# Monitoring of the Golden-cheeked Warbler
# 2002 Field Season

## Travis County Natural Resources
## Project Number 0810-01001



Photo: The Nature Conservancy, Ft. Hood, 1998

Transportation and Natural Resources Department
Natural Resources Division

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## INTRODUCTION

This report presents the results of golden-cheeked warbler surveys conducted by Travis County Natural Resources in 2002. The golden-cheeked warbler (*Dendroica chrysoparia*, hereafter warbler) is a neotropical migrant passerine whose entire breeding range is restricted to the oak-juniper (*Quercus-Juniperus*) woodlands of central Texas. In response to declining populations and accelerated habitat loss, this species was listed as federally endangered by the U.S. Fish and Wildlife Service in 1990 (U.S. Fish and Wildlife Service 1990). Major threats to species' survival are habitat loss and habitat fragmentation (Pulich 1976).

Travis County is one of only 25 counties in Central Texas in which the warbler is known to breed (Ladd and Gass 1999). In the last two decades, development has expanded westward from the city of Austin at a rapid pace, accelerating loss and fragmentation of warbler breeding habitat in Travis County. In 1996, the Balcones Canyonlands Conservation Plan was approved by the USFWS to facilitate the local recovery of the warbler and seven other endangered species. The plan calls for setting aside 30, 428 acres (12,314 ha) of endangered species habitat in western Travis County. This preserve system, the Balcones Canyonlands Preserve (BCP), is managed and owned by various governmental and private entities, including Travis County.

At the beginning of field season 2002, county-owned and -operated preserve land totaled 2,881 acres (1,165 ha), of which 2,062 acres (834 ha) is currently included in the BCP. Monitoring of the golden-cheeked warbler on county lands began in 1996 and has since been conducted annually (Travis County Natural Resources 1996; 1997; 1998; 1999; 2000; 2001). Survey efforts for the 2002 field season represent a continuation of these efforts.

Overall management goals for warbler recovery outlined in the BCP Land Management Plan (Balcones Canyonlands Preserve 1999) call for maintaining and, where possible, increasing the warbler population on BCP lands via habitat protection, enhancement, and creation. In order to assess population trends and formulate specific management strategies, it is essential to collect accurate population and territory data. In 2002, territory mapping was conducted on three newly acquired tracts of the Jollyville Unit: Grandview Hills (north section), Vista Point, and Bunten; as well as on the Vireo Management Area of Steiner Ranch. Data were collected on four population parameters: male abundance, species distribution, territory density, and territory location.

In addition to these efforts, territory and productivity data were collected on two permanent 100-acre (40.4 ha) plots that are monitored annually. On these plots, data were collected on territory density and location, pairing success, breeding success, and productivity. The study plots are located at Hamilton Pool Preserve and on the Lake Perspectives tract of the Jollyville Unit.

Finally, presence/absence surveys were conducted on two tracts of Steiner Ranch (Tracts 2 and 5) that had not been surveyed in 2001, but contained potential warbler habitat.

## STUDY SITES

Baseline territory mapping for golden-cheeked warblers was conducted on the following Balcones Canyonlands Preserve tracts in 2002: Vista Point, 490 acres (198 ha); Bunten, 141 acres (57 ha); and the north section of Grandview Hills, 160 acres (65 ha). A 100-acre study plot was located on the Lake Perspectives tract (124 acres [50 ha]). These tracts are all part of the Jollyville Unit located in the Cypress Creek macrosite (**Figure 1**). The Jollyville Unit is situated on the southwestern edge of the Jollyville Plateau. The gently sloping topography of the plateau gives way to steep, highly eroded canyons. The remainder of the preserve is characterized by hilly topography dissected by intermittent, spring-fed streams. Dominant vegetation type is oak-Ashe juniper (*Quercus* sp.-*Juniperus Ashei*) woodlands with a more or less closed canopy. Territory mapping was also conducted on the Steiner Ranch Vireo Management Area (127 acres [51 ha]; see **figure 2**) located in the North Lake Austin macrosite. The Vireo Management Area comprises upland hills incised by a number of draws with vegetation ranging from closed canopy juniper-oak woodlands to open shrubland. Presence/absence surveys were conducted on a second tract of Steiner Ranch (Tract 1) comprising 101 acres (41 ha; see **figure 2**). This northernmost tract contains excellent, though limited, warbler habitat in several steep draws. A second 100-acre plot was located at Hamilton Pool Preserve (232 acres [94 ha]) located in far southwestern Travis County in the Pedernales macrosite. River and creek terrain provides excellent habitat for the golden-cheeked warbler where mesic slopes support a mixed evergreen-deciduous woodland dominated by Ashe juniper, Spanish oak (*Quercus buckleyi*), and cedar elm (*Ulmus crassifolia*)(Carr 1996). Methods and properties surveyed are summarized in **Table 1** below.

**Table 1**. Travis County preserve and park tracts surveyed for golden-cheeked warblers in 2000, 2001, and 2002 and the methods used on each tract. (P/A = presence/absence survey; TM = territory mapping on entire tract; TM (100 ac plot) = territory mapping on permanent 100 acre plot; NS = not surveyed; "—" = property not yet acquired.) See "Methods" section for explanation of different methods used.

| | 2000 | 2001 | 2002 |
|---|---|---|---|
| **Travis Co. Preserves** | | | |
| Bunten | — | P/A | TM |
| Grandview Hills north | — | — | TM |
| Grandview Hills south | — | — | NS |
| Hamilton Pool | TM (100 ac plot) | TM (100 ac plot) | TM (100 ac plot) |
| Lake Perspectives | TM | TM | TM (100 ac plot) |
| Romberg | P/A | NS | NS |
| Steiner Ranch: | | | |
| Tract 1 "J-Canyon" | — | TM | NS |
| Tract 2 "L-Bend" | — | NS | P/A |
| Tract 3 "Middle" | — | NS | P/A |
| Tract 4 Vireo Mgmt Area | — | TM | TM |
| Tract 5 "Northeast" | — | NS | P/A |
| Toops | — | — | NS |
| Vireo Ridge | — | TM | NS |
| Vista Point | — | — | TM |
| **Travis Co. Parks** | | | |
| Cypress Creek Park | P/A | NS | NS |
| Hippie Hollow Park | P/A | NS | NS |
| Sandy Creek Park | P/A | NS | NS |

## METHODS

### TRACT TERRITORY MAPPING

*Data Collection.* Golden-cheeked warblers were surveyed at Vista Point, Bunten, the northern section of Grandview Hills, and the Vireo Management Area of Steiner Ranch from 13 March to 6 June 2002. Territory mapping was used to estimate warbler densities and abundance. All observations (both visual and auditory) of male, female and juvenile warblers were plotted on hard-copy digital orthophoto maps (scale 1:5,000 or less). For each observation, the following demographic data were recorded: sex, age, presence of a mate, and number of fledglings observed. Avian locations were later recorded in an ArcView (Esri, Inc., Redlands, California) database using the Texas State Plane Coordinate System. Spatial and demographic data were entered into the database via an ArcView script (Horne 2000).

Territory mapping methods generally followed IBCC guidelines (1970). Improvements in this method suggested by Verner (1985) and Bibbey (1992) were incorporated to increase accuracy in assigning observations to specific territories (clusters). Bibbey's consecutive flush was modified to be less intrusive with no more than five sequential movements attempted at one time to minimize influencing bird behavior. Field observations (e.g., bird behavior, phenology) and general knowledge of the species (e.g., territory size, habitat requirements) were also relied upon to help differentiate individual males and delineate their territories. Any male that could be differentiated from surrounding males was given a unique number for further tracking. Females or fledglings associating with a unique male were given the same unique number.

Observations of warblers that could not be differentiated from surrounding individuals with any confidence were designated as "unknown." Playback tapes of warbler vocalizations were not used to elicit warbler responses. Systematic nest searching was not conducted during this field season. However, incidental observations of any warbler nests were noted and mapped. All observations of brown-headed cowbirds (*Molothrus ater*) and any signs of nest parasitism were noted. Brown-headed cowbird fledglings seen being tended by a warbler were dispatched as soon as possible.

All potential warbler habitat at each site was surveyed repeatedly throughout the breeding season. Total survey hours varied according to tract size and terrain. Total survey hours spent at each tract were as follows: Vista Point: 182; Bunten: 65; north Grandview Hills: 73; and Steiner Ranch Vireo Management Area: 22. Due to limitations inherent in territory mapping methods, including but not limited to differences in observer ability and the stability of exclusive territories of the target species, results of all surveys should be interpreted as indices, rather than complete counts (Verner 1985).

*Data analysis.* Abundance is the sum of all individual male warblers detected at a given study site (regardless of territory status). Individual males using areas outside of tract boundaries were also included in the abundance index. Species distribution comprises all locations where warblers were observed. This includes males, females, and fledglings and may include multiple sightings of the same individual.

An individual male was considered to have established a breeding territory if one or more of the following conditions was observed: 1) a male was observed with a female; 2) a nest was located for an individual male; 3) a male was observed with fledglings; and/or 4) a male was

observed at least three times (on different days with at least one week between observations) using the same general location. Males that only used areas outside of tract boundaries were not included in the territory analysis.

