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# THE HENSLOW'S SPARROW (*Ammodramus henslowii*) OF MINNESOTA: POPULATION STATUS AND BREEDING HABITAT ANALYSIS

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ABSTRACT

THE HENSLOW'S SPARROW *(Ammodramus henslowii)*
OF MINNESOTA: POPULATION STATUS AND
BREEDING HABITAT ANALYSIS

by Lynelle G. Hanson

Henslow's Sparrow *(Ammodramus henslowii)* is a species of special concern in Minnesota. Landscape conversion to agriculture has resulted in a precipitous decline of this grassland species. This investigation focused on the status of Henslow's Sparrows in Minnesota and its breeding habitat requirements. The population of Henslow's Sparrows in Minnesota has never been large, but an extensive survey of recent breeding records (1968 - 1988) revealed this sparrow's plight as more precarious than previously thought. From 1987 to 1989, there were only a few scattered observations of Henslow's Sparrows in Minnesota outside of 0. L. Kipp State Park in Winona County. During the same period, there was an average of only ten breeding pairs per year at 0. L. Kipp State Park. Intensive and extensive habitat evaluation suggests that Henslow's Sparrows prefer grassland areas with abundant uncompressed litter layer and standing tall forbs.

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# CHAPTER I
# INTRODUCTION

The breeding range of Henslow's Sparrow (Ammodramus henslowii) extends from eastern South Dakota and central Minnesota in the west to the eastern coastal states (American Ornithologists' Union 1983). Recent Christmas Bird Counts reveal that the species winters primarily in Florida, Louisiana, Georgia, and Texas (Heilbrun and the CBC Regional Editors 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983; Rubega and the CBC Regional Editors 1984; Drennan and the CBC Regional Editors 1985; Leukering 1986; LeBaron 1988, 1989, 1990, 1991).

Henslow's Sparrow is a grassland bird. Audubon (1831) stated that it is ,found in tall grass. Hyde (1939) found that throughout its summer range, Henslow's Sparrow's habitat is characterized by weedy or grassy fields and meadows. In many instances, its habitat is interspersed with small bushes and situated in low-lying, damp areas. In Michigan, Robins (1971) reported that the species breeds in areas characterized by

1. herbaceous cover,
2. presence of litter,
3. an intermediate range of moisture, and
4. possibly the presence of singing perches (in spring).

The litter layer and song perches are two components of grasslands that appear important to Henslow's Sparrow. The birds require a significant litter layer in which to build their nests, escape from predators, and forage (Hyde 1939). Females gather nesting material from the litter layer surrounding the nest (Hyde 1939, Robins 1971,

Zimmerman 1988). Henslow's Sparrows seek the protection of the litter layer when disturbed (Audubon 1831, Hyde 1939). Hyde (1939) reported insect species associated with the litter layer among food items found in the stomach of a nestling. Furthermore, Henslow's Sparrows use runways within the litter layer for foraging and escape. This "mouse with wings," as Audubon referred to the bird, is more likely to drop to the ground and run when flushed than it is to fly (Audubon 1841). Zimmerman (1988) reported that spring burning, which removes the litter layer, prevents settling on tallgrass prairie in the Flint Hill Uplands of Kansas. Clawson (1991) believed Henslow's Sparrows selected unburned areas because of the greater amount of dead vegetation. In addition to the litter layer, tall forbs are an important component of Henslow's Sparrow breeding habitat (Hyde 1939, Able 1967, Robins 1967, Zimmerman 1988). When males return to breeding areas in spring, they establish and defend territories *through song* while perched on last year's standing dead forbs.

Throughout their range, Henslow's Sparrow populations are stable or declining (USFWS 1987). In a 15-year (1965 -1979) summary of the Breeding Bird Survey, Robbins et al. (1986) reported that Henslow's Sparrow observations were too few in most states to produce significant trend data. However, 25 states exhibited a decreasing trend (Robbins et &1.1986). The United States Fish and Wildlife Service lists the Henslow's Sparrow for special consideration (USFWS 1987). The National Audubon Society Blue List includes Henslow's Sparrow as a special concern because its populations continue to decline (Tate 1986).

Nowhere in its range does Henslow's Sparrow appear to be increasing. The species is listed as accidental in North Dakota (Renkin and Dinsmore 1981). The Breeding Bird Survey reports a decline in the already wall number of sightings in South Dakota (Whitney et al.1978). Henslow's Sparrows are known to occur consistently at only one site in Minnesota

(Eckert 1983). Their abundance in Iowa has remained fairly stable, but one population has been extirpated (Ennis 1959, Dinsmore et al. 1984). Numbers appear stable in Missouri (Baskett et al. 1980) where significant populations occur on several managed public prairies in southwestern counties (Wilson 1984). Zimmerman (1988) reported a stable population of at least 40 birds in Kansas. Oklahoma designates the species as a straggler because records indicated only 15 birds sighted between 1923 and 1986 (Baumgartner and Baumgartner 1993). The population in Texas that Arnold (pers. com.) proposed as a new subspecies no longer exists. The Wisconsin colony at Waylusing State Park is gone, but Koshir (pers. com.) found Henslow's Sparrows in 1989 at a new location near Madison: In Illinois the species is an occasional migrant and summer resident in northern and central counties and a rare summer and winter resident in southern counties (Bowles and Thom 1981). The Michigan populations studied in 1939 and 1967 have disappeared (Hyde 1939, Robins 1967, R. Brewer, R. Adams, pers. com.). In Indiana, the population is declining; yet the Ohio population appears to be stable (Robbins et al.1986). Able (pers. com.) believes the population he studied in Kentucky has declined and may no longer exist. Opengari (1980) discovered Henslow's Sparrows while doing a Breeding Bird Survey south of Covington, Virginia. The number of birds seen in South Carolina by Gauthraux is down (S. Gauthraux, unpublished data).

