City of Austin 2021
Black-capped Vireo *(Vireo atricapilla)*
Monitoring and Management Program

Balcones Canyonlands Preserve Annual Report



Female black-capped vireo nest-building on the Cortaña tract – City of Austin staff photo

City of Austin, Austin Water
Wildland Conservation Division
Balcones Canyonlands Preserve Program
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Disclaimer: The data and information presented in this report are provisional and subject to revision.

City of Austin 2021
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 2021 black-capped vireo (*Vireo atricapilla*) species monitoring and habitat management program. The 2021 field season was the twenty-fourth year of monitoring this formerly endangered species (delisted in May 2018) on the City of Austin's Balcones Canyonlands Preserve (BCP) tracts. We found seventeen black-capped vireo males holding territories across the Forest Ridge (ten territories) and Cortaña (seven territories) tracts. Though black-capped vireos were observed on the Kent Butler tract, territories were primarily situated on the adjacent Travis County Ribelin tract. Pairing success, excluding territories primarily on adjacent properties, was 100%. Of the 27 nests observed, 52% failed due to predation, weather, or abandonment. The Reicher Ranch and Hamilton West warbler study plots also had non-territorial males observed and a vireo pair was observed on one day on the Barton Creek Habitat Preserve warbler study plot.

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 westward expansion of development from the City of Austin 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 and seven other endangered species (USFWS 1996). The permit requires a minimum of 12,300 hectares of endangered species 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 conservation plan.

Vireos have been documented on several BCP tracts that are managed by the City of Austin. The City of Austin 2020 annual report (City of Austin 2020) and previous annual reports summarize observations before 2016. Though other areas on City property have been managed to create vireo habitat in recent years – at Vireo Preserve, the Bohls tract, and a small patch on the Lime Creek tract – vireos have rarely been detected at those sites and (except in 2020 at Vireo Preserve) have not been found to establish a territory. A ridge in the center of the Cortaña tract has also been the focus of habitat restoration for vireos; in 2019, for the first time, a male vireo attempted to establish a territory, and in 2020 three males

established territories, with one pair successfully raising a brood. Other records for vireos on the City of Austin's BCP tracts for the past decade include intermittent sightings of males on the Commons Ford, Reicher Ranch, and Sam Hamilton West tracts. In 2020 a male vireo attempted to establish a territory on the Barton Creek Wilderness tract.

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 City of Austin's 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 City of Austin tracts to promote vireo habitat (see Black-capped Vireo Habitat Management), where such restoration will not conflict with managing for golden-cheeked warbler habitat.

METHODS

Sites and Survey Effort

Monitoring and color banding methods for vireos are similar to those for golden-cheeked warblers, and returned to pre-pandemic effort level (hereafter warbler; see Methods in City of Austin and Travis County 2019). However, because the vireo population is much smaller than the warbler population on City BCP properties, monitoring takes the form of a complete census rather than a sampling. There are no defined plots; City of Austin BCP biologists search suitable habitat and monitor vireos where they are found for evidence of mated status and breeding success. Vireos are also not monitored as frequently as warblers, unless their territories are near a warbler study plot.

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. 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 2021 field season, biologists monitored vireos in four locations: within and adjacent to the warbler intensive monitoring plots on the Forest Ridge and Kent Butler tracts; in the shinnery of the northern Cortaña tract; and in live oak savanna and shrubland on the central Cortaña tract. In addition, biologists surveyed potential habitat on the Bohls tract and areas where vireos were observed in 2020 on the Barton Creek Wilderness tract and Wild Basin/Vireo Preserve. Any vireos encountered on other sites during warbler surveys were also recorded.

Vireos were first detected on the Forest Ridge warbler plot on March 26 and were surveyed at least twice each week from March 15 through July 23, with two more visits on July 27 and August 4. After the first vireo was detected on the Kent Butler warbler plot on April 14, vireos were monitored once or twice per week through June 16. Vireos were detected on the first survey of the northern Cortaña shinnery April 7; after that date, biologists monitored this site weekly through July 28, then twice more on August 13 and 17. A vireo was detected on the first visit to the central Cortaña site April 8; biologists then monitored the site weekly until July 28, with a final visit August 13.

Table 1. Summary of Black-capped Vireo Survey Effort on the Balcones Canyonlands Preserve, Travis County, Texas, Field Season 2021.

