

History and current population status of the Black-capped Vireo in Oklahoma

Once a locally common species in parts of Oklahoma, Kansas, Texas, and Mexico, the Black-capped Vireo has declined considerably.

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Female Black-capped Vireo, Oklahoma, July 6, 1984. Photo/Joseph A. Grzybowski.

THE BLACK-CAPPED VIREO (*VIREO atricapillus*) formerly nested in scrub-oak habitats from south-central Kansas through central Oklahoma and central Texas to central Coahuila, and possibly Nuevo Leon and Tamaulipas in Mexico (Graber 1961, A.O.U. 1983). However, it was last reported in Kansas in 1953 (Tordoff 1956, Graber 1961), and considerable population decline was becoming apparent in Oklahoma during the late 1970s and early 1980s (Williams 1982). This paper presents a historical review and current status of the Black-capped Vireo in Oklahoma, and comments on possible factors influencing the species' populations.



Black-capped Vireo breeding habitat at the Methodist Canyon Camp, Canadian County, Oklahoma. Photo/Joseph A. Grzybowski.

Woodhouse (1852) first discovered the Black-capped Vireo May 26, 1851, when he collected two males near the source of the Rio San Pedro River in western Texas (now Devil's River, Sutton County; Deignan 1961). Almost 30 years later, in 1878, W. H. Werner discovered the first nest and eggs in Comal County, Texas (Brewster 1879). Goss (1885) found the species nesting in Comanche County, in extreme south-central Kansas. It was not until 1901, however, that its presence in Oklahoma was detected (Bunker 1910).

Pre-1950 Oklahoma records

Bunker (1910) found the Black-capped Vireo abundant in Blaine County. He reported collecting up to



Above: Male Black-capped Vireo at nest, Oklahoma, June 14, 1984. Left Contents of Black-capped Vireo nest with four eggs and one Brown-headed Cowbird egg. Below: Contents of nest showing size of Brown-headed Cowbird when vireo young are hatching. Taken July 26, 1986, in Kerr County, Texas Photos/Joseph A. Grzybowski.



48 birds during July 1901, May 1902 and July 1903. Many were prepared as specimens, some of which are currently housed in the Stovall Museum of Science and History, at the University of Oklahoma. Bunker also commented on finding numerous nests.

By the time of Nice (1931), the Black-capped Vireo had been reported in seven Oklahoma counties, including the probable extremes of its former possible Oklahoma range (Beaver, Tulsa, Comanche and Murray counties; Fig. 1 and Appendix 1). One, probably a migrant, was observed at Gate, Beaver County, in the Oklahoma panhandle May 5, 1923, by W. E. Lewis (Nice 1931), but never again that far west in Oklahoma Nesting was reported in Creek and Tulsa counties, northeastern Oklahoma (Nice and Nice 1924, Morse 1927, Nice

1931, and Yocum 1935), but some confusion and errors exist as to the specific dates for most of these records. None have been reported for Tulsa and Creek counties since Yocum (1935).

Nice and Nice (1924) and Saunders (1926) indicated that the vireo was common in the Arbuckle Mountains in Murray County. Sutton (1967) reported that they were locally common in 1937; six specimens were collected by Sutton and Karl Haller April 26–27, and almost finished nests were found. F. M. Baumgartner (*pers. comm.*) found a nest with three eggs, and located three singing males May 8–10, 1942; this latter is the most recent record for the Arbuckle Mountains. Graber (1957) thoroughly searched the past sites of occurrences in the Arbuckles during her study in the mid-1950s, but discovered no birds; these areas had been considerably disturbed.

Only seven other pre-1950 records exist for Oklahoma; one each in Blaine, Cleveland, Oklahoma and Payne counties (Nice 1931, Baumgartner 1944, Graber 1957), and three from Comanche County (Nice 1931, Tyler 1979, Coffey, *vide* Baumgartner; Appendix 1). Thus by 1950, the vireo had been reported in only nine Oklahoma counties (Fig. 1), and at least 13, possibly 16, different specific localities. In four of these counties (Beaver, Creek, Murray, and Tulsa), it has not been reported since.

Post-1950 Oklahoma records

In the mid 1950s, Jean Graber undertook a thorough study of the distribution, ecology, and natural history of the Black-capped Vireo (Graber 1957, 1961). She found vireos breeding in Caddo, Dewey and Major counties, Oklahoma; they probably also nested in Blaine and Canadian counties, and possibly in Cleveland County (Graber 1961, Fig. 1). However, this still represented only as many specific localities as counties, all where the species had not been previously documented (Appendix 2). At her primary Oklahoma study site near Cogar in Caddo County, she followed the nesting activities of 12–16 pairs from 1954–1956.

From 1957 through 1970, with the expansion of interest in birding, the vireo was observed at about 23 localities in Oklahoma, including four counties in which it had not been previously re-

ported (Alfalfa, Garvin, Kiowa, and Logan counties; Fig. 1), and at least 18 new specific localities (Appendix 2). The species was observed during the breeding season primarily in Caddo County, and the very southwestern corner of Canadian County, popular birding spots, but also in Blaine and eastern Dewey counties, west-central Oklahoma, where the vireo was believed to occur regularly. Others were reported from Cleveland, Oklahoma and Logan counties, in central Oklahoma, where it was thought to nest irregularly, and Comanche County, in southwestern Oklahoma, where the vireo's status was uncertain (Sutton 1967). Single males were observed in Alfalfa and Garvin counties, and a molting female was seen in Kiowa County (Appendix 2).

