

Monitoring of the Black-capped Vireo

2002 Field Season

Travis County Parks and Natural Resources

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INTRODUCTION

This report presents the results of the 2002 black-capped vireo surveys conducted by Travis County Natural Resources personnel. The black-capped vireo (*Vireo atricapillus*, hereafter vireo) is a migratory passerine whose breeding range in the United States has decreased markedly within the last few decades. Though not known to have been widespread in the United States, vireos were once found in Kansas, Oklahoma, and Texas (Grzybowski 1995). Today, however, the vireo breeds in a restricted range that includes only small parts of Oklahoma and Texas. As of 1999, the vireo occupied only three areas in Oklahoma and is probably extirpated from north central Texas (U.S. Fish and Wildlife Service [USFWS] 1991; Grzybowski, Tazik, and Schnell 1994; Grzybowski 1995, Oklahoma Dept. of Wildlife Cons. 1999). Vireo populations have been reported in 34 south-central and central Texas counties (USFWS 1996).

Vireo populations in Travis County have been drastically reduced by habitat loss. In 1996, less than 100 individual vireos were estimated to occur in Travis County. Historic colonies no longer exist as urban sprawl further fragments vireo habitat. To prevent further losses, the U.S. Fish and Wildlife Service issued the Balcones Canyonlands Conservation Plan (BCCP) section 10(a)(B) permit to the City of Austin and Travis County in 1996. The plan calls for 30,428 acres of endangered species habitat in western Travis County to be set aside and managed within the Balcones Canyonlands Preserve (BCP); at least 2000 of these acres should provide vireo habitat.

Goals for vireo recovery outlined in the BCP Land Management Plan (1999) include maintaining and increasing the current population and protecting contiguous blocks of habitat. As a managing partner of the BCCP, Travis County acquired several tracts to be managed as a unit now called Jollyville (Fig. 1). At present, most of the county-owned vireo habitat occurs on the Vireo Ridge tract and is of poor to marginal quality due to suppression of natural disturbances. Isolated pockets of habitat can also be found on the Vista Point and Grandview Hills tracts. Optimal black-capped vireo habitat is located along the southwestern boundary of the Vireo Ridge tract adjacent to the Grandview Hills subdivision.

During winter 2001-2002, Travis County contracted to have approximately 40 acres of primarily poor vireo habitat selectively cleared for restoration. Fifteen of these 40 acres were cleared as part of mitigation for the Grandview Hills development. The goal was to reduce the amount of Ashe juniper (*Juniperus ashei*) and stimulate the growth and shrubby structure

of woody species needed for optimum vireo habitat. The majority of this clearing occurred adjacent to habitat occupied in 2001. However, in areas where territories were established in 2001, some lanes were cut in order to create the patchy physiognomy associated with vireo habitat. A second phase of restoration began in January 2003, during which an additional 10-20 acres is targeted for selective clearing and lane cuts.

Vireo population data collected from the Jollyville Unit will be analyzed annually in order to monitor changes in abundance and determine productivity. Monitoring the population will help gauge the effectiveness of habitat restoration projects and to prioritize sites for future restoration activities.

STUDY SITE

The Jollyville Unit is comprised of 1790 acres (724 ha) and includes the following tracts: Grandview Hills, Lake Perspectives, Vireo Ridge, Bunten, Vista Point and Toops. It is located 13 miles (21 km) northwest of downtown Austin with two primary access points on FM 2769 (Figure 1). Both the golden-cheeked warbler (*Dendroica chrysoparia*) and the black-capped vireo occupy this property. Topography includes upland plateau that gives way to irregular, steep slopes and ravines. Ravines drain into an unnamed tributary of Lake Travis (Colorado River) or into Cypress Creek. Drainages tend to flow from the east to west. Total vertical relief is 250 feet (970-720 msl). Riparian soils are in the Volente complex; Brackett and Tarrant soils are found on steep slopes (USDA 1974). Tarrant soils also occur in upland areas. Closed canopy oak-juniper (*Quercus-Juniperu*) woodlands cover the majority of the canyons and slopes. Historic harvest of mature Ashe juniper has allowed shrubby, second-growth junipers to dominate the uplands. Open grasslands are found in valleys, while riparian vegetation dominated by black walnut (*Juglans nigra*), sycamore (*Platanus occidentalis*) and elms (*Ulmus spp*.) are found along creeks and drainages.

Refer to Travis County Parks and Natural Resources (2001) for a detailed site description of Steiner Ranch Preserve.

METHODS

Data Collection

Vireos were surveyed on the Vireo Ridge, Vista Point and the Grandview Hills (north section) tracts from 28 March to 1 August 2002. All potential vireo habitat on the Jollyville Unit was surveyed repeatedly throughout the breeding season. Additionally, Steiner Ranch, Sections 4 and 5, were monitored for the presence of vireos while staff surveyed for golden-

cheeked warblers. Vireos were surveyed for a total of 179 hours. Due to limitations inherent to territory mapping methods (Verner 1985), results should be interpreted as indices, rather than complete counts.

