

## TIMING OF MIGRATION AND STATUS OF VIREOS (VIREONIDAE) IN LOUISIANA

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Abstract.—Data are presented on the status of the vireos (Vireonidae) that occur in Louisiana. Based primarily on year-round surveys at coastal sites in southwestern Louisiana and censuses at an inland site in central Louisiana, data on timing of migration are presented for White-eyed (*Vireo griseus*), Solitary (*V. solitarius*), Yellow-throated (*V. flavifrons*), Philadelphia (*V. philadelphicus*), and Red-eyed (*V. olivaceus*) vireos. In general, migrant vireos in spring are much more common on the coast than inland, whereas the reverse is true in fall. Bell's Vireo (*V. bellii*) has been recorded 12 times in southern Louisiana between 4 November and 22 January; this represents a substantial portion of all late fall/early winter records from eastern North America. No documented records exist of Yellow-throated Vireo from early November to early March for Louisiana, or probably elsewhere in the Gulf Coast region, despite numerous published sight records. Warbling Vireo (*V. gilvus*) has declined dramatically as a breeding species in Louisiana for unknown reasons; there have been almost no reports of breeding birds for three decades. Two specimens of the subspecies *V. g. swainsonii* from western North America have been collected in Louisiana, one of which is the first winter specimen of the species for eastern North America. One specimen of White-eyed Vireo from Louisiana is *V. griseus micrus*; this represents the first record of this taxon north of southern Texas. One of the three Louisiana specimen records for Bell's Vireo is of a subspecies (*V. b. medius*) from the southwestern USA and north-central Mexico. One specimen record of Solitary Vireo from Louisiana is a distinctive subspecies (*V. s. plumbeus*) from western North America. A specimen of Yellow-green Vireo (*V. flavoviridis*) from Louisiana evidently is just the second documented record for the eastern United States. Two of 12 Louisiana specimens of Black-whiskered Vireos (*V. altiloquus*) are of the nominate subspecies (from the Greater Antilles), for which there was only one previous record for the United States.

### FECHA DE MIGRACIÓN Y ESTADO DE LOS VIREOS (VIREONIDAE) EN LOUISIANA

Sinopsis.—Se presentan datos sobre el estatus de los vireos en Louisiana e información sobre el período de partida migratorio para estas aves. El trabajo se fundamentó en la búsqueda de estos pájaros, a través del año, en localidades de la costa en el suroeste de Louisiana y censos en la parte central del estado. Los datos se tomaron para *Vireo griseus*, *V. solitarius*, *V. flavifrons*, *V. philadelphicus* y *V. olivaceus*. Por lo general, durante la primavera los mencionados resultaron más comunes en la costa que en las partes interiores del estado y lo contrario se encontró durante el otoño. *V. bellii* fue encontrado en 12 ocasiones en el sur de Louisiana entre el 4 de noviembre y el 22 de enero. Esto representa una porción sustancial de todos los registros de esta ave tarde en el otoño y temprano en el invierno, en la parte este de Norte América. No existen registros documentados de *V. flavifrons* desde principios de noviembre a principios de marzo en Louisiana y probablemente lo mismo aplique a la costa del golfo. *V. gilvus* ha descendido drásticamente como especie residente de Louisiana. Dos individuos de *V. g. swainsonii*, del oeste de Norte América, han sido coleccionados en Louisiana, uno de los cuales es el primer informe de la especie para el este de Norte América, durante el invierno. Un individuo de *V. griseus micrus* representa el primer registro de esta raza al norte del sur de Texas. Uno de los tres informes de *V. bellii* para el estado, corresponde al de la subespecie *V. b. medius*. Además, uno de los individuos de *V. solitarius* corresponde a la subespecie de *V. s. plumbeus*. Por su parte un individuo de *V. flavoviridis* es el segundo informe documentado para el este de los Estados Unidos. Dos de los 12 registros de *V. altiloquus* pertenecen a la subespecie de las Antillas Mayores, del cual había un solo informe para los Estados Unidos.

Timing of migration is a critical component of a bird species' biology. Although concentrations of migrating birds in the Gulf Coast region of the southeastern United States are perhaps greater than anywhere else in North America (Lowery 1974: 73), few quantitative data have been published on migration phenology of any bird species in this region. Species accounts of migratory passerines in the Birds of North America series published so far (Poole et al. 1991–1994) present few such data. Given the escalating attention given to conservation of Nearctic migrants that winter in the Neotropics (e.g., Hagan and Johnston 1992), such data take on increased significance. For example, comparison of migration phenologies over a range of latitudes and longitudes would allow determination of whether a species has “staging areas” or whether it passes quickly through its migratory range. Also, migration phenologies allow documentation of interseasonal and interspecific differences in migration route (e.g., Rappole et al. 1979)

Most accounts of regional avifaunas present some information on migration phenology. These are usually prose statements, however, concerning peak and extreme dates (e.g., Oberholser and Kincaid 1974, James and Neal 1986) or bar graphs that use a semi-quantitative scale for relative abundance (e.g., Lowery 1974, Touns and Jackson 1987). In the absence of census data from defined areas throughout the annual cycle, these regional works are unable to present more quantitative data, thereby hindering inter-regional comparisons. We here present such data for the vireos (Vireonidae) that occur in Louisiana. We also include information for certain species on status outside migration periods and occurrence of subspecies.

#### METHODS

Our data on seasonal status of vireos in Louisiana are from two sources. First, for coastal southwestern Louisiana, we compiled our field notes from 329 day-long field trips to coastal Cameron Parish from October 1978 through May 1995. Each field trip began near sunrise and lasted through at least mid afternoon, with a substantial proportion of effort (at least 4 h) spent surveying coastal woodlands (“cheniers”). We also used such day-long field trip lists provided by Kenneth V. Rosenberg ( $n = 29$ ), Curtis A. Marantz ( $n = 15$ ), and Andrew W. Kratter ( $n = 8$ ), for a total of 381 trips. The sites surveyed are primarily patches and strips of scrubby deciduous woods (canopy height usually 4–10 m) dominated by hackberry (*Celtis laevigata*); adjacent thickets dominated by acacia (*Acacia smallii*) received disproportionate attention because of the abundance of migrants there. Most woodlands are within 2 km of the Gulf of Mexico, and all are within 200 m of fresh or brackish marsh. They are separated from the forests of interior Louisiana by a zone of largely treeless marsh roughly 25–30 km wide; this zone concentrates migrating birds that prefer wooded vegetation (Lowery 1974: 77–78).

