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Golden-cheeked Warbler Annual Report – 2017



Photo by R. Rylander

Report Overview

In order to get a better understanding of the status of the endangered Golden-cheeked Warbler in southern Hays County, Texas, we conducted transect and territory mapping studies of this species between the months of March – June 2017. Though few birds were located and none observed as breeding individuals, this research still holds significance as to what remaining habitat the warbler may utilize in the future since central Texas landscapes continue to diminish under anthropogenic change.

Brief Species Introduction

The Golden-cheeked Warbler (*Setophaga chrysoparia*, hereafter GCWA) is a small neotropical passerine that selectively breeds only within the Edwards Plateau Region of central Texas. It is dependent upon large stands of mature juniper-oak woodlands that are typically located near or along canyon slopes. The birds use this habitat for nesting, breeding, and carrying

out most foraging behaviors during the months of March - July (Pulich 1976). Due to habitat loss and fragmentation over the past 50 years, the GCWA was emergency listed as endangered in 1990 by the U.S. Fish and Wildlife Service (USFWS 1990). Since then, multiple conservation-based institutions, organizations, military bases and independent biologists have dedicated their time, finances, and effort into studying and preserving this species. Even though research efforts have been fruitful and current GCWA population numbers appear stable, the warbler continues to suffer from (first and foremost) habitat loss and fragmentation, followed by other factors such as brood parasitism and predation, anthropogenic activities and noise, among other things (Groce et al. 2010, Duarte et al. 2016).

