Edwards Aquifer Habitat Conservation Plan

Permit Options Report

Prepared for:
Edwards Aquifer Authority
900 E. Quincy
San Antonio, Texas 78215

Prepared by:
ICF
2700 Via Fortuna, Suite 200
Austin, Texas 78746

FINAL

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PREPARED FOR:

Edwards Aquifer Authority
900 E. Quincy
San Antonio, TX 78215

PREPARED BY:

ICF
2700 Via Fortuna, Suite 200
Austin, Texas 78746
Contact: David Zippin, Ph.D.
(415) 677-7179

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Acronyms and Abbreviations

AMP	adaptive management plan
ASR	Aquatic Storage Recovery
BCCP	Balcones Canyonlands Conservation Plan
cfs	cubic feet per second
DNR	Washington State Department of Natural Resources
EA	Environmental Assessment
EAA	Edwards Aquifer Authority
EAA Act	Edwards Aquifer Authority Act
EAHCP	Edwards Aquifer Habitat Conservation Plan
EARIP	Edwards Aquifer Recovery Implementation Program
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FY	fiscal year
GIS	geographic information system
HCP	habitat conservation plan
ITP	incidental take permit
MSCP	Multi-Species Conservation Plan
MBHCP	Metropolitan Bakersfield Habitat Conservation Plan
NEPA	National Environmental Policy Act
SAWS	San Antonio Water System
USFWS	U.S. Fish and Wildlife Service
VISPO	Voluntary Irrigation Suspension Program Option

Executive Summary

The Edwards Aquifer Habitat Conservation Plan (EAHCP), approved by the U.S. Fish and Wildlife Service (USFWS) in 2013, represents a culmination of years of collaboration and negotiation amongst its permittees, USFWS, and stakeholders for almost two decades. The EAHCP's permit term is 15 years, expiring on March 31, 2028. The permit term is split in two phases. Phase I of the term, which concluded at the end of 2019, was largely effective in conserving covered species and contributing to their recovery. Even with the successes of the EAHCP to date, there are changes to the plan worth considering as the end of the permit term approaches, and as the permittees consider renewing the permit term beyond 2028.

Permit Renewal Options Available

Five options are available to any incidental take permit holder near the end of the permit term:

1. **Allow the permit to expire.** This option would only be used if take authorization was no longer needed. The EAHCP permittees would not let the permit expire, but the option is important to consider as a reference point with which to compare other options.
2. **Extend the duration of the permit only (permit renewal).** A permit renewal only changes the permit's expiration date. It cannot change the amount of authorized take or any other components of the plan or permit. The permit renewal applies to the habitat conservation plan (HCP) at the time of the renewal, not a renewal of the original HCP.
3. **Make changes administratively, without a permit amendment.** The process for administrative changes is described in the EAHCP, and the permittees have completed 20 administrative changes as of the end of 2019.
4. **Formally amend the permit, called a major permit amendment**. Any change that cannot be done administratively is a major permit amendment, which can address one or many aspects of an HCP at once. Depending upon the nature of the amendment, it may trigger a new *Federal Register* notice and supplemental or new review under the National Environmental Policy Act.
5. **Replace the EAHCP with a new HCP.** Plans that are very old and predate new regulations are sometimes replaced with a new HCP. The EAHCP is a relatively new plan prepared under current regulations, so it does not need to be replaced.

See Chapter 2 of the report for more details on each of these permit options and an explanation of their benefits, drawbacks, estimated timeline and cost, and case studies illustrating each one.

Potential EAHCP Changes to Consider

As they look ahead through Phase II, the EAHCP permittees have the opportunity to consider additional changes to the plan and permit. ICF identified potential changes to the EAHCP to consider through meetings with EAHCP staff, the Edwards Aquifer Authority Board, the EAHCP Implementing and Stakeholder committees, and the USFWS Austin Field Office. We identified 23 potential changes to consider (Table ES-1). Some of these changes can continue to be made through the administrative

change process or the adaptive management process. In other cases, more substantive changes would need to be part of a major amendment or part of a renewed permit term. See Chapter 3 for a description of each of these potential changes to consider, the rationale for making the change, and the simplest permit option available to make the change.

Table ES-1. Summary of Potential Changes by Permit Option

Plan/Permit Component	Potential Changes to Consider
Permit Renewal	
Permit Term	1. Extend the permit term beyond 2028 by up to another 15 years.
Adaptive Management Changes	
Adaptive management	1. Reconsider the use of ecological modeling and applied research as components of the adaptive management process (Section 6.3.3 of the EAHCP).
Adaptive management	2. Evaluate the potential effects of climate change to the Comal and San Marcos springs systems to facilitate extending the permit term beyond 2028.
Administrative Changes	
Covered activities	1. Require all commercial recreation outfitters that operate in the spring systems in the EAHCP plan area to obtain Certificates of Inclusion consistent with the plan.
Covered species	2. Add biological objectives and take authorization for non-listed covered species including the Texas Cave diving beetle, Texas troglobitic water slater, and Comal Springs salamander.
Biological goals and objectives	3. Restructure biological goals and objectives to a more typical structure, with biological goals being more broad statements of desired future conditions and objectives as measurable habitat-based targets.
Conservation measures	4. Adjust 10% annual disturbance take limit for occupied fountain darter habitat to allow for more year-to-year flexibility.
Conservation measures	5. Control recreational use and public access areas further in the San Marcos River during peak visitation periods.
Conservation measures	6. Remove dissolved oxygen management as a conservation measure.
Conservation measures	7. Establish performance standards for control of nonnative animal species.
Conservation measures	8. Remove measure to reduce gill parasites from the EAHCP.
Conservation measures	9. Establish performance standards for riparian restoration.
Conservation measures	10. Extend ASR and VISPO groundwater leases and lease options (i.e., forbearance agreements) beyond the permit term expiration date in 2028.
Conservation measures	11. Increase flexibility of the EAHCP to achieve springflow protection through additional water conservation programs or securing new sources of groundwater.
Other changes	12. Separate from EAHCP unique procedural provisions of the Funding and Management Agreement that do not support the ESA permit issuance criteria.
Other changes	13. Simplify how administrative changes and adaptive management changes are reviewed and adopted by the EAHCP permittees.
Major Permit Amendments	
Permit term	1. Extend the permit term beyond 2028 by more than another 15 years.

Plan/Permit Component	Potential Changes to Consider
Conservation measures	2. Combine the two groundwater forbearance programs of the EAHCP into one program with the same pumping reduction target of 90,000 acre-feet per year in a drought-of-record.
Conservation measures	3. Add flexibility to the groundwater rights purchase programs to allow the EAA to purchase water rights instead of only allowing term leases or lease options.
Covered activities	4. Add projects occurring in the San Marcos river with the potential to affect covered species, including dam fortification and other in-stream construction projects.
Covered species	5. Add as covered species those species occurring within the plan area that have a high likelihood of being listed during the permit term.
Covered species	6. Remove the San Marcos gambusia from the list of covered species in the EAHCP and the incidental take permit.
Permittees	7. Add permittees to the EAHCP to include entities conducting activities in the Comal or San Marcos springs systems that are adversely affecting covered listed species.

Recommended Approach

The steps below outline our **recommended approach** to the EAHCP permittees to renew the incidental take permit for a permit duration greater than another 15 years (e.g., 20 or 30 years more).

Step 1: Continue to make administrative changes (e.g., clarifications, minor administrative amendments) through the remainder of the permit term, as needed.

Step 2: Complete an assessment of the effects of climate change on the effectiveness of the conservation strategy for the covered species at least 3 to 4 years prior to permit expiration (i.e., by 2024).

Step 3: Start a major permit amendment at least 2 to 3 years prior to permit expiration (i.e., by 2025) to (1) extend the permit duration for another 20–30 years, and (2) address those changes that cannot be addressed via administrative changes or adaptive management.

Step 4: Coordinate early with USFWS and EAHCP Committees to design the permit amendment process to ensure its success.

Step 5: Complete the major permit amendment before the end of the permit term.

An **alternative approach** would be to renew the EAHCP permit options for another 5–10 years and not pursue any major amendments. This approach could be used if events over the remainder of the EAHCP's permit term change the planning landscape such that a major amendment to pursue a permit term greater than 15 years is not feasible or desirable. This approach may delay the need to conduct a climate change assessment. Under this alternative approach, coordination with USFWS remains very important to understand how long the agency may be willing to extend only the permit duration without assessing climate change effects.

See Chapter 4 for more details on the recommended approach and alternative approach to permit renewal.

Chapter 1
Introduction

The Edwards Aquifer Habitat Conservation Plan (EAHCP) was approved by the U.S. Fish and Wildlife Service (USFWS) in 2013. Activities covered under the plan include groundwater pumping from the Edwards Aquifer, surface water management, aquatic and riparian habitat management, and recreational use in the aboveground springs fed by the aquifer in the cities of New Braunfels and San Marcos. The habitat conservation plan (HCP) and its Endangered Species Act (ESA) permit provide authorization for these covered activities to "take"[1] threatened and endangered species covered by the plan.

The approval of the EAHCP in 2013 was a major achievement toward balancing the growing water demand from the Edwards Aquifer with the ecological needs of the unique and imperiled species that depend on it. In response to growing water demands and concerns about the effect of pumping on ESA-listed species, the Texas Legislature passed the Edwards Aquifer Authority Act (EAA Act) in 1996. The EAA Act created the Edwards Aquifer Authority (EAA) to regulate pumping from the aquifer and pursue a program "to ensure that the continuous minimum springflows of the Comal Springs and the San Marcos Springs are maintained to protect endangered and threatened species to the extent required by federal law…" (EAA Act § 1.14). The Texas Legislature amended the EAA Act in 2007 to form the Edwards Aquifer Recovery Implementation Program (EARIP) and directed the EARIP to work with USFWS to prepare an HCP. The EARIP process, including years of negotiations among the eventual permittees and with many stakeholders, led to the completion of the EAHCP in 2013.

The EAHCP has a relatively short permit term, 15 years, for an HCP of its scale and complexity. The EAHCP incidental take permit expires on March 31, 2028. The permit term was divided into two phases in order to manage and address the scientific uncertainty associated with the plan. Phase I of the EAHCP's 15-year permit term concluded at the end of 2019. Phase I focused on immediate conservation measures to protect the covered species and their ecosystems, such as implementation of the minimum flow programs for the Comal and San Marcos springs during times of drought. Aquatic habitat restoration and enhancement measures implemented in Comal and San Marcos springs increased the extent and quality of covered species habitat, including exceeding restoration targets for a key covered species, Texas wild-rice (*Zizania texana*).

Since the EAHCP was approved in 2013 and throughout Phase I, the program has been highly effective in conserving the covered species and the ecosystems on which they depend. Its implementation has also greatly expanded what is understood about the life histories of many of the covered species. In its 2018 *Review of the Edwards Aquifer Habitat Conservation Plan, Report 3*,[2] a National Academy of Sciences panel evaluated whether the biological goals and objectives of the EAHCP are likely to be met. The panel concluded that the plan is likely or somewhat likely to meet all

[1] The Endangered Species Act defines *take* as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any endangered and most threatened wildlife species. *Harm* may include significant habitat modification where it actually kills or injures a listed species through impairment of essential behavior (e.g., nesting or reproduction).

[2] National Academies of Sciences, Engineering, and Medicine. 2018. *Review of the Edwards Aquifer Habitat Conservation Plan: Report 3*. Washington, DC: The National Academies Press. Available: https://doi.org/10.17226/25200.

but one of the biological goals and objectives for the covered species[3]—an impressive conclusion given the complexity of the plan and the fact that the review had been conducted only 5 years into plan implementation. The EAHCP's committees have also demonstrated the ability to institute necessary and important changes to conservation and monitoring measures to increase their feasibility and effectiveness, through the plan's adaptive management process.

The expiration of an incidental take permit presents an opportunity to reflect on and assess implementation progress. It also presents an opportunity to change the direction of an HCP in perhaps substantive ways, so that it may incorporate the many lessons learned and adapt to new situations. Even with the successes of the EAHCP to date, there may still be potential changes to the plan to be considered as the end of the permit term approaches. With this Permit Options Report, the EAA has initiated considering potential changes to the EAHCP and their implications for the incidental take permit as the permittees look to renew the permit beyond 2028.

The potential changes identified in this report are based on ICF's professional judgment and do not necessarily reflect the views of the EAHCP staff, the EAA, or the permittees. The decision about which changes to make to the EAHCP and how to implement those changes ultimately rests with the EAHCP permittees and USFWS.

1.1 Purpose and Organization of Report

The purpose of this report is to identify and describe the permit renewal options available to the EAHCP permittees before their permit expires in 2028. The report also identifies the benefits and drawbacks of each permit renewal option and, when appropriate, outlines the relative time and cost involved with each option. Renewing or amending an HCP provides a tremendous opportunity to build on successes and lessons learned from HCP implementation to date. However, a permit amendment can also introduce new risks. The information in this report will assist the EAHCP permittees in considering issues with EAHCP implementation identified to date and how these issues could be addressed through different permit options. This report is intended to help the permittees select the option (or combination of options) that best suit their needs up to 2028 and beyond.

This report is organized into four chapters. This *Introduction* chapter provides an overview of the EAHCP and describes what led to development of the plan. It also describes the typical process for making administrative changes or amendments to an HCP and provides several case studies of large, multispecies HCPs that have secured or are pursuing amendments to their plans.

Chapter 2, *Permit Options Available*, reviews in detail the five options available to the EAHCP permittees with their incidental take permit and describes the process for each option. The chapter also provides several case studies of HCPs that have used each permit option and describes the typical benefits and drawbacks of each, including the relative costs and timeline for each option.

Chapter 3, *EAHCP Issues to Consider*, describes implementation issues with the EAHCP that staff and stakeholders have identified, how these issues could be addressed through incidental take permit adjustments, and the potential benefits or drawbacks of each option.

[3] The Science Review panel was "unable to determine" the effects of riparian management on the Comal Springs riffle beetle (*Heterelmis comalensis*).

Chapter 4, *Recommendations*, presents comparative evaluations of permit options and provides ICF's recommendations of the permit options we believe are best pursued by EAHCP permittees.

To help the reader navigate the report, each section begins with a list of questions that will be answered in that section.

1.2 Overview of EAHCP

The following sections describe what led to the development of the EAHCP, the key elements of the HCP, and the status of EAHCP implementation to date.

1.2.1 ESA Compliance before EAHCP

Questions addressed in this section:

- *What was ESA compliance like prior to the EAHCP?*
- *What led to the creation of the EAHCP?*

The EAHCP grew out of state legislation passed to regulate pumping from the Edwards Aquifer in central Texas. The Edwards Aquifer is approximately 180 miles long, stretching from Brackettville (Kinney County) to Kyle (Hays County), and was the primary water source for the cities of San Antonio, New Braunfels, and San Marcos. The Texas Legislature passed the EAA Act in 1996, due in large part to a 1991 lawsuit by the Sierra Club alleging unauthorized take of ESA-listed species dependent on the Edwards Aquifer from extensive and increasing groundwater pumping. The Act formed the EAA to regulate pumping from the aquifer, to implement critical period management restrictions, and to pursue a program "to ensure that the continuous minimum springflows of the Comal Springs and the San Marcos Springs are maintained to protect endangered and threatened species to the extent required by federal law…" (EAA Act § 1.14). The EAA Act also requires that the EAA regulate groundwater withdrawals to "protect aquatic and wildlife habitat" and "protect species that are designated as threatened or endangered under applicable federal or state law" (EAA Act § 1.14). The EAA Act also replaced Texas common law regarding the use of groundwater (called "rule of capture") for the Edwards Aquifer and any other regulated groundwater basin in the state.[4]

In 2007, the Texas Legislature amended the EAA Act to adjust the annual groundwater withdrawal limit from the Edwards Aquifer to 571,600 acre-feet and create the EARIP. The legislature created the EARIP in order to address concerns from stakeholders about the surface water availability in the Guadalupe River and the viability of the listed species dependent on the Aquifer. The Legislature directed the EAA to:

> Through a program, implement and enforce water management practices, procedures, and methods to ensure that, not later than December 31, 2012, the continuous minimum springflows of the Comal Springs and the San Marcos Springs are maintained to protect endangered and threatened species to the extent required by federal law (Edwards Aquifer Act § 1.14(h)).

This program took the form of the EAA and other state and local government agencies, as part of the EARIP, to work with USFWS to prepare an HCP for approval by 2012.

[4] At least 95 other groundwater districts in Texas have the authority to regulate groundwater withdraws.

The EARIP was a stakeholder-driven process, as mandated by the EAA Act, which created multiple committees and subcommittees. The EAA Act created a Steering Committee with 21 entities represented; five more were added, for total of 26 members. All EARIP meetings were open to the public, typically with 50–80 people in attendance. The group made decisions by consensus whenever possible. The EAA Act also created the Science Subcommittee and the Recharge Facilities Subcommittee. The Steering Committee created a Public Outreach Subcommittee and Ecosystem Restoration Subcommittee, as well as 16 short-term Work Groups on specific topics, and it commissioned many technical studies, the results of which are in the appendices to the HCP. With the completion of the EAHCP and the incidental take permit issued on March 18, 2013, the EARIP fulfilled its core mission and transitioned to the EAHCP program. EAHCP adoption by local agencies and permit issuance by USFWS was the result of tremendous collaboration through the EARIP process. Several of the committees the EARIP established were retained after HCP approval and persist in the EAHCP implementation structure today. These implementation committees are important for maintaining support for the EAHCP and ensuring continued collaboration among EAHCP permittees and stakeholders.

1.2.2 Key Elements of EAHCP

Questions addressed in this section:

- *What are the basic elements of the EAHCP?*
- *Which species are covered by the EAHCP? What activities are covered?*
- *How much take authorization were the permittees granted?*
- *What conservation measures did the permittees commit to implementing?*
- *How is the EAHCP implemented?*

All HCPs have the same basic elements. One or more permit holders, called **permittees**, receive the incidental take permit. An HCP has a defined **permit area**, in which all permitted activities occur. An HCP must also define the **covered species** for which take authorization is being requested. Covered species can be listed at the time the permit is issued or not. Covered species not yet listed are often covered because they are expected to become listed during the permit duration. An HCP also describes the activities or projects expected to take the covered species, called **covered activities**. The permit is issued for a specific duration, called the **permit term**. HCPs must also define **conservation measures** to offset the **authorized take** of the covered species and meet permit issuance criteria.[5] These basic elements of the EAHCP are as follows.