Territory mapping was used to estimate vireo abundance and territory numbers. All observations (both visual and auditory) of male, female and juvenile vireos were plotted on hard-copy digital ortho-photo maps with a scale of 1:3000 or less. For each observation, location, date, behavior and the following demographic data were recorded: sex, age, presence of a mate and number of fledglings observed. Vireo locations and corresponding data were later recorded in an ArcView (Esri, Inc., Redlands, CA) avian location database using the Texas State Plane Coordinate System. Spatial and demographic data were entered into the database via an ArcView script (Horne 2000). All encountered males were assigned a unique number ("territory number") to signify them as individuals. Female locations were either recorded as independent locations or, if encountered with a territorial male, entered into the avian location database as "mate present".

Territory mapping methods generally followed IBCC guidelines (1970). Bibby's (1993) "consecutive flush" was employed to increase accuracy in assigning observations of vireos to specific territories ("clusters"). However, Bibby's method was modified to be less intrusive in order to avoid harassment and/or human induced behaviors (Holiman 2000). No more than five locations for an individual bird were mapped at one time. Counter-singing and contemporaneous conspecific singing were relied upon in most cases to differentiate between individual males. Vireos that could not be differentiated from surrounding individuals with any confidence were designated as "unknown." Playback tapes of vireo vocalizations were infrequently used late in the season to elicit vireo responses.

Pairing status of male vireos was determined by observing one or more of the following conditions: a male associating with a female; the nest of a male; and/or a male tending at least one fledgling. These criteria were also used to determine if males had established a breeding territory. If a male was seen at least three times (on different days with at least a week between observations) using the same general location, it was considered to have established a breeding territory.

Observations of fledglings tended by a male or female and the total number of fledglings observed at any one time provided data on breeding success and productivity. Cursory checks for nests were made for all breeding territories. Nests were checked every 4-5 days from the date of discovery until a fate could be determined. Nest stage, contents, and behavior of the

attending adult were recorded during each nest check. For territories where no nest was found, but fledglings were present, we recorded the maximum number of fledglings present and included this in productivity and breeding success estimates.

Data Analysis

Abundance is the sum of all individual male vireos at a given study site (regardless of territory status). Species distribution comprises all locations where vireos were observed; this includes males, females and fledglings and may include multiple sightings of the same individual. In calculating territory number, territories that fell entirely or partially within the tract boundaries were considered "full" territories. Pairing success rate was calculated as the number of territories determined to have pairing success divided by the total number of territories (Anders 2001).

A territory was considered successful if at least one fledgling was observed with a territorial male or female. Thus, the success rate is the number of territories that successfully fledged young divided by the total number of territories (Koloszar and Becker 2000). Productivity data was represented in two ways: the total number of fledglings per successful territories and per total number of territories.

RESULTS

Six hundred forty-eight observations of black-capped vireos were recorded on the Jollyville Unit in 2002 (630 male, 12 female, 6 hatch year; Fig. 2). Vireo abundance on the Jollyville Unit totaled 21 males with 19 observed to have breeding territories (Figs. 3, 4, 5). No vireos were detected on either Steiner Ranch Preserve section. Territory locations are not meant to represent actual territorial boundaries, but some portion of them. This is due to the limited data collected per territory. Two territories were partially located off the Jollyville Unit. Territories were re-established in areas where lanes were cut for restoration in 2001-2002 suggesting no direct negative impacts on the vireos (Fig. 6). No color-banded vireos were found during the 2002 season. Table 1 presents a summary of vireo data collected during 2002 in addition to recent data collected by various agencies on what is currently called the Jollyville Unit.

Of the 19 reported territories, 18 (94.7%) were considered successfully paired (Table 2). Fourteen of 19 (73.7%) territories successfully fledged at least one young (Table 3) and of these, two territories had a second brood. Of the 16 broods observed, nine (56.2%) produced

at least two young. In total, at least 27 young were produced. Productivity, based on all territories, was 1.4.

Four nests were located. One was depredated with no second nest attempt or fledglings ever discovered. Two nests fledged successfully, producing at least two fledglings each. Finally, one nest was abandoned, leaving four eggs. An older fledgling was later found in this territory, verifying a second successful nest. There was no indication of nest parasitism by brown-headed cowbirds (*Molothrus ater*) on black-capped vireos, although an adult white-eyed vireo (*Vireo griseus*) was observed tending to a cowbird young in the study area.

DISCUSSION

During 2002, vireo territory establishment on the Jollyville Unit occurred roughly in areas utilized in 2000 (Travis County Parks and Natural Resources 2001). Although most territories were contiguous (had at least one adjacent territory), three territories were isolated from other territories. It remains unclear if territorial arrangements are based on habitat conditions or merely a function of age dominance amongst individuals (Anderson and Gutzwiller 1996) or the tendency of vireos to be "semi-colonial" and establish territories near other vireos (Ward and Schlossberg 2001).

Low vireo abundance, especially in and around isolated territories, may have biased detection rates, thus affecting abundance. Ward and Schlossberg (2001) found that in low-density populations of vireos, song rates and duration of song bouts were much lower than in high-density populations. Consequently, there may have been additional territories on the Jollyville Unit during 2002 that were not detected.

