

**Spring 2013 Survey Report
Golden-cheeked Warbler (*Setophaga chrysoparia*)
for LCRA's Wheless Preserve
Travis County, Texas**

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SPRING 2013 SURVEY REPORT
GOLDEN-CHEEKED WARBLER (*SETOPHAGA CHRYSOPARIA*)
FOR LCRA'S WHELESS PRESERVE
TRAVIS COUNTY, TEXAS

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1.0 INTRODUCTION

The Lower Colorado River Authority (LCRA) owns and manages the 2,317-acre Wheless Preserve, which is part of the larger Balcones Canyonlands Preserve (BCP) system. The BCP is a system of preserves associated with the Balcones Canyonlands Conservation Plan (BCCP), a regional habitat conservation plan (HCP) of which LCRA is a partner. The Wheless Preserve is located along Lime Creek Road, south of its intersection with Ranch-to-Market Road (RM) 1431 and north of the Volente community in northwestern Travis County, Texas (Figure 1). The Wheless Preserve contains approximately 1,715 acres of suitable habitat for the endangered golden-cheeked warbler (*Setophaga chrysoparia*) (GCWA), of which 1,400 acres are considered high quality habitat. Bordering Wheless Preserve are additional preserve lands owned and/or managed by Travis Audubon Society, Travis County, City of Austin, the Nature Conservancy, and private landowners.

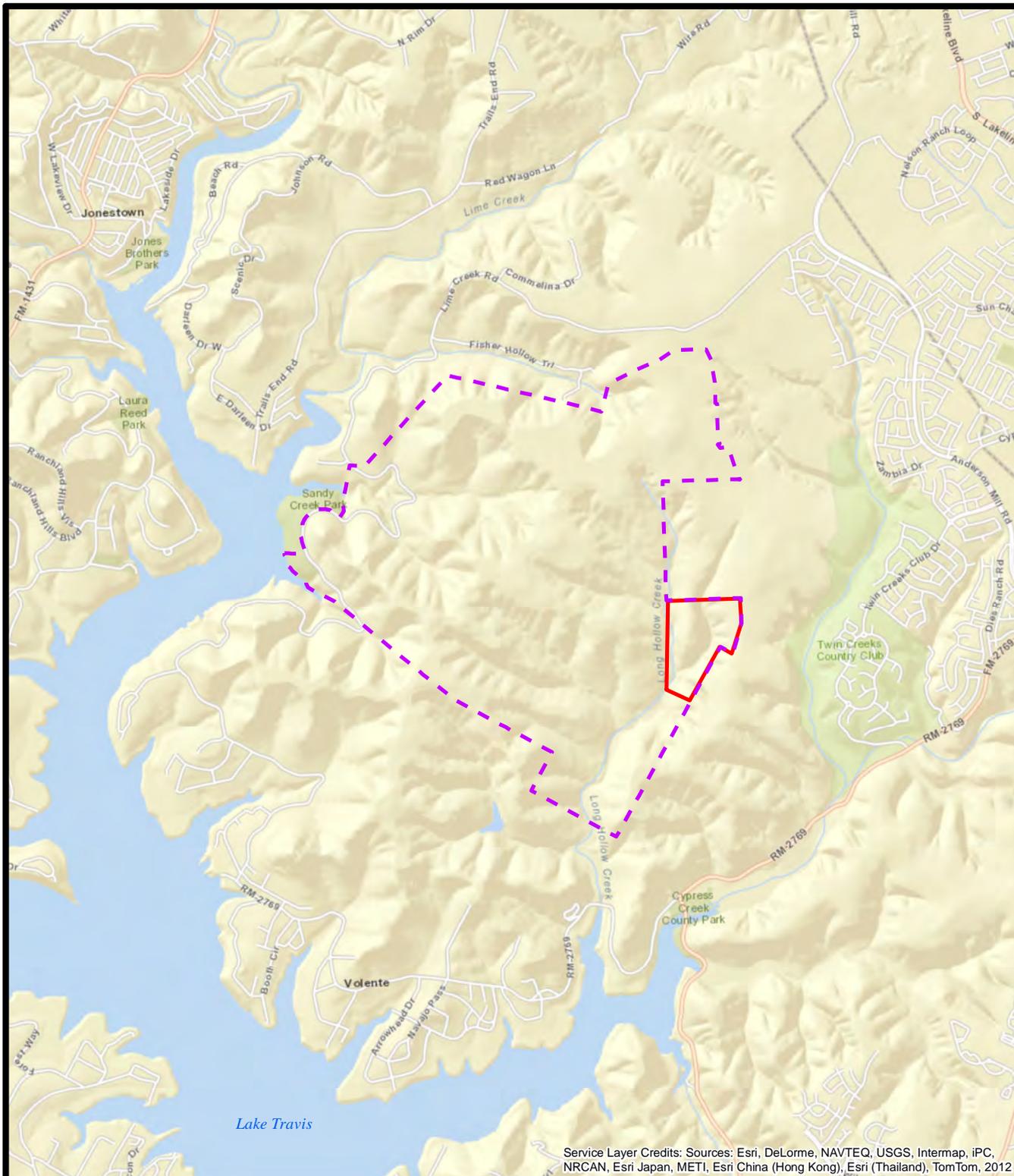
To comply with the BCP Management Plan, the LCRA contracted with Atkins to conduct a territory mapping and productivity survey for the federally listed endangered GCWA within or immediately adjacent to the LCRA's 92.3-acre Prime Plot (Figure 2). This report presents the results of the 2013 survey that Atkins performed. The survey protocols adhere to the recommended minimum procedures for 100-acre plot protocol, as outlined in the BCP Land Management Plan for GCWA Management Tier II A Chapter VII. Section 2.0 of this report presents biological information about the GCWA, while Section 3.0 presents descriptions of the study area plot. Section 4.0 presents the methods Atkins employed to perform the 2013 territory mapping surveys, while Section 5.0 presents the results of the territory mapping surveys. Section 6.0 provides a discussion and Section 7.0 is the reference section.

2.0 BIOLOGICAL BACKGROUND

2.1 GOLDEN-CHEEKED WARBLER (*Setophaga chrysoparia*)

Description: The GCWA is a small (about 5 inches [13 centimeters] in length) insectivorous bird. Adult males have black on the crown, nape, back, throat, and upper breast. The wings are black with two white wing bars. The cheeks are a bright golden-yellow with a black eye line. The underparts are white, streaked with black on the flanks. Adult females are similar but duller in color; the crown and back are olive-green, with some black streaking (Farrand 1983, Oberholser 1974).

