FY 2021 Report on Monitoring

Golden-cheeked warblers (*Setophaga chrysoparia*) on

Travis County-managed Balcones Canyonlands Preserve Tracts



Male golden-cheeked warbler

Photo: Courtesy of Heather Valley

Travis County

Department of Transportation and Natural Resources

Natural Resources and Environmental Quality Division

October 1, 2020 – September 30, 2021

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Introduction

As specified in the Balcones Canyonlands Conservation Plan (USFWS 1996; hereafter BCCP), the City of Austin and Travis County developed and implemented a Land Management Plan (LMP) to provide guidelines for managing the Balcones Canyonlands Preserve (BCP). The LMP Tier IIA-7 chapter (BCP 2007) describes the current management and monitoring goals for golden-cheeked warbler (*Setophaga chrysoparia*; hereafter GCWA) populations on the BCP. It states, "The GCWA population within the BCP will be monitored through a regional program to determine population size, territory density and trends, distribution, productivity, use of marginal habitat, and to determine the effects of habitat manipulation, urbanization, and recreation..." Guidelines are provided in the LMP for various levels of monitoring including presence/absence, territory mapping, pair detection and productivity.

In fiscal year 2021 (FY21), Travis County Natural Resources staff (Staff) and volunteers conducted various GCWA surveys and monitoring efforts on approximately 1,893 hectares (ha) of Travis County-managed BCP properties (Figure 1; Table 1). This report summarizes the results of the Travis County Natural Resources GCWA monitoring program in FY21.

Table 1. GCWA Survey and Monitoring Effort Summary, FY21, Travis County BCP, Texas.

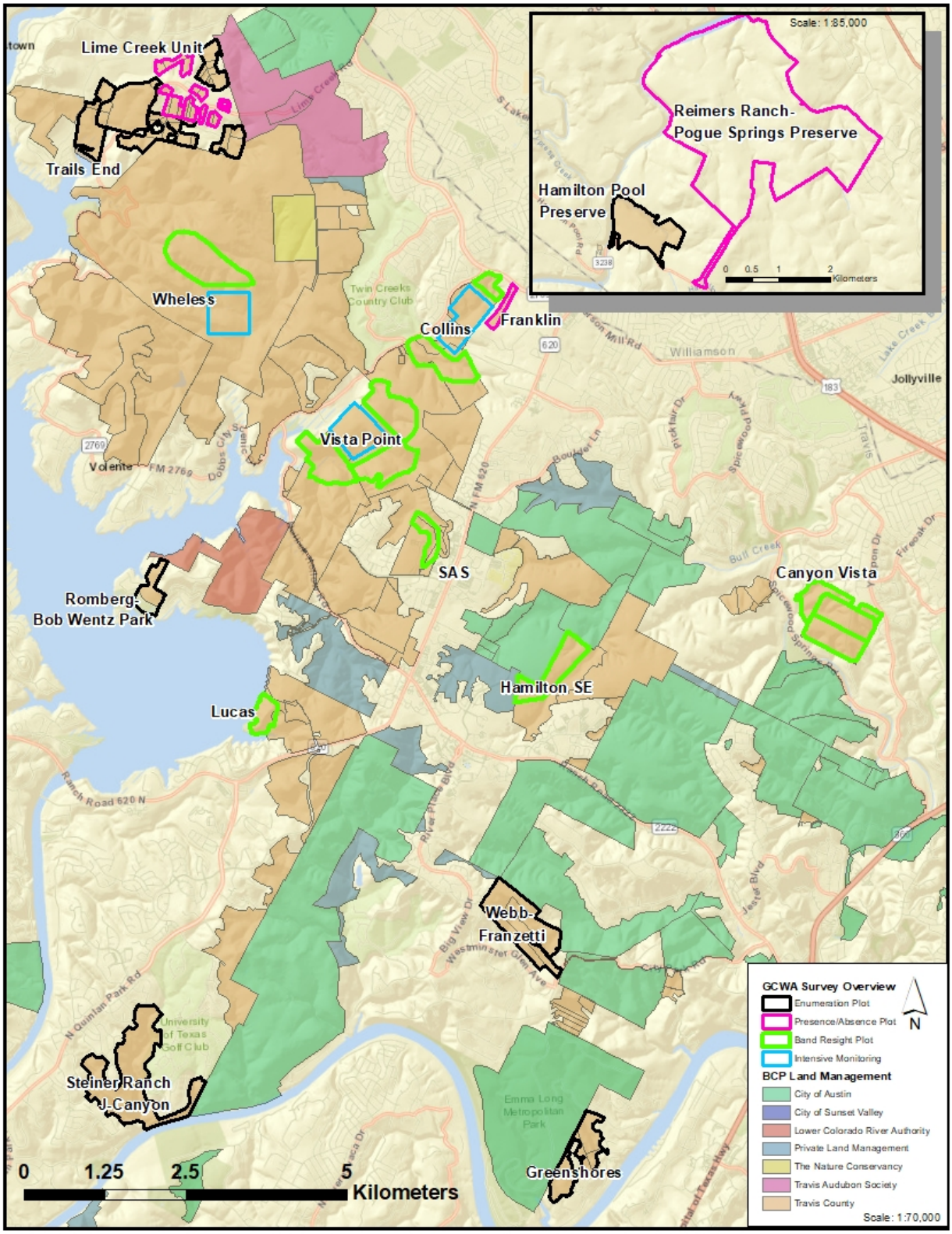
Survey Area[1]	Survey Type	Macrosite	Hectares Surveyed	Total Survey Hours
Greenshores	Enumeration	North Lake Austin	48	55.50
Hamilton Pool Preserve	Enumeration	Pedernales River	95	42.00
Lime Creek – Trails End	Enumeration	Cypress Creek	160	182.50
Romberg/Bob Wentz	Enumeration	Cypress Creek	22	15.50
Steiner Ranch J-Canyon	Enumeration	North Lake Austin	129	75.25
Webb/Franzetti	Enumeration	North Lake Austin	80	91.50
Collins[2,3]	Intensive Monitoring	Cypress Creek	56	257.00
Vista Point[2,3]	Intensive Monitoring	Cypress Creek	70	168.50
Wheless[2,3]	Intensive Monitoring	Cypress Creek	70	70.00
Canyon Vista[2,3]	Band Re-sighting	Bull Creek	70	113.50
SAS	Band Re-sighting	Cypress Creek	15	15.75
Lucas	Band Re-sighting	Cypress Creek	17	35.25
Wheless	Band Re-sighting	Cypress Creek	63	25.50
Franklin - P/A	Presence/Absence	Cypress Creek	7	6.25
Lime Creek- P/A	Presence/Absence	Cypress Creek	37	27.50
Reimers Ranch/Pogue	Presence/Absence	Pedernales River	954	28.00
Total			1,893	1,209.50

[1] Survey Areas may contain multiple BCP tracts

[2] The City of Austin staff analyzed these data, see Appendix F of the FY21 BCCP Annual Report for additional information

[3] Area surveyed includes 100-meter survey buffer

Figure 1. GCWA Survey Area Overview on the Balcones Canyonlands Preserve, FY21, Travis County, Texas.



Methods

Enumeration Surveys

Enumeration surveys, or territory mapping, may provide an estimate of GCWA abundance, occupancy, distribution, and territory density in selected study areas (or plots). Enumeration surveys on Travis County-managed properties are typically carried out every five years or on an "as needed" basis should new or future potential disturbance activities occur on or adjacent to the BCP.

Enumeration plots are typically surveyed from 15 March to 25 May with a minimum of eight visits in each plot to ensure adequate plot coverage. Additional surveys may occur between 25 May - 15 June to determine late-season nesting or territorial behavior. Surveys may begin 30 minutes before sunrise, and typically proceed for three to six hours depending on survey area size. Surveys are canceled or postponed if weather conditions produce a steady rain or if wind inhibits surveyor's ability to hear birds (approximately <12 miles/hour).

