City of Austin 2012
Black-capped Vireo *(Vireo atricapilla)*
Monitoring Program

Balcones Canyonlands Preserve Annual Report
Fiscal Year 2012-13

Black-capped Vireo nestlings (10-11 days old)
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City of Austin Water Utility
Wildland Conservation Division
Balcones Canyonlands Preserve Program

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2012 Black-capped Vireo Monitoring Program
Balcones Canyonlands Preserve Annual Report

This report summarizes the results of the City of Austin's 2012 black-capped vireo (*Vireo atricapilla*) endangered species monitoring program. The 2012 field season was the fifteenth year of endangered species monitoring on the City of Austin's Balcones Canyonlands Preserve tracts.

Collaborative efforts to create and restore habitat continue for the black-capped vireo. The City of Austin is partnering with Travis County, St. Edwards University, Wild Basin, and volunteers to restore and create vireo habitat on the Wild Basin/Vireo Preserve, including degraded areas that are currently not habitat for either the vireo or the golden-cheeked warbler. Since Wild Basin/Vireo Preserve supports many of the habitat types observed throughout the BCP, lessons learned at this site should be applicable to other areas within the BCP.

INTRODUCTION

Background

The black-capped vireo (vireo) is an endangered, neotropical migrant that breeds in portions of Oklahoma, Texas, and Mexico (Grzybowski 1995). The U.S. Fish and Wildlife Service listed this species as endangered in 1987 (USFWS 1987). Major threats to the vireo's survival include habitat loss, habitat fragmentation, over-grazing/browsing, natural vegetation succession, and parasitism by brown-headed cowbirds. Rapid westward expansion of development from the city of Austin led to the creation of the Balcones Canyonlands Conservation Plan (a Habitat Conservation Plan) and issuance of a 10(a)(1)(B) permit in1996 by the U.S. Fish and Wildlife Service to the City of Austin and Travis County to mitigate for the incidental "take" of habitat loss due to development and to facilitate the local recovery of the vireo and seven other endangered species (USFWS 1996). The permit requires a minimum of 12,300 hectares of endangered species habitat in western Travis County be set aside as a preserve (the BCP) for these species. The BCP is owned and managed by a number of public and private entities, including the City of Austin, Travis County, Lower Colorado River Authority, The Nature Conservancy, Travis Audubon Society, and St. Edwards University/Wild Basin.

The vireo has been documented on several BCP tracts that are managed by the City of Austin. The largest known colony in Travis County formerly existed at the Wild Basin/Vireo Preserve. A 1961 wildfire created several hundred hectares of vireo habitat in this area. The vireo colony likely peaked sometime in the 1970s, but declined steadily from 32 territories in 1987 to one territory in 1997 (Grzybowski 1989, DLS Associates 1989, 1990, Abbruzzese 1998), and an intermittent sighting of a male in 2004 (Becker and Koehler 2004), 2011 (City of Austin 2011), and 2012. A small breeding colony of vireos (three to five territories) had occupied habitat on the Cortaña tract every year since 2000. A part of this colony spilled onto the adjacent River Place mitigation tract to the northeast. However, in 2011, that colony had shrunk to a single territory. Two to three vireo territories have been established on the Forest

Ridge tract each year since 2009. On the Kent Butler Ecological Reserve (formerly known as the Ivanhoe tract), a pair of vireos nested in 2008 and 2009 along electric transmission line corridors, but no vireos have established territories in that area for three years now. Other records for vireos on the City of Austin's BCP tracts for the past decade include intermittent sightings of males on the Commons Ford, Parke West, and Hamilton West tracts.

Objectives

The Balcones Canyonlands Conservation Plan (USFWS 1996) states that "baseline monitoring will be gathered in accordance with the Land Management Plan Guidelines and approved land management plans, and should concentrate on determining basic population levels on preserve lands, key population parameters, and other ecological parameters that may affect the target species." The Tier IIA-8 land management plan (BCP 2007) identifies "distribution, abundance, productivity, and recruitment" as key population parameters to monitor. The City of Austin's vireo monitoring program continues to focus on estimating abundance, the extent of territories, pairing, nesting, and productivity for all vireos detected each year.

Because of the threat posed by brown-headed cowbirds, monitoring for direct and indirect signs of cowbird parasitism during field surveys is a high priority, and BCP staff is committed to intensive management of cowbirds at or near all vireo colonies.