EAHCP Key Elements

Permittees: Edwards Aquifer Authority, City of San Antonio (through its San Antonio Water System [SAWS]), City of San Marcos, City of New Braunfels, and Texas State University.

Permit Area: For the purposes of the EAHCP, the permit area is the same as the plan area. It is approximately 3.3 million acres, coinciding exactly with the jurisdictional boundaries of the EAA

[5] The key permit issuance criterion related to conservation measures is that, collectively, they must minimize and mitigate the impact of the taking on each covered species to the maximum extent practicable.

over which it regulates groundwater uses (not surface water uses): all of three counties (Bexar, Medina, Uvalde) and portions of five counties (Atascosa, Comal, Caldwell, Hays, and Guadalupe).

Permit Term: 15 years (March 18, 2013, to March 31, 2028)

Covered Species: Seven endangered species (fountain darter [*Etheostoma fonticola*], San Marcos gambusia [*Gambusia georgei*], Texas blind salamander [*Typhlomolge rathbuni*], Peck's cave amphipod [*Stygobromus (=Stygonectes) pecki*], Comal Springs riffle beetle [*Heterelmis comalensis*], Comal Springs dryopid beetle [*Stygoparnus comalensis*], and Texas wild-rice [*Zizania texana*]; one threatened species (San Marcos salamander [*Eurycea nana*]); and three species not listed (Comal Springs salamander [*Stygoparnus comalensis*], Texas cave diving beetle [*Haideoporus texanus*], and Texas troglobitic water slater [*Lirceolus smithii*]).

Since the EAHCP was approved, there have been no changes in the listing status of the covered species. According to the USFWS National Listing Workplan,[6] 12-month findings for the Texas Cave diving beetle and Texas troglobitic water slater are anticipated in 2021. The San Marcos gambusia is presumed extinct since 1983.

Covered Activities: The EAHCP covers activities associated with use of the Edwards Aquifer (including springs) by EAA, SAWS, the City of San Marcos, the City of New Braunfels, and Texas State University. These covered activities include, in summary:

- Groundwater withdrawal programs and regulations (i.e., groundwater withdrawal permits)
- Groundwater permit transfers and amendments
- Recreational activities in Comal and San Marcos springs and river ecosystems
- Other activities in and related to Comal and San Marcos springs and river ecosystems
- Maintain diversions for Landa Park Golf Course and municipal uses (City of New Braunfels)
- Maintain public facilities and water diversions (City of San Marcos)
- Manage San Marcos River and San Marcos Springs within its jurisdiction for recreational and scientific uses (Texas State University)
- Minimization, mitigation, and conservation measures to contribute to species recovery

Authorized Take: The EAHCP's take authorization is documented in the incidental take permit. For ESA-listed covered species, take is authorized over the 15-year permit as no more than:

- 797,000 fountain darters in Comal Springs, Landa Lake, and the Comal River, and no more than 549,129 fountain darters in the San Marcos Springs, Spring Lake, and San Marcos River
- 11,179 Comal Springs riffle beetles
- 1,543 Comal Springs dryopid beetles
- 18,224 Peck's cave amphipods
- 10 Texas blind salamanders
- 263,857 San Marcos salamanders

[6] https://www.fws.gov/endangered/what-we-do/listing-workplan.html.

For non-listed covered species, the permit provides incidental take authorization based on minimum springflow requirements, noting that take limits will be exceeded if minimum flow rates are not met. For Texas cave diving beetle and Texas troglobitic water slater, the permit requires monthly average minimum flows at San Marcos Springs to be above 50.5 cubic feet per second (cfs) in Phase I and above 51.2 cfs in Phase II. For Comal Springs salamander, the permit requires monthly average minimum flows at Comal Springs to be above 27 cfs during Phase I and above 45 cfs during Phase II. Because the San Marcos gambusia may no longer exist in the wild, USFWS commits to provide incidental take coverage for individuals once the species is located or established within the permit area.

Conservation Measures: The EAHCP commits to three general types of conservation measures to mitigate the impact of take of covered species[7]:

- Flow protection measures, including the Aquatic Storage Recovery (ASR) program, Regional Water Conservation Plan, Voluntary Irrigation Suspension Program Option (VISPO), and Stage V Critical Period Management Reductions
- Habitat protection measures, including measures to reduce drought impacts and enhance the viability of covered species at San Marcos and Comal springs, such as establishing an Environmental Restoration and Protection Area at Comal Springs, implementing gill parasite control, and managing household hazardous wastes, native riparian habitat restoration, and wild-rice restoration and maintenance at San Marcos Springs
- Supporting measures, including applied research, ecological modeling, biological monitoring, expanded water quality monitoring and refugia

1.2.3 Status of Take Authorization

Questions addressed in this section:

- *What is the status of the EAHCP's take authorization?*
- *Is take authorization likely to be fully utilized by the end of the permit term? Is there likely to be any take authorization remaining at the end of the permit term?*

The EAHCP has resulted in successful ESA compliance for the permittees. For example, the incidental take permit's take authorization depends, in part, on meeting the minimum springflow requirements (see "Authorized Take" under Section 1.2.2 of this report, *Key Elements of the HCP*) and limiting disturbance of occupied habitat in the spring systems[8] to no more than 10 percent of the occupied habitat. Springflows have remained above threshold levels, even throughout the 2014 drought; net disturbance of occupied habitat has remained below the 10 percent threshold each year since. The first year that disturbance approached the 10 percent threshold for any of the covered species was 2019, when nonnative aquatic vegetation removal was estimated to result in disturbance to 8.6 percent of occupied habitat for fountain darter in the San Marcos system.

Table 1-1 summarizes the status of the EAHCP's take authorization. Annual incidental take estimates are based on the areal overlap of permittee restoration and management activities with occupied

[7] List adapted from Table 5-1 in the EAHCP.

[8] *Spring systems* refers collectively to Comal Springs, Landa Lake, the Comal River, San Marcos Springs, Spring Lake, and the San Marcos River.

habitat of covered species. Given that minimum springflow requirements have been met, and that annual disturbance of occupied covered habitat has generally remained well below the 10 percent thresholds, authorized take remains well below the maximum amount allowed under the incidental take permit.

Table 1-1. Status of Take Authorization for the EAHCP

Covered Species by Spring System	2019 Net Disturbance of Total Habitat (%)	2019 Incidental Take Total	Total Authorized Take	Take Remaining[1]
Comal Springs System				
Fountain darter	0.5	747	797,000	735,587
Comal Springs riffle beetle	0	0	11,179	8,887
Comal Springs dryopid beetle	0	0	1,543	1,527
Peck's cave amphipod	0	0	18,224	18,057
San Marcos System				
Fountain darter	8.6	12,179	549,129	461,349
San Marcos salamander	0	0	263,857	261,183
Texas blind salamander	0	0	10	10
Comal Springs riffle beetle	0	0	--	--
Comal Springs dryopid beetle	0	0	--	--

Source: Table 3.0-1 from the EAHCP 2019 Annual Report.
[1] As of December 2019; take remaining = total authorized take minus combined 7 years of take (2013–2019).

1.3 Regulatory Framework and Guidance for Administrative Changes and Amendments

Permittees can make three general types of changes to an HCP or incidental take permit: (1) permit renewal, (2) administrative change, and (3) HCP and permit amendment.

The difference between an **administrative change** and a **major amendment** depends on the nature of the changes proposed to the original HCP. If the changes are relatively minor, the permittee may be able to document the change with an exchange of letters with USFWS, an addendum or revision to the HCP, or a simple permit amendment. USFWS does not need to advertise administrative changes to an HCP in the *Federal Register* when levels of incidental take do not increase and the covered activities do not expand in ways not analyzed in the original National Environmental Policy Act (NEPA) or ESA Section 7 consultation documents. Changing the HCP without a *Federal Register* notice and without additional NEPA compliance is considered an administrative change.

However, as the scale or scope of the change to the HCP and permit increases (e.g., increasing take amount or changing plan area, covered activities, or covered species), it becomes more likely that USFWS will need to publish a public notice and amend the HCP's NEPA and Section 7 analyses. Any of these outcomes would be considered a major amendment. Chapter 2, *Permit Options Available*, provides more detail about the processes for administrative changes and amendments, as well as the other permit options for the EAHCP.

Chapter 2
Permit Options Available

Questions addressed in this section:

- *What are the permit options available to the permittees?*
- *What options are available to change the EAHCP in Phase II of the permit term before the permit expires?*
- *How do these permit options compare in terms of their process, benefits and drawbacks, and timeline and cost?*
- *How have these permit options been applied in other HCPs?*

Five options are available to any incidental take permit holder near the end of the permit term.

1. The vast majority of all HCPs in the country are small HCPs that authorize take of listed species for single projects. Once the project is built, take authorization is no longer needed because all impacts only occur during project construction. In these cases, incidental take permits are for a relatively short duration, typically only 5 or 10 years. Once the project is built, the **permit is allowed to expire**. This is the first and simplest option available to the EAHCP. Although it requires no action on the part of the permittees, this option has important consequences.
2. The second option is to **apply for a permit amendment that only extends the duration of the permit**. This is a relatively simple process, but only changes one aspect of the HCP: its expiration date. As a result, this type of amendment is often called a *permit renewal*. How long the permit can be extended depends on the amount of take authorization left to use, which is evaluated for this option.
3. The third option is to address issues in implementing the EAHCP through **administrative changes**. As described above, administrative changes can usually be conducted through an exchange of letters with USFWS and/or addendum to the HCP. The scale and scope of these can vary greatly, from making minor clarifications in the HCP to resolve ambiguities or errors, to more significant changes affecting the implementation of the plan, just short of what would require a permit amendment.
4. The fourth option is to formally amend the permit, called a **major permit amendment**. The scope and scale of this option is up to the permittees to decide; incidental take permit holders can apply to amend their permit in any way they wish. If the changes proposed to the HCP are relatively small, the amendment may not require a notice in the *Federal Register* or a new or amended NEPA document. However, the most common major permit amendments (e.g., increasing take amount or changing plan area, covered activities, or covered species) typically require both.
5. The last option is to **replace the EAHCP with a new HCP**. Ideally, this would be completed prior to the EAHCP expiration date, thus ensuring no interruption in ESA coverage for the permittees.

Each of these five options is described in more detail and evaluated in the following sections. This evaluation includes a discussion of the process by which the option is conducted, identifying typical benefits and drawbacks of each option, describing the general range in timeline and cost to complete

each option, and citing relevant case studies for each option. Although each is evaluated separately, aside from allowing the permit to expire, the options are not mutually exclusive. Chapter 4, *Recommendations*, presents a summary comparing each option (or combination of options) and its benefits and drawbacks to address the permittees' current needs, which are described in Chapter 3, *Potential EAHCP Changes to Consider*.

Permittees who wish to make any of these changes should begin by contacting USFWS to discuss the desired change. Once the permittee and USFWS agree on the best approach, the permittee should coordinate with USFWS to identify the components of the permit or HCP to be changed and the necessary procedural steps, as described below.

2.1 Allow Permit to Expire

Questions addressed in this section:

- *What is the purpose of evaluating this permit option?*
- *What happens to the EAHCP if the permit is allowed to expire in 2028?*
- *What would the ESA compliance process be like if the EAHCP permit expired and was not renewed?*

Because of the importance of maintaining the EAHCP program and the take authorization it provides, we do not expect the EAHCP permittees to allow the permit to expire. The permittees will continue withdrawing groundwater from the Edwards Aquifer and using the spring ecosystems for recreation and other uses long after 2028. However, as a useful reference point, it is important to consider what would happen if the EAHCP permit expires. This scenario demonstrates the value of the EAHCP to those that may question its usefulness, reminds permittees, users, and stakeholder of why EAHCP is important, and can motivate decisions or actions. This section explores these possible outcomes.

The current ESA compliance process under the EAHCP provides take authorization for the permittees to conduct activities affecting or dependent on the Edwards Aquifer and is summarized above under Section 1.2.2, *Key Elements of the HCP*. For example, the following covered activities receiving take coverage currently would no longer be covered for their impacts on listed species in the Edwards Aquifer:

- EAA withdrawing (and authorizing SAWS to withdraw) groundwater from the aquifer for beneficial uses (e.g., residential and agricultural uses)
- SAWS providing water to residences, businesses, and other end users in San Antonio and parts of Bexar and other surrounding counties, authorized by the EAA to pump water from the Aquifer
- City of New Braunfels allowing recreational use of Comal Springs and diverting water for irrigating the Landa Park Golf Course
- City of San Marcos allowing recreational use of the San Marcos Springs, including wading and boat use
- Texas State University allowing recreational use in San Marcos Springs, conducting educational activities within Spring Lake, and diverting water from Spring Lake and the San Marcos River for beneficial use

Should the EAHCP permit be allowed to expire in 2028, these activities listed above, and all other activities covered under the HCP, would no longer have take authorization under the ESA. All the threatened and endangered species covered by the EAHCP would remain listed. Two of the three non-listed covered species are under review for listing and may become listed by 2028 or soon thereafter. Continued take of listed species by any of the covered activities would require a take permit. Any public or private entity that takes listed species would be responsible on their own to seek take authorization directly from USFWS.

This take authorization could be obtained on a project-by-project or agency-by-agency (i.e., for entire programs) basis. If projects or programs have a federal nexus, ESA take authorization would be possible through Section 7 of the ESA. However, most on-going water operations typically lack a Section 7 nexus. Project proponents who need take authorization, but do not have a Section 7 nexus, would be left to prepare their own HCP. This by-project or by-agency HCP process would be expensive, time-consuming, and likely ineffective at providing for the conservation of listed species in the aquifer because of its piecemeal approach. The EAA would also still be required by the EAA Act, to "…ensure that [] the Comal Springs and the San Marcos Springs are maintained to protect endangered and threatened species to the extent required by federal law…"[9] Should the permit be allowed to expire, the extensive negotiations for agreeing on minimum spring flows to maintain these species would be lost.

In addition to the loss of an ESA compliance process for users of the Edwards Aquifer, the implementation of ongoing conservation measures by the permittees would cease. Without these conservation measures contributing to the recovery of the covered species, their status would likely decline. This might trigger listing petitions and, possibly, listing decisions for some of the species currently not listed, and with a worsening status, any entity seeking their own take authorization through an HCP is likely to face increasing mitigation requirements as compared to the commitments in the EAHCP. Many project- or agency-specific HCPs would also have substantially lower economies of scale than the single, comprehensive EAHCP program, likely resulting in relatively higher cost to each permittee as compared to the EAHCP today.

The timeline of this permit option is simple for the EAHCP—there is no time involved in allowing the permit to expire. However, the timeline implications should also consider the need for current EAHCP permittees to apply for and obtain their own take authorization through separate HCPs later. Assuming this is feasible, separate HCPs could take several years to prepare and negotiation with USFWS, including separate NEPA compliance for each HCP. The cost range of this option could vary tremendously depending on which EAHCP permittees seek their own incidental take authorization and how long that process takes. Total costs for all permittees could ultimately extend to several million dollars, split among those seeking their own incidental take permits.

[9] Edwards Aquifer Authority Act, Section 1.14(h)

2.2 Amend Permit to Extend Duration Only

Questions addressed in this section:

- *What is the process to extend the duration of the EAHCP permit without changing anything else?*
- *How long would it take to prepare and how much would it cost?*
- *What are the benefits and drawbacks of this approach?*

Extending the permit duration only—also called *permit renewal*—is the simplest form of HCP amendment. A permit renewal only changes the permit's expiration date. It cannot change the amount of authorized take or any other components of the plan or permit. The permit renewal applies to the HCP at the time of the renewal, not a renewal of the original HCP. In other words, the HCP would be renewed in its form at the time of permit renewal. Any administrative changes or permit amendments made up until the point of permit renewal would be carried forward into the new permit renewal period.

To apply for a permit renewal, a permittee must contact USFWS and request a renewal at least 30 days prior to permit expiration. Federal regulations allow the permit to remain in effect while USFWS considers and processes the request.[10] No NEPA compliance is required. However, USFWS must advertise the proposed permit renewal in the *Federal Register* prior to its approval. This is a feasible option for consideration by the EAHCP permittees if no other changes are needed at the time of permit renewal. The following sections identify the potential benefits and drawbacks of this option.

2.2.1 Benefits

Avoid Opening the Plan to Challenges from Stakeholders. Renewing the permit without changing any other components of the plan would avoid opening up components of the plan to challenges from stakeholders with different views of the EAHCP, where compromise could be difficult. For example, environmental groups may assert that the EAHCP has not met its conservation obligations, whereas others may feel that they have made significant sacrifices to ensure that the EAHCP's minimum springflow requirements have been maintained. Simply renewing the permit would allow the EAHCP to continue to operate with the status quo and avoid creating a potentially contentious debate among stakeholders and the public about what to change or not change.

No Administrative Burden to Adjust to Changes. This is the simplest and fastest permit renewal option. The permittees, via established processes—such as the Implementing Committee[11] and Stakeholder Committee[12]—have been implementing the EAHCP for over 7 years. Proceeding with

[10] 50 Code of Federal Regulations 13.22 (for USFWS)

[11] The Implementing Committee, as defined on page 35 of the Funding and Management Agreement, is composed of voting members from each of the five permittees and non-voting members that support the HCP Program Account with annual funding of at least $400,000. The only non-voting active member of the Implementing Committee as of this report is the Guadalupe Blanco River Authority.

[12] The Stakeholder Committee, as defined on page 38 of the Funding and Management Agreement, is composed of representatives from each of the permittees and other organizations listed in the Funding and Management Agreement or henceforth invited by the permittees to join the Stakeholder Committee. As of this report, there are 27 members of the Stakeholder Committee.

the status quo would benefit the permittees by presenting no adjustments to implementing the EAHCP.

2.2.2 Drawbacks

Current Plan Remains Unchanged. A permit renewal alone cannot address any other components of the plan besides the permit expiration date. Therefore, any components of the plan that the permittees wish to adjust or improve must be addressed in a separate permit action. No plan changes can be proposed as part of a permit renewal.