In calculating territory number, territories that fell entirely within the tract boundaries were considered "full" territories. Territories that fell at least partially outside the tract were considered "edge" territories. In order to avoid an upward bias in calculating territory number, Verner (1985) has suggested counting each edge territory as half (0.5) of a territory. In the results section, both a high estimate of territory number (all territories are weighted the same, i.e., 1.00) and an estimate based on Verner's (1985) method are given.

Territory density is calculated as the number of territories (based on Verner's (1985) method) divided by the number of acres for that tract. A conversion to hectares is also given.

### 100-ACRE PLOTS

*Data collection.* Territory mapping was conducted on 100-acre plots following the same procedure as outlined above with some exceptions. Territory mapping was conducted only between 25 March and 25 May 2002, with 2- 3 survey days after this date to gather productivity data. Surveys started one half hour after sunrise on days when the temperature was > 55° F, wind was < 15 mph, and precipitation was light to none. Plots were visited a total of ten times distributed evenly throughout the season, with each survey totaling six hours. No playback tapes were used to elicit responses. Systematic nest searching was not undertaken. A plot was surveyed by no more than two different observers for the entire season. A general study protocol for 100-acre plots is outlined in the BCP Land Management Plan (Balcones Canyonlands Preserve 1999).

All territories, including edge territories, were monitored repeatedly to collect pairing, breeding, and productivity data. Pairing status of male warblers was determined by observing one or more of the following conditions: a territorial male associating with a female; the nest of a territorial male; and/or a male tending at least one fledgling. Observations of fledglings tended by a parent and the total number of fledglings observed at any one time provided data on breeding success and productivity.

*Data analysis.* An individual male was considered to have established a breeding territory if one or more of the following conditions was observed: 1) a male was observed with a female; 2) a nest was located for an individual male; 3) a male was observed with fledglings; and/or 4) a male was observed at least three times (on different days with at least one week between

observations) using the same general location. Males that only used areas outside of tract boundaries were not included in the territory analysis.

In calculating territory number, territories that fell entirely within the 100-acre plot boundary were considered "full" territories. Territories that fell at least partially outside the plot were considered "edge" territories. In order to avoid an upward bias in calculating territory number, Verner (1985) has suggested counting each edge territory as half (0.5) of a territory. In the results section, a high estimate of territory number (all territories are weighted the same, i.e., 1.00) and a low estimate (only full territories are counted) are given along with an estimate based on Verner's (1985) method. Territory density is calculated as the number of territories (based on Verner, 1985) per 100 acres and converted to territories per 100 hectares.

Pairing success rate was calculated as the number of territorial males determined to have paired with a female divided by the total number of territories (Anders 2000). Breeding success rate was determined as follows. A territory was considered to have breeding success if at least one fledgling was observed with either the male or female parent. Thus, the breeding success rate was calculated as the number of territories that successfully bred divided by the total number of territories. (Becker and Koloszar 2000).

Productivity was measured in two ways. The first parameter ("productivity") is based on the number of territories that successfully bred (see above). Thus, productivity is calculated by summing the highest number of fledglings recorded at any one time for each territory and dividing by the number of territories that successfully bred. The second figure ("total productivity") was calculated by summing the highest number of fledglings recorded at any one time for each territory and dividing by the total number of all territories.

### PRESENCE/ABSENCE SURVEYS

Three tracts at Steiner Ranch were considered for presence/absence surveys for breeding season 2002 (Tracts 2, 3, and 5; see **figure 2**). Several visits to these tracts in both 2001 and 2002 confirmed that Tract 2 and 5 contained limited warbler habitat. Surveys followed U.S. Fish and Wildlife Service minimum procedures for golden-cheeked warbler and black-capped vireo presence/absence surveys (USFWS 1994).

## RESULTS

### TRACT TERRITORY MAPPING

In field season 2002, 1,555 observations of warblers were recorded at Vista Point, Bunten, north Grandview Hills, and the Vireo Management Area of Steiner Ranch. This total comprises observations of 1,497 males, 48 females, and 10 warblers for which sex was not determined. Distribution of golden-cheeked warblers on the Jollyville Unit (Vista Point, Bunten, and north Grandview Hills) and Steiner Ranch VMA are shown in **Figures 3** and **4**.

Abundance of male warblers at Vista Point was 64 (**Table 2**). Fifty of these males established breeding territories within the tract or along its boundary. Male abundance at Bunten equaled 22 and at Grandview Hills 31 (**Table 2**). Twenty males at Bunten established territories, while 22 males established territories at Grandview Hills north. Four individual males were recorded for Steiner Ranch (one male inferred from a group of three fledglings, see **table 2**). A total of three males established territories on the tract.

**Table 2.** Results of golden-cheeked warbler territory mapping on selected BCP tracts. Golden-cheeked warbler male abundance, territory number, and territory density* are summarized for breeding season 2002.

| Preserve tract | Abundance | No. of Territories | No. full Territories + (0.5 x no. edge Territories) | Territory Density / ac | Territory Density / ha |
|---|---|---|---|---|---|
| Bunten | 22 | 20 | 15.0 | 0.11 | 0.26 |
| Grandview Hills (north) | 31 | 22 | 14.5 | 0.09 | 0.22 |
| Steiner Ranch VMA Tract 2 | 4 | 3 | 3.0 | 0.02 | 0.05 |
| Vista Point | 64 | 50 | 44.5 | 0.09 | 0.22 |

*See methods section for explanation of calculations.

Using Verner's (1985) method of summing territories, Grandview Hills north had 14.5 territories, Bunten 15.0 territories, Steiner Ranch 3.0 territories, and Vista Point 44.5 territories (**Table 2**). Territory density was highest at Bunten with 0.11 territories per acre and lowest at Steiner Ranch with 0.02 territories per acre. Both Vista Point and Grandview Hills north had a density of 0.09 territories per acre. Mean territory density for all tracts surveyed was 0.08 territories per acre or 12.5 acres per male. Territory locations are shown in **Figures 5** through **8**. Territory locations are not meant to represent actual territorial boundaries.

On the Bunten tract, eleven males were observed paired with females, and nine territories were observed to have successfully fledged young. One active nest was located on 6 May 2002 with parents tending at least two nestlings that were later confirmed to have successfully fledged. At Steiner Ranch, females were sighted only twice and these may have been the same individual both times. Only one fledgling group was observed. No signs of brown-headed cowbird parasitism were observed at Steiner Ranch or Bunten.

At Grandview Hills, 13 males were observed paired with females, and at least seven territories produced young. Twenty-five males were observed associating with females at Vista Point and 14 fledgling groups were detected. On 4 June 2002, of a female warbler was seen feeding a fledged brown-headed cowbird at Vista Point. The female was also feeding at least one warbler fledgling. No other signs of parasitism of warblers were detected at these tracts.

### 100-ACRE PLOTS

In 2002, eight male warblers established territories on the Hamilton Pool study plot (**Table 3**). Five of these territories were entirely within plot boundaries. Fifteen warblers established territories on the Lake Perspectives study plot, of which eight fell entirely within plot boundaries (**Table 3**). Territory locations are shown in **Figures 9** and **10**. Locations are not meant to represent actual territorial boundaries.

**Table 3.** Results of golden-cheeked warbler territory mapping on 100-acre study plots. Territory number and density are summarized for breeding season 2002.*

| Study Plot | No. of full territories | No. of full and edge territories | No. of full territories plus edge territories @ 0.5[a] | Territory density per 100HA[b] |
|---|---|---|---|---|
| Hamilton Pool | 5 | 8 | 6.5 | 16.1 |
| Lake Perspectives | 8 | 15 | 11.5 | 28.4 |

*See methods section for explanation of calculations.

[a] Based on Verner (1985), see methods section for explanation.
[b] Based on calculation of territory number given in column 3.

Based on Verner's (1985) method for calculating territory number, territory density at Lake Perspectives was 11.5 territories per 100 acres (28.4 territories/100HA). Territory density at Hamilton Pool was 6.5 territories per 100 acres (16.1 territories/100HA). Mean density of both plots was 9.0 territories per 100 acres, or 22 males per 100 hectares.

Pairing success was high at both study plots. At Hamilton Pool, 86% of all males were determined to have paired with females, while at Lake Perspective, 80% of all males paired with females (**Table 4**). At Lake Perspectives, ten out of 15 territorial males were seen tending at least one fledgling yielding a breeding success rate of 0.66. On the other hand, breeding success was very low at Hamilton Pool with only 25% of all territories observed to have fledged any young.

**Table 4.** Results of golden-cheeked warbler surveys on 100-acre study plots. Pairing success, breeding success, and productivity data* are summarized for breeding season 2002.

| Study Plot | Pairing success | Breeding success | Productivity (Average no. of fledglings per successful pair) | Total productivity (Average no. of fledglings per all territories) |
|---|---|---|---|---|
| Hamilton Pool | 0.86 | 0.25 | 1.50 | 0.38 |
| Lake Perspectives | 0.80 | 0.66 | 1.90 | 1.27 |

*See methods section for explanation of calculations.

The average number of fledglings raised per successful pair at Hamilton Pool and at Lake Perspectives was 1.50 and 1.90, respectively (**Table 4**). At Lake Perspectives, the average number of fledglings for all territories was 1.27. The average number of fledglings for all territories at Hamilton Pool was 0.38.