During each visit, surveyors attempted to audibly locate and follow male GCWA and obtain several spatial and behavioral observations, while also recording male counter-singing to assist with the identification and delineation of male territory boundaries. GCWA locations are recorded using Garmin handheld global positioning units (GPS) and/or on paper maps with an aerial imagery background using topographic lines and 100-meter Universal Transverse Mercator (UTM) grid. Data were recorded and analyzed in an ArcGIS 10.7 (ESRI, Inc., Redlands, California) geodatabase using a spatial reference of NAD 1983/UTM 14N. Data recorded for each GCWA observation included date, spatial coordinates, individual male observation ID, sex, song type, band information, counter-singing presence/directions, presence of a female/nests, and presence/number of fledglings.

Males are considered to have an established territory and are assigned a unique Territory ID post-hoc if any of the following occurred: 1) a male is observed on at least three occasions each separated by at least six days; 2) a male is with a female (appearing to be paired); 3) a male is observed attending a nest or feeding hatch-year fledglings.

After all field survey are complete, territories are differentiated as either "Full", "Edge" or "Off-plot". A territory is designated as "Full" when the male is observed outside of the designated survey plot on no more than one visit. An "Edge" territory is designated when a male is regularly observed inside the plot but is also observed outside on more

than one visit. An “Off-Plot” territory is designated when a male is observed inside the plot on no more than one visit. “Off-plot” territories are not given a unique territory ID and are not included in further data analysis. A designation of “Unknown” is given, and no Territory ID is assigned to GCWA observations that do not meet the minimum requirements of a territory or when survey uncertainty cannot designate a Territory ID. After Territory IDs are assigned, Minimum convex polygons (MCP) are subsequently created using ArcGIS, around each set of unique Territory ID observations to delineate projected GCWA male territory outer boundaries.

Staff used Verner’s (1985) method to calculate GCWA territory density within survey plots, where “Full” territories were counted as 1.0 territory and “Edge” territories counted as 0.5 territories. Staff then divided the modified average of “Full” and “Edge” territories by the number of hectares in the survey plot to give an estimate of territory density (territories per hectares). Staff then calculated a GCWA abundance estimate by adding together the total number of “Full”, “Edge”, and other individual “Unknown” male observations within the survey plot. “Off-plot” males are not included in abundance calculations.

Observations of GCWA females and fledglings are recorded during enumeration surveys and assigned the Territory ID of an assumed associated male, post-hoc. If surveyors cannot determine if they are associated with an identified male territory, those females and fledglings are also designated as “Unknown”. GCWA female and fledgling observations are used to aid in male territory determinations and may also be used to assess mating pair status and nesting productivity; however, nesting productivity and mating behavior observations are not the focus of territory enumeration surveys and due to limitations inherent to territory mapping methods (i.e. differences in observer ability, observer bias, and mobility of the target species, etc.), results of all surveys should be interpreted as approximations.

Intensive Monitoring Plots and Nest Monitoring

In coordination with the City of Austin, Staff participates in a BCP-wide monitoring program of established intensive monitoring plots. These previously established “100-acre plots” are arranged across a spectrum of GCWA habitats based on canopy height. The objective of these plots is to document and estimate long-term GCWA trends using data collected from color banded male GCWA. The goal is to attempt to estimate return rates, dispersal, territory density/size, habitat use, territory age structure, pairing success, breeding success, and nest survival. For a more detailed

description of survey methods and results of the intensive monitoring program, see the City of Austin's Appendix F of the 2021 BCCP Annual Report.

The Collins intensive plot was established after Staff discovered a colony of invasive tawny crazy ants (*Nylanderia fulva*; hereafter TCA) on an adjacent property in 2017. TCAs are arboreal foragers and there are concerns of negative impacts to the GCWA prey-base. In response, Staff began a pilot study to examine the composition of the canopy arthropod community within affected and adjacent areas, along with an intensive monitoring plot for GCWA within the Collins tract. Additional information on the on-going TCA project is detailed in Appendix T4 of the 2021 BCCP Annual Report.

Banding and Band Resighting

In coordination with the City of Austin, Staff also assists with the banding GCWA on Travis County BCP intensive monitoring plots. GCWA are manually captured using mist-nets set up in known non-banded male GCWA territories. Staff lures GCWA to the mist-nets by playing audible recordings of other GCWAs' calls and songs. An imitation GCWA decoy may also be attached to nearby vegetation to assist in luring males into the net. Once a GCWA is captured, they are banded with a single silver aluminum USFWS band with a unique serial number and a up to three additional colored plastic bands, giving it a unique color band combination. Additional information collected while banding includes date of capture, sex, age, and spatial coordinates. The GCWA is captured, banded, and released as quickly as possible to minimize stress on the bird.

Previously established intensive plots, not intensively monitored in the current survey year, are treated as band resighting plots. Resight plots are also established in areas surrounding active intensive monitoring plots to identify additional GCWA dispersal and movement. These resight plots are systematically surveyed for returning color banded GCWA. This will continue until no banded GCWA are observed within these plots for one full survey season. Resight plots are surveyed four times between 20 March and 15 April, with one additional survey between 15 May and 25 May to detect dispersing GCWA. For a more detailed description of survey methods and results of the intensive monitoring program, banding, and band resighting effort, see the City of Austin's Appendix F of the 2021 BCCP Annual Report.

Staff conducted additional band resight efforts on tracts to attempt to re-locate off-plot banded birds that were sighted in FY19 and FY20. These plots are surveyed with a minimum of five visits between 20 March and 25 May. Surveyors visit the plot and

attempt to resight every male detected on each weekly visit to verify and record presence of or lack of bands.

Presence/Absence Survey

Staff may conduct GCWA presence/absence surveys on tracts where enumeration surveys may not be practical, or resources are not available to conduct more intensive monitoring efforts. These are typically tracts of smaller acreage, highly fragmented, or poor-quality GCWA habitats. Travis County BCP presence/absence surveys are modeled after the USFWS (2010) presence/absence monitoring protocol. These surveys are a minimal effort method to determine GCWA occupancy of a BCP tract/unit., surveyors also make notes about habitat conditions or general observations about the site and surrounding area.

GCWA presence/absence surveys are surveyed from 15 March to 15 May with a minimum of three visits in each plot to ensure plot adequate coverage. If no GCWA are detected in the initial three surveys, up to two additional surveys may be conducted between 15 May and 01 June. Surveys may begin 30 minutes before sunrise, and typically proceed for three to six hours depending on survey area size. Surveys are canceled or postponed if weather conditions produce a steady rain or if wind inhibits surveyor's ability to hear birds, approximately 12 miles/hour or greater. During each visit, surveyors attempted to audibly locate and follow male GCWA and obtain several spatial observations. Data recorded for each GCWA observation included date, spatial location, individual male observation ID, sex, song type, band information, if known. Spatial data were recorded using Garmin handheld GPS units and/or on paper maps with an aerial imagery background using topographic lines and 100-meter UTM grid.

Results

Enumeration Surveys Results

In FY21, Staff and volunteers conducted GCWA enumeration surveys within six survey plots on the Travis County-managed tracts of the BCP, covering approximately 534 ha and contributing approximately 462 hours of survey effort (Table 1). Estimated GCWA abundance, territories, and territory density based on enumeration survey results are presented in Table 2.

Table 2. GCWA abundance and territory density estimates based on enumeration survey results from FY21, Travis County BCP, Texas.

