# 2001 Golden-cheeked Warbler and Black-Capped Vireo Monitoring Program



Photo C. Abbruzzese

**Balcones Canyonlands Preserve**

The City of Austin

Natural Resources Division

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**Table of Contents**

I. Golden-cheeked Warblers

INTRODUCTION.....3

METHODS .....3

RESULTS AND DISCUSSION .....8

LITERATURE CITED .....14

II. Black-capped Vireos

INTRODUCTION.....12

METHODS, RESULTS AND DISCUSSION.....12

**List of Tables**

Table 1. 2000 City of Austin Golden-cheeked Warbler Surveys- Summary of Findings.....9

Table 2. 2000 City of Austin Golden-cheeked Warbler Surveys- Summary of Findings Pairing and Productivity .....10

**List of Figures**

Golden-cheeked Warbler Surveys

Figure 1. Barton Creek Plot .....15

Figure 2. Emma Long Metropolitan Park Plot.....16

Figure 3. Ivanhoe Plot.....17

Figure 4. 3M/St. Edwards Plot.....18

Figure 5. Forest Ridge Plot .....19

Figure 6. Bohls Plot .....20

Figure 7. Double J and T Plot.....21

Figure 8. Canyon Creek Plot.....22

Table of Contents- Continued

Figure 9. Reicher/Bohls Enumeration.....23
Figure 10. Emma Long Enumeration.....24
Figure 11. Coldwater North Enumeration.....25
Figure 12. Coldwater South Enumeration.....26
Figure 13. Ivanhoe Enumeration.....27
Figure 14. Hanks Enumeration.....28
Figure 15. Bull Creek Enumeration.....29
Figure 16. Double J and T Enumeration.....30

Black-capped Vireo Surveys

Figure 17. Black-capped Vireo Research Area.....31
Figure 18. Cortana.....32

**2000 Golden-cheeked Warbler Monitoring Program**

**Balcones Canyonlands Preserve**

**The City of Austin**

## I. GOLDEN-CHEEKED WARBLER MONITORING

### INTRODUCTION

Golden-cheeked warbler (*Dendroica chrysoparia*) populations within the Balcones Canyonlands Preserve (BCP) are being monitored through a standardized, system-wide program which includes both the BCP and the Balcones Canyonlands National Wildlife Refuge (BCNWR). Participants in this monitoring program are the BCNWR, City of Austin(COA), Travis County, and the Lower Colorado River Authority (LCRA). This report summarizes the 2001 GCW monitoring program on City of Austin BCP lands.

### METHODS

S*ystem-wide Monitoring*

Because the entire acreage of the BCP is too extensive for complete surveying of golden-cheeked warbler (GCW), a monitoring program was developed by a BCP biological monitoring committee in 1997. This program employs a series of 100 acre plots to sample a subset of the population. This program is described below.

*Plot Selection*

Golden-cheeked warblers were monitored on COA-owned land by mapping territorial males within 8 permanent, predesignated plots (Table 1; Refer to figures 1-8 for maps of these plots). Plots were selected as randomly as possible, using habitat rather than warbler density as a guide. However, some consideration was given to plot accessibility and ease of establishment. For example, marked boundaries or fence lines were sometimes used as boundaries.

The plots are approximately 100 acres in size, and the shapes are as square as is reasonably possible. Of the 8 plots, 6 were established in prime habitat and 2 in transitional habitat. Prime sites are defined as sites containing excellent GCW habitat with at least 70% canopy cover (See Pulich 1976 for a description of GCW habitat). Prime sites contain at least 75% to 80% excellent warbler habitat, however optimal sites have greater than 90% such habitat. Transitional habitat is defined as habitat which may have zero to a few warbler territories and has the potential to improve as GCW habitat (within the next 30 years).

*Territory Mapping*

Warbler territories were mapped using methods described by the IBCC (1970). Surveys were conducted on "days when weather conditions are suitable for the detection of bird singing" (USFWS 1994). Warbler surveys were conducted when the ambient temperature was above 55° F, as GCWs are thought to sing less frequently below this temperature (DLS 1994). All GCW monitoring was undertaken by personnel who are familiar with local bird vocalizations, and are adept at orienteering and mapping. Visits were equally distributed throughout the field season, including late season visits to obtain brood counts. Singing males were often best differentiated from one another by following individual males and by listening for countersinging between nearby males. Locations of target birds were mapped on 7.5' USGS topographic maps. Locations of birds were then transferred to a digital topography map, which was superimposed on an aerial photo using Arcview 3.2. Prime plots were visited ten times while transitional plots were visited three times each; each for six hours per visit. For each visit the time, temperature, wind direction, wind speed, and percent cloud cover were recorded at the beginning and ending of each visit (Weather data is available upon request). Playback of taped GCW or eastern screech-owl vocalizations were not used to elicit a response. Fieldwork was conducted by the following personnel; Scott Haywood (Barton Creek), Daniel Thompson (Emma Long), Mark Sanders (Ivanhoe and Canyon Creek), Carlo Abbruzzese (Bohls and Forest Ridge), and Jackie Davis (3M/St Eds and Double J and T).

Analysis of territories differs slightly in this report from IBCC recommendations. IBCC methodology recommends that edge territories "be counted as belonging to the plot only if more than half of the registrations lie within the plot or on the boundary. Otherwise they will not be counted"(IBCC 1970). However, since observers tend to spend more time within plot boundaries, the number of edge territories may be overestimated (Verner 1985). Verner (1985), suggests that this bias can be reduced by assigning only half of the edge territories to the plot. We follow Verner's recommendation and we also provide a low estimate (a count of territories that fall entirely within the plot or "full territories") and a high estimate (counts of both "full" and edge territories) for each plot.

*Productivity and Mated Status*

Researchers also recorded observations of females and numbers of fledglings produced within territories. Because females and juveniles are often difficult to detect, estimates of their numbers are minimum estimates at best. In addition, because young warblers tend to wander outside of their territories as they age and become independent from their parents, observers were more confident that fledgling groups came from a particular territory if the young observed had recently fledged. Productivity and mated status was estimated only for territories that were entirely within the plot. Fecundity was estimated by dividing the total number of fledglings produced by the number of territories that were entirely within the plot boundaries.

*Enumeration/Colorbanding Studies*

In addition to territory monitoring, observers also enumerated GCW territories in several other sites (see figures 9-16). Territory enumeration is a count of the total number of singing males in a given area. Because of the limited number of visits, GCW territory boundaries are approximate and the number of males found is likely a minimum number of the total actually present. Enumeration of territories required 3-4 visits per study area during good weather conditions. Warbler territories were enumerated around or adjacent to 100 acre plots in Emma Long Park, and Lower Bull Creek. This enumeration work also included follow-up visits to colorbanded birds in the Emma Long Park and Coldwater tracts, as part of an independent colorbanding project initiated by Dean Keddy-Hector and Maria Tolle in 1999. Warbler enumeration was conducted by Daniel Thompson, Jackie Davis, Melody Lytle, Carlo Abbruzzese, Lisette and Al Schmidley, Kristina Ecton, Meg Goodman, Trent Miller, Michael Behrens, Jim and Lynne Weber, and Mary Ruth Holder.

*Site and Plot Descriptions*

The topography and vegetation throughout the study site typify the eastern edge of the Edwards Plateau. Drier uplands are intermixed with humid, steep, canyon slopes and riparian habitats. Most of the streams that flow through these canyons are intermittent, though a few have a permanent water source like a perennial spring. It is thought that woodlands in western Travis county were logged in the late 1800s and early 1900s and are in various stages of recovery (Keddy-Hector 1996). In addition, after clearing, much of the topsoil was lost due to chaining and subsequent goat and cattle overgrazing. On some steep slopes this soil loss has greatly reduced the revegetation potential. Also, current and past overbrowsing by white-tailed deer (*Odocoileus virginianus*) has greatly reduced the understory and a distinct browse line is visible throughout. Conspicuously absent in the study area are saplings of deciduous trees such as oaks (*Quercus* sp.), escarpment black cherry (*Prunus serotina*

*serotina*), rusty black-haw (*Viburnun rufidulum*), cedar elm (*Ulmus crassifolia*), Texas ash (*Fraxinus texensis*) and Texas mulberry (*Morus microphylla*).

The forest canopy in the study area is primarily composed of Texas oak (*Quercus texana*), Ashe juniper (*Juniperus ashei*), plateau live oak (*Quercus fusiformis*), escarpment black cherry, Texas ash (*Fraxinus texensis*), and cedar elm (*Ulmus crassifolia*). Common understory species include Ashe juniper, Carolina buckthorn (*Rhamnus caroliniana*), yaupon holly (*Ilex vomitoria*), red buckeye ( *Aesculus pavia pavia*), white shin oak (*Quercus sinuata* var. *breviloba*), Mexican buckeye (*Ungnadia speciosa*), Lindheimer silk-tassel (*Garrya Lindheimeri*) and elbow bush (*Foristiera pubescens*). Ashe juniper is one of the most common understory species.