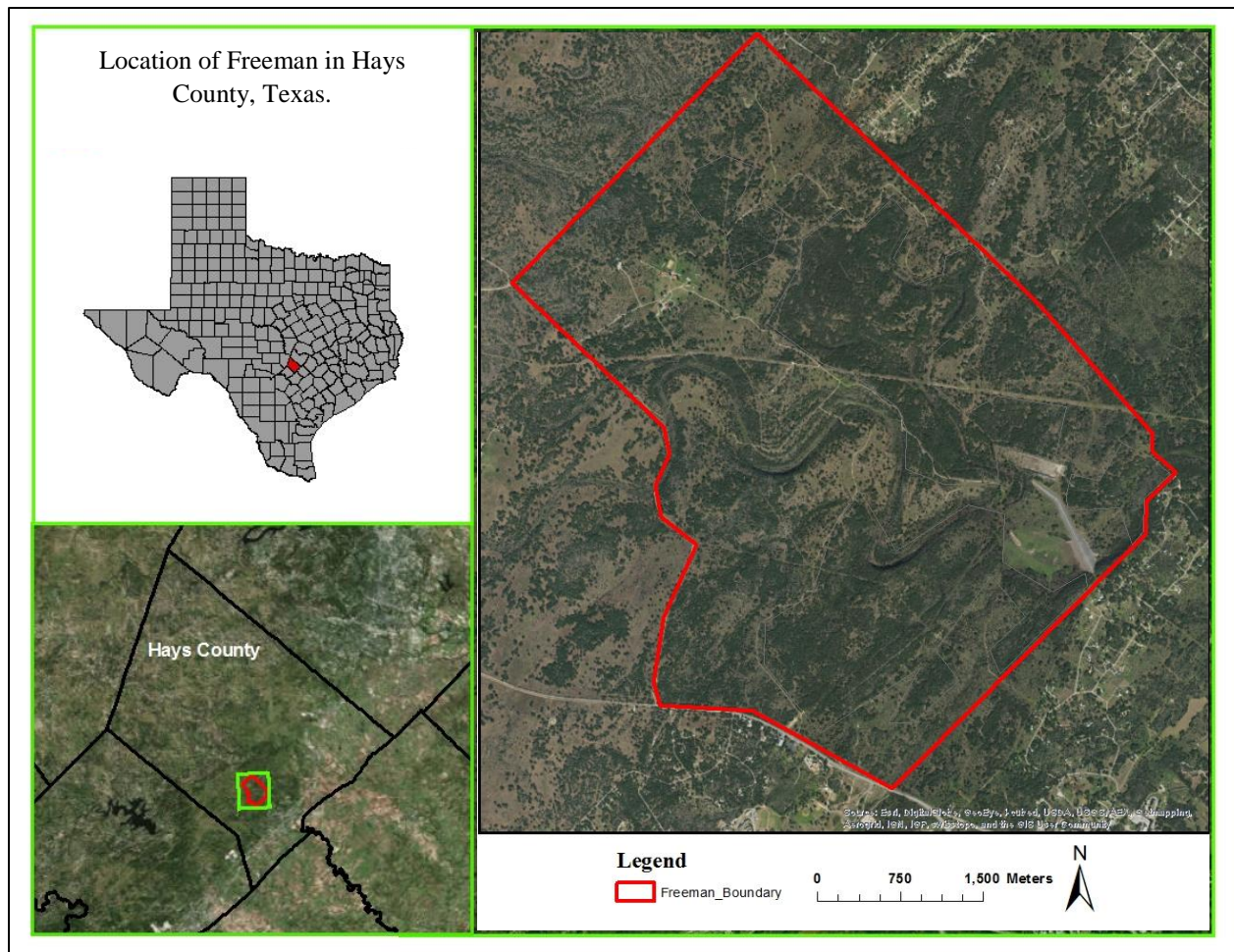
GCWA Survey Sites

The city of San Marcos is located near the southeastern tip of Hays County, which is an area that has been under constant growth and construction over the past decade. According to the U.S. Census Bureau, San Marcos and the surrounding areas near the Interstate 35 (I-35) corridor are part of the fastest growing population centers, not only in the state, but in the nation. With rapid population growth comes building human infrastructures, roads, and landscape change in order to support the increasing number of people. Therefore natural habitat such as woodlands and grasslands are fragmented and converted at an alarming rate. Among the increasing human populations in central Texas, small areas of “suitable” GCWA habitat still exist in patches within southeastern Hays County. Therefore the following survey location was chosen mostly due to availability of access, but also because it still contained decent stands of mature juniper-oak woodlands that the GCWA needs to successfully breed.

The Freeman Center, a Texas State University owned property, is located roughly 5 miles NW of downtown San Marcos, Texas, and contains over 4,000 acres of mixed habitat types (Figure 1). Large sections of oak-juniper woodlands (*Juniperus ashei*, *Quercus fusiformis*, *Quercus buckleyi*, *Ulmus crassifolia*) are scattered throughout, with the main contiguous patches of potential GCWA habitat measuring around 700 acres (as noted from aerials in ArcGIS 10.2). Other habitat types located at the Freeman Center include grasslands and savannahs that were originally kept clear of woody vegetation due to cattle grazing. While no longer a major cattle ranch, the Freeman Center hosts a number of researchers from Texas State University who study agricultural, biological and anthropological subject matters.

In order to narrow our survey locations for GCWAs at the Freeman Center, four polygons were created in ArcGIS around habitat types that seemed most likely to contain warblers during the breeding season (Figure 2). Note that all polygons are not equal in size or shape – they were only created to contain likely GCWA habitat based on aerial imagery. Previous knowledge about GCWA occupancy on property was also used in order to create the four polygons (Rylander, personal communication).

Figure 1.



