

The Least Bell's Vireo in California: a de facto endangered race

No other California passerine has declined so dramatically in historical times

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FROM ITS INTRODUCTION to the scientific community (Cooper 1861) until about 1930, the Least Bell's Vireo (*Vireo bellii pusillus*) was known to be widespread in California. Observers invariably described it as "common" (Cooper 1874, Belding 1878, Fisher 1893) or "abundant" (Baird *et al.*, 1874, Grinnell and Swarth 1913). Grinnell and Miller (1944), in their thorough and scholarly survey of the state's avifauna, still considered it "common, even locally abundant," but they noted "a noticeable decline in numbers...in parts of southern California and in the Sacramento-San Joaquin Valley, apparently coincident with increase of cowbirds." By 1970, northern California breeding populations had apparently vanished, and those in southern California had become highly localized. Because of this dramatic decline, concern for the race's ultimate survival began to be expressed (Mans and Chase 1963, McCaskie 1969, Gaines 1974).

During 1977 and 1978, with the assistance of other field ornithologists, we surveyed the historical nesting range of the Least Bell's Vireo in California. This paper presents the results of that survey, and assesses the decline, current status, and future of this formerly common bird

METHODS

INFORMATION ON THE Least Bell's Vireo in California was obtained from the scientific literature, major museum collections, unpublished field notes, and personal communications with field ornithologists. Based on these sources, survey sites were selected (1) in areas where this subspecies had bred in the past, and (2) in areas of seemingly suitable habitat within the historical range

(Figure 1).

From April through July 1977, 30 areas of the state were surveyed (Gaines and Goldwasser); in 1978, 128 locations were covered (Goldwasser and Wilbur). Suitable habitat was traversed on foot while watching for vireos and listening for their songs. When an individual was detected, an attempt was made to locate a nest.

RESULTS

Numbers and distribution. A total of 90 territorial male or paired Least Bell's Vireos was found at 31 locations, all in southern California (Figure 1, Table 1). None was detected in the Sacramento-San Joaquin Valley, in Owens Valley, or in the central coast ranges from San Francisco Bay south to Santa Barbara



Figure 1. Distribution of the Least Bell's Vireo in California. Hatched line includes historical range (after Grinnell and Miller 1944). Open circles identify survey locations where no Bell's Vireos were found. Small dots, stations with 1-2 singing males. Large dots, stations with 3 or more singing males.

County. Our results corroborate those of other field ornithologists in those areas, all of whom have failed to find this species in recent years (Gaines 1974, Gaines and Hansen in prep., pers. comm. from B. Kimball, S. Laymon, T. Manolis, and R. Stallcup). During the past decade there have been only five reports of birds possibly breeding in northern California, one in the inner coast ranges and four in the San Joaquin Valley (DeSante and LeValley 1972, U.S. Fish and Wildlife Service Breeding Bird Surveys 1975 and 1976, and L. Kiff, pers. comm.).

On the coastal slope of southern California, 67 territorial males or paired Bell's Vireos were detected at 23 of 65 sites surveyed. On the desert slope 23 were found at nine of 18 sites. None was found in many southern California areas where they had formerly nested, including six of 16 sites where territorial birds had been reported during the previous ten years (Table 2). Many of these areas

Table 2. Locations with territorial Least Bell's Vireos in 1967-1976, but not in 1977-1978.

Locality	Year(s)	# Terr. Males	Reference
Pinnacles National Monument, San Benito County	1972	1	DeSante and LeValley 1972
Bautista Canyon, Riverside Co.	1973,1976	1-2	S. Cardiff, pers. comm
Van Tassel Canyon, Los Angeles County	1970-1975	1-2	M. San Miguel, pers. comm.
Fish Canyon, Los Angeles Co.	1970-1974	2-3	Ibid.
Near Arvin, Kern County	1973	1	L. Kiff, pers. comm.
San Juan Creek, Orange Co.	1976	1	A. Fries, pers. comm.

still have seemingly suitable riparian habitat for Bell's Vireos.

Population densities. At 16 of the 31 localities with Bell's Vireos only a single pair or territorial male was found. Five sites had two pairs each, and three sites had three pairs. In the areas with more than three pairs (maximum of 13), densi-

ties ranged from five to eight singing males per linear mile of suitable habitat (three to five per kilometer).

Reproductive success. Of 14 active nests located during the survey, three (21%) fledged one or more vireos. A fourth fledged young after a Brown-headed Cowbird (*Molothrus ater*) egg was removed.