Individual plots can be described as follows:

Barton Creek (Prime Habitat) The Barton Creek plot lies roughly 2 km northwest of the intersection of Capital of Texas Highway and Mopac. The Barton Creek hike and bike trail runs roughly though the center of the plot. This area experiences high numbers of hikers, joggers, swimmers, tubers, and mountain bikers with peak use occurring on weekends and after 5pm. Approximately 85% of the plot is composed of closed canopy juniper-oak woodland, while portions of the uplands are more open (65% canopy cover).

Emma Long (Prime Habitat) The Emma Long plot straddles the Turkey Creek trail near the center of Emma Long Metropolitan Park. The eastern boundary runs parallel to and within 10-30m from City Park Road. The majority of this plot contains unfragmented, full canopied, juniper-oak woodland that appears to be excellent GCW habitat. The understory throughout much of the plot, particularly the uplands, is very dense and difficult to walk through. Terrain varies from steep canyon slopes along Turkey creek to relatively gentle slopes. Approximately 5% of the plot was cleared in the past and is in early stages of plant succession. The riparian habitat along Turkey creeks contains fairly high numbers of exotic plants such as heavenly bamboo (*Nandina domestica*), Japanese privet (*Ligustrum japonicum*) and Chinaberry (*Melia azedarach*). The Turkey Creek trail receives light use by hikers (some with dogs) mostly on weekends.

Ivanhoe (Prime Habitat) The Ivanhoe plot occurs approximately four km. to the northwest of the intersection of Spicewood Springs road and Capital of Texas Highway. With a few minor exceptions, the canopy remains intact throughout the plot. The northern plot boundary is marked by a powerline and its' associated 20m wide clearing.

St. Edwards/ 3M: (Prime Habitat). This plot occurs on both the St. Edwards and 3M tracts located about 3 km west of the intersection of Spicewood spring road and Capital of Texas Highway. Three powerlines and their associated 20m wide cleared areas beneath, cross the center of the plot. Recreational hiking and biking takes place on designated trails in the northwest corner of the plot (roughly 20% of the entire plot). Unauthorized hiking and biking occasionally occur on the rest of the plot. Roughly 1-2% of the plot contains cleared open areas that were probably used for livestock grazing in the past.

Forest Ridge (Prime Habitat): This plot occurs on the Forest ridge tract and is approximately 0.5 kilometer southwest of the intersection of Spicewood Springs Road and Capital of Texas Highway. Roughly one quarter of the plot contains drier upland habitat containing primarily plateau live oak, Ashe juniper and white shin oak. In the early 1980's, portions of the plot were hydroaxed in preparation for road and waterline construction. This hydroaxed portion accounts for approximately 5% of the total plot. These areas are currently recovering and vegetation stands at about 3-4 meters. This plot also contains numerous largely unauthorized trails which are used by mountain bikers and hikers. Recreational use of the two authorized trails takes place primarily after 5 p.m. and on weekends. (mountain biking not allowed in 2001)

Bohls Hollow (Prime Habitat). The Bohls Hollow plot lies approximately 2 km northeast of the town of Bee Cave. Roughly 60% of this plot is made up of full canopied, steep canyon slopes and drainage bottoms. The remaining 40% of uplands contain more open juniper-oak woodland (canopy closure of about 70%). The uplands appear to have undergone some type of clearing in the past. The majority of this area is composed of more than 90% juniper trees which are probably less than 20 years old.

Double J and T (Transitional Habitat). The Double J and T plot occurs roughly one km to the East of the intersection of FM 620 and Kollmeyer Rd. Currently, approximately 40-50% of the plot is woodland, which is primarily made up of young juniper. For the most part, deciduous hardwoods occur in drainage bottoms. Past chaining and overgrazing appear to have greatly reduced the density of deciduous trees in this plot. Though the land is no longer grazed, oak regeneration appears to have been hindered by deer browse for many years.

Canyon Creek (Transitional Habitat): The Canyon Creek plot can be found approximately 3.5 km from the intersection of RR 2222 and FM 620. In the mid 1980's, in preparation for development, most Ashe juniper within the plot was hydroaxed while the oak component was left largely untouched. Regrowth juniper is approximately 2-3 meters in height. One section of the plot (roughly 10%) appears to have been chained and heavily grazed and is now largely covered with Ashe juniper, King Ranch bluestem (*Bothriochloa ischaemum*), and prickly

pear cactus (*Opuntia macrorhiza*). Approximately 5-7% of the plot was not recently hydroaxed and contains closed canopied juniper oak woodland. In general, the canopy closure throughout the plot is roughly 40-50%. Most of this plot is upland habitat though it is adjacent to heavily wooded canyons.

## RESULTS AND DISCUSSION

*Overall Distribution and Abundance*

A total of 92 male GCWs held territories either fully (42) or partially (50) within the eight study plots. This represents an average of 9.6 territories per 100 acres (23.6 per 100 ha) in prime habitat and 2.5 territories per 100 acres (5.25 per 100 ha) in transitional habitat.

In general, higher warbler densities were found in larger tracts of full-canopied, mature woodland such as the Ivanhoe, Forest Ridge, and St. Edwards/3M plots. This is not surprising since most authorities consider the GCW a forest interior species which requires large blocks of unfragmented habitat (Biological Advisory Team 1990, Wahl et. al . 1990).

Of the six prime plots, the Bohls plot had the lowest density with four territorial males. These lower densities might be explained by Bohls' lower percentage of full canopied, mature woodlands.

As expected, the two transitional plots had lower warbler densities than the prime plots, with the exception of the Bohls plot which had fewer territories than the Canyon Creek plot. As previously mentioned, much of the Canyon Creek plot was selectively hydro-axed leaving high numbers of Texas oak, and live oak intact. This plot was also adjacent to prime warbler habitat to the north and south. This oak component and nearby high quality habitat may account for the slightly higher number of warblers using this transitional plot. Of all plots, the Double J and T plot appears to have the least amount of habitat favored by the GCW, so it is not surprising that warbler densities were lowest in this plot.

Figures 1-8 illustrate locations of GCW territories, females and fledgling groups. See Table 1 and 2 for a summary of findings for individual plots.

## Table 1: 1999 City of Austin Golden-cheeked Warbler Surveys - Summary of Findings

| Plot Name | Number of Full Territories[1] | Number of Full and Edge Territories[2] | Number of Full Territories plus 50% of edge Teritories[3] | Number of Territories per 100HA |
|---|---|---|---|---|
| **Prime Plots** | | | | |
| **Barton Creek** | | | | |
| 1998 | 2 | 8 | 5 | 12.5 |
| 1999 | 6 | 12 | 9 | 22.5 |
| 2000 | 5 | 9 | 7 | 17.5 |
| 2001 | 3 | 7 | 5 | 12.5 |
| **Emma Long** | | | | |
| 1998 | 6 | 11 | 8.5 | 21.3 |
| 1999 | 7 | 12 | 9.5 | 23.8 |
| 2000 | 12 | 21 | 16.5 | 41.3 |
| 2001 | 14 | 23 | 18.5 | 46.3 |
| **Ivanhoe** | | | | |
| 1998 | 7 | 13 | 10 | 25 |
| 1999 | 8 | 17 | 12.5 | 31.3 |
| 2000 | 7 | 19 | 13 | 32.5 |
| 2001 | 2 | 14 | 9 | 22.5 |
| **St. Eds/3M** | | | | |
| 1998 | 6 | 12 | 9 | 22.5 |
| 1999 | 7 | 15 | 11 | 27.5 |
| 2000 | 7 | 17 | 12 | 30 |
| 2001 | 4 | 8 | 6 | 15 |
| **Forest Ridge** | | | | |
| 1998 | 7 | 14 | 10.5 | 26.3 |
| 1999 | 11 | 17 | 14 | 35 |
| 2000 | 7 | 14 | 10.5 | 26.3 |
| 2001 | 9 | 16 | 12.5 | 31.5 |
| **Bohls Hollow** | | | | |
| 1998 | 3 | 6 | 4 | 10 |
| 1999 | 1 | 4 | 4 | 10 |
| 2000 | 1 | 5 | 3 | 7.5 |
| 2001 | 5 | 8 | 6.5 | 16.3 |
| **TOTALS** | | | | Avg. |
| 1998 | 31 | 64 | 47 | 19.6 |
| 1999 | 40 | 77 | 60 | 25.0 |
| 2000 | 39 | 85 | 62 | 25.9 |
| 2001 | 37 | 76 | 57.5 | 24.0 |
| **Transitional Plots** | | | | |
| **Double J and T** | | | | |
| 1998 | 0 | 1 | .5 | 1.3 |
| 1999 | 0 | 1 | .5 | 1.3 |
| 2000 | 0 | 1 | .5 | 1.3 |
| 2001 | 2 | 4 | 3 | 7.5 |
| **Canyon Creek** | | | | |
| 1998 | 0 | 8 | 4 | 10 |
| 1999 | 2 | 7 | 4.5 | 11.3 |
| 2000 | 0 | 8 | 4 | 10 |
| 2001 | 3 | 12 | 7.5 | 18.8 |
| **TOTALS** | | | | Avg. |
| 1998 | 0 | 9 | 4.5 | 5.7 |
| 1999 | 2 | 8 | 5 | 6.3 |
| 2000 | 0 | 9 | 4.5 | 5.7 |
| 2001 | 5 | 16 | 10.5 | 13.2 |

[1] Entire territory boundary fell within plot. [2] Includes territories whose boundaries may have occurred outside plot. [3] Includes %50 of edge territories. See Verner 1985. [4] Presence of female was inferred by the presence of juveniles.

