City of Austin 2025
Black-capped Vireo *(Vireo atricapilla)*
Monitoring and Management Program

Balcones Canyonlands Preserve Annual Report



Releasing a banded Black-capped Vireo, Forest Ridge – G. Sertich

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Austin, Texas

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

City of Austin 2025
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Balcones Canyonlands Preserve Annual Report

This report summarizes the results of the City of Austin's 2025 black-capped vireo (*Vireo atricapilla*) monitoring and habitat management program. The 2025 field season was the twenty-eighth 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 19 black-capped vireo males holding territories across the COA BCP. The Forest Ridge and Cortaña tracts both had eight territories, and the Vireo Preserve/Wild Basin, Kent Butler, and Barton Creek tracts each had one territory. An additional nine males were monitored but did not establish territories on COA BCP, at Forest Ridge, Cortaña, Commons Ford, Bohls, and Vireo Preserve/Wild Basin.

Among the established territories, pairing success was 89%. Of the 34 nests observed, 64% failed due to predation or abandonment. Nest failures at Cortaña were elevated to 66% (n=15), compared to only 21% in 2024 (n=14), which accounted for the large change in overall nest failures from the previous year of 44%. Notable observations for the 2025 field season include a nest with seven eggs in it that was later confirmed abandoned.

COA BCP staff continued a project examining genetics, juvenile survival, and dispersal patterns by banding 36 nestlings. Of the 45 nestlings that were banded in 2024, six were documented as returned adults in 2025 on COA and Travis County BCP tracts.

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 (USFWS) 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 USFWS 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 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 USFWS removed the vireo from the federal List of Endangered and Threatened Wildlife effective May 16, 2018, citing recovery of the species (USFWS 2018a). The USFWS 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.

Since annual monitoring began in 1998, vireos have regularly established territories and raised young on only a few COA BCP sites: 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 or remained relatively stable in recent years at both sites. Vegetation within the power line corridor at Kent Butler was cut back in 2009 and periodically thereafter to maintain low, shrubby growth.

A couple of areas on COA BCP have been managed to create or maintain vireo habitat, though vireos have rarely been detected on them: Bohls (2019) and Lime Creek (2022) tracts. Areas where habitat management has coincided with recurring vireo occupation include the central part of the Cortaña tract, where at least one vireo territory has been established since 2019, and Vireo Preserve/Wild Basin, where at least one vireo territory has been established four of the prior five years. 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 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 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 2025 field season, biologists monitored vireo territories in seven locations: Barton Creek, Commons Ford, central Cortaña, northern Cortaña, Forest Ridge, Kent Butler, and Vireo Preserve/Wild Basin. Vireos at Forest Ridge, Kent Butler, and Vireo Preserve/Wild Basin occur within and adjacent to the warbler study plots. Vireos occupied a shinnery in northern Cortaña and a live oak savanna and shrubland in central Cortaña. At Commons Ford, a vireo was periodically observed on COA BCP, but primarily held territory on adjacent private property, with habitat similar to that of central Cortaña. In addition, biologists surveyed potential habitat where vireos were previously observed on the Bohls and the Lime Creek tracts.

Vireos were first detected on COA BCP on March 17 at the Forest Ridge warbler plot and the last vireo detected was at Vireo Preserve/Wild Basin on September 7 (see Table 1 for survey hours).

Genetic Sampling and Banding of Nestlings

We began a pilot study in 2022 to collect DNA from adult and nestling vireos and to color-band nestlings. We partnered with Travis County BCP staff to band and collect DNA samples from vireo adults and nestlings in order to increase sample size and have a better understanding of the population dynamics in this region. We collected DNA samples through 2024, and in 2025 we continued to band nestlings. 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, we banded and collected a blood sample from each nestling (unless undersized or presenting with health issues) in the same manner as adults, as well as measured nestling weight and wing chord length. To reduce stress on the parents, we waited until they left the nest to

forage and then only collected samples from half the brood at a time in case the parent returned while we were processing the nestlings.

Table 1. Summary of Black-capped Vireo Survey Effort on the Balcones Canyonlands Preserve, Travis County, Texas, Field Season 2025.

Site	Observers	Survey Hours
Bohls	John Chenoweth	13.25
Commons Ford	John Chenoweth, William Reiner	1.5
Cortaña - central	William Reiner, Darrell Hutchinson	71.75
Cortaña - north	William Reiner, Darrell Hutchinson	117.5
Forest Ridge	Jonny Scalise, Laurel Moulton	113.25
Lime Creek	William Reiner, John Chenoweth	3.5
Kent Butler	Laurel Moulton, Jonny Scalise	21.25
Vireo Preserve/Wild Basin	Jim O'Donnell, Lisa O'Donnell	30.5
Barton Creek	William Reiner, Laurel Moulton	5.0
Total		**377.5**

RESULTS AND DISCUSSION

Territory Delineations

In 2025, biologists found nineteen vireo males holding territories across the COA BCP tracts (figures A-G): Forest Ridge (eight territories), northern Cortaña (five territories), central Cortaña (three territories), Vireo Preserve/Wild Basin (one territory), Kent Butler (one territory), and Barton Creek (one territory). This total is an 18.5% decrease from the average number of territories (23.3) from the last three years (Figure H). Nine non-territorial male vireos were detected on COA BCP tracts: Forest Ridge, Cortaña, Commons Ford, Bohls, and Vireo Preserve/Wild Basin. Of these nine, at least two were considered non-territorial on BCP because the bulk of their territory was on adjacent non-BCP property.

Banding, Return Rates, and Genetic Sampling

Biologists color-banded two adult female and eight adult male vireos in 2025. Of the 16 banded adult male vireos on COA BCP in 2024 (including returns from previous years), nine returned in 2025 (a return rate of 56%). Of the four known banded adult females in 2024, two were detected in 2025. Additionally, one adult female was banded as a nestling in 2023, but not detected in 2024. Four of the 45 nestlings banded in 2024 were detected on BCP in 2025: a female banded at Forest Ridge was resighted at Forest Ridge (she did not pair and was only seen twice), a male banded at Forest Ridge returned to and held territory at Forest Ridge, a male banded on Cortaña North was resighted by Travis County BCP (TC BCP) staff on their Kotrla tract, and another male from Cortaña North was resighted by TC BCP staff on their Ribelin tract. Additionally, COA BCP resighted two birds that were banded as nestlings on TC BCP properties: a male

banded on the Steiner Ranch tract was resighted at central Cortaña, and a male banded on the Wheless tract was found on Forest Ridge.

We color-banded 36 nestlings from 12 nests (eight nests at Forest Ridge, three at Cortaña, and one at Kent Butler). Additionally, TC BCP staff banded and collected blood samples from nestlings (Travis County 2025) which will be included in the genetic analyses.