The coverage of dates is reasonably complete (as can be seen from the year-round distribution of surveys in Fig. 1), except for gaps of more than

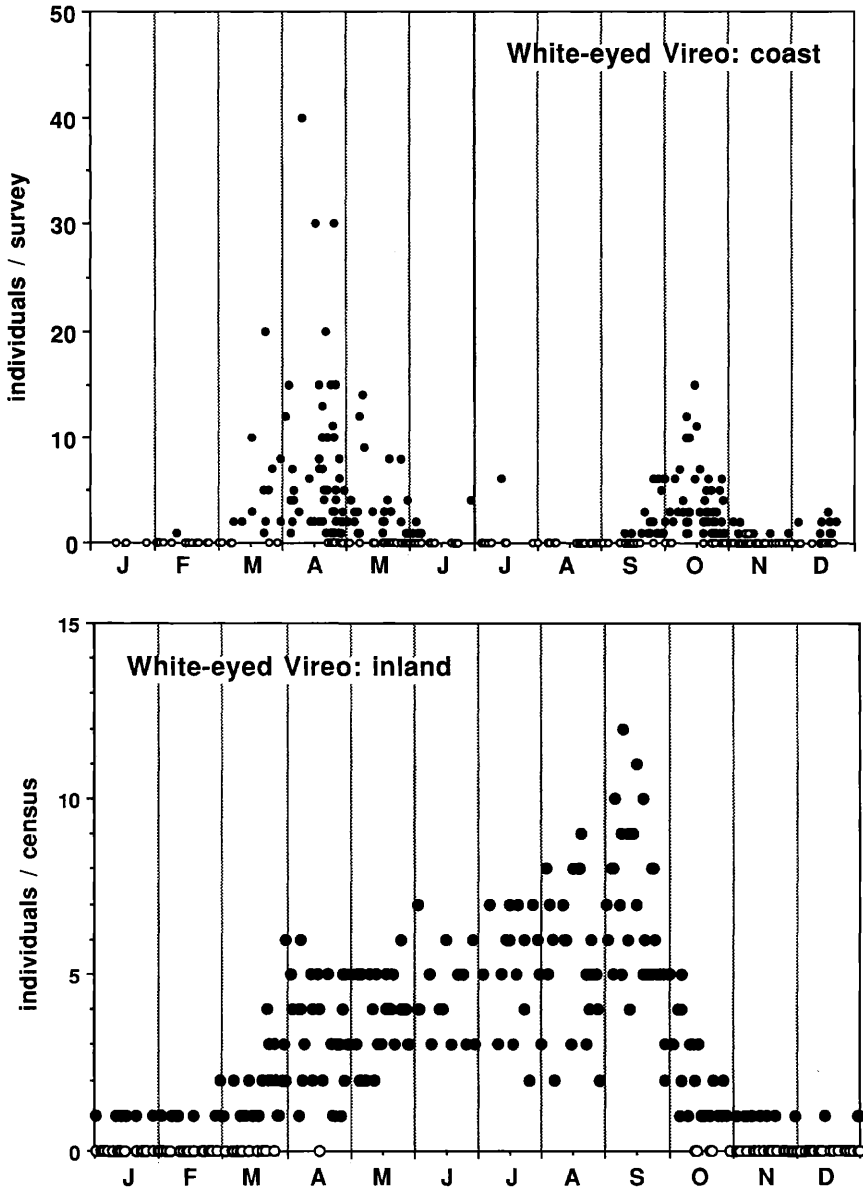


FIGURE 1. (Top) Number of individual White-eyed Vireos recorded per day on surveys of coastal woodlands in Cameron Parish, Louisiana. On this and other figures, single-letter codes for months are given on the x-axis, and counts of zero individuals are indicated by hollow circles on the appropriate date on the x-axis. (Bottom) Number of individuals recorded per census of a 2.5-ha inland site in Iberville Parish, Louisiana.

7 d in late February, late July, and from late December to early January. As spring migrants on the Louisiana coast typically sing infrequently if at all, we do not believe that there are seasonal differences in detectability that would influence seasonal comparisons. Clearly, timed censuses of a proscribed area would provide better seasonal data, but the field trip lists, with the number of individuals recorded per day for each species, provide at least a first approximation of seasonal patterns. Our data-base has one advantage over single-site or single-year studies in that the erratic year-to-year and among-site variations in species abundance generated by the unpredictability of weather are minimized. Whether patterns of occurrence from extreme southwestern Louisiana reflect those of the whole coast is unknown. We are aware of some qualitative differences discussed herein; also, Philadelphia Vireo is rarer in spring and Warbling Vireo is rarer at any season in southeastern Louisiana (D. P. Muth, pers. comm.).

Second, for an inland locality, Remsen conducted spot-map censuses of all birds seen or heard on an approximately 2.5-ha plot in south-central Louisiana about 15 km south of Baton Rouge at 545 Pecan Drive, 3.7 miles north of St. Gabriel, Iberville Parish, at least once per week from 18 Dec. 1989 through 3 Jun. 1995. The plot is approximately 90% mature, lowland bottomland hardwoods (of which approximately 75% is undisturbed and 25% had its original undergrowth removed in 1988 and is in the process of regenerating) and 10% house, lawn and flower garden with a small artificial pond that provides birds with water year-round for drinking and bathing. The predominant canopy tree species are hackberry, water oak (*Quercus nigra*), sweet gum (*Liquidambar styraciflua*), and American elm (*Ulmus americana*), with 1–5 individuals each of black cherry (*Prunus serotina*), sycamore (*Platanus occidentalis*), live oak (*O. virginiana*), laurel oak (*O. laurifolia*), water locust (*Gleditsia aquatica*), and eastern cottonwood (*Populus deltoides*). Some hackberries, water oaks, and one live oak exceed 60-cm DBH. Canopy height is 12–25 m; the canopy was generally closed except around the house until Hurricane Andrew created numerous large tree-falls in August 1993 (Remsen, in press). Most trees support a heavy growth of woody vines, primarily Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Rhus radicans*), grapes (*Vitis* spp. and *Ampelopsis cordata*), crossvine (*Bignonia capreolata*), and trumpet-creeper (*Campsis radicans*). Predominant understory shrubs are elderberry (*Sambucus canadensis*), spicebush (*Lindera benzoin*), and blackberries (*Rubus* spp.). Three-fourths of the plot borders a large tract (approx. 2 km<sup>2</sup>) of similar forest, and one-fourth borders a road, fields, and second-growth. The small size of the census plot is partially off-set by the large sample of censuses ( $n = 318$ ) and uniform seasonal coverage. Each census began approximately 1 h after sunrise and continued for 70–80 min; censuses were conducted only when weather conditions were favorable for hearing and seeing birds. The same route was followed each time. Seasonal biases in detectability are minimized for White-eyed Vireo because it sings year-round. Although singing rates for Red-eyed and Yellow-throated vireos diminish in late summer and fall, they still sing and

continue to call frequently. As the plot is covered intensively (roughly 30 min/ha), probably few individuals are missed on a census, and biases in seasonal detectability are minimized. We recognize that seasonal patterns from other inland areas in Louisiana may differ from those at this site, but no data are available for comparison.

In addition to the above field-work, we have drawn on our experience in many other areas of Louisiana, as well as additional field-work in Cameron and Iberville parishes. Specimens are deposited at the Museum of Natural Science, Louisiana State University (LSUMZ). Additional specimen localities were obtained from the National Museum of Natural History (USNM), Washington. Some previously unpublished observations were obtained from the card file of unusual bird sightings reported to the regional editors of *Audubon Field Notes-American Birds-National Audubon Society Field Notes* (hereafter "ABF") housed at the LSUMZ.