**Table 2: 2001 City of Austin Golden Cheeked Warbler Surveys - Summary of Findings- Paring and Productivity**

| Plot Name | Females Observed (inferred) | Number of Fledgling Groups[2] | Number of Fledglings Per Successful Pair[3] | Number of Fledglings per Territory |
|---|---|---|---|---|
| **Prime Plots** | | | | |
| **Barton Creek** | 1(1) | 1 | 2 | 1.3 |
| 1998 | 3(6) | 6 | 2.2 | 2.2 |
| 1999 | 4(4) | 2 | 1.5 | .6 |
| 2000 | 0(3) | 3 | 2 | 2 |
| 2001 | | | | |
| **Emma Long** | 3(6) | 6 | 2.3 | 1.3 |
| 1998 | 3(6) | 6 | 2.3 | 2.0 |
| 1999 | 5(5) | 2 | 2 | .33 |
| 2000 | 11(11) | 8 | 2 | 1.14 |
| 2001 | | | | |
| **Ivanhoe** | | | | |
| 1998 | 2(3) | 3 | 2.7 | 1.3 |
| 1999 | 3(4) | 4 | 2.8 | 1.3 |
| 2000 | 1(1) | 1 | 3 | .43 |
| 2001 | 2(2) | 2 | 3 | 3 |
| **St. Eds/3M** | | | | |
| 1998 | 5(5) | 2 | 2.5 | 0.8 |
| 1999 | 4(5) | 3 | 1.7 | 0.7 |
| 2000 | 1(3) | 2 | 2.5 | .71 |
| 2001 | 1(1) | 0 | 0 | 0 |
| **Forest Ridge** | 4(4) | 3 | 2.3 | 1.1 |
| 1998 | 5(7) | 6 | 2.7 | 1.5 |
| 1999 | 6(6) | 5 | 2.8 | 2.0 |
| 2000 | 7(7) | 5 | 2.8 | 1.6 |
| 2001 | | | | |
| **Bohls Hollow** | 0 | 0 | 0 | 0 |
| 1998 | 0 | 0 | 0 | 0 |
| 1999 | 3 | 0 | 0 | 0 |
| 2000 | 2(3) | 2 | 3 | 1.2 |
| 2001 | | | | |
| **TOTALS** | | | | |
| 1998 | 15(19) | 15 | 1.97 | .97 |
| 1999 | 18(28) | 25 | 1.95 | 1.3 |
| 2000 | 17(19) | 12 | 1.97 | .68 |
| 2001 | 23(27) | 20 | 2.13 | 1.49 |
| **Transitional Plots** | | | | |
| **Double J and T** | 0 | 0 | 0 | 0 |
| 1998 | 0 | 0 | 0 | 0 |
| 1999 | 0 | 0 | 0 | 0 |
| 2000 | 0 | 0 | 0 | 0 |
| 2001 | | | | |
| **Canyon Creek** | 0(0) | 0 | 0 | 0.6 |
| 1998 | 1(1) | 1 | 2 | 1.0 |
| 1999 | 0(1) | 0 | 0 | 0 |
| 2000 | 0(0) | 0 | 0 | 0 |
| 2001 | | | | |

| | | | | |
|---|---|---|---|---|
| **TOTALS** | | | | |
| 1998 | 0 | 0 | 0 | 0.3 |
| 1999 | 1(1) | 1 | 2 | 0.5 |
| 2000 | 0 | 0 | 0 | 0 |
| 2001 | 0 | 0 | 0 | 0 |

*Pairing, Nesting, and Productivity*

Of the 42 territories which occurred fully within the plots, at least 23 contained females. Assuming that all females seen were paired, this represents a minimum estimate of 55% warblers paired. However, the number of fledgling groups observed on several plots was higher than the number of females observed. This suggests that the number of females in all plots was 27; a 64% pairing rate. Again, this is likely an underestimate of pairing success as females are difficult to detect. Pairing success was 73% on prime plots and 0% on transitional plots.

Overall, a minimum of 48 fledglings from 20 fledgling groups were observed on all eight plots or fledglings per successful nesting attempt. This represents 0.57 male fledglings per singing male (assuming a 50:50 male/female sex ratio). This figure is considerably less than the fecundity estimate (defined as the number of male fledglings per singing male) of 0.75 for second year GCWs and 1.08 for after second year GCWs used in a model to estimate the probability of extinction in 100 years in the GCW population and habitat viability assessment (US Fish and Wildlife Service 1996). Prime plots were more productive than transitional plots with 0.65 fledglings per territory in prime plots and 0.0 male fledglings per territory in transitional plots.

Ten warbler nests were found during the study; three in Emma Long Metropolitan Park, three on the Coldwater tract, three on the Ivanhoe tract and one on the Forest Ridge tract. While these nests were checked infrequently, it was believed that six out of the ten nests successfully fledged 13 young. This represents a 60% nesting success rate and 2.6 fledglings per successful pair.

Based on repeated site visits it is believed the one pair in the southwest corner of the Emma Long 100-acre plot produced two broods. While it is not known whether the same female produced both broods the observer was fairly certain that the same male was involved because the bird was colorbanded.

*Nest Predators and Parasites*

For the most part, observers found little evidence of parasitism by brown-headed cowbirds (*Molothrus ater*). There was only one sighting of an adult GCW feeding a fledgling brown-headed cowbird. This took place on the Barton Creek plot. Brown-headed cowbirds were observed on numerous occasions in both prime and transitional plots and were most often seen following utility corridors, trails or in open fields. In 2001, three cowbird traps were employed on the Ivanhoe, Canyon Creek and 3M tracts.

Several potential nest predators were observed including, blue jay (*Cyanocitta cristata*), western scrub jay (*Aphelocoma coerulescens*), great-tailed grackles (*Quiscalus mexicanus*), common grackle (*Quiscalus quiscula*), Texas rat snake (*Elaphe obsoleta lindheimeri*), and red imported fire ants (*Solenopsis invicta*). Many of these predators thrive in urban and edge habitat and their numbers are likely unnaturally higher than they would be in less disturbed settings (Wilcove 1985). Large flocks of common grackles, a bird which is typically uncommon in western Travis county, were often seen near the Jester Estates subdivision on the Forest Ridge and Ivanhoe plots.

## II. BLACK-CAPPED VIREO MONITORING

### INTRODUCTION

Black-capped vireos (BCV) have been known to occur on several City of Austin BCP properties in the past 15-20 years. Probably the best known and studied vireo colony occurred at the Black-capped Vireo Research Area (BCVRA) off Loop 360. This group declined steadily from a high of 60 adults in 1985 to just one pair in 1997 (DLS 1988, Abbruzzese 1997). Other recent records (i.e. the past 10 years) of BCVs on COA land include sightings on the Forest Ridge, Park West, and Cortana tracts.

Approximately 80 acres of an upland portion of the Cortana tract was managed for vireo habitat in the winter of 1995. Juniper-oak woodland was cleared using both hand clearing and hydroaxing. In the past 3-4 years several vireos have been observed by City of Austin and SWCA inc. staff in this managed area. In 2000 three males defended territories in this managed area.

### METHODS

Vireos were surveyed throughout the manipulated area of Cortana and the BCVRA following methods described in the "Minimum Procedures for Determining the Presence/Absence of Golden-cheeked Warblers and Black-capped Vireos" (USFW 1984). When a vireo was encountered its territory was mapped using methods described by the

IBCC (1970). For each visit the time, temperature, wind direction, wind speed, and percent cloud cover were recorded at the beginning and ending of each visit (Weather data is available upon request). Playback of taped BCV or eastern screech-owl vocalizations were not used to elicit a response except on the BCVRA to verify an absence of vireos on this property. See Figures 14 and 15 for a maps of the BCVRA and Cortana tracts.

Part of the Forest Ridge tract (including the area where a BCV had been seen in recent years) was visited 10 times during Golden-cheeked Warbler surveys.

**RESULTS AND DISCUSSION**

Three male vireos were observed defending territories on the managed portion of the Cortana tract and adjacent riverplace mitigation tract. Based on plumage coloration 2 males were determined to be at least two years old while the third was a younger second year male (Grzybowski 1995). All three males were mated and nested, however only the two older males successfully produced two young per pair. The nest of the second year male was believed depredated. One of the two second year males attemped to re-nest however the nest was also depredated. A pair of indigo buntings (*Passerina cyanea*) also probably nested in the managed area of Cortana. Indigo buntings are uncommon to rare nesters throughout western Travis County. Other regionally declining species like painted buntings (*Passering cirus*), black-chinned hummingbirds (*Archilochus alexandri*), rufous-crowned sparrows (*Aimophila ruficeps*), and northern bobwhites were also observed on the managed area of Cortana (Shackleford and Lockwood 2000).

One second year black capped vireo was observed in the N.W. corner of the Forest Ridge plot. This bird was only observed on one occasion and while he sang nearly continuously he did not appear to be defending a territory nor mated. See figure five for the location of this male on the forest ridge plot.