Banding of nestlings and subsequent returns of adult birds has provided useful information and raised more questions. Although we have not directly documented inbreeding, the frequency of banded returns to their natal area suggests high likelihood of relatedness within our population. This coupled with the recurrence of unhatched eggs (see Other Observations) suggests our population could be seeing productivity impacts due to inbreeding. Continued nestling banding will aid in our ability to document inbreeding issues. We have partnered with Dr. Kathryn Turner at Idaho State University to sequence the blood samples that were collected from adults and nestling vireos between 2022-2024. They will use 13 microsatellite markers to examine relatedness and genetic diversity among individuals on the BCP, juvenile dispersal, and source-sink dynamics of the population.

Pairing and Reproductive Success

In 2025, 17 of the 19 territorial males were successful in finding a mate, but only 10 of those pairs successfully produced offspring. COA BCP biologists found and monitored 34 nests (Table 2). A total of 24 vireo fledglings were observed on COA BCP, and up to 34 were possible, based on nest monitoring observations. This productivity of 1.3 to 1.7 offspring per territory and 2.4 to 3.3 offspring per successful territory (Table 3) represents a major decline in observed and potential productivity from recent years (Figure I).

At Forest Ridge, seven of the eight territorial male vireos observed on and adjacent to the warbler plot successfully paired (Figure B). Biologists found 16 nests among all the pairs (Table 2). Of the 16 nests, 56% failed due to predation, and 44% successfully fledged at least one young. Despite the low nest success rate, six of the seven pairs had at least one successful nest (Table 3).

In the shinnery at the north end of the Cortaña tract, all five of the males that established territories successfully paired (Figure C) and but only two produced offspring (Table 3). One of these pairs had a successful second brood. Biologists found 11 nests on northern Cortaña (Table 2). Of these, only 27% fledged at least one young, and 73% failed due to predation or abandonment.

Three vireos established territories in central Cortaña (Figure D). Only one of these successfully paired and fledged offspring (Table 3). Four active nests were found, but only one successfully fledged young (Table 2).

At the Barton Creek intensive monitoring plot, one male held a territory (Figure E), but was not paired.

At Kent Butler, one male established a territory (Figure F) and was paired but none of the three active nests (Table 2) were successful (Table 3).

At Vireo Preserve/Wild Basin, one male held a territory (Figure G). This male successfully paired and produced offspring (Table 3). No active nests were found.

Table 2. Summary of Black-capped Vireo Nests Found on the Balcones Canyonlands Preserve, Travis County, Texas, Field Season 2025.

Site	Male ID	Nest Substrate	Nest Fate	Number of Fledglings*
Cortaña - central	NB/SI:PI/MV	*Diospyros texana*	Fledged	2
Cortaña - central	DG/SI:BL/GR	*Diospyros texana*	Abandoned	0
Cortaña - central	DG/SI:BL/GR	*Diospyros texana*	Unknown	Unknown
Cortaña - central	NB/SI:PI/MV	*Juniperus ashei*	Predated	0
Cortaña - north	UBCTB	*Quercus buckleyi*	Predated	0
Cortaña - north	DB/SI:OR/RD	*Diospyros texana*	Abandoned	0
Cortaña - north	DB/SI:OR/RD	*Quercus sinuata*	Predated	0
Cortaña - north	MV/SI:NB/BK	*Rhus virens*	Predated	0
Cortaña - north	UBCTA	*Juniperus ashei*	Fledged	1-2
Cortaña - north	UBCTC	*Quercus sinuata*	Predated	0
Cortaña - north	MV/SI:NB/BK	*Diospyros texana*	Fledged	3
Cortaña - north	UBCTA	*Quercus sinuata*	Fledged	2-3
Cortaña - north	DB/SI:OR/RD	*Mahonia trifoliolata*	Predated/Abandoned	0
Cortaña - north	UBCTB	*Quercus sinuata*	Predated	0
Cortaña - north	DB/SI:OR/RD	*Diospyros texana*	Predated	0
Forest Ridge	YE/SI:OR/YE	*Dermatophyllum secundiflora*	Predated	0
Forest Ridge	RD/PI:DB/SI	*Diospyros texana*	Fledged	2
Forest Ridge	UBFRB	*Dermatophyllum secundiflora*	Predated	0
Forest Ridge	OR/SI:NB/OR	*Quercus sinuata*	Predated	0
Forest Ridge	UBFRA	*Dermatophyllum secundiflora*	Predated	0
Forest Ridge	UBFRC	*Diospyros texana*	Fledged	3-4
Forest Ridge	YE/SI:OR/YE	*Ungnadia speciosa*	Fledged	2-4
Forest Ridge	UBFRB (Kiwi)	*Diospyros texana*	Predated	0
Forest Ridge	OR/SI:NB/OR	*Quercus sinuata*	Fledged	2-3
Forest Ridge	UBFRB	*Diospyros texana*	Predated	0
Forest Ridge	NB/BK:DG/SI	*Quercus buckleyi*	Predated	0
Forest Ridge	RD/PI:DB/SI	*Ungnadia speciosa*	Fledged	1-4
Forest Ridge	UBFRA	*Diospyros texana*	Predated	0
Forest Ridge	NB/BK:DG/SI	*Quercus buckleyi*	Fledged	1-2
Forest Ridge	UBFRA	*Frangula caroliniana*	Predated	0
Forest Ridge	UBFRB	*Diospyros texana*	Fledged	1
Kent Butler	DB/BL:WH/SI	*Ilex vomitoria*	Predated	0
Kent Butler	DB/BL:WH/SI	*Ilex vomitoria*	Predated	0
Kent Butler	DB/BL:WH/SI	*Quercus sinuata*	Predated	0
34 total nests: 22 predated or abandoned (65%); 11 successful (32%); 1 unknown (3%)				

* 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 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 2025.

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	3	3	100%	1	33%	2	0.7	2.0
Cortaña - north	5	5	100%	2	40%	6-8†	1.2-1.6	3.0-4.0
Forest Ridge	8	7	88%	6	75%	12-19†	1.5-2.5	2.0-3.3
Kent Butler	1	1	100%	0	0%	0	0	NA
Barton Creek	1	0	0%	0	0%	0	0	NA
Vireo Preserve/ Wild Basin	1	1	100%	1	100%	4	4.0	4.0
All Sites	**19**	**17**	**89%**	**10**	**53%**	**24-33†**	**1.3-1.7**	**2.4-3.3**

* Ranges indicate fledglings 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 34 vireo nests found in 2025 were parasitized, and no cowbirds were observed during vireo surveys. No vireos were observed tending cowbird fledglings. COA BCP biologists have seen no evidence of nest parasitism since trapping of cowbirds ceased 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.