During the period from 1971 to 1984, however, a decline of this species was becoming evident. The vireo was observed at only 15 localities in six counties; 11 of these localities were new (Appendix 2). By the early and mid-1970s, Black-capped Vireos were consistently being observed from year to year at only one locality—Methodist Canyon Camp, Canadian County—and becoming irregular or disappearing at two other favored birding sites in Caddo County; Red Rock Canyon State Park and Red Rock Girl Scout Camp, respectively (Baumgartner *pers. comm.*; Newell *pers. comm.*). Vireos were observed irregularly at several localities in the Wichita Mountains, Comanche County (Tyler 1979); one or two pairs were seen at least four of six years from 1972 to 1977 near Lake Thunderbird, Cleveland County (Williams 1976; Sutton [1982]; Bergey *pers. comm.*; Grzybowski *pers. obs.*); also, single birds were noted twice in Payne County (Hiatt 1978; Sutton [1982]). The vireo was not reported from Dewey or Blaine counties during this period, both previously considered primary breeding areas.

In 1984, we visited 19 of the 25–28 possible breeding localities reported since 1952, plus one older site (Appendices 1 and 2). Most previously documented localities were checked at least twice. Of the areas visited, only one had been destroyed by clearing, and only one partly modified by development, both of these in Cleveland County. In addition, numerous other localities were checked in travelling to and between these known localities. Black-capped Vireos (two pairs) were

found at only one site—Methodist Canyon Camp. Only one young vireo was fledged (from five nesting attempts), that in a nest from which three cowbird eggs were removed (unpubl. data). On June 5, 1984, a third male sang nearby, but could not be relocated. In addition, on June 16, 1984, a female was banded at Lake Overholser, Oklahoma County (Harris 1984) making a total of only seven birds found in Oklahoma during 1984.

Study areas

In 1985, the survey for vireos was intensified. Five general areas of cross-timbers habitat (low scrubby oaks) in Oklahoma were identified as having the greatest potential for breeding vireos. Four of these are in west-central Oklahoma along the western edge of this habitat type which extends eastward to the Ozark and Ouachita uplifts (Duck and Fletcher 1943). The fifth, the Arbuckle Mountains, is in south-central Oklahoma. The primary upland forest woody species in these areas are Black-jack Oak (*Quercus marilandica*), Post Oak (*Q. stellata*) and Juniper (*Juniperus virginiana*). These areas encompass the bulk of the primary known Oklahoma range, and include, from north to south:

- a) Eastern Dewey County and contiguous Blaine County. This is a strip of cross-timbers habitat north and east of the Canadian River from Seiling in Dewey County, to approximately southwest of Geary in Blaine County. Much scrub-oak habitat still exists in this strip.
- b) Blaine County. Bunker (1910) found vireos abundant here from 1901 to 1903, but never provided specific locations in his writings or on his specimen labels. The descriptions in Bunker's study, however, identify an extensive area of gypsum canyons north of Watonga. Many of these canyons and an extension of wooded draws and gulleys east of Watonga were searched in 1985, including the ones which were suspected to be those in Bunker's study site.
- c) Caddo canyon lands and surrounding cross-timbers habitat (including southwestern Canadian County) This has been perhaps the core area for Black-capped Vireos in Oklahoma, and the area containing lo-

