Balcones Canyonlands Conservation Plan: Completion Task Group Report

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TABLE OF CONTENTS

Tables:

Appendices:

1.0 Executive Summary

In May 1996, the U.S. Fish and Wildlife Service (USFWS) issued the City of Austin and Travis County (Permit Holders) a 30-year 10(a)(1)(B) permit (Permit) to authorize "incidental take[1]" of 8 endangered species (golden-cheeked warbler, black-capped vireo, and 6 karst invertebrates) and 27 species of concern (2 plants and 25 karst invertebrates) (Permitted Species) associated with development activities in western Travis County. This Permit requires the perpetual preservation and management of the Balcones Canyonlands Preserve (Preserve) for the primary benefit of these species. The supporting document for this Permit, the Balcones Canyonlands Conservation Plan (BCCP), became the first regional multi-species, multiple-partner habitat conservation plan in the country. This report describes the requirements of the Permit and the associated Habitat Conservation Plan/Environmental Impact Statement (both the Permit and HCP/EIS hereafter referred to as "BCCP"), the current status of Balcones Canyonlands Preserve (Preserve) acquisition, a funding plan for completion, and recommendations on steps for completion.

This "BCCP Completion Task Group Report" provides a current status update on the BCCP completion progress. This document was written to inform elected officials, agency officials, BCCP managing partners, and the general public. Though it may inform the current discussion with USFWS, this document is not the final "Completion Report" document to USFWS. At completion of acquisition of the mitigation for the BCCP Section 10(a)(1) (B) permit, the Permit Holders will submit a "Completion Report" to USFWS demonstrating how the permit mitigation requirements have been met.

Through informal consultation with USFWS, the Permit Holders will seek their guidance now on the number of additional Wargler/Vireo acres above the *minimum* 30,428 acres that will be needed to meet the configuration specifications for the Warbler/Vireo. Similarly, the Permit Holders will also seek their guidance now on the number of caves and the level of karst protected needed to complete the BCCP, given that some of the 62 caves may be unattainable and it is possible that additional karst features may need to be acquired.

Once all required actions are completed and the "Completion Report" is submitted to USFWS, they will then review it and determinate compliance. USFWS may determine that the mitigation requirement has been completed or they may determine that additional acres or actions are still needed, and the BCCP Permit Holders will then work to complete these actions.

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[1] The Endangered Species Act defines "take" as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any threatened or endangered 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).

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The Preserve areas and caves serve as mitigation for Permitted Species in western Travis County and are to be acquired within the BCCP's 30-year time frame. The City of Austin and Travis County's shared vision is to complete Preserve acquisition within 20 years of the Permit issuance, by the year 2016.

As of June 2011, the City of Austin (COA) and Travis County (TC) and the other managing partners have acquired 29,975 acres of the *minimum* 30,428 acres (approximately 98.5%) required for the benefit the golden-cheeked warbler (Warbler) and black-capped vireo (Vireo), and 45 of the 62 karst features listed in the BCCP have some form of protection. The Permit Holders still need to acquire 453 acres of habitat for the Warbler and Vireo to meet the *minimum* acreage requirement, plus an additional 17 karst features (including two cave clusters) for approximately 355 acres to complete the Permit terms. In addition, the Permit Holders are estimating that approximately 792 to 992 additional acres will be needed to meet Warbler and Vireo Preserve design configuration specifications (see discussion in this report). Therefore, the total acreage still needed for BCCP completion is approximately 1600 to 1800 acres.

Table 1 summarizes the current status of the Preserve and the COA and TC's permit compliance. Acquisition methods for acquiring the remaining acreage will include fee simple acquisitions, conservation easements, donations, and land transfers. It is estimated that acquisition of this remaining 1600 to 1800 acres may cost from $24 million to $54 million. The majority of this cost is expected to be borne by TC using TC's Tax Benefit Financing funds, and also Participation Certificate fees, grants, and land donations. Description and analyses of Preserve design configuration specifications and performance are included in Tables 2 and 3.

Table 1. Preserve Completion Summary

	BCCP/Permit Requirements/Specifications	Current Status and Comments	Still Needed to Complete Permit Requirements
Golden-cheeked Warbler	Acquire and manage a minimum of 28,428 acres of existing and future habitat for the Warbler (defined as 11,086 acres of existing Warbler habitat when the Permit was issued plus enhanced management to regenerate Warbler habitat in all additional Preserve acreage that is not managed for the Vireo)	TBD- Approximately 28,213 Warbler acres (though may be reduced with some areas to be managed for Vireo habitat) (total 29,975 BCP acres minus 1,762 acres managed for the Vireo; This 28,213 acre Warbler number will need to be refined since: *some areas not currently suitable for the Warbler will need to be evaluated to determine if they could be better managed to support Vireos * the status of the specific locations of the 11,086 acres of high quality Warbler habitat required is TBD * some habitat is being managed for Warbler habitat by allowed it to grow into Warbler habitat which may require many years * some areas are managed for both BCVI and GCWA)	TBD. Minimum of 215 acres to be acquired and managed to protect and restore Warbler habitat. Also, dditional acreage is needed to meet configuration specifications.
Black-capped Vireo	2,000 acres of potential habitat managed for Vireo (defined as 933 acres of existing Vireo habitat when the Permit was issued plus management to create an additional 1,067 acres of Vireo habitat)	Approximately 1,762 acres of potential habitat for Vireo	Minimum of 238 additional acres of potential habitat for Vireo (note that some of the 28,213 acres currently listed for Warbler habitat will be evaluated to determine whether they could be managed for the Vireo)
Karst Invertebrates	Total of 62 specific karst features to be protected	45 protected to some degree	17 have no formal protection and need to be acquired, management agreement established, or substituted. Approximately 355 acres will be needed to protect these 17 karst features
	35 Endangered Species Caves (out of 62 total)	27 ES caves protected to some degree	8 privately owned ES caves, not protected by BCP
	27 Karst Species of Concern Caves (SOC) (out of 62 total)	17 SOC caves protected to some degree	Privately owned and not protected by BCP - 9 SOC caves plus 1 cave in BCCP listed as SOC which actually has no known ES or SOC

	3 Specific Cave Clusters to be protected (these are included in the 62 caves requirement)	1 Cave Cluster protected (4 Points Cave Cluster)	2 additional Cave Clusters still need protection (McNeil and Northwood Clusters). Acreage needed for protection included in the 355 acres above.

2.0 Introduction

2.1 Balcones Canyonlands Preserve Completion Task Group

In 2007, TC Commissioners' Court directed TC staff to put together a team to develop a Preserve completion plan. The BCCP Completion Task Group was formed to answer the question "How can the Permit Holders complete the acquisition of Preserve land to meet the terms of the BCCP?" This report is the response to that question and will be shared with TC Commissioners' Court, the BCCP Coordinating Committee, and USFWS.

The goals of the Preserve Completion Task Group were to:

- Evaluate the BCCP and concisely interpret the Preserve requirements, goals and objectives to provide habitat for the 2 endangered birds (Warbler, Vireo), 6 endangered karst invertebrates, 27 species of concern (SOC, 25 karst species and 2 rare plants). These requirements include specifics on Preserve acreage, Preserve size, location of Preserve blocks, design configuration specifications (distance from Preserve perimeter and edge-to-area ratios), numbers of species individuals, etc.
- Determine the current status of the Preserve acquisition relative to the Permit and BCCP requirements.
- Recommend current acquisition priorities for completing the Preserve based on results of the Preserve evaluation.
- Determine options for acquisition funding and make recommendations for acquisition financing methods to complete Preserve land acquisition.
- Once the plan is approved, determine the best ways to provide information on the BCCP Completion Plan for groups such as elected officials, bond committees, landowners, the general public, etc.

The Task Group included three subcommittees:

- Preserve Design Sub-group (Permit details and ecological requirements) including a Karst subgroup
- Acquisition Financial Methods Sub-group (acquisition strategies)
- Outreach Public Education Sub-group (to be set up after the plan is approved to provide information to the public)

2.2 Background Information

2.2.1 Balcones Canyonlands Conservation Plan

Due to the presence of endangered species, urban development pressures, and the desire to create a streamlined mitigation approach under the Endangered Species Act, the Austin/Travis County community worked with the USFWS to develop the BCCP. In May 1996 this permit was issued to the COA and TC (Permit Holders). Several other entities including the Lower Colorado River Authority, Travis Audubon Society, The

Nature Conservancy, and private landowners also hold and manage land as part of the Preserve. Most of these are managing Preserve land under formal agreements or USFWS Permits. The Permit Holders will work to complete formal management agreements with any groups that are currently managing Preserve land informally. Due to the successes of this locally developed, community-based conservation plan, the BCCP has served as a model for other communities across the country.

