(s), or
    - Involves an increase in the annual program budget.
3. **Decisions Affecting Permittee(s).** If a routine decision affects Permittee(s), the Program Manager must notify the Permittee(s) and seek their input and approval before proceeding.
4. **Decisions Involving an Increase in the Annual Program Budget.** Routine adjustments that increase the annual program budget must be reviewed and approved by the Permittees and the EAA Board of Directors.
5. **Use of Science in Decisions.** The Program Manager may consult with the Science Committee, at their discretion or at the direction of the Permittee(s), to advise on routine adjustments.
6. **Voting on Decisions.** Decisions on routine adjustments that require approval from the Permittees will be made by unanimous vote.
7. **Reporting and Dissemination.** Routine adjustments will be documented and summarized in each year's Annual Report. The Annual Report will be made public on the EAA's website and provided to USFWS.

3.2.2 Adaptive Management Changes

Types of Adaptive Management Changes

It may become clear from monitoring results or from new external scientific information that certain Conservation Measures need to be adjusted in substantial ways that go beyond the day-to-day routine adjustments. Adaptive management actions are intended to capture substantial changes to the HCP that are needed to achieve a Biological Objective in the event the Conservation Measures are not working as intended. For example, monitoring may reveal that Conservation Measures, despite many routine adjustments over several years, are not expected to meet a Biological Objective. Alternatively, new techniques may become available that have the potential to dramatically improve the performance of a Conservation Measure but are untested with the Covered

Species. Such substantial changes to Conservation Measures are considered adaptive management changes that must follow the adaptive management decision-making process described below.

Adaptive management changes may require several months to years to assess, plan, and implement. Adaptive management actions require clear objectives, success criteria, and implementation schedules. Examples of adaptive management decisions include, but are not limited to the following:

- Substantial modifications to or discontinuation of any Conservation Measure or Measure that Contributes to Recovery.
- Any substantial alteration to a Biological Goal or Objective.
- Substantially altering the methods of a Conservation Measure or monitoring action due to new technology.
- Substantial changes to the timeline of any Conservation Measure that delays its completion (acceleration of a timeline does not trigger the Adaptive Management Process).
- Reducing the monitoring frequency for any Conservation Measure.
- Implementing or declining to implement an additional Conservation Measure proposed by USFWS.

Adaptive Management Decision-Making Process

The process for adaptive management decisions is as follows:

1. **Submission of Proposals.** Any Permittee or the Program Manager or USFWS may submit a proposal for an adaptive management change, which must include supporting documentation and a justification. Members of the Science Committee, Stakeholder Committee, or general public may submit proposals through a Permittee or the Program Manager.
2. **Committee Review.** The Program Manager may submit the proposal to the Science Committee and/or Stakeholder Committee for review and comment. The Science Committee evaluates the scientific basis, feasibility, and implications of the proposal and creates a written recommendation. If the Program Manager elects not to submit the proposal for review and comment, a Permittee may direct the Program Manager to submit the proposal to the Science Committee and/or Stakeholder Committee for review and comment.
3. **Decision by the Permittees.** The Program Manager sends the proposal, along with any recommendations from the Science Committee and/or Stakeholder Committee, to the Permittees. The Permittees may approve the proposal or disapprove the proposal and direct the Program Manager to document a written explanation of the approval or disapproval. A unanimous vote by Permittees is required to move forward with any proposed adaptive management change.
4. **USFWS Concurrence.** Upon approval by the Permittees, the Program Manager will submit, in writing, the proposed adaptive management change to USFWS for review and concurrence. If USFWS concurs with the decision in writing, the Program Manager will implement the change. Should USFWS suggest substantive modifications to the proposal, the Program Manager will ensure that the modifications are justified by USFWS through written correspondence. The

Program Manager will then provide the suggested modifications from USFWS to the Permittees. If the Permittees concur with USFWS suggested modifications, the Program Manager will implement the modified changes. If the Permittees do not concur unanimously with USFWS' suggested modifications, the Program Manager will implement the proposed changes as already approved by the Permittees (without modification) and notify USFWS with explanation. [*Note: In any case where an adaptive management decision results in a change that would warrant a permit amendment, additional procedural steps would be necessary to complete the amendment. The implementation chapter of the renewed EAHCP will address the process for permit amendments, but that is outside the scope of this memo.*]

Key Considerations for the Adaptive Management Process

Several key considerations for the Adaptive Management Process were identified while considering changes to Conservation Measures as part of the permit renewal. These key considerations are listed below and will be addressed in the adaptive management framework included in the revised EAHCP. New key considerations for the Adaptive Management Process could also be identified in developing the renewed EAHCP chapters and during EAHCP implementation by the Permittees or USFWS, when effectiveness monitoring yields unexpected results or when status and trend monitoring show a response by Covered Species that is not well understood. These considerations would also be addressed through the Adaptive Management Process described above.

Springflow Discharge

Springflow discharge that may occur during the renewed permit term is a key consideration, as it is the most important factor affecting Covered Species habitat. Modeling efforts to predict springflow need to consider multiple complex natural processes that are subject to multiple layers of uncertainty. Springflow discharge considerations include:

- Future temperature and precipitation
- Edwards Aquifer recharge characteristics
- Inter-formational flow (e.g., Trinity Aquifer levels and inter-formational connections)
- The relationship between recharge and springflow discharge volume
- The effectiveness of springflow protection measures
- Land use and land cover over the contributing drainage area and recharge zone

By the end of the 15th year of the new permit term, the Permittees will update the springflow projection analysis, in light of updated information regarding all of these considerations. If results of the updated analysis indicate that springflow protection measures should be changed to achieve the EAHCP Conservation Strategy, the changes will be considered through the Adaptive Management Process described above to determine the necessary changes. Any adaptive management changes made will be subject to the No Surprises assurances provided by the ITP, which assures HCP Permittees that if the plan is properly implemented, they will not be required to commit additional land, water, or financial resources beyond those agreed upon, even if unforeseen circumstances affect Covered Species or their habitats.

Species Responses to Low Springflow Discharges

It is critically important to accurately define dynamic ecosystem conditions prior to the onset of a limited recharge period to assess potential threats to Covered Species during an extended period under those conditions. Biological monitoring during a period of declining total system discharge will allow examination of species statuses and habitat conditions when flow declines to or below projected levels of concern.

To accurately consider the response of Covered Species to low-flow conditions, the Permittees will initiate additional biological and species-specific sampling (e.g., winter and summer, in addition to spring and fall) when discharge goes below 80 cfs in each system. This adaptive management response trigger is based on existing biological data with 80 cfs being an inflection point of biological relevance with increased habitat impacts. The additional sampling will focus on habitat levels and density parameters outlined in the Biological Objectives. The focus will be on the surface-dwelling Covered Species, including the fountain darter, San Marcos salamander, Texas wild-rice, and Comal invertebrates. The monitoring will involve increased SAV mapping, dipnetting for size-class and density information, and lure (cotton and/or wood) for the Comal invertebrates. A key factor of this sampling will be to limit additional disturbance as much as possible, while still collecting the necessary data to inform adaptive management decision-making. If results of the low-flow monitoring data indicate a potential increase in the level of expected take or that the Conservation Measures should be changed to achieve the EAHCP's Conservation Strategy, the changes will be considered through the Adaptive Management Decision-Making Process described above to determine the necessary changes.

