City of Austin 2023
Black-capped Vireo *(Vireo atricapilla)*
Monitoring and Management Program

Balcones Canyonlands Preserve Annual Report



Black-capped Vireo nestling leaving the nest, Vireo Preserve – Sheila Ellwood

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Disclaimer: The data and information presented in this report are provisional and subject to revision.

City of Austin 2023
Black-capped Vireo (*Vireo atricapilla*) Monitoring and Management Program
Balcones Canyonlands Preserve Annual Report

This report summarizes the results of the City of Austin's 2023 black-capped vireo (*Vireo atricapilla*) species monitoring and habitat management program. The 2023 field season was the twenty-sixth year of monitoring this formerly endangered species (delisted in May 2018) on the City of Austin's Balcones Canyonlands Preserve (hereafter COA BCP) tracts. We found twenty-three black-capped vireo males holding territories across the COA BCP. The Forest Ridge tract had eleven territories, Cortaña nine, Kent Butler two and Vireo Preserve/Wild Basin one. An additional four males were detected but did not establish territories on COA BCP.

Among the established territories, pairing success was 100%. Of the 36 nests observed, 64% failed due to predation, weather, or abandonment. The failure rate differed markedly by site: 74% of 23 nests on the Forest Ridge tract, but only 40% of 10 nests on the Cortaña sites. Notable observations for the 2023 field season include the first documented nest at Vireo Preserve/Wild Basin in 26 years, which produced four young; and a female nesting on Kent Butler that had been banded as a nestling at Fort Cavazos in 2022, which is the longest known natal dispersal for this species (93.4 km).

COA BCP staff continued a project examining genetics, juvenile survival, and dispersal patterns by banding 40 nestlings and collecting DNA from 39 nestlings from 12 nests. Additionally, DNA was collected opportunistically from three adult black-capped vireos. Of the 38 nestlings that were banded in 2022, four were observed as adult birds on COA BCP this year.

INTRODUCTION

Background

The black-capped vireo (hereafter vireo) is a neotropical migrant that breeds in portions of Oklahoma, Texas, and Mexico (Grzybowski 1995). The U.S. Fish and Wildlife Service listed this species as endangered in 1987 (USFWS 1987) due to habitat loss, habitat fragmentation, over-grazing/browsing, natural vegetation succession, and parasitism by brown-headed cowbirds (*Molothrus ater*; hereafter cowbirds). Rapid expansion of development in western Travis County led to the creation of the Balcones Canyonlands Conservation Plan (a habitat conservation plan). The U.S. Fish and Wildlife Service issued a 10(a)(1)(B) permit to the City of Austin and Travis County in 1996 to mitigate for the incidental "take" of habitat loss due to development, and to facilitate the local recovery of the vireo, seven still-endangered species, and 27 species of concern (USFWS 1996). The permit requires a minimum of 12,300 hectares of habitat in western Travis County be set aside as a preserve (the BCP) for these species. The vireo was removed from the federal List of Endangered and Threatened Wildlife effective May 16, 2018, citing recovery of the species (USFWS 2018a). The U.S. Fish and Wildlife Service developed a post-delisting plan to monitor abundance and threats to ensure that the species does not decline (USFWS 2018b). Vireos and their habitat continue to be protected on the BCP as a condition of the permit.

Prior to 2023, vireos have regularly established territories and raised young on only a few COA BCP sites since annual monitoring began in 1998 (City of Austin 2022 and earlier years): the Forest Ridge tract, the northern part of the Cortaña tract, and the Kent Butler Ecological Reserve (hereafter Kent Butler). Though there has been no active management at the Forest Ridge tract, and no recent management (since 2007) at northern Cortaña, numbers of vireos have increased in recent years at both of these sites. Habitat was expanded under power lines at Kent Butler in 2009 and vegetation has been periodically cut back to maintain low, shrubby growth.

Though some other areas on COA BCP have also been managed to create or maintain vireo habitat, vireos have rarely been detected on them: Bohls (2019), Vireo Preserve/Wild Basin (2020 and 2022), and Lime Creek (2022) tracts. One exception has been the central part of the Cortaña tract, where at least one vireo territory has been established since 2019. Other records for vireos on the COA BCP tracts for the past decade include intermittent sightings of males on the Commons Ford, Reicher Ranch, Barton Creek Wilderness, and Sam Hamilton West tracts, none of which have had active vireo habitat management.

Objectives

The Balcones Canyonlands Conservation Plan (USFWS 1996) states that "baseline monitoring will be gathered in accordance with the Land Management Plan Guidelines and approved land management plans, and should concentrate on determining basic population levels on preserve lands, key population parameters, and other ecological parameters that may affect the target species." The Tier IIA-8 land management plan (BCP 2007) identifies "distribution, abundance, productivity, and recruitment" as key population parameters to monitor. The COA BCP vireo monitoring program continues to focus on estimating abundance, territory delineations, pairing, nesting, and productivity for all vireos detected each year.

The land management plan (BCP 2007) emphasizes vegetation management and monitoring to maintain vireo habitat. Within the BCP, vireo habitat typically occurs where oaks and other hardwoods re-sprout from well-established root systems. Because re-sprouting requires some form of disturbance (e.g., from fallen trees, mechanical manipulation, fire), restoration projects in conjunction with habitat monitoring are undertaken on various COA tracts to promote vireo habitat (see Black-capped Vireo Habitat Management), where such restoration will not conflict with managing for golden-cheeked warbler habitat.

Genetic Analysis and Nestling Color Banding

Very little is known about juvenile dispersal and site fidelity. Additionally, we have frequently observed clutches that have unhatched eggs, which can be a sign of genetic incompatibility or high relatedness. In order to gain a better understanding of the genetic health and viability of the population, we continued to collect DNA samples and color-band nestling vireos. Because we are already closely monitoring active nests and banding adult vireos, this component is easily added to our ongoing research.

METHODS

Sites and Survey Effort

Monitoring and color-banding methods for vireos are similar to those for golden-cheeked warblers (hereafter warblers; see Methods in City of Austin and Travis County 2019). However, because the vireo population is much smaller than the warbler population on COA BCP properties, monitoring takes the form of a complete census rather than a sampling. There are no defined plots; COA BCP biologists search suitable habitat and monitor vireos where they are found for evidence of mated status and breeding success.

Monitoring typically begins when the vireos first arrive in late March or early April and continues at least through the end of June, or until breeding success has been determined. After they are first detected, vireos are monitored at least once a week. Territory delineations for vireos are similar to those for warblers, except observations before March 25 are excluded. There is no final date for observations to be included in territory delineations, though surveys generally cease by the end of July when vireos become difficult to detect. Because fledgling vireos are difficult to observe in dense vegetation, a range of fledglings is presented for some territories. The lower number is the tally of fledglings actually observed, and the higher number is the maximum that may have fledged given the number of eggs or nestlings originally found in the nest, minus unhatched eggs or dead nestlings found after fledging. We assume a maximum of four fledglings for nests that were not found.

