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Golden-cheeked Warbler Annual Report – 2018



Photo by K. Smith

Report Overview

To better understand the status of the endangered Golden-cheeked Warbler in southern Hays County, Texas, a group of volunteers performed transect and territory mapping surveys of this warbler between March – June 2018. While we were unable to detect breeding activity among the individuals we located, this study is still important and gives insight into what remaining habitat the warbler is utilizing in central Texas landscapes as they 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).

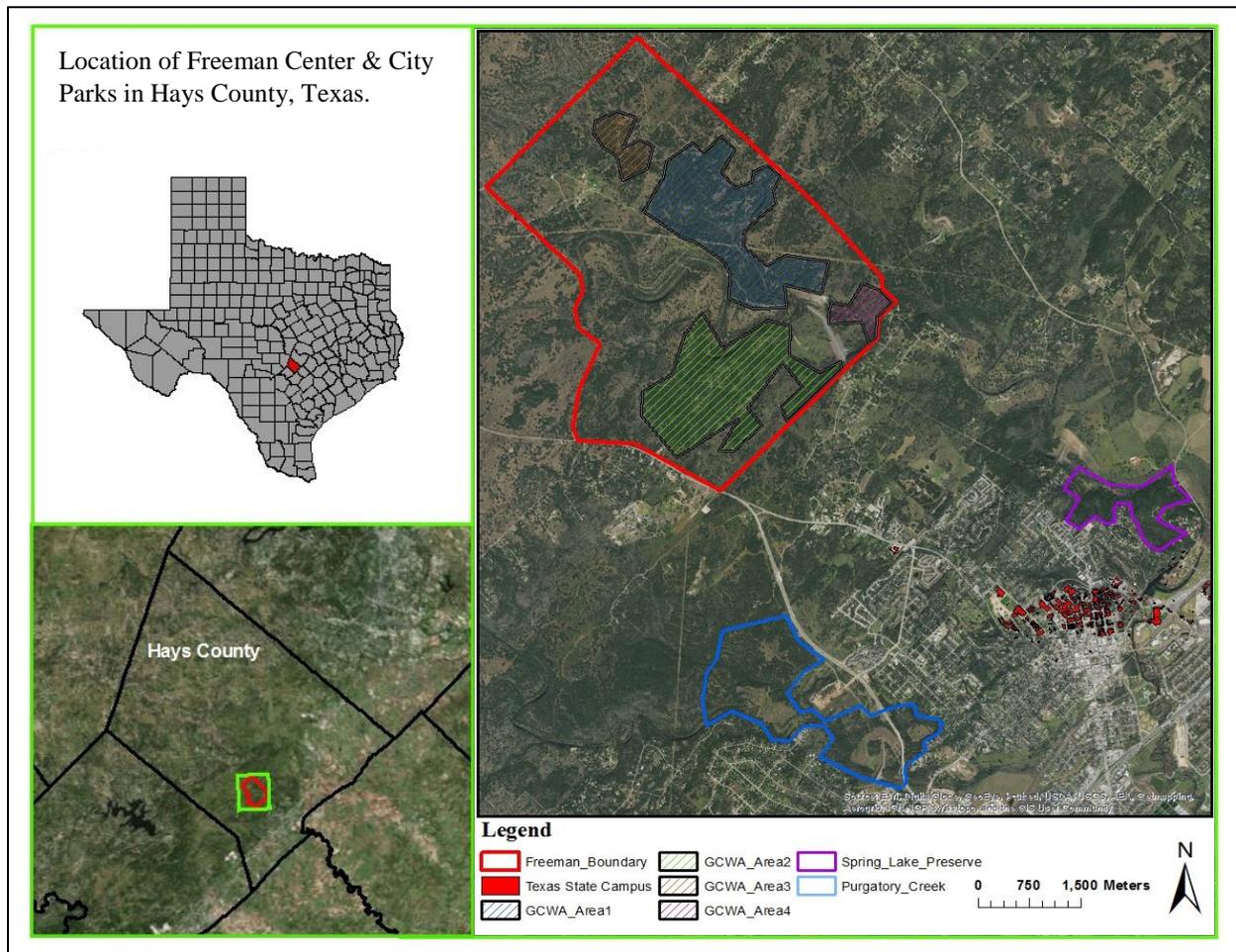
GCWA Survey Sites

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 and city parks. Transects were plotted using the “Fishnet” tool on ArcGIS 10.2 (ESRI, Inc., Redlands, California), using aerial imagery to identify suspected warbler habitat. Each transect consisted of a series of points located every 200m, where the observer paused for 5 minutes to listen for singing males (Figures 2, 3 & 4 at end of report). 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 2 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 be done to locate GCWAs on property so that territory mapping could be done for the remainder of the season.