Ten nests (79%) failed, owing to predation or cowbird parasitism. Cowbird eggs or chicks were found in seven of the 14 nests (50%). Cowbird parasitism resulted in three nest failures. The remaining nests, including those parasitized by cowbirds, fell victims to predators. The identity of the predators was not ascertained.

Four additional pairs were observed feeding fledgling vireos, and an equal number were observed feeding fledgling cowbirds.

DISCUSSION

Current status. Our surveys indicate a drastic reduction in California populations of the Least Bell's Vireo. In portions of 162 observer-days, less than 100 pairs could be located in the 150± locations surveyed, including most areas where this species was formerly common. The highest breeding densities found (3-5 singing males per km of habitat) were only slightly lower than the approximately six males per km estimated for the Arizona Bell's Vireo (*V. b. arizonae*) along the Colorado River early in the century (Grinnell 1914). However, they are much lower than the 11-29 per km recorded in the Sierra Nevada foothills by Grinnell and Storer (1924), or the recent report of eight singing males (*V. b. belli*) along 400 m of the South Platte River in Colorado (Kingery 1977).

Table 1. Locations with territorial Least Bell's Vireos, 1977-1978.

County	Location	# Terr. Males
San Diego	Jamul Creek	9
	Sweetwater River, Bonita ^{1/}	1
	Sweetwater River, Rte. 94	1
	Vallecito Creek ^{2/}	1
	San Diego River, Mission Park Dam	8
	San Diego River west of Santee	3
	San Diego River, Mission Valley	1
	San Felipe Creek	1
	Moosa Canyon ^{2/}	1
	San Luis Rey River, 3-4 mi west of I-15	5
	Santa Margarita River, Stagecoach Road	5
	Santa Margarita R., DeLuz	2
	Santa Margarita R., 9 mi east of main gate Camp Pendleton	2
	Santa Margarita R., 5 mi east of main gate Camp Pendleton	2
Santa Margarita R., 3 mi east of main gate Camp Pendleton	1	
Riverside	Coyote Creek Canyon	8
	Palm Canyon	1
	Andreas Canyon	4
	San Timoteo Canyon	1
	Santa Ana River, Hamner Avenue	2
	Santa Ana R., Etiwanda Avenue	1
San Bernardino	Santa Ana R., Prado Park	3
	Big Morongo Wildlife Preserve	4
Los Angeles	Little Morongo Canyon	3
	Van Norman Dam	2
Ventura	San Francisquito Canyon ^{3/}	1
	La Jolla Canyon ^{4/}	1
Santa Barbara	Santa Ynez River, Juncal Campground ^{5/}	1
	Mono Creek - Santa Ynez River ^{5/}	13
Inyo	Agua Caliente Creek ^{6/}	1
	China Ranch	1
	Amargosa River, Tecopa	1

Vireos found by other observers: ^{1/}Phil Unitt, ^{2/}Paul Jorgensen, ^{3/}Kimball Garrett, ^{4/}Paul Lehman, ^{5/}Janet Hamber and Jim Greaves, and ^{6/}Bill Sheehan.

It is unlikely that a bird known for the "persistence of its singing" (Grinnell *et al.*, 1930) was often overlooked. Those males located were exceedingly vociferous and easily detected, and were equally conspicuous on succeeding dates through the nesting season. One can only conclude that the Least Bell's Vireo has almost disappeared from northern California, and has become scarce and local in southern California. Even if scattered pairs were missed during our surveys, the aggregate population would still be at a low, possibly critical, level. No other California passerine has declined so dramatically in historical times.

Impact of habitat destruction and cowbird parasitism. Since Anglo-American settlement, much of the Least Bell's Vireo habitat—"low riparian growth either in the vicinity of water or in dry parts of river bottoms" (Grinnell and Miller 1944)—has been lost to stream channelization, water diversion, lowered water tables, gravel mining, and agricultural-urban development. Riparian habitat that once covered millions of acres must now be measured in thousands (Roberts *et al.*, 1977). This loss accounts for the absence of vireos in many areas where they were formerly common. Nevertheless, there is considerable apparently suitable habitat that no longer harbors Bell's Vireos. Extensive, seemingly ideal areas, such as those along the Sacramento River and Salinas River, are deserted. Nor is extensive habitat required, for the species defends a relatively small territory and is known to nest in circumscribed quarters, as in thickets along irrigation ditches (Tyler 1913). *Some factor in addition to habitat loss is involved.*

DURING THE PAST century, the Brown-headed Cowbird has spread into many parts of North America where it was previously absent. In these regions it has gained "access to host populations which have had little or no ancestral experience through which to develop effective defenses against it" (Mayfield 1965). The near disastrous decline of the Kirtland's Warbler (*Dendroica kirtlandii*) exemplifies the potentially tragic consequences. The decline of the Least Bell's Vireo may have a similar cause.