2.2.3 Estimated Timeline and Cost

The timeline for a permit renewal would be relatively short, and the cost would be minimal. The EAHCP permittees would need to contact USFWS and request a renewal at least 30 days prior to permit expiration (i.e., by March 1, 2028). USFWS would allow the permit to remain in effect while it considers and processes the renewal request. The total time involved would be approximately 4–6 months if the EAHCP permittees requested a permit extension of 15 years or less, but longer if a longer permit duration were requested. The time involved would also depend on the amount of information USFWS requires to consider the permit renewal request.

The cost would only be the administrative time for the Implementing Committee to consider and pass a motion to request a permit renewal and complete the necessary letter to USFWS and the permit renewal application. If the Implementing Committee submits the necessary information about the remaining take authorization, USFWS is likely to process and approve the renewal request relatively quickly, within 1 to 2 months.

2.2.4 Case Studies

Metropolitan Bakersfield Habitat Conservation Plan

The Metropolitan Bakersfield Habitat Conservation Plan (MBHCP) in California was one of the first regional, multispecies HCPs in the country, approved in 1994 with a 20-year permit duration. The original goals outlined in the MBHCP were to protect and enhance native habitats that support threatened and endangered species while allowing urban and rural development projects to proceed as set forth in approved local land use plans. Prior to the permit expiring in 2014, USFWS extended the incidental take permit by 5 years, to 2019. The permit was then again extended by USFWS until another 3 years, to 2022. Rather than amend the original MBHCP, the permittees (i.e., the City of Bakersfield and Kern County), with concurrence from USFWS, decided to replace the old HCP with a new HCP for the following reasons:

- The implementation regulations of the ESA and Section 10(a)(1)(B) permits have changed in important ways since 1994 that require new components of for HCPs, such as biological goals and objectives, a monitoring and adaptive management plan, and No Surprises assurances.
- The 1994 MBHCP was very general, which has required additional coordination between the permittees and USFWS to clarify aspects of the plan to ensure that it is being implemented according to the permit terms and conditions. For example, the covered activities are not stated very clearly, so frequent communication is necessary between the permittees and USFWS to decide which activities are or are not covered by the plan.

- There have been some substantial changes to species information since the MBHCP was approved. The biggest issue is the urban population of San Joaquin kit fox (*Vulpes macrotis mutica*) in Bakersfield, which has grown substantially since the MBHCP was approved. Although the MBHCP covers kit fox, it does not address the urban kit fox population, which is presently the at the highest risk for take, a critical shortfall of the existing plan to address take coverage needs.
- Permittees are proposing to remove five covered species from the original HCP and add four new covered species, a significant change to the composition of covered species, necessitating an entirely new conservation strategy.

ICF is currently preparing a new HCP for the City of Bakersfield and Kern County[13] to replace the MBHCP. A public draft of this HCP is expected to be released in 2021.

2.3 Administrative Changes

Questions addressed in this section:

- *What is the typical process for an administrative change to an HCP?*
- *What is the process now for administrative changes to the EAHCP? Do they work well?*
- *What are the benefits and drawbacks of administrative changes?*
- *How long would administrative changes take to prepare, and how much would they cost?*

The process for administrative changes is often described in the HCP itself. If an HCP does not have a prescribed process for changes in implementation, the process can be determined by coordinating with USFWS. Administrative changes would typically be accomplished by one or more of the following actions:

- Clarifying and correcting the EAHCP through an addendum and reissue of the updated document
- An exchange of letters with USFWS to document the change to the EAHCP
- A minor amendment to the HCP or permit that does not require *Federal Register* notice or additional NEPA review

As in most HCPs, the EAHCP specifically addresses the processes for administrative changes and amendments.[14] On page 9-3, the EAHCP refers to administrative changes as either "Clarifications" or "Minor Administrative Amendments." Clarifications are defined as changes that "do not change the substantive portions of any of the documents in any way but merely clarify and make more precise the provisions as they exist." Clarifications are implemented by submitting a proposed change to USFWS for their approval within a requested 30-day period. According to the EAHCP, Clarifications must be provided in writing through a letter agreement or substituted plan documents between the

[13] City of Bakersfield. No date. *The Bakersfield Habitat Conservation Plan* website. Available: http://www.bakersfieldhcp.us/.

[14] The Funding and Management Agreement, Article Seven – Adaptive Management Process (AMP) also defines procedural steps for changes to the EAHCP or permit. *Routine AMP Decisions* are defined as decisions involving ongoing, day-to-day matters related to management and administration of conservation measures.

permittees and USFWS. Examples of Clarifications include correcting errors in the EAHCP, changes in the personnel implementing the plan, and adjustments in day-to-day management decisions.

This process for plan clarifications is more stringent than most modern HCPs. Typically, HCP permittees are allowed to implement their own plan clarifications and simply notify USFWS of those changes. Most HCPs do not require preapproval by USFWS for simple plan corrections or clarifications.

Minor Administrative Amendments are defined as changes that do not make substantive changes to any of the provisions of the documents, but which may be necessary to represent more fully the overall intent of the permittees and USFWS. Examples of Minor Administrative Amendments include minor revisions to monitoring or reporting procedures and minor revisions in accounting procedures.

The process for Minor Administrative Amendments is more extensive than that for Clarifications. Minor Administrative Amendments require submittal in writing to USFWS a description of the proposed amendment, explanation of why the amendment is necessary or desirable, and an explanation of why the proposed amendment will not change the effects described in the HCP (i.e., result in changes that would affect amount of take that USFWS authorized in the incidental take permit). These changes require public noticing and posting the proposed amendment on the EAHCP website for public comment. The proposed minor administrative amendment must then be approved by the USFWS Field Supervisor, documented by written authorization within 30 days.

Similar to Clarifications, the EAHCP process for Minor Administrative Amendments is more transparent than in most HCPs. Although most HCPs would require approval in writing by USFWS of all proposed minor amendments, they would typically not require those proposals be made publicly available and reviewed prior to adoption.

There have been 20 administrative changes to the incidental take permit or EAHCP as of the end of 2019, 10 of which were Clarifications and 10 of which were Minor Administrative Amendments.[15] These changes primarily address adjustments to how the plan is administered (e.g., personnel and processes) and small adjustments to conservation measures conducted under the plan. Conservation measure adjustments include changes to biological or management objectives to clarify or more fully represent the overall intent of the EAHCP. A special case of administrative change related to adjustments to the conservation program is described in the EAHCP. These changes, known as a "routine adaptive management plan (AMP) decision," are described in the Funding and Management Agreement that accompanies the EAHCP. Routine AMP decisions are defined as involving ongoing, day-to-day decision related to the implementation of Phase I or II conservation measure. The routine AMP decision-making process is used to adjust conservation measures to ensure that they better meet the biological goals and objectives of the HCP. The Funding and Management Agreement also describes nonroutine AMP decisions, which may result in an administrative change or permit amendment, depending on the nature of the change. The process by which these decisions are made is described in the Funding and Management Agreement and uses the Implementation Committee, Stakeholder Committee, and Science Committee, all in coordination with USFWS.

[15] These amendments and clarifications are listed in Appendix A2 of the 2019 Annual Report. In two cases, Clarifications and Minor Administrative Changes were accomplished with the same document; they are counted separately for this report. In addition, two "informational" adjustments were made at the beginning of the plan (in 2013 and 2014) that are considered the same as a Clarification for the purposes of this report.

2.3.1 Benefits

Familiar Approach. Administrative changes are commonly used on many HCPs to address issues that arise during implementation. In the case of EAHCP, administrative changes have already been completed 20 times over 7 years of implementation, demonstrating a familiarity with the approach that will minimize uncertainty, timeline, and cost.

Target Specific Issues. The permittees can pursue administrative changes to address very specific issues in the EAHCP or its program documents. Depending on the issue, the administrative change can be relatively simple or more complicated, requiring more coordination with USFWS.

Avoid Opening Up the EAHCP to Extensive Public Scrutiny. Similar to the benefit of only extending the EAHCP's permit duration, pursuing only administrative changes could avoid opening up the EAHCP to extensive public scrutiny that could increase the risk of negative public perception of the plan. Clarifications are not released for public review. Proposed Minor Administrative Changes are posted on the EAHCP web site for public review prior to adoption. As described in the next option, a more formal amendment, in contrast, would be publicly noticed and undergo more extensive public review and comment before adoption by USFWS and the EAHCP permittees.

2.3.2 Drawbacks

Cannot Address All Issues. As noted previously, administrative changes can only be used to address issues that do not require amending the permit. Specifically, they could not be used to address what the EAHCP defines as "Substantive Amendments" (see page 9-4 of EAHCP) which would include the following:

- The listing under the ESA of a species that is not covered by the HCP and may be taken by covered activities
- Any change to a covered activity, including funding, that may affect take, the effects to covered species, or the nature or scope of the minimization and mitigation measures in a manner or to an extent not previously considered in issuing the incidental take permit (ITP)
- Any other modification of the covered activities that causes an effect to the covered species not considered in the original ITP

As a result, certain substantive implementation issues could not be addressed via administrative change, such as adding a covered activity, adding a permittee, adjusting take authorization, or adjusting the permit area.

Administrative Changes May Become Difficult to Track. A potential drawback of using administrative changes to address issues with the HCP or its implementation is that, as the number of these changes grows, it may be become increasingly difficult to track them. Thus far, the EAHCP has documented well all administrative changes that have occurred[16]. However, as implementation proceeds, the number of changes will accumulate and may become more difficult to track against the original or current version of the HCP.

[16] Documented in Appendix A2 of the 2019 Annual Report and in updated EAHCP documents (track change) that incorporate those changes.

2.3.3 Estimated Timeline and Cost

The time and cost of administrative changes is highly dependent on the level of complexity of the administrative change. As has been the case to date, most administrative changes could be completed at a relatively low cost and over a relatively short timeline. At the low end of potential costs, the EAA could prepare its own request for an administrative change with little or no consultant support. A more complex administrative change that requires consultant support may cost in the range of $10,000 to $150,000 to document and justify. The cost would also include the administrative time for the EAHCP staff to prepare and present the proposed administrative change to the Implementing Committee and Stakeholder Committee to consider and vote on the recommendation. It would also include time for the EAHCP staff to complete the necessary correspondence with USFWS to document the administrative change.

A simple administrative change would likely take 3 months or less to prepare and receive approval from USFWS. A more complicated administrative change (e.g., a Minor Administrative Amendment) might take 3-6 months to prepare and get approved by the committees and USFWS.

2.3.4 Case Studies

Santa Clara Valley Habitat Plan

The *Santa Clara Valley Habitat Plan* is an HCP and Natural Community Conservation Plan (under California's Natural Community Conservation Planning Act). The plan covers urban development and a range of public infrastructure projects in a 520,000-acre study area for a 50-year permit. The plan covers 18 species, including the western burrowing owl (*Athene cunicularia*), tricolored blackbird (*Agelaius tricolor)*, least Bell's vireo (*Vireo bellii pusillus*), California red-legged frog (*Rana draytonii*), California tiger salamander (*Ambystoma californiense*), Bay checkerspot butterfly (*Euphydryas editha bayensis*), and several endemic plant species. Several local jurisdictions were involved in developing the HCP: the cities of San Jose, Gilroy, and Morgan Hill, Santa Clara County, the Santa Clara Valley Transportation Authority, and the Santa Clara Valley Water District.

The Santa Clara Valley Habitat Agency is a joint powers authority established by the Habitat Plan permittees to implement the plan. The agency conducts and documents administrative changes with Plan Interpretation Memos. These memos are archived on the agency's web site on a page clearly linked to the agency's home page. Each memo is listed chronologically and has a unique identification number. The memos are organized consistently, identifying the topic of the change, justification for considering the change, which specific component of the plan it relates to and a determination for the change. The agency has posted 27 of these plan interpretation memos.[17]

Balcones Canyonlands Conservation Plan

The Balcones Canyonlands Conservation Plan (BCCP) was approved by USFWS in 1996. The HCP and its incidental take permit provide take authorization for a wide range of covered activities in the City of Austin and in Travis County, Texas across a plan area of 561,000 acres. The BCCP covers seven listed species (golden-cheeked warbler [*Dendroica chrysoparia*] and six karst invertebrates), one de-listed species (black-capped vireo [*Vireo atricapilla*]), and two plants of concern, and 25

[17] Available: https://www.scv-habitatagency.org/297/Plan-Interpretations.

karst invertebrates of concern. The plan quantifies allowable take of covered species in terms of loss of habitat.

The BCCP is one of the first regional multi-species HCPs approved in the country, and one of only a few plans that was developed as a combined HCP and Environmental Impact Statement document. Combining the HCP (the proposed action) with the NEPA review conducted through analyzing several alternatives to the HCP makes it challenging to discern what the final approved HCP is. It also makes the document more prone to inconsistencies and errors. Given its age, the plan was completed prior to modern geographic information system (GIS) software, meaning that it relies on hand-drawn maps and suffers from geographic inaccuracies that can lead to ambiguity and confusion.

In 2015, the BCCP adopted a Cave Substitution Policy as an administrative change in coordination with USFWS to allow more flexibility in how it mitigates for the take of karst invertebrate species. The BCCP also relies extensively on the institutional knowledge of staff involved with the plan since its inception to properly implement it. As the end of the BCCP's 30-year permit term approaches in 2026, the City of Austin and Travis County are proceeding with a two-phased approach to extending the permit term. Phase one involves a BCCP document "makeover" to modernize the document, remove the EIS to create a standalone HCP, and to incorporate clarifications and administrative changes, and determine if any major amendments are needed. Phase two involves incorporating major amendments, as needed, and extending the permit term beyond 2026.

2.4 Major Permit Amendment

Questions addressed in this section:

- *What is the typical process for an HCP permit amendment?*
- *What components of HCPs are typically amended?*
- *How common are HCP amendments, and who typically performs them?*
- *What are the benefits and drawbacks of a permit amendment?*
- *When is an HCP too old to amend, and when must it be replaced instead?*
- *How long would an amendment take to prepare, and how much would it cost?*

The *2016 HCP Handbook* defines a major amendment as any change that cannot be done administratively. A major permit amendment is a flexible tool that allows permittees to amend their HCP as often as needed. A permit amendment can amend one or many aspects of an HCP at once. In theory, there is no limit to the scale and scope of an amendment. However, at some point, if there are many changes proposed or the scope of the changes is such that it could result in completely changing the conservation strategy, it may be better to simply replace the HCP with a new and completely updated plan (see the *Metropolitan Bakersfield HCP* case study described above).

Another consideration as to the scale and scope of the amendments proposed is whether the changes trigger a new *Federal Register* notice and a supplemental or new NEPA analysis. The triggers for either of those will depend on the nature of the changes proposed. For example, adding covered species or increasing the allowable take is likely to trigger both a *Federal Register* notice and a supplemental NEPA analysis.

HCP permittees initiate a permit amendment with the same USFWS application form as applying for a new incidental take permit.[18]

The EAHCP defines plan and permit amendments as *Substantive Amendments* and identifies these types of changes to include

> (a) the listing under the ESA of a new species not currently addressed in the HCP that may be taken by Covered Activities; (b) the modification of any Covered Activity or minimization and mitigation measure under the HCP, including funding, that may affect take, the effects of the Covered Activities, or the nature or scope of the minimization and mitigation measures in a manner or to an extent not previously considered in issuing the ITP; and (c) any other modification of the Covered Activities that causes an effect to the Covered Species or critical habitat not considered in the original ITP.

The EAHCP does not describe the process by which the permittees would consider and carry out a substantive amendment, other than to say that "a Substantive Amendment of the ITP must be treated in the same manner as an original permit application."[19] However, the Funding and Management Agreement, which includes the details of the EAHCP's adaptive management process, also identifies the process by which a permit amendment would be made for certain changes. The Funding and Management Agreement identifies nonroutine AMP decisions, one of which is any decision that changes a Phase I or Phase II conservation measure that requires a permit amendment. The process by which the EAHCP committee and USFWS propose, review, and approve nonroutine AMP decisions is also described in the Funding and Management Agreement. For the Implementing Committee to be able to approve the decision, the change to the conservation measure must not be "substantially less likely to achieve the Biological Goals and Biological Objectives than the Conservation Measure Described in the HCP…"[20]

Although the EAHCP has made other types of nonroutine AMP decisions, none of these have resulted in a major amendment of the EAHCP or incidental take permit to date.

2.4.1 Benefits

Flexibility. As described above, the benefit of a major amendment is that it is very flexible in accommodating desired changes to the HCP or incidental take permit. For instance, a plan amendment would allow the permittees to do any or all of the following:

- Add new permittees who may want to join the plan
- Adjust conservation measures in major ways to ensure that they are more effective, feasible, or cost effective to achieve than the original conservation measures.
- Add covered species if new species are listed during the permit term.
- Remove non-listed covered species that no longer appear likely to be listed during the permit term.
- Add or remove covered activities.

[18] Form 3-200-56 (Rev. 10-2017). Available: https://www.fws.gov/forms/3-200-56.pdf.

[19] Page 9-4 of the EAHCP

[20] Funding and Management Agreement, page 54.

Federal Funding. Federal grants are now available to support HCP amendment preparation and NEPA compliance for amendments. Starting in the 2019 Fiscal Year, the Cooperative Endangered Species Conservation Fund offered HCP Planning Assistance grants for HCP preparation and HCP amendment preparation. These grants, which are administered by USFWS under Section 6 of the ESA—the grants are often called "ESA Section 6 grants" for that reason—are available annually through a competitive nationwide application process. These grants typically provide up to 75 percent of planning costs with a minimum 25 percent local match. HCP Planning Assistance grants are capped at $1.0 million per plan per year.

2.4.2 Drawbacks

Any permit amendment creates some risk that stakeholders may want to change the plan and the permit in ways that may compromise the biological benefits achieved so far. Ultimately, USFWS must approve a permit amendment using the same permit issuance criteria that were used for the original permit. This approval process provides a safeguard against changes to the plan that might undermine its biological benefits. However, a permit amendment may be susceptible to local political pressures. The level of risk of a permit amendment depends in large part on how substantially the permittees want to change the plan. By proposing few changes to the plan, the permittees can portray the amendment as focused and perhaps avoid pressure to change more components. Many proposed changes to the plan may open it up to more scrutiny by stakeholders and the public. It is common for HCP permittees to be hesitant about a permit amendment because of the perceived risk of "opening up" the plan to changes the permittees may not want to make. However, the changes they propose are up to the permittees. In the EAHCP's case, all co-permittees must agree to proposed changes to the plan and permit.

