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## Status and Habitat Area Requirements of the Veery in Illinois

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The Veery (*Catharus fuscescens*) is an occasional summer resident in northern and parts of central Illinois (Bohlen 1989), where it is known to breed in mature bottomlands, mesic upland forests, and sandy hillocks interspersed with bogs and other low-lying wet areas (Graber et al. 1971, Graber and Graber 1973; Illinois Department of Conservation, Natural Heritage Database unpubl. data). Historically, Veeries also occasionally bred in urban residential habitat in Illinois (Pratt 1890). Apparently, this species has always been relatively rare in Illinois (Nelson 1876, Ford 1956) and, as recently as 1971, their nesting distribution in the state was considered to be "poorly known" (Graber et al. 1971). The Veery is presently listed as a threatened species in Illinois (Herkert 1992).

Research in Wisconsin and the mid-Atlantic states has shown that Veeries are sensitive to reductions in the sizes of forest tracts, and avoid relatively small forest patches (Robbins 1980, Temple 1986, Robbins et al. 1989). However, because Freemark and Collins (1992) have shown that the landscape context of forest fragments significantly affects the distribution of forest bird species, comparisons of habitat area requirements between regions where forest habitat is moderately abundant with the extensively fragmented regions of the Midwest should be made with caution. For example, in the mid-Atlantic states, where Robbins et al. (1989) studied habitat area requirements of forest birds, 30 to 75% of the landscape was forested. In contrast, only 4 to 7% of northern Illinois' landscape is forested (O'Neill et al. 1988).

Previous studies of midwestern forest bird habitat-area associations have been based on the likelihood of encountering birds in woodlots of various sizes (e.g. Temple 1986, Blake and Karr 1987). However, because a significant proportion of area-sensitive forest bird species in small, isolated forest patches may be unmet (Gibbs and Faaborg 1990, Villard et al. 1993), estimates of habitat area requirements based only on presence/absence data may not accurately reflect the true breeding requirements of these spe-

cies. The purpose of my study was to examine the habitat-area requirements of the Veery in Illinois using data from known nesting areas.

*Methods.*—Since 1982, Veeries are known to have bred at 22 sites in Illinois (Fig. 1). The criteria used to identify breeding sites included in this study were: (1) observation of nests with eggs or young ( $n = 12$ ); (2) behavioral observations that suggested nesting (e.g. adult birds seen carrying food during nesting season;  $n = 3$ ); (3) observations of recently fledged young ( $n = 3$ ); (4) observations of nine or more territorial males in a particular woodlot in a single year ( $n = 4$ ); and (5) repeated observations of Veeries from the same woodlot in multiple years ( $n = 2$ ). Breeding-bird records were compiled from the Illinois Department of Conservation's Natural Heritage Database (1982-1992), the Illinois Breeding Bird Atlas project (1986-1991), and Illinois' field notes for the breeding season published in the *Illinois Audubon Bulletin* (1982-1983) and *Illinois Birds and Birding* (1984-1990). Only records from 1982 through 1992 are included in this analysis.

Forest-habitat area and configuration for sites with known Veery breeding were obtained from 1:40000 aerial photographs taken in 1988 (Markhurd Corporation, Minneapolis, Minnesota). Forest cover for Veery breeding sites was estimated by dividing the aerial photographs into 1-mm<sup>2</sup> cells. Each grid cell represented 40 m<sup>2</sup> of habitat (0.16 ha). Grid cells were classified into three categories: forested interior (grid cells containing only forest habitat), forested edge (grid cells containing forest and forest-edge habitat), and nonforested. Forest boundaries were determined by delineating breaks in the forest canopy that were at least 40 m in width. Forest cover in disturbed areas (e.g. housing subdivisions and other developments) adjacent to breeding sites were not included in the habitat-area calculations.

Four habitat-area variables were calculated for Veery breeding sites: (1) The total area of contiguous forested habitat at each breeding site was estimated. (2) The core area or amount forest habitat at least 80