In Minnesota, Henslow's Sparrows historically occurred across the lower two-thirds of the state (Green and Janssen 1975, Janssen 1987), but the number of individuals has never been great. Roberts (1890) noted Henslow's Sparrow apparently breeding in a wet marsh near Minneapolis, but he believed that Henslow's Sparrows were locally common in many localities throughout southern Minnesota. In 1933, he found a nest in Steam County in central Minnesota (Roberts 1939), and Willis (1947) found a nest at Lac Qui Parle County in western

Minnesota. Voelker was the first to report nests of the species in the Winona area (Herz 1954). In 1955, Voelker found six pairs of sparrows and 20 young in Winona County (Guttman 1956). During these same years, 1953 to 1955, three nesting pairs occurred at the Whitewater Wildlife Management Area in Winona County (Longley 1958). Huber found an adult with one young in 1961 in Clay County (Huber 1961).

Since the 1960's, most observations of Henslow's Sparrows in Minnesota have occurred in the southeastern counties. The exceptions are:

1. Eckert (1974) sighted the sparrow in southwest Minnesota at Blue Mound State Park, Rock County,

2. Fall and Eliason (1982) found a nest at Hyland Lake Park Reserve, Hennepin County, and

3. observers located Henslow's Sparrows in Aitkin, Hubbard, Washington, and Lac Qui Parle Counties (Weins 1989).

Although Henslow's Sparrows nested at the Hyland Lake Park Reserve during the 1982 breeding season (Fall and Eliason 1982, Weins 1989), they do not regularly occur within the reserve. Janssen (1987) noted small numbers of Henslow's Sparrows in Becker, Clay, Hennepin, Houston, Norman, Sherburne, Steele, and Wabasha Counties. Between 1976 and 1990, Henslow's Sparrows occurred consistently at O. L. Kipp State Park, Winona County (Eckert 1983, F. Lesher, pers. com.).

Given the wholesale conversion of prairie lands to agricultural uses, it is not surprising that the Henslow's Sparrow is stable or declining across its range. This pattern is reflected across the historic range of Henslow's Sparrows in Minnesota. Much of the bird's former range is now in row crops, and records of breeding pairs have declined in both space and time. There is an urgent need to determine the status of Henslow's Sparrows in Minnesota.

Furthermore, given the precipitous decline in grassland habitat, managers must be able to optimize conditions on remaining grasslands.

# CHAPTER II
# METHODS

## Henslow's Sparrow Status in Minnesota

To determine the status of Henslow's Sparrow in Minnesota, I extensively surveyed locations where sightings had been reported throughout the state. Locations were determined from all recorded sightings published in the Loon, (Flicker), and unpublished records of the Minnesota Ornithologist's Union (MOU). The list also included records solicited from top bird-watching enthusiasts in the state. From the compiled list, I selected the most recent sighting for each county from 1968 to 1988. The selection yielded .23 sites to survey (Table 1). I contacted observers and requested additional information about specific locations of sites and any additional information that might be helpful.

The survey began 20 June 1988 in the southeastern counties of the state. I surveyed central and northern Minnesota counties during mid-July and examined the southwestern counties in late July. I visited each site (in the morning) for two to six hours between 06:00 hrs and 12:00 hrs CDT. First, I listened for the song of the Henslow's Sparrow and scanned the site with (8x40) binoculars and a (60X) spotting scope. Next, I walked transects at the sites, both along the edges and through the center of the site. The number of transects depended upon the size of suitable habitat. I noted the number of males and females at each site.

All Henslow's Sparrows I found were male, even though I conducted careful searches of the sites for females. I spent additional time at sites where birds were present to determine whether or not birds were banded.

Table 1. The List of 23 Historical Sites Surveyed in Minnesota and the Dates Surveyed During 1988

| County | Dates of survey |
|---|---|
| Aitkin | 6 July |
| Becker | 14 July |
| Beltrami | 18 July |
| Big Stone | 22 July |
| Clay | 18 July |
| Dodge | 2 July |
| Douglas | 14 July |
| Hennepin | 5 July |
| Houston | 29 July |
| Hubbard | 6 July |
| Jackson | 26 July . |
| Lac Qui Parle | 24 July |
| Mille Lacs | 6 July |
| Norman | 17 July |
| Pipestone | 25 July |
| Rock | 25 July |
| Sherburne | 14 July |
| Stearns | 13 July |
| Steele | 2 July |
| Swift | 29 July |
| Washington | 3 July |
| Wilkin | 20 July |
| Winona (Kipp) | 30 June |

## Breeding Habitat Requirements

To develop a better understanding of breeding habitat requirements of Henslow's Sparrows, I used two methods. One was to conduct an intensive study of breeding habitat used by a population at O. L. Kipp State Park, hereafter referred to as Kipp. Kipp is in extreme southeastern Winona County, Minnesota, T106N; R5W, sections-25, 26, 27, 34, 36, and T105N R5W, sections 1, 2, 3. This method required quantifying a suite of habitat

components recognized as potentially important to Henslow's Sparrows across the breeding area, observing habitat use by breeding pairs on the breeding area, and then comparing habitat characteristics of sites used by breeding birds to characteristics of sites they did not use. With this approach, I hoped to learn more about specific aspects of the sparrow's use of breeding habitat. The second method was to conduct an extensive survey of habitat characteristics at locations where Henslow's Sparrows have been reported in Minnesota. This approach broadly characterized breeding habitat in Minnesota that has been used by Henslow's Sparrows. With this method, I hoped to learn more about the breadth of habitat requirements, i.e. do Henslow's Sparrows breed in habitat only like that found at Kipp, or do they use other, similar habitat types?