Site	Observer(s)	Survey Hours (Mar. 26-Aug. 17)
Bohls	John Chenoweth	6.50
Cortaña - central	William Reiner, Darrell Hutchinson	32.75
Cortaña - north	William Reiner, Darrell Hutchinson	104.50
Forest Ridge	Jonathan Scalise, Laurel Moulton	113.00
Kent Butler	Jonathan Scalise, Laurel Moulton	15.25
Total		**272.0**

RESULTS AND DISCUSSION

Territory Delineations

In 2021, biologists found seventeen vireo males holding territories on Forest Ridge (ten territories), northern Cortaña (six territories), and central Cortaña (one territory). In addition, a vireo male was heard singing on the Reicher Ranch warbler plot on May 2 and May 9. An unbanded pair was observed on the Barton Creek Habitat Preserve warbler plot on May 5. At Forest Ridge, a banded male was detected only on March 31 and April 15. A different male, banded as a hatch year on Forest Ridge in 2020, was resighted on Forest Ridge on April 29 and on Hamilton West warbler plot on May 26. An unknown male was also detected on Hamilton West on June 10. Biologists did not observe vireos on the Bohls or Wild Basin/Vireo Preserve tracts this year. Figures A-E provide maps of the 2021 vireo observations on City of Austin BCP tracts.

Banding and Return Rates

BCP biologists color banded one female and ten male vireos in 2021 (Table 2). Of the 14 banded adult male vireos on City BCP property in 2020 (including returns from previous years), 6 returned in 2021 (a return rate of 43%). One hatch year vireo was banded in 2020 and was resighted in 2021 on both Forest Ridge and Hamilton West. Neither of the two banded females from 2020 were observed in 2021.

Table 2. Summary of Black-capped Vireos Banded on the Balcones Canyonlands Preserve, Travis County, Texas, Field Season 2021.

Date	Color Band Combination	USGS Band Number	Site	Sex	Age
21 April	BL/PI:WH/SI	2590-26355	Forest Ridge	M	ASY
21 April	DB/YE:DB/SI	2590-26356	Forest Ridge	F	SY
19 May	YE/SI:PI/YE	2590-26361	Cortana - north	M	SY
20 May	MV/SI:DG/DG	2590-26360	Kent Butler	M	SY
25 May	BK/YE:WH/SI	2590-26362	Cortana - north	M	SY
28 May	RD/SI:PI/DG	2590-26363	Forest Ridge	M	SY
2 June	RD/SI:BK/PI	2590-26364	Kent Butler	M	SY
9 June	OR/BL:MV/SI	2590-26365	Forest Ridge	M	SY
9 June	RD/PI:DB/SI	2590-26366	Forest Ridge	M	SY
9 June	OR/SI:DB/BL	2590-26367	Forest Ridge	M	SY
8 July	MV/SI:DG/OR	2590-26371	Cortana - north	M	SY

Territory Mapping and Reproductive Success on the Forest Ridge Tract

Ten territorial male vireos were observed on and adjacent to the Forest Ridge warbler plot in 2021, all of which were paired (Figure B). Biologists found sixteen nests for nine of the pairs (Table 3). Of the 16 nests, 69 percent failed due to predation, weather, or abandonment, and 31 percent successfully fledged at least one young each. Of the ten territories, seven pairs had one successful nest each. See Table 4 for a summary of reproductive success.

Territory Mapping and Reproductive Success on the Kent Butler Tract

Two banded male vireos were occasionally observed outside the northwest corner of the Kent Butler warbler plot, but the bulk of their territories, including their nests, were on the adjacent Travis County Ribelin tract (Figure C). One of these (RD/SI:BK/PI, Table 2) was banded on the Kent Butler tract. Further details can be found in the Travis County 2021 Black-capped Vireo annual report (Travis County 2021). A third male (MV/SI:DG/DG, Table 2) was also banded on the Kent Butler tract, outside the northeast corner of the warbler plot, but was seen only once more; an unbanded male was later seen in the same area, suggesting that no territory was established.

Territory Mapping and Reproductive Success on the Cortaña Tract

Six male vireos established territories in the shinnery at the north end of the Cortaña tract in 2021 (Figure D). All successfully paired. Biologists found seven active nests for 5 pairs and located two more

immediately after fledging (Table 3). Of these nine nests, 78 percent fledged at least two young, and 22 percent failed due to predation, and abandonment before or shortly after laying.

Only one male vireo established a territory in central Cortaña (Figure E). He successfully paired, and biologists found two active nests. The first was predated, but the latter (probably a third attempt) fledged three young. See Table 4 for a summary of reproductive success.

Table 3. Summary of Black-capped Vireo Nests Found on the Balcones Canyonlands Preserve, Travis County, Texas, Field Season 2021.