#### RESULTS

*White-eyed Vireo*.—We are not aware of any quantitative data on the timing of migration of White-eyed Vireo in Louisiana or elsewhere in the Gulf Coast region. Lowery (1974: 608) indicated that for Louisiana as a whole, the White-eyed Vireo was "common to abundant" from mid-March to late October and "rare" the rest of the year; no migration peaks were indicated. We interpret our counts from coastal Cameron Parish (Fig. 1a) as follows. Spring migrants were detected from mid-March to late May, with highest numbers detected from late March to the first week of May, and no sharp peak. Reflecting the strong influence of weather on the number of migrants stopping on the coast (Gauthreaux 1971), the number of individuals detected varies dramatically even within short spans of dates. Individuals from a local breeding population of a few pairs was detected occasionally in June and July; their absence in August and early September, when singing is typically vigorous at the inland site, is apparently real. Fall migrants are detected from the second week of September to late October, with a sharp peak in numbers in the second week of October. Fall counts are almost as high as spring counts (in contrast to other vireos and most other landbird migrants on the coast). Populations remain steady from early November through December; the slightly higher counts in late December are an artifact of more intensive sampling during the National Audubon Society's Christmas Bird Counts. After late December, we have few records until early March; thus, numbers apparently decline substantially after late December.

Census data from the inland locality in Iberville Parish (Fig. 1b) may be interpreted as follows. One or two individuals spend the winter in some years, with no detectable difference in frequency of occurrence from late October until early March. An apparent, slight increase from late February to mid-March may be an artifact of increased detectability at that time, when singing by wintering individuals becomes more frequent. The influx of spring arrivals begins in the third week of March. In contrast to coastal Cameron Parish, no migration peak is detectable; numbers are

steady from early April through June and presumably represent the breeding population only. Numbers increase slightly from July through August, possibly because of the presence of birds fledged locally. Then, a distinct peak in numbers is evident from early to mid-September, followed by a precipitous decline through late October. Compared to coastal Cameron Parish, fall numbers peak nearly a month earlier inland. In fact, the peak in coastal counts coincides with the decline in inland counts, which contradicts Lowery's (1974) claim that the seasonal status of the White-eyed Vireo in the Baton Rouge area, which includes our inland site, was identical to that in the state as a whole. Our sample of specimens is inadequate to determine whether age or sex ratios differ in fall between inland and coastal populations. Although numbers cannot be compared directly, in fall the density of birds is probably much greater inland than on the coast because censuses from the 2.5-ha site produce almost as many individuals as found in large expanses of coastal woods in fall.

We follow Phillips (1991) in questioning the validity of the subspecies *noveboracensis*, the name applied to populations of most of eastern North America (AOU 1957, Blake 1968); we tentatively consider it a synonym of *V. g. griseus* (details to be published elsewhere). A specimen of White-eyed Vireo collected in extreme southwestern Louisiana is *V. g. micrus*, a subspecies found primarily in northeastern Mexico and previously known only as far north as southern Texas (Blake 1968, Phillips 1991). The specimen was collected by Robb T. Brumfield on 5 Nov. 1989 at East Jetty Woods, 2 mi. S Cameron (LSUMZ 152123; adult female). Our identification is based on the following: (1) plumage color (dorsally olive-gray with no green despite fresh plumage; only faint hints of yellow on sides and across breast); (2) wing formula (primary #8 shorter than primary #5); and (3) small size (wing chord 58 mm, tail 43.1 mm, tarsus 17.6 mm, exposed culmen 9.5 mm). This record represents yet another example of a dispersal pattern shown by several species from southern Texas or northern Mexico, namely a northeastward movement into Louisiana in late fall and winter (Cardiff and Remsen 1979; also see Bell's Vireo below).

*Bell's Vireo*.—Lowery (1974) noted that in Louisiana the Bell's Vireo is known primarily as a breeding species in the northwest, where first discovered by Jeter (1952). A few small, isolated, evidently ephemeral breeding populations have been found there. From 1983 through 1987, a breeding population was located farther east by D. T. Kee near Monroe, Ouachita Parish, in north-central Louisiana (Jackson 1983, 1987). The latest records from the vicinity of Louisiana breeding sites are 11 September (J. R. Stewart, ABF).

Bell's Vireo is so rarely detected as a migrant in Louisiana that only date spans can be given to describe migration. There are no well-documented spring records away from known breeding areas. Fall migrants have now been detected six times in southern Louisiana from 26 August to 26 September (ABF). There are also now nine sight records and three specimen records from southern Louisiana from 4 November to 22 January. These presumably represent individuals attempting to winter in Lou-

isiana and represent a high proportion of such reports from the eastern United States. A sight record by R. J. Stein from Reserve, St. John-the-Baptist Parish, on 9 Mar 1986 (Imhof 1986) could represent either a late winter record or an early spring migrant.

A specimen collected by Melvin Weber and Ralph Cambre on 17 Jan. 1959, at Reserve, St. John-the-Baptist Parish (LSUMZ 22632) was identified by Allan R. Phillips as *V. b. medius* (we concur with the identification), a subspecies that breeds in New Mexico and southwestern Texas south to north-central Mexico (Blake 1968, Phillips 1991). Two specimens from Cameron Parish (LSUMZ 152124, collected by Cardiff on 9 Sep. 1989, and LSUMZ 121881, collected by T. S. Schulenberg on 5 Nov. 1984) are both *V. b. bellii*. A specimen (LSUMZ 72) collected on 29 Dec. 1952 in Cameron Parish by Lowery, but then unfortunately placed as a mount in the museum's public exhibit area, is now so faded by exposure to light that it cannot be identified to subspecies. The Louisiana breeding population is presumably *V. b. bellii* (Brown 1993), the form that breeds in the Great Plains and the Midwest, but no specimens have been collected.

*Solitary Vireo*.—We interpret our counts from coastal Cameron Parish (Fig. 2a) as follows. The first fall arrivals occur in late September (excluding a record of a western subspecies; see below). No peaks in numbers are detected from then until mid-December, when intensive surveys associated with Christmas Bird Counts produce a conspicuous peak. As these same surveys do not produce nearly as prominent a peak in White-eyed Vireo (Fig. 1a), this peak might represent a true influx rather than a sampling artifact, particularly because counts from January through March are slightly higher than those in fall. Furthermore, coastal woodlands are searched nearly as intensively during October and November as on the Christmas Counts, yet seldom are more than 1–2 Solitary Vireos detected. In northern Florida, tower-killed migrants are detected occasionally as late as 21 December (Crawford 1981). Despite frequent April surveys, there are few records after late March: a male found by Paul McKenzie and collected by Remsen on 29 Apr. 1989, approx. 8 km east of Cameron (LSUMZ 138311), is the latest record in our surveys. Only two records from southwestern Louisiana in the ABF are later than 29 April, the latest a bird found by T. A. Parker III and photographed (examined by us) by C. Butterworth on 11 May.