Until the 2002 season, both the abundance of male vireos and number of territories had been on a general decline since 1994 (Table 1). There was a gain of three territories on the Vireo Ridge tract in 2002. Three additional territories were also discovered on newly acquired areas of the Jollyville Unit. Two of these three territories were located in areas where vireos were detected in 1993 (Texas Department of Transportation) on what is now referred to as the Vista Point tract of the Jollyville Unit. It is reasonable to assume that there are other territories on private property in the immediate vicinity of the Jollyville Unit. The potential acquisition of neighboring property may secure additional suitable, and possibly occupied, vireo habitat and could bolster the known population.

Habitat degradation may have also affected productivity. Though not quantified, typical vireo nesting habitat (see Grzybowski 1995 for description) is rarely exhibited on the Jollyville Unit. On this site, dense stands of Ashe juniper have reduced the openings in deciduous cover generally associated in optimal vireo habitat. Additionally, the vegetative growth pattern in occupied areas of the Jollyville Unit is more vertical rather than horizontal. Such growth may provide fewer preferred nesting sites resulting in poor nest concealment. Though it has been documented that it is common for open nesting species, especially vireos, to have several renesting attempts (Martin 1992, Koloszar and Becker 2000), successful second nests were only observed twice during 2002. Suitable nest sites may have not been available, therefore limiting renesting success/attempts (Martin 1992). Further research is needed to better understand vireo habitat dynamics and its relationship to reproductive success at the Jollyville Unit.

Overall, vireos seem to have responded positively to the restoration efforts undertaken between the 2001 and 2002 field seasons. Territories were re-established in areas where minor clearing occurred (lanes cut) and vireos were noted foraging and tending to young in some of the larger selectively cleared areas. Total productivity increased in 2002 (1.4 fledglings / territory) from 2001 (.92 fledglings / territory). Furthermore, the addition of three territories on the Vireo Ridge tract from the 2001 season is also encouraging.

Continued monitoring of the Jollyville Unit vireos is essential to determine whether the colony is a source or sink population. Information regarding productivity and dispersal is very limited. Additional survey seasons may reveal whether the territory gain (+6) continues and how the vireos are affected by the on-going restoration efforts. Without comprehensive productivity and banding information and a complimentary data set for surrounding properties, we cannot make a definitive statement regarding the Jollyville Unit and its role within the Austin metapopulation.

RECOMMENDATIONS

- An intensive vireo monitoring program, including color-banding, should be established once long-term funding becomes available. Such research could answer many questions concerning the viability of the Jollyville Unit colony and its role in the Austin metapopulation. Long-term data sets would then be established to facilitate yearly comparisons. Data collected should include the following: abundance, age-classes, dispersal patterns, distribution, habitat associations during the breeding season,

productivity, nest success, return rates and recruitment. Research should be focused upon answering questions of immediate relevance to setting management and recovery priorities.

- Facilitate opportunities for graduate students to collect and analyze quantitative habitat characterization data in order to build future habitat suitability and prediction models. Quantitative data are needed to compare the results of habitat restoration treatments.

- Potential habitat should be identified and mapped on all tracts owned and managed by Travis County. Historic vireo locations on Travis County owned and managed properties should be visited during the field season to determine presence/absence of vireos.

- Feasibility of habitat restoration for vireos on other County properties should be assessed in 2003. For example, the Steiner Ranch Vireo Management Area (Tract 4) contains historic breeding habitat. With its close proximity to the Cortana tract where vireos are currently breeding, Steiner VMA may be a good candidate for restoration efforts.

- Travis County should consider the acquisition of additional historic vireo breeding sites a priority in order to increase the local population of vireos.

- Habitat restoration efforts will continue on tracts that support vireo populations and on surrounding tracts that harbor potential habitat. Restoration methods will be evaluated to determine those that best create or restore suitable vireo breeding habitat. Surveys for golden-cheeked warblers should be conducted to ensure that restoration activities do not negatively affect them.

- Conspecific tape playback should continue to be utilized during the field season, especially in areas where few vireos are detected. Tape playback should increase detections of territorial males (Horne 2000).

- Cowbird trapping should continue on and adjacent to the Jollyville Unit, with additional traps added based on monitoring of populations. Though no vireo nests were found parasitized, nearly 100 female cowbirds were removed in the area. Shooting female cowbirds in habitat is also recommended.

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TABLES

Table 1. Summary of black-capped vireo survey data collected by various agencies in the study area (Jollyville Unit, as of 2001), Travis County, Texas.

Year Surveyed	Agency	No. Males	No. Territories
1989	DLS	11	5
1990	DLS	11	5
1991	DLS	14	9
1992	TXDOT	No Data[1]	Unknown
1993	TXDOT	25	20
1994	TXDOT	27	27
1995	TXDOT	23	23
1996	SWCA	19-22	15
1997	No Data[1]	Unknown	Unknown
1998	No Data	Unknown	Unknown
1999	No Data	Unknown	Unknown
2000	SWCA[2]	3	Unknown
2001	Travis County TNR	19	13
2002	Travis County TNR	21	19

1 Restricted access on the Parke.

2 Detected while on brief site visit.

Table 2. Abundance, territory number, pairing success and pairing success rate for black-capped vireos on Jollyville Unit, Travis County, Texas, March-August 2001.