Survey Methodology

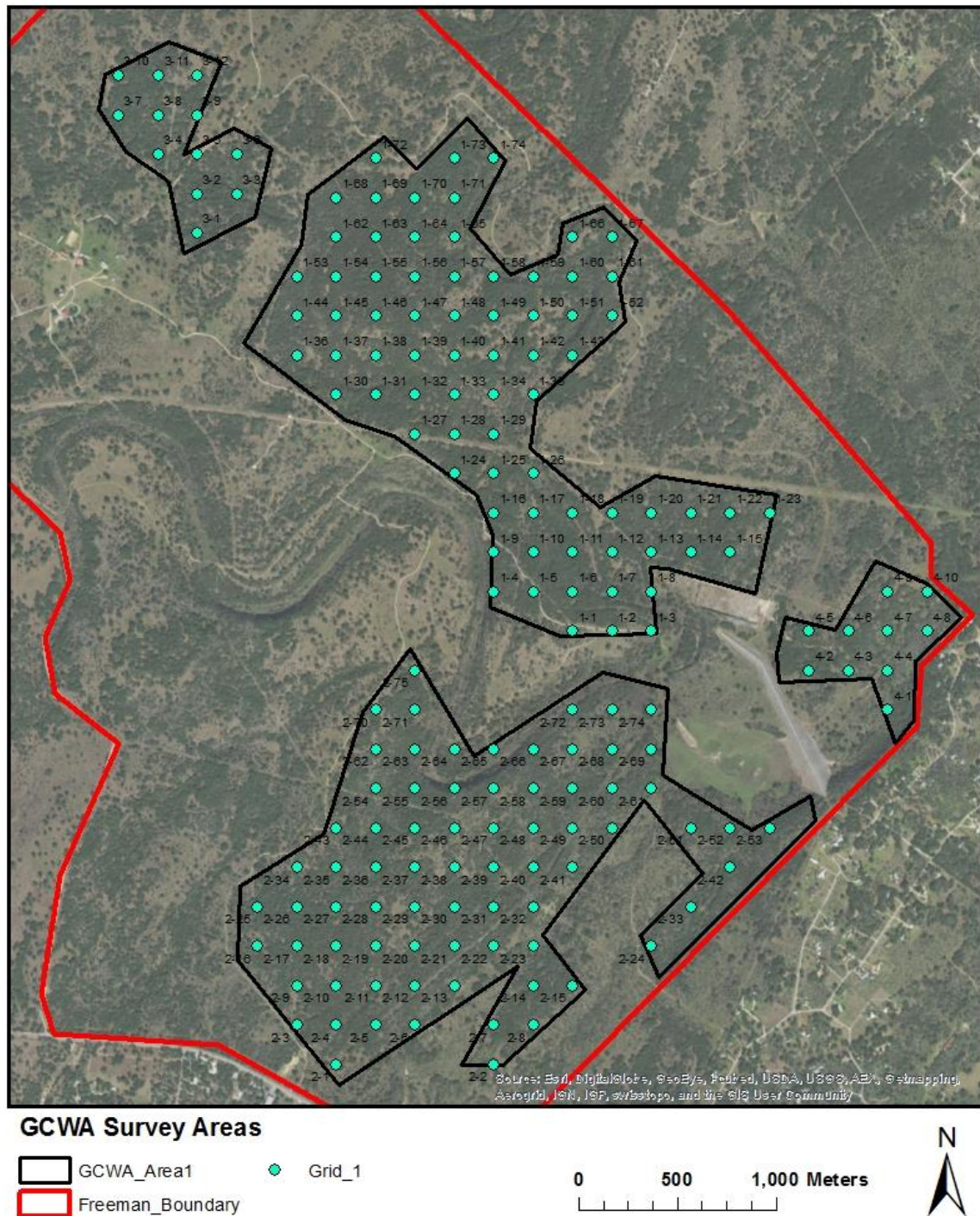
The following methods were used to survey and monitor GCWAs on university property. Even though there are many different ways to perform these surveys, we choose to use protocol similar to those used on Fort Hood Military Reserve, the Balcones Canyonlands Preserve (BCP), and Camp Bullis Military Base in San Antonio, Texas.

Transects

At the beginning of the season when GCWAs first arrive (late February and early March), transects were conducted across suspected GCWA habitat at the Freeman Center. Transects were plotted using the “Fishnet” tool on ArcGIS 10.2 (ESRI, Inc., Redlands, California), using aerial imagery to identify suspected warbler habitat (Figure 2). Each transect consisted of a series of points located every 200m, where the observer paused for 5 minutes to listen for singing males. Observers began these transects no later than 30 minutes after daybreak, and direction in which transect plots were walked were altered on each visit. Each transect point

was covered at least 3 times on visits separated by at least 5 days. If any singing males were detected at a point, an estimated distance and bearing were taken for each individual, as well as a GPS point as close to the singing individual as possible. Transects were primarily done to locate GCWAs on property so that the birds could be territory mapped later in the season.

Figure 2.



Territory mapping

If GCWAs were located via transects, males were then territory mapped using similar methods to those utilized by the City of Austin, Travis County Balcones Canyonlands Preserve, and Fort Hood Military Reserve (Reidy and Thompson 2010, Peak 2011, Balcones Canyonlands Preserve Land Managers Handbook, Tier IIA, Chapter VII: Monitoring the Golden-cheeked Warbler 2007 (hereafter BCP 2007), International Bird Census Committee IBCC Guidelines 1970, Verner 1985, Bibby et al. 1992). Between March 15 and June 1, each GCWA territory was visited once every week (>5 days between visits), and GPS locations of the bird were taken roughly every 5-10 minutes (or taken during every 'large' flight movement (>30m)) for up to 45 minutes per territory. Surveys began roughly 30 minutes before sunrise and completed within 6 hours. Temperatures needed to be above 55 degrees Fahrenheit and consistent wind patterns less than 15 mph for detectability purposes. Observations were also made on GCWA age (if clearly visible through binoculars), additional counter-singing males in the vicinity, presence of female, and potential nesting behavior. If males or females were suspected of building a nest, then extra time was taken to locate the nest. Search time was not excessive though as to keep disturbance within breeding GCWA habitat down to a minimum (BCP 2007, Reidy and Thompson 2010).