During the 2023 field season, biologists monitored vireos in five locations: Forest Ridge, Kent Butler, Vireo Preserve/Wild Basin, northern Cortaña, and central Cortaña. Vireos at Forest Ridge, Kent Butler and Vireo Preserve/Wild Basin occur within and adjacent to the warbler study plots. Vireos occupy a shinnery in northern Cortaña and a live oak savanna and shrubland in central Cortaña. In addition, biologists surveyed potential habitat where vireos were previously observed on the Bohls and the Lime Creek tracts. Vireos encountered on other sites (Reicher Ranch and Sam Hamilton) were also recorded.

Vireos were first detected on COA BCP on March 25 at the Forest Ridge warbler plot and the last vireo detected was at Vireo Preserve/Wild Basin on July 30 (see Table 1 for survey hours).

Genetic Sampling and Banding of Nestlings

We began a two-year pilot study in 2022 to collect DNA from adult and nestling vireos and to color-band nestlings. When possible after banding the adult, a PrecisionGlide™ 30-gauge beveled needle was used to prick the brachial vein and a capillary tube was used to collect 15µL of blood (~2 drops). Blood samples were stored in a lysis buffer until DNA extraction. Before releasing the bird, a cotton ball was placed over the needle insertion point with the wing held gently closed with light pressure for 30-60 seconds. Kwik-Stop® styptic powder was on hand in case bleeding did not stop after 60 seconds. Nests were monitored for nestling age; age 6-8 days old was determined optimal, because handling too close to fledge date could unintentionally force-fledge them, but younger nestlings' legs are too short and/or thick for banding. If nestlings survived to day 6-8 and had long, thin enough legs, we banded and collected a blood sample from each nestling in the same manner as adults, as well as measured nestling weight. To reduce stress on the

parents, we waited until they left the nest to forage and then only took half the brood at a time in case the parent returned while processing the nestlings. After the 2024 field season is complete, we will extract DNA from the blood samples and use microsatellite markers to examine paternity, relatedness, and effective population size. Because the results of the pilot study have provided useful information and raised more questions, we plan to continue this study for additional years.

Table 1. Summary of Black-capped Vireo Survey Effort on the Balcones Canyonlands Preserve, Travis County, Texas, Field Season 2023.

Site	Observers	Survey Hours
Bohls	John Chenoweth	5.75
Cortaña - central	William Reiner, Cristina Campbell	40.75
Cortaña - north	William Reiner, Cristina Campbell	89.75
Forest Ridge	Jonathan Scalise, Laurel Moulton	114.75
Kent Butler	Jonathan Scalise, Laurel Moulton	16
Lime Creek	William Reiner	2.25
Vireo Preserve/Wild Basin	Lisa O'Donnell, Jim O'Donnell	17
Total		**286.25**

RESULTS AND DISCUSSION

Territory Delineations

In 2023, biologists found twenty-three vireo males holding territories across the COA BCP tracts (figures A-F): Forest Ridge (11 territories), northern Cortaña (seven territories), central Cortaña (two territories), Kent Butler (two territories), and Vireo Preserve/Wild Basin (one territory). This is one less territory than was observed in 2022, which was the most observed on COA BCP since COA BCP staff began banding vireos (Figure G). Biologists did not observe vireos on the Bohls, Lime Creek, or Barton Creek tracts in 2023. Four non-territorial male vireos were detected on COA BCP tracts: Forest Ridge, Jester, Reicher Ranch, and Sam Hamilton.

Banding, Return Rates, and Genetic Sampling

Biologists color-banded one adult female and six adult male vireos in 2023. Of the 13 banded adult male vireos on COA BCP in 2022 (including returns from previous years), eight returned in 2023 (a return rate of 62%). One female banded on Cortaña in 2020 returned to Cortaña in 2023 after not being reported on the BCP in 2021 or 2022. Four of the 38 nestlings banded in 2022 were detected on COA BCP tracts in 2023, two females and two males, one of whom was not detected in 2022 as a fledgling.

We color-banded 40 nestlings from 12 nests (nine nests at Forest Ridge, one at Kent Butler, and one each at Travis County BCP's Steiner Ranch and Vireo Ridge tracts) and successfully collected blood samples from 39 of the nestlings.

Pairing and Reproductive Success

In 2023, all 23 territorial males were successful in finding a mate, and 18 of the pairs successfully produced offspring. COA BCP biologists found and monitored 36 nests (Table 2). A total of 48 vireo fledglings were observed on COA BCP, and up to 70 are possible, based on nest monitoring observations. This represents productivity of 2.1 to 3.0 offspring per territory and 2.7 to 3.9 offspring per successful territory (Table 3). Both observed and potential productivity were higher this year than any recent year, and continue a generally upward trend, that saw dips in 2018 and 2022 (Figure H).

At Forest Ridge, all 11 territorial male vireos observed on and adjacent to the warbler plot successfully paired (Figure B). Biologists found 23 nests among all of the pairs (Table 2). Of the 23 nests, 74% failed due to predation, weather, or abandonment, and 26% successfully fledged at least one young. Despite the low nest success rate, eight of the 11 pairs had one successful nest each (Table 3).

Kent Butler had two territories just north of the warbler plot (Figure C). Both successfully paired, but nests were predated near predicted fledge date, and neither pair renested (Tables 2 and 3).

In the shinnery at the north end of the Cortaña tract, all seven males that established territories successfully paired (Figure D) and produced offspring (Table 3). Biologists found seven active nests for five of the pairs. Of these seven nests, 57% fledged at least one young, and 43% failed due to predation or were abandoned.

Two vireos established territories in central Cortaña (Figure E). Both successfully paired and fledged offspring (Table 3). Two of the three active nests that were found were successful (Table 2).

One territory was established at Vireo Preserve/Wild Basin (Figure F). While males have been seen sporadically in recent years, no females were observed until 2022. An active nest was documented for the first time since 1997 and successfully fledged four young (Table 2).

Table 2. Summary of Black-capped Vireo Nests Found on the Balcones Canyonlands Preserve, Travis County, Texas, Field Season 2023.