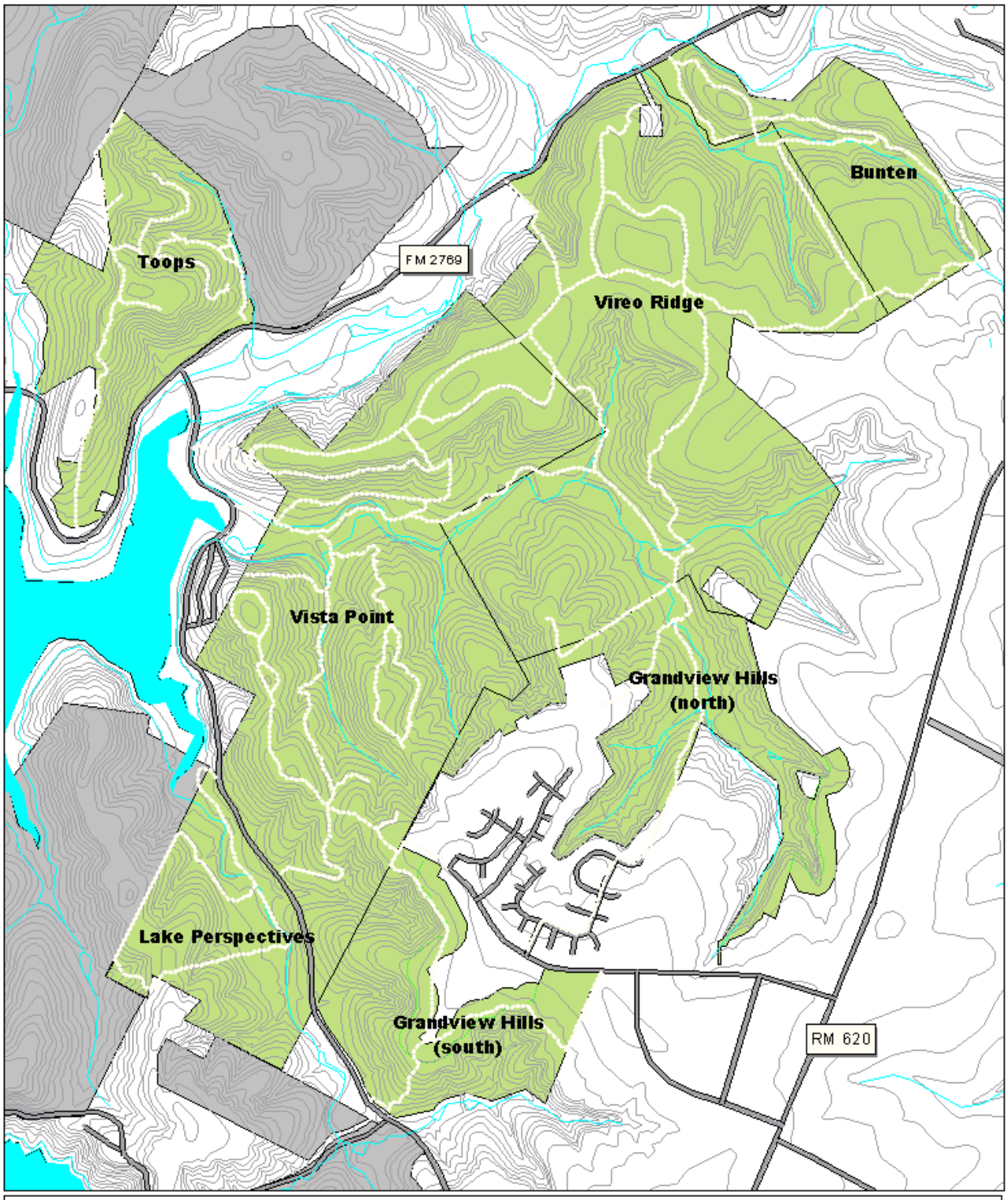
Abundance	No. Territories	Successfully Paired	Pair Success Rate
21	19	18	94.7

Table 3. Pair success and productivity for black-capped vireo territories on Jollyville Unit, Travis County, Texas, March-August 2001.

			Productivity	
No. of territories with breeding success*	**Breeding success rate**	**No. Fledglings**	**No. fledglings/ successful # territory**	**No. fledglings/ total # territories**
14	73.7	27	1.8	1.4

* Represents the number of all territories that fledged at least one young.