Effects from Recreation on Covered Species Habitat under Low-Flow Conditions

Recreational activity in the Comal and San Marcos springs systems is anticipated to increase over the proposed Permit Term. Comments for Consideration identified in the Conservation Measures Subcommittee report include the need to gather quantitative data to better understand the effectiveness of Conservation Measures, both in their feasibility (i.e., is the recreation control method actually performing as intended) and in the effects on Covered Species (i.e., is recreational control resulting in the anticipated response from Covered Species or their habitat). Gathering quantitative data on the direct and indirect impacts on Covered Species habitat from recreation activities would inform future avoidance and minimization measures, including recreation management enforcement strategies. It would also allow for evaluation of the take assessment assumptions addressing impacts from recreation.

System-wide SAV mapping is proposed to occur every spring under the renewed EAHCP (Table 4). This system-wide mapping, along with relevant seasonal reach sampling, will help identify areas where recreational activities are adversely affecting species habitat. As noted above in *General Condition Monitoring*, subsection *Recreation,* Permittee discussions will continue to determine recreation monitoring data that can be collected in a cost- and time-effective way. The monitoring data collected can be used to inform routine adjustments or adaptive management decisions to implement additional recreation management actions, as necessary.

Aquatic Vegetation Management Outside of Long-Term Biological Goal and Restoration Reaches

Biological monitoring has occurred within the Long-Term Biological Goal and restoration reaches under the existing EAHCP, providing status and trend data on Covered Species habitat in these areas. System-wide SAV mapping is proposed to occur annually under the renewed EAHCP (Table 4). This mapping, along with relevant seasonal reach sampling, will help inform routine adjustments or adaptive management decisions. To ensure cost effectiveness and alignment with the Conservation Strategy, any changes to aquatic vegetation management activities covered by the EAHCP, including but not limited to conducting vegetation management activities outside of Long-Term Biological Goal and restoration reaches, should be considered through the routine adjustment or adaptive management decision processes.

4. Applied Research

The Permittees may implement applied research projects to support the Adaptive Management Process. For example, applied research projects could address key uncertainties that are identified during EAHCP implementation or other topics that are critical to the success of the EAHCP's Conservation Strategy, such as the following:

- The health and amount of suitable aquatic habitat for the Covered Species under varying environmental and anthropogenic conditions to improve the monitoring protocol.
- Develop system-wide conceptual models that examine the efficacy of and potential improvements to Conservation Measures.
- Studies examining environmental change across the region and its potential impact on the Covered Species.

Applied research projects will be authorized through the annual Work Plan or Work Plan amendments, if needed, approved by the Permittees via unanimous vote.

5. Literature Cited

BIO-WEST. 2025a. Habitat Conservation Plan Biological Monitoring Program. Comal Springs/River Aquatic Ecosystem 2024 Annual Report. Prepared for Edwards Aquifer Authority.

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Appendix 1: Comment Matrix, Monitoring and Adaptive Management Memo

ID	Page	Line	Comment	Commentor	Status / Response
1	17	6	insert after "measures" the following: "that are proposed for inclusion"	EAA	Revised in previous version
2	17	6-7	strike "including water conservation,, Voluntary Irrigation Suspension Program Option (VISPO), San Antonio Water System (SAWS) Aquifer Storage and Recovery (ASR), and Critical Period Management."	EAA	Revised
3	17	15	insert after "measures" the following: "that are proposed for inclusion"	EAA	Revised in previous version
4	17	15-16	strike "including water conservation,, VISPO, and SAWS ASR."	EAA	Revised
5	17	20	insert after "assessment" the following: "separately for each Covered Activity of each permittee"	EAA	Not revised
6	17	20	Insert before "The" the following: "For the incidental take associated with the Covered Activity of withdrawals from the Aquifer,"	EAA	Not revised. This section is describing the incidental take assessment of all covered activities, not just the aquifer withdrawals.
7	17	27	Insert after "affected." the following: "The annual incidental take assessment protocols for the Covered Activities that are unrelated to Aquifer withdrawals are in development and will be described when available."	EAA	Not revised. This section is describing the incidental take assessment of all covered activities, not just the aquifer withdrawals.
8	17	32	"However, some of these recovery measures may also operate to mitigate the incidental take that is associated with Aquifer withdrawals."	EAA	Not revised.
9	17	34	strike "Draft Recovery Plan" and replace with the following: "Final Recovery Plan for the Southern Edwards Aquifer Springs and Associated Aquatic Ecosystems, Second Revision (May 2025)."	EAA	Revised
10	17	34	strike "and"	EAA	No change. Edit not needed
11	17	34	insert before "the" the following: "A technical review of each of"	EAA	Revised. Edited for flow.
12	17	34	insert after "7" the following: recommended action items will be undertake to determine if any of them contribute to the recovery of the Covered Species. These items"	EAA	No change. The biological goal 7 is not a recommended action, it is the goal decided on by the permittees.
13	17	34	strike ", which"	EAA	Revised
14	17	34	strike "seeks" and replace with "seek"	EAA	No change. Revised first part only.
15	18	1	insert after "measures" the following: "if any"	EAA	Not revised
16	18	1	strike "are"	EAA	Not revised
17	18	2	Insert before "designated" the following: "will be"	EAA	Not revised. The tense of the sentence should stay in the present.
18	18	2	insert the following after "recovery" the following: "if a technical showing is made for a specific identified action that properly fits within the scope of Biological Goal 7 that the action contributes to recovery."	EAA	Not revised. This section describes the measures that are included in the renewed EAHCP, not measures that might be included. The location to add this kind of qualifier is in the chapter on conservation measures.
19	18	2	strike "and"	EAA	Not revised. This section describes the measures that are included in the renewed EAHCP, not measures that might be included. The location to add this kind of qualifier is in the chapter on conservation measures.
20	18	2	insert before "will" the following: "Although no action is required to be taken under the EAHCP to implement any particular action under Biological Goal 7, if an action item is implemented, it"	EAA	Not revised. This section describes the measures that are included in the renewed EAHCP, not measures that might be included. The location to add this kind of qualifier is in the chapter on conservation measures.
21	18	3	strike "EAHCP" and replace with: "the parameters identified in the technical memo that demonstrates that the action contributes to recovery."	EAA	Not revised. This section describes the measures that are included in the renewed EAHCP, not measures that might be included. The location to add this kind of qualifier is in the chapter on conservation measures.
22	20	IC box	strike "Permittees" and replace with "Permittee"	EAA	Not revised. The IC includes multiple permittees
23	20	IC box	insert after "Permittee" the following: "for the which the adaptive management is being performed. If another Permittee can demonstrate that the Permittee is prejudiced by the adaptive management, then the approval of the protesting Permittee will also be required."	EAA	Not revised. There are multiple Permittees responsible for the adaptive management framework, not just one Permittee
24	20	IC box	strike "only"	EAA	Not revised. Needed for clarity
25	21	12	"Routine Adjustments" are not adaptive management. Recommend that this be extracted from the adaptive management section and become a stand alone administrative process that is authority separate and distinct from adaptive management.	EAA	Not revised. These routine adjustments are designed to be part of the adaptive management. We are open to alternate names
26	21	15	insert after "actions" the following: "that relate to the Covered Activity of Aquifer withdrawals, the minimization or mitigation of the effects of "take" thereof, and recovery measures that relate to the mitigation of the effects of "take" as a result of Aquifer withdrawals."	EAA	Not revised. These adjustments are not specific to the aquifer withdrawals
27	22	3	insert after "involves" the following: "an increase in"	EAA	Revised