Range: Of all the bird species known to occur in Texas, only the GCWA nests exclusively within the State's boundaries (Ladd and Gass 1999). The GCWA historically nested in 41 of Texas' 254 counties (Pulich 1976, U.S. Fish and Wildlife Service [FWS] 1996). Current confirmed breeding records exist from 28 Texas counties: Bandera, Bell, Bexar, Blanco, Bosque, Burnet, Comal, Coryell, Dallas, Edwards, Erath, Gillespie, Hays, Jack, Johnson, Kendall, Kerr, Kimble, Lampasas, Llano, Medina, Palo Pinto, Real, San Saba, Somervell, Travis, Uvalde, and Williamson (Ladd and Gass 1999,



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Legend

-  Wheless_Preserve_Boundary
-  Wheless Prime Plot Boundary



Figure 1

**SPRING 2013 GCWA SURVEY
WHELESS PROJECT AREA**



Legend

 Wheless Prime Plot Boundary



0 250 500
 Feet

ATKINS

Figure 2

SPRING 2013 GCWA SURVEY
WHELESS PRIME PLOT

Aerial Source: 2012 NAIP (6-11-2012)

Lasley et al. 1997, Lockwood and Freeman 2004, FWS 1996, Omar Bocanegra, the Service, pers. comm. to D. Green, PBS&J 2010). The GCWA was discovered in southeast Young County (Lasley et al. 1997) and was rediscovered in Dallas County in 2001 after a 35-year absence (Lockwood and Freeman 2004). The Dallas County sighting was of a lone individual on April 7, 2001, and represents the first county record since 1964 (North-Central Texas Birds 2009). Dallas County also had a sighting within the last 5 years in Dogwood Canyon, owned mostly by Audubon (Christina Williams, the Service, pers. comm. to G. Newgord, PBS&J 2010). However, the GCWA is not currently considered to breed in Young County. This species has also been encountered recently in Edwards County (FWS 2008) and Erath County (Whitenton Group 2004). Both of these counties had prior historical records. Historical records also exist for Eastland, Hamilton, Hill, Hood, Kinney, McLennan, and Stephens counties (Oberholser 1974, Pulich 1976, 1988). However, suitable habitat within these counties was probably never extensive and has likely become more restricted due to recent habitat loss and further studies are needed to determine the breeding status within these counties (FWS 1996). Additional studies are also needed to determine the breeding status within Comanche, Ellis, Mason, Menard, and Mills counties. It is likely that small areas of potential habitat exist within these five counties; however, no recent or historical records exist from these counties (Ladd and Gass 1999). During the winter, this species occurs in woodlands of mountainous areas of southern Mexico (Braun et al. 1986) and east-central Guatemala through Honduras, Nicaragua, and possibly Belize (Pulich 1976, FWS 1990).

Habitat: From March to mid-summer, the GCWA inhabits juniper-oak woodlands in the Edwards Plateau, Lampasas Cut-Plain, and Llano Uplift regions of Texas. Ashe juniper and various oaks are the dominant tree species required in this migratory songbird's breeding habitat. The bark of mature Ashe junipers is essential for nest building, while deciduous trees, particularly oaks, are important for foraging. Texas red oak, plateau live oak, shin oak, cedar elm, walnut (*Juglans* spp.), hackberry, and Texas ash are common hardwoods where GCWA are found, particularly in the central part of its range. This habitat type is typically found in areas of steep slopes, canyon heads, draws, and adjacent ridgetops. Prime habitat occurs in patches of at least 250 acres, although smaller habitat patches are also used. Minimum patch size for successful reproduction ranges from 37 to 57 acres (15 to 23 hectares) (Arnold et al. 1996, Butcher 2008, Ladd 1985, Ladd and Gass 1999, Pulich 1976, FWS 1992, Wahl et al. 1990).

The GCWA migrates between its wintering grounds in southern Mexico and Central America to its breeding grounds in central Texas. The species arrives in early to mid-March and begins migrating south in June or July. Nesting is typically completed by the end of July, and most GCWA have left central Texas by early to mid-August (Ladd and Gass 1999, Wahl et al. 1990).

The territory size of a breeding pair of GCWA ranges from as little as 4 acres (1.6 hectares) to as much as 43 acres (17.4 hectares), with most falling in the range of 5 to 20 acres (2 to 8 hectares). The size is influenced by the habitat quality and territories are defended by the males. Nests, composed of shreds of mature Ashe juniper bark bound with spider webs, are typically well

camouflaged and located high in the nest tree, making them difficult to find. The female is thought to select the nesting site and build the nest. One clutch of three to four eggs is generally produced in April of each year. Additional nesting attempts are rare and occur only if the first clutch is lost to predation or parasitism. Incubation is typically 10 to 12 days. The young fledge after 9 to 12 days and are fed by both parents for another month after leaving the nest. The GCWA feeds on insects, spiders and other arthropods (Campbell 2003, City of Austin 2007, Holimon and Craft 2000, Jette et al. 1998, Ladd and Gass 1999, Peak 2007, Pulich 1976, FWS 1992, Travis County 2007, Wahl et al. 1990).

Status: Endangered (55 *Federal Register* 18844, 4 May 1990, emergency rule; 55 *Federal Register* 53153–53160, 27 December 1990, final rule) without critical habitat. The Texas Parks and Wildlife Department (TPWD) also lists the species as endangered.

Reasons for Decline: Most recent researchers have indicated that the population decline of the GCWA is a result of various factors related to destruction and fragmentation of quality habitat in the species' breeding and wintering ranges (Ladd and Gass 1999, FWS 1992, 1995, Wahl et al. 1990). Among the major causes for the decline in the amount of contiguous, suitable habitat are land clearing for agricultural use, land development (urban encroachment), and highway and reservoir construction (Oberholser 1974). Reduction in habitat quality can be traced to the suppression of natural fires in the Hill Country and overgrazing, which result in a reduction of hardwoods present in juniper-oak communities (Campbell 2003).

Habitat loss and fragmentation have also indirectly contributed to reduced survival in the species by increasing edge habitat, resulting in greater vulnerability to nest parasitism and predation. The brown-headed cowbird, which is an edge species, will lay its eggs in GCWA nests, often after removing GCWA eggs from the nest. GCWAs will then either abandon the nest, sometimes to renest elsewhere, or will continue to brood and fledge cowbird young, thus reducing survival of their own offspring (Campbell 2003). Ratsnakes (*Pantherophis* spp.), feral cats and dogs, opossums, raccoons, and other bird species are common predators of GCWA eggs. Other factors include loss of deciduous oaks, used for foraging, to oak wilt, and predation and competition by the blue jay and other urban avian species (FWS 1992).

2.2 PRESENCE IN THE GENERAL AREA

FWS (2013) and TPWD (2013) county lists of endangered and threatened species include the federally endangered GCWA as occurring in Travis County. The presence of GCWA with the Wheless Preserve is well documented. LCRA has surveyed or contracted surveys for the species on the preserve since 1993. LCRA typically conducts study plot surveys every other year, as budgets allow. Study plot surveys focus on two areas, the 92.3-acre Prime Plot and the 100.0-acre Transitional Plot. Between 1999 and 2004, LCRA surveys on the study plots resulted in a combined total of approximately 9 to 13 males. In 2010, LCRA personnel identified approximately 10 territories

within the Prime Plot and approximately five territories with the Transitional Plot. LCRA also conducts surveys of the entire preserve every five years. In 2002, Loomis Austin, Inc. identified 70 entire and 22 partial territories. This was an increase from the 60 territories found in 1993 and 1994 by a combined effort between LCRA, Texas Department of Transportation (TxDOT), and DLS Associates. LCRA staff surveyed the entire Wheless Preserve in 2006, during which time approximately 93 to 105 males were observed. Additionally in 2012, LCRA staff recorded 72 observations of GCWA, most likely representing 12 to 15 territories within the Prime and Transitional plots. LCRA staff observed both female and fledgling GCWAs within the Prime Plot portion of the study area, providing evidence of nesting within the area (LCRA 2012)

