

## POPULATION TRENDS OF THE HENSLOW'S SPARROW IN RELATION TO THE CONSERVATION RESERVE PROGRAM IN ILLINOIS, 1975–1995

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**Abstract.**—Data from Illinois' Spring Bird Count was used to estimate long-term population trends of Henslow's Sparrows in Illinois and to examine if the Conservation Reserve Program has affected these trends. Spring Bird Count data suggest that Henslow's Sparrow populations in Illinois have declined significantly over the last 21 yr, with an estimated average rate of decline of 7.1% per year between 1975–1995. These data corroborate analyses of other long-term data sets and provide additional support for the general impression that populations of this species have declined in many parts of its range. Analyses of the potential benefits of the Conservation Reserve Program for Henslow's Sparrows revealed that recent population trends (1987–1995) in counties with high enrollment in this program were significantly greater than trends in counties with little Conservation Reserve Program enrollment. Although these data suggest that the Conservation Reserve Program may have benefitted Henslow's Sparrows in Illinois, this benefit has been insufficient to offset long-term declines due to other factors. Other conservation actions, beyond those associated with efforts aimed at reauthorizing and improving the Conservation Reserve Program, will likely be needed to achieve adequate protection for this species.

### TENDENCIAS POBLACIONALES DE *AMMODRAMUS HENSLOWII* EN RELACIÓN CON EL PROGRAMA DE RESERVAS DE CONSERVACIÓN EN ILLINOIS, 1975–1995.

**Sinopsis.**—Datos de los conteos primaverales de aves de Illinois se usaron para estimar tendencias poblacionales de largo alcance en *Ammodramus henslowii* en Illinois y para examinar si el Programa de Reservas de Conservación ha afectado estas tendencias. Los datos de los conteos primaverales de aves sugieren que las poblaciones de esta especie en Illinois se han reducido significativamente por los últimos 21 años, con una tasa anual promedio de declive de 7.1% anual entre 1975 y 1995. Estos datos corroboran los análisis de otros grupos de datos de largo tiempo y proveen sostén adicional para la impresión general de que poblaciones de esta especie se han reducido en muchas partes de su distribución. Análisis de los beneficios potenciales de el Programa de Reservas de Conservación para esta especie revelan que las tendencias poblacionales recientes (1987–1995) en condados con gran matrícula en este programa eran significativamente mayores que las tendencias en condados con poca matrícula en el Programa de Reservas de Conservación. Aunque estos datos sugieren que el Programa de Reservas de Conservación pueden haber beneficiado *Ammodramus henslowii* en Illinois, este beneficio ha sido insuficiente para alterar declives poblacionales a largo alcance debido a otros factores. Otras acciones de conservación más allá de aquellas asociadas con esfuerzos dirigidos a reautorizar e improvisar el Programa de Reservas de Conservación serán probablemente necesarios para conseguir una protección adecuada para esta especie.

The Henslow's Sparrow (*Ammodramus henslowii*) is a grassland bird that breeds in the northeastern and north-central United States and southern Canada (Hands et al. 1989). Despite concern regarding recent population declines throughout a large portion of its breeding range (e.g., Anonymous 1983, Hands et al. 1989, Herkert 1994, Smith 1992, Tate 1986), documenting population trends for this species has been difficult

(Pruitt 1996). The best data on population trends for this species come from the North American Breeding Bird Survey, a comprehensive roadside survey program that includes more than 3500 individual routes located throughout the United States and southern Canada (Peterjohn et al. 1994). Breeding Bird Survey data suggest that the Henslow's Sparrow may currently be one of the fastest declining songbirds in the United States with an estimated population decline of 8.5%/yr between 1966–1993 (Peterjohn et al. 1994). Because of the rarity of this species, however, Breeding Bird Survey population trends can be estimated for only four individual states within this species range (Michigan, New York, Ohio, and Wisconsin) (Pruitt 1996). In Illinois, near the geographic center of the Henslow's Sparrow range (National Geographic Society 1983), this species is too rarely encountered on Breeding Bird Survey routes to estimate reliable population trends (Pruitt 1996). Consequently, other monitoring efforts are needed. The Illinois Spring Bird Count is one potential alternative source of data for assessing population trends for this species, because it provides data from continually run surveys dating back to the early 1970s (Kleen 1972). Unlike the Breeding Bird Survey, which has only 64 long-term routes in Illinois, Spring Bird Counts are conducted in all 102 Illinois counties. Therefore the more comprehensive survey effort associated with the Spring Bird Count may be better able to estimate population changes for rare species, such as the Henslow's Sparrow, that are insufficiently sampled by the Breeding Bird Survey.