2.4.3 Estimated Timeline and Cost

The time required to prepare and get approved a major permit amendment depends primarily on how many changes the permittees propose to make. The time required to prepare the amendment will also depend on the scope of the change and how uncertain the potential outcomes. For example, some proposed changes could result in studies recommended by the Science Committee that would extend the schedule and increase costs.

A major amendment that requires a *Federal Register* notice, additional NEPA compliance, and modest stakeholder and public involvement is likely to take approximately 12–18 months to prepare and process with USFWS. If proposed changes are very extensive, then the timeline could exceed 2 years to prepare the amendment, conduct the necessary analysis, and prepare and process a NEPA document. The NEPA compliance necessary for a major permit amendment is likely to be an Environmental Assessment (EA), rather than an Environmental Impact Statement (EIS) because there is likely no need to increase the authorized take limit. The Department of the Interior currently mandates that federal agencies complete all EAs within 6 months of submitting a permit application with a draft HCP amendment and draft EA.[21] This accelerated timeline is factored into the timeline estimates above.

Similar to the timeline, the cost of a permit amendment varies considerably depending on the scope of the amendment and the nature of the stakeholder and public outreach needed or desired. The

[21] Secretarial Order 3355 (August 31, 2017), and August 6, 2018 memo from Deputy Interior Secretary.

cost range of a major permit amendment is much wider, owing to the uncertainties in its scope, stakeholder and public involvement, and schedule. A major permit amendment with a modest scope would likely cost in the range of $100,000 to $300,000 for the HCP and another approximately $50,000 to 100,000 for the EA. For a major permit amendment with a large scope, costs for both the HCP and EA would be approximately 50 percent higher.[22]

2.4.4 Case Studies

San Bruno Mountain HCP

The San Bruno Mountain HCP, with a permit duration of 30 years, was the first HCP to be approved in the country in 1983. Original permittees include the County of San Mateo and Cities of Brisbane, Daly City, and South San Francisco. The plan originally covered three federally listed species: the mission blue butterfly (*Icaricia icarioides missionensis*), San Bruno elfin butterfly (*Callophrys mossii bayensis*), and San Francisco garter snake (*Thamnophis sirtalis tetrataenia*). It did not cover any unlisted species because it was approved prior to USFWS's No Surprises policy, and unlisted species could not be covered. The plan area covers 3,500 acres of private and public park land and is administered by San Mateo County.

The HCP has been amended five times: twice in 1985, 1986, 1990, and 2009. In 2013 the permit was renewed for another 30 years, through 2043. Early amendments adjusted the plan area boundary and added covered activities (e.g., temporary landfill) not considered in the original plan. In 2009, a major amendment was completed to add two covered species, callippe silverspot butterfly (*Speyeria callippe callippe*) and Bay checkerspot butterfly (*Euphydryas editha bayensis*). The callippe silverspot butterfly was listed as endangered in 1997 and the HCP amendment authorized take of almost 20 acres of habitat for the species. The Bay checkerspot butterfly was listed as threatened in 1987, but it has not been observed in the plan area since the mid-1980s. It was added to the incidental take permit in case it is reintroduced or recolonizes naturally within the plan area. The amendment also reconfigured areas designated for development and conservation to increase the conservation value, added recreational activities to the list of covered activities, and added a new funding source to address long-term management costs that were much higher than originally anticipated due to new invasive species issues. In order to complete the amendment, ICF prepared for USFWS an EA and Finding of No Significant Impacts in 2009.[23]

Washington Department of Natural Resources State Trust Lands HCP

The Washington State Department of Natural Resources (DNR) HCP was approved in 1997. It covers 1.6 million acres of Washington state trust lands, six federally listed species, and 46 unlisted species. Covered activities include forest management activities, oil and gas production, and recreation activities. The plan has a 70-year permit duration, longer than typical regional HCPs, in order to encompass the full duration of forest management covered activities.

The original HCP included an interim conservation strategy for the marbled murrelet (*Brachyramphus marmoratus*). During the mid-1990s when the HCP was developed, not enough was known about murrelet habitat use to design and implement a long-term conservation strategy, and

[22] In all cases, these estimates do not include local staff costs or specialized services such as external legal support or stakeholder facilitation.

[23] 74 FR 50985

USFWS had not yet developed a recovery plan for the murrelet. Therefore, the interim conservation strategy included studies to identify marbled murrelet habitat relationships within the plan area; these studies were largely completely between 1997 and 2010.

With new information gained from murrelet habitat studies, Washington DNR and USFWS developed the long-term conservation strategy from 2012 to 2016, and DNR proposed to amend the HCP to include the revised strategy. The draft amended HCP and revised draft EIS were published in September 2018 and the amended HCP and Final EIS were published in September 2019.

Lower Colorado River Multi-Species Conservation Plan

The Lower Colorado River Multi-Species Conservation Plan (MSCP) was approved in 2005, covering 718,000 acres of the lower Colorado River and adjacent floodplain in Arizona, California, and Nevada. The plan covers operation, maintenance, and repair of water diversion facilities, with a 50-year permit duration. Originally, the plan covered six listed species and 12 unlisted species. In 2017, the Lower Colorado River MSCP was amended to add the northern Mexican gartersnake (*Thamnophis eques*) as a covered species. The northern Mexican gartersnake was not considered for coverage during development of the plan because it was believed to be extirpated within the plan area. However, in 2011 and 2012, the Arizona Game and Fish Department discovered the species in the plan area, on the Bill Williams River, which is within a designated conservation area of the plan and may result in creation of habitat and further expansion by the gartersnake. In 2014, USFWS published a final rule to list the northern Mexican gartersnake as threatened and proposed critical habitat that included portions of the Bill Williams River.[24] In June 2017, the Lower Colorado River MSHCP steering committee recommended that the plan be amended to add the gartersnake as a covered species.[25] USFWS published a draft EA to amend the HCP in November 2017, and the amendment was completed in March 2018.

2.5 Replace EAHCP with New HCP

Questions addressed in this section:

- *What is the difference between a major amendment to the permit and replacing it with a new HCP?*
- *Are there advantages to developing a new HCP that would not be available through the amendment process?*
- *How long would it take to prepare a replacement HCP and how much would it cost?*
- *What are the risks and benefits of a replacement plan?*

Developing a new HCP to replace an existing HCP is typically considered for HCPs that are out of date and those approved prior to the No Surprises Assurances policy, established in 1998[26]. Situations in which it may be appropriate to replace an old HCP include:

- An original plan that included covered species that now have very low likelihood of listing.

[24] 82 FR 56261

[25] Lower Colorado River MSCP HCP Steering Committee Resolution 17-003

[26] 63 FR 8859; 1998

- Very different understanding now of need for take authorization.
- Have levels of take authorization in original HCP that greatly overestimate or underestimate actual needs.
- Implementation has turned out very differently than predicted in original HCP.
- Need to dramatically change permittees (more or less).
- The funding program of the original HCP is no longer appropriate.

The EAHCP is a relatively new plan prepared under current regulations, to which none of the criteria identified above apply. The plan is also functioning well, as indicated by the improving status of the covered species and strong approval by many stakeholders. Therefore, replacing the EAHCP with a new HCP is not appropriate. However, this option is presented for information purposes in case regulations or other conditions change dramatically in the next 5–7 years, which may warrant considering a new HCP.

As discussed in the last section, a major amendment is a flexible option that can include a few changes to an existing HCP or many changes. However, when many changes are proposed to an existing HCP, the permittees should consider whether simply replacing the old HCP with a new HCP is a better option.

The 2016 HCP Handbook does not describe preparing a new HCP as an alternative to a permit amendment, but it can be done. For example, the City of Bakersfield and Kern County, California, extended their existing permit term for the Metro Bakersfield HCP (1994) and are preparing a new HCP to replace it, as described above in Section 2.2.4, *Case Studies* (for Amend Permit to Extend Only).

There is no clear rule as to when proposed changes reach a level that exceeds what an amendment is designed for and therefore warrants a new plan. The fundamental differences between a major amendment and a replacement HCP is that (1) the original permit is allowed to expire, but is replaced with the new HCP and permit, whereas an amended permit is renewed, and (2) the original HCP is completely replaced rather than revised. Otherwise, there are no technical differences between a major amendment and a new HCP. In both an amended and replaced HCP, the permittee must describe the changes proposed and the basis for those changes; in both cases, USFWS must comply with NEPA by publishing the appropriate NEPA document—either an EA or EIS.

2.5.1 Benefits

Clarify and update the HCP based on lessons learned. A new HCP has the unique advantage of being able to say exactly what permittees want to say about how implementation will work, based on years of implementation experience so far. This would be possible but more difficult with an HCP amendment because an amendment rewrites only small portions of the existing HCP. A new HCP could be reorganized and streamlined to be as clear and concise as possible while still containing all the implementation critical to its proper implementation.

Update the data, science, assumptions. A new HCP would require a complete update to the environmental baseline, including vegetation maps, the status of the covered species, and any models used to support the analysis (e.g., species habitat models, population viability models). Extensive monitoring has been conducted on some of the covered species since 2013. This monitoring data could be used to establish new long-term biological objectives and more effective

conservation measures. If by the time the permit is up for renewal the status of the covered species improves substantially as a result of the EAHCP, a new HCP could also be used to re-assess the conservation obligations of the plan. It may be appropriate at some point and for some covered species to reduce the standard of the HCP from contributing to species recovery (the standard of the current plan) to simply mitigating the impacts of the taking to the maximum extent practicable (the regulatory standard of all HCPs).

Federal funding. A new HCP is eligible to receive substantial federal funding under the Cooperative Endangered Species Conservation Fund. Each year, under this grant program, USFWS awards up to $1.0 million per plan for HCP planning assistance.[27] In FY 2019–20, USFWS awarded a total of $9 million nationwide for HCP planning assistance. The grants are awarded through a competitive selection process under Section 6 of the ESA, *Cooperation with States*. Local HCP applicants must work with their state wildlife agency—in this case, Texas Parks and Wildlife Department—to develop and submit the grant application to USFWS. If awarded, the local agency preparing the HCP enters into a grant contract with its state wildlife agency to receive the funds as reimbursement for work performed. All federal grants must be matched by local funding of at least 25 percent; more points are awarded for a larger match, up to 55 percent. Plans can receive multiple awards, with no limit on maximum funding.

Flexible timing. The new HCP can be prepared during a permit extension, as demonstrated by the MBHCP HCP example, described above in section 2.2.4, *Case Studies*.

2.5.2 Drawbacks

Perception of Starting Over. There may be important differences between an amendment to the EAHCP and a new plan in terms of perception by the public and stakeholders. A new HCP may give the public and stakeholders the false impression that the permittees are "starting over" and writing a new plan from scratch, even if the goal is to change some elements, but not others. This perception may embolden stakeholders to push for dramatic changes to the EAHCP that are beyond what permittees want or even feasible. Although this perception is also possible with a major permit amendment, it may be more pronounced with a replacement HCP.

Potential for Increased Mitigation and Monitoring Requirements. A new HCP would be required to reassess all aspects of the plan, including the status of the covered species, mitigation requirements, monitoring, and funding. With far more data available now for the covered species, this analysis may result in mitigation requirements changing from the original plan.

2.5.3 Estimated Timeline and Cost

The replacement HCP would take the most time and cost more than any of the other permit options. The timeline of a new HCP would depend heavily on the nature of the changes and the level of stakeholder and public involvement in the HCP development process. At a minimum, ICF estimates that a new HCP would take 2–3 years to prepare. This includes 6–12 months for data collection, compilation, and modeling, and 1 year to prepare an EIS once the new draft HCP is nearly complete. Currently, each HCP EIS must take no longer than 1 year from the date of Notice of Intent to prepare

[27] This maximum award per plan of $1.0 million has been in place since 2011.

an EIS to USFWS signing the Record of Decision for the EIS.[28] This EIS deadline is assumed to continue. Because a new EAHCP would likely include a robust stakeholder and public involvement process, the new HCP schedule could be extended by another 6–12 months, extending the schedule to a range of 2.5–4 years.

It is difficult to estimate the cost of a replacement HCP without knowing the nature of the changes proposed and the degree to which data, models, and other elements of the plan are updated. The level of stakeholder and public involvement would also greatly influence cost. Given these uncertainties, the range of potential consultant costs for a replacement HCP would be in the range of $500,000 to $1 million or more plus an estimated $500,000 for the EIS. Therefore, the total cost of the replacement HCP would be in the range of $1 million to $1.5 million in today's dollars. This estimate does not include local staff time or the costs of specialized services, such as external legal support or stakeholder facilitation.

[28] Based on Secretary of the Interior Order 3355 on NEPA Streamlining (August 2017) and USFWS memorandum regarding EISs for HCPs (April 27, 2018).

Chapter 3
Potential EAHCP Changes to Consider

Questions addressed in this section:

- *How were these potential EAHCP changes identified and evaluated?*
- *What administrative changes might the EAHCP pursue, and why?*
- *Are there changes to the EAHCP or permit that might need to be addressed by a major permit amendment, and why?*
- *What other EAGCO changes should be considered, that may not require an administrative change or major permit amendment?*

This chapter identifies how the permit options identified in Chapter 2, *Permit Options Available*, could be used to change the EAHCP and, if necessary, also change the incidental take permit. ICF has identified these potential changes, based in part on our review of documents and discussions with individuals described below. It is important to note that our identification of potential changes is based on our own professional judgment and does not necessarily reflect the views of the EAHCP staff, the EAA, or the permittees. The decision about which changes to make to the EAHCP and how to implement those changes ultimately rests solely with EAHCP permittees and USFWS and depends on whether the benefits of the change are worth the time, cost, and effort to make.

To identify potential changes, ICF conducted extensive discussions over a 4-day workshop in February 2020 with EAHCP staff actively implementing EAHCP. This workshop included a site visit to San Marcos, New Braunfels, and USFWS San Marcos Aquatic Resources Center (i.e., species refugia) and interviews of Implementing Committee members. ICF also held meetings with the EAA Board, EAHCP Implementing Committee, EAHCP Stakeholder Committee, and USFWS Austin Field Office staff to discuss their views on EAHCP implementation and permit renewal. ICF reviewed the following documents as well to gain insights into EAHCP and its implementation successes and challenges:

- *Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan* (2012)
- *U.S. Fish and Wildlife Service Incidental Take Permit to the Edwards Aquifer Recovery Implementation Program* (TE-63663A-1; 2013)
- *Funding and Management Agreement by and among the Edwards Aquifer Authority, the City of New Braunfels, the City of San Marcos, the City of San Antonio, acting by and through its San Antonio Water System Board of Trustees, and Texas State University – San Marcos to Fund and Manage the Habitat Conservation Plan for the Edwards Aquifer Recovery Implementation Program*, adopted January 1, 2012
- *Edwards Aquifer Habitat Conservation Plan 2019 Annual Report* (2020)
- *Edwards Aquifer Habitat Conservation Plan Comprehensive Phase II Work Plan (2019)*
- *Edwards Aquifer Habitat Conservation Plan, Transition from Phase I to Phase II, Summary Report and Administrative Record: Processes, Activities, and Decisions*

- *Review of the Edwards Aquifer Habitat Conservation Plan: Report 3, National Academies of Sciences, Engineering, and Medicine (2018)*

Based on this assessment, ICF has identified 23 potential changes to the EAHCP or permit that we believe will improve the plan and its implementation. Potential changes described in this chapter are organized by the key elements of the EAHCP; the order in which potential changes are listed does not reflect any priority ranking on our part. For each change considered, a brief description of rationale and the relevant permit option(s) is provided. Table 3-1, below, summarizes all potential changes considered and identifies which permit option would be the simplest to use to implement the change.

Which permit option the EAHCP permittees choose will depend largely on the nature of the changes desired. As discussed in Chapter 2, *Permit Options Available*, the EAHCP already allows for some changes to occur through the Clarifications or Minor Administrative Amendments process. To date, the EAHCP has made 20 of these types of changes. The EAHCP also specifies a clear process to change conservation measures or monitoring through adaptive management. Some of the changes discussed in this chapter can be accommodated with these existing approaches. In other cases, a more extensive change may be needed, such as a major permit amendment.

Table 3-1. Potential Changes to EAHCP to Consider in Permit Options

Plan/Permit Component	Potential Change to Consider	Simplest Permit Option[1]
Permittees	Add new permittees to the EAHCP or add new covered activities under the jurisdiction of one of the current permittees.	Major permit amendment
Permit Term	Extend the permit term beyond 2028 by another 15 years or more.	Permit renewal
Covered Species	Add biological objectives and take authorization for non-listed covered species, including the Texas Cave diving beetle, Texas troglobitic water slater, and Comal Springs salamander.	Administrative change
Covered Species	Add as covered species those species occurring within the plan area that have a high likelihood of being listed during the permit term.	Major permit amendment
Covered Species	Remove the San Marcos gambusia from the list of covered species in the EAHCP and the incidental take permit.	Major permit amendment
Covered Activities	Add projects occurring in the San Marcos River with the potential to affect covered species, including dam fortification and other in-stream construction projects.	Major permit amendment
Covered Activities	Require all commercial recreation outfitters that operate in the spring systems in the EAHCP plan area obtain Certificates of Inclusion consistent with the plan.	Administrative change
Biological Goals and Objectives	Restructure biological goals and objectives to a more typical structure, with biological goals being more broad statements of desired future conditions and objectives as measurable habitat-based targets.	Administrative change
Biological Goals and Objectives	Increase flexibility in fountain darter habitat long-term biological goals and annual targets to make them more achievable based on information gained from previous management and what is understood about the ecology of the springs systems.	Administrative change
Conservation Measures	Adjust 10% annual disturbance take limit for occupied fountain darter habitat to allow for more year-to-year flexibility.	Administrative change

Plan/Permit Component	Potential Change to Consider	Simplest Permit Option[1]
Conservation Measures	Enhance control of recreational use and public access areas in the San Marcos River during peak visitation periods.	Administrative change
Conservation Measures	Remove dissolved oxygen management as a conservation measure.	Administrative change
Conservation Measures	Establish performance standards for control of nonnative animal species.	Administrative change
Conservation Measures	Remove measure to reduce gill parasites from the EAHCP.	Administrative change
Conservation Measures	Establish performance standards for riparian restoration.	Administrative change
Conservation Measures	Combine the two groundwater forbearance programs of the EAHCP into one program with the same pumping reduction target of 90,000 acre-feet per year in a drought-of-record.	Major permit amendment
Conservation Measures	Add flexibility to the groundwater rights purchase programs to allow the EAA to purchase water rights instead of only allowing term leases or lease options.	Major permit amendment
Conservation Measures	Extend ASR and VISPO groundwater leases and lease options (i.e., forbearance agreements) beyond the permit term expiration date in 2028.	Administrative change
Conservation Measures	Increase flexibility of the EAHCP to achieve springflow protection through additional water conservation programs or securing new sources of groundwater.	Administrative change or amendment, depending on the change
Adaptive Management	Reconsider the use of ecological modeling and applied research as components of the adaptive management process (Section 6.3.3 of the EAHCP) to address high-priority uncertainties that could have implications for covered species conservation measures.	Internal change through adaptive management
Adaptive Management	Evaluate the potential effects of climate change to the Comal and San Marcos springs systems to facilitate extending the permit term beyond 2028.	Internal change through adaptive management
Other Changes	Separate from EAHCP unique procedural provisions of the Funding and Management Agreement that do not support the ESA permit issuance criteria.	Administrative change
Other Changes	Simplify how administrative changes and adaptive management changes are reviewed and adopted by the EAHCP permittees.	Administrative change

[1] Any administrative change could also be included in a major permit amendment, if desired.