No Black-capped Vireos were observed on the BCVRA property during the 2001 field season. This is not surprising considering the continual decline of vireos on that preserve and the fact that only one pair remained in 1997. In addition, the male of this pair (nicknamed “Switchbags”) was banded as an adult in 1986 so he was at least 11 years old: making him one of the longest lived BCVs known. This decline is likely caused by a number of factors which have degraded the habitat, including encroachment of surrounding development leading to high numbers potential predators such as feral and tame cats, raccoons, and jays. Natural regrowth of the vegetation may have also been a factor in the decline of the colony. These same factors are probably responsible for the general decline of BCVs throughout Travis County and may explain the lack of vireos on other COA properties.

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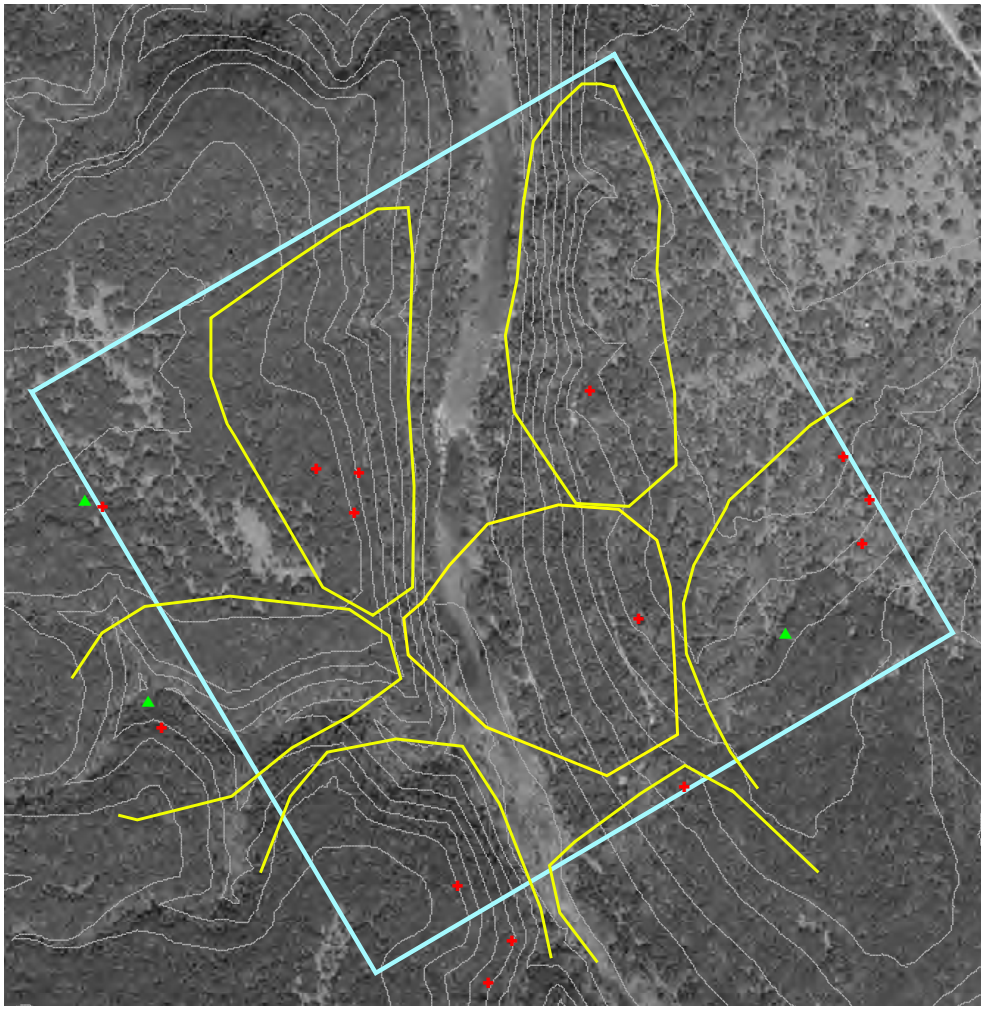
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# 2001 Golden-Cheeked Warbler Surveys
# Barton Creek 100-acre Plot

Figure 1

Legend

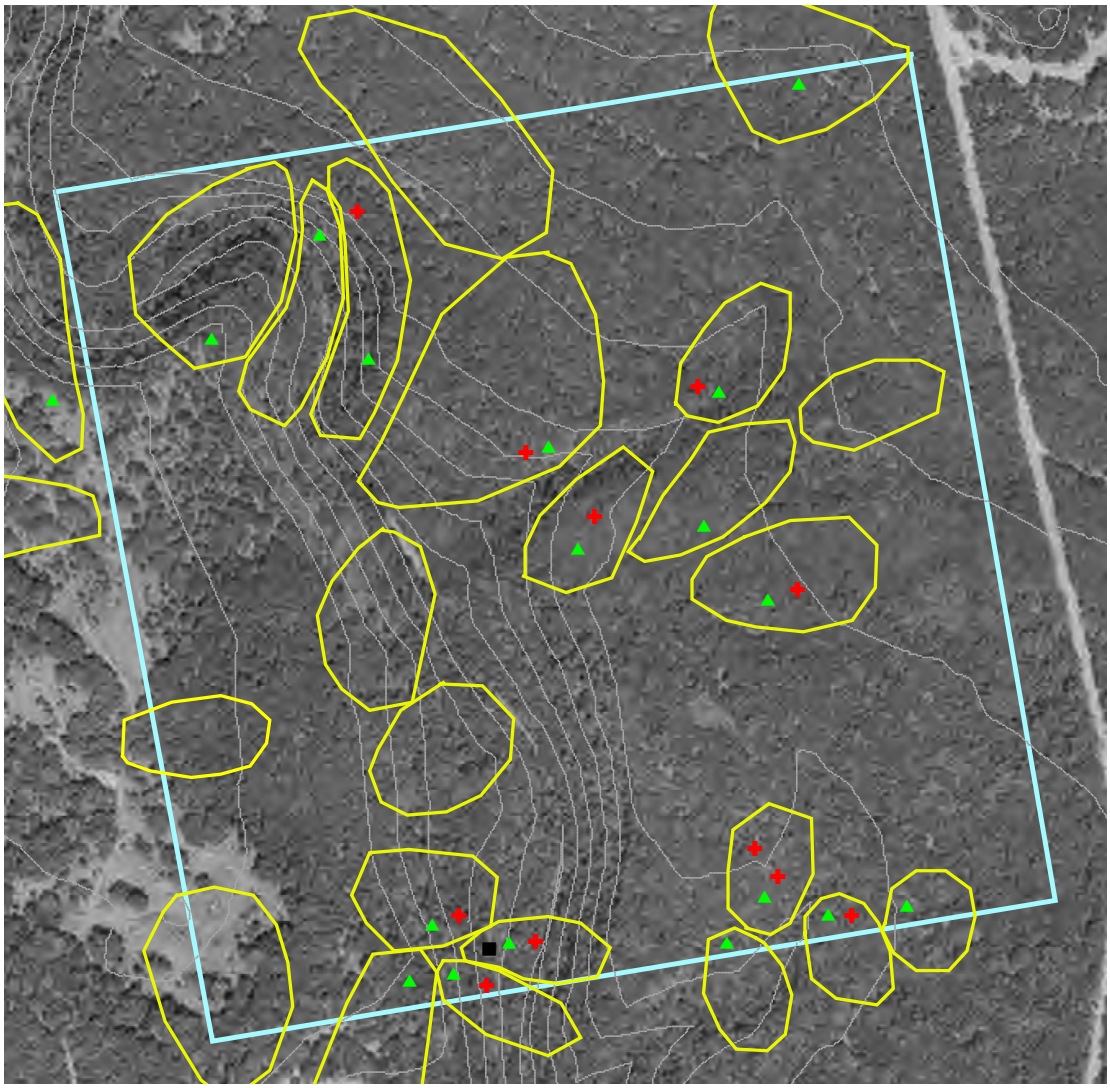
- GCW Fledglings
- GCW Females
- GCW Territory Boundary
- Plot Boundary