In order for development within Western Travis County to continue, the BCCP required large blocks of habitat to be protected as mitigation while also authorizing the "take" of Warbler, Vireo, and karst habitat in western Travis County to allow for development in the area to continue. These large blocks of habitat are collectively called the Preserve. Under the BCCP, "take" was also allowed by the Permit Holders to accomodate necessary infrastructure and school projects.

The BCCP's balance of economic as well as habitat benefits has garnered the support of landowners, developers, and the local business community as well as local, state and federal agencies. The Preserve not only provides habitat and protection for the endangered species, but also provides important air quality, water quality, and open space benefits to communities in Central Texas.

2.2.2 Preserve Location and Design

The primary mitigation proposed in the BCCP for the incidental take of the Permitted Species and their habitats focuses on the establishment of the Preserve. In the early planning process for the BCCP, the Biological Advisory Team (BAT) developed a preserve design configuration that minimized fragmentation and promoted long-term population viability. It recommended the amount of acreage needed for each species and the locations of the best remaining habitat preserve blocks. The BAT recommended that 125,000 acres were needed to adequately mitigate for the expected habitat losses. However, following a fiscal and economic analysis, this recommendation was reduced by the BCCP planners to less than 75,000 acres, with a minimum of 30,428 acres to be managed by the Permit Holders as the Preserve and 41,000 acres to be managed by USFWS within the Balcones Canyonlands National Wildlife Refuge (BCNWR). The Preserve Acquisition Area occurs in habitat blocks which extend from Austin, northwestward toward the BCNWR.

To facilitate the planning of the Preserve, western Travis County was divided into 10 primary geographic units known as "macrosites," which generally encompass watersheds as separated by roads. The Preserve Acquisition Area consists of a number of large, closely spaced Preserve units within the macrosites that include the major remaining blocks of Warbler and Vireo habitat, and additional smaller preserve units for the other Permitted Species. Designation of macrosites was, for the most part, oriented around discrete habitat areas proposed for acquisition. Each macrosite was then assessed to determine its relative overall priority in terms of long-term viability and habitat quality. Seven of the 10 macrosites were determined to be priority for inclusion in the Preserve Acquisition Area and are discussed in this report (Section 3).

The BCCP shows the locations of the macrosites and the proposed Preserve Acquisition Area (BCCP Figures 3 and 4). The BCCP requires Preserve acquisition within or adjacent to the Preserve Acquisition Area, and the Permit Holders have been acquiring land within these boundaries (See Map 1 for the current Preserve ownership).

2.2.3 Preserve Species and Habitat

Golden-cheeked Warbler: This small endangered, insectivorous songbird nests only in juniper-oak woodlands of central Texas. The principle limiting factor is the presence of mature Ashe juniper with stripping bark, which is the Warbler's main nest construction component. Other factors conducive to nesting activity include oaks and other hardwoods, high availability of arthropod prey, large blocks of closed canopy woodlands with minimal internal fragmentation, and possible proximity to water. The principle threat to the Warbler and the reason for the species' emergency listing in 1990 is habitat destruction, modification, and fragmentation from urbanization and some range management practices. Other threats include declining oak regeneration, oak wilt disease, and urban proximity.

Black-capped Vireo: The Vireo is a small endangered songbird occurring in mixed deciduous/evergreen shrubland. Breeding Vireos use shrubby growth of irregular height and distribution with spaces between the small thickets and clumps and with vegetative cover extending to ground level. Vireo habitat has an early successional characteristic which historically would have been created by disturbance such as wildfires. Historically over time, this habitat type would have moved around on the landscape given that this would be an ongoing cycle of new areas being disturbed creating new habitat and historic Vireo habitat areas growing out of suitability. Primary threats include habitat loss due to urbanization and road development, over-grazing/browsing, natural vegetation succession, fire suppression, nest parasitism by brown-headed cowbirds, and nest predation.

Karst Invertebrates: Six species of endangered karst invertebrates occur in Travis County and are protected under the BCCP: Tooth Cave pseudoscorpion, Tooth Cave spider, Tooth Cave ground beetle, Kretschmarr Cave mold beetle, Bee Creek Cave harvestman, and Bone Cave harvestman. The Permit also includes 25 karst invertebrate species of concern (SOC), which were included under the "No Surprises" clause by USFWS to protect these rare species. "No Surprises" gives the Permit Holders future assurances that in case these species are ever listed as threatened or endangered, USFWS would not require the commitment of additional land, water or financial compensation. They would also not add additional restrictions on land, water or other natural resources beyond the level otherwise agreed to in the BCCP. USFWS agreed to honor these assurances as long as the Permit Holders implement the terms and conditions of the BCCP in good faith.

These invertebrate species inhabit karst topography characterized by numerous subterranean features, including caves, sinkholes, and fissures, formed by dissolution of Edwards limestone. The surface community above the karst is an integral part of the habitat because it buffers the internal environment from fluctuations in temperature and moisture, supplies the system with energy and nutrients in the form of detritus, leaf litter,

animal droppings, and cave visitors. The surface vegetation is also important because as dissolved nutrients infiltrate into the karst, vegetation serves as a potential pollution filter and a supplier of nutrients. Numerous karst systems in the Permit area are isolated from one another by noncavernous formations, river and stream canyons, and faults. As a result of this isolation, these systems tend to support a rich and diverse endemic biota. Major threats to these karst invertebrates include the filling-in or collapsing of karst features, alteration of drainage patterns, alteration of surface plant and animal communities, contamination, vandalism through human visitation and dumping, and the red-imported fire ant. Conservation requires protecting the subsurface environment, protecting adequate surface area needed to maintain the moisture and nutrient regime, and controlling fire ants and other non-native species.

Plants: The BCCP includes two plant species, the canyon mock-orange and Texabama croton, and states that the Permit Holders will protect all of the known populations of both species within the Preserve boundaries. For the canyon mock-orange, this includes the West Bull Creek, Bohls Hollow, and Hamilton Pool populations. The Texabama croton, known only from Pace Bend Park, is included in the Permit which requires the protection and management of its population there. Since all of the known populations of the canyon mock-orange and Texabama croton are within the existing Preserve system, they are not addressed further in this report. The Bracted Twistflower is a species mentioned in the BCCP but not given protection for "incidential take" under the BCCP. However, the Permit Holders pledged to protect this plant wherever it is located within the Preserve.

3.0 BCCP Requirements, Acquisition Guidelines and Strategy

3.1 Minimum Preserve Design Specifications

The BCCP includes the following minimum Preserve design specifications that are intended to provide guidelines to create a Preserve that would limit further fragmentation of habitat for the Permitted Species.

3.1.1 Minimum Acreage

The BCCP set a target Preserve size of 30,428 acres and 62 karst features (including three cave clusters) as the *minimum* necessary for Permit issuance.

The Preserve Acquisition Area included more than 35,000 acres to provide sufficient acreage to allow acquisition of the *minimum* 30,428-acre Preserve with the understanding that not all landowners would be willing sellers and to allow flexibility for landowners to develop their tracts under individual 10(a) permits with USFWS.

3.1.2 Priority Macrosites

The BCCP identifies four priority macrosites that are considered critical to the success of the BCCP, and lists these according to acquisition priority: Bull Creek, Cypress Creek, South Lake Austin, and North Lake Austin. Three other macrosites are also recommended as part of the Preserve system, but are not considered as high a priority for protection of the Warbler and Vireo populations: West Austin, Pedernales, and Barton Creek macrosites.

The BCCP identifies acquisition and protection within the Bull Creek macrosite as the highest priority for the Warbler, followed by securing Warbler habitat in the Cypress Creek macrosite to maintain contiguity within the Preserve and minimize the distance between the Preserve and the BCNWR.

3.1.3 Configuration: Minimum Specifications for Priority Macrosites

The BCCP requires that specific minimum acreage totals be acquired within each macrosite and also lists target acreage goals. The Preserve Acquisition Area within each macrosite area contains more acreage than the total Preserve target acreage needed to give some flexibility for acquisition since not all landowners are expected to be willing sellers. When all target acreages in the seven macrosites are added together, they equal 30,428 acres, the minimum BCCP acreage required.

The BCCP states that the configuration of each Preserve unit must meet or surpass the minimum Preserve design standards (summarized in Table 2 below), include the greatest amount of habitat for the Permitted Species that is possible, and minimize the effects of habitat fragmentation[2] and development inholdings to the greatest extent practicable, given existing biological and economic constraints. In an effort to reduce habitat fragmentation, the BCCP specifies that the configuration of the "minimum Preserve acreage" should have no more than 20 percent of the total area occurring within 330 feet of the edge in each of the five largest macrosites.