28	22	5	strike "Permittees and the "	EAA	Not revised. All Permittees share the cost of implementing the EAHCP.
29	22	9	strike "Permittee and the Program Manager can agree the"	EAA	Revised
30	22	10-11	strike the last sentence	EAA	Revised
31	22	13	strike "Permittees" and replace with "the EAA Board of Directors"	EAA	Not revised. All Permittees share the cost of implementing the EAHCP.
32	22	16-17	strike this sentence	EAA	Not revised. Routine adjustment decisions that affect all Permittees require unanimous approval by all Permittees.
33	22	23	insert after "adjustments" the following: "that relate to the Covered Activity of Aquifer withdrawals, the minimization or mitigation of the effects of "take" thereof, and recovery measures that relate to the mitigation of the effects of "take" as a result of Aquifer withdrawals."	EAA	Not revised. These adjustments are not specific to the aquifer withdrawals
34	22	23-30	Strike the last sentence and bullets.	EAA	Not revised.
35	23	1	insert after "or" the following: ", if requested by a Permittee in writing,"	EAA	Not revised. The Program Manager can submit a proposal for adaptive management without being asked by a Permittee
36	23	5	insert after "review" the following: "and comment"	EAA	Revised
37	23	6	insert before "A" the following" "If the Program Manager elects to not submit the proposal for review and comment,"	EAA	Revised
38	23	7	strike "also"	EAA	Revised
39	23	11	insert after "Permittee" the following: "for information"	EAA	Revised
40	23	12-13	strike ")by any vote other than unanimous approval)"	EAA	Revised. Conflicts with last sentence.
41	23	14	insert after "the" the following" "approval or"	EAA	Revised
42	23	21	strike "Permittees" and replace with the following: "the Permittee for which the adaptive management is being performed."	EAA	Not revised. This section is not specific to adaptive management for one Permittee, but any kind of adaptive management
43	24	10	insert after "changes." the following: "However, any changes will be subject to No Surprises. In no event may any changes made as a result of the 15-year review require that any "springflow protection measure" in the EAHCP be increased in amount such that the total of all withdrawal reductions imposed on Aquifer users under the EAHCP are increased."	EAA	Revised to clarify that adaptive management changes are subject to No Surprises assurances. However, we did not add the additional requested clarification about not requiring additional withdrawal reductions. Unfortunately, that request cannot be part of the HCP. In addition, please note, the threshold at which additional changes can be required will be discussed in the Implementation chapter in relation to Changed Circumstances and Unforeseen Circumstances.
44	24	33	insert after "Term" the following: "It is acknowledged that the Covered Activity of withdrawals from the Aquifer and the Covered Activities not related to Aquifer withdrawals unrelated to recreation do not contribute to the incidental "take" of the Covered Species as a result of recreational activities in the Comal and San Marcos Spring systems. However,"	EAA	Not revised. This memo is about all covered activities, not just aquifer withdrawals
45	24	35	insert after "activities" the following: "."	EAA	Not revised. This sentence has been removed because the take assessment will separate out impacts from recreation from impacts from water withdrawals
46	24	35	strike "and"	EAA	Not revised. This sentence has been removed because the take assessment will separate out impacts from recreation from impacts from water withdrawals
47	24	35	insert before "effective" the following: "This was most likely to be because"	EAA	Not revised. This sentence has been removed because the take assessment will separate out impacts from recreation from impacts from water withdrawals
48	24	35	insert after "impacts" the following: "were thought at the time to be uncertain and that the uncertainty could not be resolved during the timeframe allowed for the development of the current EAHCP. Efforts are currently being undertaken to resolve e this uncertainty by conducting a "reasonably certain to occur" "take" assessment. If "take" is found to be reasonably certain to occur, an effects of "take" assessment will be undertaken to identify effective measures that will minimize any "take" resulting from recreational activities. However, in light of the acknowledgment made above, any such measures will not include "springflow protection measures" or actions to be taken by other permittees who are undertaking Covered Activities that are unrelated to Aquifer withdrawals and recreation."	EAA	Not revised. This sentence has been removed because the take assessment will separate out impacts from recreation from impacts from water withdrawals
49	25	4	This will also allow for the development of take assessment that isolates the effect of recreation on Covered Species to ensure that incidental "take" resulting from recreation is not assigned to Aquifer users and the other permittees when performing their Covered Activities that are unrelated to Aquifer withdrawals and recreation.	EAA	Not revised. Take assessment methods are going to separate out impacts from recreation and water withdrawals
50	25	23	insert after "projects" the following" "that relate to their respective Covered Activities and the minimization and mitigation measures related thereto"	EAA	Not revised. This covered activity is being changed- the EAHCP is authorizing the right to do research, but not the research itself