Intensive Habitat Survey

My intensive study of breeding habitat at Kipp was conducted on two fields which I refer to as the headquarters (HQ) and contact station (CS) fields (Fig. 1). In the spring of 1987, I developed a 30-meter grid system, marked with laths, within areas of sparrow activity on the HQ field (14.6 ha). In the CS field (8.5 ha), I constructed a belt transect with each 30-meter spaced transect in axial orientation to the park's main road. The belt transect arrangement suited the CS field because of the field's smaller size and linear shape (Fig. 2). After establishing the transects, I systematically traversed each field at sunrise on alternating days stopping for one minute at each grid marker. I recorded the position of each bird on a gridded map corresponding to the field. This technique, the International Spot Map Method (Franzreb 1977), was developed to plot the location of birds in an area. After the morning survey, I relocated each bird and observed its foraging, territorial, and reproductive behaviors

from just outside its territorial boundary with a 60X spotting scope. Spot-mapping was used to outline the territories used by each sparrow at Kipp and to divide the fields into sections. Sections were identified as areas of "use" or areas of "non-use" (Fig. 1). Use sections were defined as those in which sparrows perched, sang, foraged, and built nests, and in which young (fledglings or juveniles) were observed. Non-use sections were defined as those in which no sparrow, young or adult, perched. HQ and CS fields were divided into 19 sections according to use. Twelve sections (areas of use) corresponded to territories occupied by Henslow's Sparrows in 1987. Seven sections were not used by the species.

Potentially important breeding habitat characteristics were then determined for the sectioned fields. The slope of the fields and distance to water from the fields were measured. To determine the vegetation structure, a single one-hectare circular plot was established within each section. In areas of use, an important song perch was the center point of the circular plot. In areas of non-use, an arbitrarily selected point was the center of the circular plot. Forty randomly selected square meter units were sampled within each circular plot. The habitat variables that were measured are defined in Table 2. Structure of the vegetative layer was characterized using a square-meter metal frame attached to a wooden pole (Fig. 3). The frame was mounted on the pole and raised to heights of 1 cm, 25 cm, 50 cm, and 100 cm. At each height, the percentage of vegetation cover was determined.

The above ground grassland community is composed of several layers. The first layer is the space between the mineral soil: surface and the bottom of the litter layer. Next is the litter layer. Above that is the vegetative layer consisting of standing dead foliage and standing live herbaceous or woody vegetation. Additionally, within areas of use, I identified the song

Figure 1. The Headquarters and Contact Station Fields at O. L. Kipp State Park, Winona County, Minnesota. The Fields are Divided into 19 Sections According to Use by Henslow's Sparrow.