[2] Habitat fragmentation describes the emergence of discontinuities in an organism's preferred habitat. It can be caused by geological processes that slowly alter the layout of the physical environment or by human activity such as land conversion, which can alter the environment on a much faster time scale. Habitat fragmentation is frequently caused by humans when native habitat is cleared for human activities. Habitats which were once continuous become divided into separate fragments. After intensive clearing, the separate fragments tend to be very small islands isolated from each other. Habitat fragmentation includes reduction in the total area of the habitat, increase of the interior:edge ratio, isolation of one habitat fragment from other areas of habitat, breaking up of one patch of habitat into several smaller patches, and decrease in the average size of each patch of habitat.

Table 2. Configuration: Minimum Preserve Design Specifications

Macrosite	Priority	Minimum Area (acres)	Target Area (acres)	Edge-to-Area Ratio (%)[3]
Bull Creek	High	5,200	5,638	≤20%
Cypress Creek	High	7,700	8,111	≤20%
North Lake Austin	High	3,000	5,117	≤20%
South Lake Austin	High	3,000	4,491	≤20%
Barton Creek	Medium	4,000	6,330	≤20%
West Austin	Medium	--	482	--
Pedernales	Medium	--	259	--
Total Preserve Size	**--**	**--**	**30,428**	**--**

The BCCP also lists length and width goals for each macrosite and distances between macrosites. However, since Preserve blocks are large with complex shapes, it is not possible to determine specifically where and how this should be measured. Instead, the Permit Holders assume these specifications were built into the design of the Preserve Acquisition Area. Thus, acquisition of lands within the Preserve Acquisition Area and in accordance with above specifications should meet the intent of the minimum length, width, and distance specifications (See Map 1).

3.2 Management of Permitted Species

The BCCP states that the Preserve is to be managed to permanently conserve and facilitate the recovery of populations of the Permitted Species. This priority objective is to govern preserve management activities to improve Permitted Species habitat, while protecting the Preserve against degradation caused by urbanization of surrounding lands and increased public demand for recreational usage within the Preserve. The BCCP specifically requires control of human activities to eliminate or mitigate any adverse impacts of human activities to the Warbler and Vireo. It also requires the development and implementation of land management plans for the Preserve, its species, and individual tracts. The BCCP provides general land management guidelines for vegetation management, browse pressure, public access, problem animal control, springs and watercourses, research and monitoring, and species-specific management. Species-specific management strategies for all species emphasize strict regulation of public access, habitat protection and restoration, and minimizing threats from predators.

3.3 Golden-cheeked Warbler

The Warbler has been referred to as the "driving force" of the BCCP, with concerns for the Warbler's viability occupying center stage in the preserve design process. The stated

[3] Edge-to-area ratio (perimeter to area ratio) describes the amount of habitat exposed to edges. The patch shape may have a significant effect on habitat occupancy by forest birds. Research has shown the presence and abundance of forest birds is affected by patch size. Birds in the "core area" (defined as areas more than 100 meters or 330 feet from an edge) were more successful in breeding than in woodland fragments broken by open spaces. Patches that had elongated shapes, indented perimeters, or inclusions of open habitat within the fragment had fewer species and individuals than forest stands with compact shapes and unbroken perimeters. Patches with elongated shapes or indented perimeters have higher perimeter-area ratios than patches of the same area with compact shapes and unbroken perimeters. In addition, small patches generally have higher perimeter-area ratios than large patches.

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goals of the BCCP are the establishment and protection of a viable population (estimated to be at least 500 to 1,000 effectively breeding pairs) within the Preserve and the concurrent protection of a viable population in the BCNWR.

Warbler habitat in western Travis County is widely considered to be the highest quality and least fragmented of any county within its range. The largest patches of high-quality Warbler habitat occur within the Bull Creek, North Lake Austin, and Cypress Creek macrosites.

The BCCP estimated a loss of up to 71% of the Warbler's habitat in western Travis County as a result of the Permit. To mitigate for this loss, the BCCP assumes that approximately 11,086 acres of the remaining Warbler habitat, including 7,152 acres of high quality habitat (Table 21 in the BCCP), would be acquired and managed within the Preserve, and that this acreage would be sufficient to support a viable population. The BCCP estimated an upper range of 665 to 1,330 Warbler pairs within the 11,086 acres, based on an estimated density of 15 to 30 pairs/250 acres (1 pair/8.3 to 16.7 acres). The Biological Opinion (document by USFWS associated with the BCCP) rounded this estimate to 700 and 1,400 pairs. These numbers are within the range believed to be the minimum necessary to support a viable population and provide a goal for the BCP. The BCCP further assumes that with enhanced management and protection, Warbler habitat regeneration would occur over the 30-year Permit period, for a total minimum habitat goal of 28,428 acres to be managed for the Warbler within the Preserve. This total Warbler habitat acreage is derived from 30,428 total Preserve acres minus 2,000 acres managed for the Vireo.

3.4 Black-capped Vireo

The BCCP estimated a loss of approximately 55% of the Vireo's habitat in Travis County as a result of the Permit. To mitigate for this loss, approximately 933 acres of the remaining Vireo habitat known to be occupied at the time the permit was issued would be acquired and managed, with enhanced management of an additional 1,067 acres of potential Vireo habitat, for a total minimum habitat goal of 2,000 acres within the Preserve. The BCCP recognized that this is not sufficient habitat to support a viable population of Vireos, but would contribute to the regional conservation of this species outside of Travis County.

The BCCP defines "potential Vireo management areas" as sharing a set of requisite geologic substrate, slope, and vegetational characteristics in common with actual occupied Vireo habitat in the BCCP area. However, at present, these potential Vireo areas lack the appropriate specific vegetative composition, structure, or age to be attractive to Vireos. Potential Vireo management areas should not be confused with suitable or actual (e.g., extant, occupied) Vireo habitat.

The BCCP recommends focusing potential Vireo management areas in portions of the Preserve that are not currently occupied by the Warbler. However, the Permit Holders recognize that some of the potential Vireo management areas recommended in the BCCP for protection in the Preserve system are currently Warbler habitat, and some areas are

currently being managed for both species. While the Vireo is the rarer of the two species in western Travis County, the blocks of Warbler habitat within the Permit area are among the most important within the Warbler's entire range. Combined with the fact that Warbler habitat is in essence old growth woodland with a long lead time for regeneration, it is, therefore, assumed that most of the potential Vireo management areas that are presently occupied by Warblers would best be retained and managed for the Warbler and not for the Vireo.

3.5 Karst Invertebrates

The BCCP requires protection of 62 karst features in Travis County, including 35 endangered karst invertebrate localities and 27 karst features that contain one or more of the 25 karst SOCs. Some of these caves are isolated, requiring protection in individual karst preserves, and others occur in cave clusters. The BCCP identified three cave clusters: McNeil, Northwood, and Four Points (BCCP Figure 21). Detailed hydrogeological investigations are required to adequately delineate the boundaries of the areas to be protected, and this has been completed for the Four Points cave cluster and the McNeil cave cluster.

The BCCP states that karst preserves will be appropriate in size and configuration in order for the species in the Preserves to be counted toward the Permit protection requirement. To be considered "protected", a karst preserve must contain a large enough expanse of continuous karst and surface area to maintain the integrity of the karst ecosystem on which each species depends. The size and configuration of each karst preserve must be adequate to maintain moist, humid conditions, air flow, and stable temperatures in the air-filled voids; maintain an adequate nutrient supply; prevent contamination of surface and groundwater entering the ecosystem; prevent or control the invasion of exotic species, such as fire ants; and allow for movement of the karst fauna and nutrients through the interstitium between karst features. In most instances, this will entail protecting the entire surface and sub-surface drainage area of each cave and enough of the surface vegetation community to support small animals and buffer against fire ant infestations that can eliminate native ant populations. In the absence of detailed hydrological studies for use in delineating cave preserve boundaries, land delineated by the contour interval representing the bottom of the cave should be targeted for preservation. Though not an acreage requirement of the BCCP, the USFWS (2008) recommends a minimum of 69 to 99 acres for an adequate karst preserve design, which may help guide acquisition decisions for the BCP. Acquisition areas around karst features should be as large as possible since these karst ecosystems are some of the most diverse in the U.S. and, once destroyed, can never be recreated.

The BCCP requires that each karst feature be acquired or protected under formal management agreements to preserve the environmental integrity of the caves. It further states that where the surface and subsurface hydrogeologic area around a cave identified for protection is not known, the area delineated by the contour level at the bottom of the cave will be managed for cave protection. In absence of such site specific information, no Participation Certificates will be awarded within 0.25 miles of the cave entrance until

the hydrogeologic areas are properly delineated. In some cases, this assumed distance may provide insufficient cave protection.