51	25	25	strike "EAHCP's"	EAA	Revised
52	25	25	insert after "Strategy" for that particular Covered Activity	EAA	Not revised. This memo is about all covered activities, not just aquifer withdrawals
53	25	32	insert before "Applied" the following: "If funding through EAA Aquifer Management Fees,"	EAA	Not revised.
54	25	33	strike "Permittees by unanimous vote" and replace with "EAA Board of Directors"	EAA	Not revised.
55	8	Figure 2	The Comal WQ sampling location map has tributaries mislabeled. Panther Canyon is labeled as Dry Comal Creek. Dry Comal Creek is the trib shown on the southern portion of map.	CoSM	Revised
56	8	4	Recommend revising the first sentence in the "Recreation" section to: Recreational use of the Comal and San Marcos River systems can degrade habitats…	CoSM	Revised
57	8	5	Recommend rephrasing sentence to state "Proposed Conservation Measures include managing recreational use of the San Marcos and Comal River systems to minimize or avoid impacts to Covered Species."	CoSM	Revised
58	8	9-10	Considered rephrasing to "Adaptive management may be used to address adverse effects, including the potential expansion of river recreation management measures during low-flow conditions…"	CoSM	Revised
59	20	Table 7	For Science committee - state "Clarify that the Program Manager or Permittee has the discretion of consulting the committee on adaptive mgmt decisions. This change would make it consistent w process out d on Pgs 22 and 23	CoSM	Removed Permittees from below.
60	20	Table 7	For Stakeholder committee - state "Clarify that the Program Manager or Permittee has the discretion of consulting the committee on adaptive mgmt decisions. This change would make it consistent w process out d on Pgs 22 and 23	CoSM	Removed Permittees from below.
61	22	25-28	Please better define actions or changes that may require a permit amendment.	CoSM	Revised to clarify. Triggers for permit amendments will be included in the chapter on implementation
62	23	4	Recommend changing "Committee Review. The Program Manager may…" to The Program Manager shall. The thought process is that any type of Adaptive Mgmt decision, as those examples provided in s 25-31 of Pg 22, should warrant SC and SH committee review.	CoSM	No change. Keep flexibility
63	24	6	I do appreciate the inclusion of the "springflow protection analysis" by the end of the 15th year of the permit term. That said, I would be more comfortable if language could be added for an expedited analysis if we fail to meet springflow objectives repeatedly, for longer durations or more drastically than anticipated or modeled.	CoSM	None of the modeling indicates flows lower than the minimum before 25 year of the permit term. In addition, critical period management and monitoring is part of the conservation strategy.
64	21	8	The overall gist of this section suggests that substantial budget adjustments, decisions affecting individual permittees, and changes to the annual program budget are “routine adjustments.” Is that the intent?	TXST	Yes, those are routine adjustments that require the Program Manager to seek approval by the Permittees and EAA Board of Directors. Note: we removed the "substantial budget adjustment." Any increase to the annual budget requires Permittee approval.
65	22	3	“substantial budget adjustment” is defined, but “significant changes to the budget” is not. If these are supposed to be the same, then use the same language. If they are supposed to be different, then define significant changes. The overall gist of this section suggests that substantial budget adjustments, decisions affecting individual permittees, and changes to the annual program budget are “routine adjustments.” Is that the intent?	TXST	Removed the "substantial budget adjustment." Any increase to the annual budget requires Permittee approval.
66	22	8	Change “input or approval” to “input and approval.” The “or” would allow the Program Manager to get input and then proceed without approval.	TXST	Revised to "and"
67	22	21	The examples here and above for routine decisions are helpful, but, as examples, who decides which unspecified decisions are routine, routine requiring a vote, or adaptive? Suggest adding a process for this.	TXST	We have revised to clarify the distinction between routine adjustments and adaptive management. The Program Manager determines whether a routine adjustment requires Permittee approval according to the three criteria under number 1 in the process. The Program Manager may choose to consult with the Science and/or Stakeholder Committees or the Permittees may direct them to do so.
68	23	4-5	Change “The Program Manager may submit the proposal to the Science Committee 4 and/or Stakeholder Committee for review.” to “The Program Manager shall submit the proposal to the Science Committee 4 and Stakeholder Committee for review.” Given the importance of the examples offered, the Stakeholder and Science committees would need to be involved.	TXST	Not revised.
69	23	10	In the spirit of the previous comment, change “and/or” to “and”.	TXST	Not revised.
70	23	37	Change “volume of springflow discharge” to “amount of springflow discharge.” Springflow discharge is a volumetric flux (volume per time) whereas volume is, well, volume.	TXST	Revised- removed volume
71	24	3	Change “Inter-formational recharge” to “Inter-formational flow”. Recharge occurs when percolating water crosses the water table and enters the saturated zone of the aquifer. I don’t believe that is what is being described here.	TXST	Revised

72	24	6-10	I appreciate the 15th-year review of springflow protections. Please specify what will happen in the 15 years before the review of springflow protection, namely (1) having a detailed, independent review of the science by a respected scientific review committee, (2) developing or adjusting science in response to that review, and (3) having those conclusions reviewed by the review committee. Add a paragraph that defines a process that requires, after a defined amount of time, changing conservation measures after springflows in either San Marcos or Comal springs fall below the lower limits identified in the HCP.	TXST	None of the modeling indicates flows lower than the minimum before 25 year of the permit term. In addition, critical period management and monitoring is part of the conservation strategy.
73	8	5	And threatened, e.g. San Marcos salamander.	TXST	Revised
74	8	5	Suggest replacing visitor with ‘recreational user’	TXST	Changed to managing recreational use
75	8	9	And water quality	TXST	No change.
76	8	9	Please add ‘species and habitats’ impacts	TXST	Revised
77	8	13	And open substrate areas (i.e. eastern spillway for San Marcos salamanders).	TXST	Revised
78	9	31-32	Will Spring Lake SAV still be every 5-years? Or annually as part of full-system?	TXST	Spring Lake SAV mapping will be every 5 years. Added this detail in Table 3
79	10	Table 3	Need to add Spring Lake if different from annual.	TXST	Spring Lake SAV mapping will be every 5 years. Added this detail in Table 3
80	20	Table 7	Re: AMP. This is the only instance of this acronym use in the document - suggest clarifying with other terminology used. If it is Adaptive Management proposal then AMP proposal is redundant, maybe just spell out since used only once.	TXST	Revised
81	21	12	I think at least 1-2 sentences in the above paragraph differentiating ‘routine adjustments’ and ‘adaptive management decisions’ would be helpful.	TXST	Revised
82	22	1-3	Need more clarification between bullet one and three.	TXST	Revised to clarify.
83	22	4-5	Include specific numbers , i.e. equal to or greater than $50,000	TXST	Revised
84	22	9-11	In the spirit of transparency, all permittees should at least be notified and have the opportunity to provide input	TXST	All Permittees will be made aware of decisions involving the annual program budget and must approve said decisions
85	22	12	I’m not sure I understand how this is different from a substantial budget adjustment? Needs clarification.	TXST	Removed the "substantial budget adjustment." Any increase to the annual budget requires Permittee approval.
86	22	14	The Permittees (and with optional input from the Stakeholder Committee) should make the decision as to whether the Science Committee should be consulted on a routine adjustment. This should not be the sole decision of the Program Manager.	TXST	Revised to clarify. Permittees may direct the Program Manager to consult with the Science Committee
87	22	18	And their decision making process (if it is going to be subjective and occasionally the sole decision of the Program Manager as inferred here), will be described in each year’s annual report.	TXST	Not revised. Routine Adjustments and Adaptive Management Changes will be reported in the Annual Report
88	23	4	Re: "may submit" Shall or will...whatever is preferred definitive language.	TXST	Not revised.
89	23	7-8	In instances where the proposal is submitted to the Science Committee for review, the Stakeholder Committee will be notified and will also have the opportunity to also provide input to the IC, though not required.	TXST	Not revised.
90	23	34	Re: "Adaptive Management Process." If this is going to be a formalized term, maybe make clearer note of that in the section above. And maybe ‘Routine Adjustments’ need their own formalized term as well to keep them distinct.	TXST	Revised
91	23	37-40	Edit to read: Springflow discharges that may occur during the renewed permit term are a key consideration, as they are the most important factor affecting Covered Species habitat. Modeling efforts to predict springflow need to consider multiple complex natural processes, that are subject to multiple layers of uncertainty. Springflow discharge considerations include:	TXST	Revised
92	24	7	It’s good to see this in here, but there also needs to be reconsideration if springflow discharges dec below the drought of record prior to the 15 year mark, or if spring flow objectives are not meant for multiple years in a row, ~2-3 years (?). Will the existing springflow projection modeling be evaluated by an external review process? Will be the external review process for the 15-year (or sooner, as I proposed, if necessary) modeling efforts?	TXST	None of the modeling indicates flows lower than the minimum before 25 year of the permit term. In addition, critical period management and monitoring is part of the conservation strategy.
93	24	18-20	Should frequency of sampling after flows dec below 80cfs be determined in evaluation with USFWS - who will make decision on how frequent the sampling/monitoring will occur at what discharges?	TXST	Revised to explain that additional sampling will occur (e.g., winter and summer, in addition to spring and fall). Please note, if flows are below 80 cfs, there will be conversations with USFWS but the EAHCP Permittees have the authority to make adaptive management decisions without consultation with USFWS.
94	24	30-31	Suggest use of ‘Adaptive Management Process’ for consistency.	TXST	Revised to Adaptive Management Decision-Making Process. The process to make a decision is different from the process to actually do adaptive management.
95	24	4	Add bullet point: Land use and land cover over the contributing drainage area and recharge zone	TXST	Revised