Site	Male ID	Nest Substrate	Nest Fate	Number of Fledglings*
Cortaña - central	BL/YE:DG/SI	*Garrya ovata*	Predated	
Cortaña - central	BL/YE:DG/SI	*Diospyros texana*	Fledged	3
Cortaña - north	UB	*Ulmus crassifolia*	Abandoned	
Cortaña - north	UB	*Quercus buckleyi*	Fledged	2-4
Cortaña - north	YE/SI:PI/YE	*Quercus sinuata*	Predated	
Cortaña - north	RD/PI:WH/SI	*Quercus sinuata*	Fledged	2-4
Cortaña - north	BK/YE:WH/SI	*Quercus sinuata*	Fledged	2-4
Cortaña - north	NB/SI:DB/GR	*Quercus sinuata*	Fledged	2-3
Cortaña - north	YE/SI:PI/YE	*Quercus sinuata*	Fledged	2-3
Cortaña - north	RD/PI:WH/SI	*Quercus sinuata*	Fledged	2-3
Cortaña - north	MV/SI:DG/OR		Fledged	2-4
Forest Ridge	UB	*Dermatophyllum secundiflorum*	Fledged	3-4
Forest Ridge	UB	*Dermatophyllum secundiflorum*	Predated	
Forest Ridge	BK/SI:OR/GR	*Quercus sinuata*	Fledged	1
Forest Ridge	BL/SI:MV/GR	*Quercus sinuata*	Predated or weather	
Forest Ridge	BL/PI:WH/SI	*Dermatophyllum secundiflorum*	Predated	
Forest Ridge	RD/SI:PI/DG	*Garrya ovata*	Predated	
Forest Ridge	BL/SI:MV/GR	*Dermatophyllum secundiflorum*	Predated or weather	
Forest Ridge	BL/PI:WH/SI	*Dermatophyllum secundiflorum*	Fledged	1-4
Forest Ridge	OR/SI:DB/BL	*Dermatophyllum secundiflorum*	Fledged	2-4
Forest Ridge	BL/SI:MV/GR	*Quercus sinuata*	Predated	
Forest Ridge	UB	*Quercus fusiformis*	Predated	
Forest Ridge	RD/SI:PI/DG	*Quercus sinuata*	Predated	
Forest Ridge	RD/PI:DB/SI	*Ungnadia speciosa*	Predated	
Forest Ridge	UB	*Dermatophyllum secundiflorum*	Fledged	3-4
Forest Ridge	UB	*Dermatophyllum secundiflorum*	Abandoned	
Forest Ridge	UB	*Diospyros texana*	Predated	
27 total nests: 14 predated, destroyed by weather, or abandoned (52%); 13 successful (48%)				

* 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. We assume a maximum of 4 fledglings for nests that were not found.

Table 4. Summary of Black-capped Vireo Reproductive Success per Site on the Balcones Canyonlands Preserve, Travis County, Texas, Field Season 2021.

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	1	1	100%	1	100%	3	3.0	3.0
Cortaña - north	6	6	100%	6	100%	14-25†	2.3-4.2	2.3-4.2
Forest Ridge	10	10	100%	7	70%	14-25	1.4-2.5	2.0-3.6
All Sites	**17**	**17**	**100%**	**14**	**82%**	**31-53†**	**1.8-3.1**	**2.2-3.8**

* Ranges indicate fledglings actually observed vs. maximum possible (see note with Table 3).
† Includes all fledglings found, including those from second broods.

Parasitism and Interaction with Predators

No cowbirds were observed during vireo surveys on the Forest Ridge, Cortaña, or Kent Butler tracts. No vireos were observed tending cowbird fledglings. 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 BCP remains committed to reducing or eliminating the threat of cowbird parasitism on vireo nests if needed.

A vireo on the Forest Ridge tract appeared to give alarm "shrad" calls in response to the intrusion of a blue jay (*Cyanocitta cristata*), and to follow it around. A trio of vireos was observed to mob one or more Woodhouse's scrub-jays (*Aphelocoma woodhouseii*) for a long distance on Forest Ridge; the nest of one of the vireos was later found to have been predated, but the culprit was not known.

One nest on Forest Ridge was abandoned in the incubation stage and found to have fire ants (*Solenopsis invicta*) and mites within the nest.

Non-Viable Eggs

Of the 27 nests observed, only one was determined to contain a non-viable egg. Some nests were predated prior to hatching and viability was unable to be determined.

Injuries

No injuries or malformations were observed among black-capped vireos. However, a white-eyed vireo fledgling on the Forest Ridge tract was observed with a large red bump on its throat, which has been a symptom of avian pox.