3.0 STUDY AREA

The Wheless Preserve Prime Plot is approximately 92.3 acres with dominant canopy species occurring in suitable GCWA habitat include Ashe juniper, Texas red oak, plateau live oak, Durand oak, cedar elm, Arizona walnut (*Juglans major*), Escarpment black cherry, Texas ash, sycamore, and sugarberry (*Celtis laevigata*). Common midstory and understory species include Ashe juniper, plateau live oak, Texas red oak, Texas mountain laurel (*Sophora secundiflora*), Texas redbud (*Cercis canadensis* var. *texensis*), evergreen sumac (*Rhus virens*), silk-tassel (*Garrya ovata*), Texas persimmon (*Diospyros texana*), and Mexican buckeye (*Ungnadia speciosa*). Other dominant understory species include cedar sage (*Salvia roemeriana*), frostweed (*Verbesina virginica*), greenbriar (*Smilax bona-nox*), mustang grape (*Vitis mustangensis*), and other various grasses and forbs. The majority of the Prime Plot supports mature and dense canopied woodlands comprised of the above listed species; however, some portions of the study plot support sparser and less mature woodlands that are dominated primarily by shorter statured Ashe juniper and plateau live oak. These sparser areas occur on south or southwest facing slopes. Estimated canopy cover within the Prime Plot varies from 50 percent to over 90 percent (LCRA 2012).

The Prime Plot encompasses a section of Long Hollow Creek, a spring fed stream that flows north to south along the west side of the study plot. An unnamed tributary to Long Hollow Creek also flows north to south through the center of the study plot, meeting its confluence with Long Hollow Creek near the southern end of the study plot. These two streams form small canyons that are separated by a narrow ridge/hill. East of the unnamed tributary, the study plot reaches the western edge of a relatively flat and wide plateau that separates the Long Hollow Creek watershed from the Cypress Creek watershed. Numerous ephemeral streams feed into both streams, creating a network of small canyons and draws. Consequently, topography within the Prime Plot is quite varied and rugged, with elevations ranging from approximately 780 feet above mean sea level (msl) to near 950 feet above msl (LCRA 2012).

4.0 METHODOLOGY

Atkins conducted surveys in previously identified occupied GCWA habitat within Wheless Prime Plot tract. Atkins conducted its initial survey on April 5, 2013, with subsequent surveys on April 12, 22, 25, and 29, and May 1, 7, 13, 16 and 20.

To establish a survey route, Atkins used the Wheless Prime Plot grid pattern provided from the previous 2012 season survey, which contained 53 points approximately 150 feet apart. Atkins staff visited each point, recording any observations. Incidental observations between points were also recorded. Atkins made attempts to alternate the order of points and routes during surveys, in an effort to prevent time bias of any specific point. Occasionally, topographic features necessitated slight deviations from these routes. Slight deviations also occurred when investigating detections of nearby GCWA.

A FWS permitted ecologist from Atkins performed surveys using the spot-mapping method, as described by the International Bird Census Committee (IBCC 1970) guidelines (except calculation of edge territories). Breeding territories are differentiated using observations of bird behavior, location, counter-singing, and sequential movements rather than using “clusters” (Bibbey et al. 1992). Atkins used aerial photography and U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Mansfield Dam and Jollyville, Texas quadrangles) and recorded field observations with an Iphone-4™ Global Positioning System (GPS) with 4-7 meter accuracy.

5.0 RESULTS

An Atkins ecologist conducted GCWA surveys on April 5, 12, 22, 25, and 29, and May 1, 7, 13, 16, and 20. The survey effort occurred on 10 separate days, for a total of over 61.4 survey hours. During the 2013 survey effort, Atkins ornithologists encountered GCWAs on all 10 days of the survey. Table 1 presents data including survey dates, personnel, sunrise, survey begin/end times, and weather conditions. Figures 3 and 4, located in Appendix A, depict the locations and directions of movements of GCWAs encountered during 2013, with individual observations represented by the appropriate IBCC symbol and annotated chronologically (e.g., 0405A, 0405B, 0412A, etc.). Appendix B presents detailed information for each GCWA observation in 2013, including observation/date, surveyor, time, species, sex, observation type, location type, observer (latitude/longitude), and bird data (latitude/longitude). Appendix C shows project photographs, while Appendix D shows all avian species observed in the Prime Plot.

TABLE 1
SUMMARY OF SURVEY EFFORT AND WEATHER CONDITIONS*

Date	Sunrise ¹	Beginning/ Ending Times	Temperature (°F)	Wind Direction and Speed (mph)	Cloud Cover, etc.	Precipitation
4/5/13	07:15	07:35–13:38	41–64	NNW 0–5	Clear	None
4/12/13	07:07	07:35–13:38	39–72	N 0–5	Clear	None
4/22/13	06:56	07:42–13:45	56–80	S 0–5	Clear	None
4/25/13	06:53	07:41–13:45	56–67	S 0–10	Overcast	None
4/29/13	06:49	07:39–13:42	66–79	ESE 0–5	Overcast	None
5/1/13	06:47	07:36–13:50	69–85	S 0–5	Partly cloudy	None
5/7/13	06:42	07:35–13:40	48–84	S 0–5	Clear	None
5/13/13	06:38	07:01–13:07	50–82	W 0–5	Clear	None
5/16/13	06:36	07:10–13:47	69–83	S 5–10	Overcast	None
5/20/13	06:34	07:01–13:05	72–86	SE 5–10	Overcast	None

*Personnel – Gary Newgord

5.1 VISIT 1

On April 5, 2013, the initial survey of the Prime Plot, Atkins staff recorded 14 detections of GCWA; all except one were adult males. Four of these detections were visual and the remaining 10 were audible. On one occasion, detections represented simultaneous contacts with two separate birds. At 0944, an Atkins ecologist detected two male GCWA singing the “B-Song” simultaneously, with a visual of one of the birds. All other detections were of individual GCWA singing the “A-Song,” although some of these detections likely represent subsequent observations of individual birds. At 1144, a female was visually identified; however, no nest or juveniles were detected in the vicinity of this female.

5.2 VISIT 2

On April 12, 2013, the second survey of the Prime Plot, Atkins staff recorded 14 detections of GCWA, all adult males. Three of these detections were visual and the remaining 11 were audible. Three individual birds were singing the “B-Song” while the remaining were all singing the “A-Song.”

5.3 VISIT 3

Atkins staff recorded 12 detections of GCWA on April, 22, all adult males. Two of these detections were visual and the remaining ten were audible. Seven individual birds were singing the “B-Song” at least part of the time they were detected, while the remaining were only singing the “A-Song.” At 0952, an Atkins ecologist detected two male GCWA singing the “B-Song” simultaneously. Again, at 1058, an Atkins ecologist detected two male GCWA singing simultaneously, with a visual of one of the birds, in a different location.

5.4 VISIT 4

On April 25, 2013, the fourth survey of the Prime Plot, Atkins staff recorded eight detections of GCWA, all adult males. Only one of these detections was visual and the remaining seven were audible. All of the detections were of individual GCWA singing the “A-Song”.