96		Table 7	Re: "As such, this determination can be made by the Program Manager." I'm not sure this has enough checks and balances, who determines the "complexity" of the adaptive management decision?	TXST	We appreciate your comments on this change. The Program Manager will determine the complexity. We are structuring this permit renewal so that the Permittees are the primary decision makers. Concerns should be communicated to the Permittees, so they can consider them in their decisions. Stakeholder and Science Committees will retain their role as advisors and either the Program Manager or Permittees may call on them to provide advice in adaptive management decisions.
97		Table 7	Stakeholders should still retain some input on adaptive management proposals. I can see removing the mandated approval process, but a an opportunity to provide input/feedback to Program Manager and IC should be included.	TXST	Not revised. We are structuring this permit renewal so that the Permittees are the primary decision makers. Concerns should be communicated to the Permittees, so they can consider them in their decisions. Stakeholder and Science Committees will retain their role as advisors and either the Program Manager or Permittees may call on them to advice in adaptive management decisions.
98	4	Table 2	Phrasing "Sampling occurs during fixed time periods (not flow related) on sub-annual basis" is unclear. Recommend replacing "sub-annual" with explicit frequency (e.g., "twice annually").	Science Committee	Changed to spring and fall
99	5	29	Sampling may miss episodic contaminant events. Recommend adding a contingency for event-driven (e.g., spill-response) sampling.	Science Committee	There is no restriction on spill driven sampling. This can occur, as needed. One-off events like this will be considered in Changed Circumstance of the HCP, not the adaptive management.
100	8	6	"Compliment" should be corrected to "complement" in the recreation monitoring section.	Science Committee	Revised
101	9	14	The draft describes outfitter data, drone surveys, and automated counters, but does not specify how these diverse data streams will be standardized or QA/QC'd. Without this, long-term comparability could be limited.	Science Committee	This is something in the HCP
102	19	Table 7	The distinction between "routine adjustments" and "adaptive management" remains vague. Clearer criteria are needed for when a change escalates from "routine" to "adaptive," as this could cause future disputes.	Science Committee	Additional detail about the distinction between routine adjustments and adaptive management has been added throughout the memo, to clarify the difference.
103	22	18	"Routine adjustments will be listed in each year's Annual Report" could be clarified to "documented and summarized" to strengthen accountability.	Science Committee	Revised
104	24	17	The 80 cfs low-flow trigger is appropriate, but "more frequent sampling" is too vague. Recommend specifying frequency (e.g., weekly vs. monthly) and minimum dataset requirements.	Science Committee	Revised language from more frequent to additional. E.g., winter and summer, in addition to the routine spring and fall
105	25	23	Applied research priorities are broadly defined. Recommend clarifying how topics will be selected (e.g., through Science Committee ranking) to prevent scope creep.	Science Committee	The purpose of these applied research activities is to improve the success of the conservation strategy. The types of research activities are intentionally broadly described.
106	global	global	Dr. Josh Perkin provided comments in the form of a letter. Key points are provided below.	Science Committee	
107	global	global	Although conceptual models for how the systems (San Marcos and Comal) operate have been developed for species such as the fountain darter (e.g., Mora et al. 2013) and Comal Springs riffle beetle (Cooke et al. 2015), I am not currently aware of an integrative, ecosystem-scale conceptual model for how components of spring flow and aquatic vegetation interact to affect the listed organisms that are the focus of monitoring. Perhaps this is a potential priority for future work under the renewed permit.	Science Committee	We appreciate your comments. This will be considered by the EAHCP team. However, there are no changes to the memo since it describes the general monitoring and adaptive management plans for the permit renewal.
108	global	global	I think there is perhaps room for improvement in the data analysis and data management realms. In my opinion, these areas for improvement under the renewed EAHCP are linked, including managing the data in an accessible way and integrating analytical methods that field estimates of population size that include uncertainty and can be interpreted in the context of biological goals. I view these as linked because if the data were stored in a way that is accessible to a broader audience, then the challenge of identifying methods for analyzing the data as I describe above could be shared with a broader array of practitioners (e.g., academia, statisticians). A central data repository where curated data are stored with effective metadata would open many avenues for exploring models that could be used to assess population sizes and trajectories for the covered species – models that link environmental correlates with demographic processes for the focal species to reveal underlying mechanisms that could then be used to make forecasts for population responses to management actions or environmental variability (e.g., Winemiller et al. 2024)	Science Committee	We appreciate your comments. This will be considered by the EAHCP team. However, there are no changes to the memo since it describes the general monitoring and adaptive management plans for the permit renewal.