Other Noted Behaviors

Song Variation: As previously noted (City of Austin 2020), black-capped vireos appear to be more frequently imitating the songs of white-eyed vireos, sometimes so frequently that distinguishing them from the other species is difficult. This year, the male on the central Cortaña site, one male at Forest Ridge, and a male whose territory straddled the Kent Butler boundary frequently or occasionally mimicked white-eyed vireo song, but none of the males at the north Cortaña site did so.

Nest Construction: A vireo pair on the Forest Ridge site placed their nest among the branches of a Texas mountain-laurel (*Dermatophyllum secundiflorum*) in which all the leaves had been killed by a winter storm; the brood successfully fledged despite being fully exposed after all dead leaves had dropped a week before fledging. Another Forest Ridge black-capped vireo nest was found on a branch where a white-eyed vireo nest had previously been situated; when the black-capped vireo nest was found, the white-eyed vireo nest was observed on the ground. One Forest Ridge female was observed scavenging nest material from the side of an older nest – likely the first nest attempted by the female. Yet another Forest Ridge vireo nest was found to be placed at least 12 feet off the ground, unusually high for a black-capped vireo, but also noted in 2020 at Forest Ridge.

Pair Relations: A banded female first recorded with a nest on the Travis County Lucas tract was later found building a nest with an unbanded male at Forest Ridge. Biologists documented a male pairing with two different females. The first nest attempt between the banded male and his banded mate at Forest Ridge was unsuccessful. The banded female was then observed multiple times in the territory of an unbanded male (who was tending fledglings) more than 400 meters from her failed nest. The banded male later renested with an unbanded female.

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 BCP. As in previous years, territorial warblers and vireos were observed in the same or neighboring areas on the Forest Ridge, Kent Butler, and Cortaña tracts in 2021. 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, and vireos were often observed within the edges of the mature forest.

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 City of Austin 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).

Expanding Vireo Habitat – Kent Butler

For the first time in nine years, no vireo pair nested within any of the three areas mechanically manipulated in 2009, but vireos were observed foraging in the area of manipulated habitat (City of Austin 2016).

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 (*Quercus sinuata* var. *breviloba*) 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. Of the few acorns available this year, almost all were planted in the central Cortaña site.

Habitat Creation – Central Cortaña

Between 2003 and 2006, City of Austin staff coordinated mechanical clearing of junipers on 14.5 hectares in the center of the Cortaña tract, approximately 1.5 miles south of the existing shinnery. The intention was to create vireo habitat, but few suitable shrubs were growing on the site at the time. The resulting habitat has been a live oak savanna.

Biologists have planted shin oak acorns on the central Cortaña site, as they have been available for harvest from the north Cortaña shinnery and elsewhere on the BCP. Acorns are planted beneath established woody plants, especially junipers, to minimize desiccation and deer browse. The shin oak acorn harvest was small in 2021, but a biologist was still able to plant 312 more acorns in the area.

Restoring and Creating Habitat – Vireo Preserve

Efforts continue to protect and rebuild soils and promote native plant diversity. The Vireo Preserve supports many of the habitat types observed throughout the BCP, so lessons learned at this site should be applicable to other areas (City of Austin 2016, Travis County and City of Austin 2018).

Habitat Creation – Bohls

City of Austin (2016) summarizes mechanical and prescribed burn treatments conducted at this site.

Staff have established photo points and vegetation transects on the above tracts in order to track changes to habitat over time. Monitoring of these sites takes place before and after habitat manipulation events, and otherwise when feasible. No photo point monitoring was conducted in 2021.