At Forest Ridge, a female was observed persistently shradding (fuss calling) at a Texas Rat Snake (*Elaphe obsoleta lindheimeri*), a typical avian nest predator. This female was not near her nest and had strayed just outside of her mate's defended territory. She remained alert and aggravated by the snake for at least 15 minutes.

Vireos at central Cortaña appeared to scold Woodhouse's Scrub-Jays (*Aphelocoma woodhouseii*) vigorously in the vicinity of fledgling vireos (June 6), but the male appeared to pay no attention to a family of Cooper's Hawks by late July. A vireo at north Cortaña also scolded an intruding scrub-jay (June 24).

Non-Viable Eggs

Of the 34 nests observed, at least five contained eggs that did not hatch. 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.

Injuries and Deaths

When banding nestlings in a nest at Forest Ridge, one of the nestlings was notably much smaller than the other three. It weighed 4.25g compared to the average among its nestmates of 6.5g, and wing chord was only 11.5mm compared to 18, 22.5 and 23mm. Only a single aluminum USGS band was used for this

individual. In the following weeks post-fledging, the other three nestmates were frequently documented with their parents, and the undersized nestling was never observed as a fledgling and presumed dead.

Potential Egg-dumping

One nest at Cortaña was observed with seven eggs. It was found with three eggs on April 18, in the territory of a banded male. On the next check, April 23, the female was observed sitting on the nest, as though incubating. On the third visit, on May 1, the nest was apparently abandoned but documented to have seven eggs in it, of consistent size and shape for Black-capped Vireos, and a replacement nest was found less than 15 meters away. The replacement nest was attended by the banded male and contained two eggs; it was later confirmed to be still in the laying stage, since four eggs were ultimately documented. Whether one female laid the seven eggs in the original nest, or if another female found the nest and laid eggs in it, is unknown.



Black-capped Vireo nest with seven eggs, Cortaña, 2025 – W. Reiner

Pair Relations

No instances of within-season mate switching were documented this field season.

Dispersals

No adult vireo dispersals were observed this year.

We documented seven natal dispersals as a result of our nestling banding effort and partnership with Travis County staff (see Banding, Return Rates, and Genetic Sampling). The furthest natal dispersal (21.1km) was

a male vireo banded on northern Cortaña and resighted on the Kotrla tract. However, several were observed on the same tract as where they were born. Of note, two females and a male banded as nestlings on Forest Ridge returned to Forest Ridge, furthering our concern of inbreeding depression.

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 and Lime Creek tracts, infrastructure corridors (Kent Butler tract), Vireo Preserve, and uplands on the South Lake Austin Macrosite (Bohls and JJ&T tracts). Previous management activities on these tracts are summarized in City of Austin (2016), and ongoing restoration efforts at JJ&T and the Vireo Preserve are summarized in O'Donnell et al. (2022). We collected more than 2800 shin oak (*Quercus sinuata* var. *breviloba*) acorns at the north Cortaña shinnery in 2025. We sent 400 acorns to Northern Arizona University for a greenhouse experiment and planted 880 acorns as part of a companion field experiment at JJ&T and Vireo Preserve. We planted the remaining acorns at Bright Leaf (to evaluate effects of rodent granivory and deer herbivory), mid-Cortaña, south Cortaña, Lime Creek, and Vireo Preserve nursery. The 112 acorns initially planted at Bright Leaf were removed by rodents and replanted with a cover of hardware cloth to prevent additional granivory (224 acorns total).

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 2025. 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 have been 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 occupy 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 vertical distance from the overhead powerline. Since then, at least one pair had used one of the three

mechanically treated areas in most years. Though it was uninhabited by vireos in 2024, a mated pair held territory in this area again in 2025.

Maintaining and Expanding Occupied Habitat – Northern Cortaña

With the recolonization of the northern portion of the Cortaña tract by vireos (City of Austin 2016), no further habitat manipulation has been implemented. However, biologists have harvested acorns of shin oaks from trees within the existing shinnery for use in habitat creation and expansion elsewhere. Some of these have been planted on a ridge immediately south of the shinnery that was cleared of most trees in 2005 to expand the existing shinnery.

Expanding Occupied Habitat – Central Cortaña

Vireos colonized a site on the central portion of the Cortaña tract in 2020 (City of Austin 2020) after junipers had been cleared between 2003 and 2006. To further improve the habitat, staff have planted thousands of shin oak acorns on the site, primarily under junipers rather than existing oaks. Though few oaks germinated from the initial planting in 2015, subsequent germination rates have been much better, up to 75% at one site planted in 2019 (City of Austin 2020). Staff planted another 300 acorns on this site in 2025.

Creating Habitat – Southern Cortaña and Lime Creek

Following the same low-intensity methods used to expand habitat at central Cortaña, staff have continued planting shin oak acorns beneath other trees in areas occupied by neither warblers nor vireos. In 2025, staff planted 399 acorns on the Lime Creek tract and 500 acorns on the southern portion of the Cortaña tract.

Habitat Restoration and Field Experiments for Oak Regeneration – JJ&T and Vireo Preserve

The area occupied by a vireo pair at the Vireo Preserve in 2025 was within an active upland restoration site that is also occupied by golden-cheeked warblers. Restoration on the JJ&T tract focuses on areas that are not currently optimal for the warbler or the vireo. To help create vireo nesting habitat in degraded areas at both JJ&T and Vireo Preserve, we continue to install rock berms and mulch berms that are designed to hold soil and promote water infiltration (O'Donnell et al. 2022). We seed the upslope side of the berms with native wildflowers and plant shrubs in dense clusters. We then seed native grasses and wildflowers between the clusters. We also continue to plant native shrubs on and below existing bioswales at both sites, including evergreen sumac (*Rhus virens*), flameleaf sumac (*Rhus lanceolata*), Mexican-buckeye (*Ungnadia speciosa*), fragrant mimosa (*Mimosa borealis*), kidneywood (*Eysenhardtia texana*), Texas mountain laurel (*Dermatophyllum secundiflorum*), and Texas persimmon (*Diospyros texana*).