109	global	global	I see a major need for integrating across datasets as a means for thinking closer to the ecosystem level. As an example, linking aquatic vegetation type and coverage to fountain darter abundance (e.g., Edwards and Bonner 2022) effectively links management practices such as non-native vegetation removal or native vegetation planting to listed species abundance, and could address the question of whether, and to what extent, vegetation management has cascading benefits for other covered species. This would require a deeper analytical treatment of the relationship between fountain darter demographic processes and vegetation changes, and I think the data exist for fitting hierarchical models (reviewed by Rozylowicz et al. 2024) that would provide deeper inference from the existing data, inference that could be directly tied to management actions	Science Committee	We appreciate your comments. This will be considered by the EAHCP team. However, there are no changes to the memo since it describes the general monitoring and adaptive management plans for the permit renewal.
110	global	global	Thus, my summary recommendations as a member of the science committee are stated as follows, with the intent of helping to improve the already excellent work being done to ensure the persistence of extraordinary and unique aquatic life in the San Marcos and Comal springs and river systems: 1. Can we communicate to a greater degree our conceptual understanding of how these systems work? 2. Can we manage data in a more transparent and wholistic way that might ultimately make the data more approachable and available for those that seek to analyze it, particularly among those with the shared goal of advancing the biomonitoring framework? 3. Can we develop statistical analyses that operate at the scale of population estimates (e.g., census sizes with uncertainty estimates) and are based on demographic processes that are themselves linked to environmental heterogeneity? 4. Can we use these newly developed statistical analyses to inform management now and into the future in the face of environmental and global change?	Science Committee	We appreciate your comments. This will be considered by the EAHCP team. However, there are no changes to the memo since it describes the general monitoring and adaptive management plans for the permit renewal.
111	20	Table 7	Science Committee/Program Manager Discretion/ Complexity is in the eyes of the beholder. Might be wise to have SC also determine AMP proposals. The extra redundancy ensures sound decisions	Science Committee	The authority to make adaptive management decisions will rest with the Permittees. The Program Manager and/or Permittees may request feedback from the Science and/or Stakeholder Committees on specific decisions. In addition, the Science and/or Stakeholder Committees may provide input directly to the Permittees, to inform their decisions.
112	23	4-8	Non routine AM decisions are critical and should be reviewed by the Science Committee. Edit Suggestion: The Program Manager shall submit the proposal to the Science Committee...	Science Committee	Not revised
113	5	Table 2	Recommend including language that would require sediment and fish tissue samples to be collected after events like chemical spills that may enter the aquifer.	TPWD	There is no restriction on spill driven sampling. This can occur, as needed. One-off events like this will be considered in Changed Circumstance of the HCP, not the adaptive management.
114	6	1 - 10	Recommend including language that would require sediment and fish tissue samples to be collected after events like chemical spills that may enter the aquifer.	TPWD	There is no restriction on spill driven sampling. This can occur, as needed. One-off events like this will be considered in Changed Circumstance of the HCP, not the adaptive management.
115	10	Table 3	Recommend sampling fish and macroinvertebrate communities during spring and summer months to monitor biota when the system is most stressed.	TPWD	No revision. We agree. That's why we have critical period and low flow monitoring. The biological monitoring in Tables 3 and 4 is intended to describe trends in the systems overall.
116	13	Table 4	Recommend sampling fish and macroinvertebrate communities during spring and summer months to monitor biota when the system is most stressed.	TPWD	No revision. We agree. That's why we have critical period and low flow monitoring. The biological monitoring in Tables 3 and 4 is intended to describe trends in the systems overall.
117	20	Table 7	TPWD urges caution in granting the Program Manager the discretion to make decisions that would affect adaptive management decisions without the review and approval of the Science or Stakeholder Committees.	TPWD	Noted
118	4	14	All of the listed roles for monitoring are essential, not just monitoring the condition of covered species and habitat, and this language should be revised to reflect that reality. That could be done by rephrasing as follows: will continue to be essential for: (1) monitoring …, (2) assessing ..., (3) assessing ..., (4) providing ..., (5) facilitating	Texas Living Waters	Revised
119	4	28	Insert "quality" between "water" and "impairments."	Texas Living Waters	Revised
120	4	Table 2	The term "subannual" as used in the surface and groundwater quality monitoring descriptions is unduly ambiguous. It is not at all clear what monitoring frequency is being proposed.	Texas Living Waters	Changed to spring and fall
121	5	2-3	If possible, it seems that it would be beneficial to add another measuring point to be used during periods of very low flows if/when sampling at Spring Run 3 in the Comal system or the Hotel Spring in the San Marcos system becomes infeasible.	Texas Living Waters	Not revised. No additional monitoring points shall be added. In the event of very low flows, the location of sampling may be moved slightly to an area that is wetted, to ensure data is collected. However, we will ensure the sampling locations are not significantly different, so that the data collected is comparable across the years.

122	5	4	Suggest adding "In addition," at the beginning of this to help distinguish from previous sentence. Also, the term "biannual" introduces substantial ambiguity. The term commonly is defined as meaning both twice per year and once every two years. Suggest substituting a clear statement of the proposed frequency instead.	Texas Living Waters	Revised to "Additionally,"
123	5	16	The term "biannual" introduces substantial ambiguity. The term commonly is defined as meaning both twice per year and once every two years. Suggest substituting a clear statement of the proposed frequency instead.	Texas Living Waters	Revised
124	5	20	The relationship between the Realtime Network, addressed here, and the Surface Water Quality monitoring addressed at s 1-10 is unclear. Some description of sampling parameters and frequency would be helpful. This discussion may fit more appropriately as part of the Surface Water Quality discussion instead of following the groundwater monitoring discussion, which introduces ambiguity about whether monitoring of surface water or groundwater is being addressed.	Texas Living Waters	Additional detail about the parameters will be added in the HCP. The Realtime Network monitoring section has been moved above the groundwater monitoring
125	5	24-27	The language indicating the locations of the real-time monitoring would be more clear if the word "including" was replaced in both locations with a ":". It appears that the three locations where monitoring will occur are being listed but the current language suggests that there might be additional locations.	Texas Living Waters	Revised
126	6	4	It would be helpful to include a reference to where information about parameters being monitored can be found.	Texas Living Waters	Revised to explain that the results of sediment analysis, including which contaminants are monitored, can be found in the annual reports
127	6	9	The reference to "both species" is unclear. What two species are being referenced?	Texas Living Waters	Revised
128	6	10	It would be helpful to include a reference to where information about parameters being monitored can be found.	Texas Living Waters	Revised to explain that the results of sediment analysis, including which contaminants are monitored, can be found in the annual reports
129	8	6	Suggest substituting "complement" for "compliment" because it seems more consistent with the intended meaning.	Texas Living Waters	Revised
130	8	9	Suggest rephrasing the reference to adaptive management to note that adaptive management "will be used, as needed," to address adverse effects. That commitment is appropriate, and needed, regardless of whether additional monitoring of effects of recreation are added.	Texas Living Waters	Revised
131	8	10	As currently drafted, potential recreational restrictions could be misunderstood as being characterized as adverse effects. Suggest rephrasing by inserting "with potential responses" between "effects," and "including."	Texas Living Waters	Revised
132	8	16	The sentence beginning here appears to be addressing potential recreation monitoring. To be more clear, suggest adding "Recreation" before monitoring at the beginning of the sentence.	Texas Living Waters	Revised
133	9	1	Suggesting adding a specific reference to "susceptibility to recreational disturbance because of factors such as depth" to the types of information to be considered.	Texas Living Waters	Revised
134	9	24	The second link in the footnote referenced here appears to be nonfunctional. In addition, the sentence beginning on this suggests a level of randomness in monitoring that fails to acknowledge the overall structure of the monitoring program. See FMA at Section 7.5. Suggest qualifying it a bit by noting something like: "Consistent with the overall monitoring plan, the scope of monitoring can be modified ...."	Texas Living Waters	Revised
135	10	3	Suggest adding some description of the sampling methodology.	Texas Living Waters	Revised
136	10	4	For consistency with other entries, suggest moving the word "sampling" to after the scientific name and adding some description of the sampling methodology.	Texas Living Waters	Revised
137	10	Table 3	For clarity, suggest adding "annually" for each monitoring effort that occurs every year. For example, for SAV system-wide sampling, suggest rephrasing as "Annually, in spring" and for SAV reach sampling: Annually, in spring and fall.	Texas Living Waters	Revised
138	12	Figure 3	It is unclear if the notes discussion, which appears just above the caption, is appropriate for inclusion. It does not appear to be relevant. At any rate, the current wording is a bit confusing in this context.	Texas Living Waters	All maps of thermistors have been removed. For specifics about thermistor stations please refer to annual workplan and report
139	13	6	The phrase "while maximizing resources for monitoring" is a bit ambiguous. It would be helpful to clarify the goal a bit. Is it to maximize efficiency in the use of resources available for monitoring, to maximize resources used for monitoring, or to maximize something else?	Texas Living Waters	Removed
140	13	Table 4	As noted above regarding Table 3, suggest some clarification: For example, for SAV system-wide sampling, suggest rephrasing as "Annually, in spring" and for SAV reach sampling: Annually, in spring and fall. Also, for discharge measurements, presumably the reference here is to measurements other than those taken at the USGS monitoring stations on an ongoing basis. Accordingly, suggest adding that clarification. Finally, suggest adding language consistent with that appearing below Table 3 (page 11, s 1-3) referencing the addition of critical period and low-flow sampling.	Texas Living Waters	Revised
141	14	Figure 4	It is unclear if the notes discussion, which appears just above the caption, is appropriate for inclusion. It does not appear to be relevant. At any rate, the current wording is confusing in this context. There does not appear to be a reference in the Figure to M9 nor does there appear to be a reference in the Figure to USGS gage 08168710.	Texas Living Waters	Removed