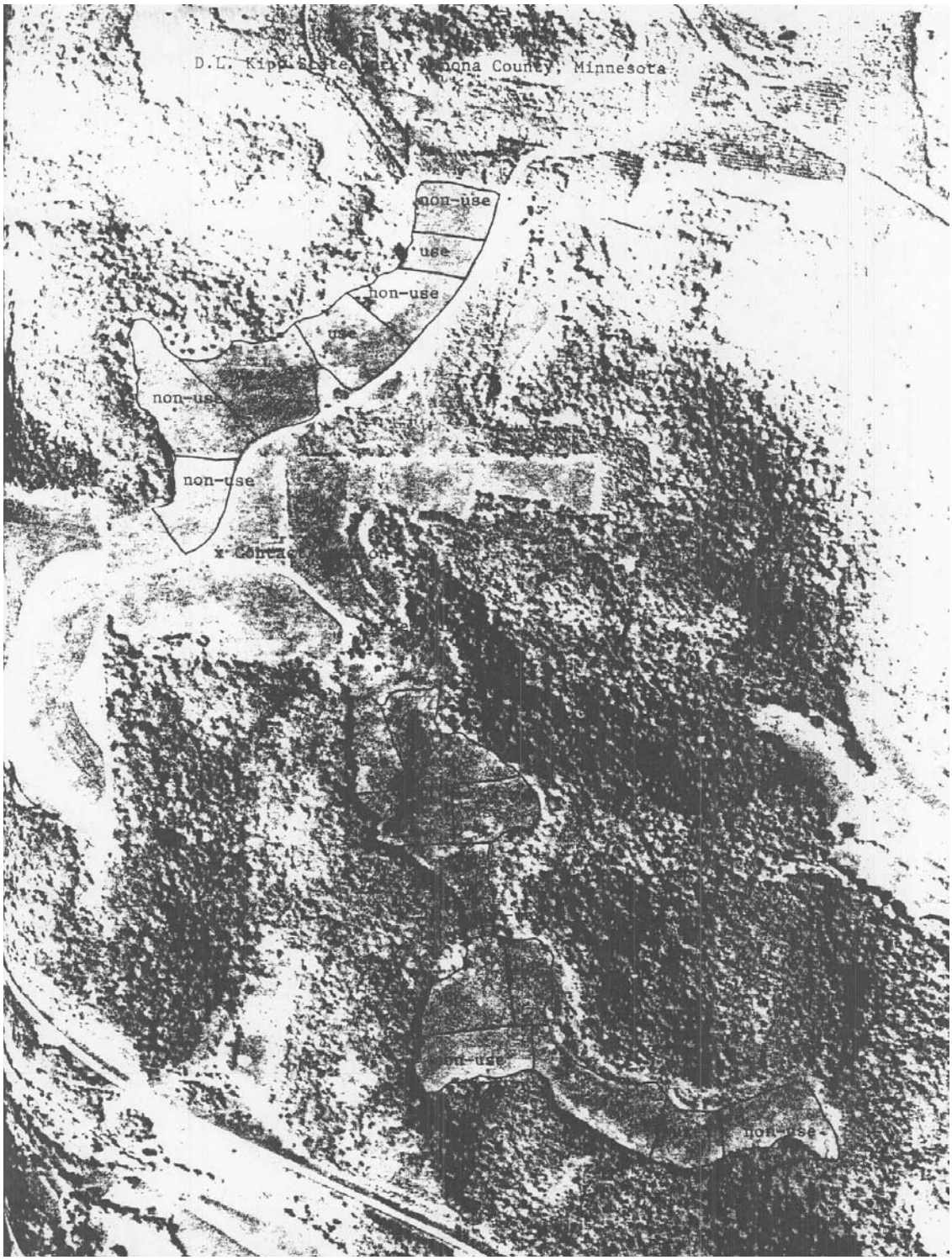
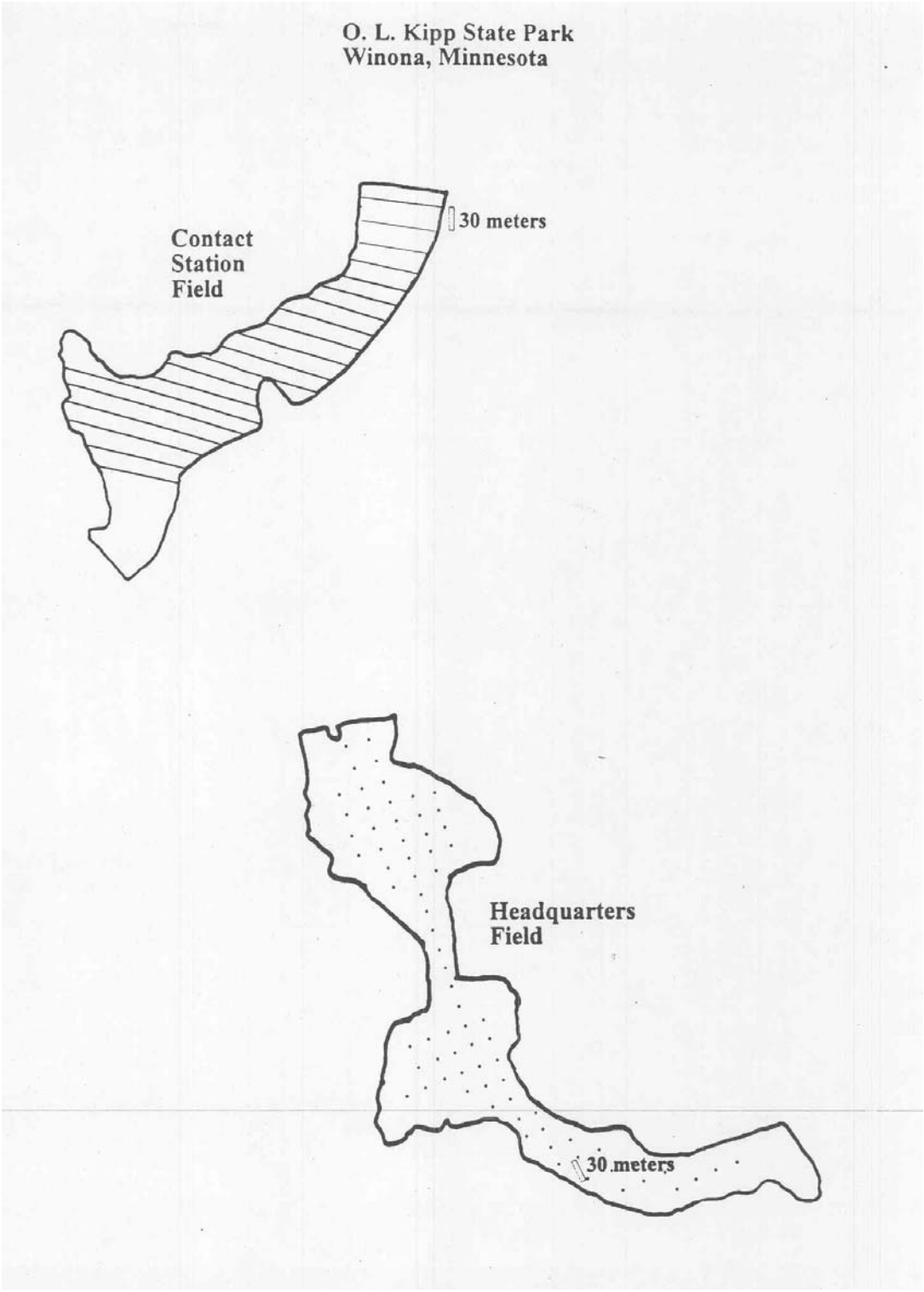


Figure 2. The Headquarters and Contact Station Fields at O. L. Kipp State Park, Winona County, Minnesota. The Headquarters Field is Sectioned by a 30-meter Grid System. The Contact Station Field is Divided by 30-meter Spaced Belt Transects.