FIGURES


Bunten
Toops
FM 2769
Vireo Ridge
Vista Point
Grandview Hills
(north)
Lake Perspectives
Grandview Hills
(south)
RM 620
Figure 1: Jollyville Unit Preserve
Jollyville Preserve
Other BCP Tracts
Preserve Access Roads
Creeks and Drainages
Major Roads
Lake Travis
N
Scale 1 : 19500

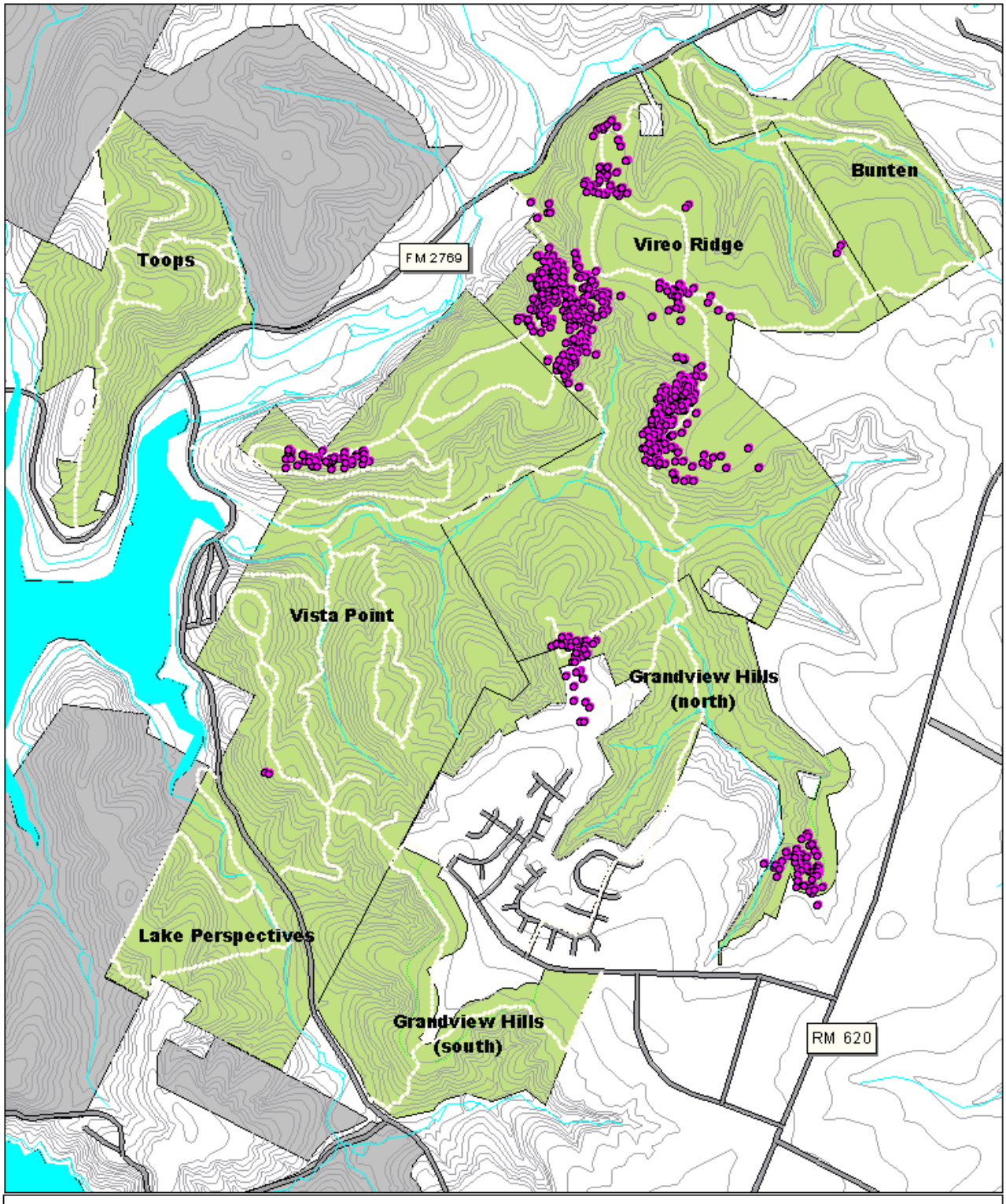


Figure 2: 2002 Distribution of BCVI Observations on the Jollyville Unit