Territories of breeding males were considered successful and used if a) the male is observed in the same location on at least three different visits, b) the male is seen with a female (courtship behavior, nest building, etc.), or c) is observed feeding fledglings (BCP 2007).

All GPS coordinates were uploaded into ArcGIS 10.2 and plotted against an aerial imagery for that particular location. Once all points were sorted out into distinctive male GCWAs, territories were calculated using minimum convex polygons (MCPs).

Six separate surveyors visited the GCWA plots for both transects and territory mapping; undergraduate students Joseph Plappert, Jacob Weishuhn, Philip Doiron, and Bryan Baird, and graduate students Sarah Durham and Rebekah Rylander. All surveyors were trained to identify GCWAs by sight and by sound (USFWS permits TE143922-1 (Bio-Spatial Services) and TE168189-0), and were familiar with transect and spot mapping techniques before official data was collected. GPS points were taken on various models of GPS units, but all were checked to be accurate and precise for the study.

Survey Results

With over 300 hours of volunteer survey efforts, a total of five unique GCWA males were detected during our Freeman Center surveys in southeastern Hays County (Figure 3). All detected male GCWAs were assigned a unique number, and those numbers are used in preceding paragraphs and tables for in-depth results (Table 1). In addition to the birds located during the 2017 survey season, the GCWAs that have been incidentally detected in previous years at the Freeman Center (2013-2016, personal observations by R. Rylander) were included on the maps as well. A total of seven different male GCWAs have been seen and heard singing during various parts of the spring and summer months in previous years since 2013.

Table 1. GCWA Territory Summary Data			
GCWA Territory #	# of detection days	Territory size (ha)	Female present?
1	4	3.5	Maybe
2	3	1.7	Maybe
3	6	9.4	No
4	3	1.2	No
5	1	NA	No

Our first detection date for GCWAs was March 7th, and our last detection date was June 1st. We cannot state for sure that there were no GCWAs present on property after this date, but no individuals were singing during the morning hours at any of our previous detection locations. Unfortunately none of the five male GCWAs remained on their territories or near their point of detection throughout the entire season. Though we were unable to confirm the presence of female GCWAs on school property, we have suspicion to believe that perhaps two males (#1 and #2) were courting and chasing duller GCWAs that was not counter-singing or aggressively chipping (Figures 4 & 5). In both cases, the two birds did not remain in view of observation for long, so confirmations were not possible.

Male #3 and #4 were the only two birds that were observed counter-singing against one another (Figure 6). Though we did not witness any physical territorial defense, the two males were quite aware of each other and seemed to stick to their patches. However during our survey on May 2nd, we were only able to locate GCWA #3, which seemed to be moving freely without competition. (Note: since we did not capture and color-band individual males, we made our best guess as to which male (#3 or #4) were the most likely to have remained in the area. There is a chance that we may have guessed wrong, which would lead to male #4's territory being expanded further north).

Male #5 was observed by two separate observers on the same day (March 7th), but was never heard or seen again after that date (Figure 7). We conclude that this individual may have only been passing through the Freeman Center on route to habitat further north than San Marcos. However without having marked this warbler via color bands, we have no way of knowing if this male didn't move into another site within the Freeman Center and observed as a "new male" during a concurrent survey.

The area in which transect grids were surveyed encompassed 668 acres at Freeman, and of those acres only ~16 at Freeman were found to have positive GCWA detections. Although we are cannot confirm that GCWAs were not present on other areas of the properties, we were able to assess which points within our transect grids did not contain appropriate and suitable GCWA habitat. Seeing that this was a pilot study, we were unable to know with certainty what habitat types were found across the survey plots since we had not visited them on foot. Thus we plan on eliminating certain areas from our future survey areas as to condense and increase survey efforts in more appropriate areas.

Potential transect points to remove are: Freeman 1-40, 1-41, 1-72, 2-29, 2-46, 2-47, 2-67, 2-73, 2-74, and 4-9.

Discussion – Management Implications

Based on our results, at least 4 of the 5 males were detected during 3 or more separate surveys, which technically makes them an official territory according to protocol. We are still uncertain of the reasons for these individuals to stick around for a prolonged amount of time if they were not breeding, but we have a few hypotheses. 1. There were females and we were unable to detect them, 2. The males were young (after hatch year AHY) and were kicked off of more suitable habitat by dominant males, 3. Abundance of food or other resources. It's likely that none of the hypotheses fully explains our data, however it gives us a better picture of the current use of the property for this endangered species.