Site	Male ID	Nest Substrate	Nest Fate	Number of Fledglings*
Cortaña - central	DG/SI:BL/GR	*Rhus virens*	Fledged	3-4
Cortaña - central	MV/BL:DB/SI	*Juniperus ashei*	Fledged	3
Cortaña - central	DG/SI:BL/GR	*Prunus serotina*	Predated	0
Cortaña - north	UBCTB	*Juniperus ashei*	Fledged	2
Cortaña - north	YE/SI:PI/YE	*Juniperus ashei*	Fledged	1-4
Cortaña - north	DG/GR:RD/SI	*Quercus sinuata*	Fledged	4
Cortaña - north	NB/SI:DB/GR	*Quercus sinuata*	Fledged	1-4
Cortaña - north	DB/SI:OR/RD	*Quercus sinuata*	Predated	0
Cortaña - north	UBCTB	*Fraxinus texensis*	Abandoned	0
Cortaña - north	UBCTB	*Quercus sinuata*	Predated	0
Forest Ridge	UBFRB	*Diospyros texana*	Predated	0
Forest Ridge	UBFRA	*Ptelea trifoliata*	Predated	0
Forest Ridge	OR/SI:DB/BL	*Quercus buckleyi*	Predated	0
Forest Ridge	DG/WH:RD/SI	*Garrya ovata*	Fledged	2-4
Forest Ridge	DG/DG:WH/SI	*Rhus virens*	Weather/Abandoned	0
Forest Ridge	DG/DG:WH/SI	*Diospyros texana*	Weather/Abandoned	0
Forest Ridge	UBFRE	*Rhus virens*	Fledged	2-4
Forest Ridge	UBFRB	*Diospyros texana*	Predated	0
Forest Ridge	UBFRD	*Dermatophyllum secundiflorum*	Predated	0
Forest Ridge	UBFRC	*Dermatophyllum secundiflorum*	Predated	0
Forest Ridge	UBFRA	*Garrya ovata*	Predated	0
Forest Ridge	OR/SI:DB/BL	*Dermatophyllum secundiflorum*	Fledged	4
Forest Ridge	DG/DG:WH/SI	*Diospyros texana*	Abandoned	0
Forest Ridge	UBFRD	*Garrya ovata*	Fledged	1
Forest Ridge	UBFRB	*Diospyros texana*	Predated	0
Forest Ridge	DG/DG:WH/SI	*Dermatophyllum secundiflorum*	Abandoned	0
Forest Ridge	UBFRF	*Ungnadia speciosa*	Predated	0
Forest Ridge	UBFRA	*Diospyros texana*	Fledged	2-4
Forest Ridge	UBFRC	*Frangula caroliniana*	Predated	0
Forest Ridge	UBFRF	*Quercus sinuata*	Fledged	2-4
Forest Ridge	DG/WH:RD/SI	*Dermatophyllum secundiflorum*	Abandoned	0
Forest Ridge	DG/DG:WH/SI	*Quercus sinuata*	Abandoned	0
Forest Ridge	UBFRD	*Dermatophyllum secundiflorum*	Predated	0
Kent Butler	OR/YE:MV/SI	*Ilex vomitoria*	Predated	0
Kent Butler	BK/SI:BL/DG	*Juniperus ashei*	Predated	0
Vireo Preserve	UBVPWBA	*Garrya ovata*	Fledged	4
36 total nests: 23 predated, destroyed by weather, or abandoned (64%); 13 successful (36%)				

* Fledgling vireos were difficult to observe in dense vegetation, so a range of fledglings is listed for some nests. The lower number is the tally of fledglings actually observed. The higher number is the maximum that may have fledged given the number of eggs/chicks originally found in the nest, minus unhatched eggs or dead nestlings found after fledging.

Table 3. Summary of Black-capped Vireo Reproductive Success per Site on the Balcones Canyonlands Preserve, Travis County, Texas, Field Season 2023.

Site	No. of Territories	No. of Territories w/ Female	Pairing Success	No. of Territories Producing ≥ 1 Young	Breeding Success	Total No. of Fledglings*	Productivity*	Productivity Per Successful Territory*
Cortaña - central	2	2	100%	2	100%	6-7	3.0-3.5	3.0-3.5
Cortaña - north	7	7	100%	7	100%	22-34†	3.1-4.9	3.1-4.9
Forest Ridge	11	11	100%	8	73%	16-25	1.5-2.3	2.0-3.1
Kent Butler	2	1	100%	0	0%	0	0	NA
Vireo Preserve/ Wild Basin	1	1	100%	1	100%	4	4.0	4.0
All Sites	**23**	**23**	**100%**	**18**	**78%**	**48-70†**	**2.1-3.0**	**2.7-3.9**

* Ranges indicate fledglings actually observed vs. maximum possible (see note with Table 2). We assume a maximum of 4 fledglings for nests that were not found.
† Includes all fledglings found, including those from second broods.

Other Observations

Parasitism and Interaction with Predators

None of the 36 vireo nests found in 2023 were parasitized, and no cowbirds were observed during vireo surveys on the Forest Ridge, Cortaña, Kent Butler, or Vireo Preserve/Wild Basin tracts. No vireos were observed tending cowbird fledglings. COA BCP biologists have seen no evidence of nest parasitism since ceasing the trapping of cowbirds in 2013. Biologists will continue to monitor vireo territories for the presence of cowbirds, and the COA BCP remains committed to reducing or eliminating the threat of cowbird parasitism on vireo nests if needed.

On at least one occasion, a male vireo in north Cortaña was observed following and scolding (shradding) a Woodhouse's scrub-jay (*Aphelocoma woodhouseii*). At central Cortaña, a Copperhead (*Agkistrodon contortrix*) was found in a vireo nest that had reently successfully fledged.



Copperhead seen on a recently fledged nest, Cortaña, 2023 – W. Reiner

Non-Viable Eggs

Of the 36 nests observed, at least six contained eggs that did not hatch. One of these nests contained an egg in which the chick appeared to have been unsuccessful in breaking free from the egg. Some nests were predated or abandoned prior to hatching and are not included in this tally. Unhatched eggs may be a sign of genetic incompatibility or high relatedness between the parents.



Black-capped Vireo nest with unhatched egg,
that appears halted mid-hatching, Forest Ridge, 2023 – J. Scalise

Injuries and Deaths

No injuries were observed among vireos this year. Last year we discovered dead nestlings in nests, but none were found this year. This does not include nests that were predated.

Pair Relations

At Forest Ridge, multiple instances of mate swapping were observed. One banded female was confirmed nesting with two different males. At least three other instances were documented of different unbanded females swapping mates for subsequent nesting attempts. One of these females was seen feeding her banded fledglings from her first successful nest, in the territory of a neighboring male who was feeding his own banded fledglings and then this pair built a nest together. In another instance, a female was found brooding a nest while her mate was seen feeding her fledgling from an earlier nest with a neighboring male.

Dispersals

A male banded at Lime Creek in 2022, who was seen at Cortaña later in 2022, returned to Cortaña (approx. 10.9 km away) in 2023 to defend territory. Similarly, a male banded on Travis County's Vireo Ridge tract in 2021, who established territory there in 2022 and was detected later in 2022 at Forest Ridge, returned to Forest Ridge (approx. 8.8 km) in 2023 to defend territory.