The BCCP allows for any of the 62 caves to be substituted with newly discovered karst features that have significant diversity of troglobitic fauna, contingent upon USFWS approval. The substitution would not increase the number of required caves, but would result in the new feature replacing a previously identified cave or caves. Substitution would likely include a consideration of factors contributing to the recovery of the Permitted Species. Selection criteria for new caves may include location within the same karst fauna region, similar species composition, and adequate preserve design/configuration. Substituting a new karst feature would require an administrative change to the Permit but would not require a major Permit amendment.

4.0 Evaluation of Current Preserve Acquisition Status

4.1 GIS Analysis

A Geographic Information System (GIS) analysis was conducted to evaluate the current status of Preserve completion.

Map 1: Preserve Ownership Map - depicts the location of the Preserve tracts and helps explain the status of meeting the Permit requirements. It shows the current BCP ownership status of the Preserve acreage acquired as of June 2011. Areas that have been acquired and managed as Preserve are shown in green.. The acreages acquired to date within each macrosite and within the entire Preserve were calculated from information provided by the BCCP managing partners. The Permit Holders are required to acquire land within or adjacent to the Preserve Acquisition Area and all Preserve tracts shown on this map comply with that requirement.

A GIS analysis is in progress to determine the total acreage of core area within each macrosite. "Core" areas are defined as the acreage in the interior of the habitat block, and "buffer" areas are located 330 feet outward from the edge of the core area. These core and buffer acreages were used to estimate the edge-to-area ratio listed in Table 3. The "core" areas were measured to meet the minimum acreages in each macrosite. This GIS analysis is ongoing and the core-buffer analysis provides relative compliance information and will be completed for future reports.

Additional GIS analyses are also in progress for the Warbler, Vireo, and karst invertebrates (see below).

4.2 Evaluation of Minimum Preserve Design Specifications

4.2.1 Evaluation of Minimum Total Acreage

As of June 2011, the acreage currently acquired and protected in the Preserve totals 29,975 acres (See Map 1). To meet the minimum required BCCP acreage, the Permit Holders will need to acquire a *minimum* of 453 acres of additional Preserve land. An estimated 355 additional acres are needed to protect karst invertebrate habitat (see Karst section below). Based on the estimated Preserve design configuration specifications in the BCCP, it is estimated that an additional 792 – 992 acres will still be needed to meet

these configuration specifications. The final determination of how many additional acres are needed above the minimum 30,428 acres for the Warbler/Vireo will be determined by USFWS. These include meeting minimum and target acreage in the macrosites, and edge-to-area ratio specifications (core and buffer), primarily in the Bull Creek and North Lake Austin macrosites.

4.2.2 Evaluation of Minimum Specifications for Priority Macrosites

The "gross" acreage refers to the total acreage acquired to date. Based on the GIS analysis (See Map 1) and the gross acreage acquired, the minimum Preserve acreage in each macrosite has been met for all except the Bull Creek macrosite, which lacks at least 176 acres to meet the gross specified minimum acreage (See Table 3). The Bull Creek macrosite still lacks the minimum acreage needed. "Target acreage" refers to the BCCP acrage specifications in each individual macrosite which all added together equil the 30,428 acre *minimum*. Since not all target acreage has been acquired in the other macrosites, additional acreage is still needed to complete the total Preserve acreage required. The Permit Holders will continue to work to acquire the minimum and target acreages, particularly in the Bull Creek macrosite.

Since it is likely that not all private landowners will be willing sellers and it may not be possible to acquire all of the minimum or target acreage within each macrosite, the additional needed acreage may need to be acquired in other macrosites within the Preserve Acquisition Area or adjacent to the Preserve Acquisition Area boundary.

All macrosites except the North Lake Austin macrosite meet the minimum edge-to-area specification of $\leq$20%. However, further analysis has determined that even with complete acquisition of lands within the Preserve Acquisition Area, the original Preserve acquisition design for this macrosite is too fragmented and cannot achieve this specification.

There is sufficient land available for acquisition within the whole Preserve Acquisition Area or adjacent to acquire the required BCCP minimum acres and target acreage. More specifically, there is sufficient acreage in 6 of the 7 macrosites (except for the North Lake Austin macrosite) to meet the edge-to-area ratio specification as long as additional tracts within the Preserve Acquisition Area are acquired. Since not all remaining landowners within the Preserve Acquisition Area are expected to be willing sellers, the Permit Holders are also working to acquire land outside of and adjacent to the Preserve Acquisition Area boundary.

Table 3. Current Acreage and Edge-to-Area Ratios For Each Macrosite

	Barton Creek Macrosite	Bull Creek Macrosite	Cypress Creek Macrosite	No. Lake Austin Macrosite	So. Lake Austin Macrosite	West Austin	Pedernales
Gross Preserve Acreage Currently Owned (as of 6/30/2011)	6,103	5,024	8,676	5,379	4,060	478*	259
Minimum Acreage/macrosite (BCCP Required)	4,000	5,200	7,700	3,000	3,000	482	259
Target Acreage/macrosite (BCCP Specification)	6,330	5,638	8,111	5,117	4,491	482	259
Meets Required Minimum Acreage/macrosite	Yes	No	Yes	Yes	Yes	Yes	Yes
% Edge-to-Area Ratio **	17.1%	19.4%	18.5%	23.4%	17.1%	N/A	N/A
Meets BCCP Required Maximum Edge-to-Area Ratio - less than 20%	Yes	Yes	Yes	No	Yes	N/A	N/A

* Specific tracts were included from start BCCP and acquisition considered complete.

**Acreage derived by GIS analysis (30 August 2010). Analysis calculation does not include acreage of later acquisitions and needs to be updated. This is the percentage of Buffer Edge to Core Ac.

4.3 Evaluation for Golden-cheeked Warbler

The BCCP requires a minimum of 28,428 acres to be managed to protect existing and restore additional Warbler habitat. Currently, 29,975 acres of land have been acquired for the Preserve. With approximately 1,762 acres of potential habitat currently managed for the Vireo (see below), this theoretically leaves approximately 28,213 additional acres that should be under an enhanced management program to promote Warbler habitat within the rest of the Preserve. Because the Warbler inhabits mature, closed canopy woodlands, habitat regeneration in some areas could take fifty years or more (BAT 1990). Thus, protecting existing Warbler habitat within the Preserve is the highest priority for the Warbler. In addition, the Permit Holders are evaluating areas within the Preserve that are not currently occupied by Warblers or Vireos to determine which of the two species these areas should be managed for.

The Permit Holders are working to determine whether the Preserve currently supports the minimum 11,086 acres of Warbler habitat existing since the time the BCCP was issued, including the 7,152 acres of high quality habitat discussed in the BCCP. To assist with this effort, the COA has contracted with Dr. Joseph White, Baylor University to estimate woodland stand ages within the Preserve based on an analysis of a decadal series of historical aerial photos from 1940 to present. Since Warblers depend on mature Ashe juniper-oak woodlands, stand age may be a critical factor in assessing habitat quality for this species. The results of this project will be used to help refine the location and amount

of high quality Warbler habitat and identify potential areas within the Preserve that could be managed for the Vireo.

The Permit Holders currently estimate that the Preserve supports about 1,005 pairs of nesting Warblers, which is within the range that the BCCP deemed necessary to support a viable population. This very cursory estimate is based on 2007-2010 survey data and should be used with caution.

COA and TC staff estimated the number of territories per tract based on intensive 100-acre study plots and more limited presence-absence surveys across a broader area of the Preserve. COA staff estimated 447 territorial males within their 13,598 acres, for a density estimate of 1 territorial male/30.4 acres. TC staff estimated 507 territorial males within their 7,154 acres, for a density estimate of 1 territorial male/14.1 acres. The differences in these density estimates may reflect real differences in habitat quality and numbers of Warblers, as well as differing levels of survey effort, observer differences, and/or other factors. BCP partners recognize the need for, and are currently working with the U.S. Forest Service (discussed below) on a more consistent and rigorous methodology to obtain reliable estimates of density and abundance across the entire Preserve.

Based on these very rough estimates, the combined COA/TC acreage (20,752 acres) may support about 954 territorial Warbler males. If the remaining 9,223 acres of Preserve land that is not managed by the Permit Holders was similarly counted using the conservative density estimate of 1 territorial male/30.4 acres (303 territorial males), this would total approximately 1,257 territorial Warbler males within the existing 29,975 acres of Preserve land. Assuming that not all males are mated and an overall 80% pairing success, a cursory estimate is currently 1,005 nesting pairs within the Preserve.