Because of the early successional nature of vireo habitat, the land management plan (BCP 2007) emphasizes vegetation management and monitoring. Vireos occupy shrublands of mixed deciduous and evergreen species with irregular height and distribution. Open spaces between clumps of woody vegetation are also important, so optimal vireo habitat appears as a mosaic of grassy or rocky spaces and clumps of shrubs. Shrubs that have a skirt of vegetative cover extending down to the ground are especially important to conceal nests. Because this early successional stage of habitat must continually be manipulated to remain viable, restoration projects in conjunction with habitat monitoring are frequently undertaken on various City of Austin tracts (see Black-capped Vireo Habitat Management).

METHODS

Sites and Survey Effort

To monitor population trends, surveys for vireos are conducted every year. The vireo monitoring program closely follows the golden-cheeked warbler (warbler) monitoring protocols (see Methods in City of Austin et al. 2012). However, the smaller population size and more transitory nature of the vireo requires more flexibility in the location, size, and extent of the survey areas, as opposed to the permanent study plots with fixed size that have been established for the warbler.

During the 2012 field season, staff searched for and mapped vireos on a 15.8-hectare section of the Cortaña tract. Combined with an 7.3-hectare section of the adjacent River Place mitigation tract, this parcel makes up the 23-hectare vireo habitat study area that was originally restored in 1996. Vireos were also mapped on and adjacent to the Forest Ridge intensive study area. Because much of this area is more typically associated with warblers, the exact size of the vireo habitat on Forest Ridge is undetermined.

Vireos detected during other endangered species surveys were also recorded and mapped, and attempts were made to determine their breeding status.

Survey effort on the established Cortaña colony is roughly equivalent, hectare-for-hectare, to the level of effort on the warbler intensive study plots. From the Cortaña colony, City of Austin staff biologists collected the following data: number of territories, territory location, pairing success, breeding success, parasitism, and productivity. Staff biologists used standard territory mapping (IBCC 1970, Bibby 1992) methods, conducting surveys from April 13 to June 25, 2012, for a total of 36.25 hours.

The Forest Ridge intensive study area was surveyed several times each week as part of the warbler monitoring program from March 15 through June 15. Once vireos were detected on April 1, staff collected data on the number of vireo territories, territory locations, pairing success, breeding success, parasitism, and productivity, continuing surveys through August 2. Because vireos and warblers both occurred at this site, the exact number of hours devoted to monitoring the vireo is difficult to ascertain. However, a rough estimate is 128 hours from April 1 through August 2.

Data Collection and Analysis

Vireo observations were recorded with Garmin global positioning units (GPS), which have an accuracy ranging from 9 to 30 feet. Other sightings were recorded on topographic maps at a scale of 1:2,400 or 1:3,600, using a 100-meter UTM grid. Pairing status, breeding success, and number of fledglings produced per pair were determined for each territory. For methodology and calculations, see City of Austin et al. 2012. No playback tapes of vireo songs or calls were used during this season's monitoring.

RESULTS AND DISCUSSION

In 2012, staff found vireos holding territories on only one City-owned BCP tract: Forest Ridge (two males; both mated and produced young). A male vireo presumed to be a floater, not holding a territory, was observed once on the Kent Butler Ecological Reserve, and a male banded as a hatch-year at the Balcones Canyonlands National Wildlife Refuge was seen on the Cortaña tract in 2012. Vireo males were also heard singing very briefly on the Sam Hamilton Memorial Reserve West and Lake Perspectives/McGregor tracts, and a late season migrant was detected at the Vireo Preserve. Exhibit A shows where vireos were observed this year.

Territory Mapping on the Cortaña Study Site

The pair of vireos that had attempted unsuccessfully to nest on this site last year apparently did not return. Although there was a male song detected briefly on the first visit by staff, no vireo established a territory on the site this year.

On June 21, a male vireo that had been banded as a hatch-year bird in 2011 at Balcones Canyonlands National Wildlife Refuge was found to be singing on the site. The band combination was RD/BK:DB/BL. Staff were unable to find him on a subsequent visit (June 25).