142	15	Figure 5	A large portion of the Old Channel is located downstream of the single indicated Thermistor location in that channel. Particularly, given the potential for water diversions from the Old Channel to occur at locations downstream of that single Thermistor, that is surprising and merits reconsideration. With only that single location, there does not appear to be a mechanism for measuring compliance with Objective 1.5 for the large portion of the Old Channel located downstream of that Thermistor. The Thermistor located in the New Channel just below the confluence is not likely to accurately characterize conditions in the Old Channel. Again, the Notes discussion appearing above the caption appears to introduce unnecessary ambiguity.	Texas Living Waters	All maps of thermistors have been removed. For specifics about thermistor stations please refer to annual workplan and report
143	16	6	It seems more accurate to characterize the monitoring as providing information about the extent of progress towards meeting Goals and Objectives rather than just about whether progress is being made. Accordingly, suggest rephrasing more like the following: to provide information on the extent of progress being made through implementation of the Conservation Measures towards achieving the Biological Goals and Objectives....	Texas Living Waters	Revised
144	16	9	Seems like the basic premise should encompass some recognition of the need for significant or meaningful progress towards achieving the objectives rather than just progress. Suggest incorporating a qualifier of that type: e.g., demonstrates substantial progress in achieving Biological Objectives.	Texas Living Waters	We agree. Text updated to acknowledge that a conservation measure is assumed to be effective if 1) progress is being made towards meeting a biological objective and 2) we expect the biological objective will be met by the required deadline.
145	17	6-8	It has been my understanding that the Water Conservation measure was being subsumed into a broader forbearance measure. Similarly, my understanding has been that the VISPO and ASR programs were being relabeled. At any rate, terminology used here should be made consistent with the language of the proposed conservation measures.	Texas Living Waters	Revised terminology re: springflow protection measures and water conservation.
146	17	14-16	As noted in previous comment, terminology regarding Water Conservation, VISPO and ASR programs should be made consistent with the proposed Conservation Measures. Although recharge data is used for triggering of what is currently referred to as the ASR program, it does not play a direct role, even in current HCP, for triggering water conservation or VISPO response.	Texas Living Waters	Revised terminology re: springflow protection measures and water conservation.
147	17	14-16	Consistent with comments made at the 9/10 Science Committee mtg, it may be appropriate to note consideration for evaluating a potential role for use of AI to augment recharge calculations.	Texas Living Waters	Noted
148	18	Table 6	For the surface-dwelling species, flow-split management entry in the table, surface flow monitoring to track flow-split between the old and new channels in the Comal system and at the spillway in the San Marcos system should be added.	Texas Living Waters	Springflow monitoring captures surface flow monitoring. Added discharge transects.
149	18	Table 6	For the surface-dwelling species, recreation management entry in the table, a placeholder should be added to acknowledge the recreation-impact assessments that are being considered for inclusion.	Texas Living Waters	No revision. Recreation monitoring is not a conservation measure. If impacts are identified adaptive management will be used to decrease them
150	18	Table 6	For the surface-dwelling species sediment management entry in the table, species and community monitoring should be added for the invertebrate species because it is another component for assessing potential impacts of sediment levels	Texas Living Waters	Revised, also added San Marcos salamander sampling.
151	20	Table 7	Although it certainly makes sense that the Strategic Adaptive Mgmt component should be deleted, it seems appropriate to include some specific process for undertaking the 15-year reassessment of climate and recharge data. It certainly would be less prescriptive than the current Strategic Adaptive Mgmt component, but defining now what that reassessment is envisioned looking like, at least on a conceptual level, could be very helpful down the road when this review would be taking place with a new set of participants and some mechanism is needed for ensuring the needed data for informing that reassessment are available. What will the process be for developing the information to be considered and how will that information be analyzed for consideration in the adaptive management process?	Texas Living Waters	This comment will be considered in drafting the Implementation Chapter of the HCP