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).

Fourteen separate surveyors visited the GCWA plots for both transects and territory mapping; undergraduate students Alex Klingele, Danielle Cordani, Dillon Harriman, Hannah Malone, Hannah Weipert, John Cheek, Joshua Robledo, Kaileigh Smith, Kristin Dyer, Mason Huffman, Natassia Gerstenkorn, Rebecca Davis, and Rebecca Hughes, all under the management of PhD student Rebekah Rylander. All surveyors were trained to identify GCWAs by sight and by sound (USFWS permits TE168189-0 (Rebekah Rylander and Dr. Clay Green)), 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. Also IACUC permits were obtained before any of this research was performed.

Capture and banding

In addition to transect and territory mapping, male GCWAs were subjected to mist-netting for capture under federal banding permit #24108 (Rebekah Rylander). In order to capture warblers, playback of aggressive male GCWA calls were used in the early daylight hours, not to exceed 20 minutes of playback, following the protocol suggested by USFWS and Fort Hood Military Reserve. Once warblers were caught, playback ceased, and birds were extracted from the net quickly and professionally. Each bird was given a unique combination of color bands that were distributed through Fort Hood, and once age and sex of the individual were determined, it was released immediately back into its territory.

By color banding male GCWAs, it provided an opportunity for surveyors to accurately identify the individual they were following and territory mapping with less error. This equated to clearer results as to where GCWAs were going and what habitat they were utilizing.

Survey Results

With over 800 hours of volunteer survey efforts, a total of seven unique GCWA males were detected during our Freeman Center surveys. 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). For a visual of where these territories are located, see Figure 2.

GCWA Territory #	# of detection days	Territory size (ha)	Female present?
1	5	10.4	No
2	6	6.1	No
3	4	5.8	No
4	5	8.1	No
5	1	NA	No
6	2	NA	No
7	1	NA	No

Our first detection date for GCWAs was March 13th, and our last detection date was June 4th. 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. Also none of the seven male GCWAs remained on their territories or near their point of detection throughout the entire season, though a couple of individuals came close, remaining for 5 and 6 weeks each.