A female banded as a nestling in 2022 at Fort Cavazos (formerly Fort Hood) was found at Kent Butler on May 24, 2023. She was recaptured to confirm the U.S. Geological Survey band number. The female paired

and nested, but the nest was predated. This observation documents a dispersal of 93.4 km, breaking the prior record of 78.1 km.

Because of our nestling banding efforts, we were able to document several natal dispersals. Two female vireos banded as nestlings in 2022 at Forest Ridge returned to nearby areas of Forest Ridge (approx. 0.45 km and 0.35 km dispersals), paired and nested. One male vireo banded as a nestling in 2022 at Forest Ridge was observed on May 2, 2023 at Reicher Ranch (16 km dispersal), but did not establish a territory. A second male vireo banded as a nestling in 2022 at Forest Ridge was detected at Forest Ridge (approx. 0.76 km dispersal) across five days, beginning June 20, 2023.

BLACK-CAPPED VIREO HABITAT MANAGEMENT

The Balcones Canyonlands Conservation Plan (USFWS 1996) requires maintaining or creating 810 hectares (2,000 acres) of vireo habitat within the BCP, and the land management plan (BCP 2007) provides additional, general guidelines to help achieve this goal. The Balcones Canyonlands Conservation Plan recommends focusing potential vireo management areas in portions of the BCP that are not currently occupied by the warbler. Focal areas for vireo habitat management on COA BCP lands include parts of the Cortaña tract, infrastructure corridors (Kent Butler tract), Vireo Preserve, and Bohls tract. Previous management activities on these tracts are summarized in City of Austin (2016). The shin oak (*Quercus sinuata* var. *breviloba*) acorn crop was poor in 2023, so no harvesting or planting took place.

Overlap of Golden-cheeked Warbler and Black-capped Vireo Habitat

In some areas, vireo habitat may progress to warbler habitat through natural succession. Likewise, natural or anthropogenic disturbance patterns may convert warbler habitat to the early successional stage preferred by the vireo. These habitat types tend to overlap within the COA BCP. As in previous years, territorial warblers and vireos were observed in the same or neighboring areas on the Forest Ridge, Kent Butler, Cortaña, and Vireo Preserve/Wild Basin tracts in 2023. The Forest Ridge warbler plot supports a dense understory of vegetation that is used by both species. On the Kent Butler tract, four electric transmission lines cross the tract at the north edge of the warbler plot. Vireos were detected using the shrubby growth within the utility corridors, where vegetation has been trimmed short in some places, to prevent damage to the electric wires. Warblers occupy habitat on both sides of the utility corridors, and in a wooded strip between them. On the northern end of the Cortaña tract, warblers occupy steep, wooded canyons on three sides of the shinnery, as well as a low, wooded knoll in the middle of the shinnery. Warblers were occasionally observed in the shinnery (especially hatch-year birds), and vireos were often observed within the edges of the mature forest. On Vireo Preserve/Wild Basin, vireos nested in scrubby vegetation near the highest point on the tract, which is surrounded by occupied warbler habitat.

Expanding and Maintaining Vireo Habitat – Kent Butler

Vegetation in the vireo habitat expansion at Kent Butler in 2009 has been periodically cut back to maintain distance from the overheard powerline. At least one pair had used one of the three mechanically treated areas for 10 of the previous 11 years; the area was uninhabited in 2021 (City of Austin 2022).

Maintenance and Expansion of Occupied Habitat – Northern Cortaña

With the recolonization of the northern portion of the Cortaña tract by vireos (City of Austin 2016), further habitat manipulation has been postponed. However, biologists have harvested acorns of shin oaks from trees within the existing shinnery for use in habitat restoration. Some of these have been planted on a ridge immediately south of the shinnery that was cleared of most trees in 2005. Others have been planted in suitable sites on the central and southern parts of the Cortaña tract and on the Lime Creek tract. The poor acorn crop resulted in no harvest or planting in 2023.

Restoring and Creating Habitat – Vireo Preserve

Efforts continue to protect and rebuild soils and promote native plant diversity. The area where the vireo pair successfully nested is within an active restoration site, which includes planting native trees, shrubs, grasses, and wildflowers. The Vireo Preserve supports many of the habitat types observed throughout the BCP, so lessons learned on this tract should be applicable to other areas (City of Austin 2016, Travis County and City of Austin 2018). Ongoing regenerative restoration efforts at the Vireo Preserve and JJ&T tracts is summarized in O'Donnell et al. (2022). While COA BCP staff found acorns on several shin oaks within the Vireo Preserve in 2023, most of the acorns were not viable.

Habitat Creation – JJ&T

COA BCP staff continued to plant native woody, grass, and wildflower seeds, transplants rescued from a site slated for development, and approximately 30 species of hyperlocal and nursery-grown native trees and shrubs in upland sites on the JJ&T tract that are currently not habitat for the warbler or vireo. These ongoing efforts are summarized in the regenerative restoration plan for the Vireo Preserve and JJ&T (O'Donnell et al. 2022). While COA BCP staff planted approximately 4,500 shin oak acorns and seeds of other deciduous shrubs on upland sites in 2022, the poor acorn and seed crop in 2023 resulted in no harvesting or planting.