In November 2025, we initiated a soil translocation project at JJ&T and Vireo Preserve in coordination with Catherine Gehring (Northern Arizona University) to help develop methods to reestablish oaks in open areas. While previous research has shown that aboveground shading is critical to protecting oak seedlings from temperature extremes, increased access to belowground resources, including beneficial soil microbes, may also be important. Field experiments can help us understand whether inoculation with native forest soils

can facilitate access to beneficial microbes and in turn further enhance oak seedling survival. On November 21, we planted 220 acorns at JJ&T with no inoculum (control) and 220 acorns with ~35 ml soil inoculum (treatment). The soil inoculum was collected from the rhizosphere (top 10 cm where root production is highest) under mature Ashe juniper and shin oak trees on the Kent Butler tract. This field experiment was repeated at the Vireo Preserve on November 23. A ring of approximately 4 liters of 50:50 chipped Ashe juniper and oak mulch was added around each planting to retain soil moisture. To provide shade and protection from deer browse, we will place a mix of juniper and hardwood brush over all plantings. To avoid attracting rodents and acorn predation, the brush will be added in late February, just prior to seedling emergence.

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FIGURES

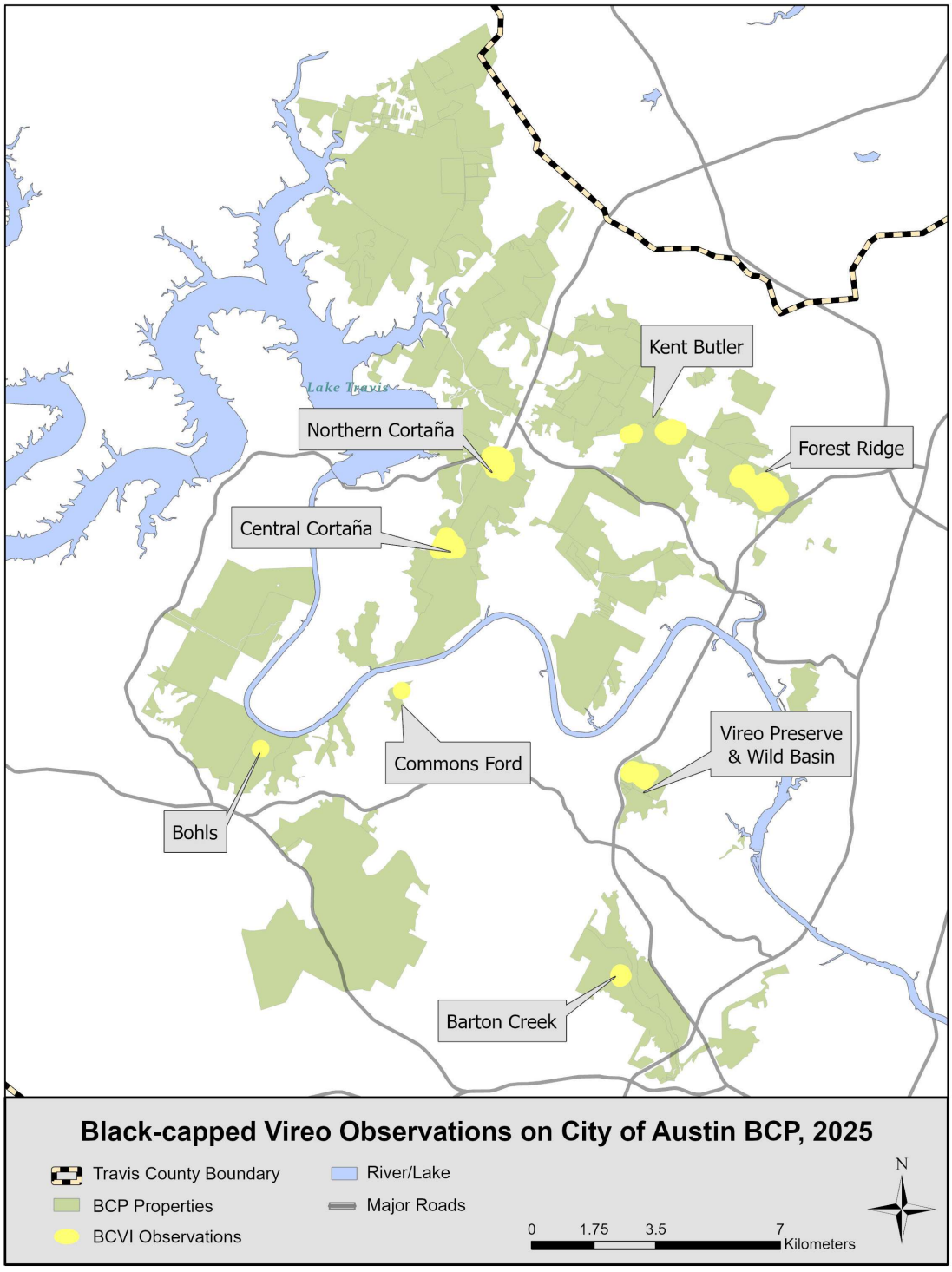


Figure A. Black-capped Vireo observations on City of Austin BCP Tracts, 2025.