Two nests were located at Lake Perspectives. On 26 April 2002, one active nest was located in a live oak (*Quercus fusiformis*) in an open savannah area. The parents appeared to be tending a brown-headed cowbird in the nest, although this could not be confirmed. No warbler fledglings for this territory were ever detected. Another nest was located on 7 June 2002. The female was feeding at least 2 warbler nestlings almost ready to fledge. One young fledgling tended by a parent was seen on a return trip three days later. No confirmed incidents of parasitism at Lake Perspectives were recorded, however cowbirds were noted on all visits, both male and female, especially along two powerline corridors.

No nests were located at Hamilton Pool Preserve. One incident of parasitism of golden-cheeked warblers was recorded on 13 June 2002. A female was seen feeding a recently fledged brown-headed cowbird. No other fledglings for this territory were subsequently detected.

### PRESENCE/ABSENCE SURVEYS

Tract 5 of Steiner Ranch Preserve was surveyed on 26 March 2002 for a total of 3.5 hours with two observers. During this survey, at least two male warblers were detected. One male was observed using a steep draw on the western side of the tract. The second warbler was detected in a smaller draw in the northeast corner of the tract along the border with the Cortaŋa tract. No females or fledglings were observed (see **figure 4**).

Tract 2 was surveyed on 10 April 2002. Total survey time was 2.5 hours with two observers. During this survey two males were detected countersinging on either side of a small wooded draw. The male to the south of the draw was observed associating with a female. No fledglings were observed (see **figure 4**).

## DISCUSSION

### TRACT TERRITORY MAPPING

Territory densities on north Grandview Hills, Bunten, and Vista Point are relatively high and comparable to a territory density of 0.24 territories per hectare reported for golden-cheeked warblers at Ft. Hood in 2001 (the last year for which data was available). This is not surprising as both Bunten and Vista Point comprise unfragmented blocks of excellent warbler habitat surrounded almost entirely by preserve or undeveloped land with similar habitat. North Grandview Hills contains excellent warbler habitat as well. However, north Grandview Hills has a very high edge to area ratio. Fifteen of the 22 territories detected were located along the tract boundary with at least some portion of each territory outside of it. Approximately 77% of north Grandview Hills' perimeter abuts development land. As development proceeds, many of these edge territories may be lost (see Friesen et al 1995). As expected, the Steiner Ranch Vireo Management Area had a low density of territories due to its limited potential habitat, which is found in only a few draws separated from each other by unsuitable habitat.

### 100-ACRE PLOTS

Territory density increased at Lake Perspectives over previous years to 11.5 territories per 100 acres in 2002 from 8.0 territories in 2001 and 6.0 territories in 2000 (Travis County Natural Resources 2000; 2001). This difference may reflect increases in observer ability and a more systematic surveying method, rather than an actual increase in the local population.

Trend data for Hamilton Pool Preserve indicate that territory numbers have remained relatively stable over the past five years (Travis County Natural Resources 1998; 1999; 2000; 2001). Nine territories were recorded within preserve boundaries in 2000, 2001, and 2002, and eleven territories were recorded in both 1998 and 1999. One male (banded with a silver USFWS leg band in 1997 as a SY male) had been observed in the same location every year from 1997 through 2001, but was not observed this year.

More importantly, there has been a marked decrease in productivity reported for Hamilton Pool. This year 0.38 fledglings per territory were reported, down from 1.00 in 2001 and 3.30 in 2000. It is likely that nest parasitism by cowbirds has a played role, though to what extent remains unclear.

Anecdotal information from field staff indicated an increase in cowbird activity on most properties in comparison with surveys conducted in 2001 in the same areas. An increase in cowbird numbers was noted at Lake Perspectives, Hamilton Pool Preserve, and at Vireo Ridge, which is adjacent to Vista Point and Grandview Hills. Detections of cowbird parasitism in 2002 also increased from 2001. In addition to confirmed parasitism of warbler nests at Vista Point and Hamilton Pool Preserve, a white-eyed vireo was observed tending a cowbird fledgling at Vireo Ridge in an area adjacent to several black-capped vireo territories. At Hamilton Pool Preserve, parasitism of northern cardinals (*Cardinalis cardinalis*), painted buntings (*Passerina ciris*), and white-eyed vireos (*Vireo griseus*) was also recorded. A painted bunting male was seen feeding a cowbird fledgling and two painted bunting fledglings. Two white-eyed vireo nests were found depredated.

Cowbirds were more abundant at Hamilton Pool Preserve than at any other property surveyed this year. In response to high numbers in 2001, a mega-trap was opened at the beginning of breeding season. However, even with this trap open, cowbird numbers remained very high (see TNR 2002). Low productivity at Hamilton Pool is almost certainly related to cowbird abundance. Most males paired with females, but fledgling groups could not be located. Hamilton Pool is, in effect, an island with good, but limited, warbler habitat surrounded on all sides by privately owned rangeland.

## RECOMMENDATIONS

- Efforts to encourage private ranchers to conduct cowbird trapping on lands neighboring Hamilton Pool Preserve should be a top priority for field season 2003. In addition, more effort should be given to locating nests and fledglings in order to assess the extent of cowbird parasitism. Observers should be well-trained in locating warbler and cowbird fledglings, nest searching, and recognizing warbler and cowbird fledgling vocalizations. They should also be familiar with feeding and nest-building behavior of warbler parents.

- A third 100-acre plot should be established in time for breeding season 2003. Suggested locations include Bunten and Vista Point.

- Grandview Hills should be surveyed again in the 2004 season (rather than 2005) to assess the health of the warbler population, since this tract is adjacent to developed areas.

- Steiner Ranch's J-Canyon should be surveyed in the 2004 season (rather than 2005) to assess the health of the warbler population, since this tract is adjacent to developed areas.

- The golden-cheeked warbler population on Vireo Ridge should be surveyed again in breeding season 2003 in order to monitor impacts on warblers of habitat restoration, which is planned for winter 2002-2003.

- The mega-trap at Hamilton Pool Preserve should be opened as early as possible in spring 2003 (no later than 1 March) in order to increase the female cowbird capture rate.

- Additional traps should be opened at Lake Perspectives and at Grandview Hills (near the lift station) based on increased cowbird activity recorded at these locations in 2002.

## DATA MANAGEMENT

Information regarding the disposition of data sets collected during the 2002 field season is provided below. Data will be archived to facilitate retrieval for further analysis. All data sets are currently stored in the Travis County Natural Resources office, 1010 Lavaca Street, Austin, Texas.

Data File Name: hpdata.xls
Description: Hamilton Pool avian location data 2002 field season
Software: Microsoft Windows NT, Excel 1997
Data File Archive Location:
Main Copy: E:\GCWA_02\Hamilton Pool
Storage Location: Computer #90176

Data File Name: LP02.xls
Description: Lake Perspectives avian location data 2002 field season
Software: Microsoft Windows NT, Excel 1997
Data File Archive Location:
Main Copy: E:\GCWA_02\Lake Perspectives
Storage Location: Computer #90176

Data File Name: vpdata.xls
Description: Vista Point avian location data 2002 field season
Software: Microsoft Windows NT, Excel 1997
Data File Archive Location:
Main Copy: E:\GCWA_02\Vista Point
Storage Location: Computer #90176

Data File Name: SRVMA.xls
Description: Steiner Ranch VMA avian location data 2002 field season
Software: Microsoft Windows NT, Excel 1997
Data File Archive Location:
Main Copy: E:\GCWA_02\Steiner Ranch
Storage Location: Computer #90176

Data File Name: buntendata.xls
Description: Bunten avian location data 2002 field season
Software: Microsoft Windows NT, Excel 1997
Data File Archive Location:
Main Copy: E:\GCWA_02\Bunten
Storage Location: Computer #90176

Data File Name: gvhdata.xls
Description: Grandview Hills (north) avian location data 2002 field season
Software: Microsoft Windows NT, Excel 1997
Data File Archive Location:
Main Copy: E:\GCWA_02\Grandview Hills
Storage Location: Computer #90176