We interpret census data from our inland locality (Fig. 2b) as follows. The first fall arrivals are usually detected in the last week of October (occasionally as early as 20 October, but not on a census); curiously, this is nearly one month later than first fall arrivals are found on the Cameron coast. Although the sample size is small, there may be a peak in November, followed by a decline through December to January. (Although none were recorded in January censuses, Remsen does have January records.) James and Neal (1986) noted that although Solitary Vireo was recorded regularly in December in southern Arkansas, few were recorded in January and February; this parallels the pattern at our inland site. Our impression is that Solitary Vireos are most frequently encountered in winter

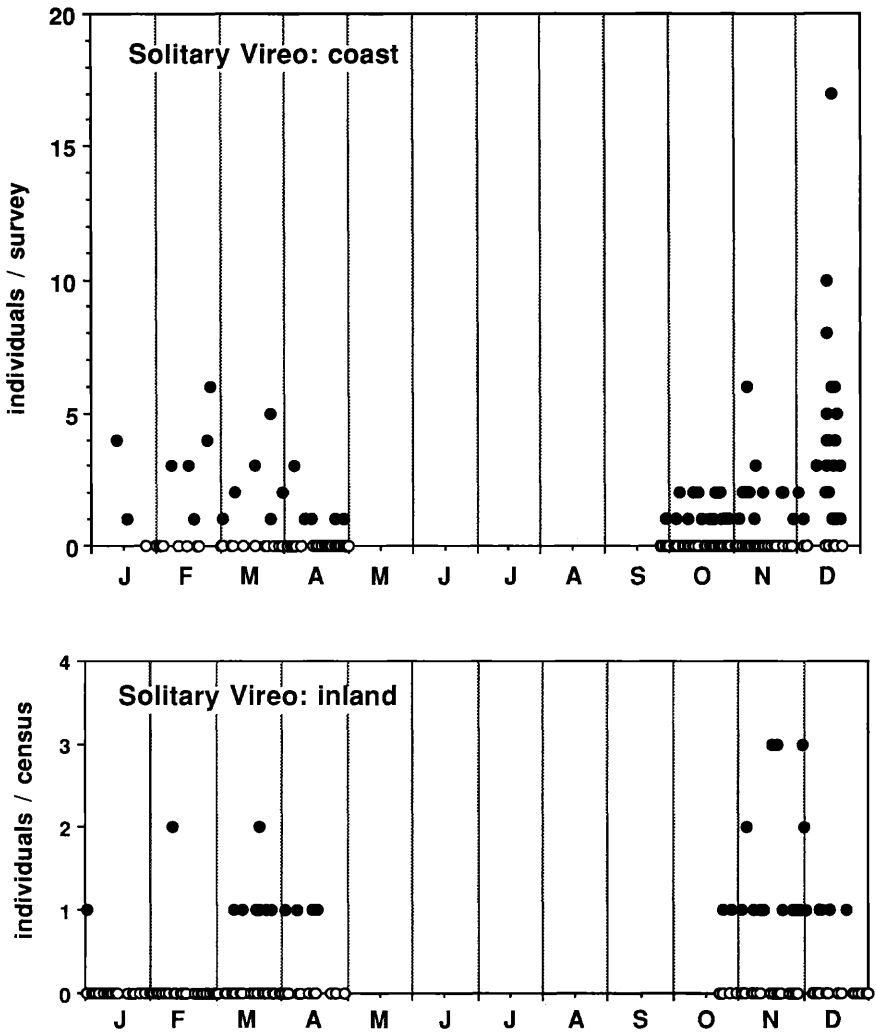


FIGURE 2. (Top) Number of individual Solitary Vireos recorded per day on surveys of coastal woodlands in Cameron Parish, Louisiana. (Bottom) Number of individuals recorded per census of a 2.5-ha inland site in Iberville Parish, Louisiana. Zero counts are not indicated on x-axis more than 3 d after latest spring occurrence or before earliest fall occurrence; see x-axis of Figure 1 for year-round distribution of surveys and censuses.

in Louisiana in the vicinity of live oak groves; because our inland site has only one mature live oak, perhaps a site that included a grove of these trees would show a smaller or no population decline in mid winter. An apparent influx of spring migrants is detected from the second week of March through early April. Thus, the inland locality seems to have distinct



early spring and late fall influxes of migrants, whereas peak numbers are found on the coast in winter.

Lowery (1974: 608) indicated that in Louisiana as a whole and in the Baton Rouge area the relative abundance of the Solitary Vireo did not change from about 5 October until about 20 April. Our data from both coastal and inland sites show that this is not the case. Lowery (1974) included with a question mark an alleged specimen from 4 August south of New Orleans (Kopman 1904); we were unable to locate this specimen and consider the record dubious.

The subspecies that winters throughout much of Louisiana is the widespread "Blue-headed Vireo" (*V. s. solitarius*) of eastern North America. The more slaty-backed, larger- and wider-billed, longer-winged subspecies that breeds in the southern Appalachian Mountains, *V. s. alticola*, also occurs in Louisiana in winter (American Ornithologists' Union 1957, Blake 1968, Phillips 1991); there are seven LSUMZ and USNM specimens collected from 18 November to 30 March, all from a limited area of eastern Louisiana in West Baton Rouge, West Feliciana, Livingston, Orleans, and Washington parishes. Also, Remsen collected a specimen in Louisiana of *V. s. plumbeus* (from the Rocky Mountain region), an immature female on 16 Sep. 1984, at Hackberry Ridge, approx. 3 km WSW Johnsons Bayou School, Cameron Parish (LSUMZ 118774; identification confirmed by Allan R. Phillips and Ned K. Johnson). This subspecies is treated as a species by Sibley and Monroe (1990) on the basis of unpublished data.

This record of *V. s. plumbeus* is also the earliest fall specimen from Louisiana and among the only September records for the state. The next-earliest specimen is from 20 Sep. (LSUMZ 135161) and is so dull and pale that it might be *V. s. cassinii* (from far-western North America). The earliest specimen from Louisiana that is definitely the nominate subspecies is an immature male from 29 September (1990; approx. 8 km E Cameron, Cameron Parish, collected by Cardiff; LSUMZ 157045), and the vast majority of individuals do not arrive until the final week of October. Therefore, any Solitary Vireo found in September in Louisiana or elsewhere along the Gulf Coast might represent one of the western taxa.

*Yellow-throated Vireo*.—We interpret our counts from coastal Cameron Parish (Fig. 3a) as follows. Spring migrants begin to arrive in mid-March, and peak counts are obtained from late March to late April. In spite of intensive surveys in late May and early June, migrants are not detected past mid-May, except for one record on 2 June (1982): a singing male collected by Remsen at Hackberry Ridge, approx. 3 km WSW Johnsons Bayou School (LSUMZ 105521; Jackson 1982). As Yellow-throated Vireo breeds within at least 90 km of coastal Cameron Parish and may have eggs as early as mid-April, such a June record may represent a post-breeding wanderer rather than a late spring migrant. Fall migrants are detected from late August through late October, with no recognizable peaks. Migrants are much less common in fall than in spring: Yellow-throated Vireo was recorded on only 20 of 103 (19%) surveys from 22 August to 28 October, with never more than two individuals recorded in one day,



not breed on the census plot (because it is mostly closed-canopy forest), roving breeding individuals from adjacent areas with scattered tall trees regularly enter the plot.

Lowery (1974: 608) indicated that the Yellow-throated Vireo was uncommon to moderately common in Louisiana as a whole, arriving 1 March and becoming "common" about 10 March. We can find only two reports in the literature on Louisiana birds or the ABF from before 12 March; however, this is consistent with its status in coastal Mississippi, where the earliest record is 15 March (Burleigh 1944, Toups and Jackson 1987) and in Alabama, where the earliest record is 13 March (Imhof 1976). An examination of the spring records in the LSUMZ and ABF shows that all records from before 22 March are from southeastern Louisiana ( $n = 7$ ), except for three from the Baton Rouge area and two from northwestern Louisiana. As coastal Cameron Parish is probably the most frequently surveyed region in Louisiana, we suspect that the absence of early records there represents a true difference between southeastern and southwestern Louisiana.

Lowery (1974) stated that there were "at least five records in December, January, and February . . . from the southern part of the state." Since 1974, eight other winter sight records have been published or reported to the ABF, including two individuals on a single Christmas Bird Count (19 Dec. 1982, Pine Prairie; Ortego 1983). None, however, is supported by a specimen, photograph, or a convincing written description.