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FIGURES

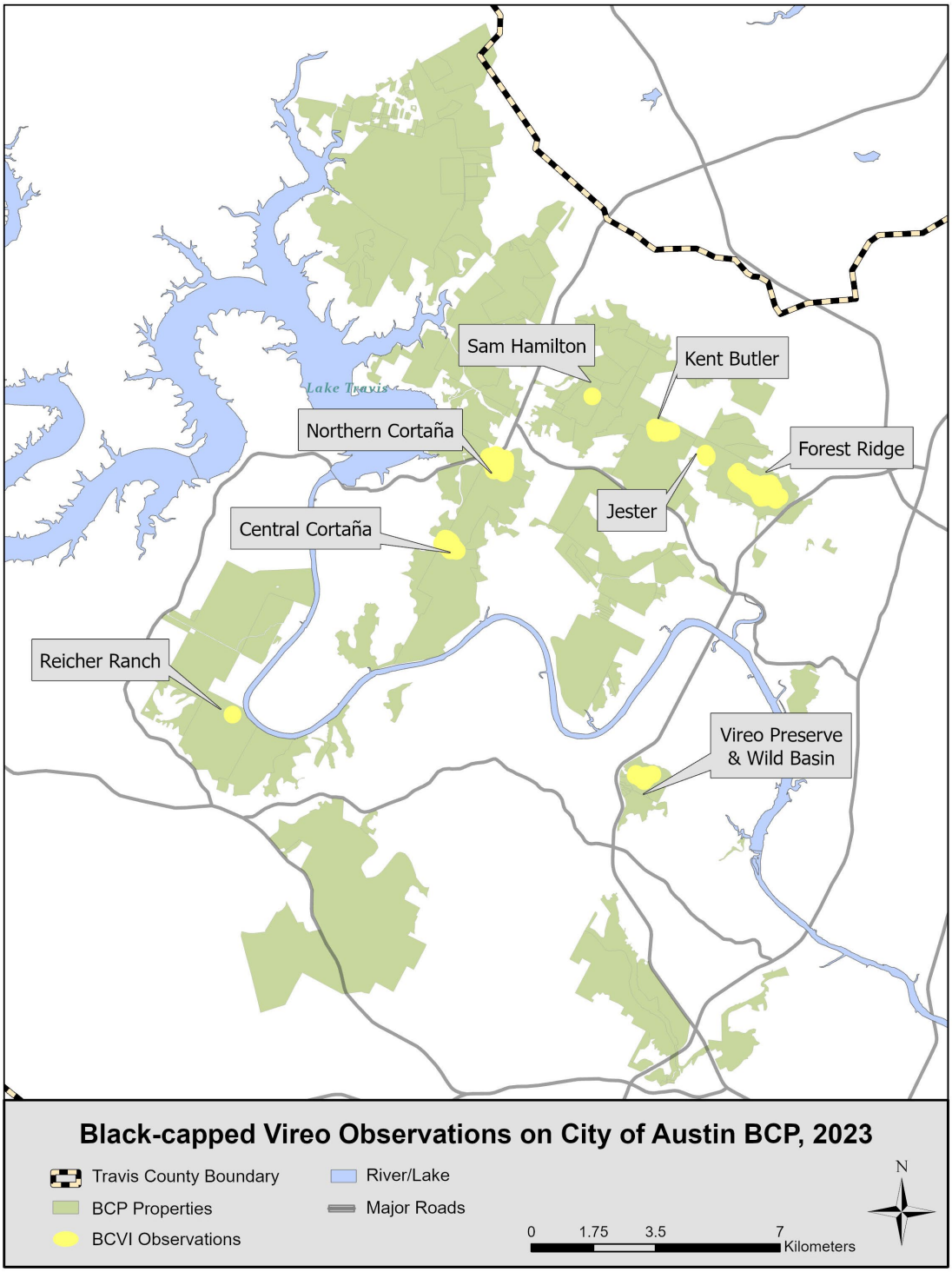


Figure A. Black-capped Vireo observations on City of Austin BCP Tracts, 2023.

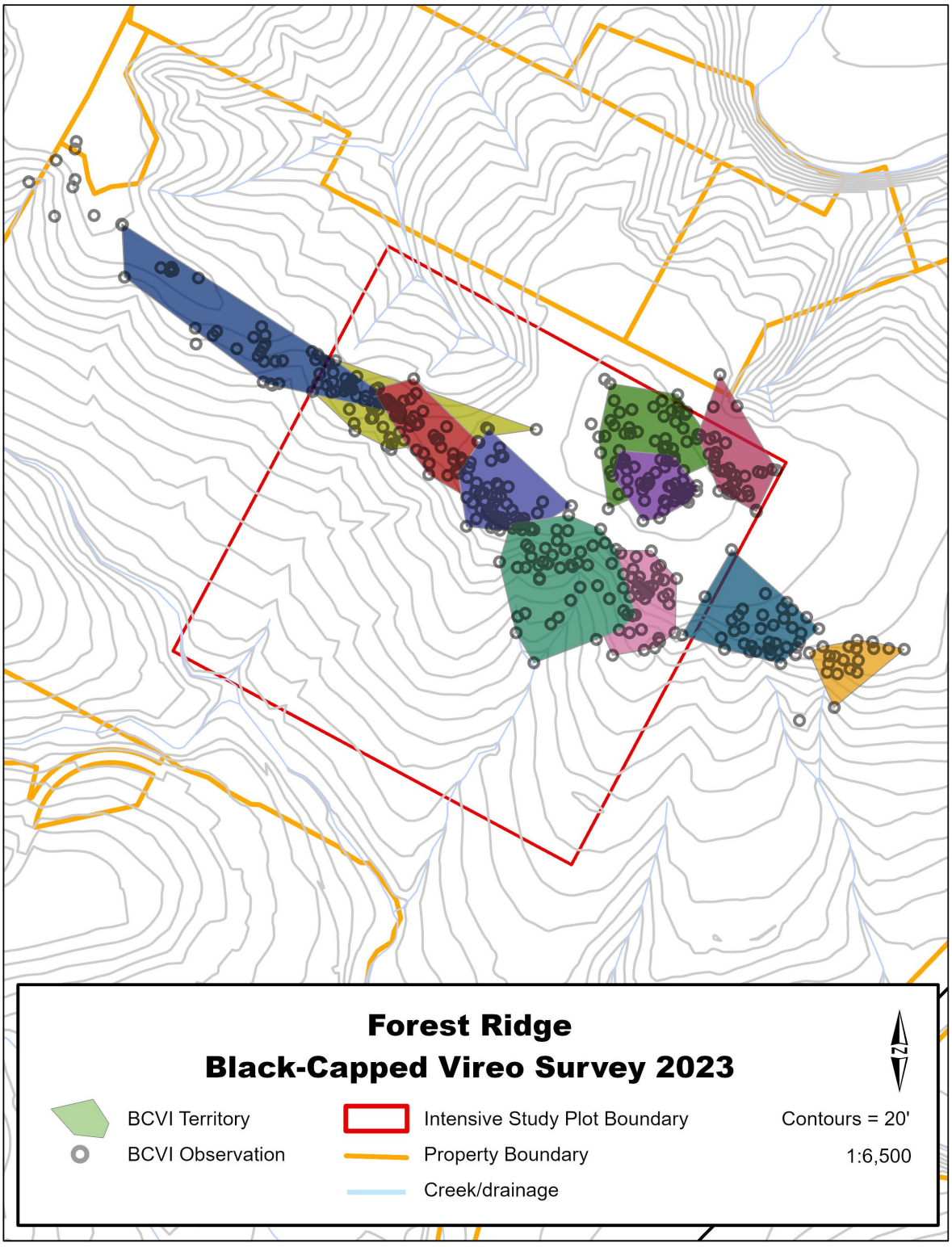


Figure B. Locations of Black-capped Vireos on Forest Ridge, 2023.