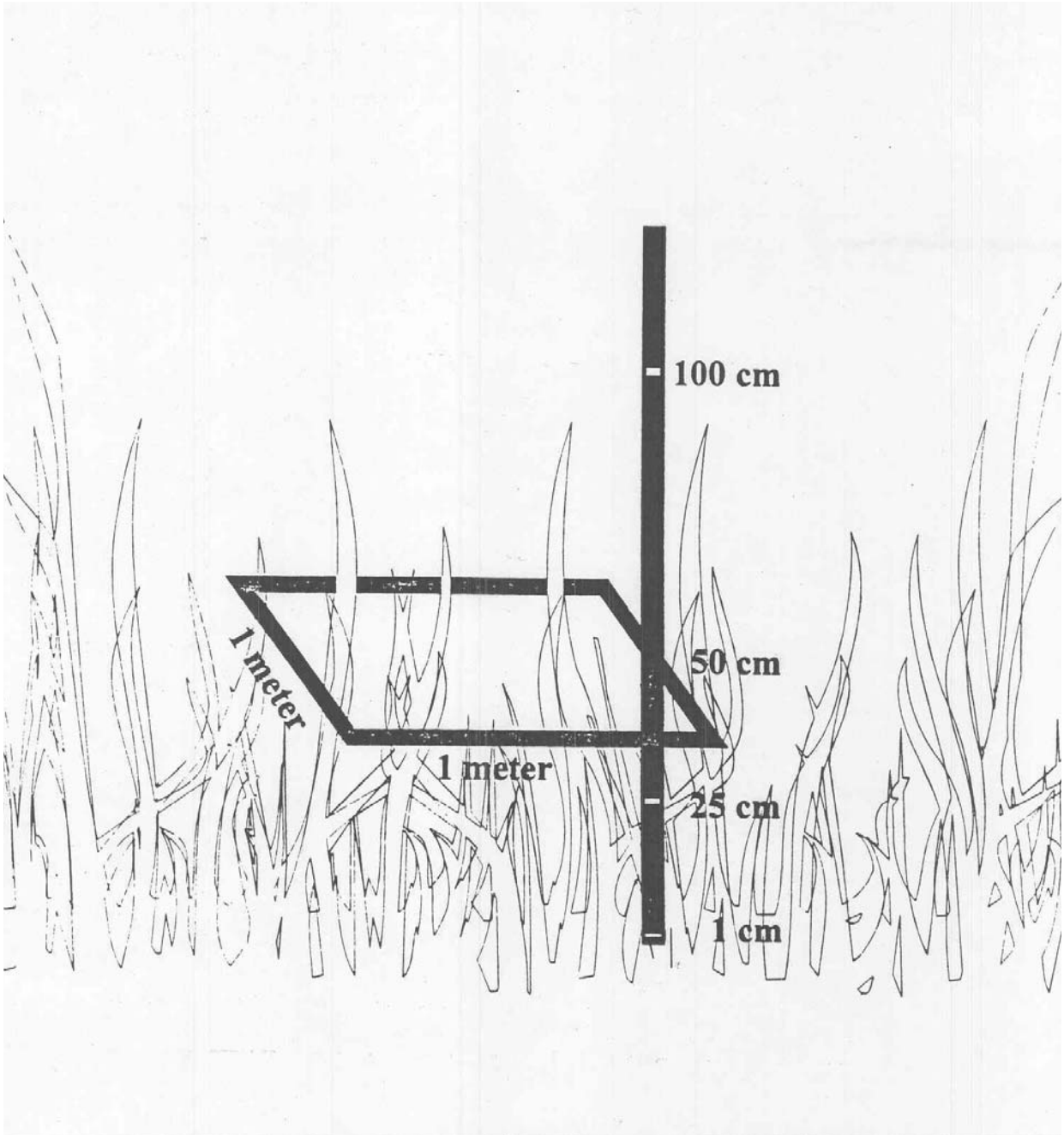



Figure 3. The Device Used for Characterizing Vegetation: One-meter Square Metal Frame Mounted on a Pole and Movable to Heights of 1 cm, 25 cm, 50 cm, and 100 cm.

Table 2. Definition of Breeding Habitat Variables Measured at O. L. Kipp State Park in Winona County, Minnesota.

| VARIABLE | DEFINITION |
|---|---|
| 1. Ground to bottom of litter layer | Distance between mineral soil and the bottom of the litter layer measured at each of the four corners of the one square meter unit. (cm) |
| 2. Litter depth | Distance between the bottom of the dead laying vegetation to the top of the dead laying vegetation measured at each of the four corners of the one square meter unit. (cm) |
| 3. Litter cover | Percent non-bare ground within each one square meter unit. |
| 4. Height of standing dead vegetation | Height from mineral soil to top of stem or flower cluster for standing dead vegetation within each one square meter unit. (cm) |
| 5. Vegetation cover at lcm, 25cm, 50cm, and 100cm | Percent cover of both live and dead vegetation visually estimated at the four heights within each one square meter unit. |
| 6. Number of woody stems | Number of trees, shrubs, and bushes within each section. Clumps of shrubs and bushes were considered as one stem. |
| 7. Song perch species | Species of each prominent song perch. |
| 8. Song perch height | Height of each prominent song perch measured to the nearest meter. (m) |
| 9. Singing position height | Height at which the bird usually sat while singing at each song perch. (m) |
| 10. Slope | Difference in elevation measured from the center of the plot to the edge of the field. (degrees) |
| 11. Distance to water body | Distance to a major water source from the center of each field measured on a topographical map. (km) |

perch species, the song perch height, and the position (height) at which a bird perched.

The Kipp habitat data were analyzed using Student's T-test and the F Max Test for homogeneous variances. The null hypothesis was areas used by Henslow's Sparrows do not differ from areas not used with respect to ground to bottom of litter layer height, litter layer depth, litter layer cover, height of standing dead vegetation, vegetation cover at 1 cm, 25 cm, 50 cm, and 100 cm, and number of woody stems.

Extensive Habitat Survey

My extensive study of Henslow's Sparrow breeding habitat was done by completing a habitat survey at each of 23 sites, including Kipp, in Minnesota. The habitat evaluation method was modified after Baskett et al. (1980). This evaluation was selected because it is less subjective than previous habitat evaluations and includes habitat elements potentially important to Henslow's Sparrows. The evaluation includes habitat characteristics such as average height of vegetation, diversity of vegetation heights, shade-producing woody invasion, average litter depth, forb canopy, and distance to water. Each characteristic is assigned a score based on its measurements - the actual score. Scores for the habitat characteristics are summed. The overall maximum possible score for any evaluation site is 60. The actual score is divided by a possible score and multiplied by 10. This produced a range in scores between 0 and 10 for each site. The result is termed the Habitat Unit Value (HUV) and is the overall score for the site. In addition to habitat characteristics, I also collected information on edge vegetation cover (between habitat types), external edge configuration, and slope of field.