GCWA Enumeration Survey Plot	Hectares (ha)	Estimated Abundance	No. of Full Territories	No. of Edge Territories	No. of Modified* Territories	Territory Density (Terr. per ha)
Cypress Creek Macrosite						
Lime Creek – Trails End	160	53	12	22	23	0.14
Romberg/Bob Wentz	22	1	0	1	0.5	0.02
Cypress Creek Average						*0.08*
Pedernales River Macrosite						
Hamilton Pool	94	7	5	0	5	0.05
North Lake Austin Macrosite						
Greenshores	48	11	4	4	6	0.13
Steiner Ranch J-Canyon	129	7	2	2	3	0.02
Webb/Franzetti	80	22	12	5	14.5	0.18
North Lake Austin Average						*0.11*
All Survey Plots Combined	**533**	**101**	**35**	**34**	**52**	**0.10**

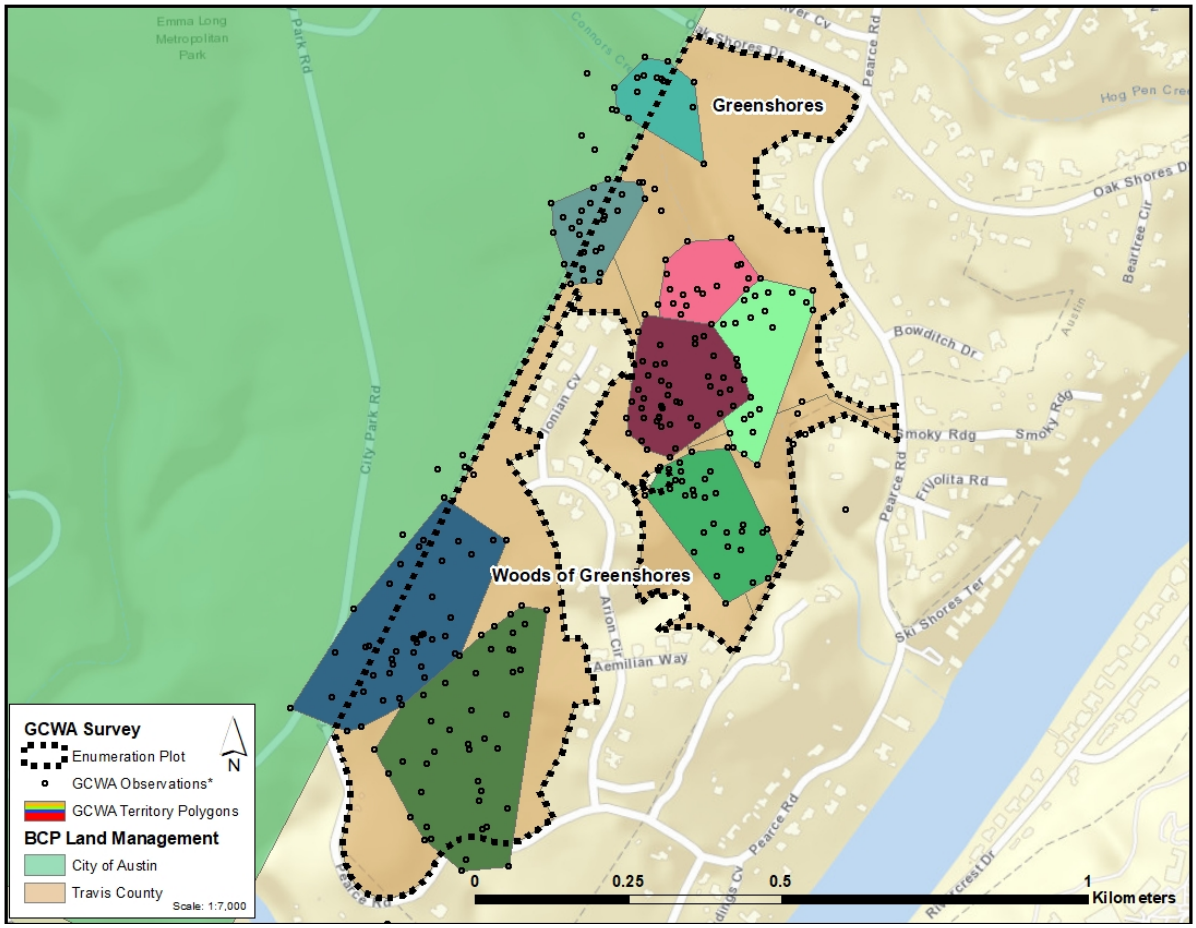
*Modified territories are the number of full territories plus one-half of the number of edge territories (Verner 1985).

Greenshores GCWA Enumeration Survey Results

The Greenshores GCWA enumeration survey plot included the Greenshores and Woods of Greenshores tracts of the BCP, totaling approximately 48 ha within the North Lake Austin macrosite. The Greenshores survey plot is located between the City of Austin's Emma Long Park and Lake Austin.

Eight GCWA territories (interior or edge) were delineated on the Greenshores survey plot. The overall density of GCWA for these survey plots were approximately 0.13 GCWA territories per ha. Female GCWA were detected within 100% (n=8) of male territories and GCWA fledglings were detected in 50% (n=4) of observed territories. GCWA observation locations and delineated territories from FY21 enumeration surveys are presented in Figure 2.

Figure 2. GCWA observations and estimated territory delineations based on the Greenshores enumeration survey from FY21, Travis County BCP, Texas.



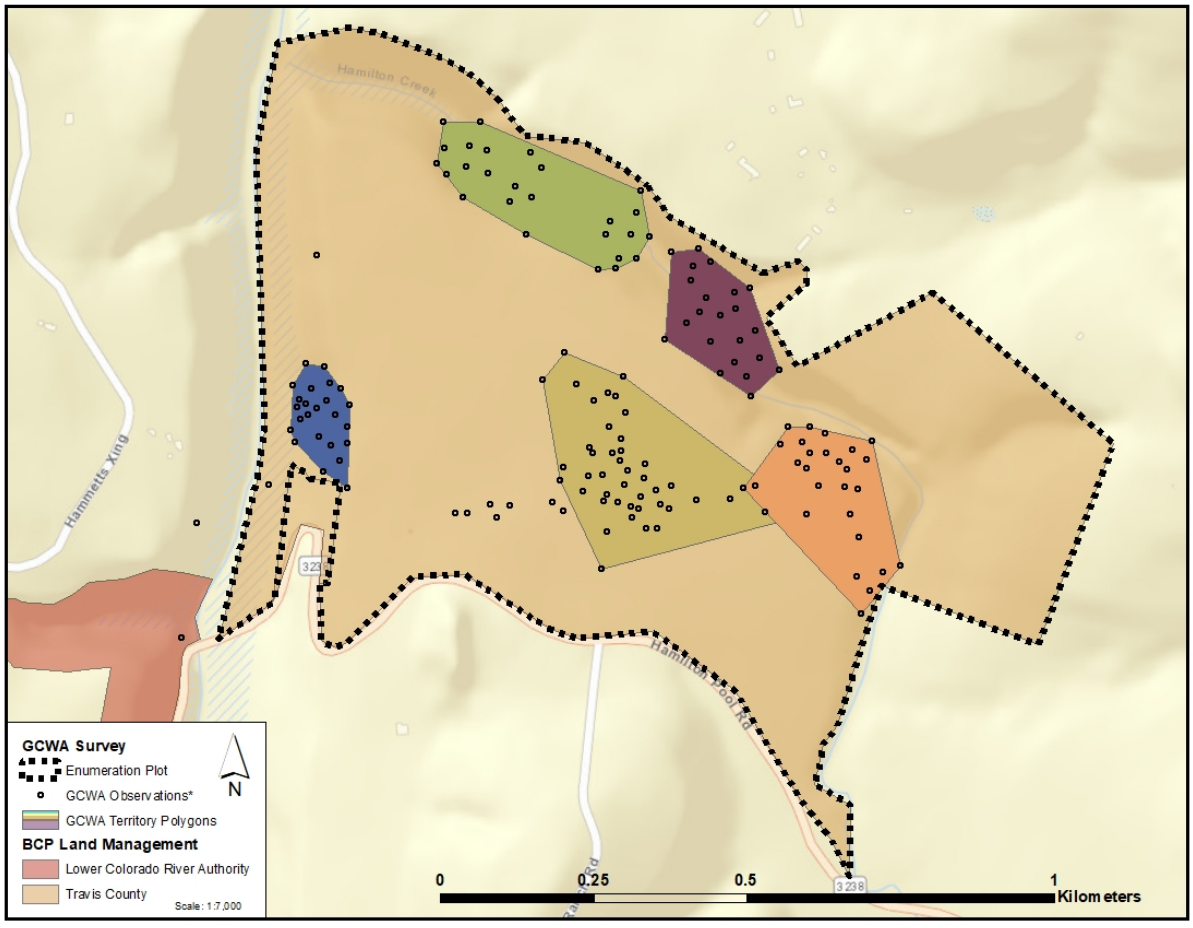
*GCWA Observations outside of designated survey boundaries are estimated locations, based on audible male detections.