For the coming 2018 season, we are planning on performing the same surveys for GCWAs on university property. In addition to transects and territory mapping we are applying for a USGS Bird Bander Permit to capture and color-band male GCWAs that occupy the Freeman Center. This way we can individually mark males for more accurate mapping, as well as get an estimate for site fidelity from year to year.

Management implications that arise from the 2017 GCWA surveys include protecting core woodland habitat in zones 1, 2 and 3, as well as leaving a certain amount of buffering habitat around these areas. By creating more openings or roads into core warbler habitat, it will likely increase the rates of predation by squirrels, jays and various other rodents, but also increase cases of nest parasitism by Brown-headed Cowbirds. Therefore clearing already existing fields and roads should be relatively harmless for the survival of the warbler on Freeman.

An additional management practice to instill would be to hold off on large-scale construction or clearing during the months in which GCWAs are on property, particularly in areas near known occupied (or previously occupied) habitat. Warblers can be sensitive to mechanical and auditory disturbances and may abandon nests and territories if put under pressure from human impact.

If GCWA management is a long-term goal of the Freeman Center, then constructing and operating a brown-headed cowbird trap would be optimal for decreasing the likelihood of nest parasitism. Because GCWAs did not evolve mechanisms in which to combat cowbird parasitism, a high number of nestling mortalities will likely occur when cowbirds are present.

Although the results of this study may not seem impressive from the raw data, it is still important to monitor the timing and habitat usage of the GCWA within this protected area in southeastern Hays County. As more construction occurs along the I-35 corridor between Austin and San Antonio, the Freeman Center (along with city-owned greenspace) may become increasingly important for the survival of the warbler in this portion of their range. It is apparent that this species is attracted to and utilizes the juniper-oak woodlands near San Marcos, therefore

it may be a matter of time before the individual warblers begin to pair-up and successfully breed at the Freeman Center as well.

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Figure 3.