In February 2011, the City of Austin initiated a project with the U.S. Forest Service to develop population viability and habitat suitability models for the Warbler within the Preserve. This project will focus on four primary questions: 1) What is the absolute abundance of the warbler on the BCP and on individual macrosites?, 2) How do demographics (e.g. density, productivity, survival, dispersal) vary with landscape and habitat factors (e.g., vegetation cover, land use, stand age, composition, slope, aspect, etc.)?, 3) How viable are these populations?, and 4) How do various management scenarios influence population viability? To answer these questions, estimates of warbler abundance, fecundity, recruitment, dispersal, survival, and habitat characteristics will be gathered across space and time within the Preserve. This project will use the research that is currently underway by Dr. Joseph White/Baylor University to estimate woodland stand age, successional pathways, and fire histories within the Preserve (discussed above) to evaluate how land use changes have affected Warbler abundance, demographics, and habitat quality. Linking Warbler monitoring data with landscape and habitat information will allow for a better understanding of factors influencing habitat suitability, predictions of population viability, and development of adaptive management strategies to promote the survival and recovery of the Warbler.

4.4 Evaluation for Black-capped Vireo

Within the 29,975 total acres in the Preserve, the current estimate of potential Vireo habitat totals 1,762 acres of the required 2,000 acres. For this report, the current acreage of Vireo habitat is defined as:

- areas occupied by the Vireo since the Permit was issued that the Permit Holders plan to continue managing for the Vireo, or
- areas where vegetation has been managed with the intent to create Vireo habitat with the expectation of it becoming occupied Vireo habitat, or
- areas that Permit Holders include in land management plans to manage for Vireo on Preserve land in the future

The Preserve currently protects most of the Vireo habitat areas outlined in the BCCP, and additional Vireo habitat areas are also being managed for this species. Consistent with the recommendations in the BCCP, the Permit Holders are evaluating the potential to create Vireo habitat in areas within the Preserve acreage that are not currently suitable for either the Vireo or the Warbler and manage them for Vireo habitat rather than for future Warbler habitat. Since Vireos occupy an earlier successional stage, actively managing to create Vireo habitat may be a more realistic option in some areas than trying to restore mature, closed canopy woodlands. This would also protect existing Warbler habitat from conversion or fragmentation to create Vireo habitat.

Although managing separate areas has been our traditional approach, in an effort to implement adaptive management, staff is continuing to investigate whether revision of this idea of separate management areas for each species is warranted and if not, how to refine this idea. The appropriate balance between the habitat management requirements of these two endangered songbirds will continue to be reexamined as further research is available and as individual management plans for the Preserve are written.

The Permit Holders still consider the acquisition of additional Vireo habitat outside of the original Preserve Acquistion Area as a viable option to meet the terms of the Permit if deemed necessary to meet the terms of the BCCP. If the habitat is not adjacent to the Preserve Acquisition Area, this may require an amendment to the Permit.

4.5 Evaluation for Karst Invertebrates

A summary of the current status of Karst Invertebrate protection is provided in Table 1. A total of 45 of the 62 required karst features have some degree of protection (See Table 4).

Table 4: Management Status of Protected Caves

Management Status of Protected Caves	Protected by
34	COA, TC, The Nature Conservancy
6	Privately-owned, Individual 10(a)(1)(B) permits
2	Privately-owned, Section 7 consultations with USFWS (one has setback and land management plan with COA)
1	Privately-owned, Private Landowner Agreement with COA
1	Privately-owned, Texas Cave Management Association
1	Privately-owned, within Critical Environmental Feature setback, COA requirement
Total 45	

The remaining 17 karst features are privately owned with no formal protection. Although acquisition efforts are continuing, not all of the remaining 17 unprotected caves may be available for acquisition from willing sellers and some caves may no longer provide quality habitat for the permitted species. Some of the 17 caves are located in the Northwoods and McNeil Cave Clusters. Protection of these Cave Clusters will require acquisition of acreage large enough to protect the karst ecosystems for several caves including cave drainage basins and cave cricket foraging areas. A detailed hydrological investigation for the McNeil Cave Cluster was completed in December 2010 and will assist in delineating the area needed for protection. The Northwoods and McNeil Cave Clusters are still privately-owned, with 5 of the 8 unprotected endangered species caves held by one landowner that is not currently a willing seller.

TC has acquired and is protecting the Four Points Cave Cluster.

A Karst Analysis is underway to determine the current degree of protection of each of the 62 caves. Full protection is determined by the presence of sufficient buffer areas around the cave entrances, the cave footprints, cave cricket foraging areas, and surface and subsurface drainage basins. The ongoing analysis indicates that some of the 45 "protected" karst features have adequate preserve size/configuration to fully protect the features while others are not as well protected. Examples of inadequate protection include insufficient setbacks due to conditions that existed before the Permit was issued and that preclude complete protection of the recommended preserve areas. While the entrances of these karst features may be protected, the surface and subsurface area needed to protect the karst ecosystems may not be adequate. Appropriately sized setbacks are needed to encompass cave cricket foraging areas and surface drainage basins. Unfortunately, pre-existing development such as subdivisions, roads, power lines, and septic lines have made complete protection of these caves impossible. Permit Holders will continue to do what is reasonable to protect these features from pre-existing development.

This Karst Analysis will also be completed for as many of the 17 unprotected caves as possible. However, full analysis of these privately-owned caves may be difficult because not all landowners are willing to grant access to verify the specific location of the caves. A preliminary analysis was completed to identify the approximate number of acres needed to assure permit compliance for karst species. This analysis only included the

total number of undeveloped acres within the 105 meter cave cricket foraging area plus a 100 meter buffer (total - 205 meters around each cave entrance). No other factors (i.e. cave footprint, drainage basins) were included since they are substantially unknown for these features. This analysis estimated that approximately 355 acres may be needed to protect the remaining 17 karst features.

The following lists the Permit Holders' priority order for acquisition/protection of the 17 unprotected karst features based on habitat type and species priorities:

1. Features within a cave cluster (McNeil, Northwood) – 6 caves
2. Features containing endangered species – 2 caves
3. Features containing species of concern (SOCs) – 8 caves
4. Features that have no known listed species or SOCs – 1 cave (or staff may propose replacement of this feature)

The Permit Holders will continue to work to acquire these karst features if they are still available for protection. Some of the area needed to protect the karst ecosystems may already be so compromised that it may be more effective to substitute another karst feature for the impacted one. The BCCP allows for the substitution of karst features in place of one or more of the 62 karst features with the approval of the USFWS under an administrative amendment to the Permit. Deciding which of the 17 unprotected caves to acquire and which to substitute with other caves that have significant diversity of troglobitic fauna will depend on a number of factors. After consulting with USFWS on this, selection criteria for substitute caves may include location within the same karst fauna region, similar species composition, and adequate preserve design and configuration.

Further karst analysis will help determine which of the 17 unprotected karst features still contain important habitat worthy of acquisition versus if they should be substituted with more beneficial caves. Examples of caves which may need to be substituted include Bee Creek Cave that may be too degraded from surrounding development and Armadillo Ranch Sink which currently is not known to contain any of the Permitted Species. Another example candidate for substitution is Spanish Wells Cave, since the exact location is not known and karst experts have not visited the cave since the 1970s. The Permit Holders will seek USFWS guidance to evaluate the feasibility of replacing these features with new features found on existing Preserve land since 1996.

5.0 Evaluation Discussion

5.1 Management Challenges for Permitted Species

Pressure to increase public access to the Preserve will continue to require attention to ensure that access is consistent with the BCCP and doesn't interfere with the management efforts needed to support sustainability and regeneration of Warbler and Vireo habitat. Some types of habitat management and restoration activities that are critical to promoting hardwood regeneration, particularly the management of deer and hogs, are not possible in areas with public access (such as Emma Long Metropolitan Park and the Barton Creek Wilderness Park and Greenbelt). Trails also create openings in the

habitat, which decrease habitat quality and increase exposure of nests to predators. To date, closing trails during the breeding season has not been a realistic option. With limited ability to sustain and restore Warbler and Vireo habitat, unrestricted public access can present a serious impediment to BCCP compliance.

Another management challenge, particularly for the Vireo, is managing sufficient Vireo acreage to meet the terms of the BCCP. The BCCP does not allow conversion of Warbler habitat into Vireo habitat and recommends focusing Vireo habitat management in areas not currently occupied by the Warbler. However, continuing with adaptive management efforts, since Vireo and Warbler habitat do overlap in some areas within the Preserve, staff will continue to investigate whether some areas can be successfully managed for both bird species at the same time. Staff will also investigate possible management of specific locations for each species in the Preserve over a longer planning horizon.

Since these species occupy habitats that are essentially at opposite ends of the spectrum of habitat succession (i.e., open shrub community vs. closed-canopy, older growth woodland), one of the main purposes of the woodland stand age study (see Section 4.3 Evaluation for Golden-cheeked Warbler) is to identify potential areas for Vireo management without impacting high quality Warbler habitat. Emphasis will be placed on identifying areas that are in an earlier successional stage that would be more suitable for active Vireo habitat management than for the Warbler. Once the stand age mapping project is complete, the Permit Holders will complete their GIS analysis of all possible Vireo habitat locations within the Preserve based on known Vireo sightings, geology, soils, vegetation, stand age, etc. and develop a plan for long-term management of all these areas to achieve the total Vireo habitat acreage required.