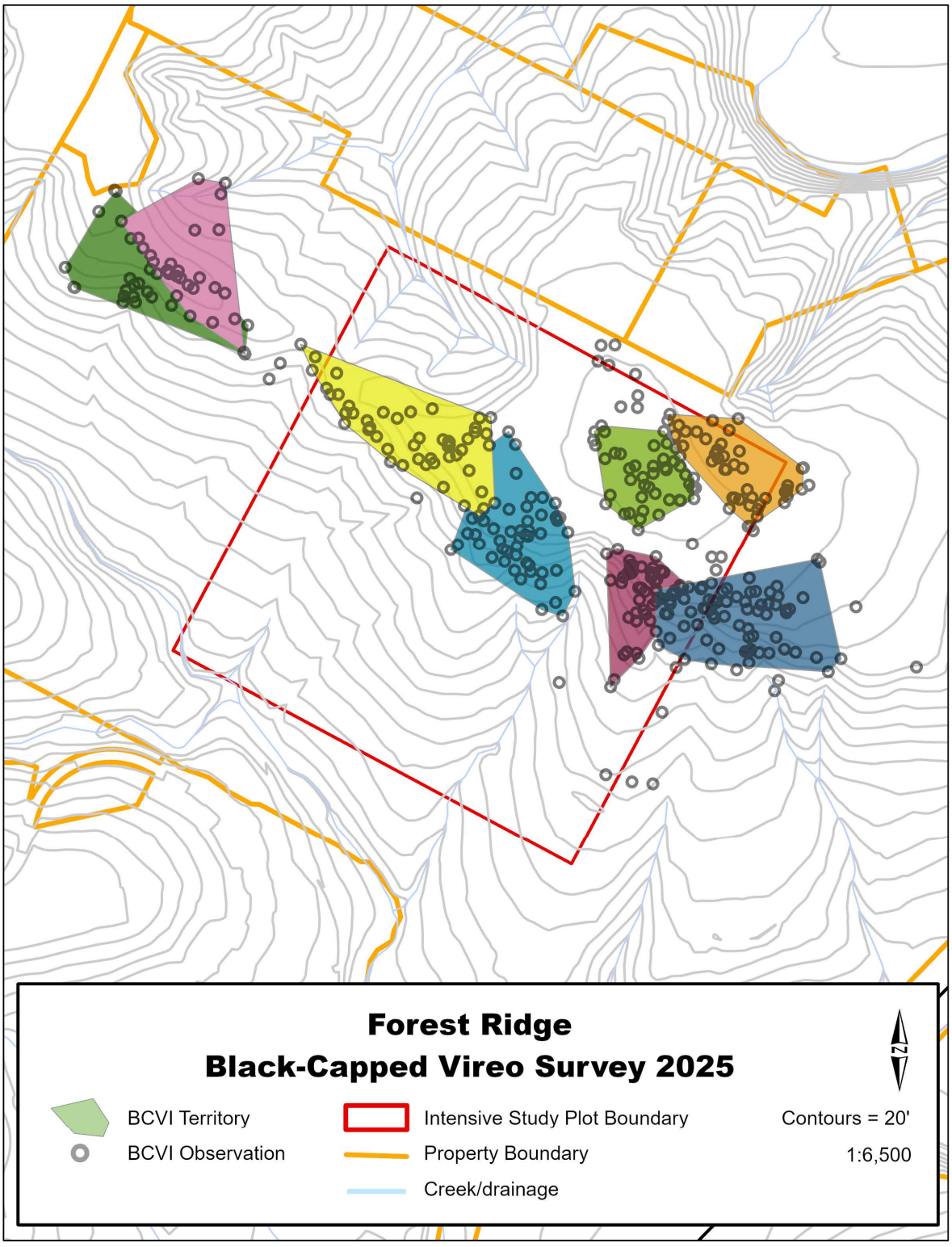


Figure B. Locations of Black-capped Vireos on Forest Ridge, 2025.

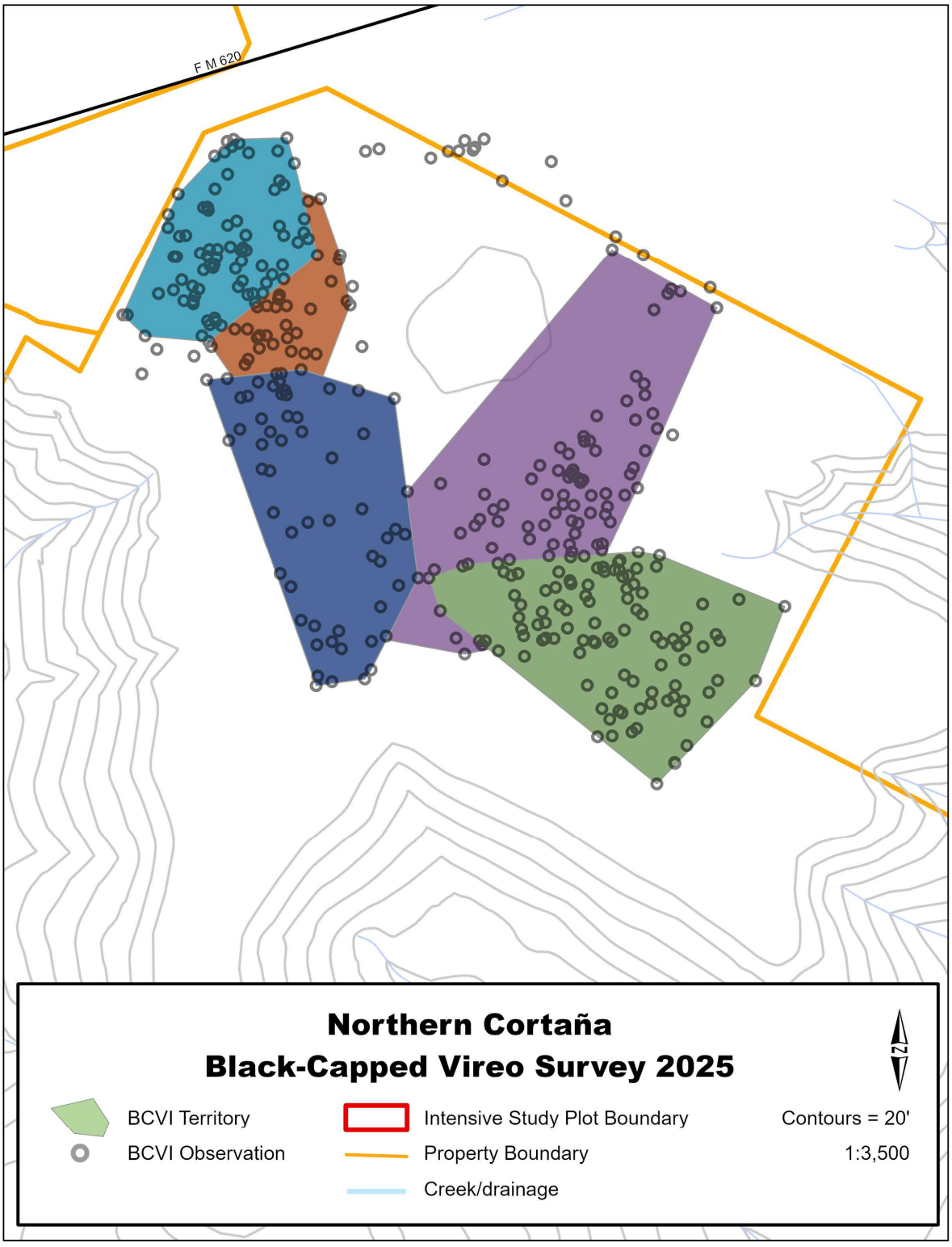


Figure C. Locations of Black-capped Vireos on Northern Cortaña, 2025.