5.5 VISIT 5

Atkins staff recorded 8 detections of GCWA on April, 29, all adult males. Only one of these detections was visual and the remaining seven were audible. At 1034, an Atkins ecologist detected two male GCWA singing the “B-Song” simultaneously, with a visual of one of the birds. Four individual birds were singing the “B-Song” at least part of the time they were detected, while the remaining were only singing the “A-Song.”

5.6 VISIT 6

During the sixth survey of the Prime Plot on May 1, 2013, Atkins staff recorded 14 detections of GCWA, all adult males. Eight of these detections were visual and the remaining six were audible. Ten individual birds were singing the “B-Song” at least part of the time they were detected, while the remaining were only singing the “A-Song.” In addition to these, “chip” notes associated with females were detected along with some of the male detections. An attempt to visual locate these were unsuccessful, and therefore were not documented as detections. Some of the male detections during this visit likely represent subsequent observations of individual birds.

5.7 VISIT 7

Atkins staff recorded eight detections of GCWA on May 7, all adult males. Five of these detections were visual and the remaining three were audible. At 0848, an Atkins ecologist detected two male GCWA singing the “B-Song” simultaneously, with a visual of one of the birds. The other bird was also previously identified visually 6 minutes earlier. Six individual birds were singing the “B-Song” at least part of the time they were detected, while the remaining two were only singing the “A-Song.”

5.8 VISIT 8

On May 13, 2013, the eighth survey of the Prime Plot, Atkins staff recorded nine detections of GCWA, with one of the detections a female. Only three of these detections were visual and the remaining six were audible. At 0852, an Atkins ecologist detected two male GCWA singing the “A-Song” simultaneously. Five individual male birds were singing the “B-Song” at least part of the time they were detected, while the remaining three were only singing the “A-Song.” At 1050, a female was visually identified while a male was singing approximately 100 feet away. No nest or juveniles were detected in the vicinity of this female.

5.9 VISIT 9

During the ninth survey of the Prime Plot on May 16, 2013, Atkins staff recorded eight detections of GCWA, with one detection of a female and a juvenile. No nest was detected in the vicinity of this female. The female and a juvenile detection were visual and the remaining six were audible. Three of the six individual male birds were singing the “B-Song” at least part of the time they were detected, while the remaining three were only singing the “A-Song.” In addition to these, “chip” notes associated with females were detected along with some of the male detections. An attempt to visually locate these were unsuccessful and were not documented as detections.

5.10 VISIT 10

On May 20, 2013, the final survey of the Prime Plot, Atkins staff recorded eight detections of GCWA, with one of the detections a female and one a fledgling. Only four of these detections were visual, which include the female and fledgling, while the remaining four were audible. At 0853, an Atkins ecologist detected two male GCWA singing the “B-Song” simultaneously, and was able to eventually visually detect both birds. Four individual male birds were singing the “B-Song” at least part of the time they were detected, while the remaining two were only singing the “A-Song.” At 0920, a female was visually identified with a juvenile in a feeding group with several black-crested titmice and Carolina chickadees. No nest was detected in the vicinity of this female.

6.0 DISCUSSION

Atkins ecologists detected 95 adult male GCWAs, 4 females, and 2 fledglings during the spring 2013 survey, with additional detections of new locations of these birds (Table 2). Thirty-two of the GCWAs (26 males, all 4 females, and 2 fledglings) were visually verified, while the remaining GCWAs were only heard. As noted above, many of these 95 male birds were likely seen on previous/subsequent visits. Based on the locations and timing of the GCWA encounters, as well as local topography, Atkins estimates that the 95 adult male GCWAs encountered in 2013 may represent 14 possible GCWA territories (Figure 4), with approximately 8 territories containing the majority of their acreage within the prime plot. Table 2 provides the estimated acreage of the territories. When factoring the calculation of edge territories, which are counted as 0.5 territories (Verner 1995), the prime plot also would contain a total of 8 territories. When factoring pairing success, territories that extend beyond the Prime Plot were not included. Therefore, one of the four territories contained within the prime plot had a female observed within its boundary, giving a pairing success of 25.0%. Additionally, the territories that had detections of a female and a fledgling extended beyond the Prime Plot and were not counted under methods based on Anders (2000), giving no breeding success, estimated brood size, or productivity. Although female and offspring observations were limited, the percentage of pairing and breeding success is expected to be much higher than what was calculated using Anders (2000). The data is constrained by the size and

borders of the Prime Plot, and the number of detections of female and fledglings may have been limited by their lack of vocalizations.

TABLE 2
ESTIMATED TERRITORIES AND ACREAGE

TERRITORY #	ACREAGE
1	-
2	6.42
3	6.35
4	5.0
5	7.12
6	7.52
7	-
8	7.59
9	-
10	6.81
11	8.59
12	-
13	4.97
14	-

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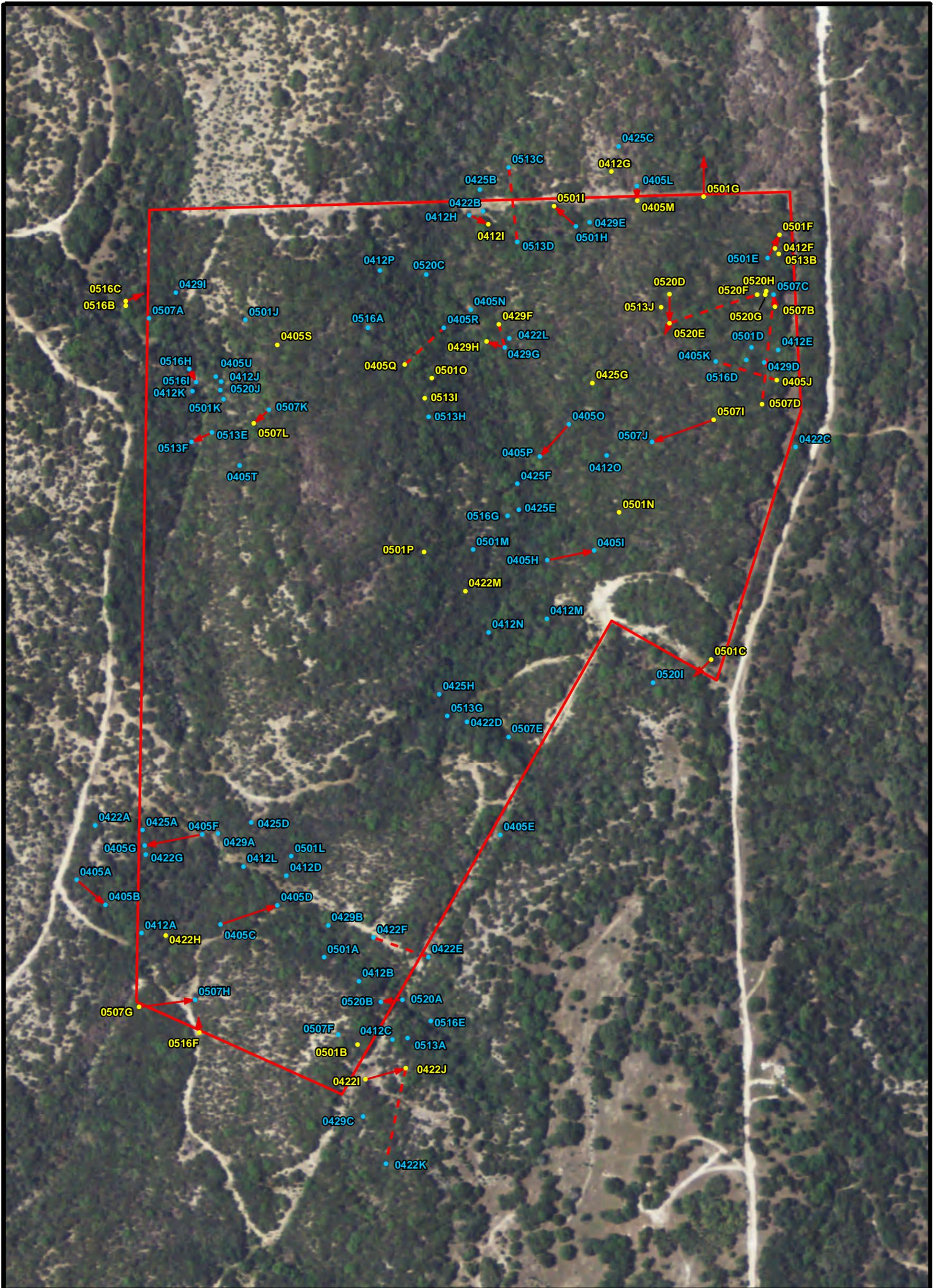
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Appendix A