5.2 Additional Acreage Needed

The question has been asked – is there still the number of acres available to acquire in each macrosite within the Preserve Acquisition Area to meet this Preseve acreage goal and is there enough land left to meet the design configuration specifications? This evaluation found that there are currently enough acres available within the original Preserve Acquisition Area to complete acquisition of the required minimum of 453 additional acres of Warbler and Vireo habitat needed and the additional acres needed to complete the Preserve design configuration specifications. There is sufficient acreage in 6 of the 7 macrosites (except for the North Lake Austin macrosite) to meet the edge-to-area ratio specification as long as additional tracts within the Preserve Acquisition Area are acquired. The Permit Holders will continue working to acquire as much of the remaining acreage within this Acquisition Area as possible. However, if it is not possible to acquire some key parcels within the Preserve Acquisition Area, additional acreage may need to be acquired outside of and adjacent to this Preserve Acquisition Area boundary. Also, if it is not possible to acquire some tracts needed for configuration purposes, additional acreage above the *minimum* 30,428-acre figure may need to be acquired in order to meet the configuration specifications outlined in the BCCP. This will likely be needed to make up for fragmentation impacts from losing key tracts and to meet the edge-to-area ratio specifications. If sufficient land is not available for acquisition within

or adjacent to the Preserve Acquisition Area, additional acreage may need to be acquired outside of these habitat blocks in order to complete the BCCP and would likely require a Permit amendment.

If key tracts within the Acquisition Area are not available from willing sellers and if any caves listed in the BCCP are not available for acquisition, the Permit Holders will consult with USFWS to determine how to provide the needed Warbler/Vireo habitat acreage and caves. The specific number of additional acres that would need to be acquired for Warbler/Vireo habitat or specific number of additional caves are not known at this time since USFWS will make the final determination on compliance with the Preserve design configuration specifications and how much additional acreage would ultimately be needed. Though the goal of the Permit Holders was to complete acquisition by 2016, the BCCP is a 30-year permit which has until 2026 (15 additional years remaining) to complete the Preserve requirements.

5.3 North Lake Austin Fragmentation Edge-to-Area Ratio Gap

The BCCP specifies that a minimum of 3,000 contiguous acres be protected in the North Lake Austin macrosite. The configuration of this core area should allow no more than 20 percent of the preserve area within 330 ft. of the boundary (the "core" area is defined as the acreage in the interior of the Preserve block, with the "buffer" areas located 330 feet from the inside edge of the perimeter of the core area). However, in the North Lake Austin macrosite, this specified configuration may be impossible to meet due to the fragmentation inherent in the original Preserve Acquisition Area design for this macrosite (see Map 1). This evaluation found that even if all tracts within the original Preserve Acquisition Area were acquired for the North Lake Austin macrosite, this edge-to-area ratio in the macrosite specifications could not be achieved. This is primarily due to the fact that two distinct preserve blocks with irregular configurations were targeted for acquisition within this macrosite (i.e., two Preserve blocks have a greater edge-to-area ratio than one block). In addition, not all landowners in key tracts may be willing sellers. Regardless, the Permit Holders are continuing to work to acquire key tracts within the North Lake Austin macrosite and the larger Preserve Acquisition Area.

6.0 Acquisition Financial Evaluation Results and Discussion

6.1 Acquisition Options

This evaluation worked to determine the best financial methods to complete acquisition of the Preserve. It was determined that completion will require a combination of several acquisition methods depending on the specific needs of the seller and buyer. Table 5 identifies the acquisition options that may be used and some of the advantages and disadvantages of each.

All of these acquisition options may be used when appropriate. TC considers the first three options **(in bold)** as the most cost-effective and likely options and will consider these first during TC negotiations.

Table 5: Acquisition Options

Type of Acquisition	Advantages	Disadvantages
Pay-as-you-go fee simple land acquisition	**Less expensive than longer term purchases.**	**Slower purchase of tracts over time as funds are available.**
Purchase Conservation Easements	**Less expensive than fee simple acquisition.**	**Long term costs higher for land management. There are also frequent problems with future CE owners that lead to increased management costs and potential habitat loss.**
Seek USFWS Section 6 Matching Grants (ex. 75% fed and 25% local match)	**Help stretch local dollars.**	**Continued federal funding for this program is uncertain and may not be available for remaining tracts since available tracts are now less competitive. May need more than one endangered species to be competitive for grants, and competition has increased nationally for these grants.**
Donation of land or Conservation Easements	Less expensive than acquisition. Only accept tracts within Preserve Acquisition Boundaries or adjacent.	Not many of these can be expected.
Conservation Buyer Agreements	Protects land now from being lost or developed.	Unknown future cost which could increase total acquisition costs.
Widening Preserve Acquisition Area to reduce land costs	May help reduce acquisition costs. May help complete total ac. requirement if land within Preserve Acquisition Boundaries is not available.	May take funding away from tracts within Preserve Acquisition Areas, which were designed to protect the highest quality habitat. Would likely require Permit amendment.
Lease-Purchase (Installment Sale) Agreements – Preserve partner and Seller	Protects land now from being lost or developed.	More expensive in current dollars but not more in future dollars. Negotiating the deal could be time consuming and complex.
Third party Lease-Purchase Agreements	Protects land now from being lost or developed.	Unknown future cost which could increase total acquisition costs.
Purchasing "Rights of First Refusal" for potential Preserve Tracts	Protects land now from being lost or developed.	Much more expensive in the long run. Negotiating the deal could be time consuming and complex.
Tracts acquired by other than TC – such as COA or LCRA	Helps complete Preserve sooner.	Acquisition cost and management costs for COA, LCRA or other entities.
Encourage additional COA acquisition in exchange for long-term County management support	Helps complete Preserve sooner.	Acquisition cost for COA. Long term management costs for TC.
Pursuing acquisition participation from TxDoT and other Infrastructure providers benefiting from the Plan	Brings in additional funding and helps complete Preserve sooner.	Not clear how to encourage these agencies to provide acquisition funding.
Increasing BCCP Public Participation by encouraging additional USFWS endangered species enforcement	Brings in additional funding and helps complete Preserve sooner.	USFWS may not be able to achieve this.
Increasing Preserve Participation Certificate Fees to generate more revenue	Helps complete Preserve sooner.	The funds from PCs are generally low and not sufficient to contribute much to speed up land acquisition.
Decrease or eliminate Participation Fees to encourage participation and increased Tax Benefit Financing (TBF)	Could encourage increased participation under the BCCP and therefore increase acquisition funds for Tax Benefit Financing.	Would reduce acquisition and management funding for COA and TC. In the past, USFWS was not supportive of total elimination of the

		fees.
Certificates of Obligation against future Tax Benefit Financing (TBF) revenue	Would provide funding to acquire land sooner at a lower cost and would protect the land now from being lost or developed.	TC Financial staff have not supported this option and say TC Voters opposed the BCCP bond election in 1993 and are not willing to consider this option now.
Identify additional revenue sources	Additional revenue sources should continue to be explored.	It is not clear what these sources would include and how this would work.
Cash donations by the public to help acquire land	Another group such as a Friends Group would have to handle this since it is difficult for governmental agencies to solicit donations.	It is not clear what group would then solicit and handle public donations and how this would work.
Include additional agency owned land (Parkland or Water Quality land)	This would add preserve land and help complete the preserve faster at a lower cost.	If this land is located outside BCCP Acquisition Boundaries, this would require a Permit amendment. It is not clear that these added tracts would meet Permit and USFWS criteria.
COA and/or TC bond election	Would provide funding to complete the preserve faster.	It is possible that these agencies may decide to do future bond elections. Since the first TC bond election failed in 1994, TC Financial staff and elected officials have consistently rejected holding another bond election.
For Karst Features and Cave Clusters: Private landowner agreement (for example, landowner provides protection; Preserve provides management, monitoring, etc.)	Though fee simple acquisition or purchased conservation easements is preferred, some landowners may not be willing sellers and may prefer management agreements. These agreements would help if acquisition is not possible.	Unclear if landowners would be interested in this. May still not adequately protect the karst features.
For Karst Features and Cave Clusters: COA agreements on setbacks/protection during development review process	Though fee simple acquisition or acquisition of conservation easements is preferred, some protection through setbacks in the development process is better than none.	Unclear if landowners would be interested in this. Likely not adequate for complete protection due to limits of legal authority to require an inadequate setback size.