3.1 Permittees

3.1.1 Add New Permittees

Change to Consider: Add new permittees to the EAHCP or add new covered activities under the jurisdiction of one of the current permittees.

Background: Anyone who carries out activities or projects that result in take of a listed species must obtain authorization from USFWS to avoid violating the ESA. This authorization can take one of two forms for non-federal activities, either (1) an incidental take statement and biological opinion from USFWS to a federal agency with jurisdiction over the activity, or (2) an incidental take permit issued by USFWS directly to the non-federal entity. Incidental take permits like the EAHCP can be amended to add permittees or add covered activities to expand their partnerships and benefits.

Currently, the EAHCP is used only by the permittees themselves or their contractors. Public agencies that hold incidental take permits can extend their take authorization to persons or entities under their jurisdiction or "direct control," provided that the habitat conservation plan that accompanies that permit covers that entity's activities. Most incidental take permits held by municipalities take this approach, extending their take authorization to private development under their jurisdiction. In Texas, for example, the Southern Edwards Plateau HCP, Balcones Canyonlands Conservation Plan (in Travis County), Hays County HCP, and Comal County HCP all take this approach.

In some cases, municipalities can extend their permit to entities such as special districts or utilities not directly under their control or jurisdiction using an approach called a "participating special entity." This process allows these entities to apply for and use the take permit by committing through a "certificate of inclusion" to adhere to the relevant requirements of the HCP in exchange for a portion of the take authorization held by the public agency permittee. The EAHCP did not contemplate its use by third parties, such as special districts or private developers within, but it did contemplate certificates of inclusion for aquatic recreation outfitters, called "Recreation Certificates of Inclusion" in the plan. This participating special entity process could be expanded relatively easily, if desired.

Rationale: There is an opportunity to expand the benefits and partnerships of the EAHCP by adding new entities as either permittees or as new covered activities under the direct control of one of the permittees. These additions would expand the local partnerships to implement the plan and potentially generate more support for the EAHCP. Adding permittees to the EAHCP would also represent a substantial savings to the new permittee—joining an existing HCP is likely to be far less costly and much faster than developing their own HCP.

Simplest Permit Option: Adding new permittees would require a major permit amendment. Adding covered activities by a new entity under the jurisdiction of one of the permittees would also likely be a major permit amendment.

3.2 Permit Term

3.2.1 Extend the Permit Term Beyond 2028

Change to Consider: Extend the permit term beyond 2028 by another 15 years or more.

Background: Take authorization provided by an incidental take permit is only valid during the authorized term of the permit. The EAHCP incidental take permit was issued for a term of 15 years, expiring on March 31, 2028. To continue the take authorization beyond this date, the EAHCP permittees must extend the permit term.

Rationale: The EAHCP is working well and providing the take authorization to the permittees that it was designed to provide. The permittees will need to continue to withdraw water from the Edwards

Aquifer and the Comal and San Marcos spring systems beyond 2028. The EAA, City of San Marcos, City of New Braunfels, and Texas State University will also continue to implement conservation actions in the spring systems and manage recreational and other uses of the spring systems that will continue to take the covered species. Therefore, the EAHCP permittees would be expected to extend the permit duration beyond 2028.

How much the permittees can extend the permit term beyond 2028 will depend on many factors, including the following:

- **Status of the species.** If the status of the covered species continues to improve as a result of EAHCP conservation measures (i.e., conservation goals to contribute to species recovery), and the EAHCP permittees are willing to commit to the same or similar conservation actions in the future, USFWS will be more likely to grant a second permit term longer than the first, perhaps as much as 20 or 30 years.
- **Scientific uncertainty.** A key factor in the determination of a permit term is the level of scientific uncertainty in the ecology of the covered species, effects of climate change on covered species and their habitat, the effectiveness of conservation measures, or the nature of impacts to the species from covered activities. The EAHCP has already substantially improved the scientific understanding of the covered species through its robust and extensive monitoring program and its funding of scientific studies and reviews of the covered species. This trend of narrowing the scientific uncertainty about the covered species, if it continues, will also increase the likelihood that USFWS will grant a second permit term longer than the first.
- **Level of mitigation and conservation.** The EAHCP was designed to exceed mitigation requirements and contribute to the recovery of the covered species. If the EAHCP permittees continue this approach, then USFWS will be more likely to approve a new permit term longer than the first.
- **Track record of implementation.** By the time the permit is renewed, the EAA and its permittee partners will have amassed a 15-year track record of successful implementation. This successful history of implementation will also increase the likelihood that USFWS can support a second permit term longer than the first term.

Simplest Permit Option: The simplest way to extend the permit term is through a permit renewal that only changes the permit expiration date. As described in Section 2.2, *Amend Permit to Extend Duration Only*, this is a simple process that can be initiated as late as 30 days prior to the permit expiration date. If the EAHCP permittees are amending other aspects of the permit through a major permit amendment anyway, a permit term extension could also be included in the same major permit amendment.

3.3 Covered Species

3.3.1 Add Biological Goals and Objectives for Non-Listed Covered Species

Change to Consider: Add biological objectives and take authorization for non-listed covered species, including the Texas Cave diving beetle, Texas troglobitic water slater, and Comal Springs salamander.

Background: All HCPs are required to include biological goals and biological objectives, typically for each of the covered species. Biological goals are often broad statements of desired future conditions, whereas biological objectives are clear, measurable statements of how the plan will collectively achieve each biological goal. Chapter 4 of the EAHCP includes biological goals and objectives for all of the eight covered species listed at the time the EAHCP was completed. However, the plan does not include biological goals and objectives for the three non-listed covered species: Edwards Aquifer diving beetle, Comal Springs salamander, and Texas troglobitic water slater.

Rationale: Adding biological goals and objectives for the three non-listed covered species would help demonstrate the effectiveness of the HCP in conserving these species, which could help prevent the listing of these species. USFWS anticipates 12-month findings on the Texas Cave diving beetle and Texas troglobitic water slater in fiscal year (FY) 2022. If these species were to be listed in the future, having biological goals and objectives in the EAHCP would serve as a clear measuring point to demonstrate the plan's conservation of these species.

Simplest Permit Option: Biological goals and objectives are not permit terms and conditions, but targets by which to measure plan effectiveness. Therefore, adding biological goals and objectives for non-listed covered species could be accomplished with an administrative change (likely a Minor Administrative Amendment).

3.3.2 Add Covered Species that May be Listed in the Future

Change to Consider: Add as covered species those species occurring within the plan area that have a high likelihood of being listed during the permit term.

Background: When developing the EAHCP, a workgroup in 2010 considered covering 34 rare species (see EAHCP p. 1-9). Species were evaluated against a set of criteria that included the likelihood of listing based on listing petitions or status reviews at the time and professional judgment of those involved.

Rationale: Since the decisions about which species to cover in the EAHCP were made in 2010 and 2011, additional rare species are being considered for listing. For example, USFWS anticipates 12-month findings in FY 2021 on the following species that occur within the EAHCP plan area and that may be affected by EAHCP covered activities:

- Blanco blind salamander (*Eurycea robusta*)
- Comal blind salamander *(Eurycea tridentifera)*
- Texas salamander (*Eurycea neotenes*)[29]
- Toothless blindcat (*Trogloglanis pattersoni*)
- Widemouth blindcat (*Satan eurystomus*)

At the end of the 12-month finding period USFWS will determine whether listing the species is warranted, listing is warranted but precluded, or listing is not warranted. If USFWS determines that listing is warranted, USFWS would begin preparing a listing proposal for this species. Because of the steps involved and the long time period between a listing proposal and listed decision (at least 1

[29] The EAHCP covered species work group decided in 2010 not to cover Texas salamander because it did not overlap geographically with the covered activities (EAHCP p. 1–9). This conclusion should be verified in light of more recent data on the species' range and occurrence.

year), EAHCP permittees should have ample warning before a non-covered species is listed or may be listed. For the species listed above, a final listing decision would likely not occur until at least 1 year after the 12-month finding, which would be during fiscal year 2023 at the earliest. It is beyond the scope of this report to evaluate the risks of take of any of these species for the EAHCP covered activities. However, if there are indications that any non-covered species may be listed, the EAHCP should evaluate carefully whether the permittee need take authorization.

Simplest Permit Options: Major Permit Amendment. Adding covered species to the EAHCP and incidental take permit would require a major permit amendment, with additional NEPA compliance.

3.3.3 Remove San Marcos Gambusia from Covered Species List

Change to Consider: Remove the San Marcos gambusia from the list of covered species in the EAHCP and the incidental take permit.

Background: The last known sighting of the San Marcos gambusia occurred from the San Marcos River in 1983. When the EAHCP was prepared, the species was considered likely to be extinct, but not confirmed as such. Despite this, the permittees decided to cover the species because actions benefitting other covered species would provide benefits to the gambusia, were it to be rediscovered within the spring system.

Since the EAHCP was approved in 2013, no San Marcos gambusia have been found. USFWS intends later this year to formally delist the species due to extinction.[30] The process by which USFWS removes a species considered extinct from the list of endangered species is the same process by which any other species is proposed for delisting and removal. The process would be initiated by an external delisting petition or by USFWS itself and would take approximately 1 year to take effect. Delisting due to extinction is very rare—there have been only 11 instances of this in the entire 47-year history of the ESA.

Rationale: If USFWS delists San Marcos gambusia, the permittees should consider removing this species from the list of covered species. Similarly, if the species remains listed and the permittees are confident that the species does not occur in the plan area, the permittees should also consider removing this species from the list of covered species in the EAHCP.

Simplest Permit Option: Adding or removing a covered species requires a major permit amendment, but this amendment could be included with any other amendments identified as the permittees consider extending the permit term.

[30] Tanya Sommer, USFWS. Personal communication to ICF and EAA. June 22, 2020.

3.4 Covered Activities

3.4.1 Add Dam Fortification and other Construction Activities in the San Marcos River as Covered Activities

Change to Consider: Add projects occurring in the San Marcos River with the potential to affect covered species, including dam fortification and other in-stream construction projects.

Background: The EAHCP covers activities in four categories: (1) the regulation and use of the Aquifer; (2) recreational activities in the Comal and San Marcos spring and river ecosystems; (3) other activities in, and related to, the Comal and San Marcos springs and river ecosystems; and (4) activities involved in and related to the implementation of the minimization and mitigation measures in these ecosystems. The EAHCP covers only routine, minor maintenance and repair of infrastructure along the springs systems, not major construction projects.

Rationale: Since the covered activities were determined in 2010 and 2011, other infrastructure projects have been proposed in the San Marcos Springs system that could affect covered species and their habitats, including dam removal and fortification. For example, the City of San Marcos voted to remove Cape's Dam in 2016, but the project stalled after the Historic Preservation Commission voted to recommend that Cape's Dam be designated a historical landmark. If this project were to occur, it may result in take of the covered species and require take authorization. Similarly, bank stabilization projects in the EAHCP plan area have occurred and are likely to continue to occur without being covered by the EAHCP.

Other in-stream infrastructure projects may be needed in the future. Including these future projects as covered activities in the EAHCP could streamline the permitting process for these projects and ensure that their mitigation aligns with the conservation goals of the EAHCP. Covering these future construction projects in the EAHCP could also save these projects time and money by eliminating the need to obtain their own take authorization or designing and implementing their own mitigation measures.

Simplest Permit Option: Adding dam removal/fortification and other major in-stream construction projects would require a major amendment, with additional NEPA compliance.

3.4.2 Make Certificates of Inclusion Mandatory for Commercial Recreation Outfitters

Change to Consider: Require all commercial recreation outfitters that operate in the spring systems in the EAHCP plan area obtain Certificates of Inclusion consistent with the plan.

Background: The EAHCP covers a wide range of recreational activities overseen by the City of New Braunfels, Texas State University, and the City of San Marcos because of their impacts on the covered species. An important conservation measure in the EAHCP for minimizing these impacts was a commitment by the cities of New Braunfels and San Marcos to issue Certificates of Inclusion to commercial outfitting businesses that facilitate recreational activities on the Comal River and the San Marcos River and who choose to opt into this program. This voluntary program was intended to help ensure that these recreational outfitters minimized their adverse impacts on the covered species. If an outfitter opted in, they would commit to implementing measures such as providing

litter bags to all customers, sponsoring the annual river cleanup efforts, providing educational materials and signage, and stenciling an anti-litter message, provided by the cities, on all rented recreational equipment. The commercial recreation outfitter market has continued to grow since adoption of the EAHCP in 2013. Despite this, no commercial recreational outfitters have opted into this program to date.

Rationale: The reasons for the lack of participation in this program are unclear but may be due to a lack of incentives. Commercial operators who voluntarily join the EAHCP would be required to implement measures that would cost them money, potentially putting them at a competitive disadvantage with operators not participating in the program. Many operators are small (as few as one person), and perhaps cannot easily afford new costs.

Recreational outfitters facilitate continued and growing recreational uses of the spring systems, potentially increasing adverse impacts to the covered species and reducing the effectiveness of key conservation measures, such as in-stream restoration. The impacts of recreational uses, especially at lower flows, are described in the EAHCP for several of the covered species, especially Texas wild-rice, fountain darter, and San Marcos salamander (e.g., see EAHCP pp. 4-42 and 4-45). If these impacts continue to grow and undermine the overall success of the plan, the permittees should consider making Certificates of Inclusion mandatory for all commercial recreational outfitters operating in the EAHCP plan area. This could be accomplished through local ordinances in the cities of New Braunfels and San Marcos. Making the program mandatory for all operators would remove any issues with competitive disadvantages. The EAA or the cities could perhaps provide small grants to provide economic support to small operators who could not afford on their own to implement the program's provisions.

Simplest Permit Option: Because this program is already envisioned in the EAHCP, making the program mandatory could be an administrative change to the EAHCP. To change the program to being mandatory, the two cities would also each need to pass an ordinance codifying the change.

3.5 Biological Goals and Objectives

3.5.1 Restructure Biological Goals and Objectives

Change to Consider: Restructure biological goals and objectives to a more typical structure, with biological goals being more broad statements of desired future conditions and objectives as measurable habitat-based targets. Adjust objectives to be more relevant to the viability of covered species and aligned with feasible effectiveness monitoring.

Background: All HCPs are required to include biological goals and biological objectives, typically for each of the covered species. Biological goals are often broad statements of desired future conditions. Biological objectives are clear, measurable statements of how the plan will collectively achieve each biological goal. Biological objectives are often defined in terms of habitat parameters because of the challenges in monitoring populations of covered species and often high natural variability in population numbers.

The EAHCP includes biological goals and objectives in Chapter 4 for all of the covered species that were listed at the time the EAHCP was completed. However, the biological goals and objectives are structured differently from most other HCPs and they are not consistent with current USFWS

guidance described in the *2016 HCP Handbook*. The EAHCP biological objectives are habitat-based, but instead of the biological goals being broad statements of a desired future condition, the EAHCP biological goals include specific population targets for the listed covered species.

Rationale: Restructuring the biological goals and objectives of the HCP would better align the HCP with current USFWS policy for biological goals and objectives as described in the *2016 HCP Handbook*. It may also clarify how the EAHCP contributes to species recovery and serve to provide better guidance for future decisions on implementing conservation measures and adaptive management decisions. The population-based metrics of the current biological goals have been difficult and expensive to measure and achieve and are more suitable as targets for effectiveness monitoring, as opposed to biological goals or objectives.

Simplest Permit Option: Biological goals and objectives are targets by which to measure the effectiveness of the HCP's conservation strategy, Therefore, biological goals and objectives can be adjusted without a permit amendment, so long as the conservation measures remain consistent with the HCP, and the take limits are unchanged.

3.5.2 Increase Flexibility of Fountain Darter Habitat Goals

Change to Consider: Increase flexibility in long-term biological goals and annual targets for fountain darter habitat to make them more achievable based on information gained from previous habitat management and understanding gleaned about the ecology of the springs systems.

Background: The original long-term biological goals for fountain darter were defined in two measures: (1) areal cover of habitat in representative river reaches of the Comal and San Marcos systems,[31] and (2) measured median density of fountain darters within each of seven aquatic habitat types.[32] In the San Marcos system, two set of targets were provided to measure the first long-term biological goal (i.e., areal cover of habitat), each using a different measurement method. All of these long-term biological goals were open to interpretation and proved difficult to achieve through management of aquatic vegetation in the restoration reaches of both systems.

The permittees have since modified the long-term biological goals for fountain darter habitat in the Comal and San Marcos rivers from those originally described in Section 4.1 of the EAHCP through several clarifications and minor amendments.[33] However, these revised long-term biological goals and annual targets for fountain darter habitat have turned out to be too prescriptive and inflexible in light of the annual variation in hydrologic conditions in the springs. For example, the Cities of New Braunfels and San Marcos have sometimes varied planting targets substantially year-to-year. This uncertainty and high variation in planting effort made it difficult to plan for and allocate funds for the resources necessary for aquatic vegetation management each year (e.g., approving the annual budget and procuring contractors to perform the work).This high annual variation can also result in changes to the native aquatic vegetation community beyond what was considered in the revised biological goals. The long-term biological goals for fountain darter habitat have sometimes conflicted with EAHCP targets for aquatic vegetation community composition (i.e., percent cover); in

[31] See EAHCP Figure 4-1 for the Comal system and Figure 4-3 and Table 4-20 for the San Marcos system.