Territory Mapping and Reproductive Success on the Forest Ridge Study Site

Two territorial males were observed on and adjacent to the Forest Ridge intensive study plot from April 1 through August 2, 2012. Both males were first heard countersinging on April 1. One was a five-year old male (OR/SI:BL/GR, banded as a second-year male in 2009 on Forest Ridge by William Simper, Travis County BCP), and the other male was unbanded. Both males held territories along south-facing slopes on either side of a ravine near the east side of the plot. OR/SI:BL/GR was also observed with his family group along the ridgeline on the western half of the plot beginning in early June, although he would periodically return to his original territory to countersing with the unbanded male. Both males were heard countersinging in this area on July 19. The unbanded male was last detected, and believed to be travelling with a fledgling, on August 2.

Both males were mated and produced young. OR/SI:BL/GR was believed to be defending recently fledged young in his territory near the east side of the plot on May 23. Two to three fledglings were confirmed on June 4 and appeared to be about three weeks old. An active nest for the unbanded male was found July 5 in a mountain laurel under mature Ashe junipers (see photo, below), with three nestlings about six to seven days old. The young had fledged by July 10, and both the unbanded male and female were seen feeding the fledglings.

Based on the two confirmed vireo territories, pairing and breeding success at Forest Ridge was 100 percent. A total of five to six fledglings were observed (approximately 0.12 to 0.15 fledglings/ha). Productivity was 2.5 to 3.0 for the two successful territories.

Black-capped Vireo Nest in Mountain Laurel, Forest Ridge

Vireos on Other Tracts

A male vireo was found in two locations on the same day (May 7) in the eastern portion of the warbler intensive study area of the Kent Butler Ecological Reserve; the habitat appears to be unsuitable (relatively closed-canopy oak and juniper woodland).

On two different dates (April 16 and May 5) a male vireo was heard singing briefly on the south side of the Sam Hamilton Memorial Reserve West tract. A brief male vireo song was also heard on the Lake Perspectives/McGregor plot on April 17. These males all sang very briefly and were not heard again. A late season migrant, but very vociferous male, was found singing in and near the habitat restoration areas near the center of the Vireo Preserve on August 31 and September 1.

Parasitism

No brown-headed cowbirds were observed during vireo surveys at either Forest Ridge or Cortaña, though several were caught in a trap at the latter site. No vireos were observed tending cowbird fledglings.

BCP staff and volunteers have managed cowbirds at the Cortaña colony every year since vireos were first observed there in 2000. A cowbird trap that had been maintained on the Kent Butler Ecological Reserve, near the area where vireos have nested, was abandoned in 2012 after it had been vandalized the previous winter.

City staff observed neither interactions between vireos and potential predators, nor any harassment of vireos by other species.

Golden-cheeked Warblers in Black-capped Vireo Habitat

In some areas, vireo habitat may progress to warbler habitat through natural succession. Likewise, natural or anthropogenic disturbance patterns may convert warbler habitat to the early successional stage preferred by the vireo. These habitat types often overlap. During 2012 within the City of Austin BCP, territorial warblers and vireos were observed in the same or neighboring areas on the Forest Ridge tracts.

Warblers were incidentally mapped during vireo surveys around the 15.8-hectare vireo habitat area on the Cortaña tract. Male warblers were usually detected singing near the perimeter of the vireo habitat area; the canyons surrounding the upland study site are excellent warbler habitat. On April 19, a warbler nest was discovered in a cedar elm near the north boundary of the Cortaña tract in a band of Spanish oaks that encircles a knoll in the center of the study area. The nest successfully fledged at least one young, observed on April 21.

On the Forest Ridge tract, the vireo territories were intermingled with warbler territories within prime warbler habitat on and near the intensive study plot. The Forest Ridge study plot supports a dense understory of vegetation that is used by both species.

BLACK-CAPPED VIREO HABITAT MANAGEMENT

The Balcones Canyonlands Conservation Plan (USFWS 1996) requires maintaining or creating 810 hectares (2,000 acres) of vireo habitat within the BCP, and the land management plan (BCP 2007)

provides additional, general guidelines to help achieve this goal. The Balcones Canyonlands Conservation Plan recommends focusing potential vireo management areas in portions of the BCP that are not currently occupied by the warbler. Consistent with these recommendations, BCP staff is implementing adaptive management to create vireo habitat in areas within the BCP that are not currently suitable for either the vireo or the warbler. 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. Focal areas for vireo habitat management on City of Austin BCP lands currently include Cortaña, Wild Basin/Vireo Preserve, Bohls, and infrastructure corridors (Kent Butler Ecological Reserve).