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FIGURES

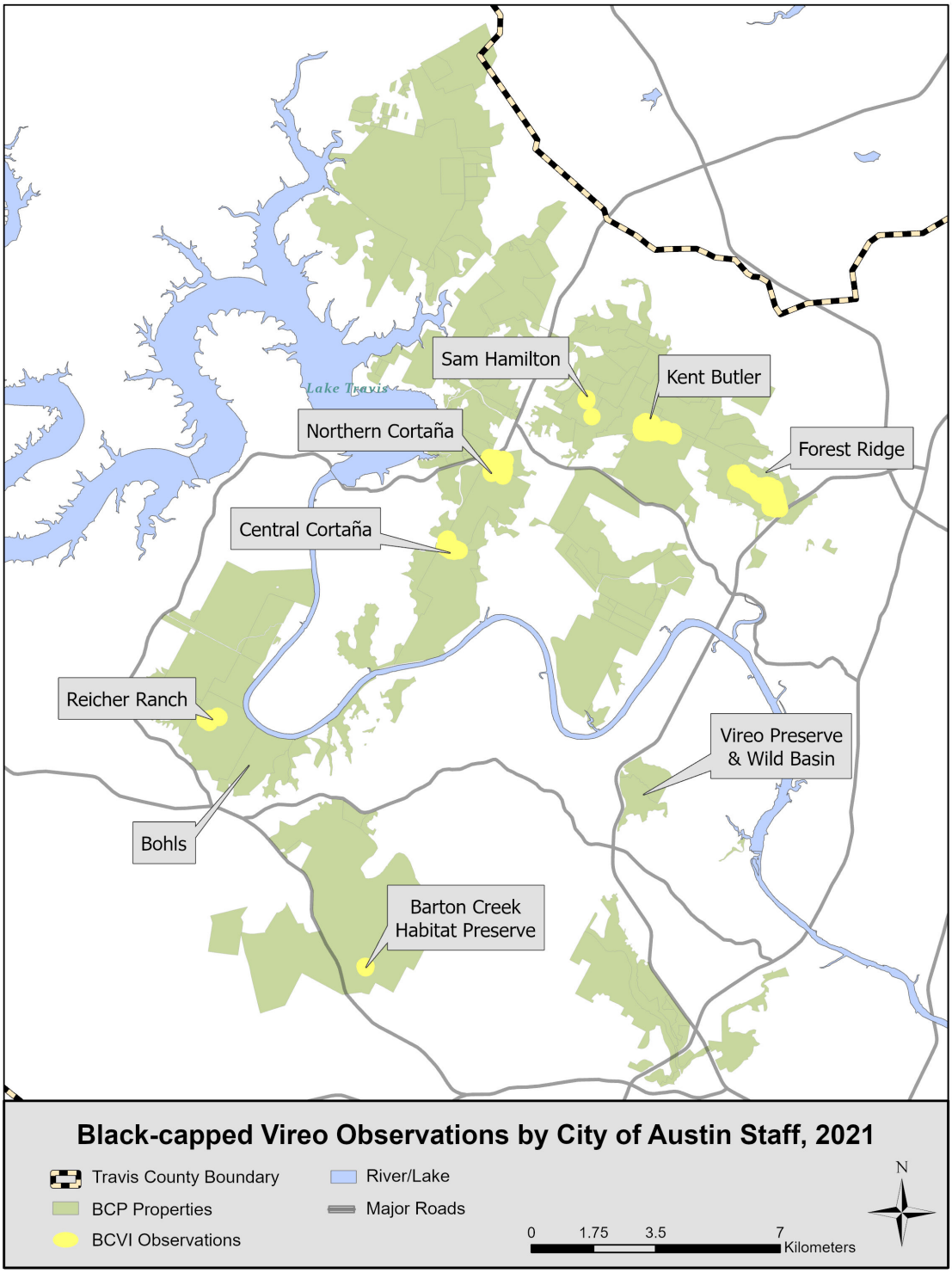

Figure A. Sites Where Black-capped Vireos were observed on City of Austin BCP Tracts, 2021.