Figures of GCWA Locations



Legend

GCWA Observation Type

- Auditory
- Visual
- Movement
- - - Simultaneous
- Wheless Prime Plot Boundary



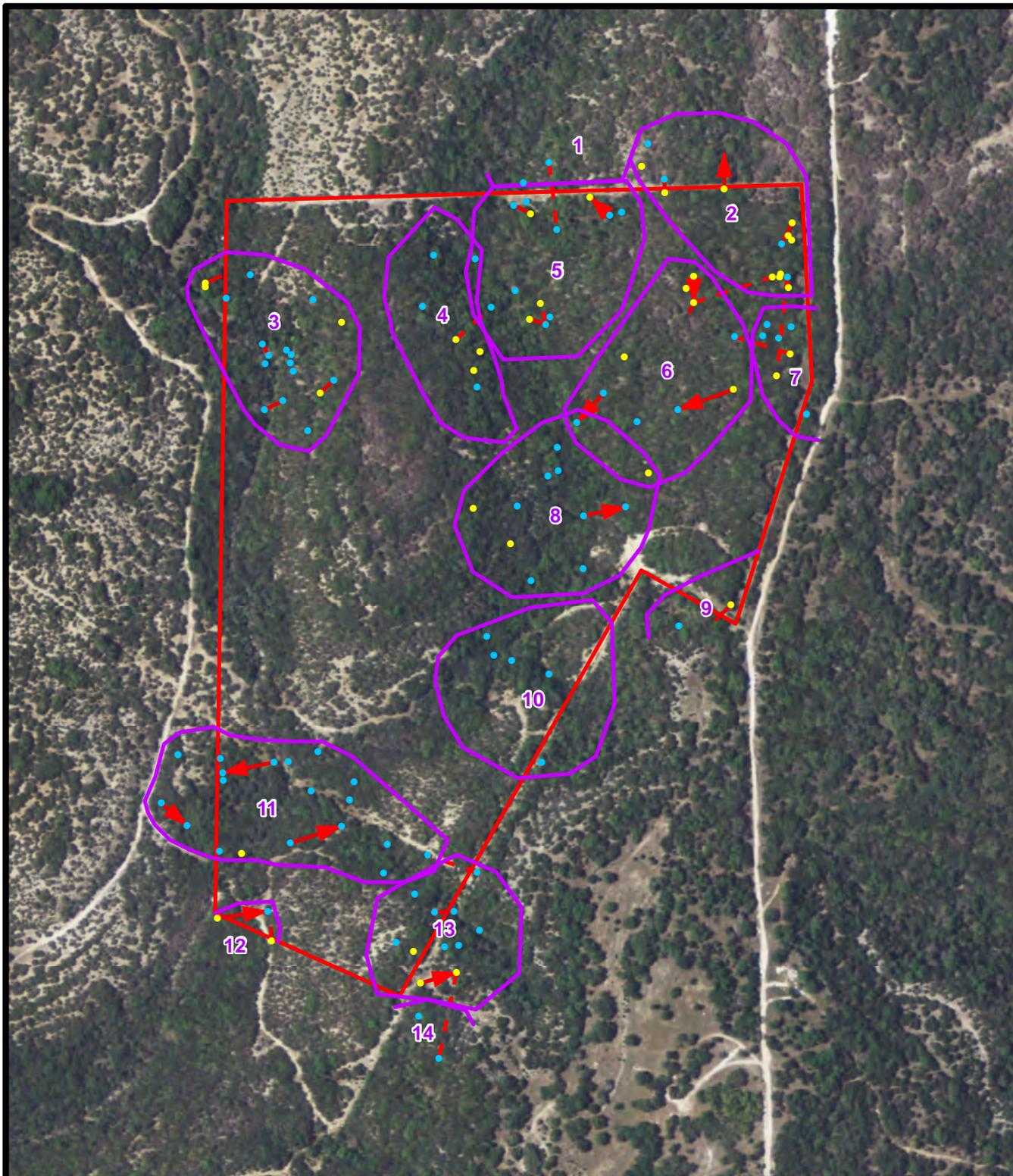
0 150 300
 Feet

ATKINS

Figure 3

SPRING 2013 GCWA SURVEY
 WHELESS PRIME PLOT
 GCWA OBSERVATIONS

Aerial Source: 2012 NAIP (6-11-2012)



Legend

GCWA Observation Type

- Auditory
- Visual
- Territory Boundary
- ➔ Movement
- Simultaneous
- Wheless Prime Plot Boundary



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Figure 4
 SPRING 2013 GCWA SURVEY
 WHELESS PRIME PLOT
 ESTIMATED GCWA TERRITORIES