Habitat loss has frequently been implicated as a major factor in the decline of Henslow's Sparrows (e.g., Hands et al. 1989, Smith 1992, United States Fish and Wildlife Service 1995), in particular loss of idle grasslands that this species prefers (e.g., Herkert 1994, Sample 1989, Skinner et al. 1984, Zimmerman 1988). One program that has the potential to increase the amount of grassland habitat available for Henslow's Sparrows in the Midwest is the Conservation Reserve Program. The Conservation Reserve Program was established by the 1985 Food Security Act (Berner 1988). The primary purposes of the Conservation Reserve Program were to bring crop supplies in line with demands and to conserve soil and water resources by retiring marginal crop land under ten-year contracts (Johnson and Igl 1995). A secondary objective of this program was to enhance habitat for fish and wildlife populations (Johnson and Igl 1995). Most of the acreage of Conservation Reserve Program lands in Illinois (344,000 ha) and the United States (roughly 14.8 million ha) has been planted to grassland habitat (Illinois Department of Agriculture 1995, Rislely et al. 1995). Studies in the Great Plains have suggested that the Conservation Reserve Program has benefitted some grassland bird species (Johnson and Igl 1995, Johnson and Schwartz 1993, Reynolds et al. 1994), and observers in several Midwestern states have commented on a possible population benefit of the Conservation Reserve Program for Henslow's Sparrow (Pruitt 1996). Conservation Reserve Program fields may be particularly attractive to Henslow's Sparrows because they are not disturbed by mowing, grazing, or burning (except under emergency situations, see Hays

and Farmer 1990, Risley et al. 1995) and are likely to provide the type of undisturbed grassland habitat that this species prefers (e.g., Herkert 1994, Skinner et al. 1984, Zimmerman 1988). However, no quantitative analyses of the potential benefits of the Conservation Reserve Program for Henslow's Sparrow have been conducted to date.

The purpose of this paper is (1) to assess the usefulness of Spring Bird Count data for estimating Henslow's Sparrow population trends in Illinois, (2) if appropriate, to use Spring Bird Count data to estimate long-term population trends for this species in Illinois, and (3) to examine if the Conservation Reserve Program has affected Henslow's Sparrow population trends in Illinois.

#### METHODS

The Illinois Spring Bird Count is a statewide annual survey of birds that was initiated in 1972. The Spring Bird Count was developed to gain information on the spring bird migration in Illinois, but was also developed with the goal of estimating the spring abundance of permanent residents and early summer residents (Kleen 1972). Spring Bird Counts are conducted in early May, occurring on the first Saturday that falls between 4–10 May. Spring Bird Counts are organized by counties, with each county being assigned a coordinator. County coordinators are responsible for recruiting observers, assigning participants to areas, compiling results and securing documentation for rare and unusual species. Each year more than a thousand volunteer observers (range 1002–1548 individuals) spend thousands of party hours (range 3205–5442 h) afield recording birds for this annual event. This coverage is more extensive than the Breeding Bird Survey or other more localized counts. Therefore, this survey may be better able to monitor rare species that are infrequently encountered on the Breeding Bird Survey if they are already breeding or establishing territories when the Spring Bird Counts are conducted.

Henslow's Sparrows leave their wintering grounds in the southeastern United States in late March or early April (Graber 1968, Hyde 1939). They typically reach Kansas, northern Illinois, southern Michigan, and New Jersey by the second or third week of April and reach the northern limit of their breeding range by the middle of May (Hyde 1939). The relatively short distance between this species' wintering and breeding grounds may be covered in as little as two weeks (Austin et al. 1995). Henslow's Sparrow spring migrants have been recorded in northern Illinois as early as 28 March (Eifrig 1911), but most migrants usually arrive in central portions of the state by 14 April and northern Illinois by 18 April (Bohlen 1989). Fourteen years of observations by William Dreuth in a Chicago lakefront park, where the Henslow's Sparrow is only a migrant, suggest that spring migrants of this species typically have passed through northern Illinois by 5 May (Clark and Nice 1950). These data suggest that the Spring Bird Count (which is conducted between 4–10 May) may be well-timed for monitoring Henslow's Sparrow populations in the state, because most migrants have apparently passed through the state by the time of the

count. The Spring Bird Count is also conducted close to the Henslow's Sparrow breeding season in Illinois. Henslow's Sparrow nests with eggs have been reported in Illinois as early as 20 May (Graber 1968), roughly one to two weeks following a typical Spring Bird Count. However, to assess further the suitability of Spring Bird Count as a Henslow's Sparrow monitoring program, I examined the correspondence between counties that have reported Henslow's Sparrows during the Spring Bird Count with counties known to possess summering individuals, as determined by observations of adults in appropriate habitat during the breeding season (mid-May-late July, Bohlen 1989). A list of Illinois counties with recent summer records for Henslow's Sparrows was obtained from Herkert (1992).