[32] See EAHCP Table 4-1 for the Comal system and Table 4-21 for the San Marcos system.

[33] As submitted by the EAHCP to USFWS on September 20, 2016, and approved by USFWS on October 24, 2016 (included in the EAHCP 2016 Annual Report, Appendix A).

some cases, for example, there may only be physical space in a particular area or reach to meet one vegetation target at a time.

Rationale: Increasing flexibility in the annual targets and long-term biological goals for fountain darter habitat would make them more feasible to achieve. Instead, long-term biological goals could be based on total cover with a range of percent composition by species. Alternatively, annual targets, which are currently established for each restoration reach, could be changed to apply to the groups of reaches or the entire springs system. Modifying the long-term biological goals and annual targets for fountain darter habitat in these ways would also improve the spring community's ability to plan where and when to dedicate staff and contractor resources and vegetation management activities each year.

Simplest Permit Option: Biological goals and objectives can be changed without a permit amendment via the EAHCP's adaptive management process, so long as the conservation measures remain consistent with the plan, and the take limits are unchanged.

3.6 Conservation Measures

3.6.1 Increase Flexibility of Annual Disturbance Limit of Fountain Darter Habitat

Change to Consider: Adjust 10 percent annual disturbance take limit for occupied fountain darter habitat to allow for more year-to-year flexibility.

Background: The incidental take permit (item M (1a) and (2a)) limits on an annual basis disturbance of the "(a) substrate, (b) water quality, (c) plants, and (d) animals" from implementing conservation measures in the springs systems to no more than 10 percent of the occupied habitat for all covered species. The actual annual disturbance of occupied habitat is documented each year in Appendix E of the EAHCP's annual report. In 2019, net disturbance was well below the 10 percent threshold for all covered species, except for occupied fountain darter habitat in the San Marcos system. Disturbance of fountain darter habitat in 2019 was estimated to be 8.6 percent.

Rationale: Estimating the annual disturbance is difficult, vulnerable to observer bias and subjectivity, and costly to complete. The 10 percent disturbance limit is also somewhat arbitrary relative to the biological outcomes of the fountain darter population. Therefore, the permittees to consider adjusting the 10 percent annual disturbance take limit for fountain darter habitat to allow for more management flexibility when conducting conservation measures that could have short-term disturbance long-term benefit for the species populations. This flexibility could be achieved by allowing more year-to-year variability, such as allowing up to 15 percent or 20 percent in nonconsecutive years.

Simplest Permit Option: Increasing flexibility in the annual disturbance limit for fountain darter habitat could be done through an administrative change if the disturbance parameters that allow more flexibility are still within the level of effects evaluated in the EAHCP and EIS.

3.6.2 Enhance Control of Recreational Use and Litter in San Marcos River

Change to Consider: Enhance control of recreational use and public access areas in the San Marcos River during peak visitation periods.

Background: The EAHCP covers a wide range of recreational activities overseen by the City of New Braunfels, Texas State University, and the City of San Marcos because of their adverse impacts on the covered species. For example, the EAHCP identifies trampling and physical removal of plants from recreational access and uses as key impacts on Texas wild-rice and other submerged aquatic vegetation that provides habitat for covered species.[34] The plan also identifies physical habitat disturbance (e.g., increased turbidity) as another consequence of recreational uses in covered species habitat. In general, people wading and swimming have been identified by EAHCP field staff as being one of the largest continuing threats to native macrophyte growth and the health of covered species habitat.

Because recreational use was identified as such an important impact, both spring communities committed in the EAHCP to reducing and controlling recreational uses to minimize take.[35] For example, the City of San Marcos committed to establishing permanent and controlled river access points at Dog Beach, Lion's Club Tube Rental, Bicentennial Park, Rio Vista Park, the Wildlife Annex, and other areas as determined by the adaptive management process (EAHCP p. 5-27). The City also committed to enforcing City of San Marcos Resolution 2011-21, which includes trespassing enforcement, creating buffer zones excluding day-use amenities (e.g., picnic tables, tents, portable grills) to minimize litter in the river, educating river users, and developing a partnership with Texas State University to implement and enforce these measures (EAHCP p. 5-23).

The City of San Marcos has established permanent access points and continued to enforce Resolution 2011–21. Fencing of vegetation restoration areas has limited impacts from recreational use in these areas. However, measures committed to in the HCP have not been effective at controlling litter, which continues to impact covered species habitat (e.g., 3,073 cubic feet of litter were removed from the San Marcos River during the 2019 recreation season[36]). The City is required to commit significant resources to controlling recreation and the litter that recreationists generate (EAHCP Section 5.3.3). The EAHCP currently spends approximately $56,000 per year to hire Texas State University students to patrol the river on foot or in kayaks. These students educate park users about the importance of the area for the covered species and the importance of controlling litter and disturbance. Student patrols and City park staff work together to try to control litter. City park rangers also try to enforce EAHCP buffer zones, but this has proven infeasible in cases where City park rangers are vastly outnumbered by recreationists crowding the river.

[34] For example, see EAHCP pages 4-40, 4-42, and 4-114.

[35] See EAHCP Section 5.2.3 for the City of New Braunfels commitments, Sections 5.3.2 and 5.3.7 for City of San Marcos commitments, and Section 5.4.2 for Texas State University commitments.

[36] 2019 Annual Report, Table 6.3-1.

Rationale: Recreational use of the San Marcos River has intensified[37] and may continue to grow, especially from visitors traveling from surrounding communities to recreate in the river. Continued growth of recreation is likely to increase impacts to aquatic habitat through unauthorized access outside of designated access areas. Perhaps more significantly, increasing recreation is expected to increase litter deposited into the river and surrounding riparian habitat. To address this growing threat, the permittees should consider adopting more stringent measures to limit the number of recreational users in the San Marcos River or the amount of littler deposited in the river, or both. These new control measures could take a variety of forms. One model could be the City of New Braunfels, which adopted a strong ordinance in place to address recreational access and disposal containers serving as evidence that impacts to covered species habitat from recreational uses can be addressed through local government actions.

Containers on New Braunfels Rivers (2011 Ordinance).

Recognizing that recreational access to the San Marcos River is an important value for the local community, measures to limit the number of people accessing the river could prioritize access for locals, while limiting access by non-locals. The City could impose parking fees for non-residents, for example, or a wristband system similar to the one used in New Braunfels. The City should also consider a disposal container ordinance, given that this type of measure has successfully limited river litter in New Braunfels (Figure 3-1).[38] The issue of growing impacts of recreational uses on the San Marcos River, if it goes unaddressed, has the potential to threaten or undermine a permit amendment of the EAHCP. However, if the EAHCP permittees can address this growing issue now, the plan can be positioned well for any of the permit options described in this report, including a permit term longer than the original 15-year period.

Simplest Permit Option – Administrative Change: Because managing recreational use of the San Marcos River was already envisioned in the EAHCP, limiting the number of recreational users and applying restrictions on disposal containers could be an administrative change to the EAHCP. These changes would require the City of San Marcos to pass an ordinance codifying the changes.

[37] Melani Howard, City of San Marcos. Personal communication with ICF and EAA. February 19, 2020.

[38] The City of New Braunfels passed the ordinance in 2011. A local referendum to repeal the ordinance failed. A lawsuit challenging the ban on disposable containers in the river was upheld, and the ordinance was suspended in 2014. The City appealed the ruling. In November 2017, the container ban was reinstated after a Texas Court of Appeals overturned the lower court decision.

3.6.3 Remove Dissolved Oxygen Management as a Conservation Measure

Change to Consider: Remove dissolved oxygen management as a conservation measure.

Background: The EAHCP includes in Section 5.2.4 measures to address threats from decaying vegetation and the resulting decrease in dissolved oxygen concentration in Landa Lake during low-flow conditions, which the HCP identified as a threat to covered species. If the flow of Comal Springs drops below 80 cfs, the EAHCP requires implementing measures such as artificial aeration and decaying vegetation removal.[39] The City of New Braunfels, in implementing these methods for the first 2 years of the plan, found artificial aeration to be ineffective at managing dissolved oxygen levels. The independent science review panel agreed and recommended discontinuing the measure in its *Review of the Edwards Aquifer Habitat Conservation Plan, Report 2* (2016).[40] The EAHCP has discontinued artificial aeration during low-flow conditions.

Removing decaying vegetation has also proven to be very difficult and costly and appears not to have the desired effects on dissolved oxygen level, except in low-flow conditions. Furthermore, removing decaying vegetation also results in adverse effects to covered species habitat through disturbance and spreading sediment. The EAHCP now removes dying and decaying floating vegetation only during low-flow conditions.

Rationale: Removing dissolved oxygen management as a conservation measure will update the HCP based on information gained through implementation. Managing dissolved oxygen in the springs is an infeasible and ineffective means of protecting covered species habitat during low-flow conditions. The EAHCP's Springflow Habitat Protection Workgroup is currently considering ways to protect covered species habitat during low-flow periods. Monitoring dissolved oxygen levels could remain in the HCP as a way of tracking effectiveness of new conservation measures, if added later to protect habitat during low-flow periods.

Simplest Permit Option: The permittees could make this administrative change as a routine AMP decision that would result in a minor permit amendment.

3.6.4 Establish Performance Standards for Nonnative Animal Species Removal

Change to Consider: Establish performance standards for control of nonnative animal species.

Background: The EAHCP includes as a conservation measure control harmful nonnative animal species, including suckermouth catfish, tilapia, nutria, and ramshorn snail.[41] Three of the permittees are responsible for implementing this measure: the City of New Braunfels, the City of San Marcos, and Texas State University. The HCP is not specific in identifying methods by which control can occur, but notes that animals should be "disposed of out of the floodplain" and describes the use of seines, gill nets, case nets, or other methods to remove tilapia. During implementation, the Cities of New Braunfels and San Marcos have identified the most effective control measures to be targeted

[39] This trigger has been met only once to date: in 2014, when total Comal Springs flow dropped to about 65 cfs and the upper springs stopped flowing for approximately 3 weeks.

[40] https://www.edwardsaquifer.org/doc_publications/nas-report-2/.

[41] EAHCP Section 5.2.5 for New Braunfels, Section 5.3.9 for San Marcos, and Section 5.4.13 for Texas State University.

spearfishing to remove nonnative fish species and hand collecting to remove ramshorn snails. The City of San Marcos even holds a biannual spearfishing tournament help remove more of these species. The Cities' efforts have resulted in a large quantity of nonnative animal species removed, over 10,000 pounds of biomass in 2019.[42] However, because there are no clear targets or objectives for the conservation measure, it is unclear how much effort or cost the EAHCP permittees should spend on it or when success is achieved.

Rationale: Establishing performance standards for the nonnative animal species removal would allow the three permittees implementing this measure to better gauge the success of the program and to align the program with the overall objectives and annual budget of the EAHCP.

Simplest Permit Option: Because the HCP is silent about measurable targets for this conservation measure, these targets could be established as a routine adaptive-management decision.

3.6.5 Adjust Methods for Monitoring and Reduction of Gill Parasites

Change to Consider: Remove measure to reduce gill parasites from the EAHCP.

Background: The EAHCP (Section 5.2.6) includes as a conservation measure for the City of New Braunfels to "retain and oversee the work of a contractor to establish a gill site monitoring and reduction program." The parasitic trematode *Centrocestus formosanus* was a major concern for its potential effects to fountain darter in the Comal Springs system when the EAHCP was developed. A pilot study conducted during the EAHCP's development confirmed that removing *Melanoides tuberculatus*, a nonnative snail that also hosts the parasitic trematode, would reduce the abundance of *C. formosanus*. However, measures to reduce *M. tuberculatus* have been unsuccessful. Removing the nonnative host snail requires removing submerged aquatic vegetation, which results in adverse effects to fountain darter habitat. Since the EAHCP's approval, another trematode gill parasite of the fountain darter, *Haplorchis pumilio,* has been discovered in the Comal Springs system. Green heron (*Butorides virescens*) that occur on Pecan Island in Landa Lake are known to host this parasite. Options to remove or control green herons would likely be impractical. Although these trematode species are understood to be gill parasites of fountain darter, their presence in the Comal Springs system does not appear to have a significant adverse impact on the fountain darter population.[43]

Rationale: Section 5.2.6 of the EAHCP should be revised to identify the gill parasite monitoring and management actions that are feasible to implement.

Simplest Permit Option: If the EAHCP continues to monitor and manage gill parasites in the Comal Springs system, an administrative change performed via a routine adaptive-management decision could document how management and monitoring will change under the HCP. If no feasible gill parasite control measure can be identified through further study, the permittees should consider removing this conservation measure as part of a formal amendment.

[42] 2019 Annual Report, Table 6.3-7.

[43] The *Habitat Conservation Plan Biological Monitoring Program: Comal Springs/River Aquatic Ecosystem Annual Report* (December 2019) note that for the third year in a row normalized population estimates for fountain darter in the Comal Springs system in 2019 were slightly higher than long-term averages (p. 32).

3.6.6 Establish Performance Standards for Riparian Restoration

Change to Consider: Establish performance standards for riparian restoration.

Background: The EAHCP (Section 5.2.8) includes a conservation measure to restore degraded riparian zones to benefit the Comal Springs riffle beetle and improve bank stabilization and nutrient and sediment processes. The EAHCP also includes (Section 5.7.1) a conservation measure to restore native riparian habitat along the San Marcos River and in the riparian zone along Landa Lake and the Old Channel.

Extensive riparian restoration has been completed to date. In the Comal Springs system, the City of New Braunfels has removed nonnative vegetation and replanted native species along the western shore of Landa Lake and completed stabilization measures, nonnative removal, and native replanting along the Old Channel.[44] In the San Marcos system, the City of San Marcos had removed nonnative vegetation and planted native vegetation in riparian zones along Ramon Lucio Park, Dog Beach Park, Rio Vista Park, Crooks Park, Bicentennial Park, City Park, and Sessom Creek Park and used fencing of these restored areas to control recreational access to the river.[45] However, it is unclear how much these restoration efforts have contributed to achieving the biological goals and objectives of the EAHCP[46] and the EAHCP lacks clear objectives for riparian restoration. Without performance standards, the permittees are uncertain how much riparian restoration is enough.

Rationale: Establishing performance standards for riparian restoration efforts would allow the cities of New Braunfels and San Marcos to better gauge the success of the program, and facilitate the proper allocation of resources to these measures in alignment with the overall budget of the EAHCP.

Simplest Permit Option: Since the HCP is silent on measurable targets for this conservation measure, these targets could be established as a routine adaptive management decision.

3.6.7 Combine Groundwater Forbearance Programs of EAHCP into Single Program

Change to Consider: Combine the two groundwater forbearance programs of the EAHCP into one program with the same pumping reduction target of 90,000 acre-feet per year in a drought-of-record.

Background: Three mitigation measures of the EAHCP are intended to ensure minimum flows to the spring systems during drought conditions: (1) the EAA's Voluntary Irrigation Suspension Program Option, (2) the San Antonio Water System's (SAWS) Aquifer Storage and Recovery facility, and (3) municipal water conservation in the Cities of New Braunfels and San Marcos.

The Voluntary Irrigation Suspension Program Option (VISPO) is administered by the EAA to help suspend aquifer pumping during a drought of record. The EAHCP requires that the EAA enroll at

[44] National Academies of Sciences, Engineering, and Medicine. 2018. *Review of the Edwards Aquifer Habitat Conservation Plan: Report 3*. Washington, DC: The National Academies Press. doi: https://doi.org/10.17226/25200. Pp. 144–146.

[45] Review of the Edwards Aquifer Habitat Conservation Plan: Report 3, p. 147.

[46] Review of the Edwards Aquifer Habitat Conservation Plan: Report 3, p. 149.

least 40,000 acre-feet of irrigation water rights in this program through 5- or 10-year leases.[47] Enrolled landowners are paid a fee annually during the lease term regardless of aquifer conditions and another fee for each year pumping suspensions are required during a drought. The VISPO program provides an option for landowners with groundwater pumping rights without forcing them to give up those rights. Because the fee provided to landowners is set by EAA, the program is also flexible to market conditions.

For the second program, SAWS stores pumped water from the Edwards Aquifer in an underground operation using the Carrizo sand aquifer formation present in southern Bexar County, called the Aquifer Storage and Recovery (ASR) facility. Use of the ASR is both a covered activity and a mitigation measure for contributions toward springflow protection. The EAHCP anticipated that the EAA would purchase leases or lease options on at least 50,000 acre-feet of groundwater from Edwards Aquifer permitted pumping entities, primarily farmers. When the drought-of-record occurs, these 50,000 acre-feet of water would be left in the Edwards Aquifer ("forborne") by the EAA to help meet minimum springflow requirements of the while ASR and VISPO are activated through prescribed triggers and contracts. Additionally, the combined ASR and VISPO programs are expected to result in up to 90,000 acre-feet less pumping from the Edwards Aquifer during a repeat of a worst year of a drought of record or similar event.

Rationale: Based on discussions with EAA staff, the ASR and VISPO program are working remarkably well, having almost met the target leases or lease options already.[48] However, one challenge is that the two programs have turned out to be much more similar than envisioned, with the programs overlapping substantially. As a result, one program somewhat competes against the other for the same groundwater leases or options. Combining these two programs into one would increase EAAs flexibility to meet EAHCP requirements and simplify plan administration. Combining the two programs into one would also simplify the message to farmers and other groundwater permit customers.

Simplest Permit Option: The EAHCP envisioned the ASR and VSPO as separate programs with distinct approaches to implementation. Combining these into one groundwater management program would require new analysis and decisions on triggers for forbearance that would best be accomplished through a major permit amendment to ensure that USFWS and the public has the opportunity to review and comment on the new approach. There also may be environmental consequences of the change, which would need to be evaluated in a NEPA analysis of some kind.

3.6.8 Allow Purchase of Groundwater Rights Instead of Only Leasing

Change to Consider: Add flexibility to the groundwater rights purchase programs to allow the EAA to purchase water rights instead of only allowing term leases or lease options.