Freeman Center GCWA - 2018

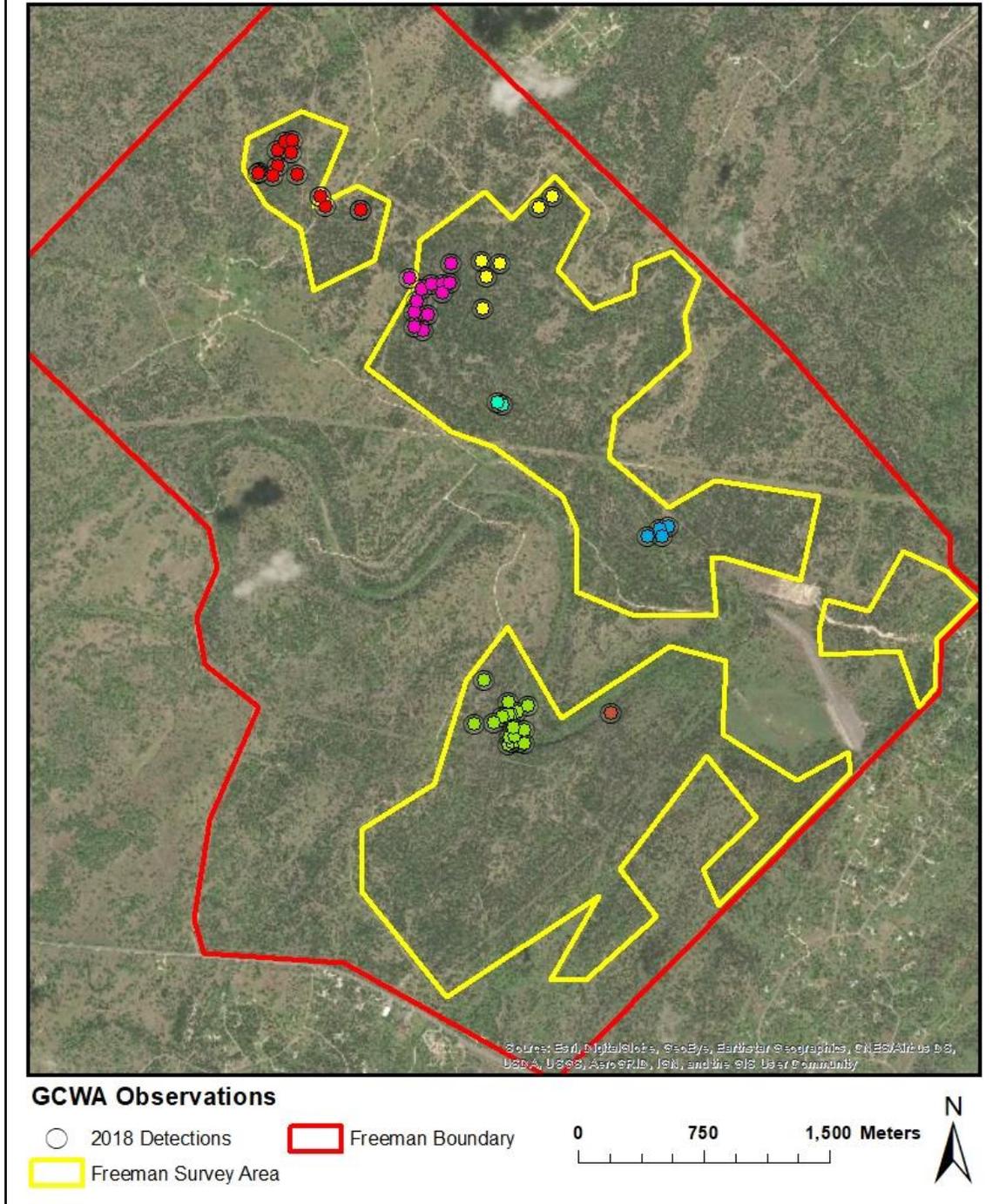


Figure 2. Mapped territories for GCWAs in 2018. The following numbers have been assigned to each territorial GCWA male. These will be referred to in the rest of the report:

Red = male #1, pink = male #2, yellow = male #3, green = male #4, turquoise = male #5, blue = male #6, brown = male #7.

Males # 1-4 were the only individuals that were repeatedly detected on 3 or more consecutive surveys, making them official territory-holders according to protocol. Their delineated territory sizes (Table 1) are fairly consistent with those of GCWAs found elsewhere, though male #3 is likely to have had a larger territory, but due to only 4 detections, we could only positively delineate its range to 5.8 hectares. Males # 5-7 were detected on only 1 or 2 surveys, making these individuals “transients” that were most likely passing through the area on their way to more suitable habitat elsewhere. For detailed maps of all zones with detected GCWAs, see figures 3-5.

The area in which transect grids were surveyed encompassed 668 acres at Freeman, of which only ~76 were found to have positive GCWA detections. However, all habitat that was encompassed by territorial and transient males was typical of warbler habitat, with old-growth juniper and oak woodland being the leading vegetation type. Two of the territorial males (#2 and 4) were found on steep limestone cliffs that are also common for GCWA activity.

Banding Results

Three males were successfully captured and banded during the 2018 season (Table 2).

Table 2.

Territory	USGS Band	Color-bands (left leg : right leg)	Date Captured	Age
Male #1	2830-66002	orange/white : dark blue/USGS	3/26/18	SY
Male #2	2830-66003	black/USGS : white/red	3/30/18	SY
Male #4	2830-66001	yellow/red : black/USGS	3/15/18	SY

All males captured were second year (SY) birds, meaning they were born in 2017 with 2018 being their first breeding season. Once banded, all males were released and flew off without injury or undue stress, as noted by their singing within minutes after perching in nearby trees.

Attempts were made to capture male #3, 5, and 6, but all attempts were unsuccessful either due to the male not being interested in playback (#3), or the individual not being present or detected during the time of banding (# 5 and 6). Male #7 was not attempted to capture due to its remote location and its single detection. If it had been detected on a consecutive survey, it would have received more efforts.

Several photos of the successful captures are included at the end of the report.