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## FIGURES

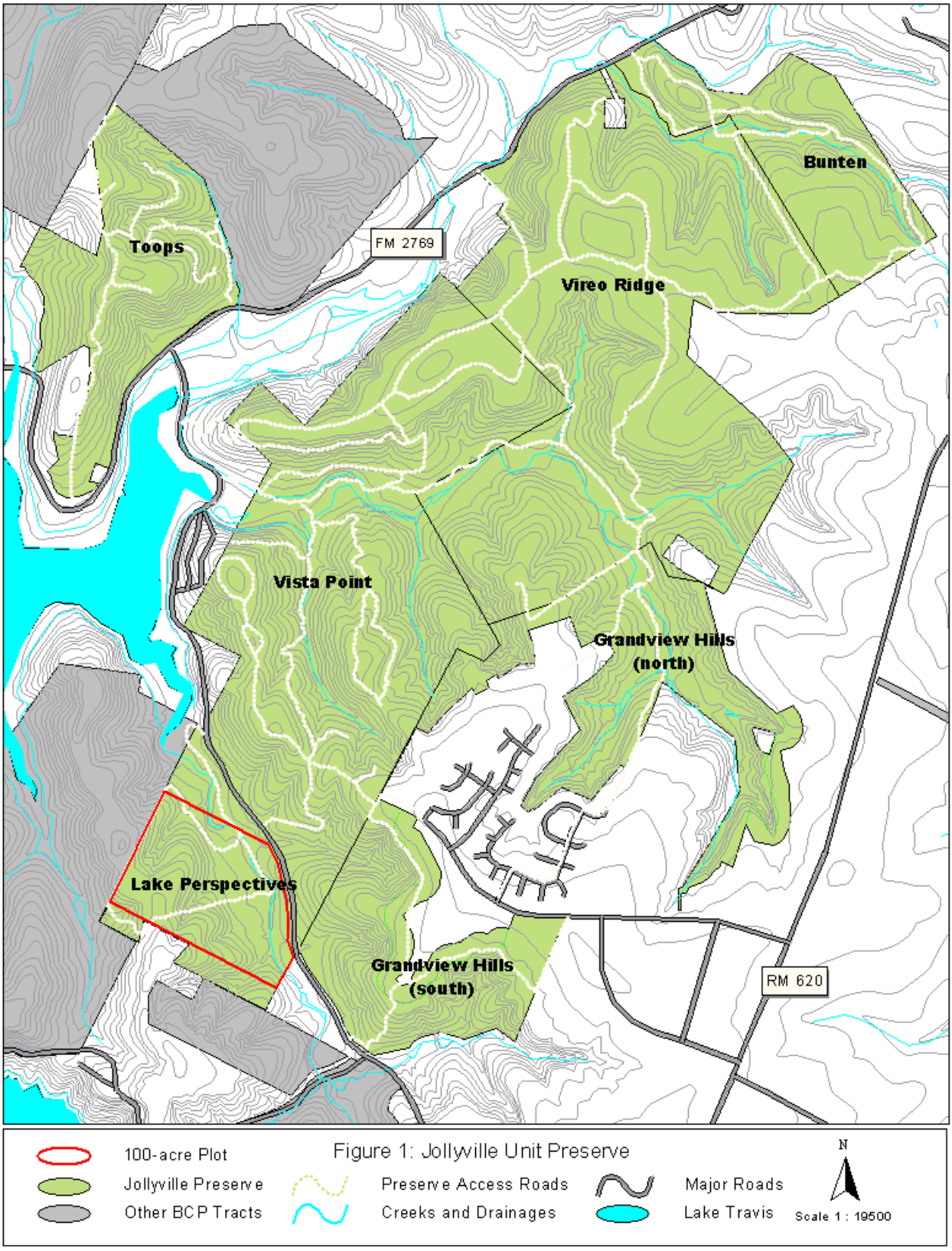
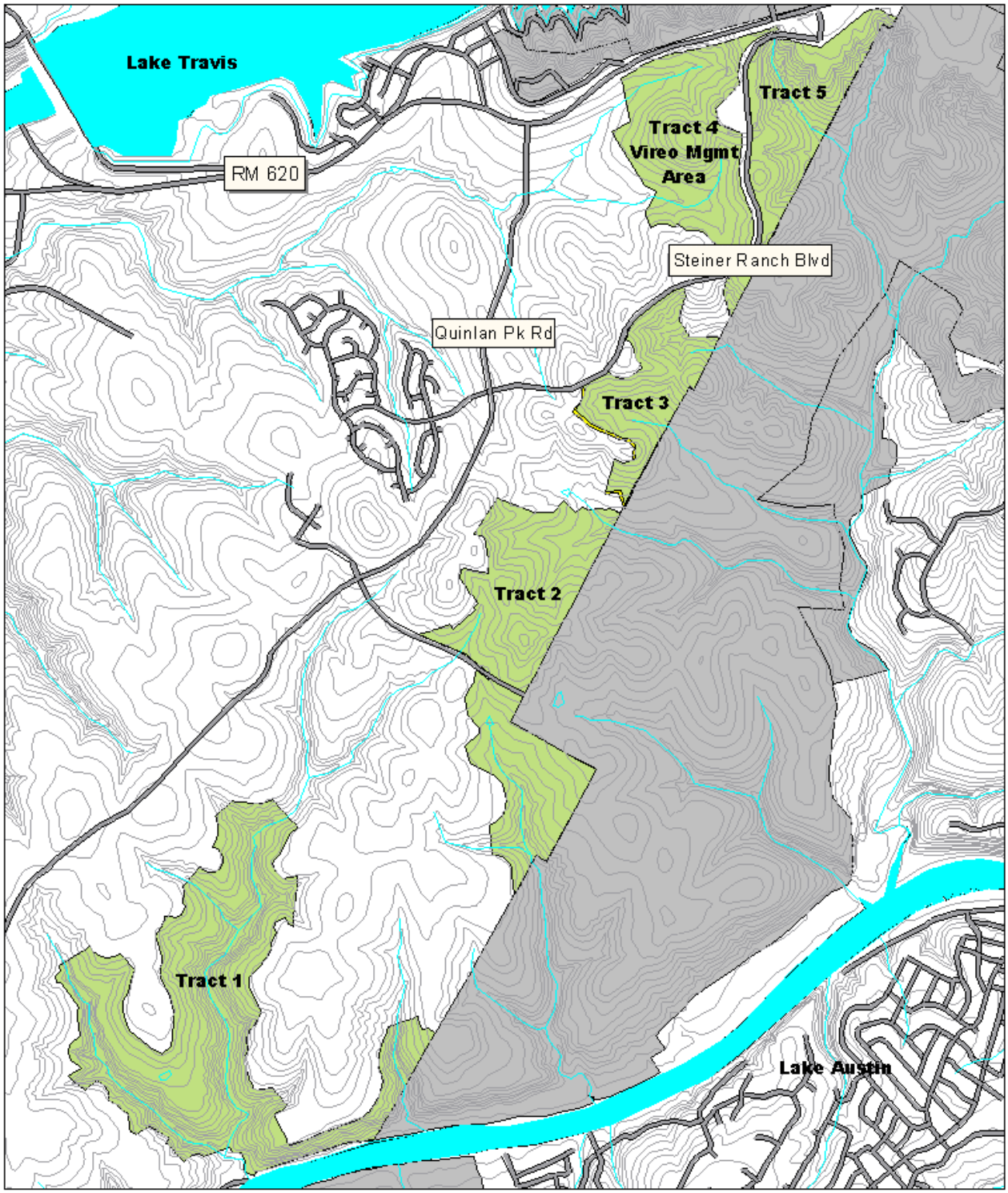



Figure 1: Jollyville Unit Preserve


Lake Travis
RM 620
Tract 5
Tract 4
Vireo Mgmt
Area
Steiner Ranch Blvd
Quinlan Pk Rd
Tract 3
Tract 2
Tract 1
Lake Austin
Figure 2: Steiner Ranch Preserve
Steiner Ranch Preserve
Other BCP Tracts
Rivers and Lakes
Creeks and Drainages
Major Roads
N
Scale 1 : 25000