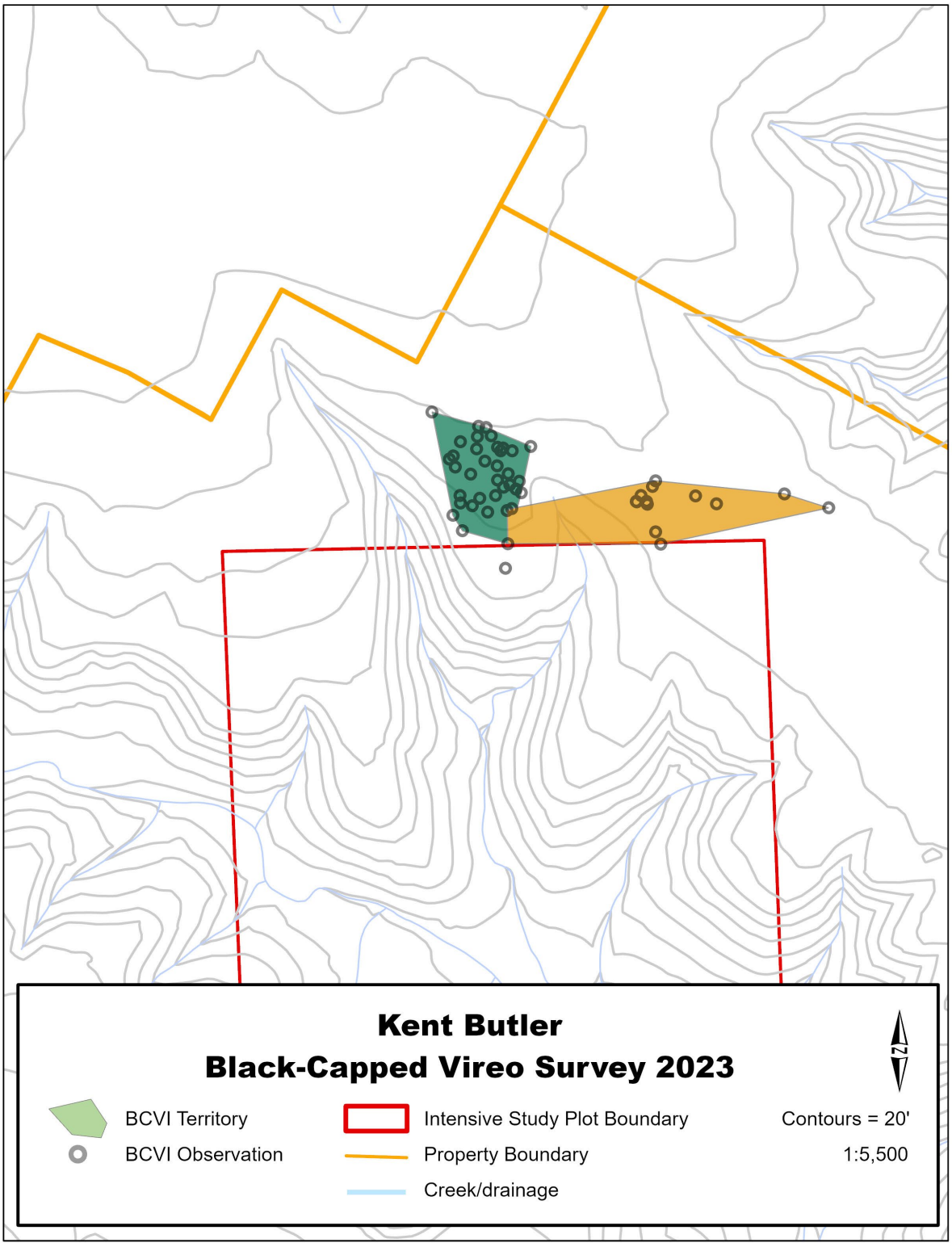


Figure C. Locations of Black-capped Vireos on Kent Butler Ecological Reserve, 2023.

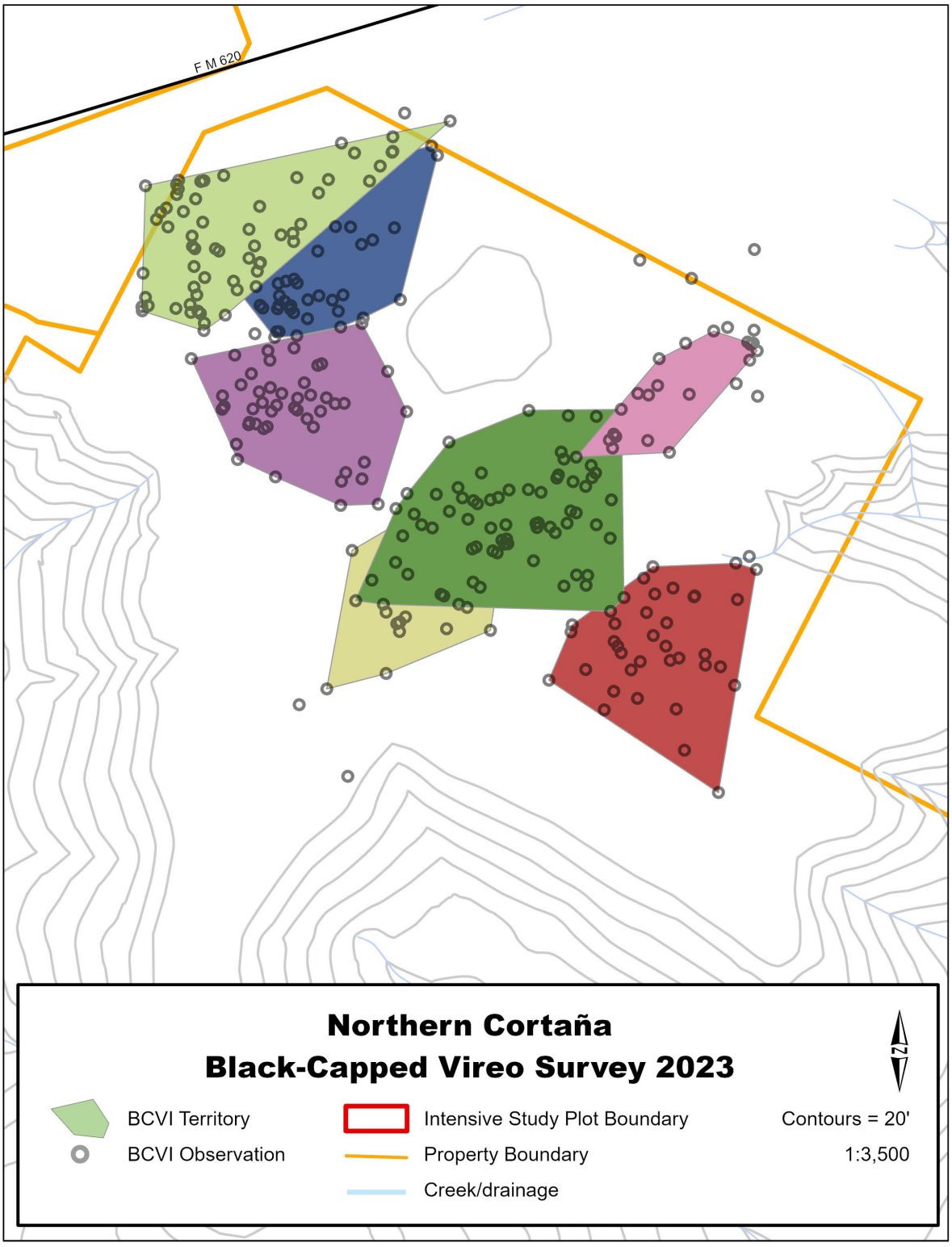


Figure D. Locations of Black-capped Vireos on Northern Cortaña, 2023.