Maintenance of Currently Occupied Habitat – Cortaña

The Cortaña tract (709 hectares) in the North Lake Austin Macrosite has been under active management for over 15 years. In 1996, about 23 hectares of juniper-oak woodlands on the northern Cortaña tract and the adjacent, privately managed, River Place mitigation tract were cut back to establish a shrubby successional stage favorable to vireos. Approximately 15.8 hectares were treated on Cortaña and 7.3 hectares on River Place. Both hand-clearing and hydro-axing methods were applied. In each year from 2000 to 2011, one to five males had established territories in this area – until this year, when the site was visited intermittently but did not appear to support an established territory.

During winter 2009-10, City of Austin staff created fire lanes in anticipation of a prescribed burn to enhance habitat on approximately 4.5 hectares of the Cortaña tract. However, burn bans and staffing limitations may make mechanical treatments more feasible than prescribed burns for future habitat revitalization.

Restoring and Creating Habitat – Wild Basin/Vireo Preserve

The Vireo Preserve and adjacent Wild Basin tract supported at least 32 vireo territories during the mid-1980s, making this the largest concentration of vireos known in Travis County. This area was once part of a larger ranch that was in the process of being cleared of brush in preparation for a cattle ranch and subsequently burned in April 1961 (Austin American-Statesman 1961, Respess 1987, Westlakehills undated). The wildfire was reportedly ignited by a cigarette tossed from a car along St. Stephens School Road, which started a grass fire. A strong cold front and the large piles of brush scattered throughout the ranch further fueled the fire, which burned for three days and spread over about 1,620 hectares. Although shrubs and many trees burned, pockets of mature Ashe juniper woodlands survived. The brush clearing followed by the 1961 wildfire converted what was formerly a closed-canopy Ashe juniper-oak woodland (preferred habitat of the warbler) to mostly open shrub land (preferred habitat of the vireo). Analysis of a decadal series of aerial photos of this area shows habitat succession progressing steadily since the 1961 fire (Exhibit B). Assuming vireo habitat in western Travis County has a life-span of 20 to 30 years following intense manipulation, and warbler habitat takes at least 50 years to recover (BAT 1990), a decline of the vireo colony as the habitat matured toward a taller, more closed-canopy woodland would be expected during the 1980s-1990s. Complicating this issue, however, is the simultaneous increase in

urbanization (including the building of Loop 360 and surrounding subdivisions) that occurred during this same time period. The last vireo observed nesting on the Wild Basin/Vireo Preserve (an 11-year old male banded as an SY in 1987) was in 1996, 35 years after the 1961 fire.

The Wild Basin/Vireo Preserve collectively supports over 100 hectares of former vireo habitat (13% of the 810-hectare requirement). Habitat restoration efforts to date have included a prescribed burn on about 2.8 hectares (February 16, 2010), perimeter fencing (fall 2010), and mechanical manipulation of about 20 hectares (fall 2010 and 2011). The primary focus of these habitat restoration efforts has been to encourage resprouting of mature evergreen sumac and other broad-leaved species, protect regenerating plants from browse by white-tailed deer, create a more open habitat with a diverse height structure on the uplands, and protect the diversity of habitat types across Wild Basin/Vireo Preserve, including warbler habitat. Due to the 2011 drought and subsequent burn ban, City of Austin staff revised plans for 7.5 hectares of woody vegetation that had been cut with a tree shear in preparation for a prescribed burn. During the fall of 2011, the majority of the slash was mulched to assist with other habitat restoration efforts within the BCP. More details on these restoration efforts are presented in City of Austin (2010) and (2011).

Management efforts are currently focused on creating vireo habitat in areas that are not currently suitable for the vireo or the warbler. Bray (1904) documented extensive soil erosion following deforestation near the Wild Basin/Vireo Preserve (Exhibit B). In some areas, particularly on the slopes, this soil loss has greatly reduced the revegetation potential. The BCP partners (City of Austin, Travis County, Wild Basin, St. Edwards University) are exploring management techniques to restore these degraded areas. Adaptive management includes using locally and commercially available materials (mulch, mulch socks, biochar, mycorrhizal fungi, soil amendments) with the goal of rebuilding soils and promoting regeneration of woody plants. Mulch is a common by-product of juniper-oak forest clearing and thus readily available for habitat restoration projects. Allowing mulch to age and "compost" contributes additional nutrients and micro-organisms. Biochar is a low temperature charcoal produced from the biomass of wood and leafy plant materials (http://www.biochar-international.org/biochar/soils), and is a commercially produced soil amendment that increases plant growth yields by contributing carbon and increasing activity of mycorrhizal fungi and other beneficial micro-organisms. Other soil amendments used to date include organic fertilizers, composts, and/or mycorrhizal fungi inoculants. Photographs showing examples of 2012 habitat restoration projects are presented in Exhibit C.