At each site, I familiarized myself with the entire field and noted the characteristics mentioned on the evaluation form (Baskett et al. 1980). To determine the mean height of vegetation and mean depth of litter layer, I selected 30 randomly located points along each bird census transect. Height of standing vegetation was measured with a graduated stick marked at 5-cm intervals. Depth of litter layer was determined with a standard centimeter ruler. Around each height/depth measurement point, I placed four square meter metal frames and estimated the percent cover of forbs and diversity of vegetation heights. Diversity was classified as either uniform (more than 50% of vegetation within 10 cm of average height) or not uniform (less than 50% of vegetation within 10 cm of average height). Studying the entire field, I counted the number of shade-producing woody plants and classified slope as flat (less than 5 degree change from center to edge), slightly sloped (5 to 30 degrees of change), or sloped (greater than 30 degrees of change). Additionally, I classified the type of edge cover as overgrown or dense shrubs and trees, weedy or intermittent shrubs and trees, or clean or few shrubs; and the external edge configuration as meandering, slightly meandering, or straight. From a topographical map, I determined the distance in kilometers to the nearest water.

# CHAPTER III
# RESULTS

## Henslow's Sparrow Status in Minnesota

During the three years of this study, the statewide population survey revealed that Henslow's Sparrows in Minnesota were concentrated within Kipp. In 1987, the sparrow was sighted only at Kipp in Winona County (n = 23). In 1988, the sparrow was observed at Kipp (n =19) and at five other sites - Aitkin (T47N, 27W, section 3), Hennepin (T116N, R21W, section 29), Hubbard (T139N, R32W, section 35), Lac Qui Parle(T120N, R45W, section 6), and Washington (T27N R20W, section 2) Counties. Two singing males were seen in Aitkin County in June and July. One male was heard singing in June in Hennepin County. Two singing males were sighted in Hubbard County in July. One singing male was heard in Lac Qui Parle County throughout the summer. One male was observed at Afton State Park in Washington County in June. In 1989, 22 birds were at Kipp. Two birds were observed in Wilkin County by the Minnesota Biological Survey crew and one late migrant was observed in Dakota County. Thus, there were only a few scattered records of Henslow's Sparrows outside of Kipp in two of the three years.

The population of sparrows at Kipp was stable during the three years of this study. A summary of the Henslow's Sparrow population at Kipp during the 1987, 1988, and 1989 field seasons is shown in Table 3.

## Breeding Habitat Analysis

### Intensive Habitat Survey

The structural layers (bare ground to bottom of litter layer, litter layer depth, and height of standing dead vegetation) that comprised the above-Habitat Analysis ground grassland

Table 3. The Total Number of Males, Females, Territories, Nests, Family Units, Nestlings, and Fledglings of the Henslow's Sparrow Population at O. L. Kipp State Park in Winona County, Minnesota, During 1987, 1988, and 1989

| Population Characteristics | 1987 | 1988 | 1989 |
|---|---|---|---|
| Number of males | 13 | 11 | 12 |
| Number of females | 10 | 8 | 10 |
| Number of territories | 11 | 8 | 12 |
| Number of nests discovered | 0 | 3 | 2 |
| Number of family units observed | 5 | 8 | 2 |
| Number of nestlings | 0 | 14 | 10 |
| Number of fledglings | 5 | 13 | 4 |

community differed significantly between areas of use and areas of non-use at Kipp (Table 4). The habitat analysis at Kipp also revealed that overall litter cover in areas of use was more extensive than in areas of non-use. Furthermore, percent standing vegetative cover was greater at 1 cm, at 25 cm, at 50 cm, and at 100 cm above the ground surface. The number of woody stems did not differ significantly between use areas and non-use areas: Song perch species included green ash, goldenrod; black walnut, boxelder, black cherry, Queen Anne's lace, wooden laths, mullein, and brome grass. Green ash used by the birds were trees less than 10 cm dbh. The average height of song perches was 180 cm and the height of the sparrows' singing position was 103 cm (n =114). The rolling fields at Kipp (slope = 5 to 30 degrees) had a slightly meandering edge. The nearest major water source, the Mississippi River, was 2.4 km east of the fields., Overall, Student's T-tests revealed (99 % confidence) that the areas of use differed significantly from areas of non-use (a = .01).

Table 4. Comparison of Breeding Habitat Variables Measured on Grassland Areas Used and Not Used by the Henslow's Sparrows at O. L. Kipp State Park in Winona County, Minnesota

| VARIABLES | USE mean n=11 | NON-USE mean n=8 | T | prob. |
|---|---|---|---|---|
| 1. Ground to bottom of litter layer (cm) | 0.88 | 0.20 | 2.89 | 0.01 |
| 2. Litter depth (cm) | 7.10 | 3.98 | 4.36 | <0.001 |
| 3. Litter cover ( %) | 95 | 77 | | |
| 4. Height of standing dead vegetation (cm) | 59.38 | 33.66 | 4.51 | <0.001 |
| 5. Vegetation cover (%) at: | | | | |
| lcm | 100 | 82 | | |
| 25cm | 99 | 40 | | |
| 50cm | 69 | 11 | | |
| 100cm | 2 | 0 | | |
| 6. Number of woody stems per section | 4.5 | 2.5 | 1.5 | .13 |

Extensive Habitat Survey

The habitat characteristics evaluation scores are found in Table 5. The Habitat Unit Value (HUV) was calculated for the 23 statewide habitat survey sites (Table 5). Scores ranged from 4.4 (Becker County) to 7.7 (Winona County). The survey revealed that one-third of sample sites have been altered by humans through agricultural practices. Of the sites not altered, five received an HUV closely resembling the Kipp score (7.7). Sites in Big Stone, Hubbard, Pipestone, Steele, and Washington Counties received a score of 7.5 or better. The average HUV for the seven sites where birds were observed during 1988 / 1989 was greater than the average HUV for areas where birds were not observed during 1988 / 1989.