N
W E
S

Scale

300 0 300 600 Feet

Base Map: USGS 7.5' Austin West, Tex.
Observer: Scott Haywood



# 2001 Golden-Cheeked Warbler Surveys
# Emma Long 100-acre Plot

Figure 2

## Legend

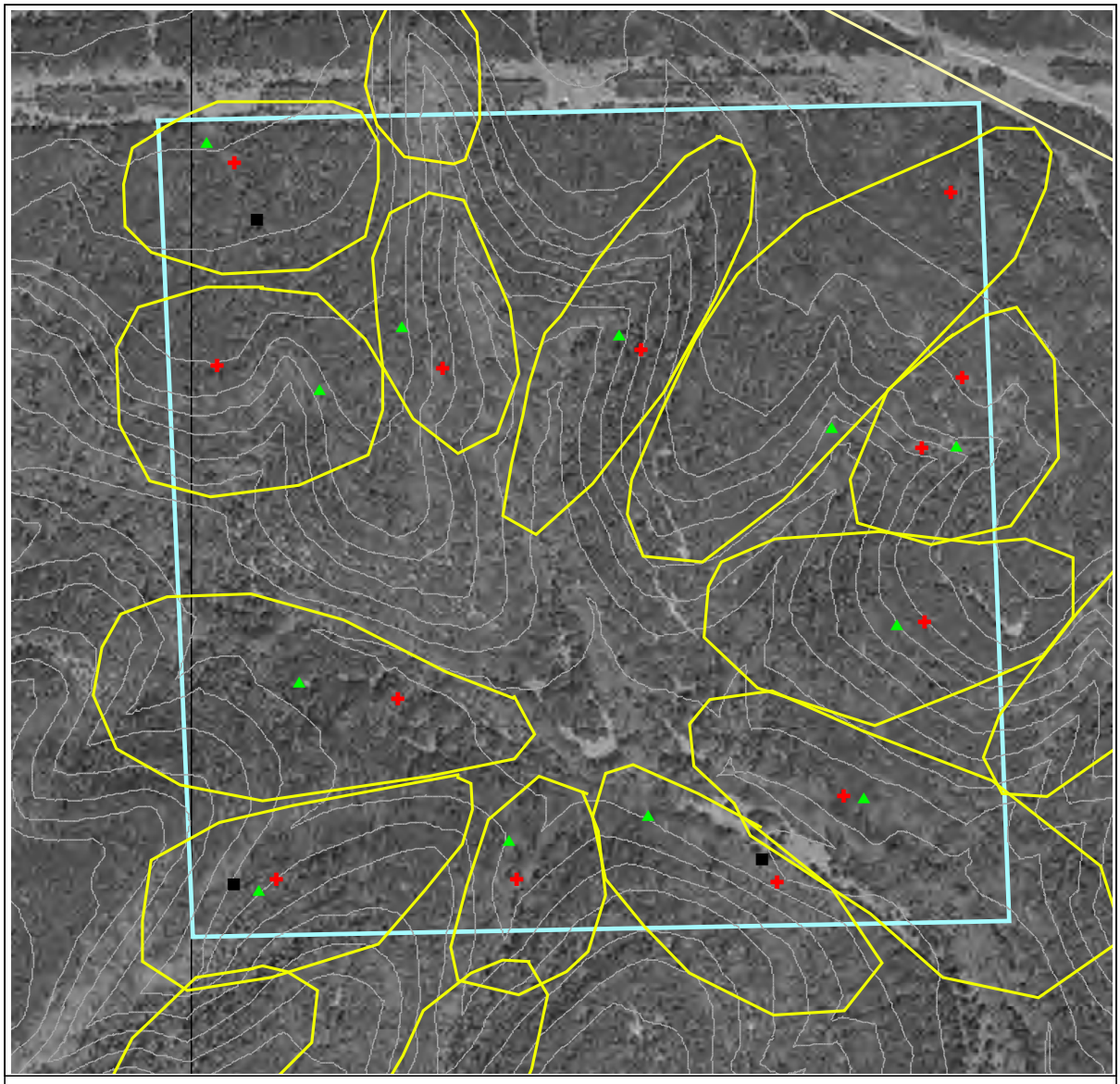
- GCW Nest
- GCW Fledglings
- GCW Females
- GCW Territory Boundary
- Plot Boundary

N
W E
S

## Scale

300 0 300 Feet

Base Map: USGS 7.5' Austin West Tex.
Observer: D.Thompson



# 2001 Golden-Cheeked Warbler Surveys
# Ivanhoe 100-acre Plot

Figure 3

## Legend

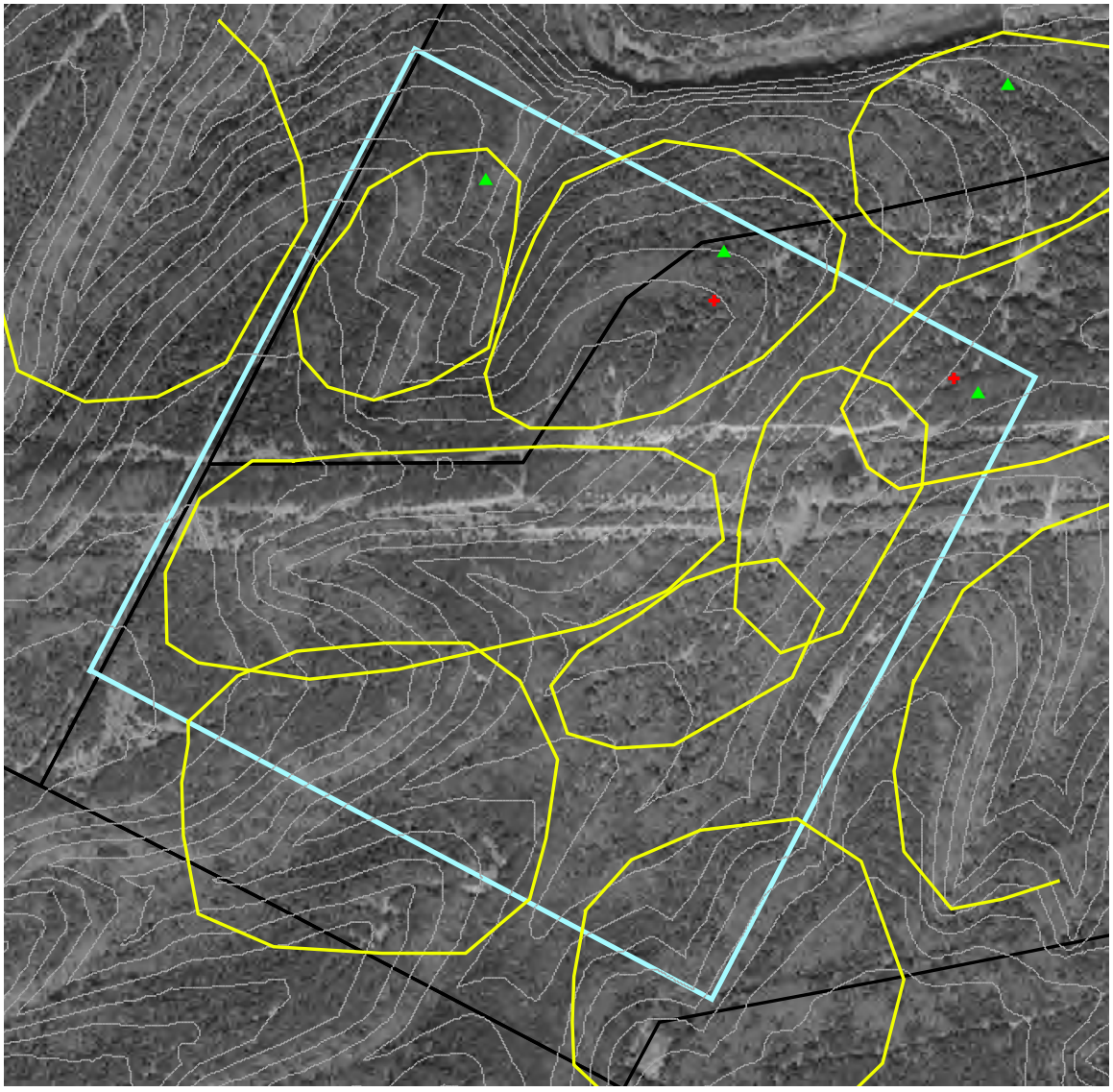
- GCW Fledglings
- GCW Females
- GCW Territory Boundary
- Plot Boundary

N
W E
S

## Scale

400 0 400 Meters

Base Map: USGS 7.5' Jollyville, Tex.
Observer: Mark Sanders



# 2001 Golden-Cheeked Warbler Surveys
# 3M/St. Edwards 100-acre Plot

Figure 4

## Legend

- Property Boundary
- GCW Fledglings
- GCW Females
- GCW Territory Boundary
- Plot Boundary

N W E S

## Scale

300 0 300 600 Feet

Base Map: USGS 7.5' Jollyville, Tex.
Observer: Jackie Davis



# 2001 Golden-Cheeked Warbler Surveys
# Forest Ridge 100-acre Plot

Figure 5

Legend

- Property Boundary
- GCW Fledglings
- GCW Females
- GCW Enumeration
- GCW Territory Boundary
- Plot Boundary
- GCW Nest
- Male BCV