Like the Kirtland's Warbler, the Least Bell's Vireo was virtually unexposed to Brown-headed Cowbird parasitism until near the turn of the century. But with irrigated agriculture, cowbirds spread into the valleys of California. For example,

Willett (1933) wrote that "the increase of the cowbird in southern California during the past 20 years has been remarkable, in fact unparalleled by any of our native birds." The same story repeated itself throughout the state (Grinnell and Miller 1944).

The decline of the Least Bell's Vireo parallels the increase of the cowbird. Following the first record of parasitism in 1907, when cowbird eggs were found in several vireo nests at Buena Vista Lake, Kern County (Linton 1908), the incidence of reported parasitism increased rapidly. "No birds," noted Dawson (1923), "are more frequently parasitized either absolutely or relatively," a view corroborated by other ornithologists (Hanna 1918 and 1928, Rowley 1930). Since the late 1920s, more than one-third of Least Bell's Vireo nests for which we have records have harbored cowbird eggs. Although this figure is not derived from a random geographical sample and does not compare the success of initial versus re-nesting attempts, it does indicate a high rate of parasitism. Sustained over a half-century, this parasitism must have significantly reduced reproductive success, since parasitized pairs either desert the nest or raise the cowbird at the expense of their own brood (Pitelka and Koestner 1942, Mumford 1952).

The Least Bell's Vireo is one of at least five woodland-dwelling passerines whose breeding populations have declined in the lowlands of California with

the advent of the Brown-headed Cowbird. The others are Willow Flycatcher (*Empidonax traillii*), Blue-gray Gnatcatcher (*Poliophtila caerulea*), Warbling Vireo (*Vireo gilvus*), and Yellow Warbler (*Dendroica petechia*). These songbirds—all small, insectivorous, open-cup nest builders—are precisely those members of the lowland avifauna most vulnerable to cowbird parasitism (Gaines 1974, 1977). The Bell's Vireo, unlike the others, is restricted to the lowlands where the pressure from cowbirds is likely to be the greatest. This may explain why it has suffered the largest aggregate reduction in numbers.

STILL, THE EVIDENCE implicating the Brown-headed Cowbird is not entirely conclusive. There is no clear-cut relationship, for example, between the numbers of cowbirds and the numbers of vireos detected in our surveys. In the Sacramento and San Joaquin valleys high numbers of cowbirds correlates with absence of vireos. However, in a vireo stronghold near Gibraltar Reservoir in Santa Barbara County cowbirds were common. In the Coast Range north of Santa Barbara, cowbirds were not conspicuous and habitat looked satisfactory, but no vireos were found. However, the historic status of either vireo or cowbird in this area is not known.

Prospects for survival. If nesting populations continue to decline, the Least Bell's Vireo could become extirpated in California. To assure its survival we



Least Bell's Vireo at nest. Photo/Karla Kramer

must ascertain the health of existing populations. This will require intensive study of their population dynamics and habitat preferences, including the impact of cowbird parasitism on reproductive success.

In conjunction with these studies, we feel that a pilot program of cowbird removal should be instigated at one or more sites where vireos currently nest. We can then evaluate the advisability of continuing and extending such a program. Removal of cowbirds has proven an effective means of increasing reproductive success of the Kirtland's Warbler (Mayfield 1977).

Ultimately, the Least Bell's Vireo survival will depend on the preservation of its habitat. Hence, we must assure that currently occupied areas are not degraded, and that there is additional suitable habitat for the birds to re-colonize.

On June 27, 1980, the California Fish & Game Commission added the Least Bell's Vireo to the state list of endangered species.

ADDENDUM

SINCE OUR STUDY, a population of about 12 pairs of Bell's Vireos has been discovered near Piru, Ventura County (R. Webster, *Am. Birds* 1979, 33:898). Also, the Mono Creek-Santa Ynez River population, Santa Barbara County, has been found to include about 50 pairs (J. Greaves, pers. comm). These are encouraging findings, but the total California population is still very small. Major floods in southern California in 1978 and 1980 have stripped many riverbottom areas of dense vegetation, and this may have some effect on the vireos' ability to find suitable breeding habitat.—S.R. Wilbur.

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