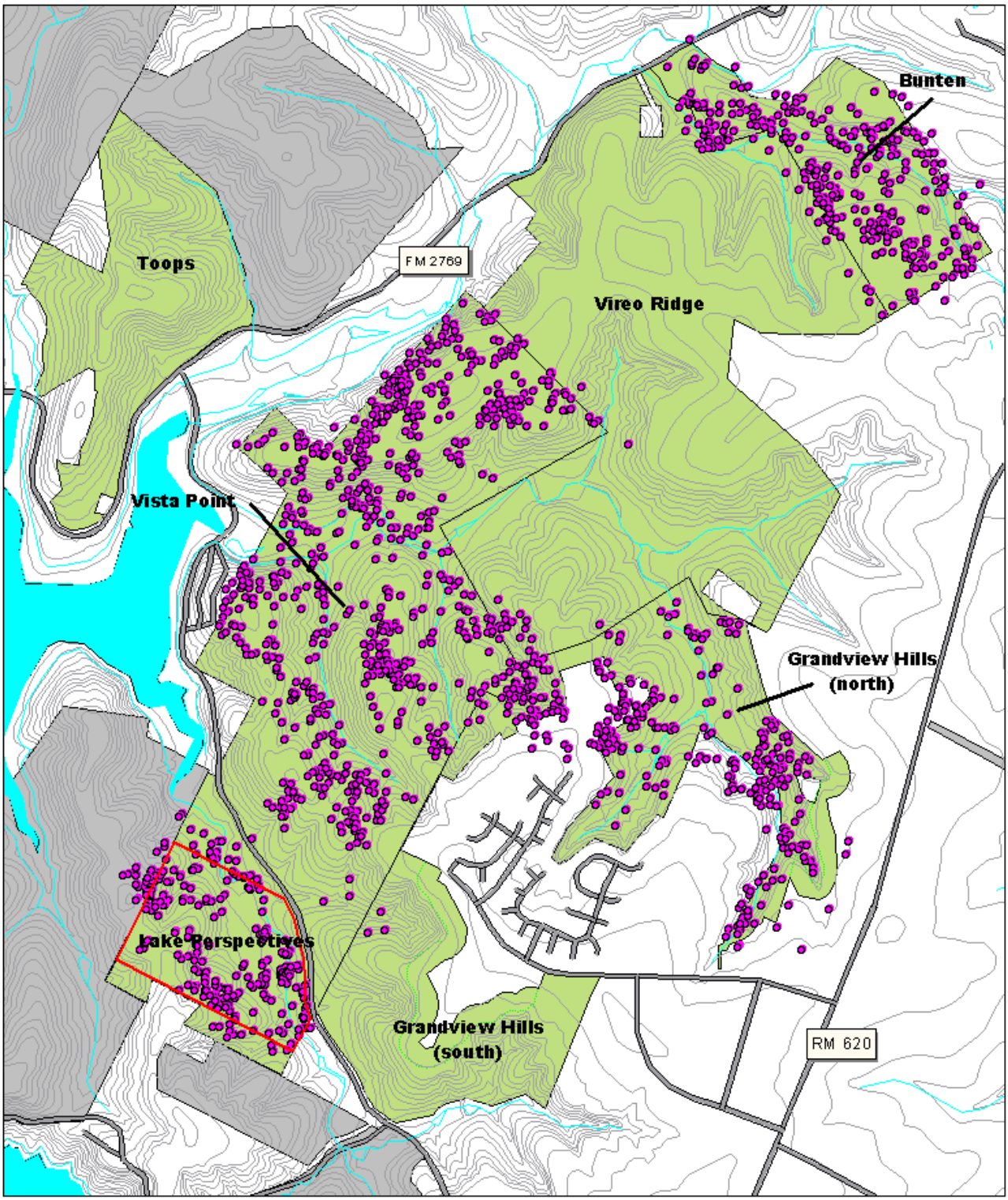



Figure 3: 2002 Distribution of GCWA Observations on the Jollyville Unit

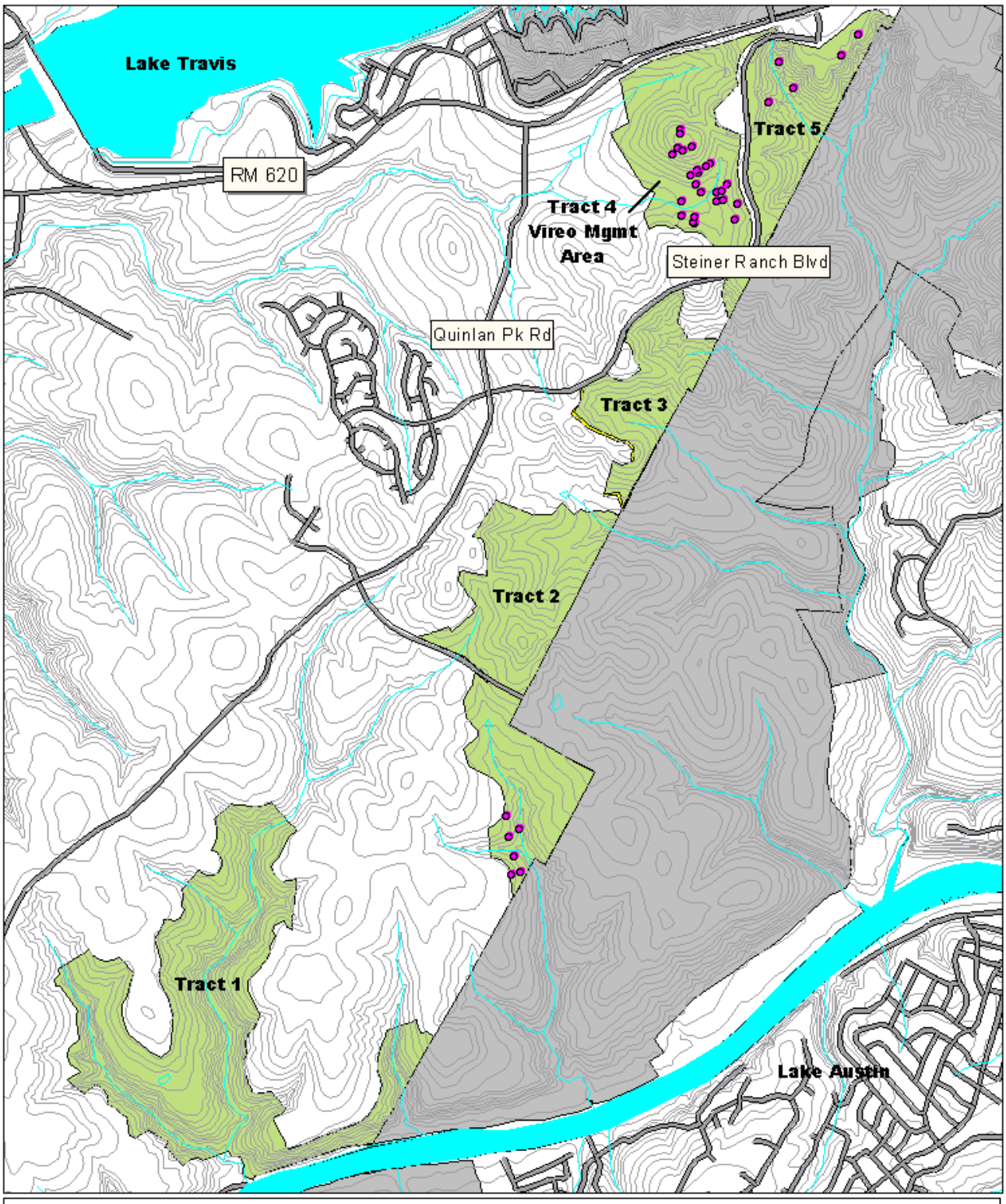



Figure 4: 2002 Distribution of GCWA Observations on Steiner Ranch Preserve

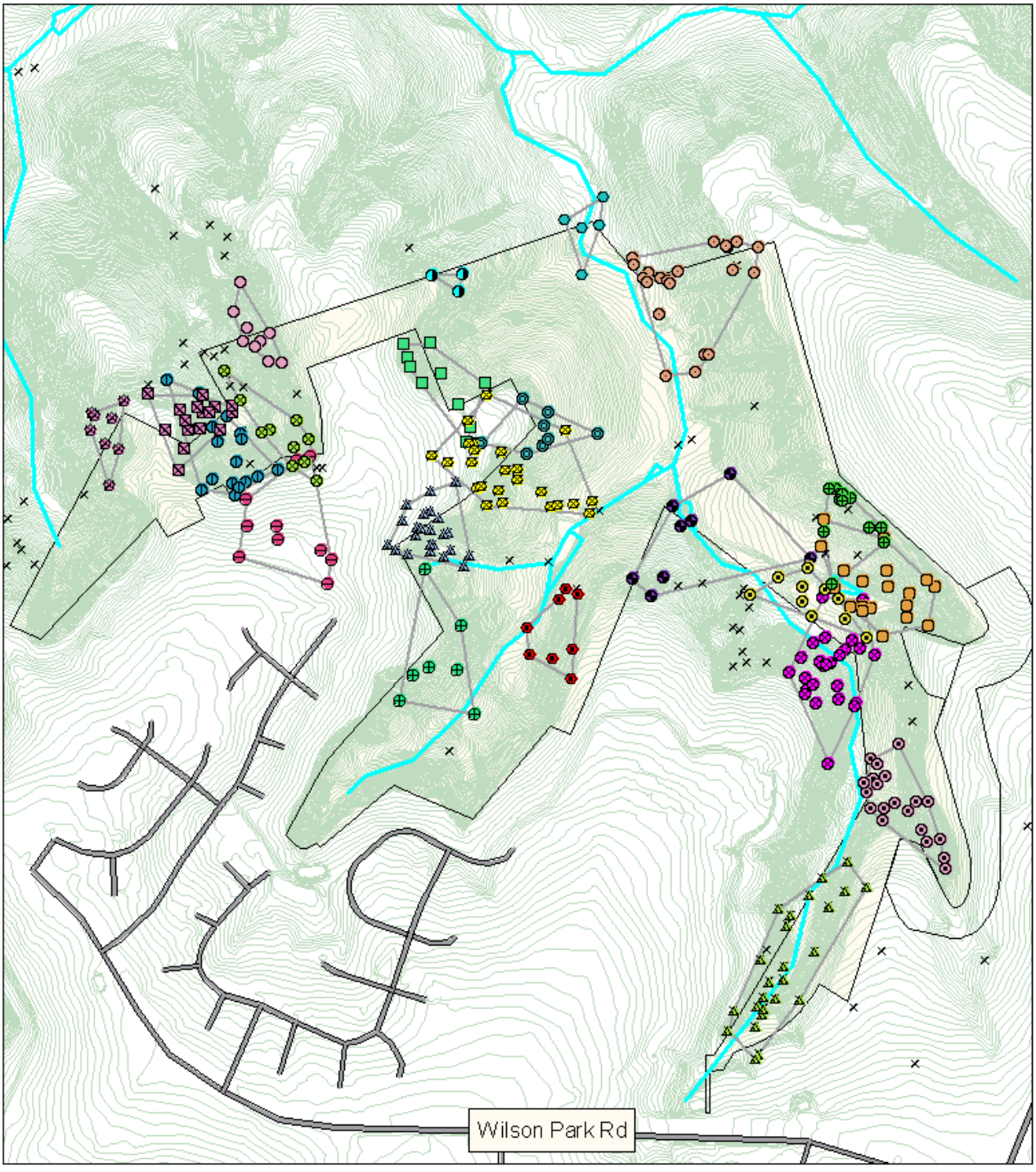
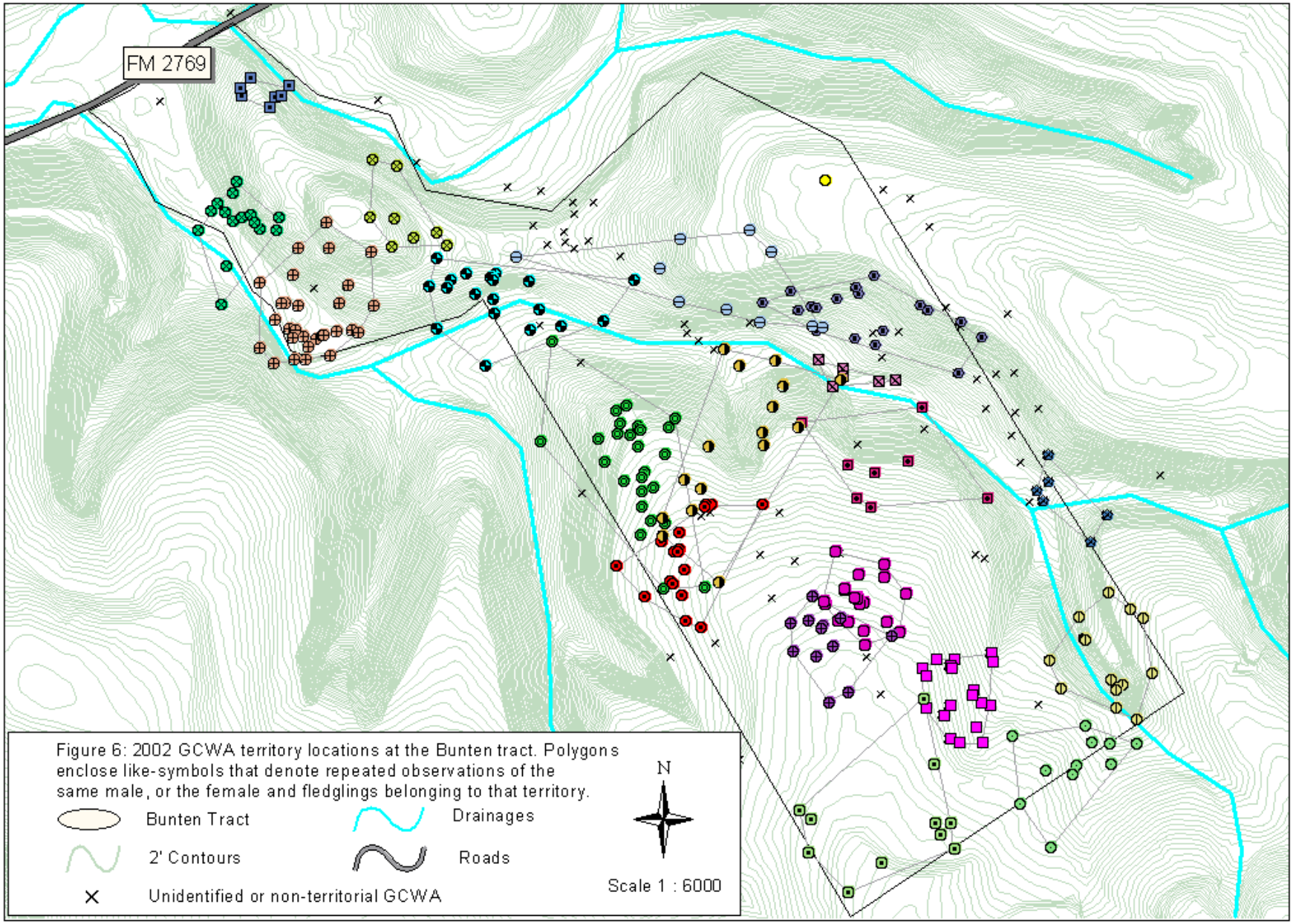
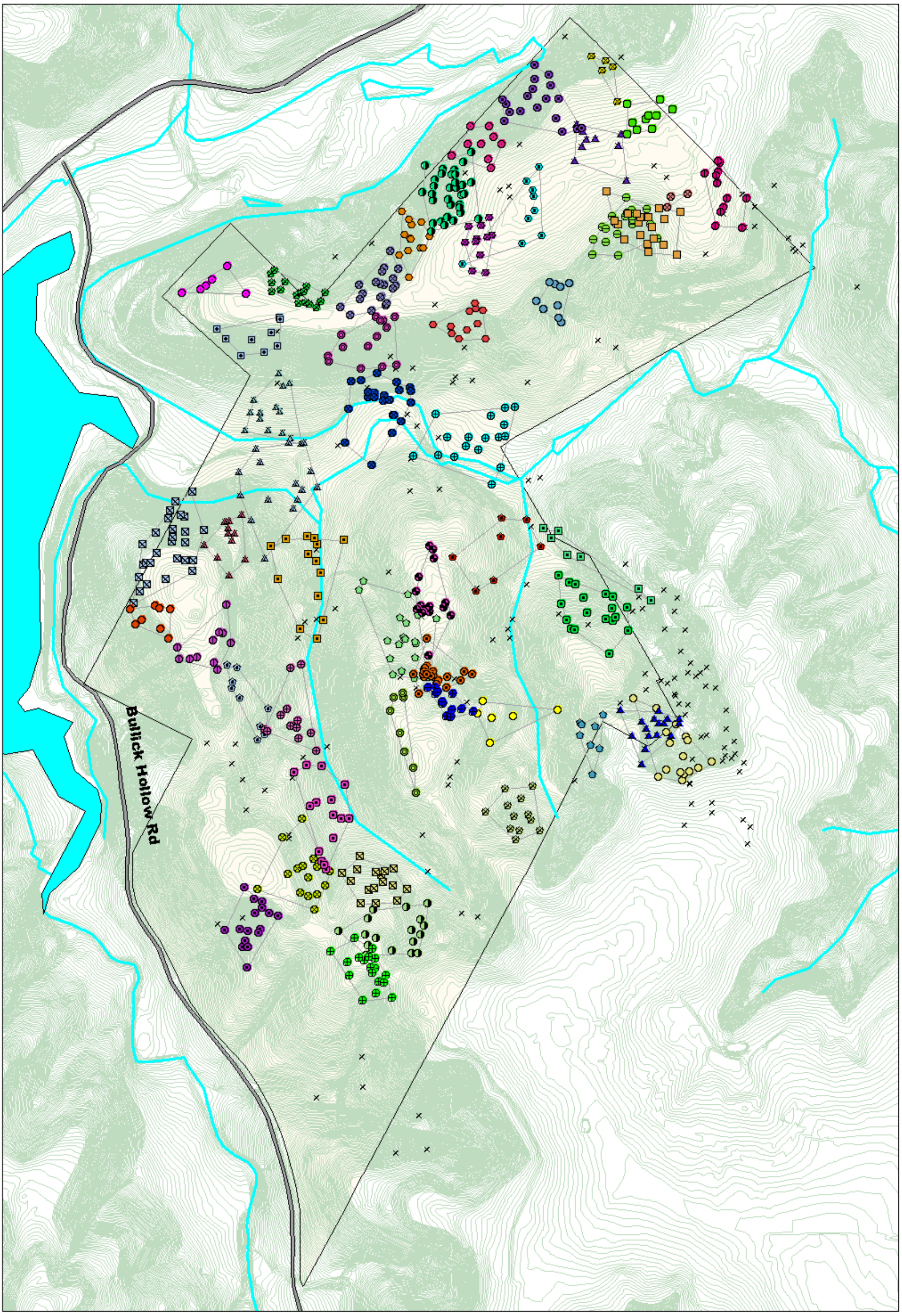



Figure 5: 2002 GCWA territory locations at Grandview Hills (north section only).
Polygons enclose like-symbols that denote repeated observations of the same male, or the female and fledglings belonging to that territory.

Drainages
Roads
2' Contours
North Grandview Hills Tract
Unidentified or non-territorial GCWA
N
Scale 1 : 8000


FM 2769
Figure 6: 2002 GCWA territory locations at the Bunten tract. Polygons enclose like-symbols that denote repeated observations of the same male, or the female and fledglings belonging to that territory.
Bunten Tract
Drainages
2' Contours
Roads
Unidentified or non-territorial GCWA
N
Scale 1 : 6000


Bullick Hollow Rd
Figure 7: 2002 GCWA territory locations at the Vista Point tract. Polygons enclose like-symbols that denote repeated observations of the same male, or the female and fledglings belonging to that territory
Drainages
Roads
Vista Point
2' Contours
Unidentified or non-territorial GCWA
N
Scale 1 : 7500