N
W E
S

Scale

900 0 900 1800 Feet

Base Map: USGS 7.5' Jollyville, Tex.
Observer: Carlo Abbbruzzese



# 2001 Golden-Cheeked Warbler Surveys
# Bohls 100-acre Plot

Figure 6

## Legend

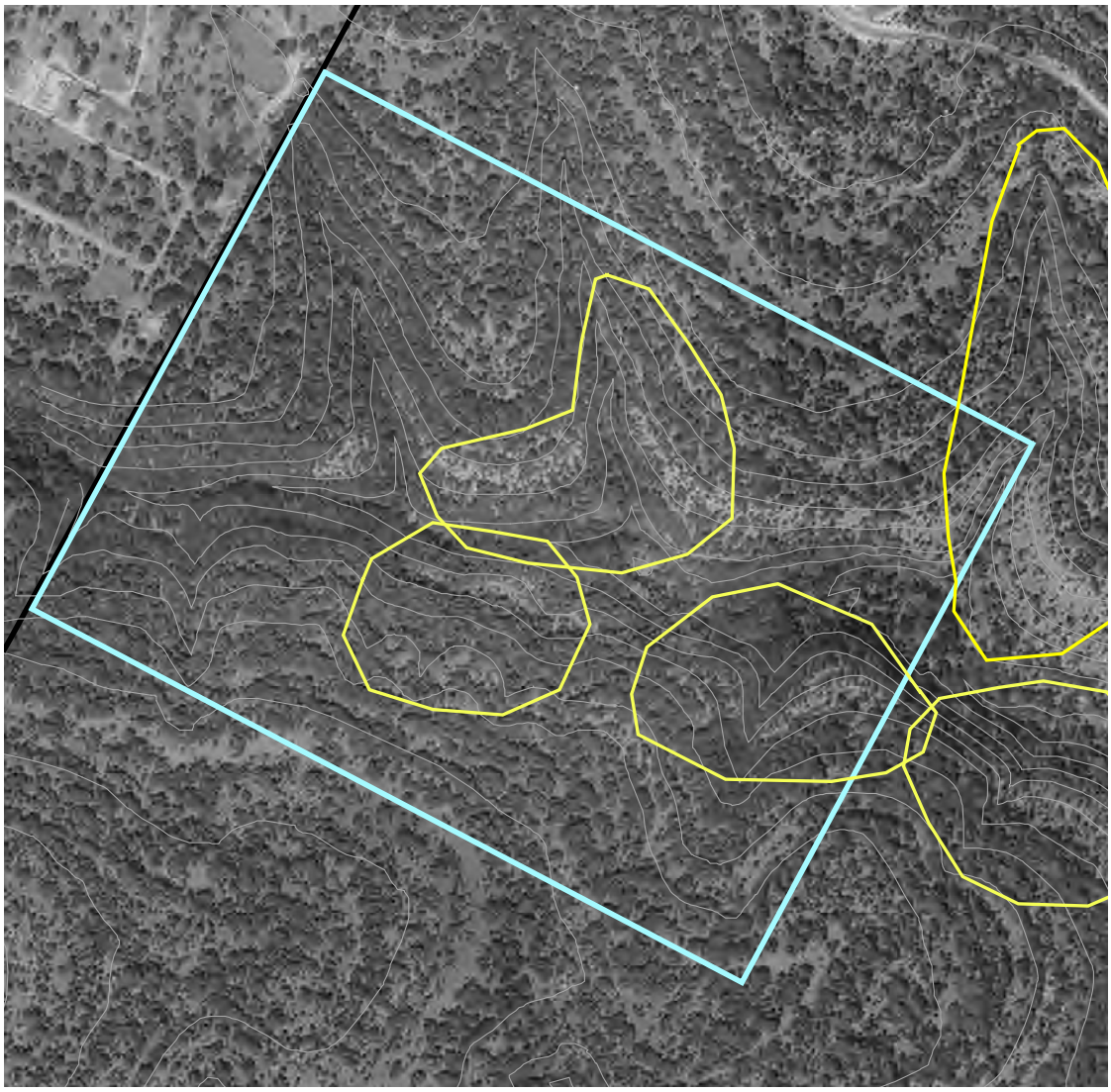
- GCW Fledglings
- GCW Females
- Property Boundary
- GCW Territory Boundary
- Plot Boundary

N
W E
S

## Scale

400 0 400 Feet

Base Map: USGS 7.5' Bee Cave, Tex.
Observer: Carlo Abbruzzese



# 2001 Golden-Cheeked Warbler Surveys
# Double J & T 100-acre Plot

Figure 7

Property Boundary
Legend
GCW Territory Boundary
Plot Boundary

N
W E
S

Scale
300 0 300 600 Feet

Base Map: USGS 7.5' Bee Cave, Tex.
Observer: Jackie Davis



# 2001 Golden-Cheeked Warbler Surveys
# Canyon Creek 100-acre Plot

Figure 8

## Legend

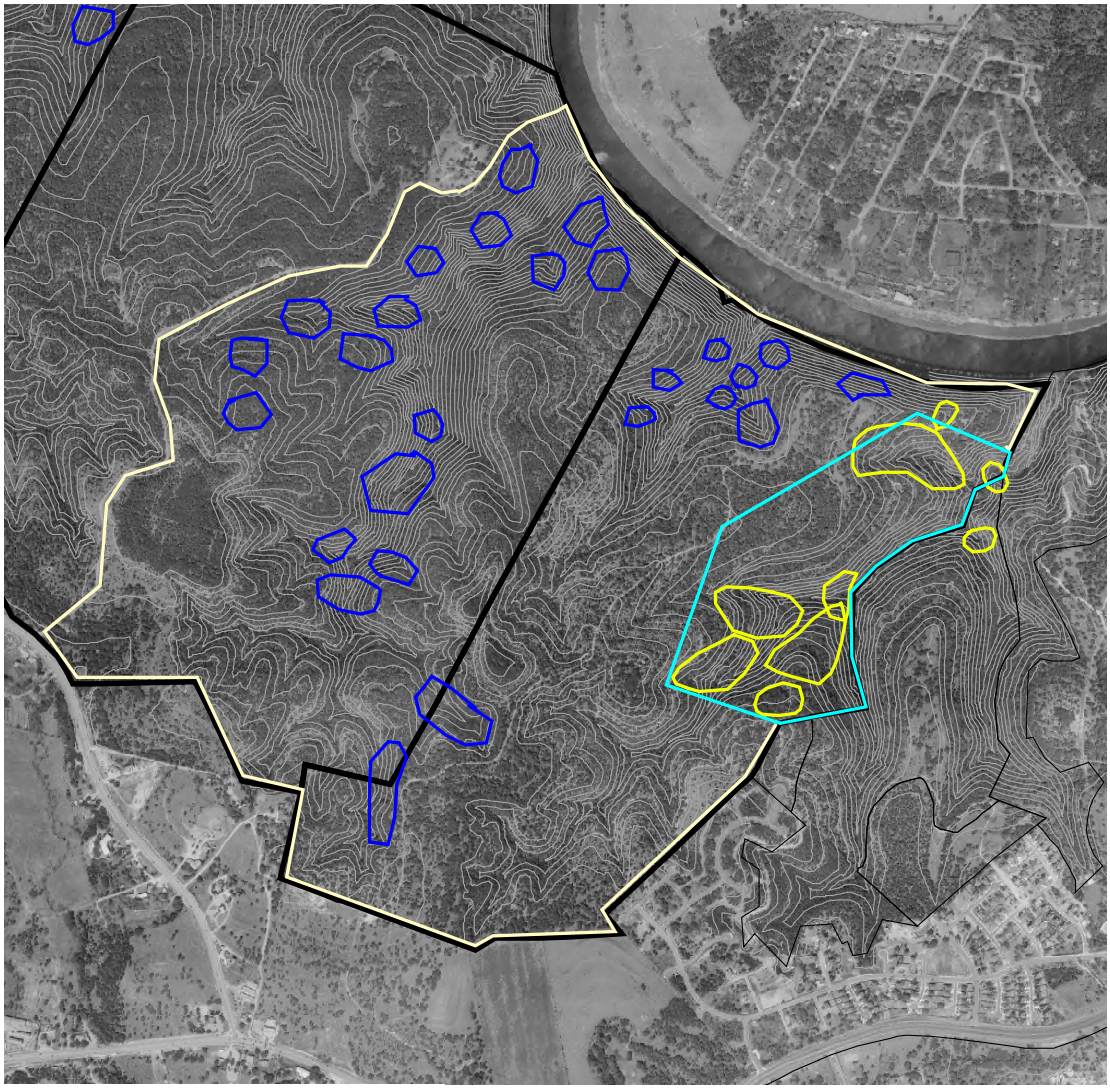
- Property Boundary
- GCW Fledglings
- GCW Females
- GCW Territory Boundary
- Plot Boundary