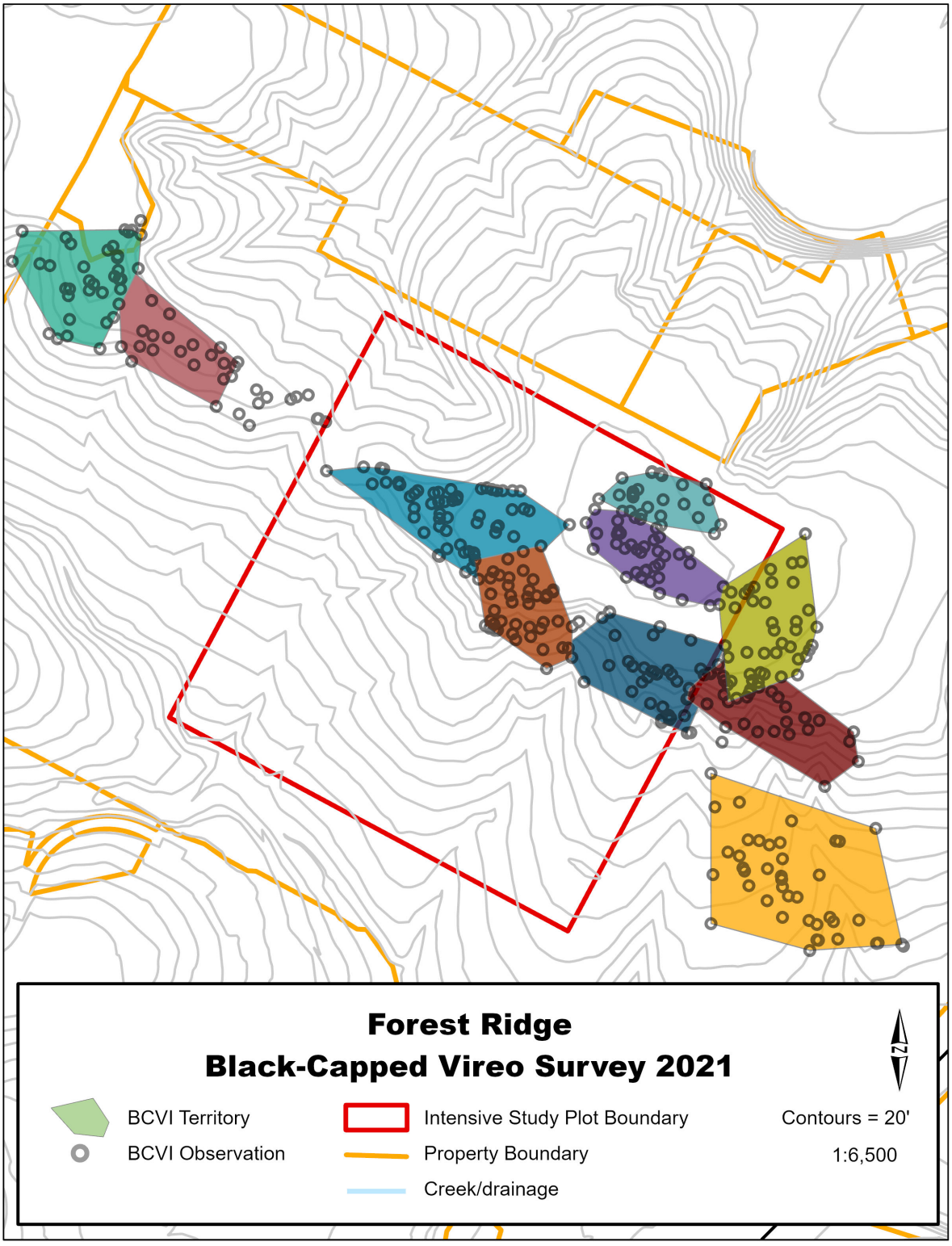

Figure B. Locations of Black-capped Vireos on Forest Ridge, 2021.