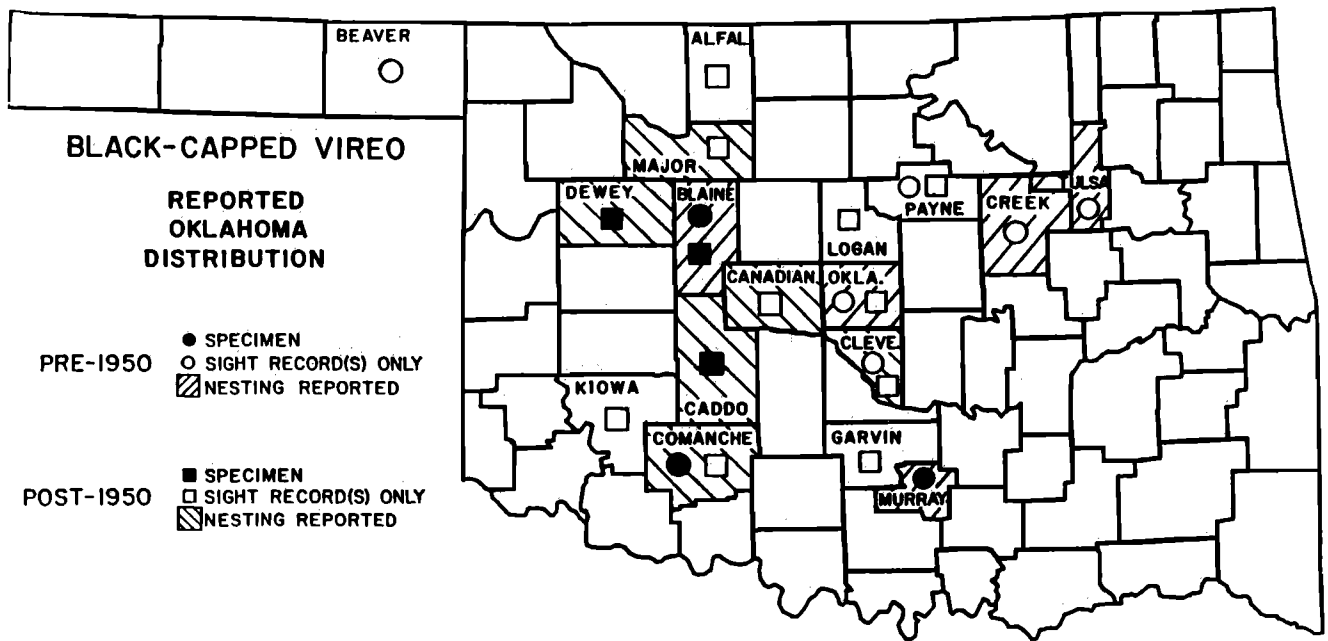


Figure 1. Oklahoma counties in which Black-capped Vireos were reported. A solid circle indicates that a specimen was collected before 1950, specimens collected after 1950 are designated by a solid square; open circles indicate sight records only before 1950; open squares designate that only sight records exist after 1950; cross-hatching indicates at least one breeding record—up to the right for pre-1950 reports, and up to the left for post-1950 reports.

- calities to which birders returned. Red Rock Canyon State Park and Methodist Canyon Camp were the areas most often visited. This area also contains Graber's (1961) primary Oklahoma study site near Cogar, Caddo County.
- d) Wichita Mountains Wildlife Refuge, Comanche County. While Graber (1957) did not find vireos present there in 1955 and 1956, the species has been observed subsequently on a number of occasions (Tyler 1979). In 1984, visits were made to localities of previous occurrences, all in public-use areas. No "Special Use" areas (*i.e.*, areas not open to the public) were checked in 1984. The surveys in 1985 included both public-use and "Special Use" areas.
- e) Arbuckle Mountains, Murray County. Though common here in 1925 (Saunders 1926) and 1937 (Sutton 1967), Graber (1957) did not observe them in 1955 or 1956. Given the detection of the vireos in the Wichita Mountains since Graber's study, and the vireo's early reported abundance in the Arbuckle Mountains, these were included in the 1985 survey.

Methods

Each of the primary areas was sampled from April 27 through June 21, 1985—mostly before May 17, 1985. Four observers spent a total of 23 independent field days conducting the survey. Observers travelled in the survey area and systematically stopped and listened for vireos at sites with suitable amounts of woody vegetation. Graber (1961) described primary Black-capped Vireo habitat as being "wooly," *i.e.*, heterogeneous in vegetation heights with some spacing between trees, and with cover to ground level. The Methodist Canyon Camp site, occupied by vireos, was used as a standard. Taped recordings of vireo songs were used to help elicit responses from male vireos. Each specific locality was marked on a United States Geological Survey (U.S.G.S.) topographic map. Other data on vireo occurrences were obtained from various cooperating individuals.

Ten minutes was the recommended length of time for these stops, but actual times varied. To facilitate checking as many stops as possible, observers were encouraged to make even brief stops at areas appearing marginal. Some general

notes on the amounts and configurations of juniper and oak vegetation were recorded for many of the longer stops. Only areas along roads were generally sampled to increase the amount of area covered; however, when observers could see a particularly suitable area for vireos away from the road, they were encouraged to walk toward the area and survey it. At sites where Black-capped Vireos were located, observers were instructed to assess the number of birds present.

During May in Oklahoma, male Black-capped Vireos sing loudly, many are vocal throughout the day, and they often occur locally with other male vireos. Playing taped recordings of their songs usually stimulated males to sing and also approach the song source. In some cases, the female also approached a song source. The vireos at the Methodist Canyon Camp site, in 1984, were usually detected within the first ten seconds of arrival through June. While there is variation in response among individuals, and some male vireos at a Texas study site demonstrated an elusiveness even though actively breeding (*pers. obs.*), most male Black-capped Vireos at specific localities could readily be detected during May with the aid of