Appendix B

Observation Data and Locations

Appendix B: Observation Data and Locations

Observation	Date	Surveyor*	Time	Species	Sex	Observation Type	Location Type	Observer Latitude	Observer Longitude	Bird Latitude	Bird Longitude
0405A	4/5/2013	GN	7:36	GCWA	Male	Auditory	Digitized	30.456516	-97.875124	30.456658	-97.874952
0405B	4/5/2013	GN	7:43	GCWA	Male	Auditory	Digitized	30.456447	-97.875072	30.456439	-97.874676
0405C	4/5/2013	GN	7:59	GCWA	Male	Auditory	Digitized	30.456061	-97.873777	30.456251	-97.873547
0405D	4/5/2013	GN	8:13	GCWA	Male	Auditory	Digitized	30.456213	-97.873213	30.456403	-97.872983
0405E	4/5/2013	GN	8:24	GCWA	Male	Auditory	Digitized	30.456965	-97.870933	30.456962	-97.870774
0405F	4/5/2013	GN	8:41	GCWA	Male	Auditory	Digitized	30.457366	-97.873698	30.457022	-97.873707
0405G	4/5/2013	GN	8:43	GCWA	Male	Auditory	Digitized	30.457126	-97.874044	30.456936	-97.874273
0405H	4/5/2013	GN	9:18	GCWA	Male	Auditory	Digitized	30.459002	-97.869924	30.459300	-97.870253
0405I	4/5/2013	GN	9:29	GCWA	Male	Auditory	Digitized	30.459075	-97.869461	30.459373	-97.869790
0405J	4/5/2013	GN	9:44	GCWA	Male	Visual	Actual	30.460797	-97.867952	30.460797	-97.867952
0405K	4/5/2013	GN	9:44	GCWA	Male	Auditory	Digitized	30.460901	-97.868098	30.460968	-97.868553
0405L	4/5/2013	GN	10:04	GCWA	Male	Auditory	Digitized	30.462342	-97.869292	30.462480	-97.869289
0405M	4/5/2013	GN	10:09	GCWA	Male	Visual	Actual	30.462356	-97.869288	30.462356	-97.869288
0405N	4/5/2013	GN	10:20	GCWA	Male	Auditory	Digitized	30.461462	-97.871268	30.461456	-97.870950
0405O	4/5/2013	GN	10:39	GCWA	Male	Auditory	Digitized	30.460469	-97.870484	30.460460	-97.870008
0405P	4/5/2013	GN	10:44	GCWA	Male	Auditory	Digitized	30.460191	-97.870540	30.460186	-97.870302
0405Q	4/5/2013	GN	11:14	GCWA	Male	Visual	Actual	30.460999	-97.871612	30.460999	-97.871612
0405R	4/5/2013	GN	11:14	GCWA	Male	Auditory	Digitized	30.460926	-97.871677	30.461306	-97.871218
0405S	4/5/2013	GN	11:44	GCWA	Female	Visual	Actual	30.461194	-97.872861	30.461194	-97.872861
0405T	4/5/2013	GN	12:02	GCWA	Male	Auditory	Digitized	30.460171	-97.873576	30.460165	-97.873259
0405U	4/5/2013	GN	12:47	GCWA	Male	Auditory	Digitized	30.460839	-97.873587	30.460934	-97.873472
0412A	4/12/2013	GN	7:41	GCWA	Male	Auditory	Digitized	30.456018	-97.874533	30.456189	-97.874327
0412B	4/12/2013	GN	8:01	GCWA	Male	Auditory	Digitized	30.455542	-97.871979	30.455740	-97.872198
0412C	4/12/2013	GN	8:07	GCWA	Male	Auditory	Digitized	30.455229	-97.871625	30.455234	-97.871879
0412D	4/12/2013	GN	8:18	GCWA	Male	Auditory	Digitized	30.456647	-97.872569	30.456653	-97.872886
0412E	4/12/2013	GN	9:12	GCWA	Male	Auditory	Digitized	30.460641	-97.867942	30.461054	-97.867932
0412F	4/12/2013	GN	9:19	GCWA	Male	Visual	Actual	30.461921	-97.867942	30.461921	-97.867942

Observation	Date	Surveyor*	Time	Species	Sex	Observation Type	Location Type	Observer Latitude	Observer Longitude	Bird Latitude	Bird Longitude
0412G	4/12/2013	GN	9:42	GCWA	Male	Visual	Actual	30.462609	-97.869535	30.462609	-97.869535
0412H	4/12/2013	GN	9:50	GCWA	Male	Auditory	Digitized	30.462403	-97.870942	30.462266	-97.870945
0412I	4/12/2013	GN	9:59	GCWA	Male	Visual	Actual	30.462183	-97.870760	30.462183	-97.870760
0412J	4/12/2013	GN	10:29	GCWA	Male	Auditory	Digitized	30.460896	-97.873737	30.460890	-97.873420
0412K	4/12/2013	GN	10:54	GCWA	Male	Auditory	Digitized	30.460818	-97.874023	30.460812	-97.873706
0412L	4/12/2013	GN	11:35	GCWA	Male	Auditory	Digitized	30.456746	-97.873624	30.456740	-97.873307
0412M	4/12/2013	GN	11:39	GCWA	Male	Auditory	Digitized	30.458793	-97.869951	30.458800	-97.870269
0412N	4/12/2013	GN	11:53	GCWA	Male	Auditory	Digitized	30.458420	-97.870851	30.458695	-97.870844
0412O	4/12/2013	GN	12:43	GCWA	Male	Auditory	Digitized	30.459633	-97.869659	30.460183	-97.869645
0412P	4/12/2013	GN	12:43	GCWA	Male	Auditory	Digitized	30.461260	-97.871848	30.461810	-97.871834
0422A	4/22/2013	GN	7:52	GCWA	Male	Auditory	Digitized	30.457114	-97.874440	30.457120	-97.874758
0422B	4/22/2013	GN	8:42	GCWA	Male	Auditory	Digitized	30.462433	-97.870802	30.462295	-97.870805
0422C	4/22/2013	GN	9:09	GCWA	Male	Auditory	Digitized	30.460222	-97.867845	30.460221	-97.867782
0422D	4/22/2013	GN	9:37	GCWA	Male	Auditory	Digitized	30.457930	-97.870823	30.457934	-97.871077
0422E	4/22/2013	GN	9:52	GCWA	Male	Auditory	Digitized	30.455934	-97.871667	30.455931	-97.871508
0422F	4/22/2013	GN	9:52	GCWA	Male	Auditory	Digitized	30.456383	-97.872037	30.456108	-97.872044
0422G	4/22/2013	GN	10:10	GCWA	Male	Auditory	Digitized	30.456865	-97.874505	30.456860	-97.874267
0422H	4/22/2013	GN	10:31	GCWA	Male	Visual	Actual	30.456166	-97.874086	30.456166	-97.874086
0422I	4/22/2013	GN	10:51	GCWA	Male	Visual	Actual	30.454896	-97.872155	30.454896	-97.872155
0422J	4/22/2013	GN	10:58	GCWA	Male	Visual	Actual	30.454986	-97.871757	30.454986	-97.871757
0422K	4/22/2013	GN	10:58	GCWA	Male	Auditory	Digitized	30.454770	-97.872629	30.454174	-97.871970
0422L	4/22/2013	GN	12:01	GCWA	Male	Auditory	Digitized	30.461196	-97.870259	30.461202	-97.870576
0422M	4/22/2013	GN	12:50	GCWA	Male	Visual	Actual	30.459060	-97.871541	30.459051	-97.871065
0425A	4/25/2013	GN	7:49	GCWA	Male	Auditory	Digitized	30.456689	-97.874752	30.457069	-97.874293
0425B	4/25/2013	GN	8:22	GCWA	Male	Auditory	Digitized	30.462196	-97.871176	30.462481	-97.870833
0425C	4/25/2013	GN	8:37	GCWA	Male	Auditory	Digitized	30.463101	-97.869452	30.462826	-97.869460
0425D	4/25/2013	GN	9:49	GCWA	Male	Auditory	Digitized	30.457091	-97.873698	30.457115	-97.873223
0425E	4/25/2013	GN	10:32	GCWA	Male	Auditory	Digitized	30.459745	-97.870996	30.459736	-97.870520
0425F	4/25/2013	GN	10:36	GCWA	Male	Auditory	Digitized	30.459965	-97.870847	30.459959	-97.870529