6.2 Acquisition Completion Cost Estimates

The total number of acres needed to complete acquisition may vary depending on which specific tracts are acquired and which are not available due to lack of willing sellers. To complete the Preserve design configuration specifications, additional acres beyond the *minimum* of 30,428 acres of Warbler/Vireo habitat listed in the BCCP will need to be acquired, plus additional acreage for protection for caves and cave clusters. For these costs estimates, a total of approximately 1,600 - 1800 acres is estimated to be needed to complete the Preserve. This includes 453 acres to meet the minimum 30,428 acre requirement, plus approximately 355 acres karst habitat for the remaining 17 karst features and 2 cave clusters, plus approximately 792 to 992 additional acres needed to meet Preserve design configuration specifications needed in the Bull Creek and North Lake Austin macrosites.

If key tracts are not available from willing sellers and configuration specifications cannot be met, the Permit Holders will consult with USFWS who will make a determination of the number of acres needed to replace Warbler/Vireo habitat that cannot be be acquired within the Acquisition Area. If some of the Warbler/Vireo habitat within the Preserve

Acquisition Area cannot be acquired, it is likely that the total acreage needed would be higher than the original *minimum* BCCP acreage.

The cost to acquire this total acreage is estimated to range from approximately $24 million to $54 million. This cost range reflects uncertainties discussed as the assumptions under the Potential High Cost Scenario and the Potential Low Cost Scenario listed in Table 6, below. It is assumed that TC would be the main agency to acquire this remaining acreage, though some additional acreage may be acquired by the COA or other entities.

When acquiring land, TC uses independent appraisers to determine the value of specific tracts. In the last 3 years, acquisition costs for TC Preserve land have ranged from a low of $13,000 per acre to more than $300,000 per acre depending on factors such as location, access to roads and utilities, views, topography, presence of endangered species, development approvals, federal permit held, highest and best use, etc. In addition, cost estimates reflect factors such as the owners asking price, current market value, availability, and average prices TC has recently paid for land in this area. The figure of $30,000 per acre[4] will be used here for this acquisition cost estimate since it reflects the approximate average price per acre TC has paid to acquire Preserve land. It is possible that some tracts may appraise for far more than this and others far less.

[4] Actual cost average per acre of $29,436 for the 3008 acres acquired for Preserve by TC since 2002. This does not include land transferred without cost such as conservation easements, 10(a) permit mitigation land transfers, or donations.

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Table 6: BCCP Completion Cost Estimates*

Scenario	Acquisition Method	Cost	Assumptions
Acquire 1,600 to 1,800 acres	**100% Fee Simple Purchase**	**Average cost per acre = $30,000** **Total cost = $48 – 54 million**	• **Purchase available tracts within BCCP Acquisition Area** • **If landowners within target acquisition areas aren't willing to sell, additional acreage purchased outside preserve boundary**
Acquire 1,600 to 1,800 acres	**Fee simple purchase, conservation easement, & donation**	**Average cost per acre = $15,000** **Total cost = $24 - $27 million**	• **½ acres purchased fee simple at average cost $30,000/acre** • **½ acres donated or acquired by by conservation easement**
Acquire 2,100 acres (1,500 acres within BCP Acquisition Area and 600 acres outside Acqisition Area)	**Fee simple purchase**	**1,500 acres @ average cost $30,000/acre = $45 million** **+** **600 acres @ average cost $15,000/acre = $9 million** **Total: 2,100 acres $54 million**	• **May be necessary to substitute outside BCP Acquisition Area if landowners unwilling to sell** • **600 Warbler or Vireo acres outside preserve = 300 acres not acquired inside or adjacent to BCP Acquisition Area** • **Buy larger property at lower cost, farther from Austin.**

* Costs listed here assume current acquisition costs. Each future year could add an additional 1-7% per year due to changes in the value of land in the real estate market.

6.3 Acquisition Funding Sources

Funding for acquisition efforts is anticipated to continue to come from several sources including TC's Tax Benefit Financing (TC's main funding source), as well as Grant Funds and BCCP Participation Fees. Note that TC is currently still using existing acquisition funds received in previous years. TC's future land acquisition projects will be paid for with both current and future funds from these sources. The COA may continue to acquire additional properties when possible.

6.3.1 Travis County's Tax Benefit Financing

The primary funding source for land acquisition by TC is the Tax Benefit Financing (TBF, formerly called the TIF). The TBF was established by the Interlocal Agreement/Shared Vision between TC and COA in 1995 to fund TC's Preserve land acquisition obligations. The Agreement describes the TBF as a key component of TC's acquisition funding plan in achieving the goals set forth in the Permit:

> "Provide an annual appropriation in an amount equal to 100% percent (100%) of the operations and maintenance (O&M) portion of tax revenue from new

construction on property for which Participation Certificates were purchased, or for which mitigation rights were purchased from a party to this Agreement, or which is utilizing the Permit, as set forth in more detail in subsection 4.1 (b) below, which shall be used to complete land acquisition for the preserve and to fund capital costs for its acquired and designated preserve system lands in accordance with Article V of this Agreement. After preserve system land acquisition is complete, the annual appropriation may be reduced to an amount equal to the County's annual land management costs for its acquired and designated preserve system lands in accordance with Article V of this Agreement".

Because TBF funds are tied to development, the dollar amount generated over time varies directly with the value of improvements on parcels benefiting from the plan. Rapidly increasing valuations over the past several years have generated TBF funds at a rate exceeding original TC Planning and Budget Office projections.

In Fiscal Year 2011 (FY11), TC's Preserve program received approximately $9.5 million to use for Preserve acquisition. The TBF process is expected to generate a similar amount annually until all Preserve land has been acquired. The total future funds anticipated to be generated from TBF funds for TC land acquisition from FY12-FY16 (5 years @ $9 million/year) would total approximately $45 million. However, it is anticipated that the remaining Preserve land can be acquired for a lower total cost given that some acreage may be acquired at a lower cost through Conservation Easements rather than all of the needed acreage acquired fee simple. As outlined in the Interlocal Agreement/Shared Vision, after all Preserve land has been acquired, this TBF amount will be reduced to an annual sum needed to support TC's long-term Preserve staffing and operation and management funding needs.

6.3.2 Participation Certificate Funding

Participation Certificate (PC) fees collected from landowners provide funding to both the COA and TC for land acquisition and land management. The PC funding mechanism was established by the Interlocal Agreement/Shared Vision between TC and the COA in 1995 to help fund Preserve land acquisition and land management obligations. These mitigation fees are collected from landowners that participate under the BCCP to mitigate for habitat loss on private land (see Table 7).

Table 7: BCP Participation Certificate Funds Received

	Total PC Funds Received	50% share to COA	50% share to TC
FY1997	$111,480	$55,740	$55,740
FY1998	$810,818	$405,409	$405,409
FY1999	$728,032	$364,016	$364,016
FY2000	$620,446	$310,223	$310,223
FY2001	$2,362,203	$1,180,601	$1,180,601
FY2002	$518,050	$259,025	$259,025
FY2003	$176,288	$88,144	$88,144
FY2004	$312,399	$156,199	$156,199
FY2005	$2,082,100	$1,041,050	$1,041,050
FY2006	$1,496,796	$748,398	$748,398
FY2007	$3,438,650,	$1,719,325	$1,719,325
FY2008	$3,100,550	$1,550,275	$1,550,275
FY2009	$126,650	$63,325	$63,325
FY2010	$77,525	$38,762	$38,762
Total	$15,960,989	$7,980,494	$7,980,494

6.3.3 Grant Funding

One of the Permit Holders' main funding sources for land acquisition has included Federal Section 6 Grant funds. These cost share grants generally include a 25% local match and 75% federal match. Some have been issued with a 40% local match. The total Section 6 grant funds received by both TC and the COA are $81,222,130 (includes both local and federal shares). It is unclear whether federal grant funding will be available in the future. Indications are that these funds may be reduced at the federal level or may not be available to BCP since most remaining targeted tracts have only one endangered species. In the past, grant proposals have been ranked based upon the number of endangered species protected. An increase in grant competition nationally also makes it less likely that grant funds will be received to acquire additional Preserve land in the future.

7.0 Recommended Preserve Completion Plan

7.1 Recommended Acquisition Design Plan

In order to assure permit compliance, the Permit Holders believe it is necessary to:

- Acquire the additional acreage needed for Warbler/Vireo habitat to reach the required minimum BCCP acreage of 30,428 acres (*minimum* of 453 acres).
- Acquire this needed acreage primarily within the Bull Creek and Cypress Creek Macrosites.
- Within this 453 acre total, designate and manage a *minimum* of approximately 215 additional acres of Warbler habitat within the Preserve Acquisition Area.
- Within this 453 acre total or elsewhere within existing Preserve land, designate and manage approximately 238 additional acres of Vireo habitat.
- To meet configuration needs, designate and manage approximately 792 to 992 additional acres for Warbler/Vireo habitat within or adjacent to the Preserve Acquisition Area. (This is just an estimate and USFWS will need to provide guidance on the total acreage needed to meet the configuration specifications.)