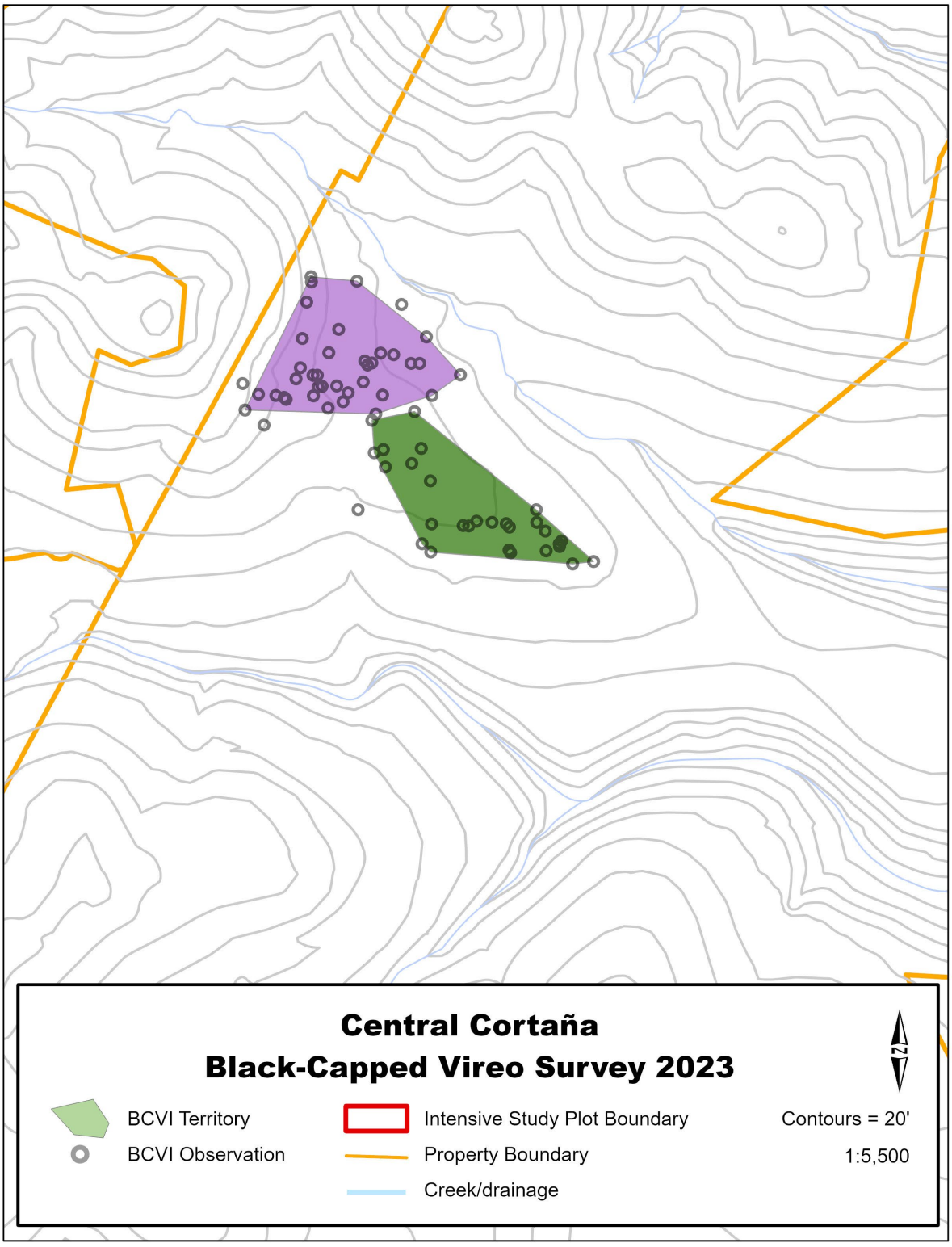


Figure E. Locations of Black-capped Vireos on Central Cortaña, 2023.