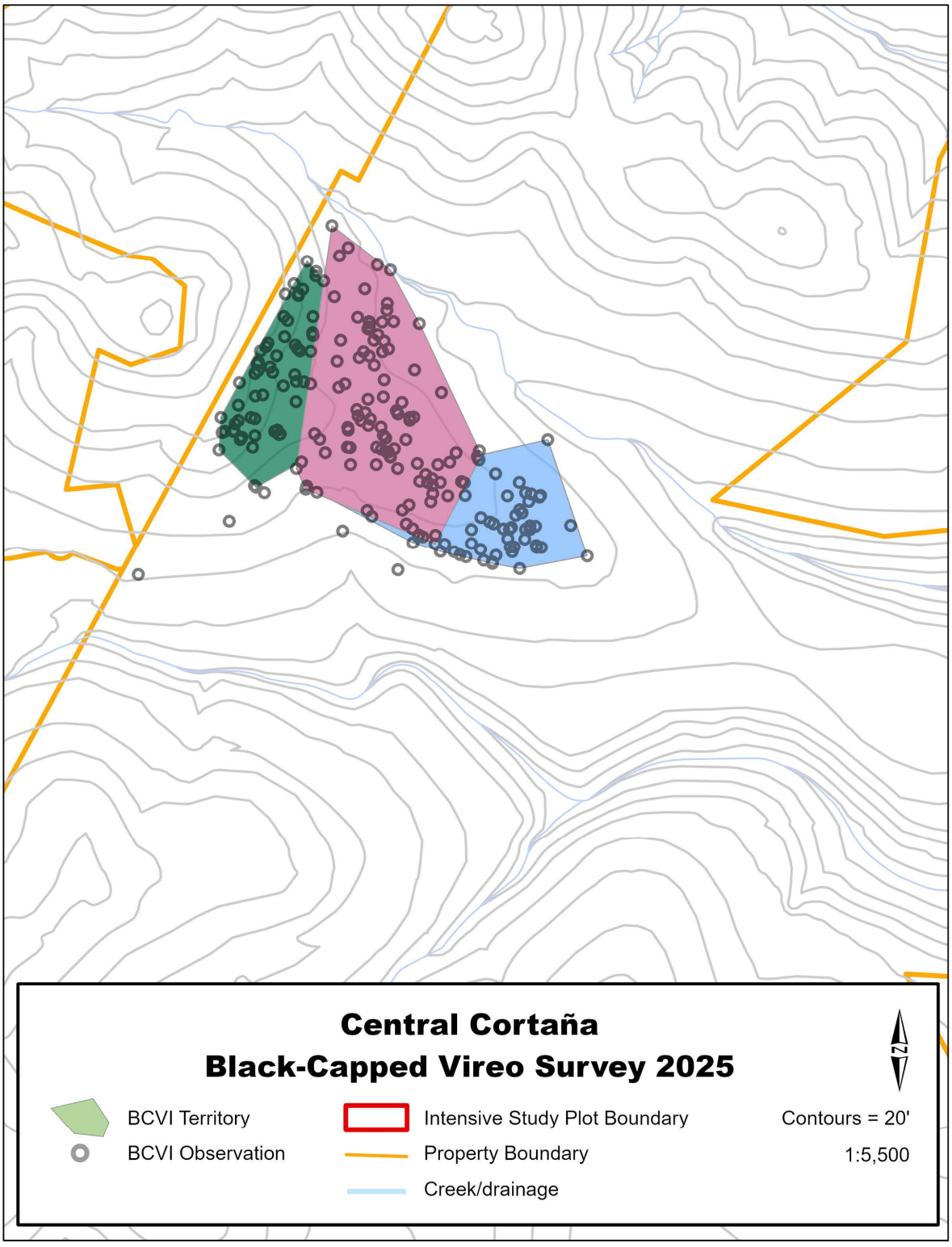


Figure D. Locations of Black-capped Vireos on Central Cortaña, 2025.

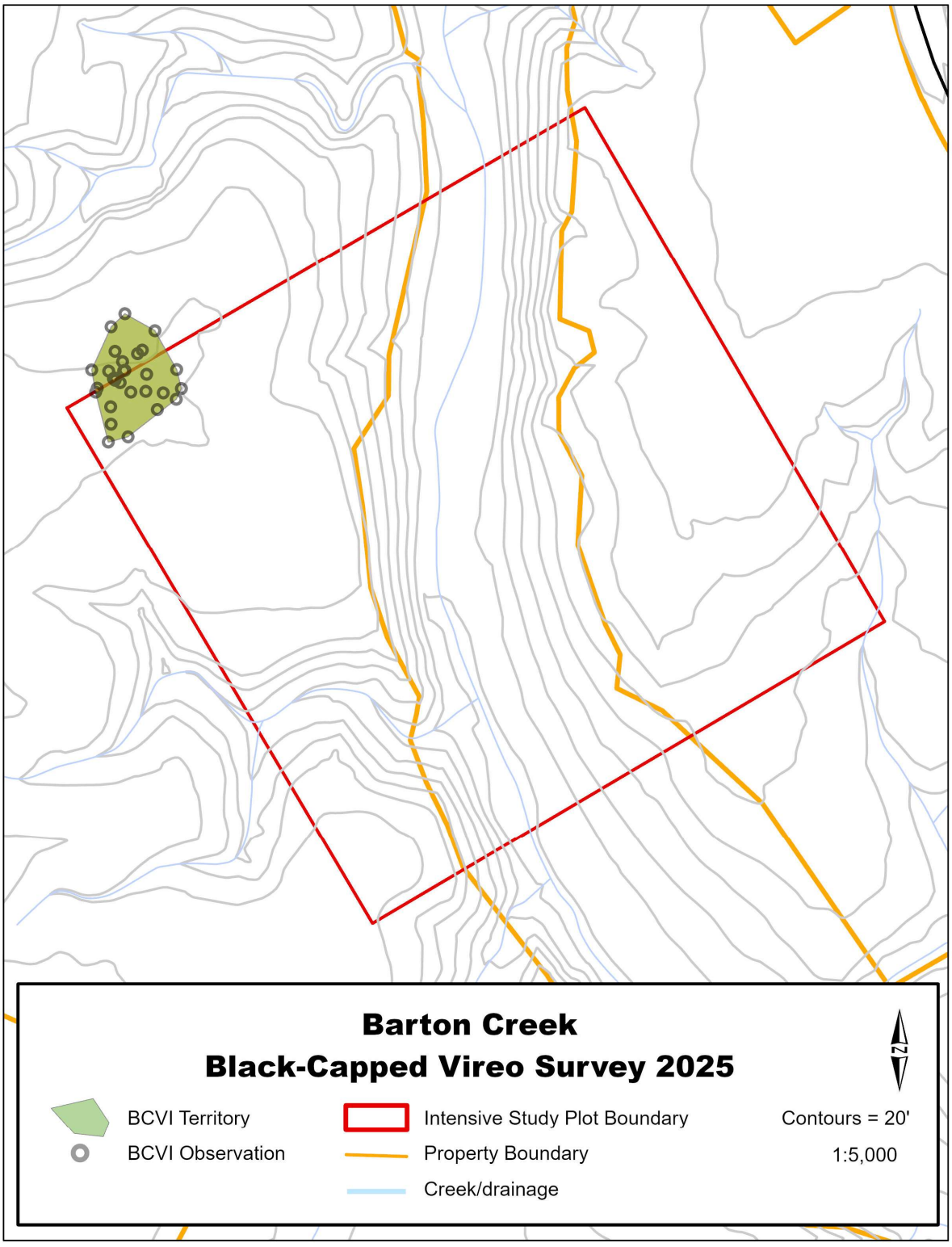


Figure E. Locations of Black-capped Vireos on Barton Creek, 2025.