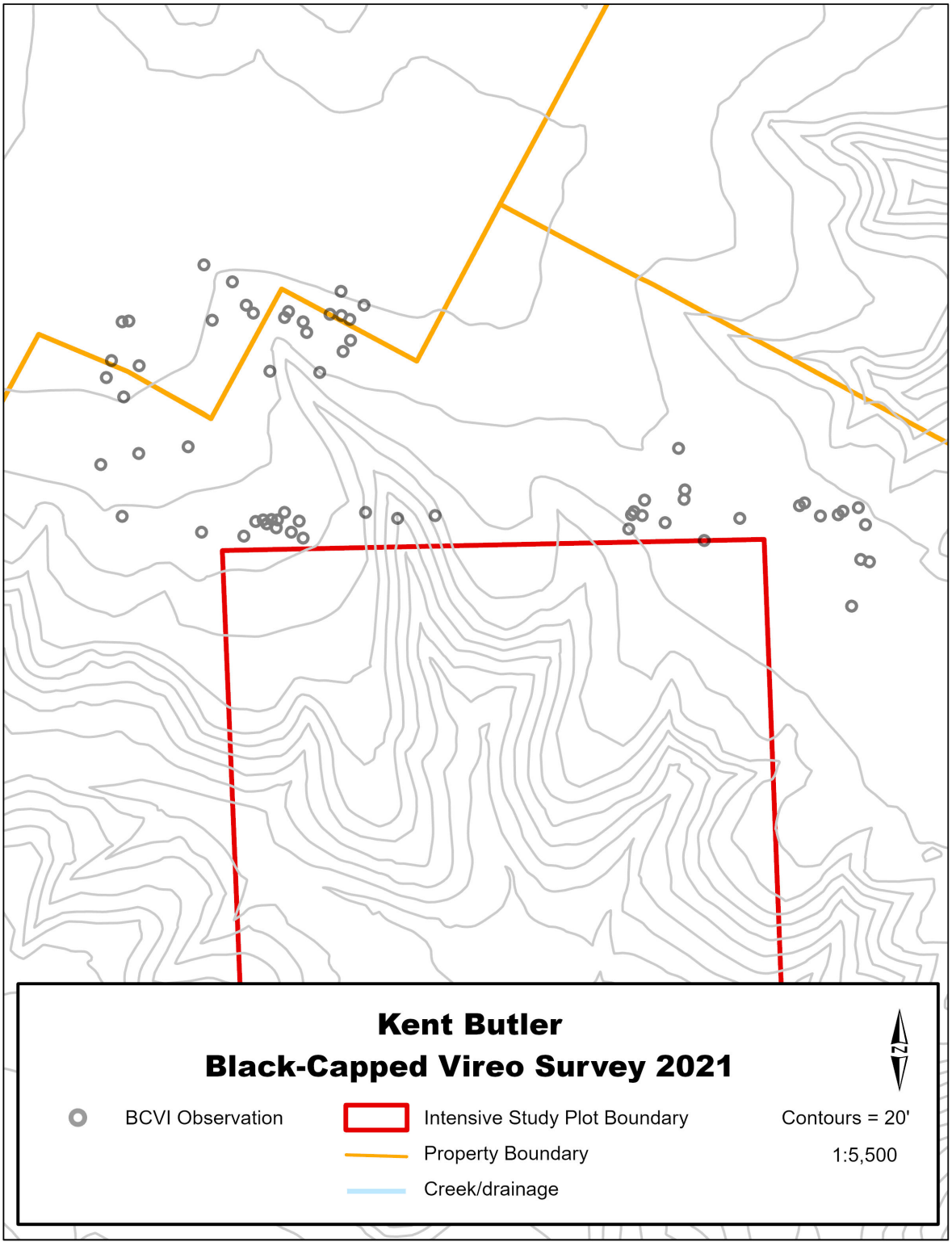

Figure C. Locations of Black-capped Vireos on Kent Butler Ecological Reserve, 2021.