Discussion

Based on our results, at least 4 of the 7 males were detected during 3 or more separate surveys, which technically makes that 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 (SY) 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 these properties for this endangered species.

When comparing the 2017 and 2018 season (figure 6), it is apparent that warblers are using the same areas consistently for the most part. The territory in zone 3 and zone 2 (male #1 and #4) were both occupied with much overlap, and areas located within zone 1 also had overlap. However, it is important to note that the three males that were banded (#1, 2, and 4) were not the same males that were detected last year due to them only being second year birds. Thus other different warblers were attracted to the same habitats and territories last year. Thus, it will be interesting to get another year of survey information to confirm if these are designated GCWA locations or not.

For the coming 2019 season, we are planning on performing the same surveys for GCWAs on university property, with possibly the addition of the Pollard tract located between Wimberly and Blanco. Every season there are GCWAs detected within the woodlands of that tract, so it may be beneficial to understand how the numbers of individuals fluctuate over time on that property, as well as if there are breeding individuals 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 these protected areas in southeastern Hays County. As more construction occurs along the I-35 corridor between Austin and San Antonio, the Freeman Center 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 located within these properties, therefore it may be a matter of time before the individual warblers begin to pair-up and successfully breed on property as well.

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Figure 3.

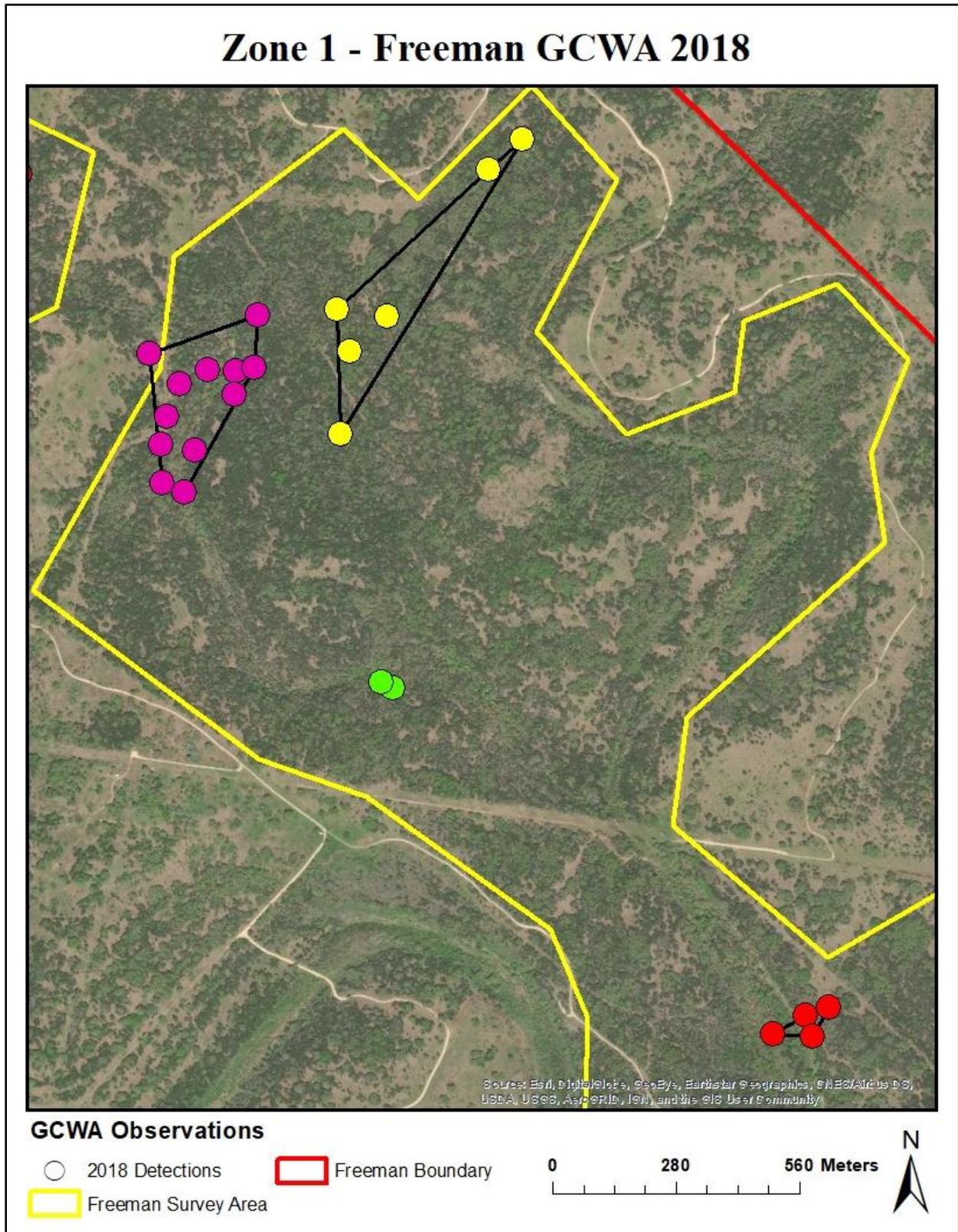


Figure 4.

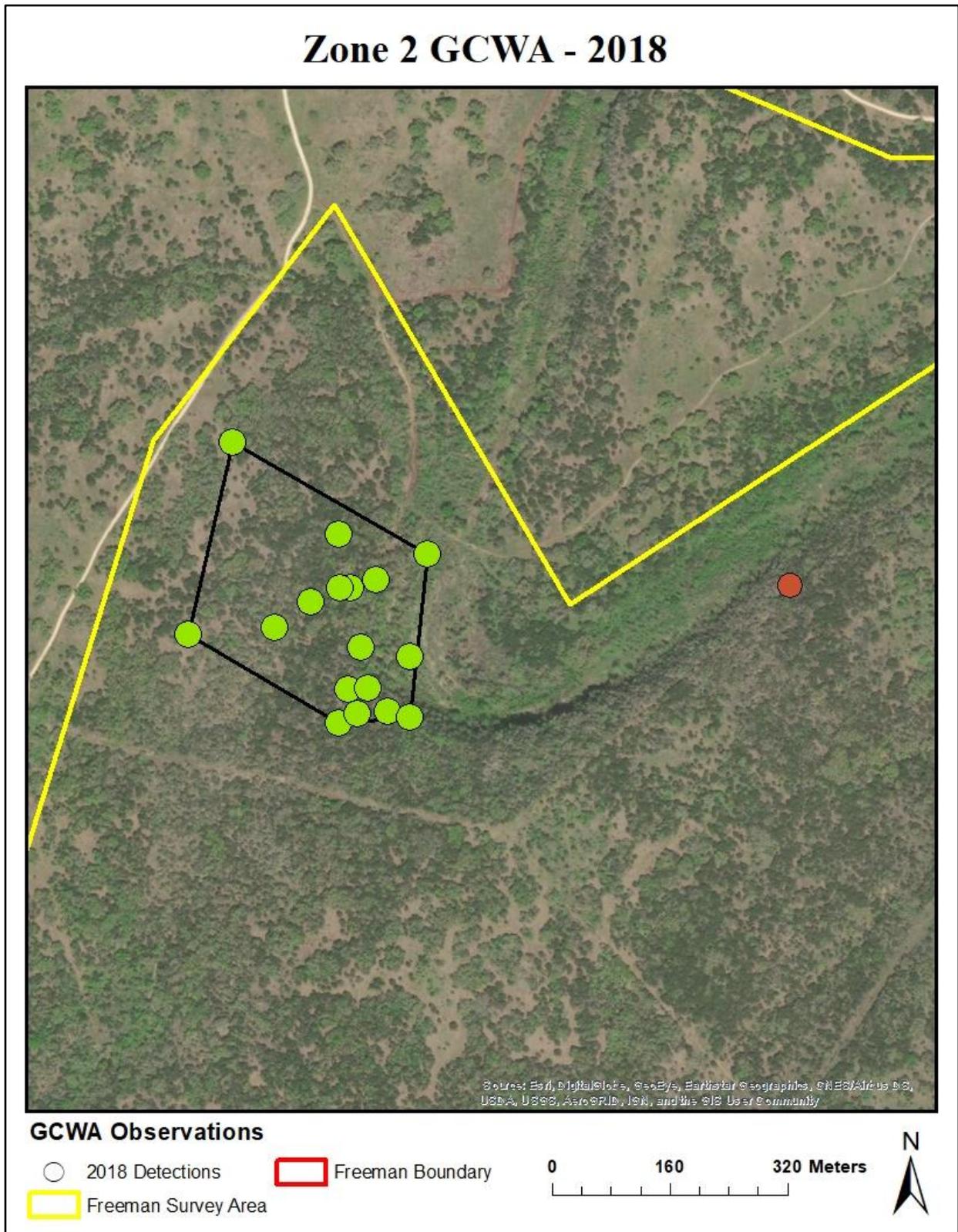


Figure 5.