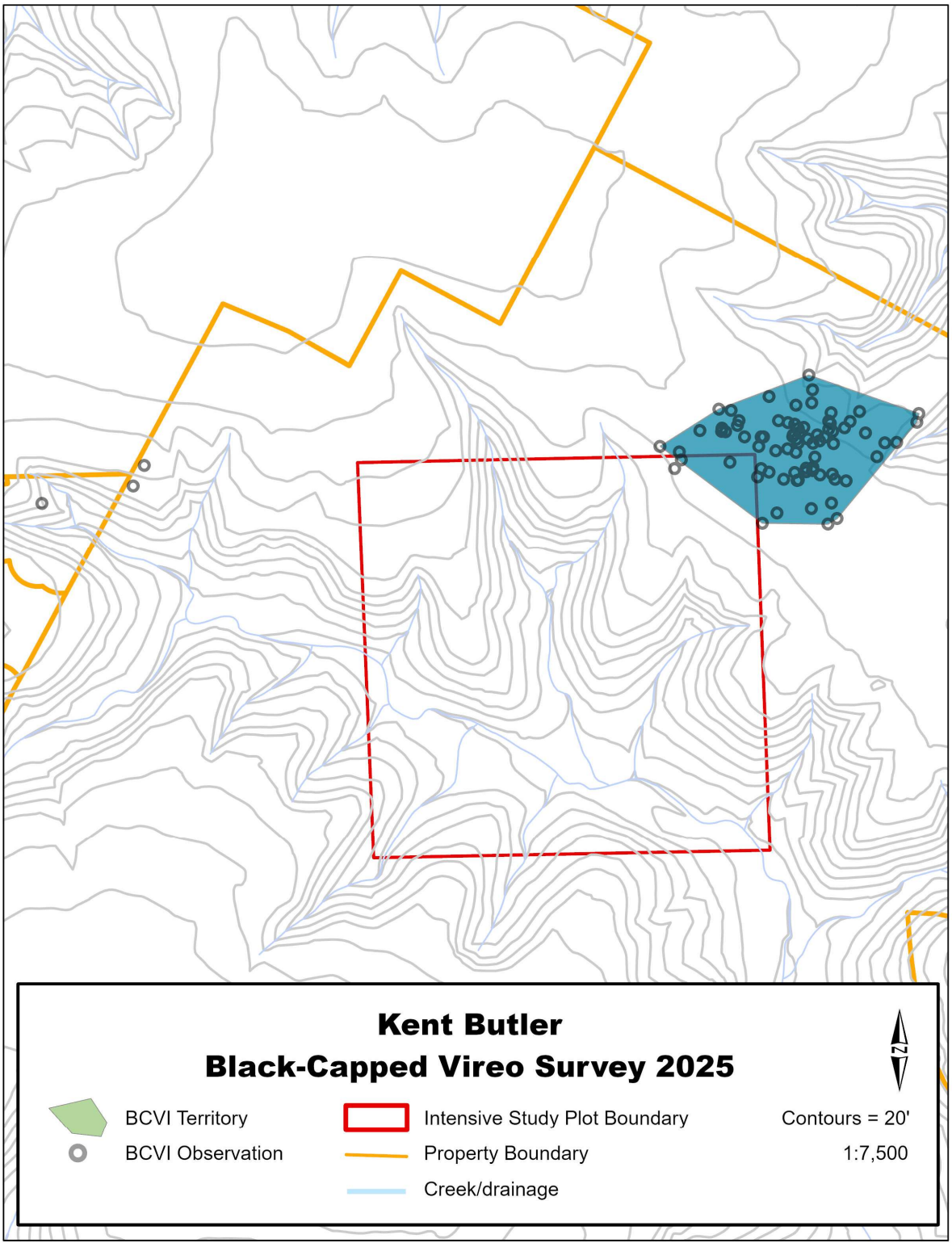


Figure F. Locations of Black-capped Vireos on Kent Butler, 2025.