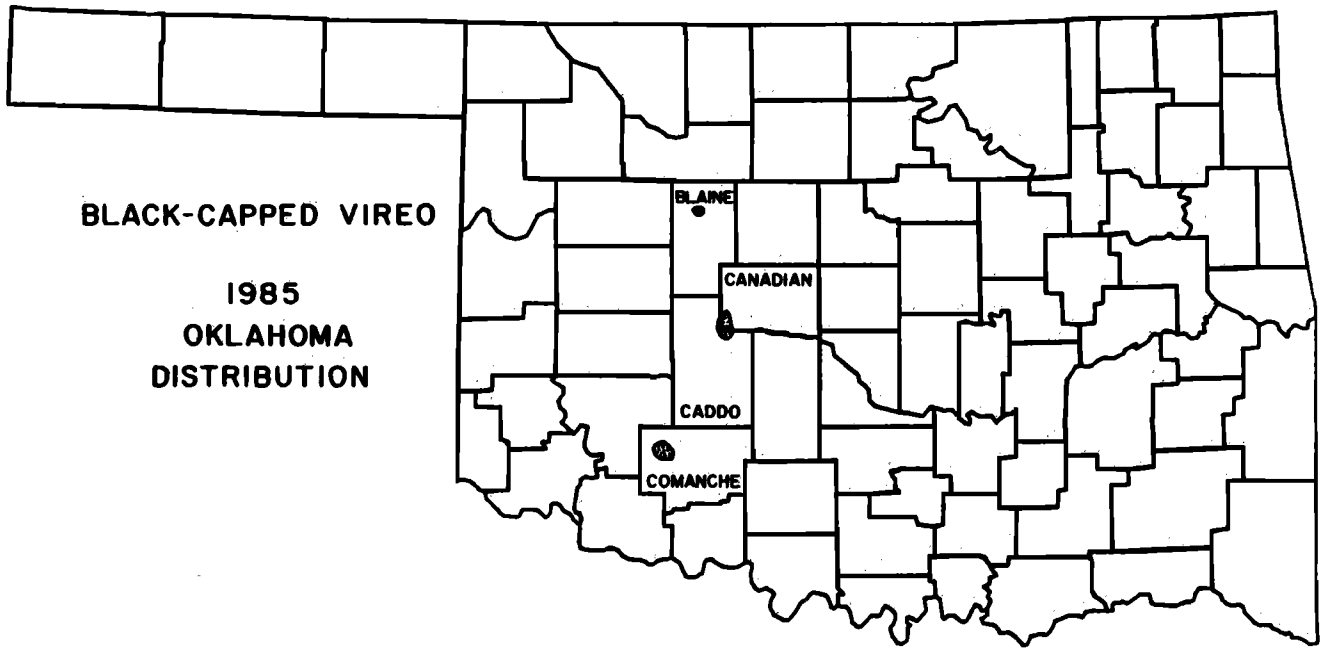


Figure 2. Current Oklahoma distribution of Black-capped Vireos—1985. Stipling indicates areas where vireos were located.

the taped songs. In general, negative data for this species are much more reliable than for that for many other passerines. Beyond May, however, reliability of negative data will decline, and only local groups of vireos, still actively breeding, are likely to be detected.

Areas with vireos in 1985 were surveyed more intensively during 1986 to more accurately establish the number of females, and also to interfere with cowbird (*Molothrus* sp.) nest parasitism—believed to be a serious problem. Cowbird decoy-traps were used to remove cowbirds from the Methodist Canyon Camp site in 1985 and 1986, and in the Cedar Mountain area of the Wichita Mountains during 1986.

Survey results

Exactly 599 specific localities were checked for Black-capped Vireos during 1985. The breakdown of the numbers of localities visited by county is given in Table 1, and includes a comparison with the number of stops made in 1984. Of these, Black-capped Vireos were found at 14. A listing of the number of vireos found by county (north to south) during 1985, is given in Table 2 along with the numbers established as present during 1986.

Table 1. Numbers of specific Oklahoma localities surveyed for the presence of Black-capped Vireos in 1984 and 1985, by county.

County	1984		1985		
	Total	With Vireos	Total	Vegetation Recorded	With Vireos
Blaine	39	0	115	25	1
Caddo	89	0	147	58	1
Canadian	18	1	66	26	3
Cleveland	20	0	0	0	0
Comanche	43	0	119	31	9 ^a
Dewey	47	0	95	25	0
Grady	0	0	2	0	0
Kiowa	5	0	0	0	0
Major	20	0	15	4	0
Murray	0	0	40	23	0
	281	1	599	192	14

^a Four of 13 proximal sites combined into nine.

Table 2. Numbers of adult Black-capped Vireos located in Oklahoma during 1985 and 1986.

County	1985			1986		
	Number of localities	M ^a	F ^a	Number of localities	M ^a	F ^a
Blaine	1	3-4	0	1	3	2
Canadian	3	7	4	2	6-7	4
Caddo	1	2	0	1	1-2	1
Comanche	9 ^b	16-19	3	3	16-19	11-13
Totals	14 ^b	28-32	7	7	26-31	18-20

^a M = male; F = female.

^b Habitat at one locality inappropriate for breeding.

About 35–39 adult Black-capped Vireos were observed during 1985, including 28–32 males and seven females. Adding the 10–11 young produced at the Methodist Canyon Camp site, the total known Oklahoma population of Black-capped Vireos in 1985 was 45–50 birds.

In 1986, 44–51 adults, producing 14–17 young, were located, but the apparent increase in numbers was due primarily to more intensive survey effort in the Wichita Mountains, and the consequent discovery of more females. The actual number of sites where vireos could be located declined from 14 to seven; most of the sites where vireos were no longer present in 1986 are in the Wichita Mountains.

With the exception of the isolated Blaine County locality, the rest of the specific localities were clustered into two groups (Fig. 2). One of these groups (four specific localities in 1985; three in 1986) is in extreme southwestern Canadian County and immediately adjacent Caddo County; the greatest distance between pairs of sites being about six miles. The second group is within five contiguous sections (one square mile each) near Cedar Mountain, Comanche County, and four localities within five miles of Cedar Mountain; the greatest distance between pairs of sites is about eight miles. In 1986, however, all vireo territories located in Comanche County were within two miles of Cedar Mountain, a "Special Use" area not open to the public.

The Blaine County locality is in a gypsum canyon north of Watonga, and is believed to be the same as that where Bunker (1910) made his observations in 1901–1903. While no females could be located here in 1985, two pairs were located in 1986; one of these fledged four young from a nest from which a cowbird egg was removed. Unfortunately, the second pair successfully fledged a cowbird.