In Louisiana, there are no documented records after 3 November, much less in winter. The latest specimens from Louisiana were collected by Cardiff on 28 Oct. 1984 at Hackberry Ridge, approx. 3 km WSW Johnsons Bayou School, Cameron Parish (LSUMZ 121885) and by T. D. Burleigh on 31 Oct. 1945 at New Orleans (USNM 364037). The latest convincing sight records are: (a) 2 Nov. 1985, Barataria Unit, Jean Lafitte Nat. Hist. Park, Jefferson Parish (David P. Muth, C. Lyon; ABF); (b) 3 Nov. 1985, City Park, New Orleans (A. E. and G. B. Smalley; Purrington 1986); both these sight records occurred after a tropical storm ("Juan") that produced numerous exceptionally late records in Louisiana.

Several sources indicate that Yellow-throated Vireo winters regularly in Texas, Florida, and occasionally elsewhere along the Gulf Coast. For example, the American Ornithologists' Union (1983) stated that Yellow-throated Vireo winters casually in southern Texas and northern Florida. Robertson and Woolfenden (1992) stated that it was rare but regular in winter in extreme southern Florida and "occasional to irregular farther north." Stevenson and Anderson (1994) mapped at least 26 winter sight records, most from northern and central Florida. The National Geographic Society (1987) portrayed its winter range as including all of coastal Texas and much of peninsular Florida. Imhof (1976) listed sight records for Alabama from 28 November, 29 December, and 3 January. Oberholser and Kincaid (1974) reported at least 10 sight records from Texas from late December to late February. James and Neal (1986) mentioned a report from Arkansas "in December." Toups and Jackson (1987) listed

a report from 17 Dec. Winter sight records reported on Christmas Counts and in *American Birds* are too numerous to list.

We, however, join Phillips (1991) in questioning the validity of virtually all winter reports from the United States. The only specimen that we know of from the United States taken from mid-November to early March is the one reported by Robertson and Woolfenden (1992) and Stevenson and Anderson (1994) from extreme southern Florida (24 Jan. 1957, Dade County, collected by D. R. Paulson), where this species is a rare winter resident (W. Robertson, in litt.). A sight record of an individual that wintered in Riverside County, California (Garrett and Dunn 1981), is the only well-documented winter record for western North America. We suspect that all winter reports of Yellow-throated Vireo in eastern North America north of southern Florida are misidentified male Pine Warblers (*Dendroica pinus*) or Yellow-breasted Chats (*Icteria virens*). Male Pine Warblers in fall-early winter plumage are brighter yellow than the worn, breeding season males more familiar to many field observers, perhaps misleading them, despite the many behavioral, structural and plumage differences among these species and the attention to this problem by some of the first field guides (e.g., Peterson 1934). To illustrate how easy it is to confuse the two species, in 1993 Remsen found a specimen of male Pine Warbler identified as a Yellow-throated Vireo and retained as such for over 100 yr in the collection of the National Museum of Natural History, Smithsonian Institution, one of the most heavily used bird collections in the world (USNM 118983; collected 10 Sep. 1886, accessioned 1890, Tarpon Springs, Florida). This demonstrates that even specimens and hand-held birds, such as at bird-banding stations, can be misidentified. We challenge field ornithologists in the southeastern United States to provide tangible evidence for the presence of Yellow-throated Vireo in the region from early November to early March; however, such tangible evidence obviously would not validate the many previous sight records.

*Warbling Vireo*.—Breeding populations of Warbling Vireo in Louisiana have declined dramatically over the last four decades. Beyer (1900) stated that the Warbling Vireo was a “fairly common summer resident throughout the state.” Allison (1904) considered it a “common summer resident” in West Baton Rouge Parish. Kopman (1904) stated that it was “a common breeder along the Mississippi in southern Louisiana.” Lowery (1931) described it as “common along the banks of the Ouachita River” in north-central Louisiana. Oberholser (1938) considered it a rare summer resident throughout Louisiana except in the extreme south. Lowery (1974) indicated that Warbling Vireo was an uncommon to common breeding species in cottonwood groves along rivers in central and northern Louisiana. There are numerous sight records and 10 LSUMZ and USNM specimens from the late 1930s and early 1940s from the Baton Rouge area in late spring and summer. Only three singing, territorial males, however, have been reported in Louisiana for at least the last three decades (ABF, D. P. Muth, pers. comm.), and direct evidence of breeding is lacking. An intensive, state-wide, breeding bird atlas program in spring-summer 1994

produced only one record of one singing bird (D. A. Wiedenfeld, pers. comm.). Remsen's 45-km-long "River Road" Breeding Bird Survey route, which follows the Mississippi River from Baton Rouge to St. Gabriel, the area where numerous records of Warbling Vireo were obtained 50–60 years ago, has never produced a record of this species (1987–95). The causes for this decline are unknown; cottonwoods are still prominent in the "batture" woodlands inside the Mississippi River levee at Baton Rouge and elsewhere in central Louisiana in the Atchafalaya-Mississippi River basin.

The American Ornithologists' Union (1983) did not mention any winter records of this species from eastern North America. Phillips (1991) disputed the validity of any winter record from North America, evidently overlooking Webster's (1970) photographic record of an individual overwintering in California. On 19 Dec. 1990, Gary H. Rosenberg found and convincingly described an individual in the Bayou Grand Marais area, Vermilion Parish, on the Crowley Christmas Bird Count. On 26 Dec. 1993, Paul Conover found a Warbling Vireo at Oak Grove, south of Creole, Cameron Parish, where seen through at least 22 Jan. 1994; the authors reviewed Conover's videotape of this bird and agree with the identification. On 26 Jan. 1994, Cardiff collected one in Plaquemines Parish; this was an individual of the taxon *V. g. swainsonii* of western North America rather than *V. g. gilvus* of eastern North America (see below).

All specimens from Louisiana that we have examined, except two, are of the widespread, expected subspecies of eastern North America, *V. g. gilvus*. The exceptions are two *V. g. swainsonii*, the breeding form found throughout much of western USA except the Great Basin (American Ornithologists' Union 1957, Blake 1968): (1) a female collected by Cardiff on 13 Sep. 1987, at Garner Ridge, approx. 5 km W Johnsons Bayou School, Cameron Parish (LSUMZ 135157); and (2) a female collected by Cardiff on 26 Jan. 1994, 1 km south of Fort Jackson, lower Plaquemines Parish (LSUMZ 159815). The identifications as *swainsonii* are based on: over-all small size (13.2 g, heavy fat; 12.0 g, light fat; wing chords 67.5 and 66 mm); short, shallow bill (culmen from nares 7.2 and 6.9 mm, bill depths at nares 3.4 and 3.3 mm); and by the more olivaceous (less yellowish) wash on the sides and flanks, dingier (less pure white) underparts, and darker gray crown and post-ocular patch, resulting in more contrast between the crown and back and more conspicuous superciliary and face pattern than in *V. g. gilvus*. The LSUMZ series of *V. g. gilvus* from autumn are larger birds (14.9–17.3 g, mean 16.3 g,  $n = 6$ ; wing chord 67.1–75.4, mean = 69.8,  $n = 7$ ) with bigger bills (culmen from nares 7.9–8.7 mm, mean = 8.1 mm; bill depth at nares 3.7–4.1, mean = 3.9 mm,  $n = 7$ ). The Louisiana specimens are evidently the third and fourth records of this form from eastern North America. Phillips (1991) listed two previous specimens, one from Florida and one from southern Louisiana. For the latter, Phillips provided only a date (24 November) but no locality, year, or museum deposition; evidently, no such specimen exists (A. Phillips, in

litt.). The subspecies *swainsonii* is treated as a species by Sibley and Monroe (1990) on the basis of unpublished data.