Henslow's Sparrow population trends were calculated using a modification of the route regression technique described by Geissler and Sauer (1990), with data from each county comprising a separate "route." An overall population trend for the state was then estimated as a weighted mean of the individual county trends (Geissler and Sauer 1990). Survey effort has increased over the years in the Spring Bird Count, and analyses of trends from these data need to account for the potential confounding effects of this increased survey effort. Preliminary analyses of Spring Bird Count data revealed that several measures of observer effort such as the number of individual observers participating, the number of miles walked and driven, and the total number of party hours spent looking for birds have all significantly increased over the years and that these variables were significantly correlated with one another. I therefore chose total party hours as my measure of effort since analyses of other bird surveys with variable observer effort (such as the Christmas Bird Count) have selected total party hours as the most meaningful metric of observer effort (e.g., Bock and Root 1981, Butcher and McCulloch 1990). Therefore, to account for the confounding influence of increased survey effort, the total party hours for each individual count was also included in the individual county regression models as a covariate (cf. Geissler and Sauer 1990). The significance of the overall state trend was assessed by determining if the mean of the individual county trends was significantly different from zero using a one sample *t*-test (Sokal and Rohlf 1995). In addition to the estimation of individual county trends, annual population indices were also calculated for the state using the residual method of Sauer and Geissler (1990). Although the Spring Bird Count was initiated in 1972, county-level data are only available dating back to 1975. Population trends were therefore limited to the 1975-1995 period.

The potential influence of the Conservation Reserve Program on Henslow's Sparrow population trends was assessed by comparing county trends for years since the Conservation Reserve Program was initiated (1987-1995) with a measure of each county's Conservation Reserve Program enrollment using product-moment correlation (Sokal and Rohlf 1995). Because Illinois counties differ in size, Conservation Reserve Program enrollment was expressed as a percentage of each counties' land area. Ad-

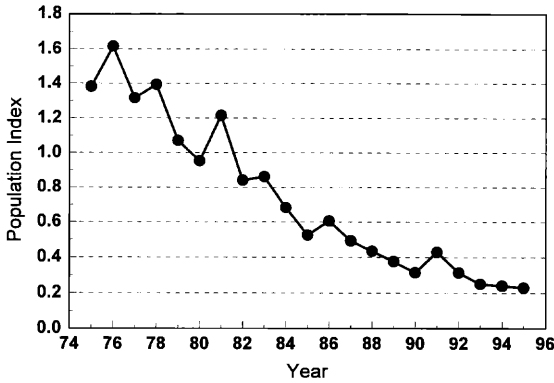


FIGURE 1. Population trends for the Henslow's sparrow in Illinois (1975–1995), estimated from Spring Bird Count data. See text for description of the methodology used to derive annual indices.

ditionally, because percentage data often have a non-normal distribution, I applied an arcsine transformation to the Conservation Reserve Program enrollment figures prior to the correlation analysis (Sokal and Rohlf 1995). County Conservation Reserve Program enrollment figures were obtained from the Illinois Department of Agriculture's 1995 Annual Progress Report (Illinois Department of Agriculture 1995).

#### RESULTS

Henslow's Sparrows have been recorded on Spring Bird Counts in 27 of Illinois' 102 counties since 1975. This species is, however, relatively rare with statewide Spring Bird Count totals ranging from 0–27 birds/yr between 1975 and 1995. Of the 27 counties reporting Henslow's Sparrows on Spring Bird Counts, 15 have also reported recent summering individuals. Additionally, of the 75 counties not reporting Henslow's Sparrows during Spring Bird Counts, only one has reported summering Henslow's Sparrows. These data show a high degree of correspondence (>87%) between counties with Spring Bird Count records and the presence of summering (potentially breeding) individuals and between counties lacking both Spring Bird Count and summer records. Only 13 of Illinois' 102 counties (12.7%) were discordant with respect to Spring Bird Count and summer records (i.e., counties known to have summer records and not Spring Bird Count records or counties with Spring Bird Count records and not summer records).