In February 2012, BCP staff and volunteers initiated an experiment to test the effectiveness of various combinations of mulch and biochar in promoting growth of native plants, particularly woody plants. A series of mulch socks were lined in rows along three tiers of two south-facing slopes on the southeastern part of the preserve. The primary purpose of the mulch socks was to reduce further soil erosion and capture soil runoff during rain events. The upslope side of each of row of mulch socks included five "treatments": 1) "control" (no mulch or biochar), 2) 10-15 year old composted mulch from the 1990s, 3) fresh mulch, 4) composted mulch plus biochar, and 5) fresh mulch plus biochar, for a total of six replicates for each treatment. St. Edwards University is currently conducting two

research projects in conjunction with the mulch sock project, including one to characterize the genomic complexity of bacterial, arachaea, and fungal communities within each of the treatments and another study to assess the abundance and distribution of ants. BCP staff is also monitoring plant growth within each of the treatments. To date, the combination of composted mulch and biochar appear to be most promising in supporting growth of woody plants (particularly evergreen sumac).

Habitat Creation – Bohls

In an effort to create vireo habitat, City staff coordinated a combination of mechanical cutting followed by a prescribed burn on about 12 hectares of the Bohls tract. The mechanical clearing took place during the winter of 2003-04, in September 2005, and in February 2007, and the prescribed burn in February 2007. City of Austin staff continues to monitor habitat succession on this site, which has not yet been occupied by vireos. Additional work is planned to expand the vireo habitat management area near the established shinnery, including either a prescribed burn or mechanical treatment.

Monitoring Effects of Habitat Management Efforts

During the fall of 2010, staff established 16 photo points at the Vireo Preserve just prior to the mechanical manipulation, and repeated the photo points upon completion of the manipulation in February 2011 and again in February 2012. BCP staff also collected data on species diversity, abundance, and cover for the mulch sock project at the Vireo Preserve in September 2012.

Identifying Other Potential Management Sites

Travis County and City of Austin BCP staff are continuing work on a comprehensive plan to identify existing and potential sites for vireo habitat management. A GIS database has been developed to assess site characteristics and to locate suitable sites to restore or create vireo habitat. Data layers include geology, soils, topography, historic vireo sightings, and warbler observations. Travis County staff has been conducting spatial analyses to quantify warbler and vireo habitat using landcover maps and territory data. These analyses will be used to identify both priority warbler and vireo management areas. Other variables that are being considered in identifying sites for vireo management include size of the potential restoration area, history of occupation by vireos, proximity to the nearest vireo colony, proximity to urban development, and feasibility of management.