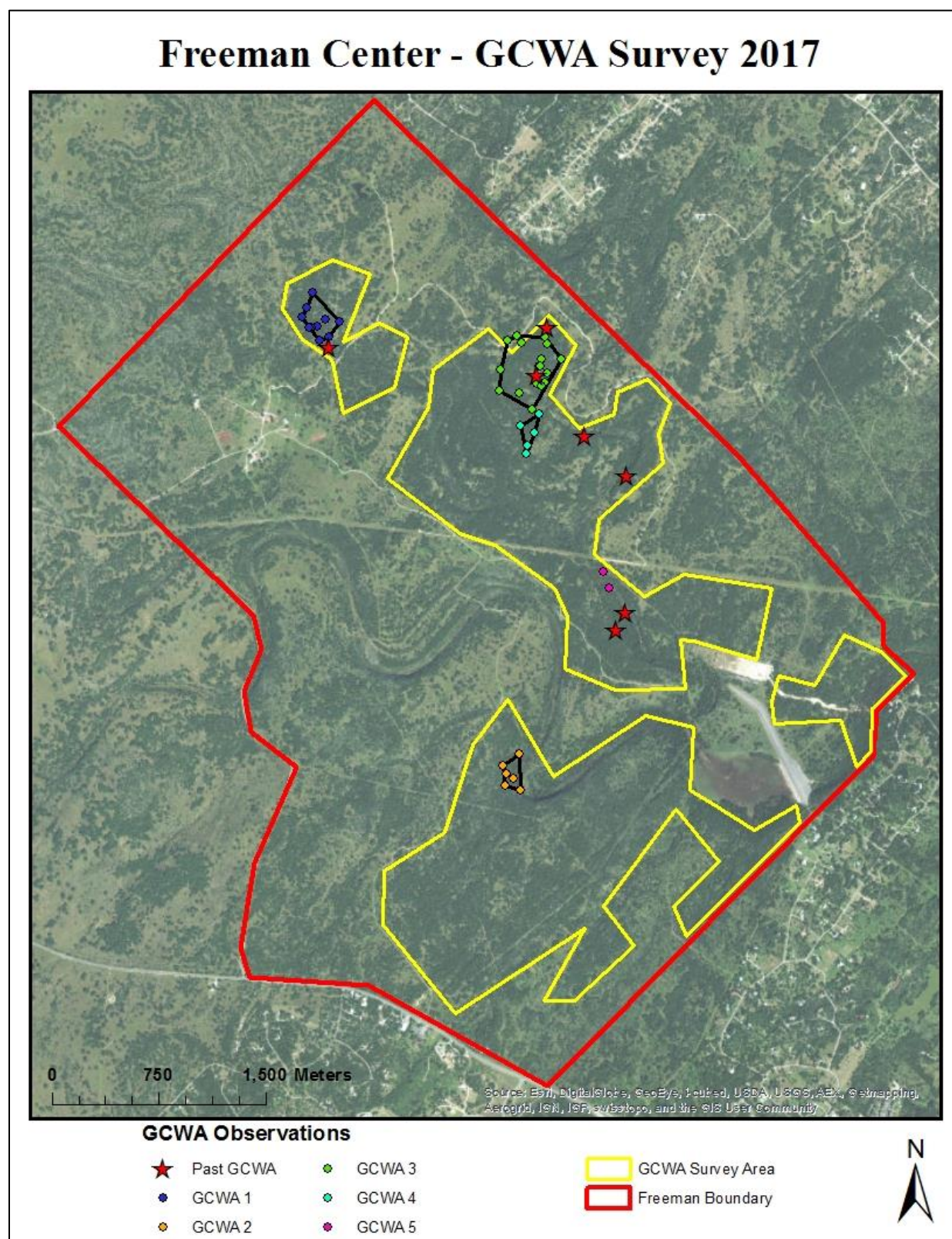
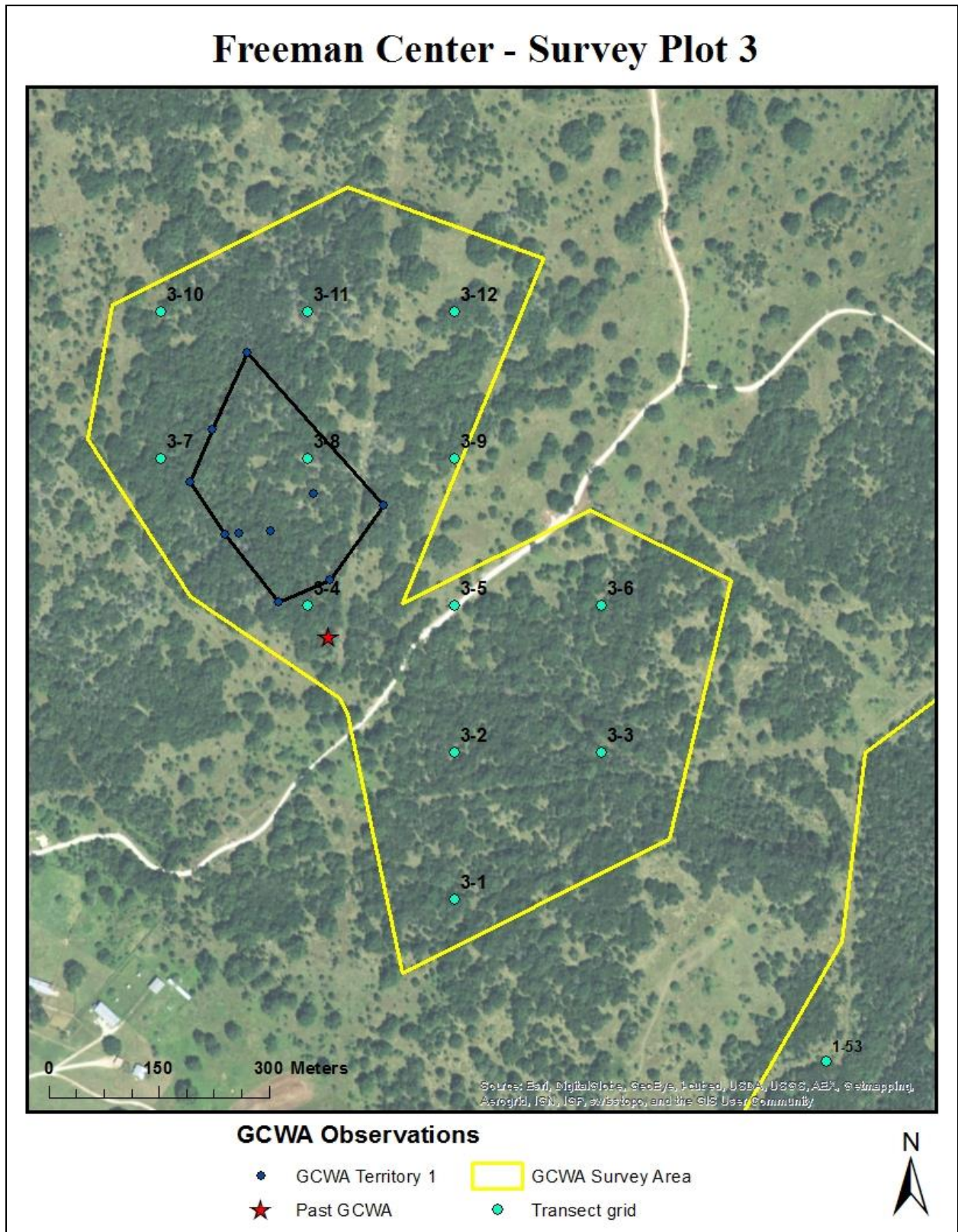