All three pairs at the Methodist Canyon Camp site in Canadian County fledged young during 1985; however no young were produced here in 1986. The reproductive output in 1985 was attributed, in part, to the removal of cowbirds. Two vireo males were present at another locality in Canadian County both years; during 1986, two females were also located. These birds disappeared by late June in both years. An-

other site in Canadian County had one pair in 1985; none was present in 1986.

The largest group of male vireos located in the Wichita Mountains during 1985 was six to seven, and was found in the Cedar Mountain area. All other sites in Comanche County contained only one to three males. In 1986, with more intensive monitoring, 12–15 males and 8–10 females were located in the Cedar Mountain area. While no young were known to be produced in the Wichita Mountains during 1985, four pairs fledged at least 10–13 young in 1986. Again, cowbird trapping and removal of cowbird eggs from active nests was believed responsible, in part, for this increased production.

Vireos could not be located in mid- and late June at most localities where small numbers occurred. Sadly, when local populations are small, some pairs may attempt breeding early in the season and then quit, as happened with some of the small pockets of vireos in Texas (Grzybowski 1985). Some males may go unmated and begin to wander by early June. For a sample of males where mated status could be determined, 66% (27 of 41) were found to be mated from 1984 through 1986. Unfortunately, this reduces the effective size of the known breeding population (those actually discovered by the survey) for Oklahoma to 20 or fewer pairs in 1986.

Possible projections

There are almost always more birds present than observed, especially for a small passerine such as the Black-capped Vireo; but how many more? If we assume a 1.06:1 male to female sex ratio (Graber 1961), knowing that isolated females would not be readily detectable with the survey techniques used, the estimate of adults in 1985 would rise to about 60 birds. Assuming that only about 50% of the possible sites for vireos were searched, an educated "guesstimate" which considers that all blocks of woody habitat were not penetrated and a few gaps in coverage occurred (but also subtracting the Methodist Canyon Camp birds already known before sampling began), the estimated adult population for Oklahoma during 1985 would still be fewer than 110 birds. Since pockets of actively

breeding birds are more likely to be detected, the estimates of adults would project even lower, to fewer than 100 vireos.

While more adult vireos were detected in 1986 than in 1985, the number of males was approximately the same. Given the more intensive monitoring in the Wichita Mountains, this probably represents a small decline. Thus, the Oklahoma population of adult Black-capped Vireos was probably still below 100 birds during 1986. However, the effective population may be fewer than 30 actively breeding pairs. It is unlikely that many birds exist outside the primary range surveyed given that vireos sporadically appeared and disappeared in the peripheral counties, were never noted in any but small numbers, and that the occupied range in the core areas is already substantially clustered and contracted.

Dispersal and survival

As distances increase between populations, and mates become more difficult to locate, the potential for increasing the effective breeding population decreases. Little evidence exists that Oklahoma vireo populations have historically been contiguous with those in Texas. However, Graber (1957) cited several old breeding records of Black-capped Vireos in Cooke County, bordering Oklahoma (Ragsdale 1880, Cooke 1888); and a pair nested in Grayson County, also bordering Oklahoma, in 1954 (Pulich *pers. comm.*). These locations are only about 40 miles south of the Arbuckle Mountains, and about 110 miles southeast of the Wichita Mountains. The next closest breeding localities to Oklahoma are near Dallas, Texas (and a few counties to the southwest of Dallas), where the vireo is still known to breed (Graber 1961, Williams 1982, Pulich *pers. comm.*). This, however, is now more than 180 miles southeast of the Wichita Mountains Wildlife Refuge. The north to south cline of increasing numbers in Oklahoma is consistent with the notion that dispersal from Texas may be a factor contributing a few birds to Oklahoma vireo populations. Some old records from Nebraska and Kansas (Bruner 1896, Tordoff 1956) suggested that substantial "overshooting" is possible.

Cowbird nest parasitism

One factor implicated in the decline of the Black-capped Vireos in Oklahoma is nest parasitism by Brown-headed Cowbirds (*Molothrus ater*). Cowbirds can impact vireos by removing vireo eggs when laying their own. Some cowbirds attempt to disrupt active nests which have advanced beyond egg-laying (Graber *pers. comm.*). Vireos may abandon nests in which cowbird eggs are laid. The vireos may raise the cowbird young instead of their own. Incubation time to hatching is 14–17 days for Black-capped Vireos (Graber 1961; *pers. obs.*) but only 10–12 days for cowbird eggs (Friedmann 1929, Bent 1958). Brooding of young and, thus, incubation of the remaining eggs continues for a few days after the cowbird egg hatches, but then such attentiveness declines, ceasing about the sixth or seventh day after hatching (Graber 1957). However, many vireo eggs do not even hatch in parasitized nests. Some vireo eggs are ejected by the cowbird hatchling (*pers. obs.*); for others, incubation (or brooding) wanes before they reach hatching time (Graber *pers. comm.*; *pers. obs.*). The few vireos that do hatch find themselves companions to cowbird young, which may already be the same weight as adult vireos (about 10 grams compared to about one gram for the vireo hatchling), soon die, and are removed by the adults (Graber 1961).