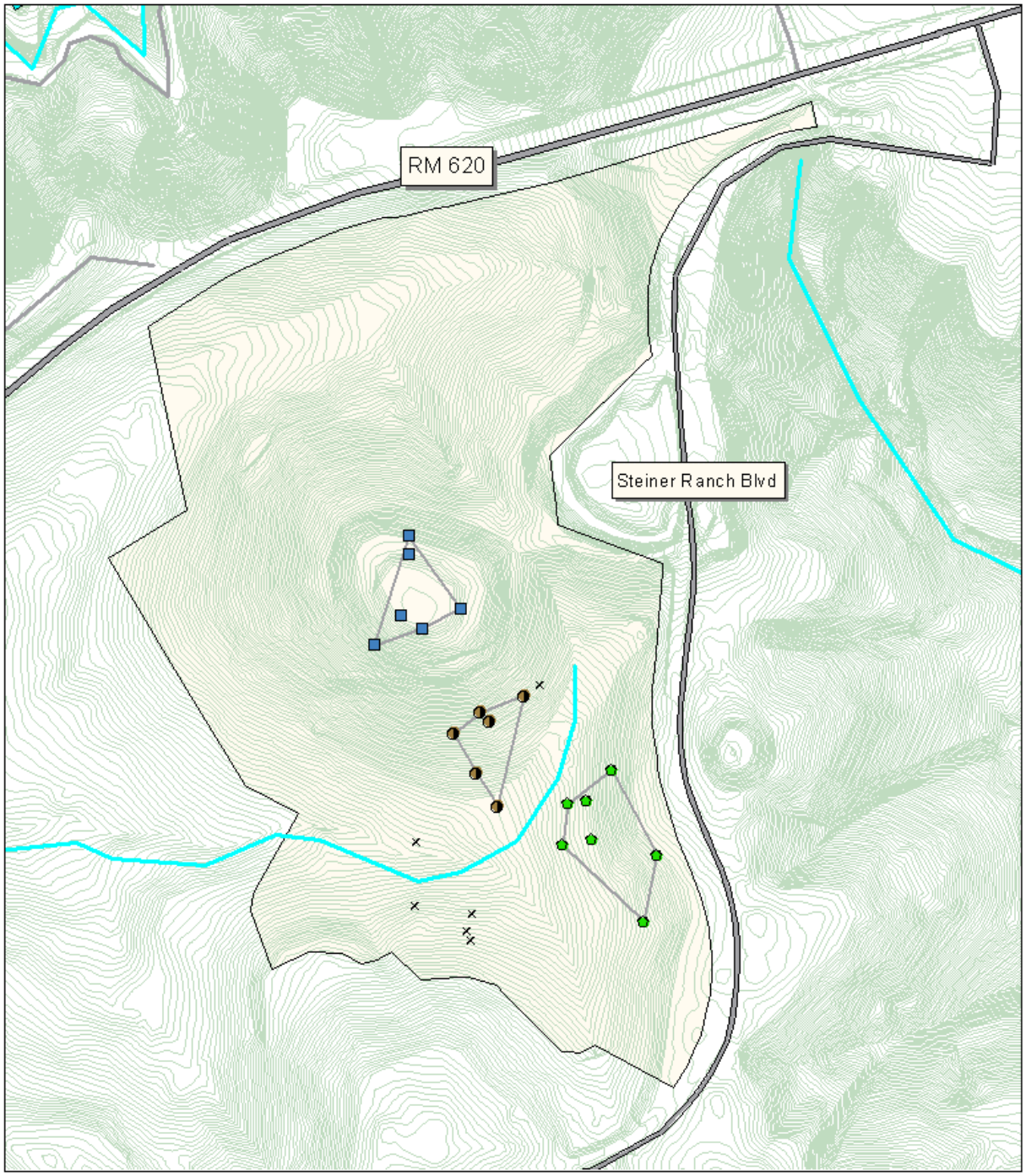



Figure 8: 2002 GCWA territory locations at Steiner Ranch Vireo Management Area. Polygons enclose like-symbols that denote repeated observations of the same male, or the female and fledglings belonging to that territory.

Drainages
Roads
2' Contours
Unidentified and non-territorial GCWA
Vireo Management Area Boundary (Tract 4)
N
Scale 1 : 6000

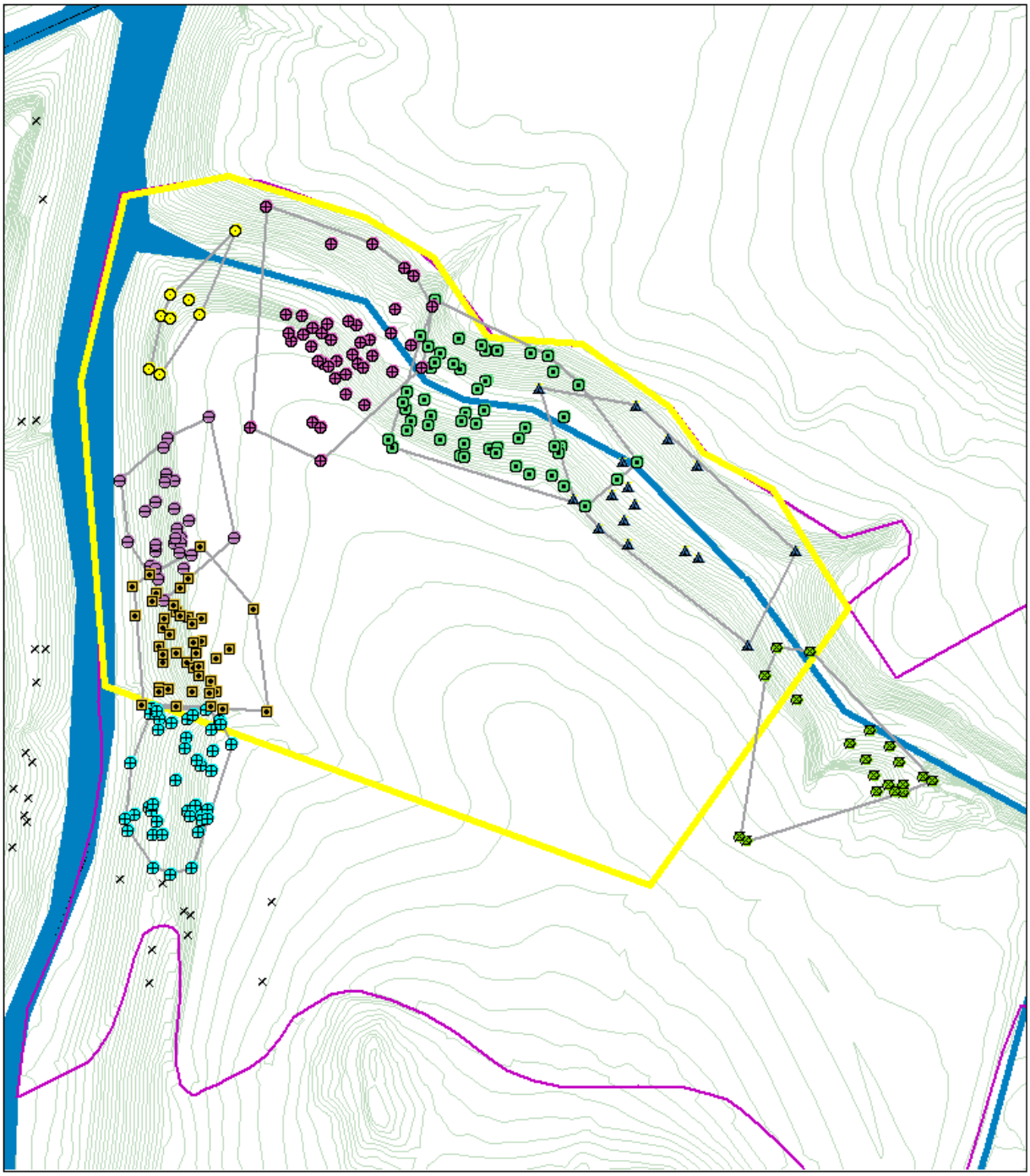


Figure 9: 2002 GCWA territory locations at Hamilton Pool 100-acre plot. Polygons enclose like-symbols that denote repeated observations of the same male, or the female and fledglings belonging to that territory.
Hamilton Creek
Pedernales River
100-acre Plot Boundary
2' Contours
Unidentified GCWA
Preserve Boundary
N
Scale 1 : 5500