Background: The EAHCP requires that the EAA enroll at least 40,000 acre-feet of irrigation water rights in VISPO through either 5- or 10-year leases. From 2010 through 2014, drought conditions

[47] In June 2019, the EAHCP permittees increased this requirement through a minor administrative change to 41,795 acre-feet/year based on new modeling that indicated that was necessary to meet minimum springflow protection of 30 cfs daily average during a repeat drought-of-record.

[48] To date the EAA has acquired over 90,300 acre-feet of water rights leases or lease options, or over 98 percent of the total requirement of the EAHCP (91,795 acre-feet/year).

greatly reduced the interest in 5- or 10-year lease options under either the VISPO or the ASR program also administered by the EAA. The permittees decided to offer short-term (1 to 3 year) leases in order to bolster enrollment in these programs, which was very successful.[49] However, enrollees have continued to prefer groundwater leases of 1- to 3-year terms over longer terms of 5 to 10 years. This has created a situation where the EAA must renegotiate lease terms frequently, resulting in increased administrative costs, less financial certainty, and less security in the total water forborne under these programs.

Rationale: Creating a program where EAA purchases groundwater rights outright, instead of leasing them, would remove the administrative burden of frequently renegotiating leases and increase the security of water supply during drought conditions to ensure minimum spring flows. This purchase or water rights could be accomplished by buying the groundwater withdrawal permit that EAA issues. The groundwater estate and surface ownership could remain unchanged.

Simplest Permit Option: The EAHCP and the incidental take permit identify the VISPO program and use of the SAWS ASR as covered activities for springflow protection. Under both programs the EAA acquires water rights through leases or lease options. Neither the EAHCP nor the permit consider that EAA would purchase water rights outright to ensure springflow protection. Therefore, adding this option would likely require a major permit amendment that would likely require additional NEPA analysis.[50]

3.6.9 Extend Groundwater Leases Beyond 2028

Change to Consider: Extend ASR and VISPO groundwater leases and lease options (i.e., forbearance agreements) beyond the permit term expiration date in 2028.

Background: As described in Section 3.6.7 above, *Combine Groundwater Forbearance Programs of EAHCP into Single Program*, the EAHCP permittees are required to purchase at least 90,000 acre-feet of groundwater lease or lease options through the ASR and VISPO programs (i.e., 50,000 acre-feet and 40,000 acre-feet, respectively). These leases are also called *forbearance agreements*. The EAA has been able over time to increase the number of longer-term leases or lease options with willing landowners. However, all leases or lease options entered into by the EAA to fulfill its obligations under the ASR and VISPO programs will expire on or before March 31, 2028, when the EAHCP permit expires. The diminishing terms on these agreements creates uncertainty in the long-term commitments to these programs beyond the EAHCP's current permit term.

Rationale: Forbearance agreements will need to be sustained through the EAHCP's permit renewal process to ensure the stability of these program through the end of this permit term and into the renewed term. This could be accomplished through bridge agreements extending beyond the current permit term, with the agreements being contingent on the renewal of the EAHCP permit.

Simplest Permit Option: Establishing water forbearance agreements beyond the current permit term could be done internally amongst the permittees. However, given the importance of the

[49] This change in approach was documented in an adaptive management change to the EAHCP on February 12, 2018 (https://www.edwardsaquifer.org/wp-content/uploads/2019/02/4_Formal_EAHCP_Amendment_Request.pdf).

[50] The EAA currently has the authority to purchase groundwater rights, which it could do and lease those rights back to the EAHCP. This could likely be done without an amendment to the EAHCP. However, because the tool was not considered in the original HCP, we recommend including it as an amendment to give the public the ability to review and comment on the use of this new tool to achieve the goals of the HCP.

springflow protection measures to the viability of the EAHCP, the permittees may want to document this change more formally with USFWS via an administrative change.

3.6.10 Increase Flexibility to Achieve Springflow Protection

Change to Consider: Increase flexibility of the EAHCP to achieve springflow protection through additional water conservation programs or securing new sources of groundwater.

Background: Springflow protection measures are at the heart of the EAHCP conservation strategy. The plan includes the following measures implemented by the EAA and SAWS to ensure springflow protection. These requirements were the result of extensive modeling, analysis, scientific study, and negotiations between the permittees and USFWS through the EARIP process.

- The **ASR and VISPO programs** are the primary means of ensuring springflow protection during low flow periods. Refer to Sections 3.6.7, *Combine Groundwater Forbearance Programs of EAHCP Into Single Program*, and 3.6.8, *Allow Purchase of Groundwater Rights Instead of Only Leasing*, of this report for background information on these programs. They are also described in detail in Section 5.1.2 (VISPO) and Section 5.5.1 (ASR) of the EAHCP.
- The **Regional Water Conservation Program** (see Section 5.1.3 of the EAHCP) was implemented successfully, fulfilling its commitment to conserve 20,000 acre-feet per year of permitted or exempt Edwards Aquifer withdrawals.[51] This program was originally envisioned in the EAHCP as being administered by the EAA and implemented by SAWS and the springs communities. It proved more difficult than anticipated to implement water conservation in the spring communities, so all of the water savings were secured through water conservation measures implemented by SAWS.
- **Critical Period Management – Stage V** (Section 5.1.4 of the EAHCP) is intended to severely reduce withdrawals from the aquifer, up to 44 percent, during extreme low-flow conditions. Stage V critical period management conditions have only been reached once in 2014, during the only drought of record to occur during the permit term. During this period, spring flows remained above threshold levels.

All of these programs have been successfully implemented in Phase I of the EAHCP. However, all are complete or mature at this point and are no longer augmenting EAA's groundwater reserve.

Rationale: Given the vital importance to the EAHCP's success of ensuring adequate springflows, the permittees should be incentivized to achieve the springflow protection any way they can, not just with the tools currently identified in the EAHCP. In discussions with EAHCP staff, water conservation programs are already ongoing that should be incorporated into the EAHCP to increase assurances of success. Furthermore, there are other water supplies that the EAA could explore on behalf of EAHCP permittees to increase the security of meeting minimum springflows. These options are listed below.

- The EAA implements water conservation programs separate from the EAHCP that include precipitation enhancement (i.e., cloud seeding) and a program to discourage the use of flood irrigation. Precipitation enhancement alone generates an estimated 3,180 acre-feet of aquifer recharge per year. If this measure could be fully or partially counted toward EAHCP

[51] Review of the Edwards Aquifer Habitat Conservation Plan: Report 3, p. 101.

requirements, the EAA would be incentivized and would have additional resources to expand them further.

- Soil amendments could increase soil-water permeability and retention, which would, in turn, increase recharge into the Edwards Aquifer. The EAA has been granted a 150-acre property to conduct research on this topic. If research results are promising, this pilot program could be expanded into voluntary partnerships with landowners to realize a new source of increased recharge.
- Purchasing groundwater estates in other aquifer sources could increase EAA's control over potential future effects on the Edwards Aquifer. Other aquifers may influence groundwater levels in the Edwards Aquifer, and as the region becomes more developed, effects to the Edwards Aquifer may become more pronounced. Pending further research on the relationship between the Edwards Aquifer and surrounding aquifers, securing some of the groundwater in these other aquifers could give the EAA more control over potential impacts of these systems to the Edwards Aquifer. The EAA could partner with entities sharing common goals and programs, like the City of San Antonio's Edwards Aquifer Protection Program, to help fund and administer these types of purchases.

Simplest Permit Option: Because springflow protection was already envisioned in the EAHCP, measures to secure additional groundwater for springflow protection could be done through administrative changes if these types of measures were already analyzed in the EAHCP and they did not substantially change any of the other key elements of the plan. However, some of the measures listed above (cloud seeding, soil amendments) were not analyzed in the HCP, and therefore could require a major amendment and additional NEPA analysis. Additionally, purchasing groundwater estates in the Trinity Aquifer system outside of the plan area would require a major amendment to change the plan area boundary and evaluate the environmental effects of this change in a supplemental NEPA document.

3.7 Adaptive Management

This section presents two potential changes to the EAHCP to consider related to the adaptive management process. Adaptive management changes are also suggested above in Sections 3.6.3, *Change Dissolved Oxygen Management Methods*, 3.6.4, *Establish Performance Standards for Nonnative Animal Species Removal*, 3.6.5, *Adjust Methods for Monitoring and Reduction of Gill Parasites*, and 3.6.6, *Establish Performance Standards for Riparian Restoration*, of this report.

3.7.1 Reconsider the Use of Ecological Modeling and Applied Research as Components of the Adaptive Management Process

Change to Consider: Reconsider the use of ecological modeling and applied research as components of the adaptive management process (Section 6.3.3 of the EAHCP) to address high-priority uncertainties that could have implications for covered species conservation measures.

Background: The EAHCP, as a component of its adaptive management process, describes the development of a "predictive ecological model" to quantify adverse effects from covered activities and to help with the development of alternative mitigation and conservation measures. The EAHCP's

vision for the ecological model was ambitious—it was to be a holistic model of the Edwards Aquifer ecosystem, capable of simulating dynamics of terrestrial and aquatic ecosystems at various spatial scales over various groundwater pumping conditions. Results of applied research to be conducted under the EAHCP (Section 6.3.4.2) were to facilitate development of the ecological model. This predictive model as originally envisioned by the EAHCP has not been successfully developed. Furthermore, initial applied research efforts did not yield conclusive results on which to base model assumptions (e.g., the response of submerged aquatic vegetation to various flow and water quality conditions).

Rationale: The ecological modeling and applied research objectives of the EAHCP have evolved since the plan's inception. Updating the overarching goals and objectives of these programs may be warranted to ensure that they align with the biological goals and objectives of the EAHCP (or revised biological goals and objectives of the EAHCP: see Section 3.5.1 of this report, *Restructure Biological Goals and Objectives*) and focus on addressing the most critical uncertainties to inform the adaptive management process. The process of updating the ecological modeling and applied research objectives of the EAHCP could also serve to help focus the attention of plan participants on the most important and practical needs of the plan.

Simplest Permit Option: No administrative change or plan or permit amendment would be necessary to update these adaptive management components of the plan. This could be done through the EAHCP's existing adaptive management process.

3.7.2 Evaluate Potential Effects of Climate Change

Change to Consider: Evaluate the potential effects of climate change to the Comal and San Marcos springs systems to facilitate extending the permit term beyond 2028.

Background: The EAHCP does not consider the potential effects of climate change. This decision was made intentionally because of the high degree of uncertainty as to the potential effects of climate change on the Edwards Aquifer and, in turn, on the covered species. The EARIP participants were concerned that trying to address climate change effects could bog down the EAHCP development process and jeopardize completing the plan within the time constraints imposed by the Texas Legislature through the EAA Act. To avoid the need to evaluate climate change effects, the EARIP participants deliberately chose a relatively short permit term of 15 years. The EAA is now beginning to assess how climate change could affect recharge of the Edwards Aquifer. Ongoing or potential future activities to better understand potential climate change effects include[52]:

- **Conducting literature reviews** to improve internal knowledge of global climate models, model scenarios and assumptions, available model outputs, and methods for downscaling model outputs to local scales. The EAA has begun the process of downscaling global climate models to adapt them to the central Texas region.
- **Networking with outside agencies and stakeholders** (e.g., South Central Climate Adaptation Science Center, University of Texas – San Antonio) who are facing similar issues or who have experience with using global climate model outputs to assess local environmental effects.

[52] Adapted from list provided by EAHCP staff, April 13, 2020.

- **Developing software applications** and utilities to format climate model outputs in a manner that is appropriate for input to watershed models or other analytical methods that will be used to assess potential environmental impacts.
- **Using EAA weather station data** and other data sources and modeling efforts to better understand how various climate parameters effect evapotranspiration rates spatially and temporally.
- **Forecasting climate effect on groundwater flows** through global climate models and watershed hydrologic modeling.
- **Researching machine learning/artificial intelligence** approaches for their utility in predicting evaporation rates, stream flows, and aquifer recharge based on climate input parameters such as temperature, precipitation, wind speed, solar radiation, and humidity.

Rationale: Assessing the potential effects of climate change on the hydrology of the Edwards Aquifer would support and strengthen a permit term extension of the EAHCP. As noted in Section 3.2.1 of this report, *Extend the Permit Term Beyond 2028,* scientific uncertainty is a key factor in determining how much the permittees can extend the permit term beyond 2028. Should the permittees seek to extend the permit term beyond another 15 years, USFWS is likely to require that the plan address the potential effects of climate change. The *2016 HCP Handbook* identifies understanding the potential effects of climate change as a critical element to enhancing the durability of an HCP's conservation program. There is mounting evidence that climate change is likely to have effects on the Edwards Aquifer and its management, both positive and negative, but the resulting effects on the covered species remain unknown. This uncertainty will make it more difficult for USFWS to issue a permit term extension much beyond another 15-year term.

Simplest Permit Option: Evaluating the potential effects of climate change could be done voluntarily by the permittees apart from any changes to the EAHCP. However, the permittees should coordinate with USFWS on the timing and methods of evaluating climate change effects to ensure that this analysis will help inform their permit renewal decision. USFWS may provide insight into the types of evaluations that would be most likely to address the scientific uncertainties to support a permit term renewal longer than 15 years. USFWS may also be willing to financially support these efforts through cost sharing with federal grants.

3.8 Other Changes

3.8.1 Separate EAHCP and Funding and Management Agreement

Change to Consider: Separate from EAHCP unique procedural provisions of the Funding and Management Agreement that do not support the ESA permit issuance criteria.

Background: Appendix R of the EAHCP is an important document called the *Funding and Management Agreement* (FMA). This document, signed by all of the permittees, includes a combination of items repeated from the EAHCP chapters and provisions of the implementation program only described there and not in the EAHCP itself. The FMA is summarized on pages 9-1 and 9-2 of the EAHCP. The FMA resembles a typical Implementing Agreement found in other multi-permittee HCPs but does not include USFWS as a signatory. It also goes well beyond typical

Implementing Agreements in the unique details found only in the FMA.[53] Important elements of EAHCP implementation only described in the FMA include:

- Job description of the EAHCP Program Manager and Acting Program Manager (Section 2.3).
- Procedures for annual work plans and budgets and their review and approval (Article 4).
- Uses and limitations of uses of EAHCP funds and fund accounts (Section 5.6).
- Detailed process and procedures for funding applications from permittees or third parties (Section 6.1).
- Details of the adaptive management program (Article 7), including its governance by an Implementing Committee (Section 7.7), a Stakeholder Committee (Section 7.8), and a Science Committee (Section 7.9).
- Establishment, charge, membership, and procedures of the independent Science Review Panel (Section 7.10), which became the National Academies of Sciences, Engineering, and Medicine review panel (2015–2018).
- Detailed procedures for making all adaptive management decisions (Sections 7.11, 7.12, and 7.14).

Rationale: As summarized above, 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. Because the FMA is an appendix to the EAHCP and is incorporated into the EAHCP itself (see EAHCP p. 9-2), it is part of the plan and the permit requirements. As a result, these detailed protocols and procedures cannot be easily adjusted as the needs of the plan evolve over time. Some of the details of the FMA, like the adaptive management process, would typically be included in the HCP itself. Other unique details of the FMA, such as a job description of the EAHCP Program Manager or specific membership and procedural requirements of implementation committees, are details often left to be developed during the first several years of HCP implementation by the permittees themselves. Even if those details were drafted prior to permit issuance, they would not typically be included in an HCP, either in the HCP or in an appendix.

At the time the EAHCP was adopted and approved, it was important to the permittees and stakeholders to have the procedural rules of implementation well established, clear, and agreed to by all. Over the last 7 years the EAHCP permittees have established a strong track record of implementation with this robust governance process. However, as part of the FMA as an appendix to the EAHCP, these rules are locked in as permit conditions and difficult to change.

The EAHCP permittees may in the future wish to streamline plan administration and reduce administrative costs by simplifying the governance structure and reducing procedural requirements. The EAA may also wish to increase its flexibility in managing the funds of the EAHCP on behalf of the permittee. Some restrictions imposed by the FMA make the financial management of the EAHCP more difficult and costly than it needs to be. For example, the EAA could transfer funds more easily to accounts and contractors performing critical tasks without some of the procedural restrictions of the FMA (or at least more flexibility in implementing them). Similarly, these

[53] The EAHCP permittees signed an Implementing Agreement with USFWS, Texas Parks and Wildlife Department, and the Texas Commission on Environmental Quality in 2012. However, this Implementing Agreement is very short (only nine pages excluding signatures) and is not an appendix to the EAHCP.

restrictions at times limit the EAA's ability to respond quickly to market fluctuations, thereby limiting their effectiveness to efficiently acquire groundwater rights from willing landowners.

Changes like this to increase operational efficiency and flexibility could be greatly facilitated by separating the detailed provisions of the FMA from the HCP itself that are not required to meet ESA permit issuance criteria. Important provisions of the FMA still needed for the HCP (e.g., adaptive management process) could be retained as a new appendix or incorporated directly into the relevant chapters of the EAHCP.

Simplest Permit Option: This change could perhaps be accomplished through an administrative change if the EAA can demonstrate to USFWS that the removal from the EAHCP of certain provisions of the FMA do not alter the fundamental structure or outcomes of the EAHCP for the covered species. Page 9-2 of the EAHCP states that

> Because it is part of the HCP and will be relied on by USFWS in deciding whether the HCP meets the issuance criteria, the Applicants agree that they will not amend the FMA in a manner that will cause the FMA to diverge from or create an inconsistency with the Permit, the IA, or this HCP *except through the process for HCP amendments described below* (italics added).

This supports the approach of removing from the FMA the components not tied to permit issuance criteria.

3.8.2 Simplify Administrative and Adaptive Management Changes to the EAHCP

Change to Consider: Simplify how administrative changes and adaptive management changes are reviewed and adopted by the EAHCP permittees.

Background: As described in Section 2.3 of this report, the EAHCP in Section 9.2 describes two kinds of administrative changes, Clarifications and Minor Administrative Amendments. In both cases, the EAA must notify USFWS of these proposed changes and obtain their approval for these changes in writing before adopting them.