Table 5. Habitat Evaluation Results for the Nine Characteristics Scored at 23 Sites Previously Used by Henslow's Sparrows in Minnesota. The Scores Were Used to Determine the Habitat Unit Value (HUV) for Each Site.

| County | mean hght veg | div of veg hght | shade prod woody plants | mean litter depth | forb canopy | edge veg cover | distance to water | ext edge config | slope of field | na max | cor max | actual score | huv |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aitkin | 7 | 3 | 10 | na | 5 | 1 | 2 | 1 | 5 | 5 | 55 | 34 | 6.2 |
| Backer | 2 | n a | 10 | 1 | 2 | 2 | 1 | 1 | 5 | 5 | 55 | 24 | 4.4 |
| Beltrami | na | na | na | na | na | na | na | na | na | 60 | na | na | unk |
| Big Stone | 9 | 4 | 7 | 3 | 4 | ? | 3 | 3 | 5 | | 60 | 95 | 7.5 |
| Clay | 10 | 4 | 10 | 4 | 3 | 2 | 1 | 1 | 5 | | 60 | 40 | 6.7 |
| Dodge | 7 | 3 | 8 | 1 | 3 | 5 | 1 | 1 | 5 | | 60 | 34 | 5.? |
| Douglas | na | na | na | na | na | na | na | na | na | 60 | na | na | unk |
| Hennepin | 7 | 5 | ? | 5 | 4 | 6 | 2 | 4 | 4 | | 60 | 44 | 7.3 |
| Houston | 8 | 4 | 5 | 4 | 4 | 3 | 2 | 2 | 2 | | 60 | 34 | 5.7 |
| Hubbard | 8 | 4 | 8 | n a | 3 | 7 | 2 | 4 | 5 | 5 | 55 | 41 | 7.5 |
| Jackson | na | na | na | na | na | na | na | na | na | 60 | na | na | unk |
| Lac Qui Parle | 8 | 4 | 8 | 3 | 1 | 7 | 3 | 3 | 5 | | 60 | 42 | 7.0 |
| Mills Lacs | 2 | n a | 10 | n a | 2 | 5 | 2 | 2 | 5 | 10 | 50 | 28 | 5.6 |
| Norman | 5 | 4 | 8 | 1 | 2 | 5 | 1 | 4 | 2 | | 60 | 32 | 5.3 |
| Pipestone | 7 | 4 | 9 | 4 | 4 | 6 | 2 | 4 | 5 | | 80 | 45 | ?.5 |
| Hock | 7 | 4 | 6 | 4 | 3 | 3 | 2 | 4 | 3 | | 60 | 36 | 6.0 |
| Sherburne | 8 | 4 | 2 | 3 | 3 | 8 | 1 | 5 | 5 | | 60 | 39 | 6.5 |
| Stearns | 10 | 4 | 11 | 3 | 1 | 1 | 5 | 1 | 1 | | 60 | 36 | 6.0 |
| Steel | 9 | 4 | 8 | 4 | 3 | 8 | 2 | 3 | 5 | | 60 | 46 | 7.7 |
| Swift | na | na | na | na | na | na | na | na | na | 60 | na | na | unk |
| Washington | 8 | 4 | 9 | 4 | 3 | 8 | 2 | 3 | 5 | | 60 | 46 | 7.7 |
| Wilkin | 10 | 4 | LO | 4 | 5 | 1 | 1 | 1 | 5 | | 60 | 41 | 6.8 |
| Winona (Kipp) | 9 | 5 | 8 | 3 | 5 | 7 | 2 | 4 | 3 | | 60 | 46 | 7.7 |

Table 6. Habitat Evaluation Scores (HUV) of Habitat at 23 Sites Previously Used by Henslow's Sparrows in Minnesota. The Most Recent Record in Each County Was Included in the 1988 Survey

| COUNTY | HABITAT UNIT VALUE | ALTERED SITES | NUMBER OF BIRDS OBSERVED IN 1988 OR 1989 |
|---|---|---|---|
| Aitkin | 6.2 | | 6 |
| Becker | 4.4 | grazing cows | |
| Beltrami | unknown [2] | | |
| Big Stone | 7.5 | | |
| Clay | 6.7 | | |
| Dodge | 5. 7 | recently burned | |
| Douglas | unknown[1] | under cultivation | |
| Hennepin | 7.3 | | 1 |
| Houston | 5.7 | | |
| Hubbard | 7.5 | | 2 |
| Jackson | unknown [1] | under cultivation | |
| Lac Qui Parle | 7.0 | | 1 |
| Mille Lacs | 5.6 | recently mowed | |
| Norman | 5.3 | | |
| Pipestone | 7.5 | | |
| Rock | 6.0 | | |
| Sherburne | 6.5 | | |
| Steams | 6.0 | | |
| Steele | 7.7 | | |
| Swift | unknown[1] | cornfield | |
| Washington | 7.7 | | 1 |
| Wilkin | 6.8 | | 2 |
| Winona (Kipp) | 7.7 | | 19 |

Note: In some counties the HUV could not be calculated because of (1) drastic habitat change caused by humans or (2) site inaccessibility.