Using Graber's (1961) figures collected from 1954–1956, 122 of 243 eggs (50%) laid by vireos failed to fledge young owing to cowbird activity. Of 15 nests found at an Austin, Texas, site in 1983 and 1984, 14 were parasitized; a cowbird egg was found on the ground under the fifteenth (O'Donnell *pers. comm.*). Of 16 nestings we documented in Oklahoma from 1984 to 1986 where no cowbird removal occurred, 15 (94%) were parasitized. Of five other nestings discovered in Oklahoma from 1971 to 1983, four were parasitized; the fifth was uncertain (Williams 1975, Tyler 1979, Newell *pers. comm.*). In addition, 40 of 53 vireo nestings (75%) found on the Kerr Wildlife Management Area, Kerr County, Texas, were parasitized by cowbirds (Grzybowski 1985, unpublished data).

Cowbirds were reported parasitizing nests of Black-capped Vireos by Bunker (1910) during 1901–1903. Graber

(1961) noted a substantial impact by cowbirds on vireo nesting success. However, the percent of nest parasitism has apparently increased in recent years. The results at Austin and Oklahoma indicate that cowbird nest parasitism is a serious problem.

Habitat changes

Another factor potentially responsible for the decline of vireos is loss of habitat. Breeding Black-capped Vireos use habitats restricted to scrub-oak growth of irregular height and distribution, with spaces between the small thickets and clumps, and with vegetation cover to ground level (Graber 1961). The presence of junipers and even taller trees are tolerated if they match or do not disrupt this general "wooly" vegetational configuration (*pers. obs.*). These taller trees are often used as song perches (*pers. obs.*). However, overgrazing will negatively impact the vegetation cover near ground level, making areas unsuitable for vireos.

The habitats preferred by vireos are potentially ephemeral subclimax growths which can be maintained best under edaphic conditions in gulleys, edges of ravines, and on eroded slopes. Other areas can be suitable as they recover from clearing or burning. These successional conditions may have been maintained during pre-settlement times over larger areas than presently by wild fires or fires set by Indians. Two areas in Texas with local populations among the largest currently known (Marshall *et al.* 1985), and also the currently occupied areas near Cedar Mountain in the Wichita Mountains, have all been burned from six to ten years ago. Graber (1961) found that the preferred vireo habitats occurred very locally. It became clear as the survey progressed that this is still true. Only small areas of the Methodist Canyon Camp area were suitable for vireos. The specific site utilized was on a slope with much sand in the soil and good drainage, which maintained the appropriate vegetational configuration without recent burning. In contrast, the vegetation at Graber's primary study site in 1954–1956 has grown up and filled in. The same appears to be true for the Red Rock Girl Scout Camp in Caddo County. In a sample of 192 sites for which vegetation

data were recorded, 119 (62%; 20% of all sites) could be characterized at least partly as "wooly." Vireos were found at only 14 of these (12%) as sampled. While not all of the 119 sites were suitable, many more suitable sites occurred than were occupied by Black-capped Vireos.

Future prospects

A key element in the decline of Black-capped Vireos appears to be nest parasitism by Brown-headed Cowbirds. Parasitism is nearing 100% of vireo nests in Oklahoma. The production observed was that enhanced by observer interference (1984) and cowbird removal (1985 and 1986). No vireo production was noted at the Cedar Mountain site late in the nesting season during 1985. Given the dangerously low numbers of vireos found in Oklahoma, cowbird control will be necessary to begin to increase vireo production.

Another potential factor is the ability of existing vireos to locate mates. The effective breeding population may be less than 70% of the total. Immigration from Texas populations may be enhancing those in Oklahoma. This immigration could be critical numerically and genetically (to avoid the detrimental effects of inbreeding), yet the contribution of such immigration is unknown.

In addition, Black-capped Vireos may require the stimulation of each other to continue nesting throughout the potential breeding season if early attempts fail. Some small groups of vireos at a Texas locality abandoned nesting activity in early June after a few unsuccessful nesting attempts (Grzybowski 1985), but it was unclear whether these represented birds in marginal habitats, or marginal local groupings. The smallest grouping observed by Graber (1961) was five males and three females; all but one of the Oklahoma groups was smaller. Females were noted at a number of sites in Oklahoma where vireos disappeared in June; one grouping in the Wichita Mountains not located in June, 1985, contained three males and two females in May.

Much more vireo habitat appears to exist in Oklahoma than is occupied. Some edaphic situations have been occupied for long periods, but areas re-

APPENDIX 1. Pre-1950 records of Black-capped Vireos in Oklahoma.