Hamilton Pool GCWA Enumeration Survey Results

The 95 ha Hamilton Pool GCWA enumeration survey plot includes the Martin tract and the Hamilton Pool Preserve, a Travis County Park that is included in the BCP. Hamilton Pool Preserve is located north of Hamilton Pool Road in southwest Travis County, within the Pedernales River macrosite.

Five GCWA territories (interior or edge) were delineated on the Hamilton Pool survey plot. The overall density of GCWA for these survey plots were approximately 0.05 GCWA territories per ha. Female GCWA were detected within 40% (n=2) of male territories and GCWA fledglings were detected in 20% (n=1) of territories. The overall density of GCWA for these survey plots were approximately 0.02 GCWA territories per ha. GCWA observation locations and delineated territories from FY21 enumeration surveys are presented in Figure 3.

Figure 3. GCWA observations and estimated territory delineations based on the Hamilton Pool enumeration survey from FY21, Travis County BCP, Texas.



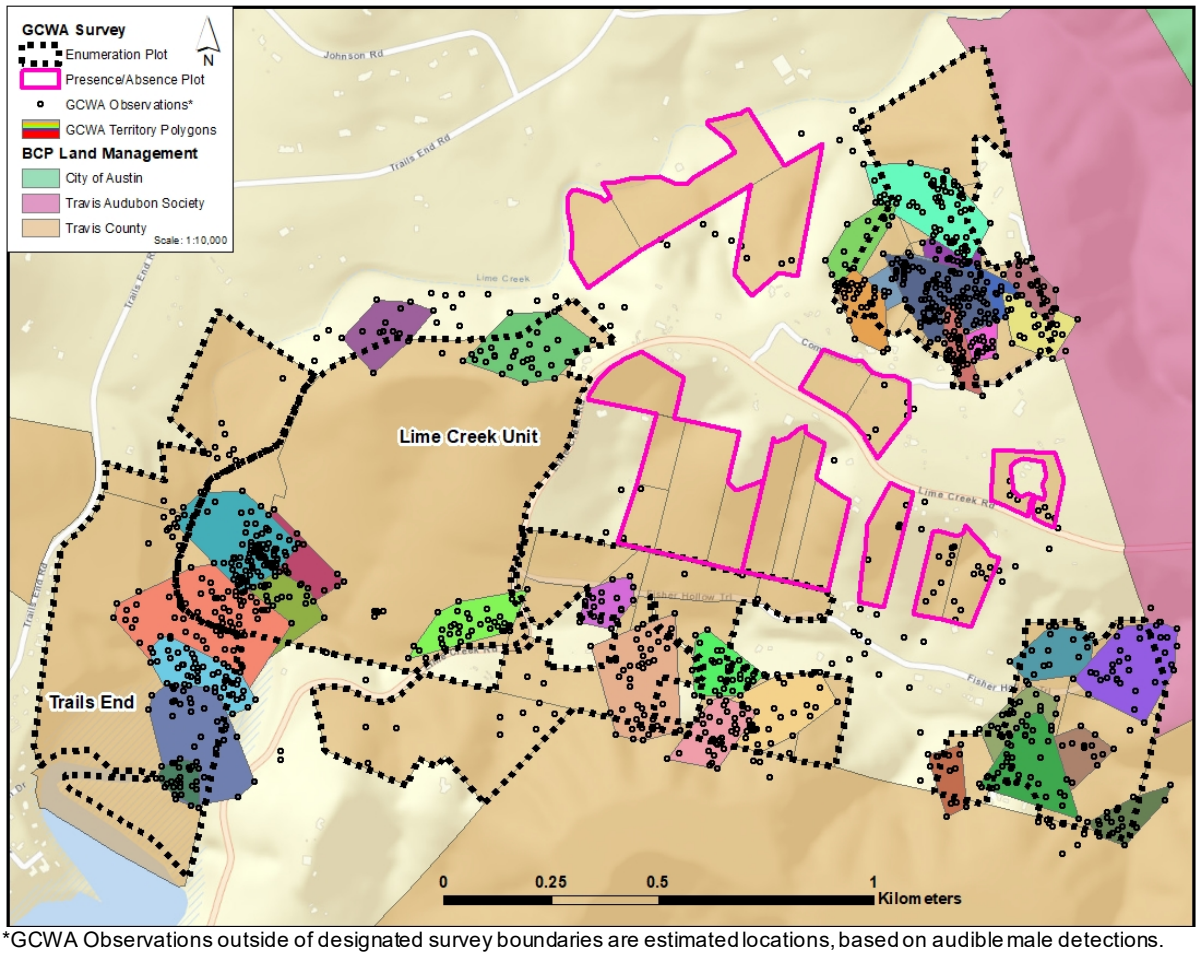
*GCWA Observations outside of designated survey boundaries are estimated locations, based on audible male detections.

Lime Creek – Trails End GCWA Enumeration Survey Results

The Lime Creek – Trails End GCWA enumeration survey plot included the eastern portions of the Trails End tract, as well as several tracts of the Lime Creek Unit of the BCP, totaling approximately 160 ha within the Cypress Creek macrosite. The Lime Creek – Trails End survey plot is located between the cities of Jonestown and Cedar Park, on the north and south sides of Lime Creek Road.

Thirty-four GCWA territories (interior or edge) were delineated on the Lime Creek – Trails End survey plot. The overall density of GCWA for these survey plots were approximately 0.14 GCWA territories per ha. Female GCWA were detected within 59% (n=20) of territories and GCWA fledglings were detected in 18% (n=6) of territories. GCWA observation locations and delineated territories from FY21 enumeration surveys are presented in Figure 4.

Figure 4. GCWA observations and estimated territory delineations based on the Lime Creek – Trails End enumeration survey from FY21, Travis County BCP, Texas.