## Scale

1000 0 1000 2000 Feet

N W E S

Base Map: USGS 7.5' Jollyville, Tex.
Observer: Mark Sanders



# 2001 Golden-Cheeked Warbler Surveys
# Reicher Ranch/Bohls Enumeration

Figure 9

## Legend

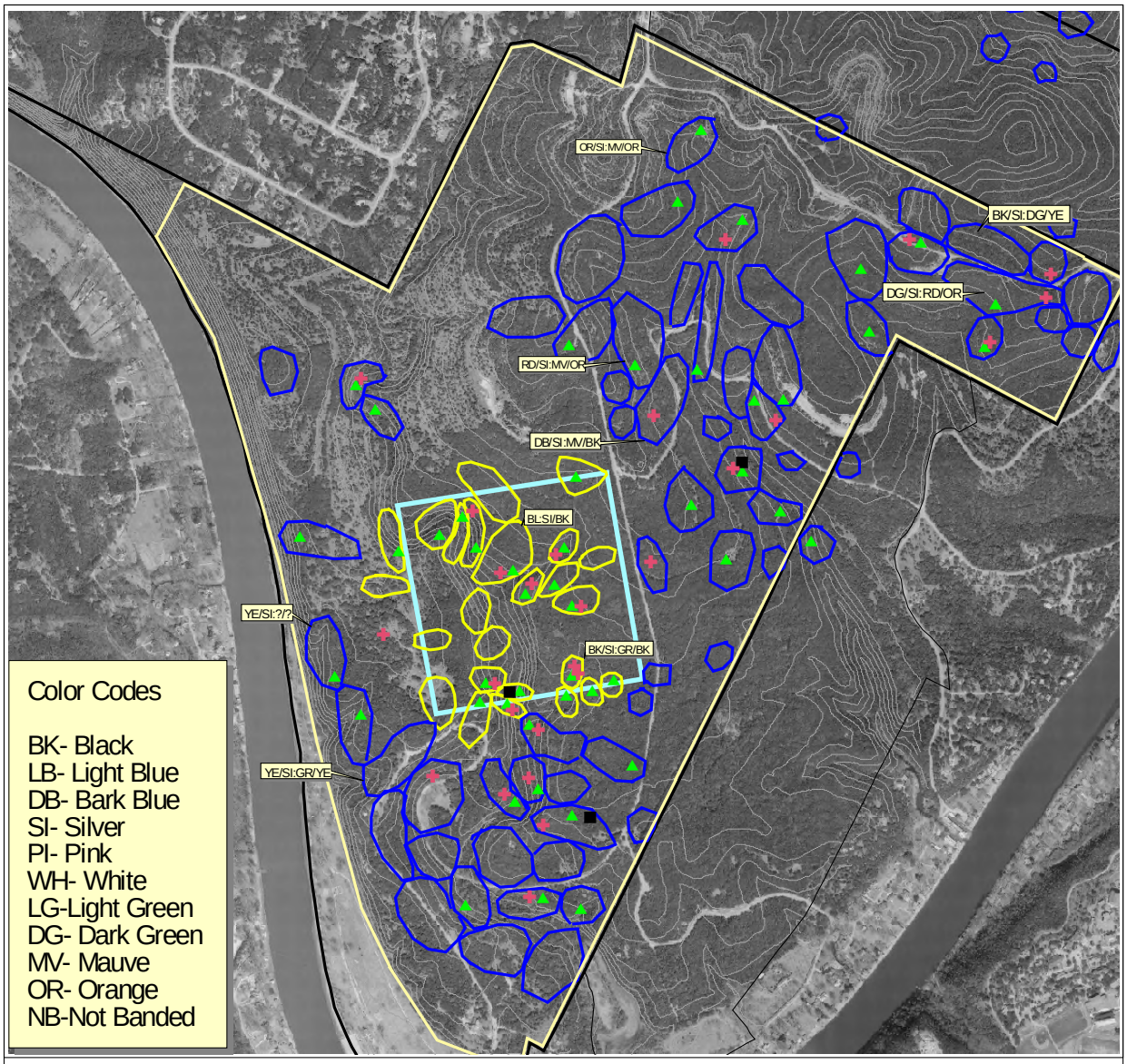
- Property Boundary
- GCW Fledglings
- GCW Females
- Plot Boundary
- GCW Territory Boundary
- Survey Area

## Scale

N
W E
S

900 0 900 1800 Feet

Base Map: USGS 7.5' Bee Caves, Tex.
Observer: Carlo Abbruzzese




# 2001 Golden-Cheeked Warbler Surveys
# Emma Long Enumeration

Figure 10

## Legend

- Plot Boundary
- GCW Nest
- GCW Fledglings
- GCW Females
- YE/BK:PI/Si Colorbanded GCW
- GCW Territory Boundary
- Property Boundary
- Survey Area
- GCW Enumeration

N W E S

## Scale

2000 0 2000 4000 Feet

Base Map: USGS 7.5' Austin West Tex.
Observer: D.Thompson, M. R. Holder



# 2000 Golden-Cheeked Warbler Surveys
# Coldwater North Enumeration

Figure 11

## Legend

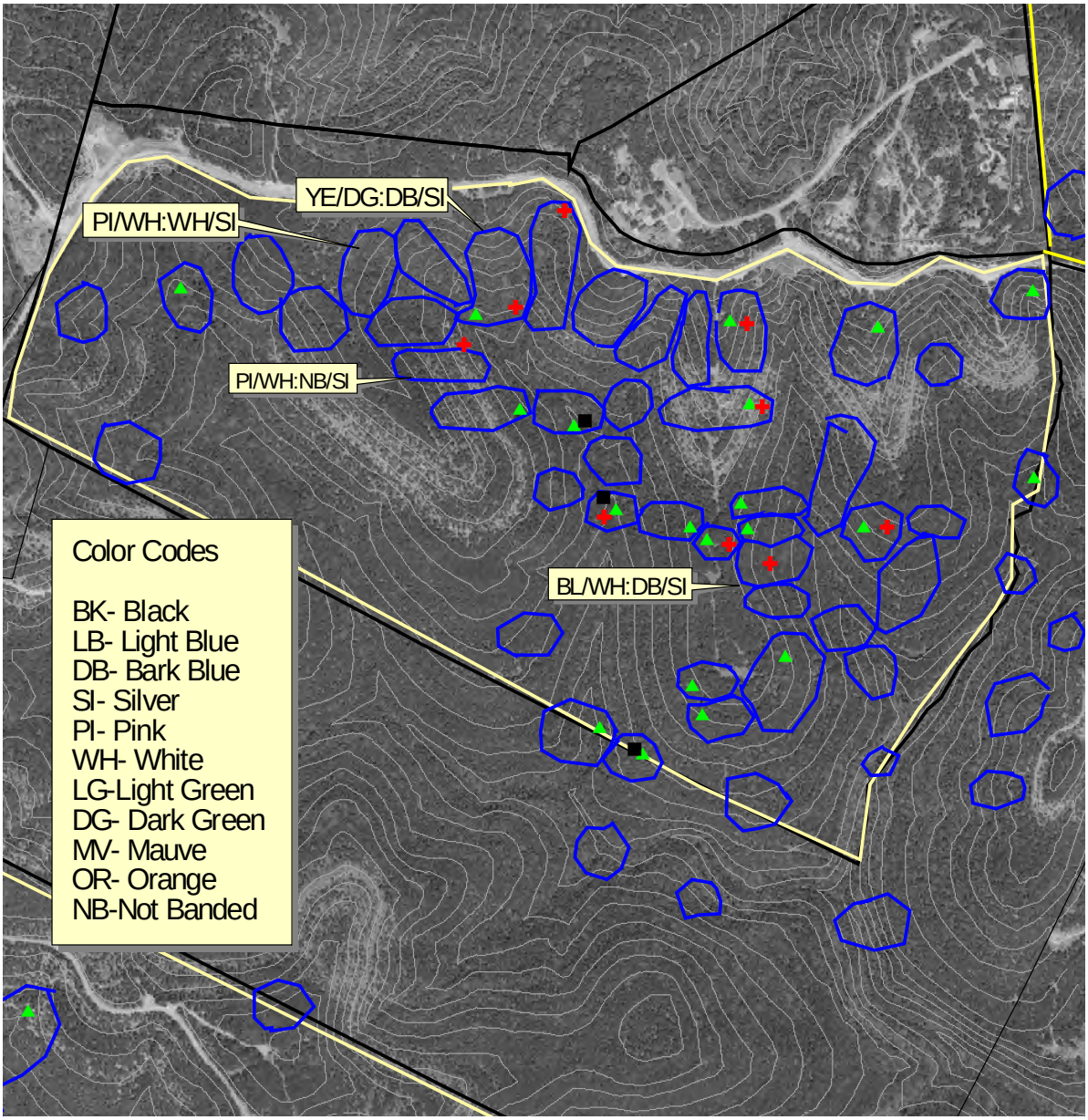
- Property Boundary
- GCW Fledglings
- GCW Territory Boundary
- GCW Females
- GCW Enumeration

## Scale

N W E S

2000 0 2000 Feet

Base Map: USGS 7.5' Austin West, Tex.
Observer: L. and A. Schmidley




# 2001 Golden-Cheeked Warbler Surveys
# Coldwater South Enumeration

Figure 12

## Legend

Property Boundary
GCW Territory Boundary
GCW Fledglings
GCW Females
GCW Nest

N
W E
S

## Scale

1500 0 1500 3000 Feet

Base Map: USGS 7.5' Jollyville, Tex.
Observer: D. Thompson



# 2001 Golden-Cheeked Warbler Surveys
# Ivanhoe Enumeration

Figure 13

## Legend

- Property Boundary
- GCW Fledglings
- GCW Females
- GCW Enumeration
- Plot Boundary
- GCW Nest
- Survey Area