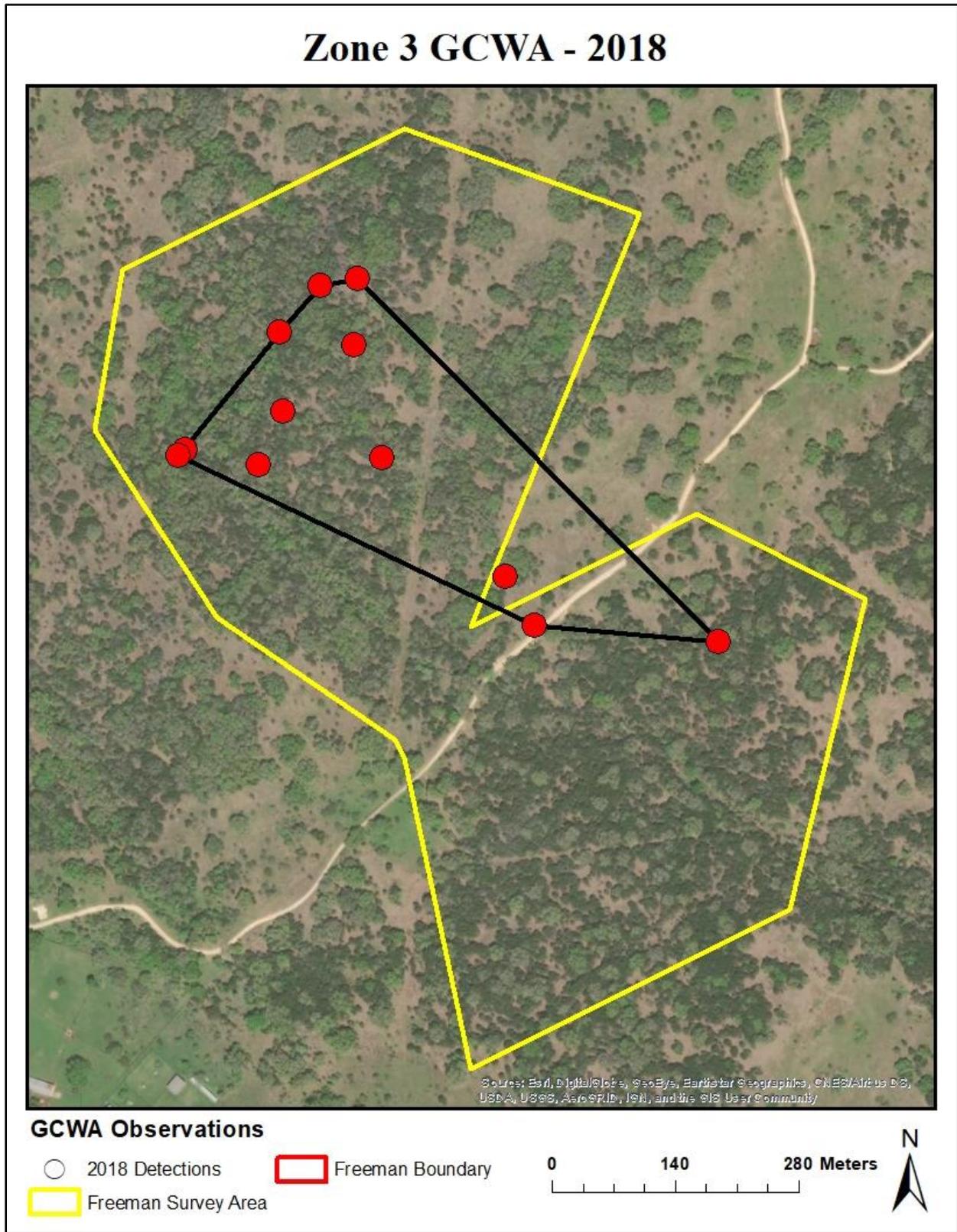
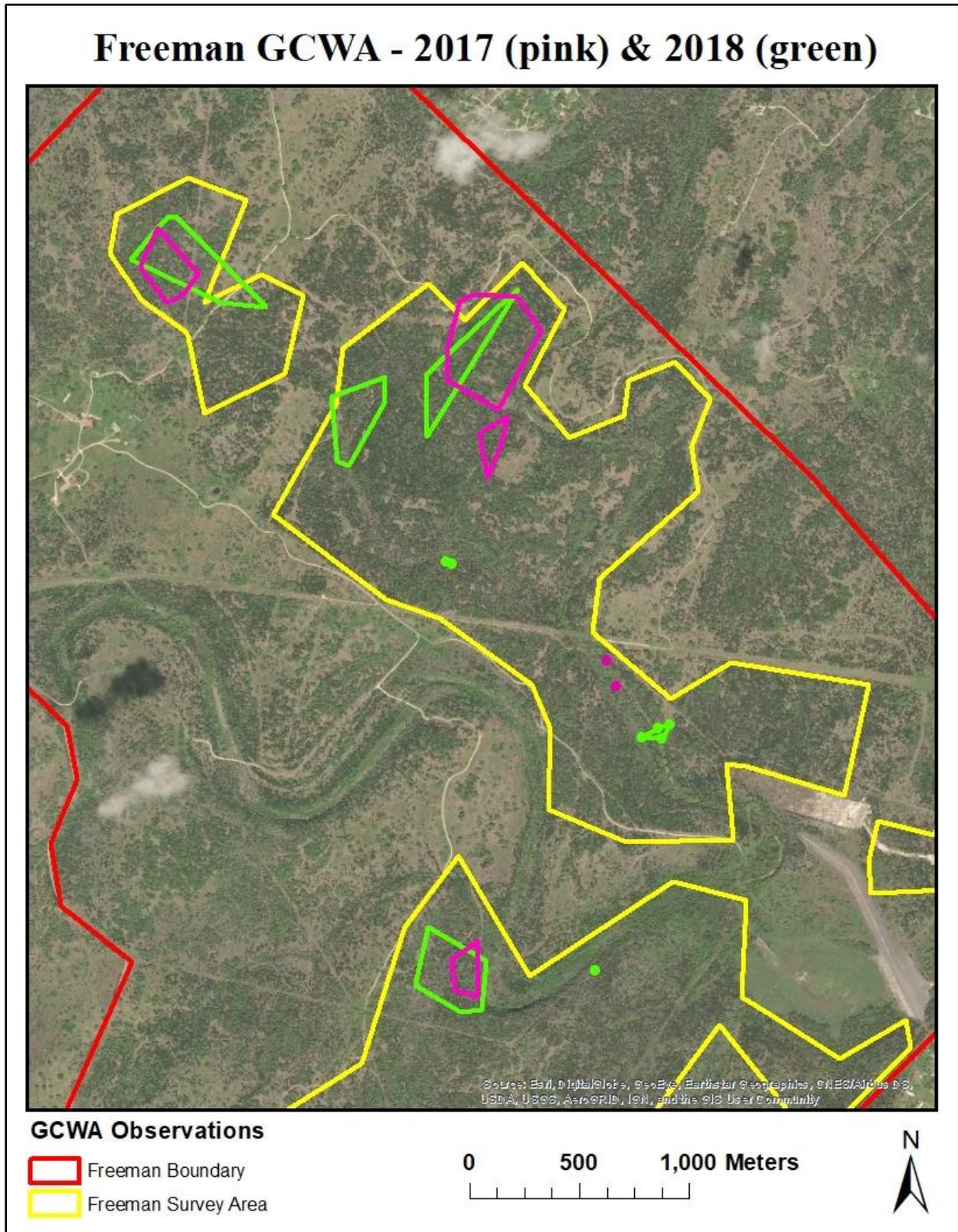


Figure 6.



Photos of GCWAs that were successfully captured at Freeman in 2018.



Top left: GCWA being aged as SY – alular feathers are lighter brown than covers. (Credit: K. Smith)

Top right: Showing one of the color bands and the USGS band on male #2. (Credit: H. Weipert)

Bottom left: Age based on retricies – feather ware/shape are distinctive of SY. (Credit: A. Matthews)

Bottom right: Banding male #4. (Credit: C. Farrell)