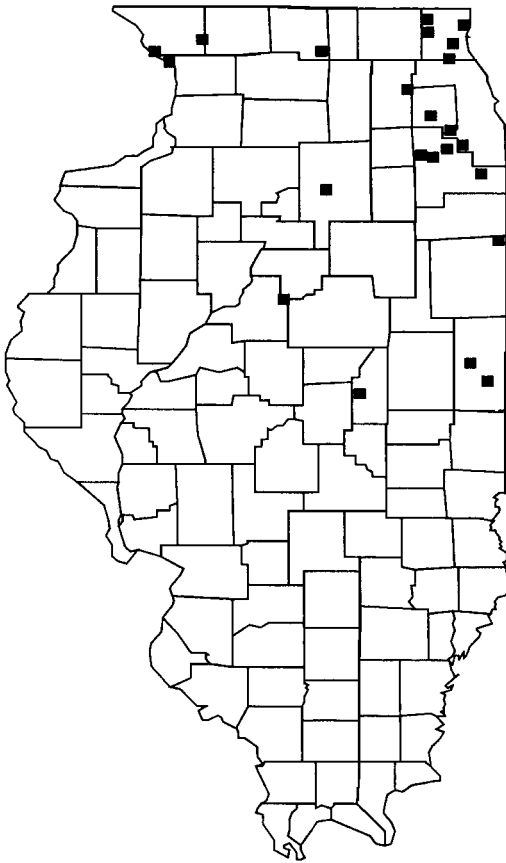


Fig. 1. Distribution of known Veery breeding areas in Illinois (1982-1992).

m from a forest edge was determined. Core area has been shown in some instances to be a better predictor of occupancy of habitat by forest bird species than total forest area (e.g. Temple 1986). I chose 80 m as my edge distance in determining core area because it was intermediate between the 100 m used by Temple (1986) and the more commonly employed 50 m used by others (see review by Paton 1994), and it was easily measured using my 40-m<sup>2</sup> grid cells. (3) I also determined the perimeter:area ratio, which is the ratio of the total number of forested-edge to forested-interior grid cells for each site. The perimeter:area ratio, therefore, is a measure of the proportion of forest habitat that is directly adjacent to edge habitat. A low perimeter:area ratio indicates that only a small portion of the forest habitat is directly adjacent to edge habitat. (4) I estimated the amount of additional forested habitat within 2.5 km of the center of the breeding woodland. Studies elsewhere have shown that forest bird species occasionally may occur in relatively small forest patches if the surrounding land-

TABLE 1. Habitat variables for known Veery breeding areas in Illinois.

Site	Habitat area (ha)	Core area (ha)	Perimeter: area ratio	Additional forest area within 2.5 km
Weldon East	1,004	782	0.111	40
Sag Bridge	800	704	0.113	1,178
Blackhawk	674	466	0.110	0
Danville SE	615	261	0.216	174
Starved Rock	477	207	0.272	0
Green Island	416	262	0.140	281
Mackinaw	310	129	0.404	242
Steger	284	174	0.191	169
Kent	250	150	0.181	52
Palos Park	235	129	0.168	1,359
Elgin	234	180	0.108	168
Donovan	212	96	0.202	226
Libertyville	194	139	0.135	341
Joliet	184	129	0.150	177
Mokena	173	81	0.226	184
Wheaton	156	95	0.229	46
Cherry Valley	145	82	0.247	317
Wheeling	116	58	0.236	126
Wauconda	109	48	0.338	164
Fox Lake	107	30	0.401	264
Danville NW	83	27	0.376	286
Plainfield	27	7	0.491	34

scape contains a high proportion of forest habitat (Askins and Philbrick 1987).

*Results.*—In Illinois, Veeries breed in forest patches that range from 27 to more than 1,000 ha (Table 1). Of the 22 forest patches in which Veeries are known to breed in Illinois only 2 (<10%) are smaller than 100 ha, and over one-half are larger than 200 ha. The mean forest size for the 22 known Veery breeding areas in Illinois was 309 ha. Core areas for Veery breeding sites ranged from 7 to 782 ha (Table 1). More than one-half of these sites had a core area that was more than 100 ha. Not surprisingly, total area and core area were highly correlated ( $r = 0.96$ ), indicating that, overall, large sites also had large core areas.

Perimeter:area ratios ranged from 0.491 to 0.108, with a mean of 0.230. Most sites (74%) had perimeter:area ratios that were less than 0.250 (Table 1), indicating that Veeries in Illinois tended to select woodlots where less than 25% of the forested area is directly adjacent to edge habitat.

Forest patches where Veeries breed in Illinois also tended to be surrounded by other forested habitat. Occupied Veery breeding areas had an average of 261 ha of additional noncontiguous forest habitat within 2.5 km of the breeding area. Only six sites (26%) had less than 100 ha of additional surrounding forest habitat (Table 1). Three of the six were among the largest areas examined overall (Table 1).

TABLE 2. Distribution of known breeding areas and probability of encounter for Veeries in forest fragments in Illinois and Wisconsin. Figures for Illinois breeding sites represent percentage of 22 known Veery breeding areas in each forest size class from this study. Also shown is likelihood of encountering Veeries (incidence) in randomly selected forests based on studies of 49 forest fragments in Wisconsin and 12 forest fragments in Illinois.