*Philadelphia Vireo*.—Confusion exists over the fall migration period in Louisiana. Oberholser (1938) considered this species a “rare transient” from late July to 31 October. Lowery (1974: 608) indicated that in fall, the species was “uncommon” starting 2 August, becoming “common” in late August and remaining common through mid-October, then decreasing through late October. Our experience with the timing of fall migration over the last 15 yr differs drastically. The ABF, which contains a large data base of Louisiana bird sightings that Lowery must have used in compiling his seasonal status information, contains no fall reports earlier than 30 September prior to 1974 (and none earlier than 12 September since 1974). The LSUMNS has no fall specimens from Louisiana taken earlier than 14 September. Beyer (1900) claimed that a specimen was taken by H. Ballowe on 2 Aug. 1893 in St. James Parish, and Oberholser (1938) considered this to be the first Louisiana record. It is not clear, however, whether Beyer or Oberholser saw the specimen, which we cannot locate. The only other report that we can find for Louisiana from before mid-September is from Kopman (1904), who claimed to have seen one or more along the Mississippi River in “the last days of July” 1893, and that they then “appeared in astonishing abundance Aug 2,” when he stated that he collected a specimen. (Curiously, this is the same date as Ballowe’s specimen, adding to our suspicions concerning these records.) Kopman was clearly aware that Philadelphia Vireos normally arrived much later in the fall. Nevertheless, given that we are unable to locate this specimen, that Kopman’s dates are unprecedented, and that Kopman’s birds were in “a heavy growth of willows,” typical Warbling (and Bell’s?) Vireo habitat, we suspect that these birds were freshly molted Warbling (or Bell’s?) Vireos that may have looked very different to Kopman from worn breeding birds. We also suspect that Oberholser (1938) and Lowery (1974) accepted Kopman’s records and then assumed that this species was present from early August through September, despite the absence of valid reports between Kopman’s early records and late September.

Our observations from Iberville and East Baton Rouge parishes, combined with ABF observations (Fig. 4a), show that Philadelphia Vireo is frequently encountered in inland bottomland forests from late September through 4 November, with only one record before 21 September. Our counts from coastal Cameron Parish show a similar pattern (Fig. 4b) but with fewer records from September and records extending to 13 November (1983: an immature female collected by T. A. Parker III at Hackberry Ridge, approx. 3 km WSW Johnsons Bayou School; LSUMZ 113120). The latter is one of the latest documented records for eastern North America. Perhaps the only valid winter record for eastern North America is the female collected by S. A. Gauthreaux on 5 Feb. 1961 at Buras, lower Plaquemines Parish (Gauthreaux 1962; LSUMZ 23778).

That the Philadelphia Vireo is primarily an October migrant in Louisiana is consistent with its status in the next two states to the north of

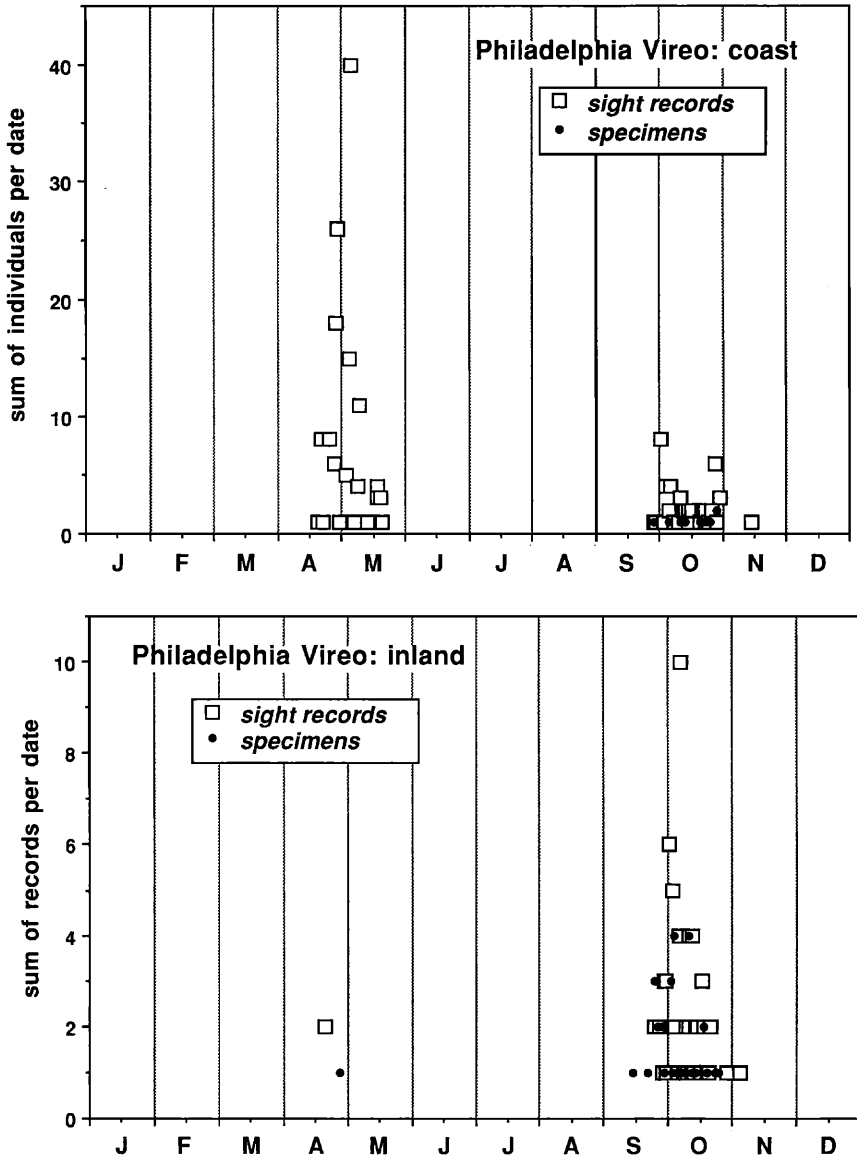


FIGURE 4. (Top) Seasonal distribution of Philadelphia Vireos recorded on surveys of coastal woodlands in Cameron Parish, Louisiana. (Bottom) Seasonal distribution of Philadelphia Vireos (1) seen at Pecan Drive, approx. 6 km north of St. Gabriel, Iberville Parish, Louisiana, from November 1989 through June 1995, (2) collected (LSUMZ) in east-central Louisiana in East Baton Rouge, Iberville, and West Feliciana parishes. In both figures, points represent the sum of the number of individuals detected on each date with years pooled (versus the number per day in other figures).

Louisiana: Arkansas, where its fall migration occurs "primarily from the fourth week of September to mid-October (James and Neal 1986) and Missouri, where the earliest record is 24 August and the peak is not until late September (Robbins and Easterla 1992). Additionally, in nearby states on the Gulf Coast, the fall migration of Philadelphia Vireo is from 19 September to 6 November (Mississippi; Burleigh 1944, Touns and Jackson 1987), primarily from late September to late October (Alabama; Imhof 1976), and 26 September to 28 October (n. Florida; Crawford 1981). Finally, the earliest fall record for Philadelphia Vireo for a far-northern state, Wisconsin, is 4 August, and typical first fall arrivals are in late August (Robbins 1991). Thus, late July-early August records in Louisiana would be highly unlikely.