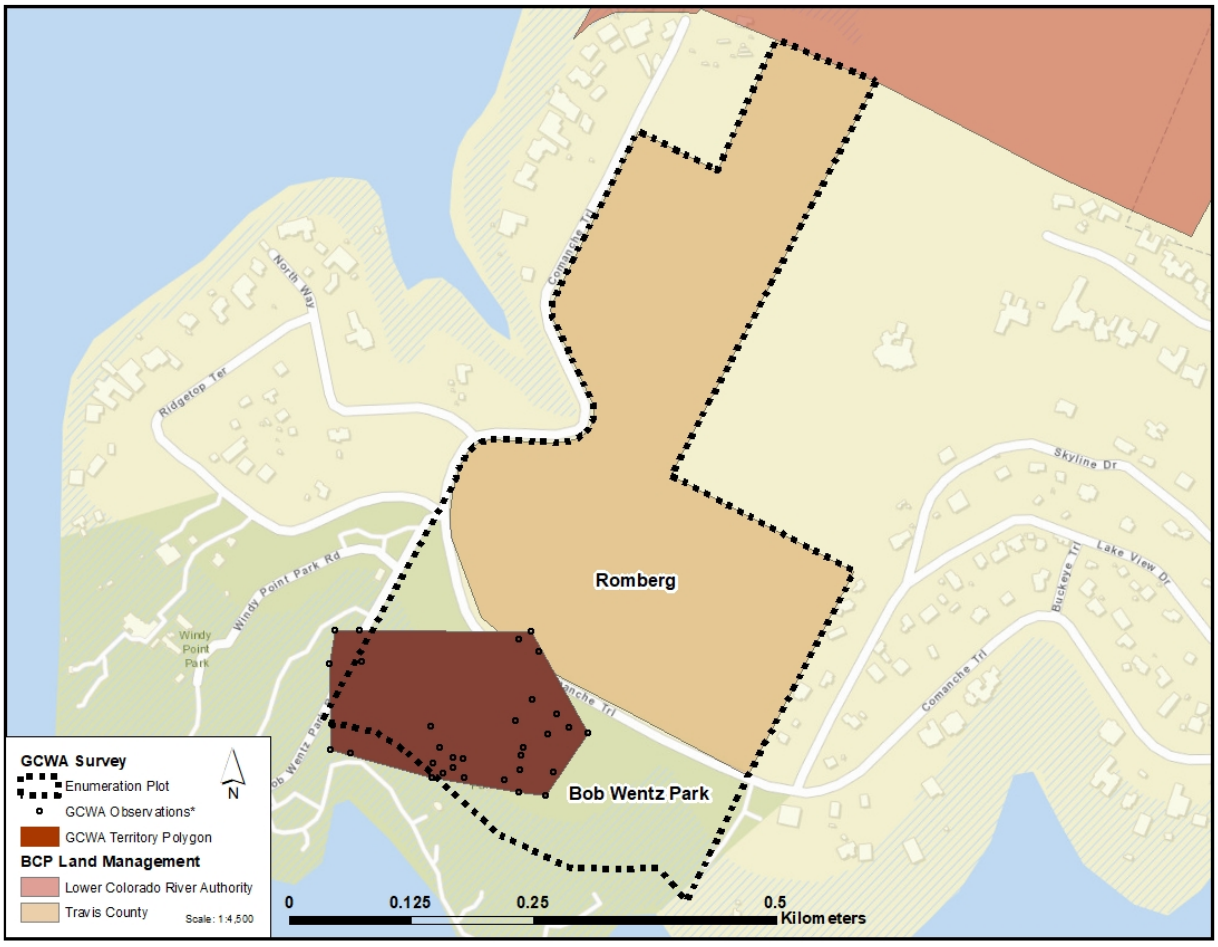
*GCWA Observations outside of designated survey boundaries are estimated locations, based on audible male detections.

Romberg – Bob Wentz Park GCWA Enumeration Survey Results

The Romberg – Bob Wentz Park GCWA enumeration survey plot included the Romberg tract of the BCP, as well as adjacent portions of potential GCWA habitat at the Travis County's Bob Wentz Park, totaling approximately 22 ha within the Cypress Creek macrosite. The Romberg – Bob Wentz Park survey plot is located adjacent to Windy Point on Lake Travis, on the north and south sides of Comanche Trail Road.

Only one GCWA territory was delineated in the Romberg – Bob Wentz Park survey plot, primarily located within Bob Wentz Park. No female or fledgling GCWA were observed within the survey plot. The overall density of GCWA for these survey plots were approximately 0.02 GCWA territories per ha. GCWA observation locations and delineated territories from FY21 enumeration surveys are presented in Figure 5.

Figure 5. GCWA observations and estimated territory delineations based on the Romberg – Bob Wentz Park enumeration survey from FY21, Travis County BCP, Texas.



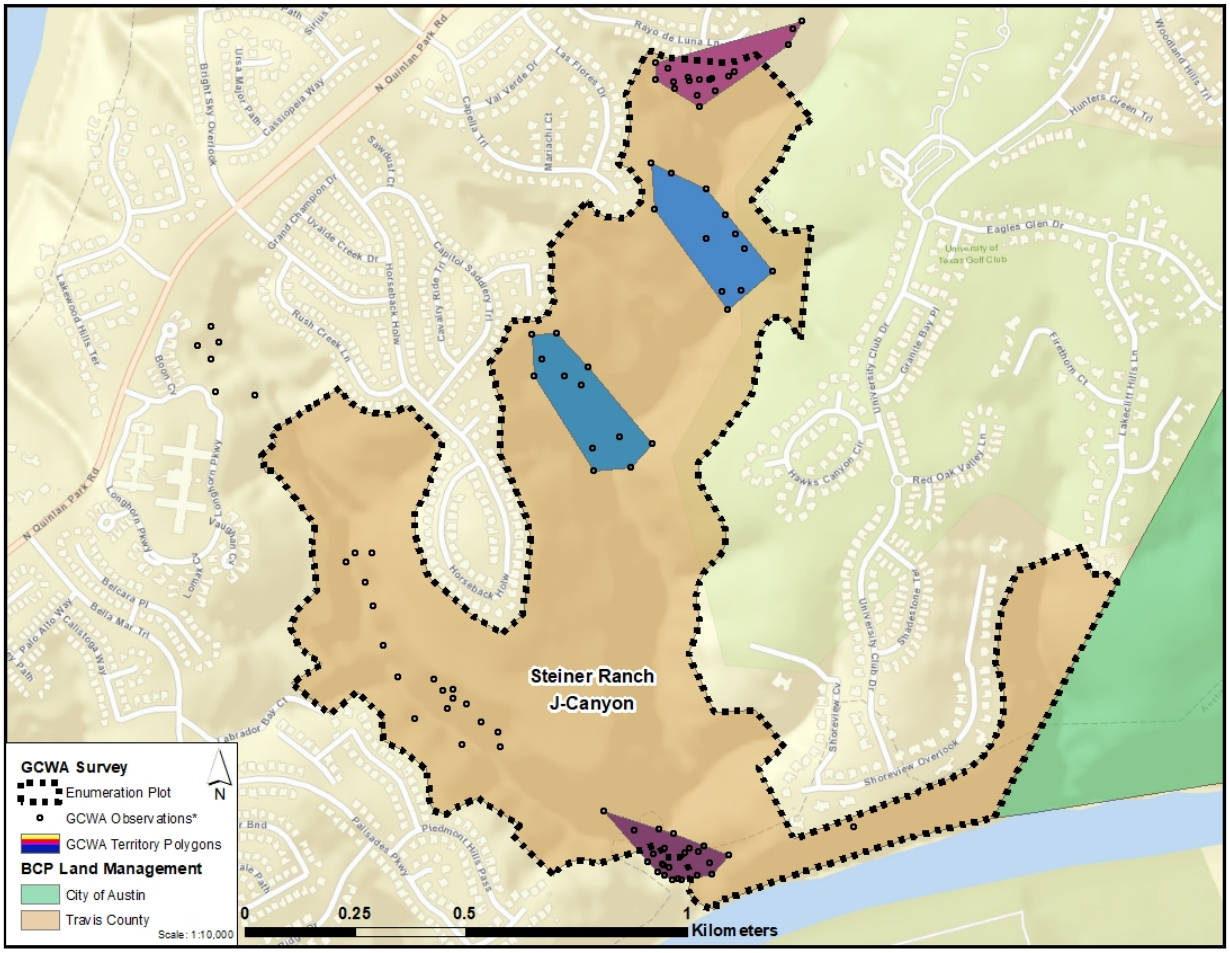
*GCWA Observations outside of designated survey boundaries are estimated locations, based on audible male detections.