## Scale

N
W E
S

2000 0 2000 4000 Feet

Base Map: USGS 7.5' Jollyville, Tex.
Observer: K. Ecton, M Goodman



# 2001 Golden-Cheeked Warbler Surveys
# Hanks Tract

Figure 14

Legend

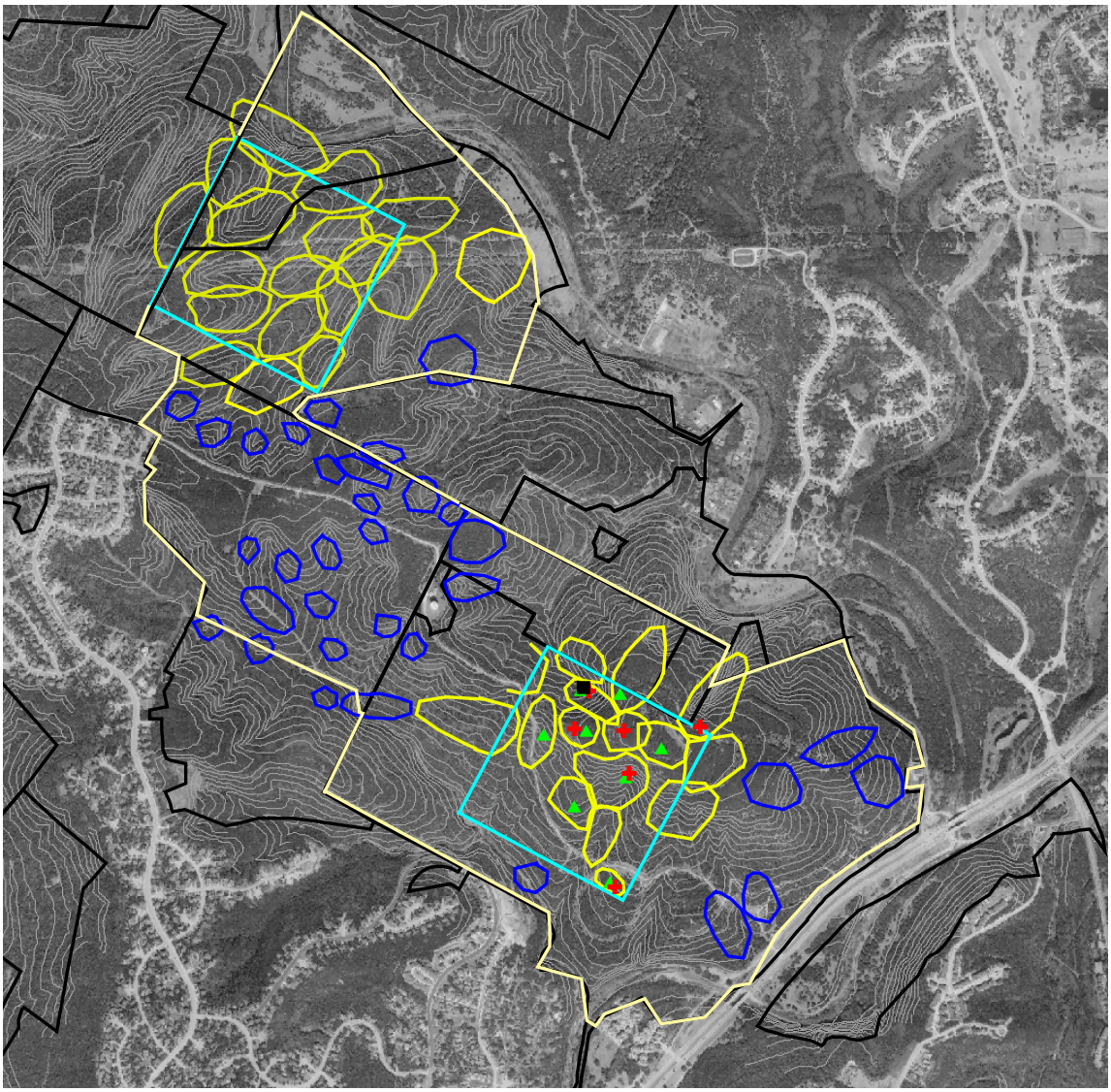
- Property Boundary
- GCW Fledglings
- GCW Females
- GCW Territory Boundary
- Survey Area

N W E S

Scale

1000 0 1000 2000 Feet

Base Map: USGS 7.5' Jollyville, Tex.
Observer: C.Abbruzzese, M. Sanders



# 2001 Golden-Cheeked Warbler Surveys
# Bull Creek Enumeration

Figure 15

## Legend

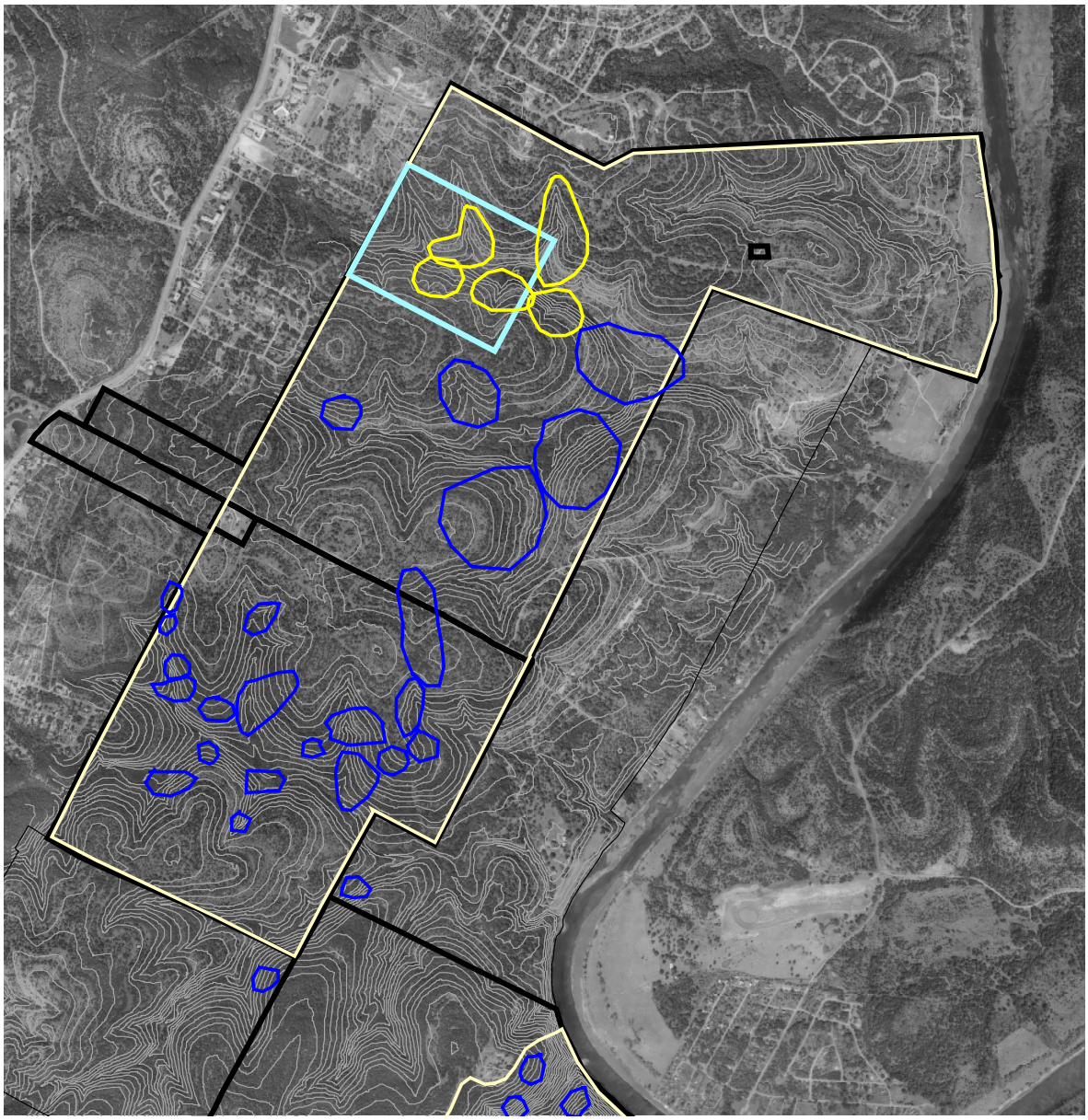
- Property Boundary
- GCW Fledglings
- GCW Females
- GCW Territory Boundary
- Survey Area

N
W E
S

## Scale

4000 0 4000 Feet

Base Map: USGS 7.5' Jollyville, Tex.
Observer: J. Davis, T. Miller, M. Behrens, J. and L. Weber



# 2001 Golden-Cheeked Warbler Surveys
# Double J and T Enumeration

Figure 16

## Legend

- Property Boundary
- GCW Territory Boundary
- GCW Fledglings
- Survey Area
- GCW Females
- Plot Boundary

N
W E
S

## Scale

900 0 900 1800 Feet

Base Map: USGS 7.5' Bee Cave, Tex.
Observers: D. Thompson, Jackie Davis, C Abbruzzese.



# 2001 Black-capped Vireo Surveys
# Black-capped Vireo Research Area

Figure 17

Legend

Property Boundary  Survey Area

N
W E
S

Scale

400 0 400 800 Feet

Base Map: USGS 7.5' Austin West Tex.
Observers: K. Ecton, W. Simper, C. Abbruzzese



# 2001 Black-capped Vireo Surveys
# Cortana Tract

Figure 18

## Legend

- Property Boundary
- BCV Fledglings
- BCV Territory Boundary
- BCV Females

N
W E
S

## Scale

200 0 200 400 Feet

Base Map: USGS 7.5' Jollyville, Tex.
Observers: C.Abbruzzese, B. Simper, K. Ecton