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V. EXHIBITS

Exhibit A: Locations of Black-capped Vireo Observations, 2012

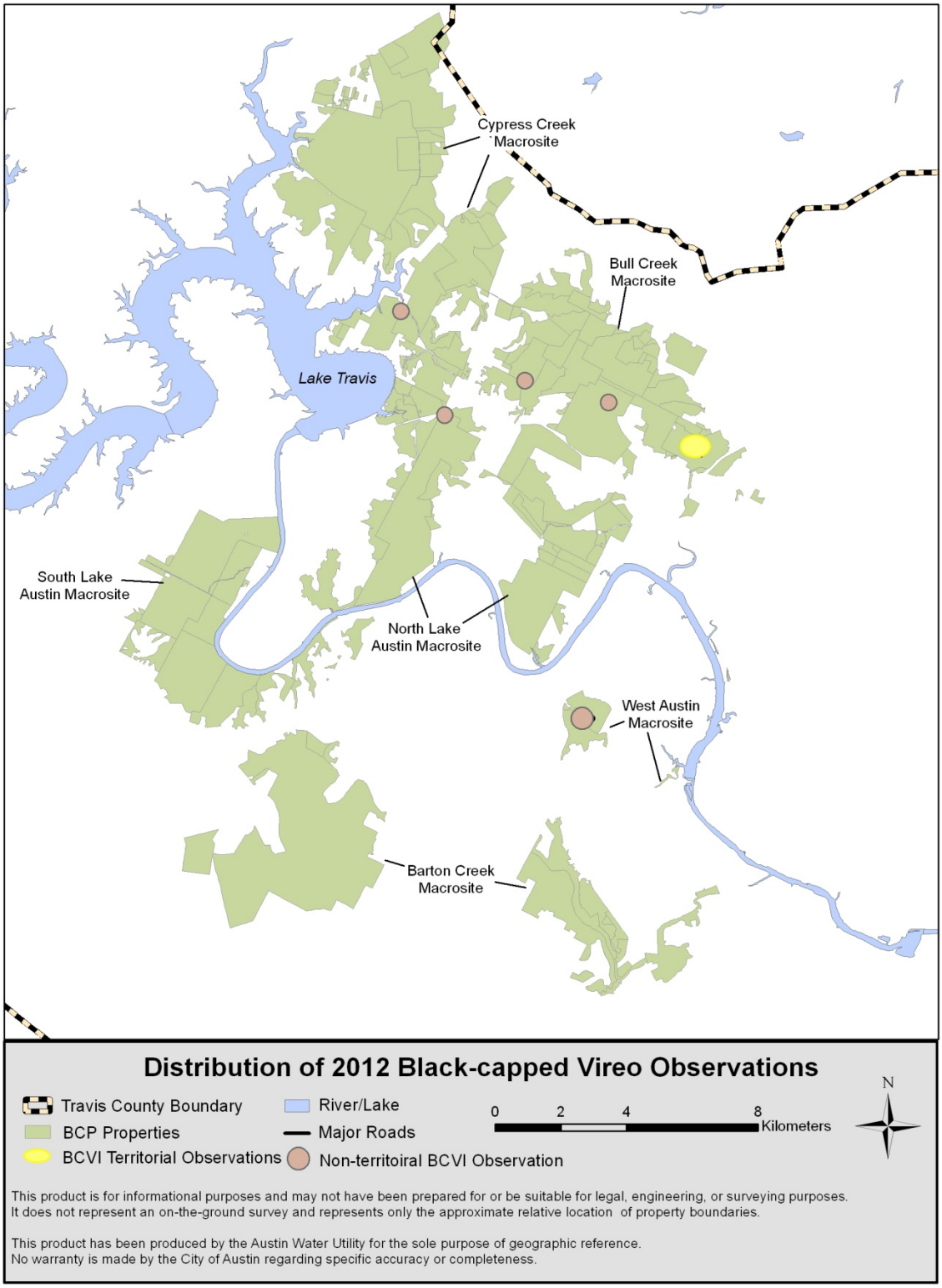
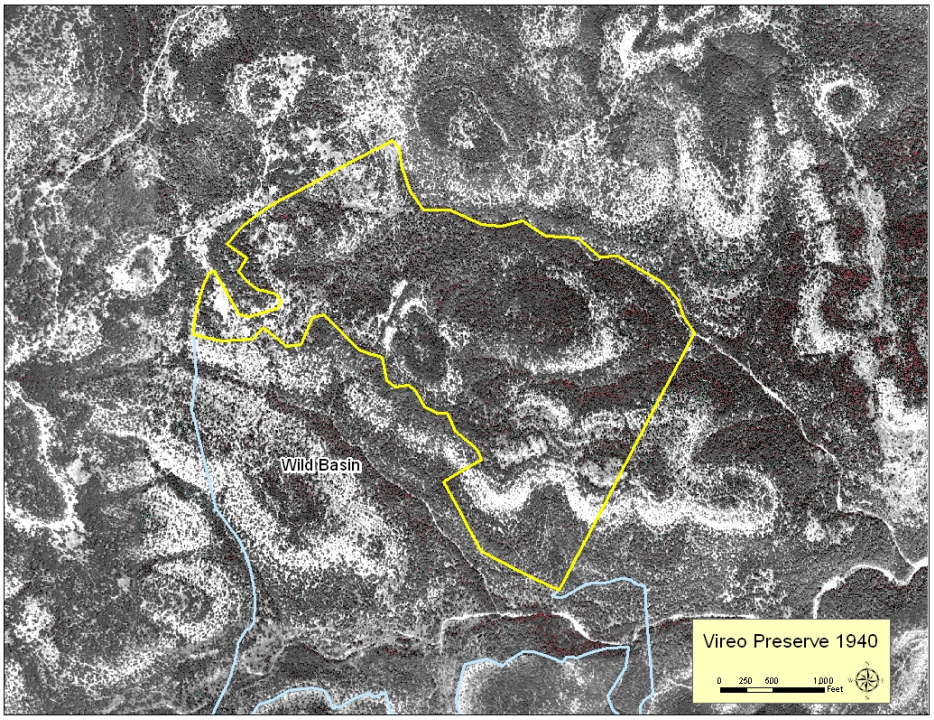
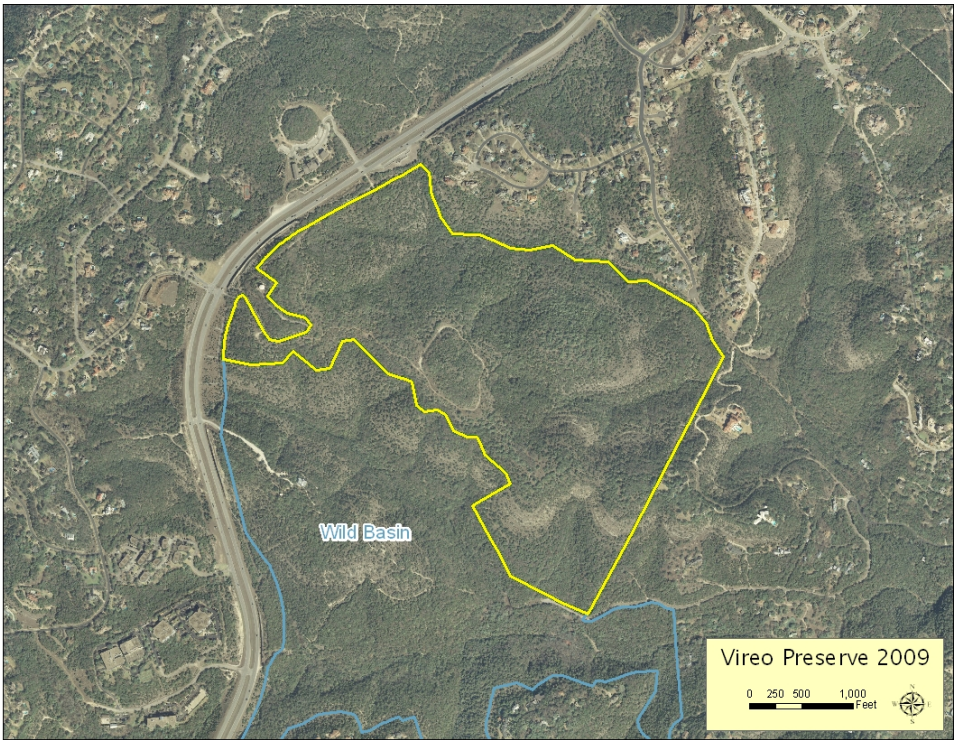