<i>County</i>	<i>Date(s)</i>	<i>Specific locality—Comments</i>	<i>Source(s)</i>
Beaver	May 5, 1923	Gate. One seen by W. E. Lewis.	Nice 1931
Blaine	July 1901–May 1903	deep canyon “with outcroppings of gypsum rock” and “with strong salt stream running at bottom.” This matches description of gypsum canyons in upper reaches of Salt Creek. 48 collected; some specimens at Univ. Oklahoma; many nests found, frequently with cowbird eggs.	Bunker 1910
	June 27, 1934	no specific locality given. Specimen taken by M. Leonard (at Univ. Kansas).	Graber 1957
Cleveland	May 11, 1926	no specific locality given. 1 male singing.	Nice 1931
Comanche	June 4–5, 1929	Wichita Mountains Wildlife Refuge, near Lower Narrows of West Cache Creek. ^a 2 males observed.	Nice 1931
	May 19, 1937	near Cache. 2 males collected by T. D. Burleigh; [one specimen in U.S. National Museum, one at Univ. of Michigan (Sutton [1982]).]	Tyler 1979
	April 25, 1943	Fort Sill. 2 seen by B. B. Coffey and C. F. Price	<i>vide</i> Baumgartner
	July 17, 1943	Fort Sill. 1 seen by B. B. & L. Coffey.	<i>vide</i> Baumgartner
Creek	July 20, 1919	Sapulpa. “rather common;” 2 pairs seen by T. R. Beard; 2 nests, both with cowbird eggs; location in blackberry patch not consistent with Black-capped Vireo. Nice (1931) gives incorrect year of 1929. [Graber (1957) and Sutton (1967) use Nice’s incorrect 1929 date. Sutton (1974) does same and adds 1928 date because of errors in his personal summaries. Force (1928 MS) gives date of Beard letter as Sept. 8, 1920.]	Nice & Nice 1924, Nice 1931
Murray	June 27, 1920	“Arbuckles.” “Rather common;” N3Y ^b —newly hatched. [Nice (1931) gives N4Y—3 tiny young and one hatching; also changes date to 17 June. Graber (1957) uses incorrect 17 June date, and switches dates with 1927 record below.]	Nice & Nice 1924
	May 1–5, 1925	Arbuckle Mountains, Price’s Falls and hilltops bordering Falls Creek. Very common.	Saunders 1926
	April 23, 1927	Arbuckle Mountains. Sight record.	Nice 1931
	April 26–27, 1937	Arbuckle Mountains “on steep slopes.” “Common locally;” 6 collected; specimens at Univ. Oklahoma; two nests found, still without eggs.	Sutton 1967
	May 8–10, 1942	Arbuckle Mountains, near Turner Falls. 3 males seen; N3E ^c May 9.	<i>pers. comm.</i> Baumgartner
Oklahoma	May 2 & 9, 1938	Spencer. Pair building nest; found by J. W. Harmon.	Graber 1957
Payne	May 20, 1942	near Lake Carl Blackwell. Singing male.	Baumgartner 1944
Tulsa	May 20, 1926	Tulsa. 3 egg sets taken (2/4, 1/3); [confusion later in literature; Nice (1931) lists 3 dates for Morse, one for 4 egg clutch collected May 20, 1928; also adds north Lewis Road as locality; Force (1928 MS) says nest with 4 eggs collected June 1, 1926 and May 20, 1928 (?); also cites north Lewis Road locality; Graber (1957) cites Nice (1931) and incorrectly gives 1927 as second date instead of 1928. No catalog of Morse collection available.]	Morse 1927
	July 2, 1930	Tulsa, Mohawk Park. Singing male seen by E. R. Force and R. D. Langenkamp.	Sutton [1982]
	May 12, (?)	Tulsa. Nesting; date assumed in early 1930’s.	Yocum 1935

^a Visited in 1984.

^b N3Y indicates nest with 3 young.

^c N3E indicates nest with 3 eggs.

APPENDIX 2. Localities where Black-capped Vireos were observed in Oklahoma from 1950 through 1984.

<i>County</i>	<i>Specific Locality—Comments</i>	<i>Date(s)</i>	<i>Source(s)</i>
Alfalfa	Great Salt Plains National Wildlife Refuge headquarters (¼ mi. N). One singing male.	June 4, 1961	Newell <i>pers. comm.</i>
Blaine	Okeene (6 mi. S, 6 mi. W). ^a Male and female collected by J. L. Cracraft; locality very near where vireos observed in 1985 and 1986; may be same as study site of Bunker (1910).	June 18, 1963	OUMZ ^b
	Watonga (8 mi. W) along dry streambed. ^a 2 males seen and one male collected, respectively; latter by G. M. Sutton	June 3, 1955 and June 28, 1961	Graber 1957 and OUMZ
	Watonga (6 mi. E) along highway 3. ^a One singing male seen by J. G. Newell.	May 26, 1964	Baumgartner 1964
Caddo	Cogar (3 mi. W). ^a Specimens on first date; 12–16 pair monitored by Graber from 1954 to 1955; many nests found; 68+ birds (including 30 fledglings banded); earliest arrival April 17, 1955; latest departure Sept. 17, 1954; seen 1953–1960, 1963, 1970, 1972; 2 males and a female on last date by G. M. Sutton <i>et al.</i>	April 26, 1953 through June 19, 1972	OUMZ, Graber 1957, Graber 1961 and Sutton [1982]
	Red Rock Canyon State Park. ^a Many times; never more than 2 males notes; seen in 1961, 1966, 1967, 1970, 1972–1976, 1982; nests found were parasitized.	April 23, 1961 through July 1, 1982	Newell, <i>pers. comm.</i> and Sutton [1982]
	Red Rock Girl Scout Camp (Binger, 3 mi. W). ^a Up to 6 males (1962) noted; nest found in 1959 with 2 young; seen in 1957, 1959, 1961, 1962, 1965, 1970, 1971, 1972.	July 20, 1957 through April 22, 1972	Baumgartner, <i>pers. comm.</i> , and Newell <i>pers. comm.</i> , and Sutton [1982]
	Cedar Hills Baptist Youth Camp (south of Binger). ^a Several males observed.	early 1980s	Wilson, <i>pers. comm.</i>
	near Binger (no specific locality). 24 seen or heard by V. E. Martin.	late June, 1961	Baumgartner 1961
	Anadarko (about 5 mi. S, one mi. E). One and 3 males, respectively, by M. B. Lamb.	June 10, 1967 and June 29, 1968	Breeding Bird Survey, <i>vide</i> Carter
	Anadarko (about 5 mi. S, 5 mi. E). One male recorded by J. J. Hellack.	June 24, 1973	Breeding Bird Survey, <i>vide</i> Carter
Canadian	Methodist Canyon Camp. ^a Up to 5 males seen (1955); parasitized nests found; observed 1953, 1960, 1963, 1964, 1967–71, 1974–84.	May 3, 1953 through July 15, 1984	Graber 1957, Newell, <i>pers. comm.</i> , and Grzybowski, <i>pers. obs.</i>
	Cedar Lake. Noted through 1970s.	1970s	Brown, <i>pers. comm.</i>
Cleveland	Norman (15 mi. E). ^a 2 males; one nest found by G. M. Sutton and J. C. Johnson, Jr.	June 2, 6 & 15, 1955	Graber 1957
	Norman (Oliver's Woods). One male seen by W. M. Davis.	April 18, 1958	Sutton [1982]
	Stella (3 mi. W). ^a Singing male seen by W. M. Davis and J. G. Newell. [Baumgartner (1960) says they nested (?).]	June 18, 1960	Sutton [1982]
	Norman (Univ. Oklahoma Campus). Singing male by V. Wiedeman.	May 14, 1961	Sutton [1982]
	Norman (6 mi. E) ^a singing male seen by W. M. Davis.	April 14, 1963	Sutton [1982]
	Norman (9 mi. E); may be same as 8 mi. E, and Denver Cemetery. 1–2 males seen by W. M. Davis and G. M. Sutton.	June 22 & 30, 1961	Sutton [1982]
	Norman (8 mi. E); (see comments above and below). One male seen by R. H. Forman and G. M. Sutton <i>et al.</i>	May 21, 1967	Sutton [1982]