The difference between inland and coastal sites in spring is dramatic. Whereas we have only one spring sight record and one specimen from Iberville and East Baton Rouge parishes, spring migrants are detected in numbers in coastal Cameron Parish from 20 April to 21 May, with a strong peak in late April-early May (Fig. 4); in fact, spring high counts are exceeded among vireos only by Red-eyed (see below). This conflicts directly with Lowery's (1974: 608) designation of Philadelphia Vireo as a "rare" spring migrant. Differences between inland and coastal sites in fall are much less dramatic. Although quantitative comparisons are difficult, our impression is that the density and frequency of occurrence of Philadelphia Vireo inland in fall is much higher than on the coast.

*Red-eyed Vireo.*—We interpret our counts from coastal Cameron Parish (Fig. 5a) as follows. Spring migrants appear in the last week of March, and small numbers are detected through mid-April. A long, broad peak occurs from mid-April through late May, with the highest counts from the last week of April and first week of May; however, the second-highest count of all (20 May 1993) was rather late. Small numbers are found even into the first week of June. A presumed fall migrant has been detected as early as 10 July, and occasional individuals are detected in early August. The peak of fall migration is weakly defined but seems to be from late August to the third week of September. Only two records have been obtained later than the first week of November: (1) an immature male found by Dittmann and collected by Remsen on 11 Nov. 1984 at Monkey Island, approx. 1.5 km southwest of Cameron (LSUMZ 121888) and (2) an immature female found by Angelo P. Capparella and collected by Remsen on 13 Nov. 1983 at Hackberry Ridge, approx. 3 km WSW Johnsons Bayou School (LSUMZ 113123). These are among the latest documented records for North America.

We interpret the census data from the inland site (Fig. 5b) as follows: the first spring arrivals are detected as early as 21 March, and a peak in numbers in April presumably represents spring migrants rather than the local breeding population. Frequency of occurrence (fewer "0" counts) increases slightly in August, possibly representing fall migrants or locally hatched immatures. A possible peak occurs in September and the last



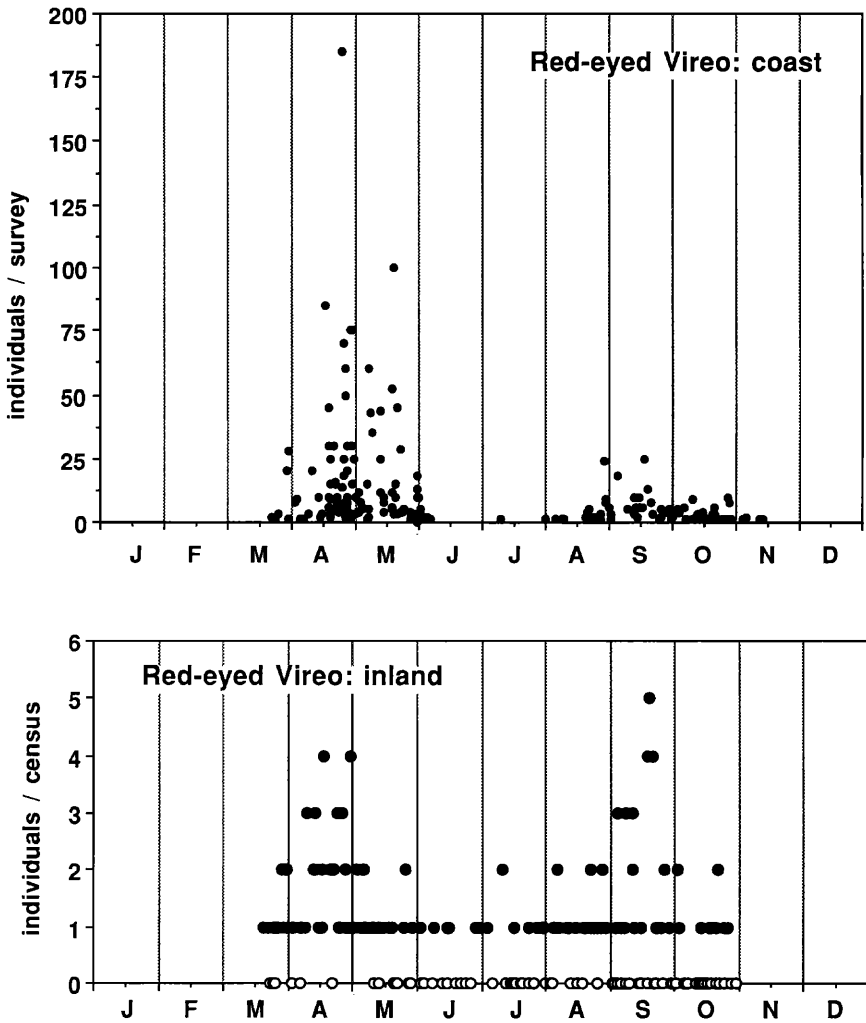


FIGURE 5. (Top) Number of individual Red-eyed Vireos recorded per day on surveys of coastal woodlands in Cameron Parish, Louisiana. (Bottom) Number of individuals recorded per census of a 2.5-ha inland site in Iberville Parish, Louisiana. Zero counts are not indicated on x-axis more than 3 d after latest fall occurrence or before earliest spring occurrence (no zero counts given in Top figure to improve clarity; see x-axis of Figure 1 for year-round distribution of surveys and censuses).

individuals are detected in late October. The inland pattern seems roughly similar to that on the coast.

*Yellow-green Vireo.*—The only previous record for this species from eastern North America is a specimen from the Gulf Coast of extreme northwestern Florida, collected by Burt L. Monroe, Jr., on 4 May 1958 (Monroe

1959, Robertson and Woolfenden 1992; LSUMZ 22492). On 2 May 1992, David P. Muth, B. Mac Myers, and Peter Yaukey found one at Smith Ridge, approx. 5 km NW Johnsons Bayou School, Cameron Parish. They asked Cardiff to collect the specimen (LSUMZ 154286) the next day.

Phillips (1991) recognized three existing subspecies of *V. flavoviridis* and described two new ones; the nominate form is widely distributed in Middle America, whereas the other four have relatively tiny ranges. The Louisiana specimen closely matches LSUMZ material from throughout Middle America, so we assume that it is *V. f. flavoviridis*. The LSUMZ series of seven late May–June *V. f. hypoleucus* (the name applied to the breeding population in Sonora and most of Sinaloa, northwestern Mexico), however, is virtually indistinguishable from spring and early summer specimens of *V. f. flavoviridis*. We were unable to use any characters of *hypoleucus* listed by Phillips, most of which involve slight differences in color shade, to distinguish individuals from this series from those of the nominate form. The series from Sonora together may average slightly duller over-all in color than a comparable series of the nominate subspecies, but individuals could not be distinguished. Measurements given by Phillips for *hypoleucus* overlap extensively those that he gave for *flavoviridis*. Unfortunately, sample sizes, the importance of which in assessing mensural data has been recognized by taxonomists for more than a century, are not given by Phillips. In our opinion, only discrete geographic variation should be recognized by subspecies names, and individuals should be identifiable with a high degree of certainty to subspecies without reference to geography. This is clearly not the case, even by Phillips's own admission: of at least 12 specimens of "*hypoleucus*" mentioned by Phillips (1991) from outside the breeding range, he indicated uncertainty in the identification for at least six. We suspect that a thorough analysis of geographic variation in *V. flavoviridis* might show that the population from the extreme northwestern, arid portion of its range averages slightly duller in coloration, but that "*hypoleucus*" cannot be distinguished as an entity. Perhaps examination of fresh-plumaged material, however, might reveal diagnostic characters.