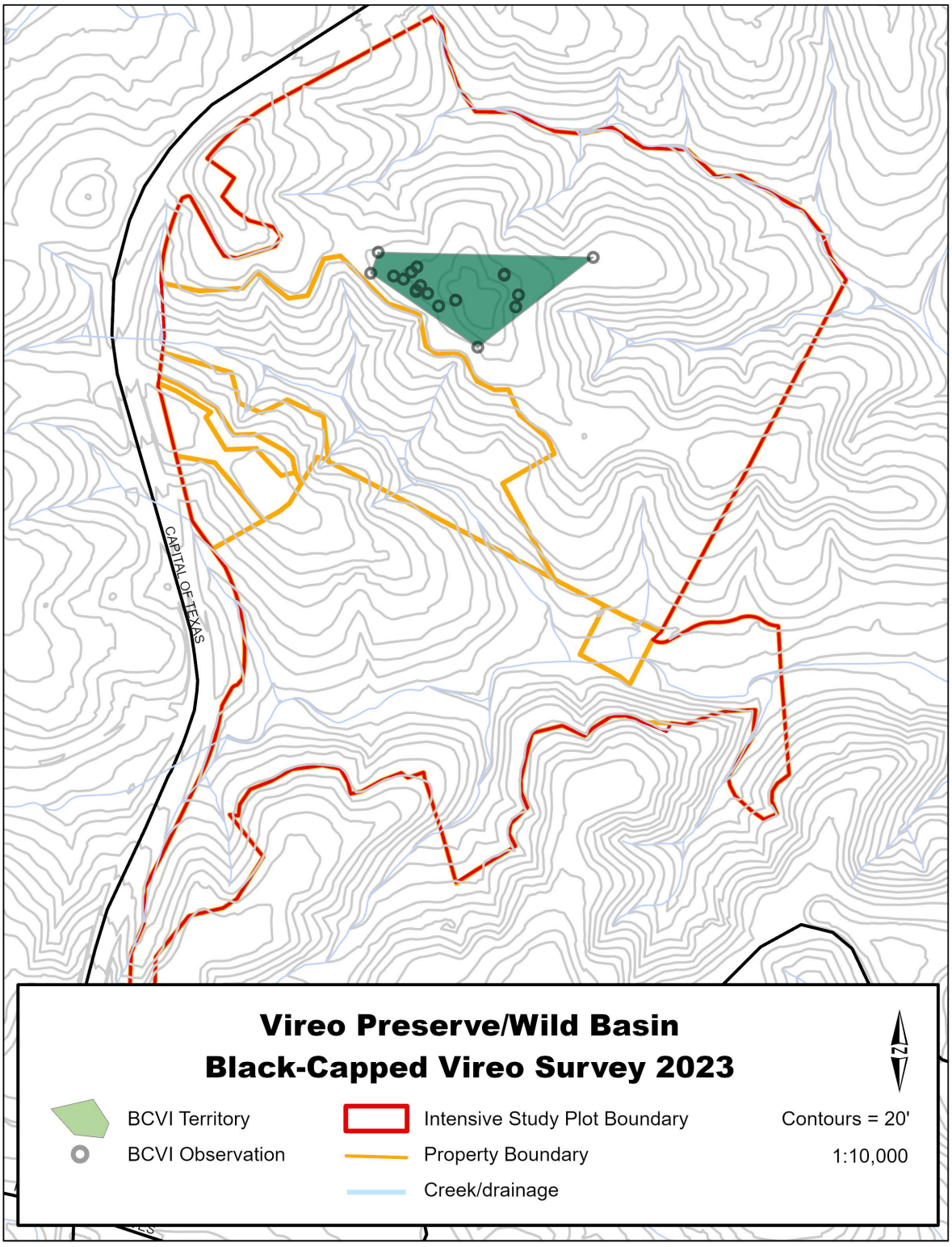


Figure F. Locations of Black-capped Vireos on Vireo Preserve/Wild Basin, 2023.

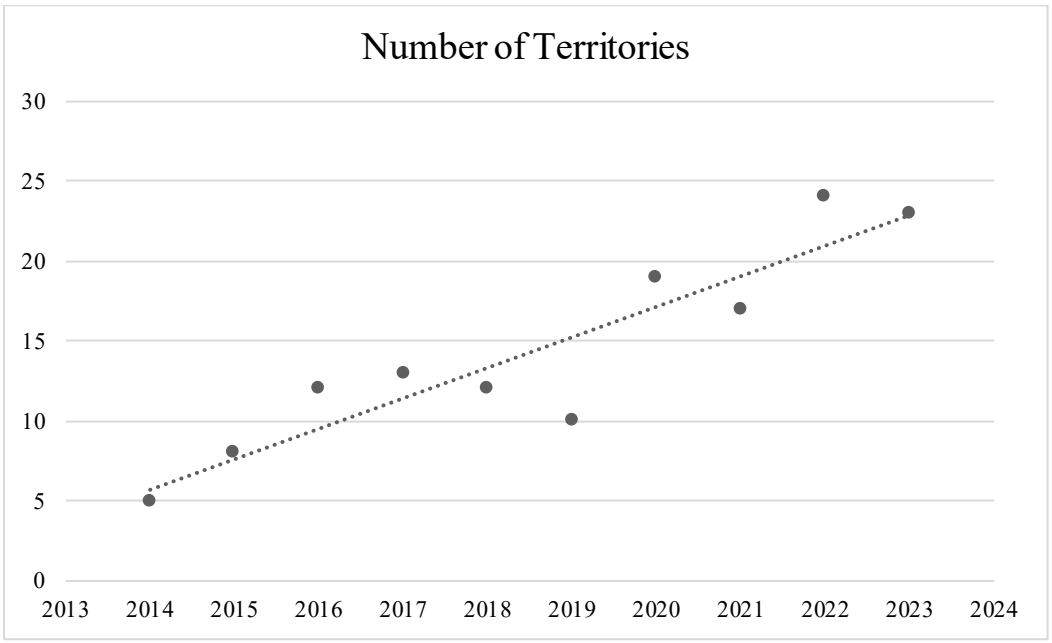


Figure G. Number of Black-capped Vireo territories on COA BCP, 2014-2023.

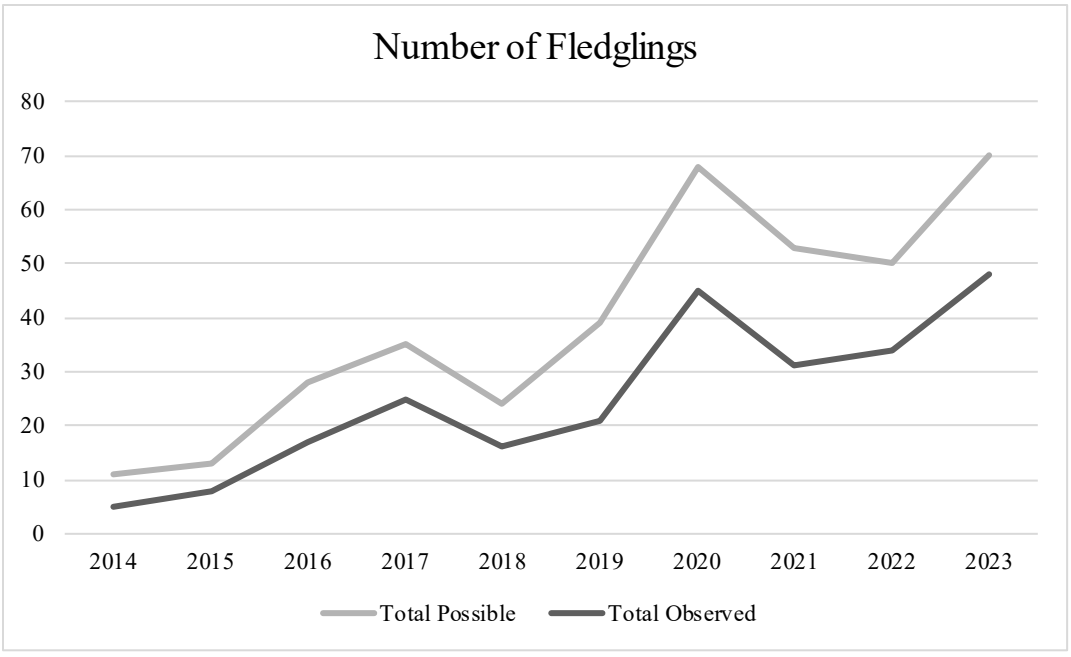


Figure H. Number of observed and possible Black-capped Vireo fledglings on COA BCP, 2014-2023.