Observation	Date	Surveyor*	Time	Species	Sex	Observation Type	Location Type	Observer Latitude	Observer Longitude	Bird Latitude	Bird Longitude
0425G	4/25/2013	GN	11:10	GCWA	Male	Visual	Actual	30.460805	-97.869768	30.460805	-97.869768
0425H	4/25/2013	GN	12:23	GCWA	Male	Auditory	Digitized	30.457970	-97.871348	30.458176	-97.871343
0429A	4/29/2013	GN	7:58	GCWA	Male	Auditory	Digitized	30.457227	-97.873770	30.457028	-97.873550
0429B	4/29/2013	GN	8:22	GCWA	Male	Auditory	Digitized	30.456077	-97.872659	30.456220	-97.872487
0429C	4/29/2013	GN	8:42	GCWA	Male	Auditory	Digitized	30.454780	-97.872404	30.454582	-97.872185
0429D	4/29/2013	GN	9:58	GCWA	Male	Auditory	Digitized	30.460951	-97.868072	30.460951	-97.868072
0429E	4/29/2013	GN	10:21	GCWA	Male	Auditory	Digitized	30.462386	-97.869757	30.462180	-97.869762
0429F	4/29/2013	GN	10:34	GCWA	Male	Visual	Actual	30.461328	-97.870676	30.461328	-97.870676
0429G	4/29/2013	GN	10:34	GCWA	Male	Auditory	Digitized	30.461524	-97.871062	30.461126	-97.870624
0429H	4/29/2013	GN	10:38	GCWA	Male	Visual	Actual	30.461180	-97.870800	30.461180	-97.870800
0429I	4/29/2013	GN	11:55	GCWA	Male	Auditory	Digitized	30.461655	-97.873659	30.461659	-97.873850
0501A	5/1/2013	GN	7:54	GCWA	Male	Auditory	Digitized	30.455568	-97.872994	30.455948	-97.872535
0501B	5/1/2013	GN	8:08	GCWA	Male	Visual	Actual	30.455195	-97.872225	30.455195	-97.872225
0501C	5/1/2013	GN	9:07	GCWA	Male	Visual	Actual	30.458420	-97.868660	30.458420	-97.868660
0501D	5/1/2013	GN	9:26	GCWA	Male	Auditory	Digitized	30.461083	-97.868197	30.461083	-97.868197
0501E	5/1/2013	GN	9:41	GCWA	Male	Auditory	Digitized	30.461743	-97.867908	30.461842	-97.868018
0501F	5/1/2013	GN	9:42	GCWA	Male	Visual	Actual	30.462038	-97.867897	30.462038	-97.867897
0501G	5/1/2013	GN	10:06	GCWA	Male	Visual	Actual	30.462377	-97.868632	30.462377	-97.868632
0501H	5/1/2013	GN	10:12	GCWA	Male	Auditory	Digitized	30.462424	-97.869888	30.462149	-97.869895
0501I	5/1/2013	GN	10:13	GCWA	Male	Visual	Actual	30.462324	-97.870107	30.462324	-97.870107
0501J	5/1/2013	GN	10:41	GCWA	Male	Auditory	Digitized	30.461608	-97.873388	30.461410	-97.873169
0501K	5/1/2013	GN	10:53	GCWA	Male	Auditory	Digitized	30.460744	-97.873720	30.460738	-97.873403
0501L	5/1/2013	GN	11:09	GCWA	Male	Auditory	Digitized	30.456677	-97.873006	30.456819	-97.872835
0501M	5/1/2013	GN	12:10	GCWA	Male	Auditory	Digitized	30.459401	-97.870822	30.459404	-97.870981
0501N	5/1/2013	GN	12:43	GCWA	Male	Visual	Actual	30.459696	-97.869533	30.459696	-97.869533
0501O	5/1/2013	GN	13:08	GCWA	Male	Visual	Actual	30.460878	-97.871349	30.460878	-97.871349
0501P	5/1/2013	GN	13:25	GCWA	Male	Visual	Actual	30.459392	-97.871461	30.459392	-97.871461
0507A	5/7/2013	GN	8:00	GCWA	Male	Auditory	Digitized	30.461537	-97.874004	30.461442	-97.874119
0507B	5/7/2013	GN	8:42	GCWA	Male	Visual	Actual	30.461423	-97.867957	30.461423	-97.867957

Observation	Date	Surveyor*	Time	Species	Sex	Observation Type	Location Type	Observer Latitude	Observer Longitude	Bird Latitude	Bird Longitude
0507C	5/7/2013	GN	8:48	GCWA	Male	Auditory	Digitized	30.462352	-97.867943	30.461528	-97.867964
0507D	5/7/2013	GN	8:48	GCWA	Male	Visual	Actual	30.460594	-97.868104	30.460594	-97.868104
0507E	5/7/2013	GN	9:28	GCWA	Male	Auditory	Digitized	30.457937	-97.870669	30.457799	-97.870672
0507F	5/7/2013	GN	9:54	GCWA	Male	Auditory	Digitized	30.455150	-97.872415	30.455288	-97.872412
0507G	5/7/2013	GN	10:08	GCWA	Male	Visual	Actual	30.455559	-97.874366	30.455559	-97.874366
0507H	5/7/2013	GN	10:09	GCWA	Male	Auditory	Digitized	30.455231	-97.874271	30.455612	-97.873813
0507I	5/7/2013	GN	12:08	GCWA	Male	Visual	Actual	30.460470	-97.868582	30.460470	-97.868582
0507J	5/7/2013	GN	12:09	GCWA	Male	Auditory	Digitized	30.460671	-97.868735	30.460291	-97.869194
0507K	5/7/2013	GN	12:55	GCWA	Male	Auditory	Digitized	30.460633	-97.872641	30.460639	-97.872958
0507L	5/7/2013	GN	13:10	GCWA	Male	Visual	Actual	30.460524	-97.873110	30.460524	-97.873110
0513A	5/13/2013	GN	7:22	GCWA	Male	Auditory	Digitized	30.455249	-97.872047	30.455243	-97.871729
0513B	5/13/2013	GN	8:28	GCWA	Male	Visual	Actual	30.461873	-97.867905	30.461873	-97.867905
0513C	5/13/2013	GN	8:52	GCWA	Male	Auditory	Digitized	30.462388	-97.870553	30.462663	-97.870546
0513D	5/13/2013	GN	8:52	GCWA	Male	Auditory	Digitized	30.462299	-97.870472	30.462024	-97.870479
0513E	5/13/2013	GN	9:17	GCWA	Male	Auditory	Digitized	30.460461	-97.873841	30.460455	-97.873524
0513F	5/13/2013	GN	9:18	GCWA	Male	Auditory	Digitized	30.460471	-97.873611	30.460376	-97.873726
0513G	5/13/2013	GN	10:16	GCWA	Male	Auditory	Digitized	30.457782	-97.871273	30.457989	-97.871268
0513H	5/13/2013	GN	10:39	GCWA	Male	Auditory	Digitized	30.460822	-97.871382	30.460548	-97.871389
0513I	5/13/2013	GN	10:50	GCWA	Female	Visual	Actual	30.460707	-97.871423	30.460707	-97.871423
0513J	5/13/2013	GN	11:24	GCWA	Male	Visual	Actual	30.461441	-97.869076	30.461441	-97.869076
0516A	5/16/2013	GN	7:47	GCWA	Male	Auditory	Digitized	30.461072	-97.871692	30.461321	-97.871966
0516B	5/16/2013	GN	9:10	GCWA	Female	Visual	Actual	30.461554	-97.874345	30.461554	-97.874345
0516C	5/16/2013	GN	9:10	GCWA	Immature	Visual	Actual	30.461593	-97.874344	30.461593	-97.874344
0516D	5/16/2013	GN	9:44	GCWA	Male	Auditory	Digitized	30.461163	-97.868019	30.460972	-97.868249
0516E	5/16/2013	GN	10:43	GCWA	Male	Auditory	Digitized	30.455583	-97.871716	30.455385	-97.871496
0516F	5/16/2013	GN	11:01	GCWA	Male	Visual	Actual	30.455330	-97.873778	30.455330	-97.873778
0516G	5/16/2013	GN	12:32	GCWA	Male	Auditory	Digitized	30.459289	-97.870194	30.459686	-97.870633
0516H	5/16/2013	GN	13:10	GCWA	Male	Auditory	Digitized	30.460781	-97.873739	30.461001	-97.873733
0516I	5/16/2013	GN	13:15	GCWA	Male	Auditory	Digitized	30.460884	-97.873478	30.460888	-97.873669