Figure 4.



Freeman Center - Survey Plot 2

0 125 250 Meters

Source: Esri, DigitalGlobe, GeoEye, IGN, USDA, USGS, AeroGRID, IGN, JSP, swisstopo, and the GIS User Community

GCWA Observations

- GCWA Territory 2
- Past GCWA
- Transect grid
- GCWA Survey Area

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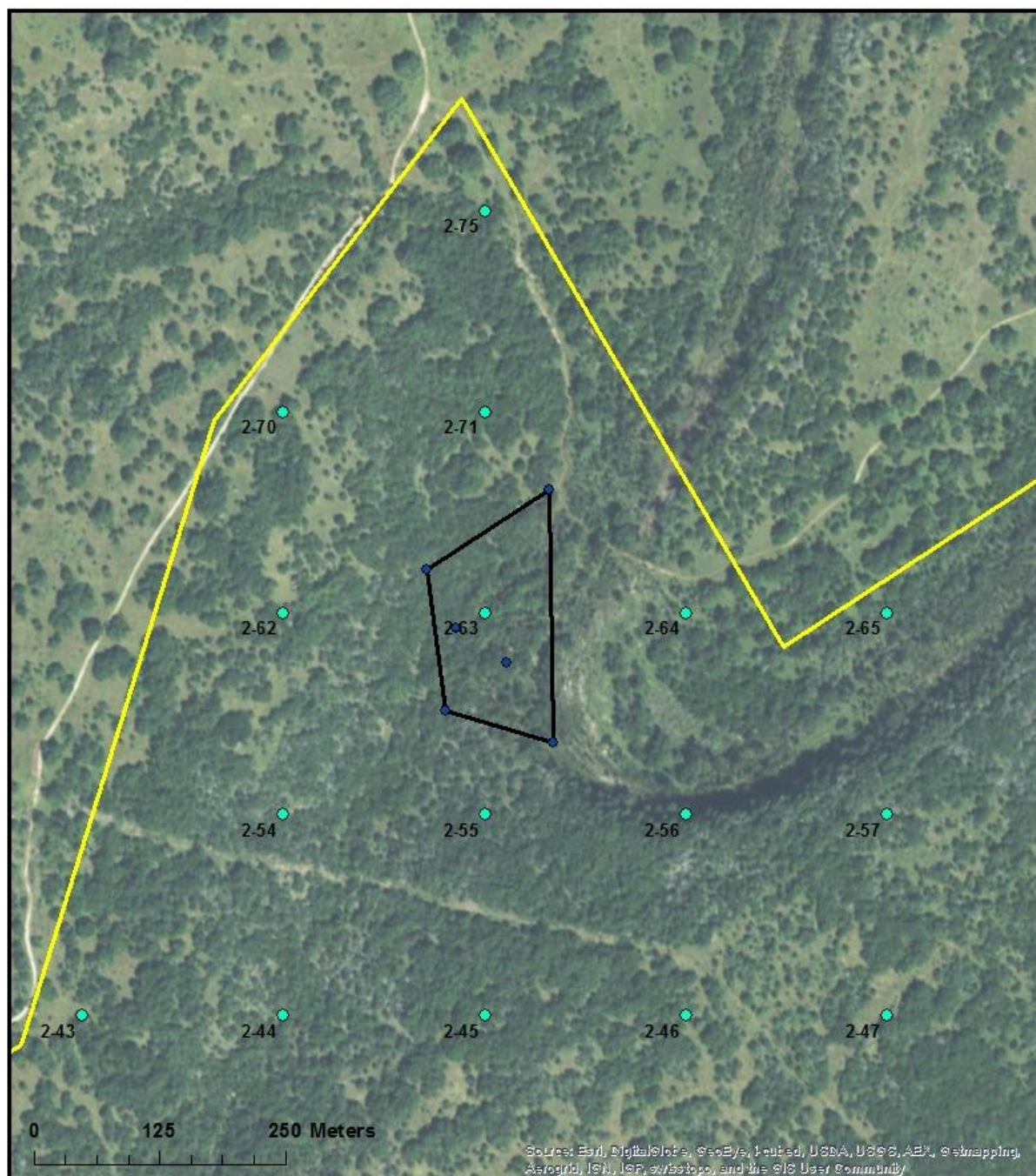


Figure 6.