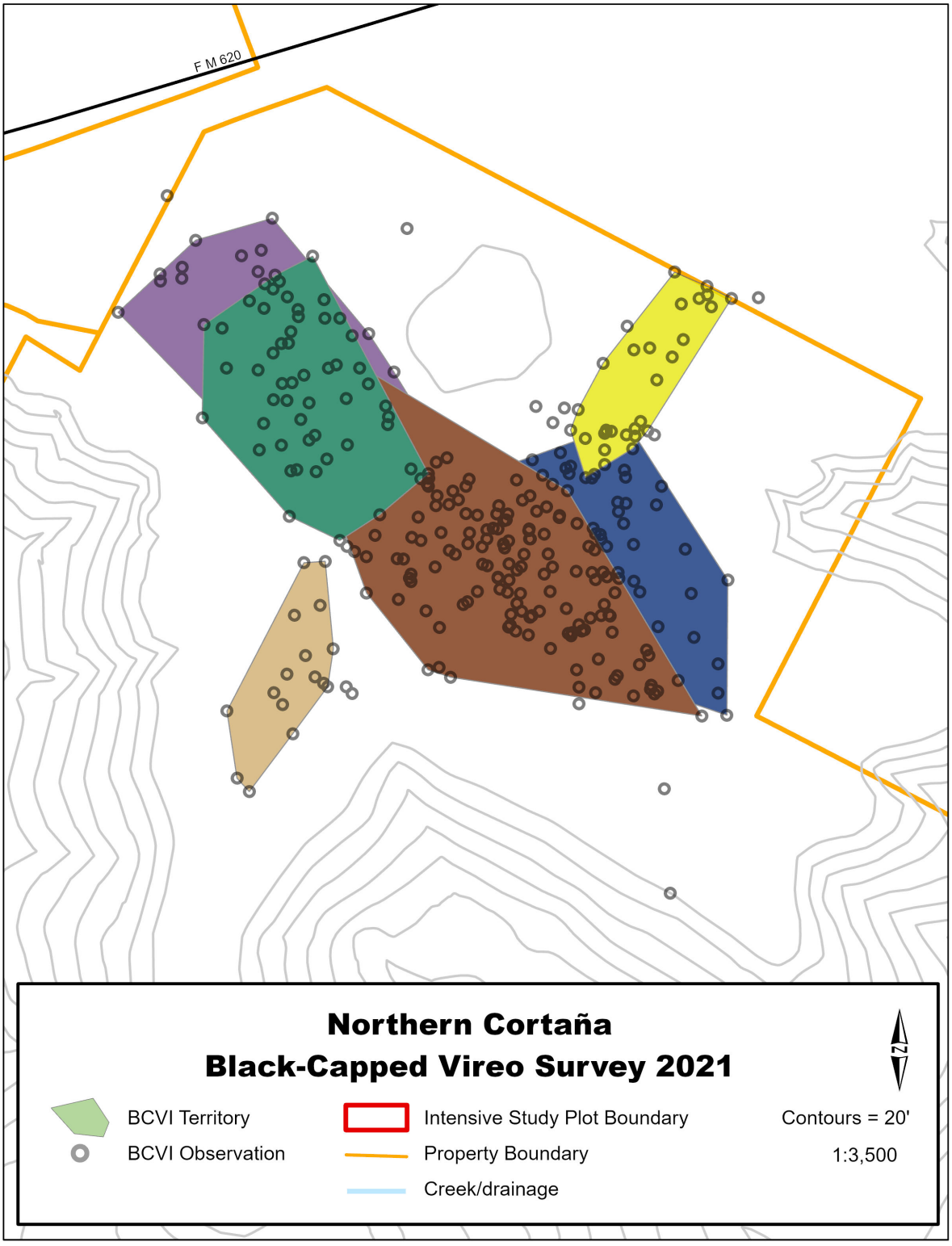

Figure D. Locations of Black-capped Vireos on Northern Cortaña, 2021.

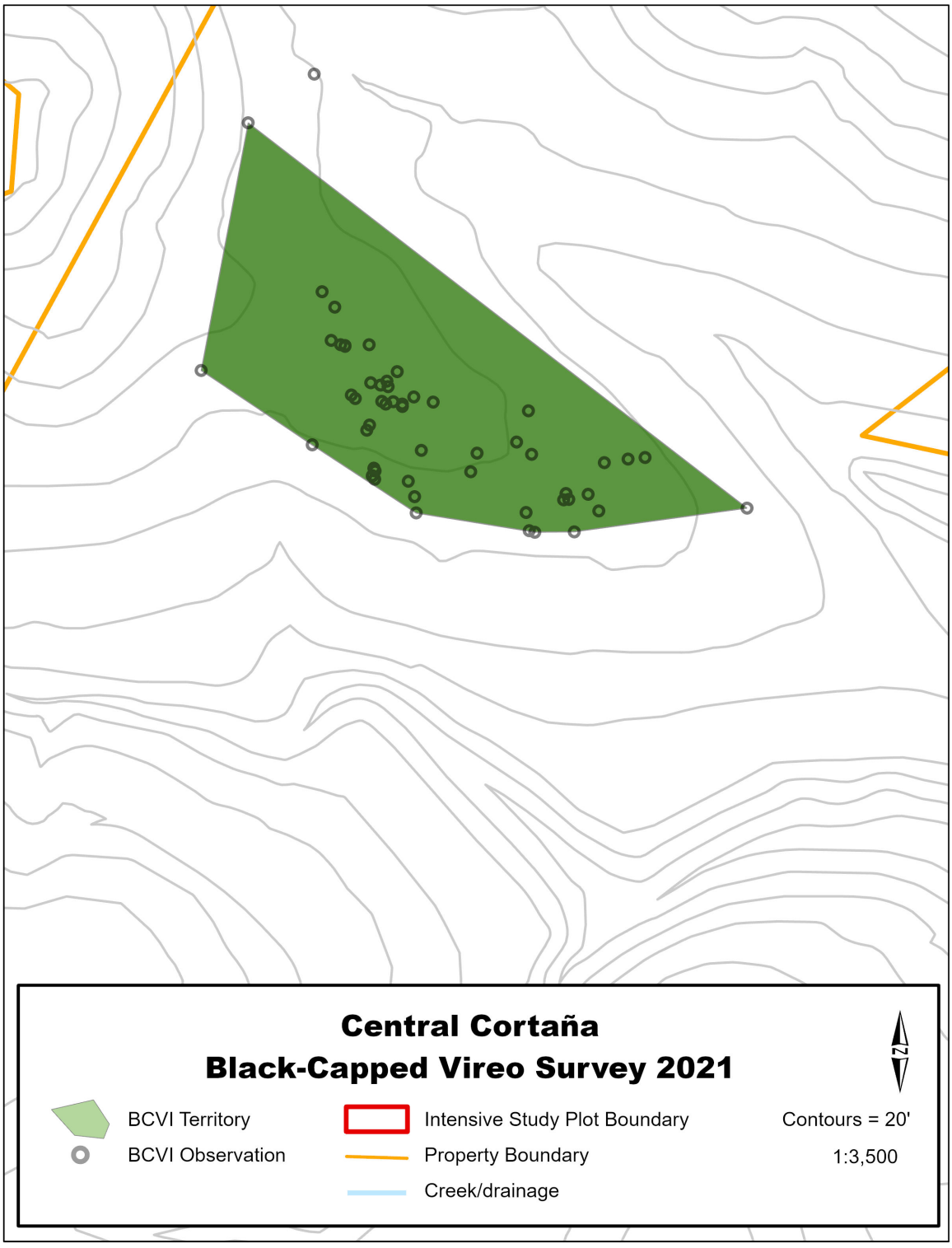

Figure E. Locations of Black-capped Vireos on Central Cortaña, 2021.