152	20	Table 7	The proposed changes in role for these committees are understandable if viewed solely through a short-term efficiency frame. Decisions can be made more quickly and with less effort if external scientists and stakeholders are removed from the process. However, one of the strengths of the EAHCP is the level of buy-in achieved across the universe of affected persons through having a process that, although perhaps somewhat unwieldy at times, provides assurance that a wide variety of perspectives and expertise are being considered in the process. The Texas Legislature understood the value of that inclusive process in establishing the legislation that got us here. The current EAHCP and it's continuation through an amended permit should honor the Legislative directive for inclusiveness. Simplifying the process for routine changes by removing them from the adaptive management process makes sense, but care is needed in defining the universe of routine changes. Under the existing HCP, because of the level of detail included, a distinction between routine and non-routine changes based on which ones required a permit amendment established a fairly bright that ensured major changes would not be characterized as routine. However, because the new HCP is being drafted with the stated intent of leaving out details in order to minimize the potential for changes to require permit amendments, that bright will go away, or perhaps more accurately, may well be greatly shifted so that changes that might be very significant would fall into the routine change category. It makes sense to minimize the need for formal permit amendments but, with that new drafting approach, the status of a change as requiring a permit amendment will no longer provide an appropriate differentiation between major and minor changes that makes sense for defining categories used in the EAHCP adaptive management process. We should establish an efficient process for changes that really are minor--but, based on what we have been told to expect, the requirement for a permit amendment will not be a good indicator of which changes are minor and which are not. More clarity is needed on how the universe of routine changes will be determined. Also, it is important to recognize that achieving efficiency in the short-term, particularly for changes that might significantly affect a stakeholder group, may be a poor trade-off against potential loss of community support in the long-term. It also is appropriate to recognize that the EAHCP involves special considerations because the existence of the entire wild population of the Covered Species rests on the Plan's success. At least in the past, the Service has acknowledged its comfort in EAHCP decisions was increased by knowing that scientists on the Science Committee and members of the Stakeholder Committee had evaluated and supported those decisions.	Texas Living Waters	We appreciate your comments on this change. We are structuring this permit renewal so that the Permittees are the primary decision makers. Concerns should be communicated to the Permittees, so they can consider them in their decisions. Stakeholder and Science Committees will retain their role as advisors and either the Program Manager or Permittees may call on them to provide advice in adaptive management decisions.
153	22	10-11; 16-17	These two provisions appear to conflict. It is unclear why a different standard applies for the first, but if there is a good reason, the language on s 16-17 should acknowledge the exception addressed in s 10-11.	Texas Living Waters	Revised
154	22	14-15	It is unclear how the decision by permittees to request Science Committee input would be made. Consistent with the language for adaptive management decisions, suggest that the language here should allow any permittee to trigger obtaining input from the Science Committee. A comparable mechanism also should be provided to allow for obtaining input from the Stakeholder Committee when desired.	Texas Living Waters	This has been clarified. Any Permittee may direct the Program Manager to consult with the Science and/or Stakeholder Committees.
155	23	4	Suggest creating a standard procedure that, at least absent extenuating circumstances (such as special timing concerns) making the submission for review inappropriate, such proposals will be submitted for review by the Science and Stakeholder Committees. These types of changes are major ones and should be informed through formal input processes. If timing precludes advance review, the opportunity for such review such be provided ASAP with the potential to revisit decisions made. At minimum, the option for any Permittee to provide for such review should be retained.	Texas Living Waters	Not revised.
156	23	11-14	The sentence starting on 11 is confusing, particularly the language about disapproval, and, even though it comes from current procedures, appears to be unnecessary. The following sentence requires unanimous approval for all decisions and that seems quite clear. It may be appropriate simply to provide that, for any decision (approval or lack of approval) under this provision, a written explanation for the decision will be provided.	Texas Living Waters	Revised
157	24	7	Because the key here will be consideration of new or improved information that has become available regarding the listed factors, suggest rephrasing to read more like "in light of updated information regarding all these considerations."	Texas Living Waters	Revised
158	24	8	First, the reference to "permitted take" here is confusing. Presumably the level of permitted take will be set by the ITP. Seems like "predicted take" or "anticipated take" may be more appropriate here. Second, it is unclear what process is contemplated for evaluating if springflow protection measures should be changed in light of new or improved information. Although the adaptive management process would be used for approving any changes, a process is needed for evaluating if, and what, changes should be considered through adaptive management. Suggest ensuring a role for the Stakeholder and Science Committees in this process.	Texas Living Waters	Regarding the first part of this comment, this reference is deleted to avoid confusion. The only way to change allowable take is with a permit amendment. We appreciate your other comments on this change. We are structuring this permit renewal so that the Permittees are the primary decision makers. Concerns should be communicated to the Permittees, so they can consider them in their decisions. Stakeholder and Science Committees will retain their role as advisors and either the Program Manager or Permittees may call on them to advise in adaptive management decisions.
159	25	6	Presumably, the seasonal mapping also would be very important in this endeavor. Suggest inserting ", along with relevant seasonal reach sampling," after "systemwide mapping."	Texas Living Waters	Revised
160	25	15-16	Suggest adding ", along with relevant seasonal reach sampling," after "This mapping" on 16.	Texas Living Waters	Revised

161	20	Table 7	One possibility for maintaining input from the Stakeholder and Science Committee for non-major decisions that require prompt action is to provide for a formal mechanism of presenting routine adaptive management changes to the Science Committee and the Stakeholder Committee at the first meeting of those committees following such decisions and allowing those committees, if they desire to do so, to provide formal feedback on those changes. However, that approach would be meaningful only if that feedback is seriously considered in determining if further adjustments to the previous decision are needed.	Texas Living Waters	We appreciate your comments on this change. We are structuring this permit renewal so that the Permittees are the primary decision makers. Concerns should be communicated to the Permittees, so they can consider them in their decisions. Stakeholder and Science Committees will retain their role as advisors and either the Program Manager or Permittees may call on them to provide advice in adaptive management decisions.
162	17	28	Refugia should be listed as a measure that contributes to recovery. (this should be a conservation measure as well.)	SMRF	No revision. No specific measures of recovery are listed in this memo. Those can be found in the conservation measures memo
163	19	4	We'd like to ensure that the Implementing Committee and Stakeholder Committee review any changes proposed for the FMA.	SMRF	The Permittees will review any changes proposed for the FMA. The request for the Stakeholder Committee to review proposed changes to the FMA is noted.
164	20	SC Section	The Implementing Committee should also be able to consult the science committee. (reference pg. 23 as well)	SMRF	Not revised. Permittees may direct Program Manager to consult Science Committee
165	20	SC Section	The Implementing Committee should also have discretion to consult the stakeholder committee.	SMRF	Not revised. Permittees may direct Program Manager to consult Stakeholder Committee
166	21	25-28	We'd like to see more specific examples about what is considered routine vs. a major adaptive management decision. This section is too broad.	SMRF	Additional detail about the distinction between routine adjustments and adaptive management has been added throughout the memo, to clarify the difference.
167	23	4	The word "may" needs to be changed to "shall." It should read: "The program manager shall submit the proposal to the science committee..."	SMRF	The EAHCP team proposes these important changes to control plan administration costs, simplify adaptive management decision making, and ensure decision-making authority rests with the Permittees. This change is consistent with implementation by most other HCPs in the country of similar type and scale to the EAHCP.
168	23	5	the word "/ or" needs to be removed. It should read: "....and the stakeholder committee for review."	SMRF	The EAHCP team proposes these important changes to control plan administration costs, simplify adaptive management decision making, and ensure decision-making authority rests with the Permittees. This change is consistent with implementation by most other HCPs in the country of similar type and scale to the EAHCP.
169	24	6	The following should be added: By the end of the 15th year of the permit term, "or any significant period of time when springflow objectives are consistently not being met," the permittees will..... (there may need to be specificity around what is considered a significant period of time.)	SMRF	None of the modeling indicates flows lower than the minimum before 25 year of the permit term. In addition, critical period management and monitoring is part of the conservation strategy.
170	5	4	Perhaps add "additionally" or "also" to indicate the biannual are done along with the monthly samples	Recreational Interest	Revised
171	5	15	are these three springs just examples? Are the three springs chosen at random?	Recreational Interest	Not revised. No, they're not examples. They're the actual monitoring sites. They were strategically chosen to capture monitoring at each system.
172	8	7	add "location"	Recreational Interest	Revised
173	8	13	add "native"	Recreational Interest	Revised
174	8	14	Target protection could reduce impacts (want to infer the possibility that targeted is the goal but may not be the solution	Recreational Interest	Revised
175	8	15	could we also include impacts to the riparian buffer (loss of vegetation/compacted riverbank), not just within the river itself.	Recreational Interest	Recreation monitoring is not just limited to in river monitoring- it will be specific to recreation areas, which may include riparian areas, banks, etc.
176	9	6	perhaps the items brought into the river park system could be monitored – plastic bottles, straws, charcoal, etc all have a negative impact on biota.	Recreational Interest	The EAHCP already reports on the amount of litter picked up. There will be no inventory of the litter because the benefits will not outweigh the costs.
177	25	1	add “direct and indirect” impacts. Thus the riparian zone could be included in the impact assessment.	Recreational Interest	Revised