Steiner Ranch J-Canyon GCWA Enumeration Survey Results

The Steiner Ranch J-Canyon GCWA enumeration survey plot includes approximately 129 ha of the Steiner Ranch conservation easement. This survey plot is located North of Lake Austin, south of Quinlan Park Road, within the North Lake Austin macrosite.

Four GCWA territories (interior or edge) were delineated on the Steiner Ranch J-Canyon survey plot. The overall density of GCWA for these survey plots were approximately 0.02 GCWA territories per ha. No female or fledgling GCWA were detected within delineated territories. One female was observed within the plot, but we were unable to determine if she was associated with an in-plot male territory; thus, she was classified as "Unknown". GCWA observation locations and delineated territories from 2021 enumeration surveys are presented in Figure 6.

Figure 6. GCWA observations and estimated territory delineations based on the Steiner Ranch J-Canyon enumeration survey from FY21, Travis County BCP, Texas.



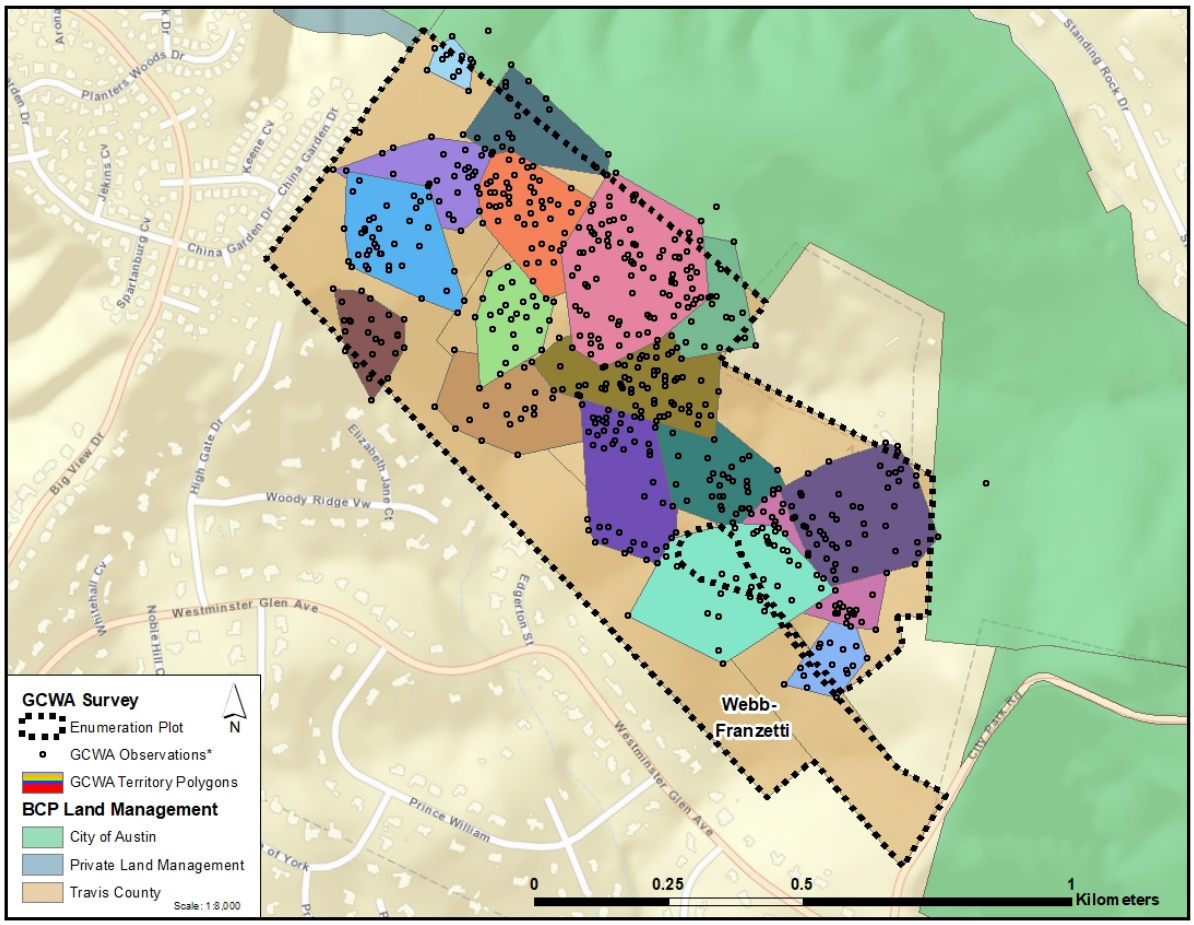
*GCWA Observations outside of designated survey boundaries are estimated locations, based on audible male detections.

Webb-Franzetti GCWA Enumeration Survey Results

The Webb-Franzetti GCWA enumeration survey plot included the Webb and Franzetti tracts of the BCP, totaling approximately 80 ha, within the North Lake Austin macrosite. The Webb-Franzetti survey plot is located north of the intersection of Westminster Glen Avenue and City Park Road.

Seventeen GCWA territories (interior or edge) were delineated on the Webb-Franzetti survey plot. The overall density of GCWA for these survey plots were approximately 0.18 GCWA territories per ha. Female GCWA were detected within 82% (n=14) of territories and GCWA fledglings were detected in 35% (n=6) of territories. GCWA observation locations and delineated territories from FY21 enumeration surveys are presented in Figure 7.

Figure 7. GCWA observations and estimated territory delineations based on the Webb-Franzetti enumeration survey from FY21, Travis County BCP, Texas.



*GCWA Observations outside of designated survey boundaries are estimated locations, based on audible male detections.

Intensive Monitoring Plot and Nest Monitoring Results

In FY21, Staff conducted GCWA intensive plot monitoring at the Collins, Vista Point, and Wheless plots (Figure 1). Staff surveyed intensive monitoring plots weekly from 15 March 2021 to 25 May 2021. Additional weekly visits to the plots occurred between 25 May 2021 and 15 June 2021 to continue monitoring nesting activity, obtain hatch-year bird observations, and gain addition band resight information. Staff contributed approximately 261.0, 168.5, and 70.0 hours of survey time to the Collins, Vista Point, and Wheless intensive monitoring plots, respectively.

In FY21, Staff located ten GCWA nests while conducting intensive plot surveys. Eight and two nests on the Vista Point and Collins plot, respectively. All ten nests were in Ashe Juniper (*Juniperus ashei*) trees. Of these ten nests, five (50%) successfully fledged young, the other five (50%) failed due to presumed depredation. No nests were observed to have been parasitized by brown-headed cowbirds (*Molothrus ater*). A male and female GCWA pair on Collins were observed attempting to aggressively distract a nearby foraging blue-jay (*Cyanocitta cristata*) away from their nest. On that occasion it appeared that the blue jay did not find the nest, but that same GCWA nest was observed depredated a few days later.

Travis County shared intensive plot monitoring and nest data collected in FY21 with the City of Austin staff for further analysis and publication. For a more detailed summary of the results and discussion of the intensive monitoring program and nest monitoring effort, see the City of Austin's Appendix F of the 2021 BCCP Annual Report.

Banding and Band Resighting Results

In FY21, Staff assisted the City of Austin with banding GCWA on Travis County BCP intensive monitoring plots. Staff contributed approximately 20 hours to GCWA banding effort on the Collins and Wheless plots, collectively. A summary of Staff FY21 banding efforts are shown in Table 3. In addition, City of Austin staff banded 14 GCWA (13 male, 1 female) on the Vista Point plot. For a more detailed information on the City of Austin's banding efforts, see the City of Austin's Appendix F of the 2021 BCCP Annual Report.