APPENDIX 2. (Continued)

County	Specific Locality—Comments	Date(s)	Source(s)
Cleveland	Denver Cemetery; ^a possibly same as 9 mi. E and 8 mi. E given above. Not more than 2 birds noted; one assumed collected in 1972; also seen 1973, 1976, 1977.	1972 (?) through May 1, 1977	Sutton [1982], Bergey, <i>pers. comm.</i> , and Grzybowski, <i>pers. obs</i>
Comanche	Wichita Mtns. W. R., near west exit (9 mi. N of Indianoma). ^a Male seen by W. M. Davis.	June 16, 1962	Tyler 1979
	Wichita Mtns. W. R., northwest slope of Mt. Scott. ^a Pair seen by A. H. Halloran.	June 10, 1966	Tyler 1979
	Wichita Mtns. W. R., Treasure Lake. ^a 3 males and 2 females seen; cowbird young being fed; seen by J. E. Kiley.	July 20, 1971	Tyler 1979
	Lawton. Bird seen by J. M. McGee.	April 18, 1973	Tyler 1979
	Wichita Mtns. W. R., Elk Mtn. 2 seen by W. D. Harden and C. A. Enright; one seen 1983.	Aug 3, 1974 and 1983	Tyler 1979, and <i>fide</i> Crabtree
	Wichita Mtns. W. R., Sunset Lake (½ mi. SW). ^a One male seen by J. D. Tyler and F. E. Smith; may be same as Elk Mtn site above.	July 9, 1977	Tyler 1979
Dewey	Seiling (11–12 mi. SE), high ground along Little Robe Creek. ^a 2 specimens, nest found with 4 eggs; pair banded in 1955.	May 13, 1955 through May 4, 1958	Graber 1957, OUMZ, and Sutton [1982]
	Seiling (8 mi. SE) along highway 3. ^a Single male.	May 26, 1964	Newell, <i>pers. comm.</i>
Garvin	Elmore City (5 mi. W). Single male by W. M. Davis.	June 3, 1962	Sutton [1982]
Kiowa	Snyder (3 mi. W) along Otter Creek. Molting female seen by G. M. Sutton.	Aug. 27, 1963	Tyler 1979
Logan	near Guthrie, just south. Up to 4+ birds seen in 1967; observed all four years by J. G. Newell, W. Doane and/or T. Shires.	May 23, 1964 through May 21, 1967	Baumgartner 1964, and Newell, <i>pers. comm</i>
Major	Chester (6 mi. E). ^a Adults captured, nest found, and young banded.	July 12 and Aug. 2, 1955	Graber 1957
Oklahoma	Silver Lake west of Lake Hefner. One male in backyard seen by V. J. Vacin.	April 12, 1965	Baumgartner 1965
	Girl Scout day camp near Edmond. One male	May 30, 1966	Newell, <i>pers. comm.</i>
	Lake Overholser (coffer dam). One female banded.	June 16, 1984	Harris 1984
Payne	Stillwater. One male in backyard.	Sept. 29, 1976	Hiatt 1978
	Stillwater (8 mi. W); may be same as 1942 locality. One singing male seen by R. R. Leppla <i>et al.</i>	May 6, 7, 16, 1979	Sutton [1982]

^a Visited in 1984.^b OUMZ signifies collection at the Stovall Museum, University of Oklahoma.

covering from burning also appear to attract vireos. However, with the dangerously low numbers of vireos found, the future of the Oklahoma population remains precarious.

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