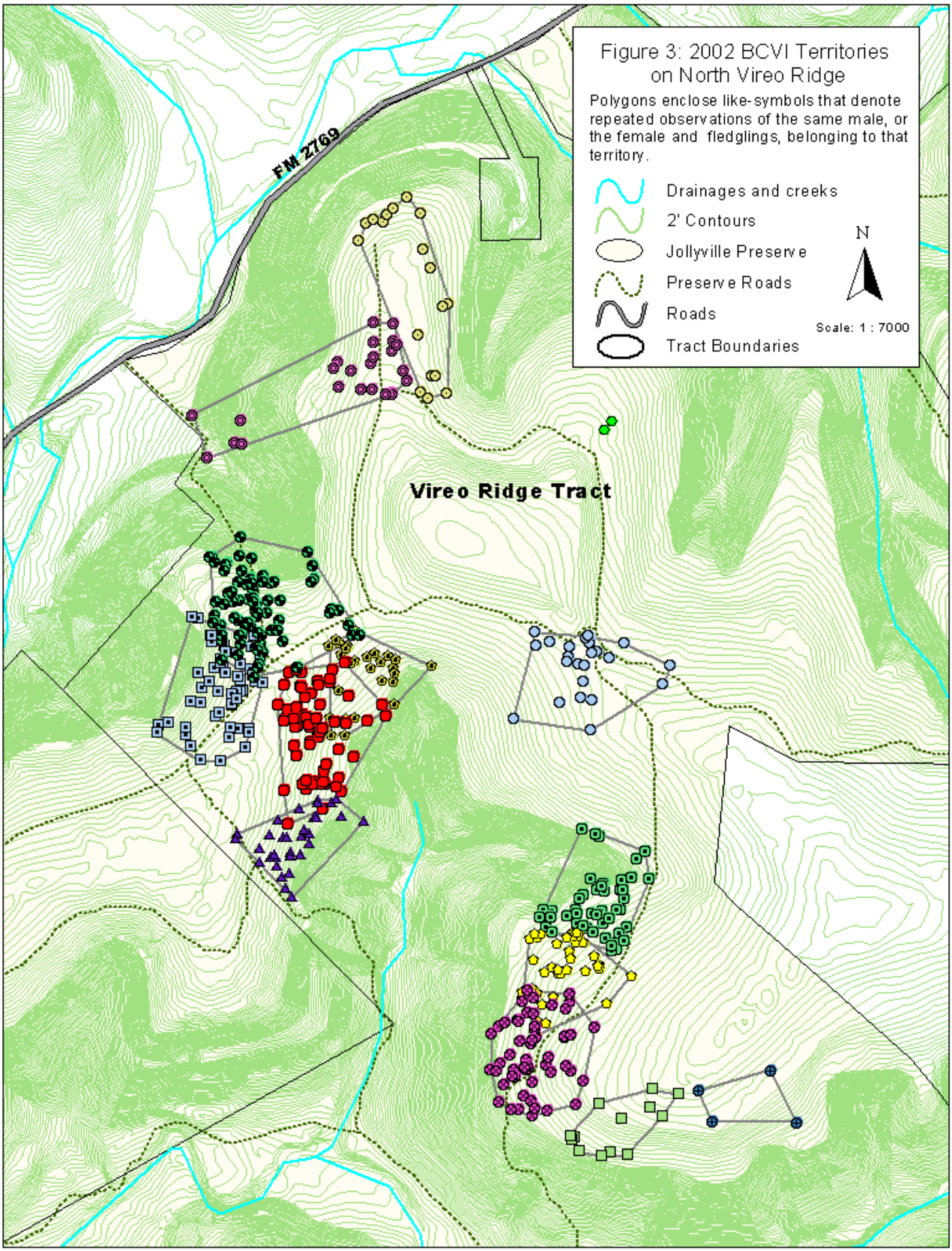


Figure 3: 2002 BCVI Territories on North Vireo Ridge
Polygons enclose like-symbols that denote repeated observations of the same male, or the female and fledglings, belonging to that territory.
Drainages and creeks
2' Contours
Jollyville Preserve
Preserve Roads
Roads
Tract Boundaries
N
Scale: 1 : 7000
FM 2769
Vireo Ridge Tract