- Acquire or obtain management agreements on approximately 355 acres for the 17 unprotected karst features that include either the remaining unprotected caves specifically identified in the Permit or substitute one or more of these caves with more recently discovered and adequately protected karst features approved by USFWS.
- Acquire and protect the NcNeil and Northwoods Cave Clusters as identified in the bullet above.
- Work to obtain formal agreements with unofficial BCP managing partners.

7.2 Recommended Acquisition Financing Plan

The Permit Holders believe the following are necessary to assure permit compliance:

- The Permit Holders will continue to acquire the needed acreage from willing sellers within and adjacent to the Preserve Acquisition Area with the target goal of completing acquisition by 2016.
- The Permit Holders will work together to complete acquisition, with TC taking the lead and the COA acquiring Preserve land when possible.
- The Permit Holders will continue to apply for federal and other acquisition grants to help to acquire land.
- TC will continue to use Tax Benefit Financing (TBF) funding as the primary funding source for land acquisition.
- TC will place the highest focus on fee simple acquisitions and the purchase of conservation easements since it appears that adequate funding will be available over the remaining five years leading up to the 2016 completion target goal date. Other acquisition methods will be used when determined to best fit the needs of the landowner and TC.

7.3 Recommended Administrative Changes to the Permit

The Permit Holders will be requesting the following administrative changes from USFWS to allow needed changes to the Preserve Acquisition Area and changes to correct some minor issues needed to complete the Preserve:

- If different from the BCCP minimum acreage number (30,428 acres) and BCCP Preserve locations (within or adjacent to the BCCP Preserve Acquisition Area), requesting approval of the final Preserve acreage number, configuration and specific Preserve locations acquired. This may require an administrative amendment to the BCCP. A factor affecting this BCCP acreage number and Preserve locations is the pre-existing habitat fragmentation and USFWS authorized fragmentation since Permit issuance (1996). There are several areas within the Preserve Acquisition Area that had pre-existing development prior to issuance of the Permit. Additionally, several tracts within the Preserve Acquisition Area have been issued individual "incidental take" permits by USFWS since the Permit was issued. Examples include permits to develop the Grayson Volente tract, Ribelin Ranch tract, and The Crossings tract. Issuance of these individual 10(a) permits have authorized development within the Preserve Acquisition Area, resulting in Preserve fragmentation outside the control of the Permit Holders.

- Requesting changes in the edge-to-area ratio specifications for the North Lake Austin macrosite to reflect the fragmentation inherent in the original preserve design. See section 5.3.
- Requesting substitution of one or more of the original 62 karst features with more recently discovered karst features in the event the Permit Holders are not able to acquire one or more caves from willing sellers or one or more caves have been substantially impacted by existing development such that it would preclude adequate protection. This may require an administrative amendment to the Permit.
- Requesting acceptance by USFWS of some karst features as meeting the terms of the BCCP which have less than full protection due to pre-existing development that precludes the ability of the Permit Holders to provide a greater level of protection.

7.4 Recommended Additional Scientific Analysis Needed To Support Preserve Completion:

- Complete the stand age analysis of juniper-oak woodlands (study in progress by Dr. Joseph White, Baylor University).
- Conduct an analysis to delineate existing and potential future Warbler habitat on all Preserve tracts. Correlate Warbler monitoring data with landscape/habitat features within the Preserve (including Baylor University's estimates of woodland stand age, successional pathways, and fire histories) to better understand factors influencing habitat suitability, predict population viability, and develop adaptive management strategies to promote the survival and recovery of the Warbler (study underway by U.S. Forest Service).
- Conduct an analysis to identify potential future Vireo habitat on all Preserve tracts to determine which areas could potentially be managed to create Vireo habitat with the highest probability of success while avoiding impacts to the Warbler. This analysis would be based upon the juniper-oak woodland stand age, geology, soils, vegetation type, species historic sightings, etc.
- Conduct additional species surveys within karst features in western Travis County to determine which alternative karst features could be substituted for any of the remaining 17 currently unprotected Preserve karst features and/or to offset any of the remaining 45 karst features within the Preserve that lack sufficient protection.

Literature Cited

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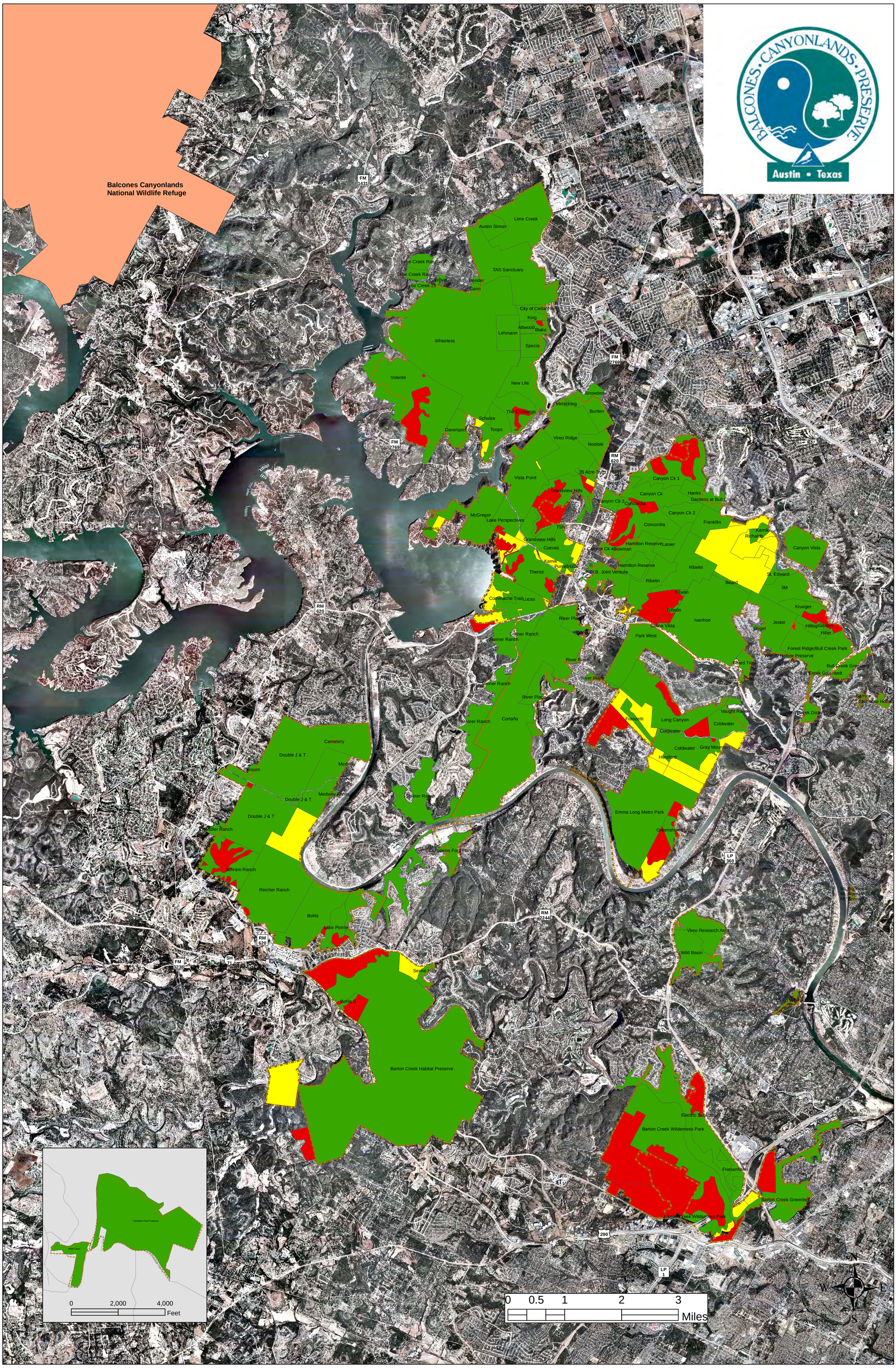
BCCP Completion Task Group Committee Members

Preserve Design Sub-Group:

Travis County, City of Austin, Lower Colorado River Authority, and USFWS staff, and a member of the BCCP Scientific Advisory Committee.

Acquisition Financial Sub-Group Members:

Travis County and City of Austin Preserve and Financial staff



BCP Preserve Acquisition Area

BCP

Potential Future Preserve

Unavailable

Balcones Canyonlands Preserve System
Travis County, Texas

Date: 3/10/2011

Path: V:\Projects\BCP\NEW\BCP_StopLightMap.mxd