Observation	Date	Surveyor*	Time	Species	Sex	Observation Type	Location Type	Observer Latitude	Observer Longitude	Bird Latitude	Bird Longitude
0520A	5/20/2013	GN	7:14	GCWA	Male	Auditory	Digitized	30.455297	-97.871779	30.455572	-97.871772
0520B	5/20/2013	GN	7:20	GCWA	Male	Auditory	Digitized	30.455558	-97.871827	30.455561	-97.871985
0520C	5/20/2013	GN	8:20	GCWA	Male	Auditory	Digitized	30.462177	-97.871370	30.461765	-97.871380
0520D	5/20/2013	GN	8:45	GCWA	Male	Visual	Actual	30.461550	-97.868991	30.461550	-97.868991
0520E	5/20/2013	GN	8:53	GCWA	Male	Visual	Actual	30.461304	-97.868997	30.461304	-97.868997
0520F	5/20/2013	GN	8:53	GCWA	Male	Visual	Actual	30.461531	-97.868127	30.461531	-97.868127
0520G	5/20/2013	GN	9:20	GCWA	Female	Visual	Actual	30.461527	-97.868048	30.461527	-97.868048
0520H	5/20/2013	GN	9:20	GCWA	Immature	Visual	Actual	30.461557	-97.868039	30.461557	-97.868039
0520I	5/20/2013	GN	9:37	GCWA	Male	Auditory	Digitized	30.458508	-97.869231	30.458233	-97.869238
0520J	5/20/2013	GN	11:26	GCWA	Male	Auditory	Digitized	30.460955	-97.873259	30.460813	-97.873431

*Personnel GN = Gary Newgord

Appendix C

Project Photographs

**Appendix C: LCRA Wheless Prime Plot Project Photographs
Travis County, Texas**



Photo 1: View of Prime Plot from cut in eastern portion facing southwest.



Photo 2: View of typical understory in ravine within central portion of the Prime Plot.

Appendix D

Avian Species Observed in the Prime Plot

Appendix D: Avian Species Observation in the Prime Plot

Common Name ²	Scientific Name ²
Northern bobwhite	<i>Colinus virginianus</i>
Wild turkey	<i>Meleagris gallopavo</i>
Great blue heron	<i>Ardea herodias</i>
Black vulture	<i>Coragyps atratus</i>
Turkey vulture	<i>Cathartes aura</i>
Mississippi kite	<i>Ictinia mississippiensis</i>
Cooper's hawk	<i>Accipiter cooperii</i>
Red-shouldered hawk	<i>Buteo lineatus</i>
Swainson's hawk	<i>Buteo swainsoni</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
White-winged dove	<i>Zenaida asiatica</i>
Mourning dove	<i>Zenaida macroura</i>
Inca dove	<i>Columbina inca</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Greater roadrunner	<i>Geococcyx californianus</i>
Common nighthawk	<i>Chordeiles minor</i>
Chuck-will's-widow	<i>Antrostomus carolinensis</i>
Chimney swift	<i>Chaetura pelagica</i>
Black-chinned hummingbird	<i>Archilochus alexandri</i>
Golden-fronted woodpecker	<i>Melanerpes aurifrons</i>
Ladder-backed woodpecker	<i>Picoides scalaris</i>
Least flycatcher	<i>Empidonax minimus</i>
Eastern phoebe	<i>Sayornis phoebe</i>
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>
Great crested flycatcher	<i>Myiarchus crinitus</i>
Scissor-tailed flycatcher	<i>Tyrannus forficatus</i>
White-eyed vireo	<i>Vireo griseus</i>
Warbling vireo	<i>Vireo gilvus</i>
Red-eyed vireo	<i>Vireo olivaceus</i>
Blue jay	<i>Cyanocitta cristata</i>
Western scrub-jay	<i>Aphelocoma californica</i>
American crow	<i>Corvus brachyrhynchos</i>

Common Name ²	Scientific Name ²
Purple martin	<i>Progne subis</i>
Cliff swallow	<i>Petrochelidon pyrrhonota</i>
Carolina chickadee	<i>Poecile carolinensis</i>
Black-crested titmouse	<i>Baeolophus atricristatus</i>
Canyon wren	<i>Catherpes mexicanus</i>
House wren	<i>Troglodytes aedon</i>
Carolina wren	<i>Thryomanes ludovicianus</i>
Bewick's wren	<i>Thryomanes bewickii</i>
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>
Golden-crowned kinglet	<i>Regulus satrapa</i>
Ruby-crowned kinglet	<i>Regulus calendula</i>
Swainson's thrush	<i>Catharus ustulatus</i>
Northern mockingbird	<i>Mimus polyglottos</i>
Northern waterthrush	<i>Parkesia noveboracensis</i>
Black-and-white warbler	<i>Mniotilta varia</i>
Tennessee warbler	<i>Oreothlypis peregrina</i>
Orange-crowned warbler	<i>Oreothlypis celata</i>
Nashville warbler	<i>Oreothlypis ruficapilla</i>
Mourning warbler	<i>Geothlypis philadelphia</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Magnolia warbler	<i>Setophaga magnolia</i>
Blackburnian warbler	<i>Setophaga fusca</i>
Golden-cheeked warbler	<i>Setophaga chrysoparia</i>
Black-throated green	<i>Setophaga virens</i>
Wilson's warbler	<i>Cardellina pusilla</i>
Rufous-crowned sparrow	<i>Aimophila ruficeps</i>
Chipping sparrow	<i>Spizella passerina</i>
Lark sparrow	<i>Chondestes grammacus</i>
White-crowned sparrow	<i>Zonotrichia leucophrys</i>
Summer tanager	<i>Piranga rubra</i>
Northern cardinal	<i>Cardinalis cardinalis</i>
Painted bunting	<i>Passerina ciris</i>
Great-tailed grackle	<i>Quiscalus mexicanus</i>
Brown-headed cowbird	<i>Molothrus ater</i>

¹Nomenclature and taxonomic order follows American Ornithologists' Union (AOU, 1998, 2000, 2002–2012)