The Spring Bird Count data suggest that Henslow's Sparrow populations in Illinois have declined significantly ( $P < 0.05$ ) at a rate of  $-7.1\%/yr$  over the last 21 yr (Fig. 1). The decline of this species has been most severe in the northern part of the state. There was a significant correlation ( $r = 0.59$ ,  $P < 0.01$ ) between Henslow's Sparrow county-level population trends and the latitude of the geographic center of each



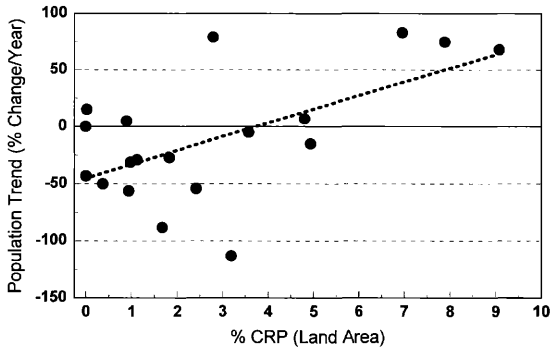


FIGURE 3. Recent Henslow's sparrow county-level population trend estimates (1987–1995) plotted as a function of county Conservation Reserve Program enrollment. Conservation Reserve Program numbers represent the percent of each particular county's land area that is enrolled in the program. Conservation Reserve Program numbers shown in this figure are untransformed; statistical analyses of these data were based on transformed (arcsine) data.

source of data for monitoring Henslow's Sparrow population trends. There have likely been some late spring migrants recorded on Spring Bird Counts, however, and how these observations may have influenced trend analyses of these data are unknown.

Other data sets have also documented significant population declines for this species over the last half century. Richard and Jean Graber reported an estimated decline of more than 90% for Henslow's Sparrows in Illinois between 1958–1978 (Anonymous 1983). Data from the Breeding Bird Survey also suggest a significant recent population decline in the Midwest region that includes Illinois. Breeding Bird Survey data for the Midwest (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio and Wisconsin) suggest that Henslow's Sparrows have declined by an average rate of  $-7.6\%/yr$  between 1966–1994, and that the rate of decline for this species in the region has intensified recently with an average rate of decline of  $-12.4\%/yr$  for the most recent 15 yr of the survey (1980–1994, Sauer et al. 1996). These three separate data sets (Breeding Bird Survey, Spring Bird Count, and the Graber's surveys) all suggest that populations of this species may be in some jeopardy. These data also suggest that population declines exhibited by this species have been sizable, providing support for the general impression that this species has undergone a significant population decline in many parts of its range. Additional documentation for a significant population decline for this species comes from analyses of Christmas Bird Count data based on counts located within the winter range of this species. Butcher and Lowe's (1990) analyses of Christmas Bird Count data from the southeastern United States also revealed a significant population decline for this species on its wintering grounds between 1963–1987. Both the consistency and magnitude of these inde-

pendent estimates of Henslow's Sparrow population trends, on both the breeding and wintering grounds, point to a need for heightened conservation attention for this species.

Compounding this species' population problems is the fact that there are very few areas known to sustain persistent populations of this species (Pruitt 1996). Recent discoveries of apparently sizable populations of this species in some portions of its range (see Pruitt 1996) are encouraging, but until it can be shown that these populations are maintaining these high numbers or are shown to exhibit some degree of population persistence, continued range-wide concern is warranted.

The indication that the Conservation Reserve Program may have benefitted Henslow's Sparrows in Illinois (Fig. 3) is encouraging in that it suggests that efforts to increase the amount of grassland habitat in a particular region has the potential to influence populations trends positively. The challenge is to find a more cost-effective, long-term solution to this habitat problem than the Conservation Reserve Program. The Conservation Reserve Program, while affecting only a modest acreage in Illinois (<2.5% of the state land area), has been costly. More than \$350 million has been spent on the Conservation Reserve Program in Illinois since its inception (Illinois Department of Agriculture 1995). Despite this financial investment, the fate of these lands once the current contracts expire is uncertain. Landowner surveys suggest that much of this land may revert to cropland once contracts expire (e.g., Kurzejeski et al. 1992). Suggestions to lengthen future Conservation Reserve Program contracts from 10 yr to 20 yr or to perpetual easements (Risley et al. 1995), may be beneficial for Henslow's Sparrow populations. In the future, maintaining the suitability of Conservation Reserve Program lands (or other long-term land retirement programs) for Henslow's Sparrow will likely require that some form of periodic habitat management be allowed on these lands, to reduce the impacts of woody encroachment on this species. Henslow's Sparrows tend to be adversely affected by woody vegetation (e.g., Kahl et al. 1985, Peterson 1983, Wiens 1969). As a result, provisions allowing for some habitat management would be beneficial, and possibly necessary, to sustain the value of Conservation Reserve Program fields for grassland wildlife in general (Risley et al. 1995) or Henslow's Sparrows in particular. Although these data suggest that the Conservation Reserve Program may have benefitted Henslow's Sparrows in Illinois, this species' long-term trend in Illinois suggests that this benefit has been insufficient to offset previous declines due to other factors. Therefore other conservation actions besides those associated with efforts aimed at reauthorizing and improving the Conservation Reserve Program will likely be needed in Illinois, and probably elsewhere in this species' range, to achieve adequate protection for this rare denizen of grassland habitats.

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