Table 3. GCWA banding results from FY21, Travis County BCP, Texas.

Banding Area	Date Banded	Sex	Age*
Collins	3/24/2021	Male	SY
Collins	3/30/2021	Male	SY
Collins	3/30/2021	Male	SY
Collins	3/30/2021	Male	SY
Collins	4/14/2021	Male	SY
Collins	4/14/2021	Male	SY
Collins	4/14/2021	Male	SY
Collins	4/14/2021	Male	SY
Wheless	4/22/2021	Male	ASY
Wheless	4/22/2021	Male	SY
Wheless	4/22/2021	Male	ASY
Wheless	4/22/2021	Male	ASY
Collins	4/28/2021	Male	ASY
Collins	4/28/2021	Male	ASY

* SY = Second Year; ASY = After Second Year

In FY21, Staff and volunteers assisted with band resighting efforts at the Canyon Vista and volunteer only efforts were conducted surrounding the Vista Point, Collins, and Hamilton SE intensive monitoring plots (Figure 1). Staff contributed approximately 113.50 hours of survey time on the Canyon Vista plot surveying for band resights. In FY21, no banded GCWA were observed on the Canyon Vista band resight survey plot.

Staff conducted additional band resight efforts on the Lucas, SAS, and Wheless tracts (Figure 1) to attempt to re-locate off-plot banded birds that were sighted in FY19 or FY20. Staff contributed approximately 35.25, 15.75, and 25.50 hours of survey time to the Lucas, SAS, and Wheless Tracts, respectively. In FY21, no banded GCWA were observed during these band resight surveys.

Travis County shared banding and band resighting data collected in FY21 with the City of Austin staff for further analysis and publication. For a more detailed summary of the results and discussion of the band resighting effort, see the City of Austin's Appendix F of the 2021 BCCP Annual Report.

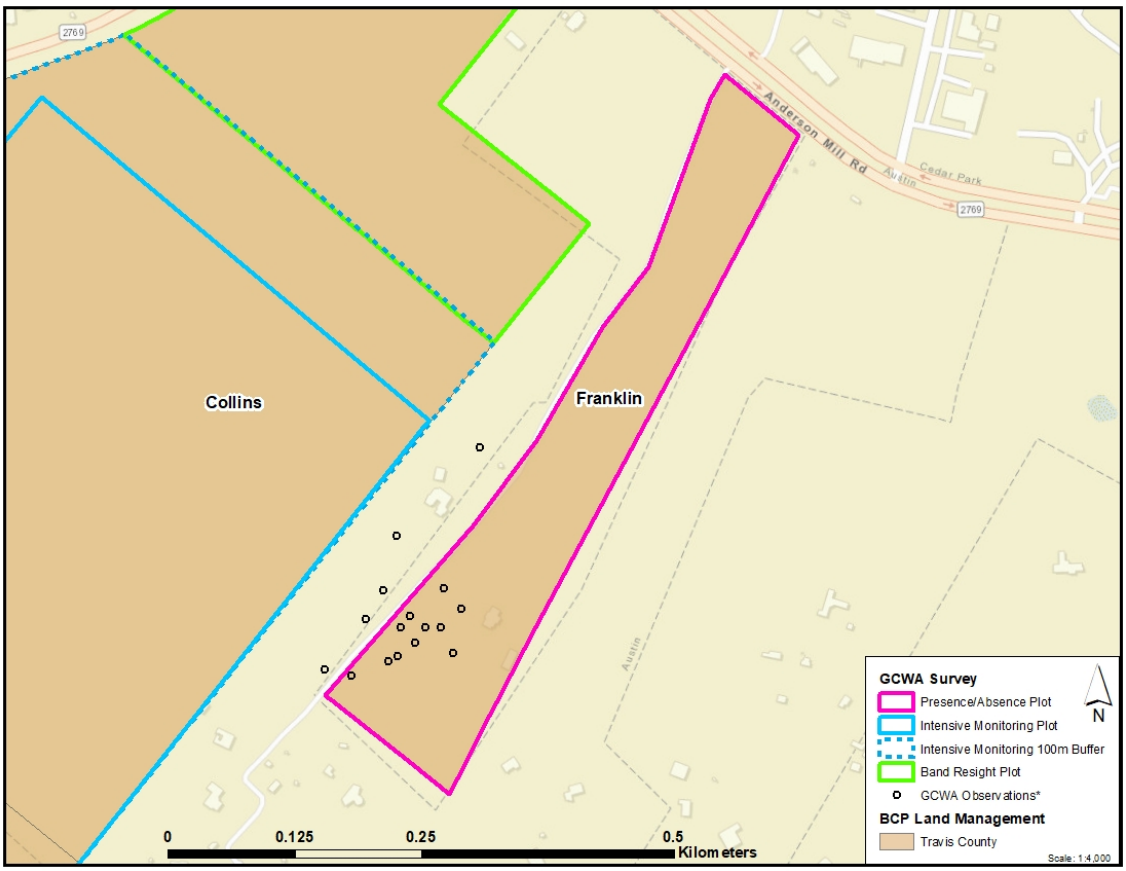
Presence/Absence Survey Results

In FY21, Staff conducted GCWA presence/absence surveys on the Franklin Tract and several smaller tracts within the Lime Creek Unit, totaling approximately 44 ha. Additionally, volunteers conducted GCWA presence/absence surveys on the Milton Reimers Ranch Park and Pogue Springs Preserve and totaling approximately 954 ha. Collectively, in FY21 staff and volunteers contributed approximately 61.75 hours of survey effort to presence/absence surveys

Franklin GCWA Presence/Absence Survey Results

The Franklin GCWA presence/absence survey plot included the isolated Franklin tract of the BCP, totaling approximately seven ha, within the Cypress Creek macrosite. The Franklin survey plot is located south of Anderson Mill Road and adjacent to the Collins intensive monitoring plot and volunteer band resight plot. GCWA observation locations from FY21 Presence/Absence surveys are presented in Figure 8. GCWA detections from Collins plots are not included in this figure.

Figure 8. GCWA observations based on the Franklin presence/absence surveys from FY21, Travis County BCP, Texas.