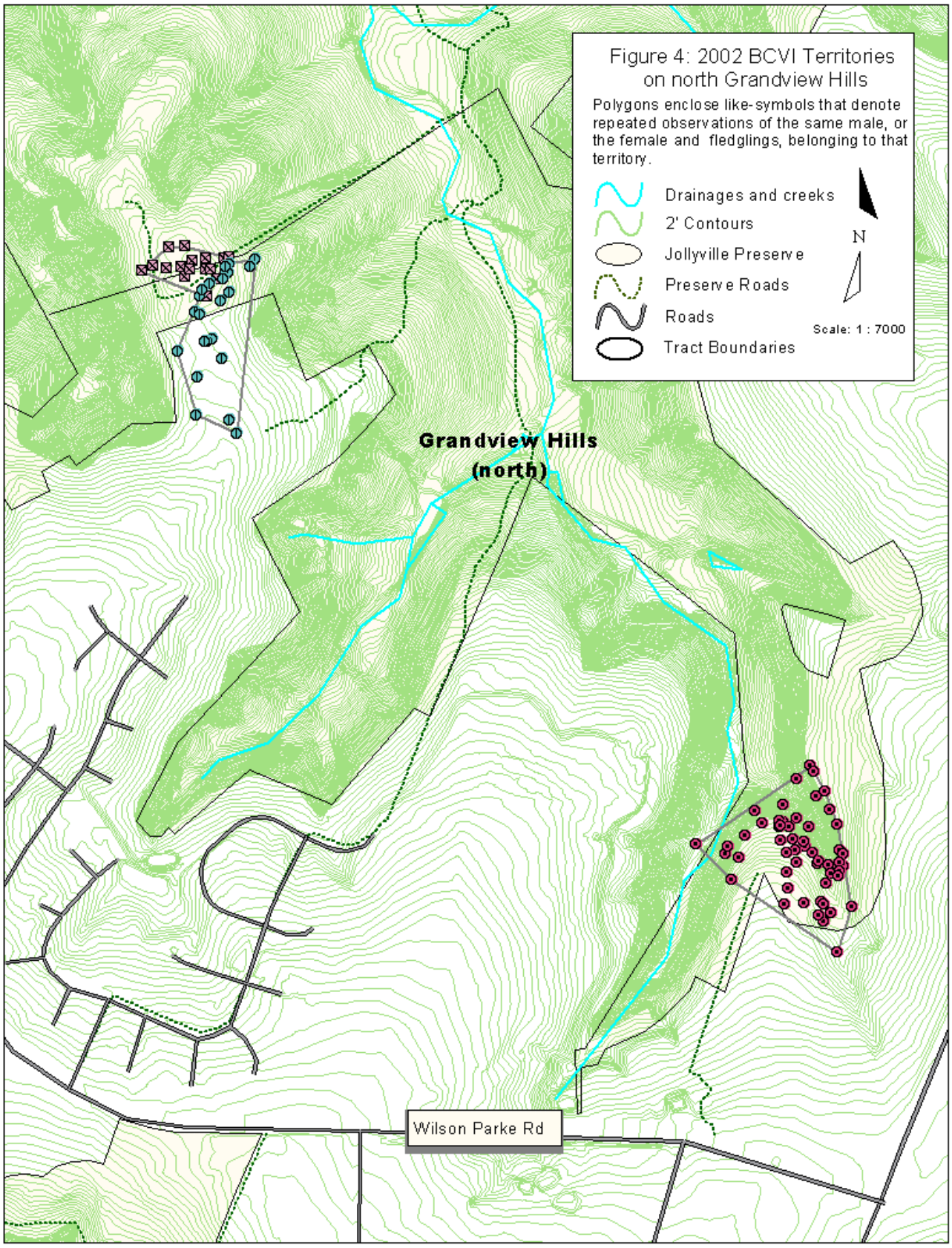
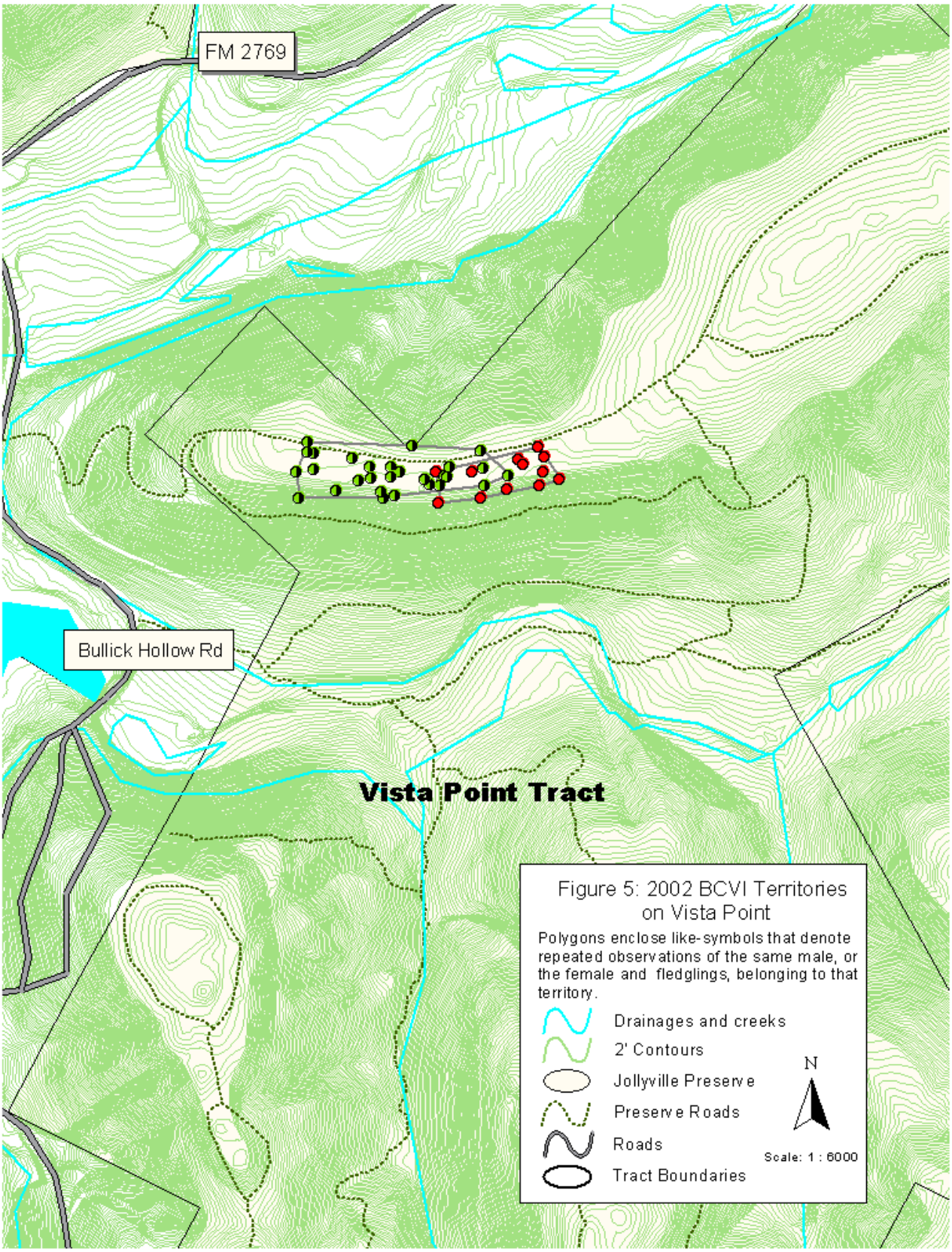
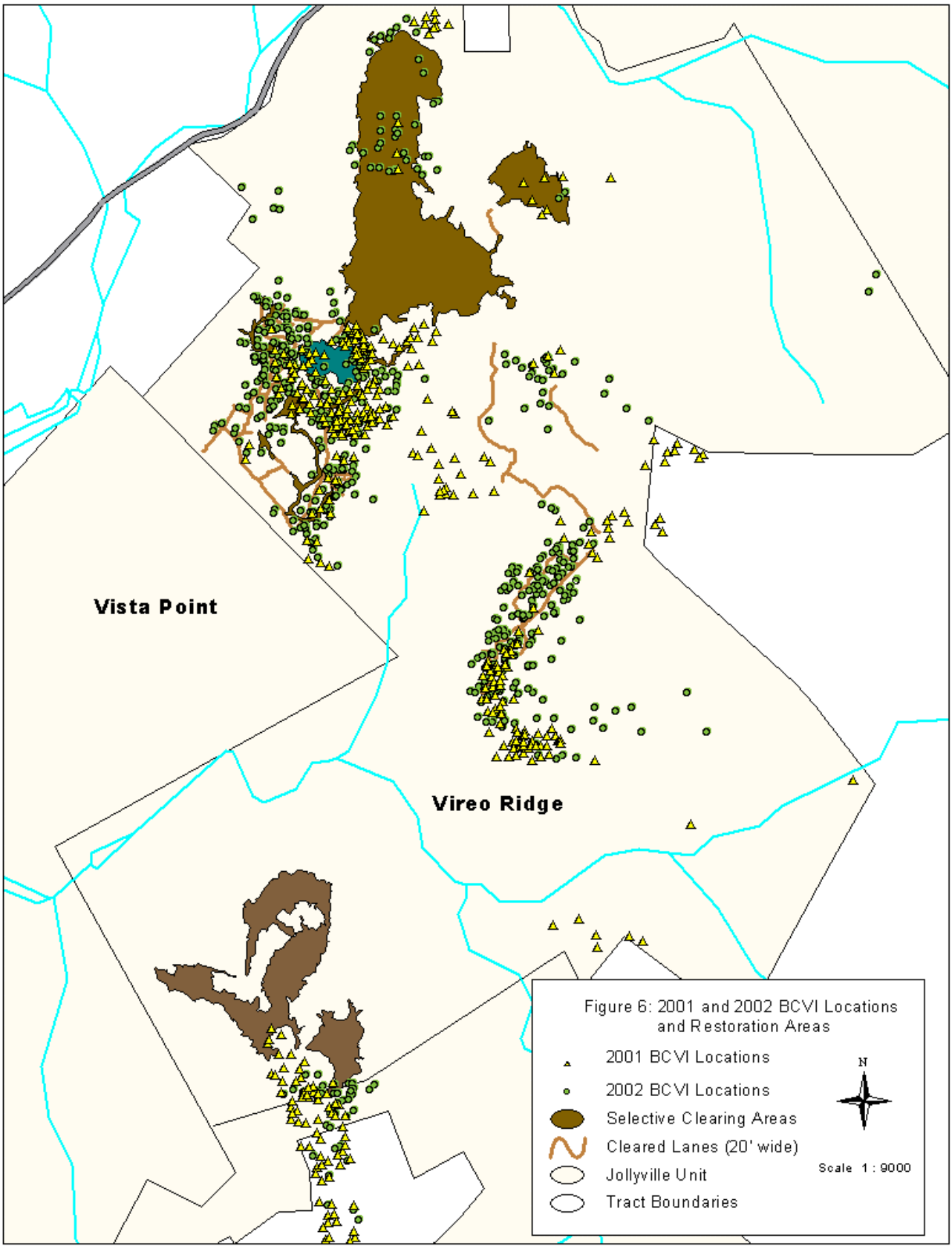


Figure 4: 2002 BCVI Territories on north Grandview Hills
Polygons enclose like-symbols that denote repeated observations of the same male, or the female and fledglings, belonging to that territory.
Drainages and creeks
2' Contours
Jollyville Preserve
Preserve Roads
Roads
Tract Boundaries
N
Scale: 1 : 7000
Grandview Hills (north)
Wilson Parke Rd


FM 2769
Bullick Hollow Rd
Vista Point Tract
Figure 5: 2002 BCVI Territories on Vista Point
Polygons enclose like-symbols that denote repeated observations of the same male, or the female and fledglings, belonging to that territory.
Drainages and creeks
2' Contours
Jollyville Preserve
Preserve Roads
Roads
Tract Boundaries
N
Scale: 1 : 6000


Vista Point
Vireo Ridge
Figure 6: 2001 and 2002 BCVI Locations and Restoration Areas
2001 BCVI Locations
2002 BCVI Locations
Selective Clearing Areas
Cleared Lanes (20' wide)
Jollyville Unit
Tract Boundaries
N
Scale 1 : 9000