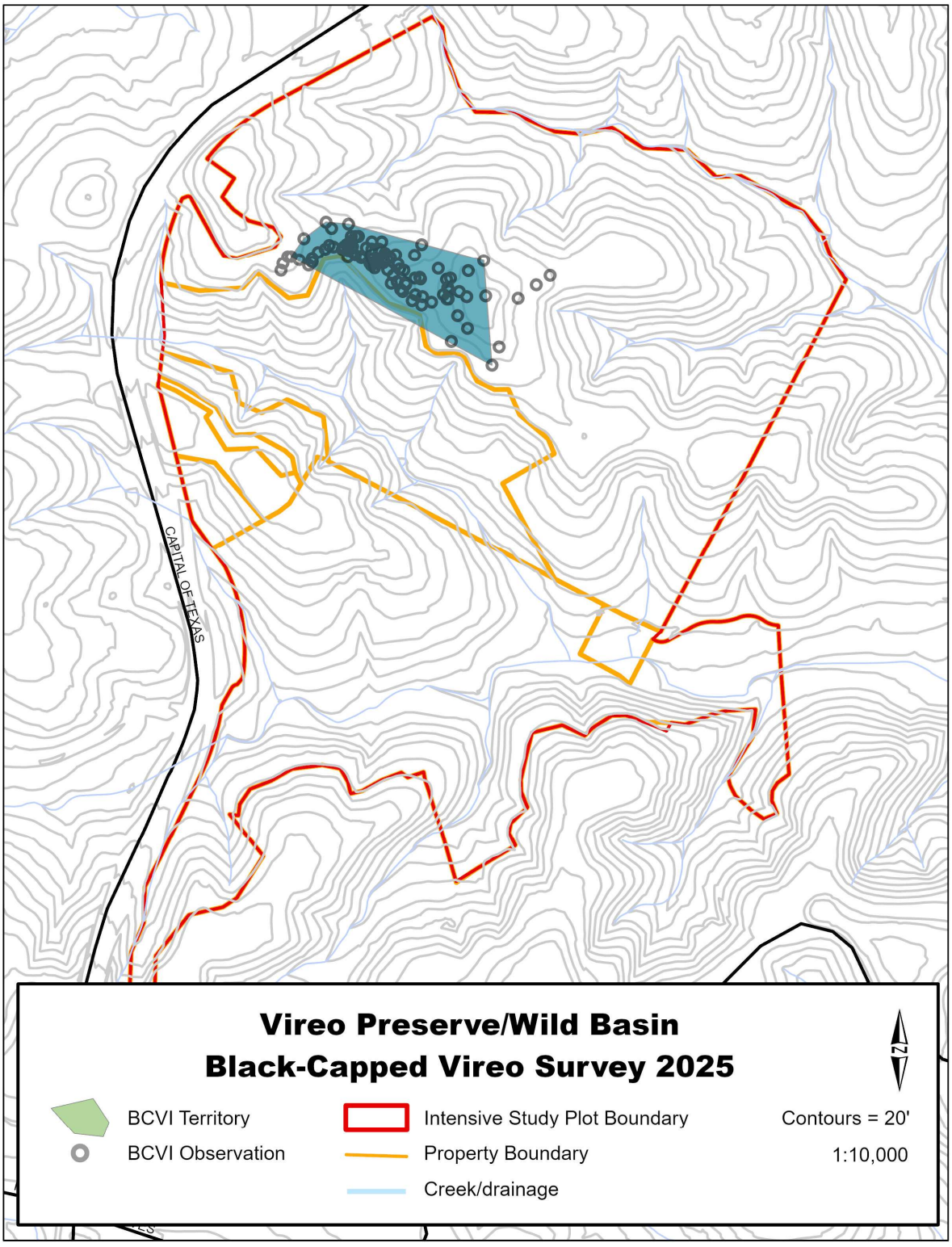


Figure G. Locations of Black-capped Vireos on Vireo Preserve/Wild Basin, 2025.

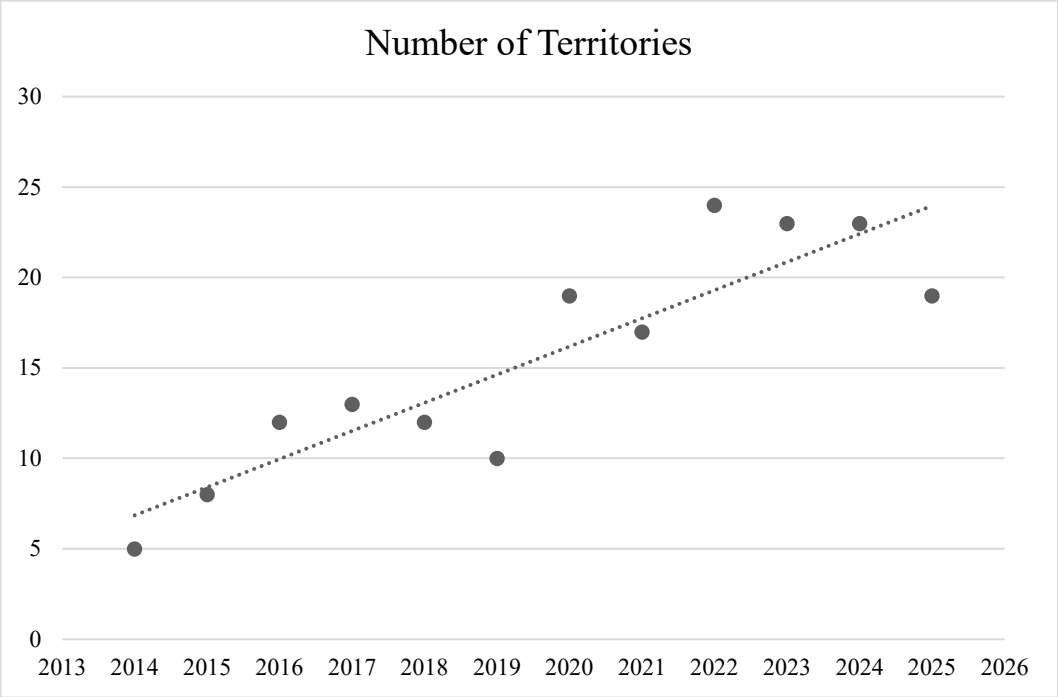


Figure H. Number of Black-capped Vireo territories on COA BCP, 2014-2025.

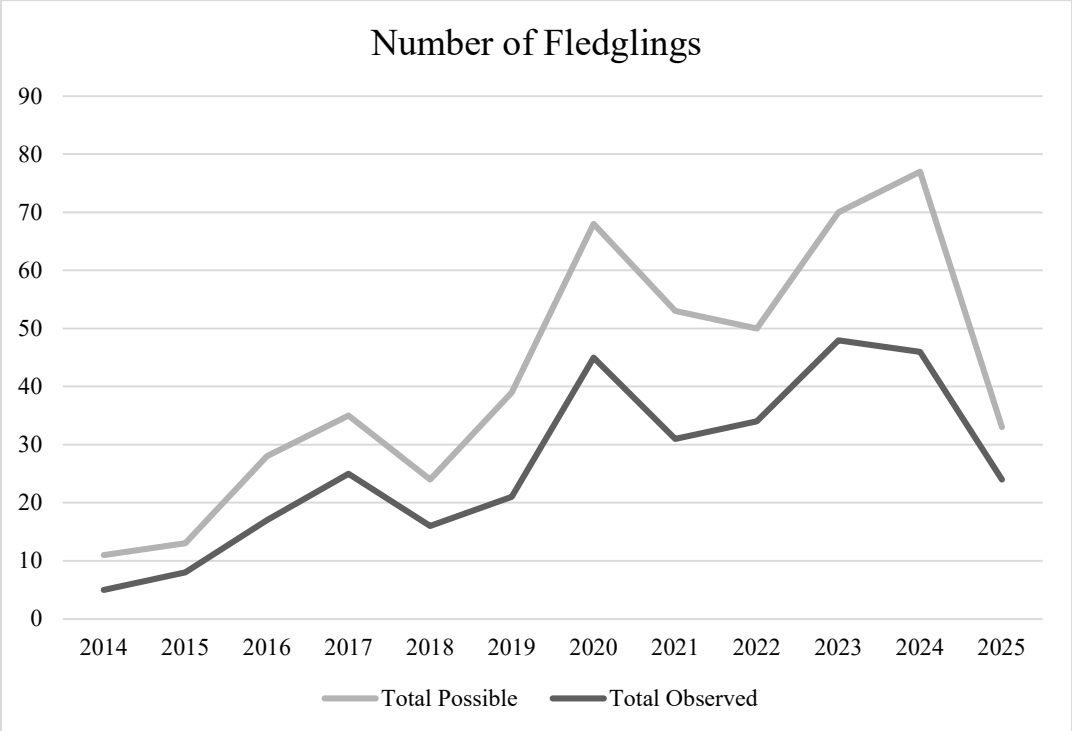


Figure I. Number of observed and possible Black-capped Vireo fledglings on COA BCP, 2014-2025.