	Size of contiguous forest area (ha)		
	0-10	11-100	>100
Percentage of Illinois breeding sites	0.0	9.1	90.9
Probability of encountering Veeries (incidence)			
Wisconsin (Temple 1986)	20	32	88
Illinois (Blake 1991)	0	25	100

*Discussion.*—Veeries have previously been identified as being area-sensitive in southern Wisconsin (Temple 1986) and in the mid-Atlantic United States (Robbins 1980, Robbins et al. 1989). Temple (1986) studied 49 forest patches in southern Wisconsin and found Veeries to occur in only 12 of 41 (29%) forest patches less than 100 ha in size, and 7 of 8 (88%) forest patches larger than 100 ha. Robbins (1980) initially estimated that at least 100 ha of contiguous forest may be required to sustain viable breeding populations of Veeries in the mid-Atlantic states. Subsequently, Robbins et al. (1989:fig. 3) have shown that Veeries in the mid-Atlantic states are most likely to be encountered in forests 3,000 ha or greater in size. However, they also reported that Veeries occasionally were recorded in forest patches as small as 9 ha.

My results suggest that Veeries are area-sensitive in Illinois and rarely occur in forest patches less than 100 ha. Data on the distribution of Veeries within forest fragments in east-central Illinois provided by Blake (1991) support this conclusion (Table 2). In Blake's study of 12 forest fragments in east-central Illinois, Veeries were rarely (<15%) encountered in woodlots smaller than 100 ha (Table 2). In fact, Blake found that the only areas consistently used by Veeries (i.e. present in both years of his study) were larger than 100 ha. All three of the woodlots less than 100 ha in which Blake encountered Veeries were occupied by this species in only one of the two years of his study. Additionally, in my study, one of the two known Veery breeding areas smaller than 100 ha was found to contain Veeries in only one of the two years it was surveyed (F. White pers. comm.).

Perhaps the weakest aspect of a study based on known breeding areas is that there may be a bias toward larger sites. Data sets partially consisting of

volunteer information (such as this data set) may reflect census efforts that are biased toward large sites because there is greater expectation of finding "rare" birds. However, because the distribution of known Veery breeding sites closely matches the incidence data from two independent studies of randomly sampled midwestern woodlots (Table 2), this does not appear to be a great shortcoming. Furthermore, the data in this analysis include information from the breeding-bird atlas project in Illinois. This project surveyed over 373,000 ha of atlas blocks north of 40°N latitude, the approximate southern limit of the Veery breeding range in Illinois (Fig. 1). This wide coverage (over 18% of land area in Illinois north of 40°N) should have assured that the survey effort was distributed in a wide range of forest sizes. Yet, only two woodlots smaller than 100 ha are known to have breeding Veeries in Illinois.

Factors other than habitat area also may influence the distribution of Veeries in Illinois. Robbins et al. (1989) showed that, although Veeries were found to be area-sensitive in the mid-Atlantic states, several aspects of vegetation structure (foliage density between 0.3 and 1.0 m, moisture gradient, tree basal area, tree density, and canopy height) had a statistically stronger association with Veery abundance within forest patches than habitat area in this region. However, considering the severity of forest fragmentation in Illinois and many other parts of the Midwest, it seems likely that habitat area may influence midwestern Veery populations more than it does in the northeastern United States, where forest fragmentation is not as severe.

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### First Nesting Record of the Tamarugo Conebill (*Conirostrum tamarugense*)

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The Tamarugo Conebill (*Conirostrum tamarugense*), an endemic bird of the arid regions of northern Chile and southern Perú, is a species known to science for only two decades (Mayr and Vuilleumier 1983). Since its formal description (Johnson and Millie 1972), there are many aspects of the species' biology that have remained unknown. The lack of information about its population size, seasonal movements, breeding behavior, distribution, and other aspects of its natural history have resulted in national and international organizations including this species in the "insufficiently known" category (Glade 1988, Rottmann and López-Calleja 1992, Collar et al. 1992). In this paper, we report on the nesting of *C. tamarugense* and describe some patterns of its breeding habitat use.

*Study area and methods.*—Observations were made at the "Pampa del Tamarugal" National Reserve (20°24'S, 69°44'W) in the Tarapacá region of Chile.

This area, located at 1,000 m altitude, has an extreme desert climate with a mean annual rainfall of only 0.3 mm (di Castri and Hajek 1976). Both temperature and relative humidity undergo wide daily variations (8° to 30°C, and 3-8% to 80-100%, respectively, in October; Sudzuki 1985).

Originally covered with extensive savannas of tamarugo (*Prosopis tamarugo*), a highly specialized tree that can obtain water from as deep as 50 m below the surface, the "Pampa del Tamarugal" was intensively exploited during the last four centuries, almost leading to its disappearance (Briones 1985). To reverse this situation, the Chilean government started a plantation program in the 1930s that has allowed the recreation of 14,600 ha of tamarugo forest (Aguirre and Wrann 1985).

As a part of an assessment of the conservation status of *C. tamarugense*, we visited the reserve between 25