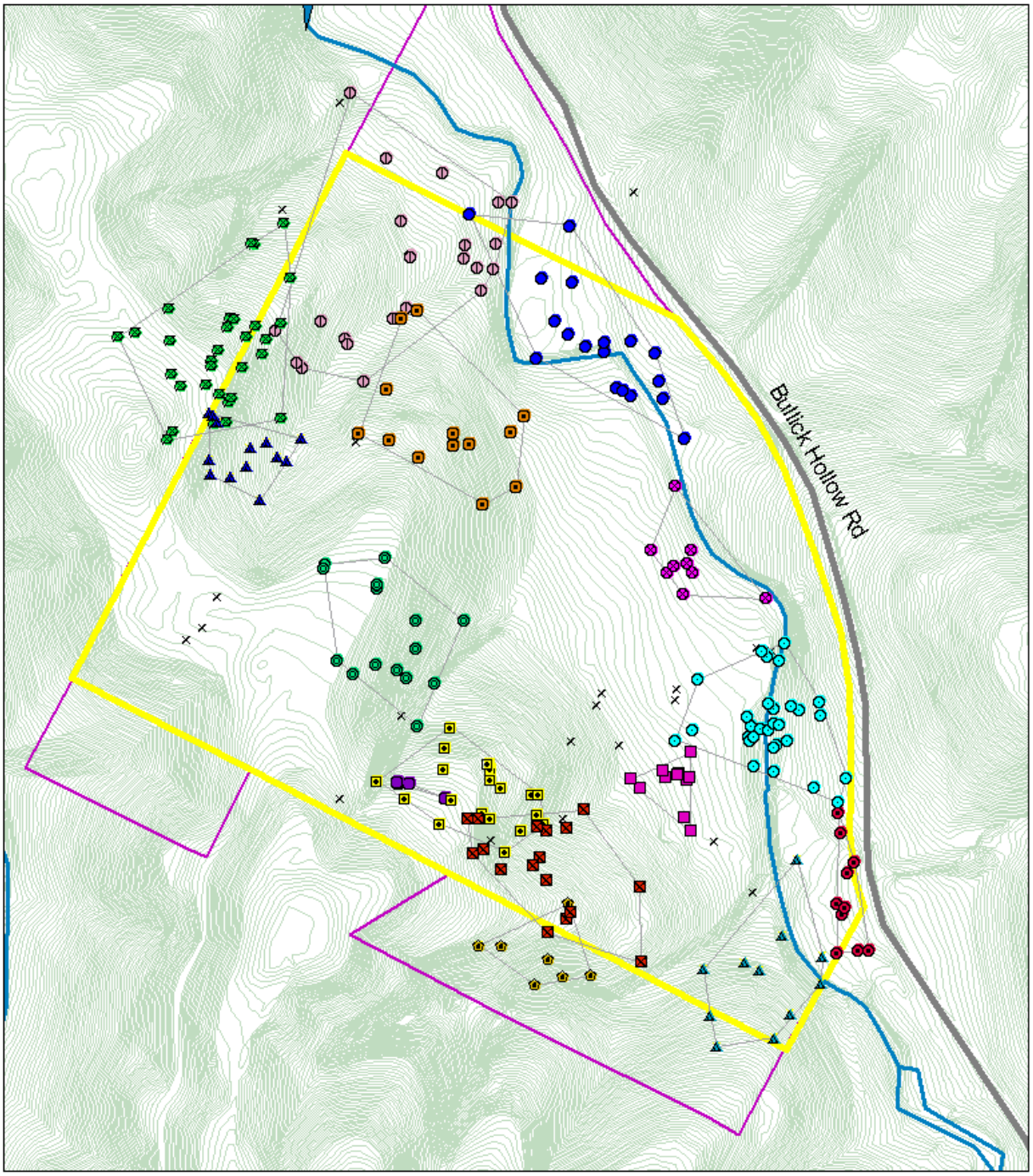



Figure 10: 2002 GCWA territory locations at Lake Perspectives 100-acre plot. Polygons enclose like-symbols that denote repeated observations of the same male, or the female and fledglings belonging to that territory.

## APPENDIX

| Park/Preserve/Tract | Surveyors | Year | Territorial Males | Notes/ comments |
|---|---|---|---|---|
| Bob Wentz | DLS | 1990 | 0 | + 2 males off property |
| Bob Wentz | DLS | 1991 | 0 | + 7 or 8 males off property |
| Bob Wentz | DLS | 1992 | 0 | + 5 males off property |
| Bob Wentz/Romberg | Travis Co. | 1996 | 0 | |
| Bob Wentz/Romberg | Travis Co. | 1997 | 0 | + 1 male off property |
| Bob Wentz/Romberg | Travis Co. | 1998 | 0 | + 2 males off property |
| Bob Wentz/Romberg | Travis Co. | 1999 | 1? | 1 male crossing fenceline |
| Bob Wentz/Romberg | Travis Co. | 2000 | 0 | 2 males off property |
| Bob Wentz/Romberg | na | 2001 | na | not surveyed |
| Bob Wentz/Romberg | na | 2002 | na | not surveyed |
| | | | | |
| Bunten Tract | Travis Co. | 2001 | present | presence/absence only; males detected off prop. also |
| Bunten Tract | Travis Co. | 2002 | 20 | 2 additional territories unconfirmed |
| | | | | |
| Grandview Hills North | Travis Co. | 2002 | 22 | +9 additional males detected (4 on adj. private property) |
| | | | | |
| Hamilton Pool | Travis Co. | 1990 | 7 or 8 | + 4 males off property |
| Hamilton Pool | Travis Co. | 1991 | 10 | + 3 males off property |
| Hamilton Pool | DLS | 1992 | 10-13 | + 3 males off property |
| Hamilton Pool | DLS | 1993 | 8-9 | + 1 male off property |
| Hamilton Pool | Travis Co. | 1994 | 12 | + 3 males off property |
| Hamilton Pool | Travis Co. | 1995 | 10-12 | |
| Hamilton Pool | Travis Co. | 1996 | 10-12 | + 1 male off property |
| Hamilton Pool | Travis Co. | 1997 | 10-11 | + 1 male off property |
| Hamilton Pool | Travis Co. | 1998 | 11 | + 3-4 males off property; 1 BHCO fledgling |

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| Park/Preserve/Tract | Surveyors | Year | Territorial Males | Notes/ comments |
|---|---|---|---|---|
| Hamilton Pool | Travis Co. | 1999 | 11 | + 3-4 males off property |
| Hamilton Pool | Travis Co. | 2000 | 9 | + 5-7 males off property |
| Hamilton Pool 100 ac plot | Travis Co. | 2001 | 9 | + 5-7 males off property; new 100 acre plot |
| Hamilton Pool 100 ac plot | Travis Co. | 2002 | 8 | 3-4 males off prop.; BHCO fledgling |
| | | | | |
| Hippie Hollow | DLS | 1992 | 0 | some males off property |
| Hippie Hollow | DLS | 1993 | 0 | + 4 males off property |
| Hippie Hollow | DLS | 1995 | 0 | |
| Hippie Hollow | Travis Co. | 1996 | 0 | |
| Hippie Hollow | Travis Co. | 1997 | 0 | + 1 male off property |
| Hippie Hollow | Travis Co. | 1998 | 0 | |
| Hippie Hollow | Travis Co. | 1999 | 0 | 1 male heard on McGregor |
| Hippie Hollow | Travis Co. | 2000 | 0 | 1 male heard on McGregor |
| Hippie Hollow | na | 2001 | na | not surveyed |
| Hippie Hollow | na | 2002 | na | not surveyed |
| | | | | |
| Lake Perspectives | Travis Co. | 1999 | 7 | 1 male heard on McGregor |
| Lake Perspectives | Travis Co. | 2000 | 9 | possible 10th male |
| Lake Perspectives | Travis Co. | 2001 | 12 | other males detected on adjacent prop. |
| Lake Perspectives 100ac plot | Travis Co. | 2002 | 15 | first year as 100 acre plot |
| | | | | |
| McGregor | DLS | 1993 | 2+ | |
| McGregor | Travis Co. | 1997 | 10-11 | |
| McGregor | Travis Co. | 1998 | 8 | |
| McGregor | Travis Co. | 1999 | 1 | male heard during H. Hollow survey |

## APPENDIX

| Park/Preserve/Tract | Surveyors | Year | Territorial Males | Notes/ comments |
|---|---|---|---|---|
| McGregor (NE Ridge) | Travis Co. | 2000 | 12 | 7 males within study area (NE Ridge) |
| McGregor | TC&B | 2001 | na | |
| | | | | |
| Sandy Creek | DLS | 1993 | 2 | |
| Sandy Creek | DLS | 1994 | 0 | + 1 male off property |
| Sandy Creek | DLS | 1995 | 0 | |
| Sandy Creek | Travis Co. | 1996 | 0 | + 3 males off property |
| Sandy Creek | Travis Co. | 1997 | 1 | + 1 male off property |
| Sandy Creek | Travis Co. | 1998 | 0 | + 2 males off property |
| Sandy Creek | na | 1999 | na | not surveyed |
| Sandy Creek | Travis Co. | 2000 | 1 | 1 male & 1 female |
| Sandy Creek | Travis Co. | 2001 | 0 | only 1 site visit made |
| Sandy Creek | na | 2002 | na | not surveyed |
| | | | | |
| Steiner Ranch* | EH&A | 1993 | 19 | |
| Steiner Ranch | SWCA | 1994 | 9 | |
| Steiner Ranch | SWCA | 1995 | 9 | |
| Steiner Ranch | SWCA | 1996 | 15 | |
| Steiner Ranch | SWCA | 1997 | 13 | |
| Steiner Ranch | SWCA | 1998 | 17 | |
| Steiner Ranch | SWCA | 1999 | 12 | |
| Steiner Ranch | na | 2000 | na | not surveyed |
| | | | | |
| Steiner Ranch Tract 1 | Travis Co. | 2001 | 17 | additional 3-4 territories undetermined |
| Steiner Ranch Tract 1 | na | 2002 | na | not surveyed; to be surveyed in 2003 |

## APPENDIX

| Park/Preserve/Tract | Surveyors | Year | Territorial Males | Notes/ comments |
|---|---|---|---|---|
| Steiner Ranch Tract 2 | Travis Co. | 2001 | 0 | presence/absence survey only |
| Steiner Ranch Tract 2 | Travis Co. | 2002 | present (2) | presence/absence survey only; 2 males counter singing |
| Steiner Ranch Tract 3 | Travis Co. | 2001 | na | not surveyed, visited once |
| Steiner Ranch Tract 3 | Travis Co. | 2002 | na | not surveyed, visited once |
| Steiner Ranch Tract 4 | Travis Co. | 2001 | 1 | possible second male de;tected on one visit |
| Steiner Ranch Tract 4 | Travis Co. | 2002 | 3 | an additional territory undetermined |
| Steiner Ranch Tract 5 | Travis Co. | 2001 | present (3) | presence/absence survey only; at least 2 males detected |
| Steiner Ranch Tract 5 | Travis Co. | 2001 | present (2) | presence/absence survey only; at least 3 males detected |
| Toops Tract | Travis Co. | 2002 | present (6) | presence/absence survey only; at least 6 males detected |
| Vireo Ridge Tract | Travis Co. | 2001 | 27 | +9 additional on or adj.; called "Jollyville Preserve" in 2001 |
| Vireo Ridge Tract | na | 2002 | na | to be surveyed in 2003 |
| Vista Point Tract | 2002 | 2002 | 50 | +14 undetermined territories within or adjacent; BHCO fledgling |

* Steiner Ranch territorial male numbers prior to 2000 reflect birds located within the current preserve boundaries.