Exhibit B. Historic and Current Aerial Photos of Wild Basin/Vireo Preserve



Aerial Image of Wild Basin/Vireo Preserve, 1940



Aerial Image of Wild Basin/Vireo Preserve, 2009

Exhibit C. Historic Photos Near Wild Basin/Vireo Preserve (Bray 1904)

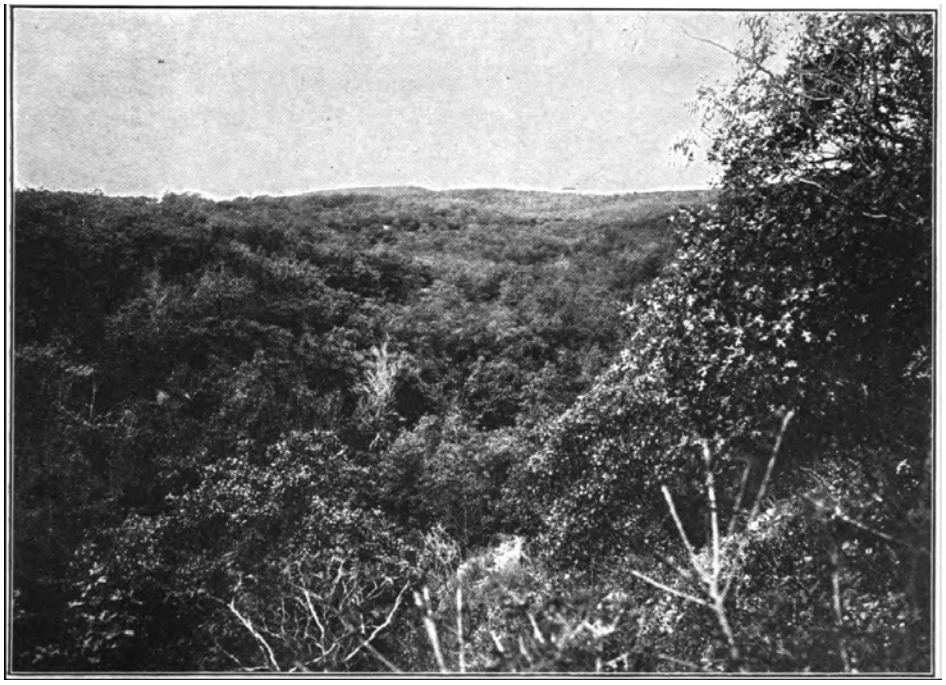


Plate V, Figure 2 from Bray 1904. “North Gorge” from Lone Tree Hill
[just north of Wild Basin/Vireo Preserve]

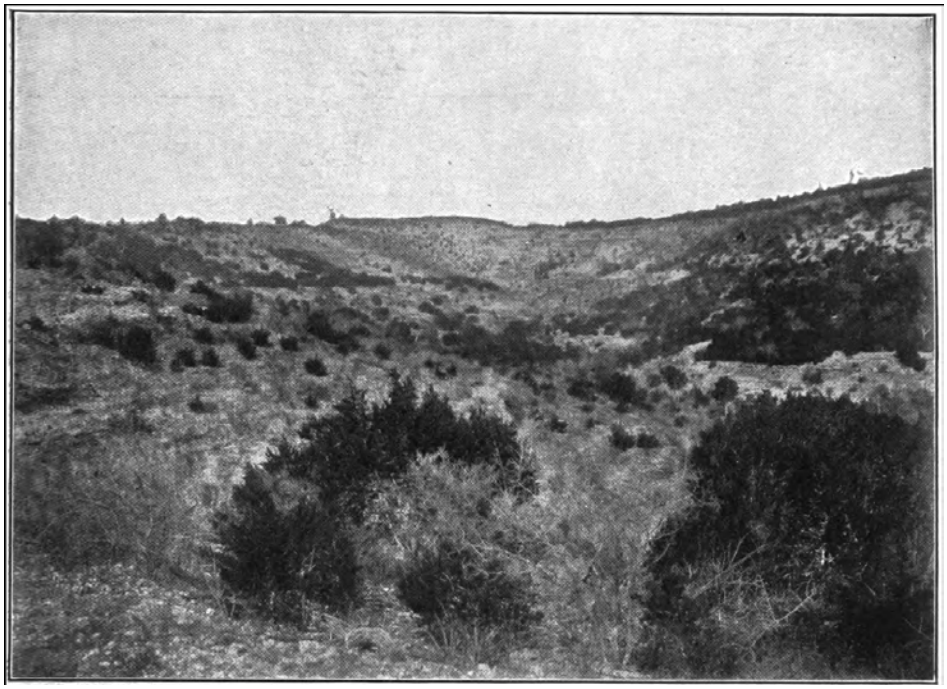


Plate V, Figure 1 from Bray 1904. “South Gorge” at its head under Lone Tree Hill
[just north of Wild Basin/Vireo Preserve]

Exhibit D. Photos of Black-capped Vireo Habitat Restoration/Creation Projects at Wild Basin/Vireo Preserve, FY 2012-2013

Installation of mulch sock "treatments" with combinations of fresh and composted mulch and biochar
Winter 2012

Mulch sock "treatment" using composted mulch and biochar, Spring 2012

Exhibit C. Photos of Black-capped Vireo Habitat Restoration/Creation Projects at Wild Basin/Vireo Preserve, FY 2012-2013 (continued)

Black-capped Vireo Habitat "Guilds," experimenting with additions of mulch, soil amendments, and native seeds

Slope stabilization/ restoration following prescribed burn, using mulch socks, mulch, soil amendments, native seeds

Restoration of denuded area using mulch and soil amendments