*Black-whiskered Vireo*.—Lowery (1974: 608) indicated that this species was "very rare" in coastal Louisiana from 18 March to mid-April, "rare" from then until about the third week of May, and then "very rare" until 4 July, with an isolated record from 29 August. Additional field-work has shown that this species is at least "very rare" through July until the second week of August, at least in the Grand Isle area, Jefferson Parish, where the number of summer records of singing birds suggests that breeding may occur in some years. A compilation of all Louisiana records from the ABF (Fig. 6) shows that records from the coast of southeastern Louisiana are spread rather evenly through the spring and summer, with a slight peak from 5 to 25 May, whereas those from Cameron Parish, in extreme southwestern Louisiana, are mainly from 16 April to 11 May, with a peak in late April, and three records from early June. Thus, the patterns differ between the eastern and western extremes of the coast, but the small

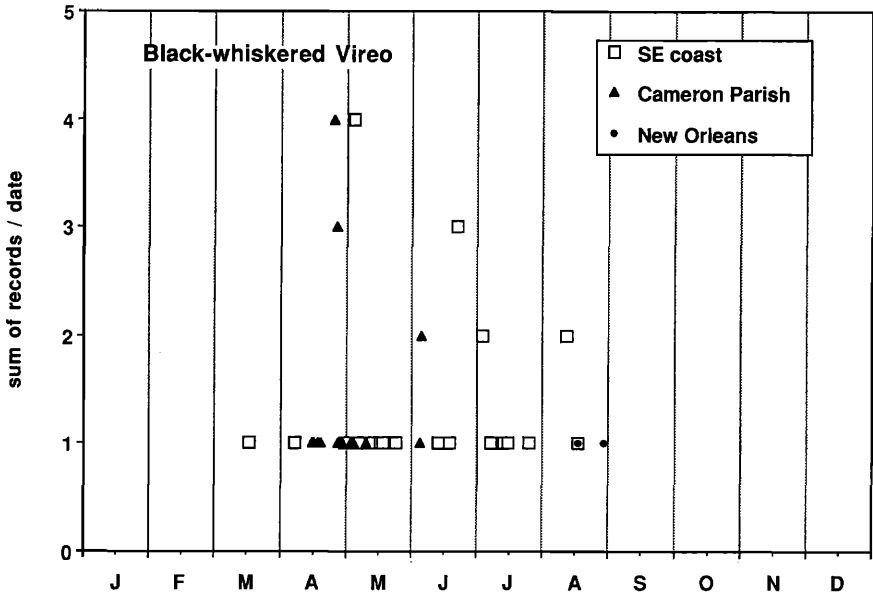


FIGURE 6. Seasonal distribution of Black-whiskered Vireo records for Louisiana through November 1994.

number of observations makes any interpretation tentative. The only two Louisiana records away from the immediate coast are from the New Orleans area, and both are later than any coastal record; they may represent fall migrants.

Of the 12 study skins in the LSUMZ collection from Louisiana, 10 are *V. a. barbatulus* (including the individual believed not to be this subspecies by Imhof [1986]), the form that breeds in Florida, the Bahamas, and Cuba (Blake 1968). The other two are *V. a. altiloquus*, which breeds primarily on Jamaica, Hispaniola and Puerto Rico (Blake 1968). Data for the two specimens of *V. a. altiloquus*, both males, are: (1) 26 Apr. 1964, approx. 5 km ESE Johnsons Bayou, Cameron Parish, collected by Sidney A. Gauthreaux (LSUMZ 32930); and (2) 26 Apr. 1970, Cameron, Cameron Parish, collected by Kenneth M. Eyster (LSUMZ 155577). The following characters identify them as the nominate subspecies: crown suffused with buff-olive; superciliary and auriculars strongly tinged buff; long bill (exposed culmens 15.6 and 17.0 mm, respectively); throat and upper breast slightly tinged with buff and greenish olive. They are indistinguishable from specimens from our extensive series of *V. a. altiloquus* from Jamaica, Hispaniola and Puerto Rico. Phillips (1991) listed only one other record of this subspecies in the United States, also from the northern Gulf Coast (St. George Island, Florida, 8 April) but did not provide the year (1977) or museum where specimen deposited (Tall Timber Research

Station), nor did he indicate that the record had been published previously (Stevenson 1978).

#### DISCUSSION

Although each of Louisiana's common vireo species shows a different pattern of seasonal occurrence, two trends are shared among the four species that winter primarily south of Louisiana (White-eyed, Yellow-throated, Philadelphia and Red-eyed). First, they are much more common in spring migration on the coast than at the inland site. Lowery (1945) proposed that the scarcity of migrants inland was a consequence of weather effects on northward-bound spring migrants: if weather is unfavorable for migration, then trans-Gulf spring migrants "precipitate" along the Gulf coastline, with few moving farther inland, whereas if weather is favorable for migration, migrants continue inland some distance beyond southern and central Louisiana, thus largely bypassing our inland site. Lowery (1951) later proposed that the scarcity of spring migrants on the coastal plain was a dilution effect: with so much of the region wooded, no concentrations of migrants could be detected, giving the illusion of an absence of migrants. Gauthreaux's (1971) radar studies showed that during favorable weather the majority of migrants continued inland approximately 40–120 km. Thus, the real "coastal hiatus" should be beyond (north of) the 120-km line from the coast. Our inland locality is approximately 120 km due north of the nearest coastline. Therefore, few migrants are expected during either favorable or unfavorable weather for migration. The "dilution effect" should apply to anywhere inland in eastern North America, yet concentrations of spring migrants are a regular feature of spring migration almost everywhere north of central Louisiana and presumably other areas of comparable distance from the Gulf Coast.

The second trend is that fall migrants are almost as common or more common inland than on the coast. Although our data do not allow direct comparisons of densities between sites, we are certain that Philadelphia and White-eyed vireos are more common, Yellow-throated Vireo is at least as common, and that Red-eyed Vireo is often just as common inland as on the coast. Our interpretation of this pattern, in combination with the first trend, is that most migrants find the scrubby coastal woodlands with their low plant diversity much less suitable than the richer, taller inland forests and use coastal woodlands mainly when forced to land there by unfavorable weather.

Some ornithologists see little need for continued collecting of specimens in well-known regions such as eastern North America. We show that judicious collecting of vireos has documented that distinctive subspecies from western North America of Bell's, Solitary, and Warbling vireos occasionally occur in Louisiana, as well as the Greater Antillean subspecies of Black-whiskered Vireo.

We believe that our analysis provides an example of the value of field notes. Our data from coastal Cameron Parish were extracted from field notes made during and after each trip, including counts of all species

seen. When we began visiting this area in 1978, we did not foresee that we would be returning with such frequency, and not until we began this manuscript did we realize that the volume of data accumulated could be analyzed in a quantitative, formal way. As Remsen (1977) earlier emphasized, the value of field notes often cannot be anticipated immediately.

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