The FMA, which is incorporated by reference to the EAHCP (as Appendix R), contains detailed procedures for considering and adopting three types of adaptive management changes: routine, nonroutine, and strategic. Routine adaptive management changes are relatively easy to consider and adopt. However, nonroutine adaptive management changes are required to go through an extensive review and approval process with mandated timelines by the Implementation Committee, Stakeholder Committee, and Science Committee. According to EAA staff, this review process can take from 2 to 6 months.

Rationale: In almost all other HCPs like the EAHCP, plan clarifications are not subject to USFWS review and approval. The rationale for this approach is that USFWS has provided an incidental take permit and expects the permittees to implement the plan properly. This means that the permittees will, as needed, make minor adjustments to the plan to correct errors, ensure consistency, and adjust operations as needed to meet the biological goals and objectives for the covered species. Plan clarifications should be at the sole discretion of the permittees and do not need USFWS approval. Once a plan clarification is adopted, the EAA should continue to make these changes available to USFWS and the public through the annual report.

Adaptive management changes are an important process for any HCP. The EAHCP has an unusually robust and thorough adaptive management process, especially for nonroutine adaptive management changes. This robust process may no longer be necessary to ensure transparency and proper implementation of plan. If that is the case, the detailed procedures and review and approval process for nonroutine adaptive management changes could be simplified so that nonroutine adaptive management changes could be implemented faster.

Combined, these procedural changes could streamline the operations of the EAA and save administrative costs.

Simplest Permit Option: Changing the approval process for plan clarifications could be accomplished with a minor administrative amendment. Simplifying the process for nonroutine adaptive management changes would first need to occur by separating this provision of the FMA from the EAHCP (see Section 3.8.1, *Separate EAHCP and Funding and Management Agreement*, of this report for that recommendation). Once that is accomplished, the EAHCP permittees could likely simplify the procedures for nonroutine adaptive management changes through a minor administrative amendment.

Chapter 4
Recommendations

Questions addressed in this section:

- *How does each permit option compare in terms of relative time, costs, benefits, and drawbacks?*
- *Which permit option(s) is/are recommended to maximize benefits and minimize risks?*
- *What schedule is recommended to implement the recommended permit options?*
- *What issues could influence the permit options selected as the end of the permit term approaches?*

Overall, EAHCP implementation through the first 7 years of the permit term has been a success. The program has functioned effectively through its implementing committees, one of which is the Science Review Panel. In their 5-year review, this panel confirmed that all Phase I conservation measures were either successful or likely to be successful.[54] However, as with any long-term plan, implementing some of the conservation measures has proven challenging in some respects. The EAHCP has effectively addressed many of these challenges by adjusting some conservation measures via the adaptive management process.

As they look ahead through Phase II, the EAHCP permittees now have the opportunity to begin considering additional changes to the plan and permit. Some of these changes can continue to be made through the administrative change process or the adaptive management process. In other cases, more substantive changes can be part of a major amendment or part of a renewed permit term after March 31, 2028.

In the following sections, we summarize how the permit options described in Chapter 2, *Permit Options Available*, address each of the potential changes for the EAHCP permittees to consider identified in Chapter 3, *Potential EAHCP Changes to Consider*. We also provide recommendations for how the EAHCP permittees should consider these potential changes in the context of the remainder of the permit term and in preparation for a permit renewal in 2028.

4.1 Summary of Potential Changes and Permit Options to Consider

ICF intends that the recommendations in this report will provide a starting point for the EAHCP permittees, USFWS, and stakeholders to consider and discuss the direction of the program through Phase II and the permit renewal process. Table 4-1 summarizes the permit options available to the EAHCP identified in Chapter 2, the potential benefits and drawbacks of each permit option, and compares the relative time and cost involved in each permit option.

[54] National Academies of Sciences, Engineering, and Medicine. 2018. *Review of the Edwards Aquifer Habitat Conservation Plan: Report 3*. Washington, DC: The National Academies Press. Available: https://doi.org/10.17226/25200.

Table 4-1. Comparison of EAHCP Permit Amendment Options

Option	Est. Timeline	Est. Cost to EAA	Benefits	Drawbacks
1. Allow Permit to Expire (Section 2.1)	None (excludes time to prepare project-HCPs)	None (excludes cost of project HCPs by each permittee)	• No administrative burden on permittees to renew permit	• Streamlined ESA compliance lost, increasing cost and project permitting timeline • No streamlined ESA compliance to accommodate anticipated growth • Potential decline of covered species, increasing mitigation requirements for project-specific HCPs • Lose economies of scale with multi-permittee regional HCP • Substantial new costs to terminate EAHCP program
2. Amend Permit to Extend Duration Only (Section 2.2)	4–6 months or more, depending on length of extension	Minimal for short time extension, modest for longer	• Avoids perception of "opening plan" to undesirable changes • No administrative burden to adjust to changes • Lowest cost, shortest timeline	• Current plan remains unchanged • Cannot seek plan improvements
3. Administrative Changes (Section 2.3)	1-4 months depending on the nature of the change	Low to minimal	• Common approach used 20 times on EAHCP to date • Can be relatively simple • Targeted to fix certain issues without "opening up" entire plan • Relatively low cost and time, depending on the issue	• Can only be used for relatively minor issues • Cannot be used to extend permit term • Plan clarifications may be difficult to track as they grow
4. Major Permit Amendment (Section 2.4)	12–18 months + depending on scope	$150K–$400K depending on scope	• Address issues that cannot be accomplished through administrative changes • Opportunity for public and stakeholders to review proposed changes • Federal grants will now help support preparation of major permit amendments (up to 75% of total cost)	• Increased scrutiny from stakeholders and public (e.g., NEPA review) • More time and cost involved than other options
5. Replace EAHCP with New HCP (Section 2.5)	2–3 years or more	$1.0 to $1.5 million or more depending on scope	▪ Clarify and update the HCP based on lessons learned ▪ Update data, science, assumptions ▪ Federal funding available for plan preparation (up to $1M per plan per year, covering up to 75% of total costs)	▪ Perception of starting over and balancing stakeholders' desires ▪ Potential for increased mitigation, monitoring requirements

In Chapter 3, we identified and described 23 potential changes to the EAHCP to be considered in assessing the plan's permit options. ICF identified these potential changes because we believe that all of these changes have merit and will benefit the plan, the covered species, and its participants. However, these changes are for the EAHCP permittees to consider and determine for themselves if the benefits of the change are worth the time, cost, and effort to make.

Each potential change concludes with a statement of the simplest permit option that could be used to implement that change by itself. However, if desired, the EAHCP permittees could use a more complicated permit option to bundle multiple plan changes into one package of changes (e.g., one major permit amendment that includes multiple changes). Table 4-2 illustrates all of the permit options available to implement each of these 23 potential changes.

This report is also intended to support the EAHCP permittee's assessment of the implications of various changes and show how a suite of desired changes might be packaged to implement at once or in several phases. The following section provides our recommended approach of how to consider these changes through the remainder of the permit term.

Table 4-2. Potential Changes to EAHCP Identified in this Report and Available Permit Options

Potential Change (and Report Section)	Available Option to Implement Change				
	1 Allow to Expire	2 Permit Renewal	3 Administrative Change	4 Major Amendment	5 Replace EAHCP
3.1.1, *New Permittees*	No	No	No	Yes	Yes
3.2.1, *Extend the Permit Term Beyond 2028*	No	Yes	No	Yes	Yes
3.3.1, *Add Biological Goals and Objectives for Non-Listed Covered Species*	No	No	Yes	Yes	Yes
3.3.2, *Add Covered Species that May be Listed in the Future*	No	No	No	Yes	Yes
3.3.3, *Remove San Marcos Gambusia from Covered Species List*	Yes	No	No	Yes	Yes
3.4.1, *Add Dam Fortification and other Construction Activities in the San Marcos River as Covered Activities*	No	No	No	Yes	Yes
3.4.2, *Make Certificates of Inclusion Mandatory for Commercial Recreation Outfitters*	No	No	Yes	Yes	Yes
3.5.1, *Restructure Biological Goals and Objectives*	No	No	Yes	Yes	Yes
3.5.2, Increase Flexibility of Fountain Darter Habitat Goals	No	No	Yes	Yes	Yes
3.6.1, *Increase Flexibility of Annual Disturbance Limit of Fountain Darter Habitat*	No	No	Yes	Yes	Yes
3.6.2, *Enhance Control Recreational Use and Litter in San Marcos River*	No	No	Yes	Yes	Yes
3.6.3, *Remove Dissolved Oxygen Management as a Conservation Measure*	No	No	Yes	Yes	Yes
3.6.4, *Establish Performance Standards for Nonnative Animal Species Removal*	No	No	Yes	Yes	Yes
3.6.5, *Adjust Methods for Monitoring and Reduction of Gill Parasites*	No	No	Yes	Yes	Yes

Potential Change (and Report Section)	Available Option to Implement Change				
	1 Allow to Expire	2 Permit Renewal	3 Administrative Change	4 Major Amendment	5 Replace EAHCP
3.6.6, *Establish Performance Standards for Riparian Restoration*	No	No	Yes	Yes	Yes
3.6.7, *Combine Groundwater Forbearance Programs of EAHCP into Single Program*	No	No	No	Yes	Yes
3.6.8, *Allow Purchase of Groundwater Rights Instead of Only Leasing*	No	No	Maybe	Yes	Yes
3.6.9, *Extend Groundwater Leases Beyond 2028*	No	Yes	Yes	Yes	Yes
3.6.10, *Increase Flexibility to Achieve Springflow Protection*	No	No	Maybe	Yes	Yes
3.7.1, *Reconsider the Use of Ecological Modeling and Applied Research as Components of the Adaptive Management Process*	No	Yes	Yes	Yes	Yes
3.7.2, *Evaluate Potential Effects of Climate Change*	No	Yes	Yes	Yes	Yes
3.8.1, *Separate EAHCP and Funding and Management Agreement*	No	No	Maybe	Yes	Yes
3.8.2, *Simplify Administrative and Adaptive Management Changes to the EAHCP*	No	No	Yes	Yes	Yes

4.2 Approaches to Consider

Based on the permit options described in Chapter 2, *Permit Options Available*, and the potential changes described in Chapter 3, *Potential Changes to EAHCP Changes to Consider*, we identify a recommended approach and an alternative approach for permit renewal. We outline these two approaches in the following sections.

4.2.1 Recommended Approach

The steps below outline our recommended approach to the EAHCP permittees for permit renewal. This approach includes continuing administrative changes and a major permit amendment. The major permit amendment would address a suite of proposed changes and would support permit renewal for an additional 20–30-year permit term. These steps are in chronological order.

Step 1: **Continue to make administrative changes (e.g., clarifications, minor administrative amendments) through the remainder of the permit term, as needed**. The EAHCP has established an effective process and track record to make these types of changes. ICF identified 13 potential changes that have strong merit and could be made through administrative changes (Table 4-3). The permittees should consider making these administrative changes easier in the future by adjusting how administrative changes and adaptive management changes are reviewed and adopted by the EAHCP permittees (see Section 3.8.2, *Simplify Administrative and Adaptive Management Changes to the EAHCP*).

Step 2: **Complete an assessment of the effects of climate change on the effectiveness of the conservation strategy for the covered species at least 3 to 4 years prior to permit expiration (i.e., by 2024)**. We believe that assessing the potential effects of climate change on the EAHCP's covered species and conservation strategy will be needed to support a

permit renewal for any term length greater than another 15 years. USFWS Austin Field Office staff confirmed this.[55] It will be important to design this climate change assessment in coordination with USFWS so they can advise the permittees how the assessment can best support a permit renewal of the desired duration. This assessment would be informed by work already underway by the EAA on climate change effects to the Edwards Aquifer. Completing this climate change assessment well before permit expiration would help to inform the scope of the major permit amendment that should be started soon afterward (also see Section 3.7.2 of this report, *Evaluate Potential Effects of Climate Change*).

Step 3: **Start a major permit amendment process at least 2 to 3 years prior to permit expiration (i.e., by 2025).** This timing should allow enough time to determine the changes proposed in the major amendment and to complete the required coordination and NEPA review. The major amendment would (1) extend the permit duration for another 20–30 years, and (2) address those changes that cannot be addressed via administrative changes or adaptive management. We identified seven potential changes that likely can only be made through a major permit amendment (Table 4-3). More changes may be identified in the remainder of the permit term. This major amendment should also include the following:

- Revise the EAHCP document itself to incorporate all clarifications, minor amendments, and adaptive management changes adopted to date.
- Revise the EAHCP to incorporate the necessary procedural components of the Funding and Management Agreement, simplify the Funding and Management Agreement to focus just on funding amongst the permittees and remove this streamlined Funding and Management Agreement from the EAHCP (see Section 3.8.1, *Simplify Administrative and Adaptive Management Changes to the EAHCP*).

Step 4: **Coordinate early with USFWS and EAHCP Committees to design the permit amendment process to ensure its success**. USFWS's input will be important to inform how certain components of the plan must change to support a permit term longer than another 15 years that they are likely to accept and approve (e.g., addressing the potential effects of climate change). The EAA should also coordinate closely with the Implementing Committee and Stakeholder Committee regarding the components and schedule for the permit amendment. The EAA may also wish to coordinate with the Science Committee on the results of the climate change assessment and how those results are used to inform the design of the permit amendment.

Step 5: **Complete the major permit amendment before the end of the permit term**. If the major amendment process needs to extend beyond the permit expiration date (March 31, 2028), the permittees can apply for a short-term permit term renewal for 1-3 years while the major permit amendment is being completed. The Bakersfield HCP in California used this approach (see case study in Section 2.2.4, *Case Studies*, of this report).

[55] Adam Zerrenner, USFWS Austin Field Office Supervisor. Personal communication on call with ICF and EAHCP staff. June 22, 2020.

Table 4-3. Summary of Potential Changes by Permit Option

Plan/Permit Component	Potential Changes to Consider (see Chapter 3 for details)
Permit Renewal	
Permit Term	1. Extend the permit term beyond 2028 by up to another 15 years.
Adaptive Management Changes	
Adaptive management	1. Reconsider the use of ecological modeling and applied research as components of the adaptive management process (Section 6.3.3 of the EAHCP).
Adaptive management	2. Evaluate the potential effects of climate change to the Comal and San Marcos springs systems to facilitate extending the permit term beyond 2028.
Administrative Changes	
Covered activities	1. Require all commercial recreation outfitters that operate in the spring systems in the EAHCP plan area to obtain Certificates of Inclusion consistent with the plan.
Covered species	2. Add biological objectives and take authorization for non-listed covered species including the Texas Cave diving beetle, Texas troglobitic water slater, and Comal Springs salamander.
Biological goals and objectives	3. Restructure biological goals and objectives to a more typical structure, with biological goals being more broad statements of desired future conditions and objectives as measurable habitat-based targets.
Conservation measures	4. Adjust 10% annual disturbance take limit for occupied fountain darter habitat to allow for more year-to-year flexibility.
Conservation measures	5. Control recreational use and public access areas further in the San Marcos River during peak visitation periods.
Conservation measures	6. Remove dissolved oxygen management as a conservation measure.
Conservation measures	7. Establish performance standards for control of nonnative animal species.
Conservation measures	8. Remove measure to reduce gill parasites from the EAHCP.
Conservation measures	9. Establish performance standards for riparian restoration.
Conservation measures	10. Extend ASR and VISPO groundwater leases and lease options (i.e., forbearance agreements) beyond the permit term expiration date in 2028.
Conservation measures	11. Increase flexibility of the EAHCP to achieve springflow protection through additional water conservation programs or securing new sources of groundwater.
Other changes	12. Separate from EAHCP unique procedural provisions of the Funding and Management Agreement that do not support the ESA permit issuance criteria.
Other changes	13. Simplify how administrative changes and adaptive management changes are reviewed and adopted by the EAHCP permittees.
Major Permit Amendments	
Permit term	1. Extend the permit term beyond 2028 by more than another 15 years.
Conservation measures	2. Combine the two groundwater forbearance programs of the EAHCP into one program with the same pumping reduction target of 90,000 acre-feet per year in a drought-of-record.
Conservation measures	3. Add flexibility to the groundwater rights purchase programs to allow the EAA to purchase water rights instead of only allowing term leases or lease options.

Plan/Permit Component	Potential Changes to Consider (see Chapter 3 for details)
Covered activities	4. Add projects occurring in the San Marcos river with the potential to affect covered species, including dam fortification and other in-stream construction projects.
Covered species	5. Add as covered species those species occurring within the plan area that have a high likelihood of being listed during the permit term.
Covered species	6. Remove the San Marcos gambusia from the list of covered species in the EAHCP and the incidental take permit.
Permittees	7. Add permittees to the EAHCP to include entities conducting activities in the Comal or San Marcos springs systems that are adversely affecting covered listed species.

4.2.2 Alternative Approach

We offer an alternative approach to a major permit amendment in case events unfold over the remainder of the EAHCP's permit term that change the planning landscape. If substantial changes occur, a major permit amendment to pursue a 20 to 30-year permit term may be less feasible or less desirable than the recommend approach. For example, these factors could include the following:

- If a multi-year drought-of-record occurs before the end of permit term, and how well the plan fares in this first major "stress test."[56]
- The political climate at the time, and the permittee's willingness to go through an extensive public and stakeholder process again to develop the major permit amendment and propose it formally to USFWS.
- The status of the species and state of improved knowledge of their ecology and responses to EAHCP covered activities.
- The state of the planning effort as the permit term nears its end, including key stakeholders, USFWS staff familiar with and supportive of the program, institutional knowledge, continued track record of success, and willingness of participants to put in the effort required for a major amendment. If many of these factors suggest a difficult planning process, then plan participants may prefer to wait until after securing a permit renewal (for 10–15 years) to prepare a major permit amendment. However, with the passage of more time major plan changes may get more difficult to achieve, not less.

Should factors such as those listed above make our recommended approach infeasible, an alternative option is to renew the EAHCP permit for another 5–10 years (see Section 2.2, *Amend Permit to Extend Duration Only*). This relatively simple approach may avoid the need to conduct a climate change assessment or at least delay it. Under this alternative approach, coordination with USFWS remains very important to understand how long the agency may be willing to extend only the permit duration without assessing climate change effects. Based on our discussions with USFWS Austin Field Office staff, the potential effects of climate change to the long-term viability of the EAHCP program remain a very important consideration.

[56] The EAHCP began implementation in 2013, during the last severe drought that ended in 2014.

Chapter 5
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