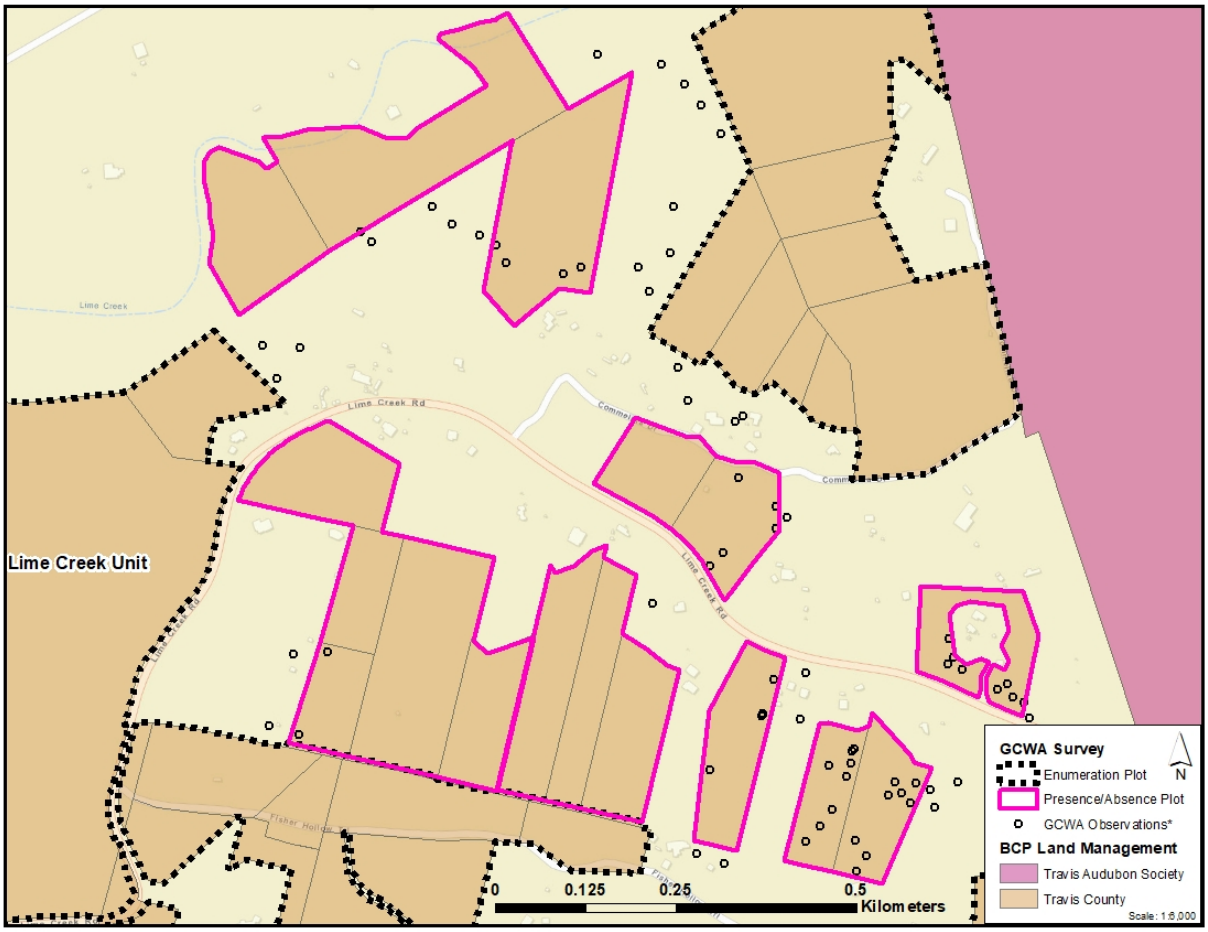


*GCWA Observations outside of designated survey boundaries are estimated locations, based on audible male detections.

Lime Creek Unit GCWA Presence/Absence Survey Results

The Lime Creek Unit GCWA presence/absence survey plot includes several fragmented tracts within the Lime Creek Unit of the BCP, totaling approximately 37 ha, within the Cypress Creek macrosite. The Lime Creek presence/absence survey plot is located between the cities of Jonestown and Cedar Park, on the north and south sides of Lime Creek Road. GCWA observation locations from FY21 presence/absence surveys are presented in Figure 9. The Lime Creek Unit presence/absence survey plots are located adjacent to the Lime Creek-Trails End GCWA enumeration plots, GCWA detections from enumeration surveys are not included in this figure.

Figure 9. GCWA observations based on the Lime Creek Unit presence/absence surveys from FY21, Travis County BCP, Texas.

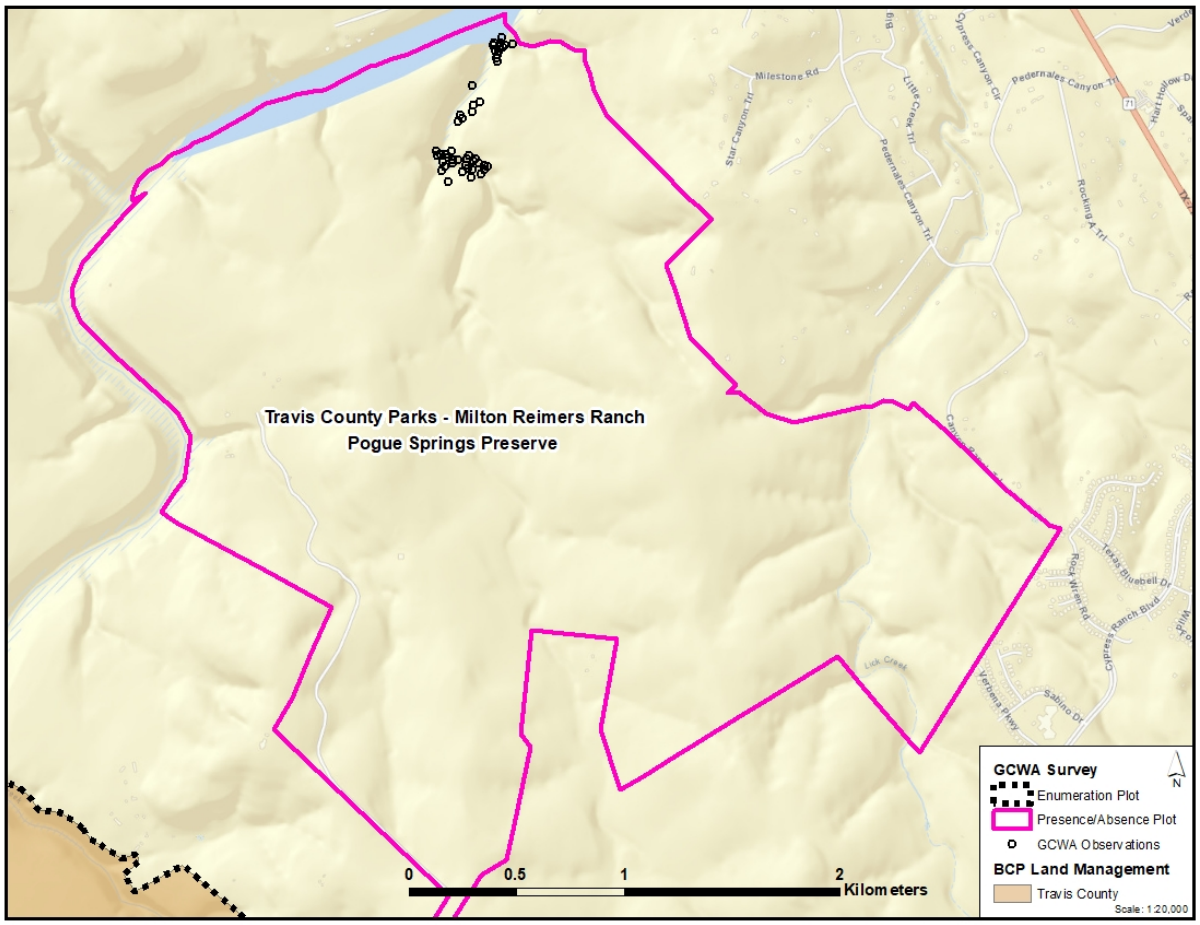


*GCWA Observations outside of designated survey boundaries are estimated locations, based on audible male detections.

Milton Reimers Ranch Park and Pogue Springs Preserve GCWA Presence/Absence Survey Results

The GCWA presence/absence surveys at the Milton Reimers Ranch Park and Pogue Springs Preserve included approximately 954 ha within the Pedernales River macrosite. These areas are managed by Travis County Parks and are located north of Hamilton Pool Road in southwest Travis County. These areas are not part of the BCP, but BCP staff works closely with Travis County Parks staff to periodically monitor these properties because of the presence of protected species. Knowledge of protected species may assist Parks staff in making future management decisions. GCWA observation locations from FY21 Presence/Absence surveys are presented in Figure 10.

Figure 10. GCWA observations based on the Milton Reimers Ranch Park and Pogue Springs Preserve presence/absence surveys from FY21, Travis County BCP, Texas.



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