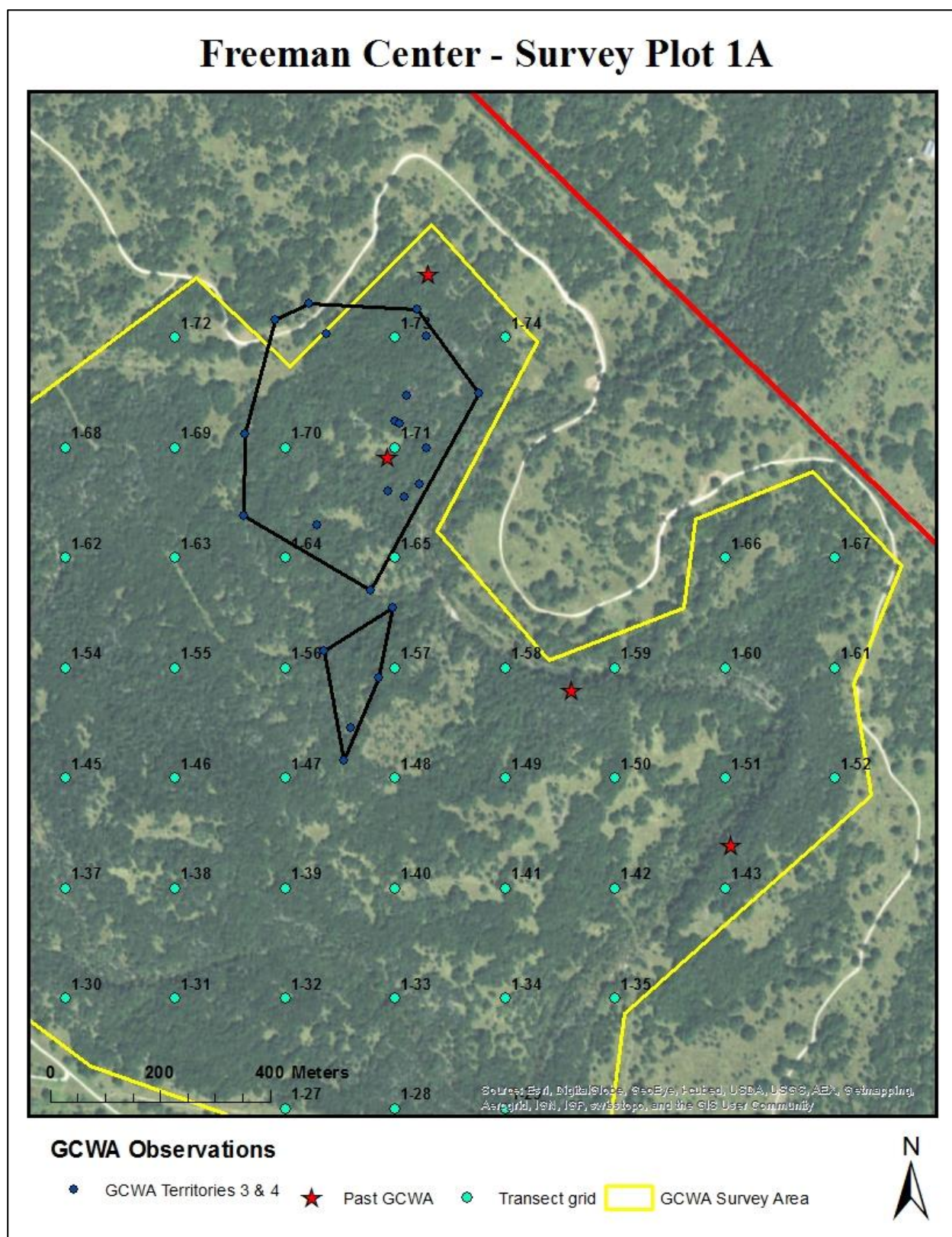


Figure 7.