# CHAPTER IV
# DISCUSSION

## Population

Henslow's Sparrows have often been described to breed in "loose colonies" (Hyde 1939, Graber 1968, Wiens 1969). The only known colony of Henslow's Sparrows in Minnesota occurred at Kipp where birds have consistently occurred since 1976 (F. Lesher, pers. com.). In many parts of the Henslow's Sparrow's breeding range, populations have often been described as somewhat unstable with numbers fluctuating from year to year (Hyde 1939, Wiens 1969, Robins 1971). During the three years of this study (1987-1989), the breeding population at Kipp remained relatively unchanged. In 1988, the population in the park was slightly less than 1987 and 1989. Yet it is notable that in 1988, the number of birds observed outside the park was the highest ever recorded. During 1990 and 1991, however, the number of individuals observed in the park declined. Henslow's Sparrows were not observed in the park in 1992 or 1993 (F. Lesher, pers. com. and Hanson, pers. ob.) Elsewhere in Minnesota, only two Henslow's Sparrows were reported in 1992 (Weins 1993) and none in 1993. Henslow's Sparrows have not been observed outside of the park every year, and sightings outside of the park generally are of individuals, not of colonies. Therefore, this study indicates that the plight of Henslow's Sparrow is more precarious than previously thought.

## Habitat

Habitat loss appears to be a major cause for the decline of Henslow's Sparrow. During my extensive statewide survey, I discovered that only two thirds of sampled sites are still suitable nesting areas for the species. Urban development appears to be the primary cause of

habitat loss in southeastern Minnesota. In other parts of the state, changes in agricultural practices contribute to additional loss of habitat. Sites that previously were suitable for Henslow's Sparrow, some old fields and pasture land, have been plowed and planted in row crops.

The Kipp fields apparently have characteristics favorable to Henslow's Sparrows because they were repeatedly occupied by a colony of the species until recently. One adult bird banded in 1988 was recaptured in 1989 within 100 meters of the original capture site (USFWS band no. 1310-87960).

Able (1967) advanced the hypothesis that the density and clumping nature of the grass mat near the ground are the most important features in habitat selection in this species. I concur that Henslow's Sparrows prefer grassland areas with a substantial uncompressed litter layer. This is supported by the evidence that the amount of space between the bare ground and the bottom of the litter layer is greater, the depth of the litter layer is greater, and the overall cover of the litter layer is greater for areas of use than for areas of non-use. Values obtained for litter layer and amount of woody vegetation at Kipp were similar to reports from other studies (Hyde 1939, Able 1967, Robins 1971, Zimmerman 1988, Clawson 1991, & Herkert 1994).

The height of the standing dead vegetation at Kipp correspond with the height of vegetation found within territories of Henslow's Sparrows by Zimmerman (1988) in Kansas and by Baskett et al. (1980), Clawson (1991), Kahl et al. (1985), Skinner et al. (1984) in Missouri. Herkert (1994) found a higher percentage of standing residual vegetation in occupied transects than in unoccupied transects. In Minnesota standing dead vegetation is also important for the species as the amount of standing dead vegetation within areas of use

differed significantly (a = 0.001) from areas of non-use at Kipp. Zimmerman (1988) and Clawson (1991) also recommend caution for removing considerable standing dead vegetation.

Percent standing vegetative cover was greater at 1 cm, at 25 cm, at 50 cm, and at 100 cm above the ground surface in areas of use than for areas of non-use at Kipp. Similarly, in Illinois, occupied transects tended to have a greater vegetation density between 0 and 25 cm above ground surface than did unoccupied transects (Herkert 1994): The amount of woody vegetation within territories did not differ significantly from the amount outside of territories at Kipp. However, Zimmerman (1988) found less woody vegetation within established territories in Kansas.

Robins (1967) suggested that song perches were not important habitat requirements for Henslow's Sparrow, yet my study results suggest that song perches are an. important part of the habitat. In Robins's study, laths placed in the fields were not used by the sparrows (Robins 1971). In my study, on every occasion that I visited the fields, I observed sparrows perched on laths.

In Minnesota, the 23 evaluated sites ranged in size from a few hectares to more than 100 ha. Herkert (1994) suggests that grassland size is the major factor influencing Henslow's Sparrow habitat selection in Illinois and possibly in other midwestern states where habitat is similarly fragmented. In Illinois, Henslow's Sparrows occurred on only one grassland less than 100 ha (Herbert 1994). Yet the combined area of the two fields at Kipp, a nesting area used by the species for more than 15 years, totaled only 23.1 ha. Herkert (1994) recommended management efforts directed toward protecting or establishing large grassland areas would offer the most promising approach to conserving and managing populations of

this species in the Midwest. Although this approach has advantages, clusters of smaller suitable sites (such as Kipp) should also be protected and managed (Sampson 1980).

Habitat Management

Basic research on the habitat requirements of species, particularly those that are endangered, is important if managers expect to manage any species habitat appropriately. It is essential to know what the relevant habitat components are so these components may be enhanced and not degraded or eliminated. Because the Henslow's Sparrow in Minnesota and throughout its range is declining, managers need to focus on providing suitable breeding habitat. This study provides a basis for choosing appropriate management practices. In particular, my results suggest a need to address two characteristics of grasslands, the litter layer and the standing tall forbs. These habitat components were crucial determinants of suitable breeding habitat.

Any management activity that removes the litter layer and standing tall forbs (such as fire, mowing, and grazing) would have a negative effect on the overall habitat suitability for Henslow's Sparrows. In the oak savanna region of Minnesota, grasslands were historically sustained by fires of natural and artificial origin (Moore 1972). Fires maintain grasslands by removing accumulated litter, halting woody invasion, and stimulating new growth. In Henslow's Sparrow breeding habitat, it is important to keep the woody invasion in check, yet it is also important to retain the litter layer. Henslow's Sparrows use the litter layer for foraging, nesting, and escaping predators. Therefore, managing grasslands solely with fire would remove an important component of Henslow's Sparrow habitat. A second management tool, mowing, halts the woody invasion and does not remove the accumulated litter, but it

does remove the standing tall forbs. Standing tall forbs are used for song perches during advertisement and defense of territories. Therefore, managing grasslands solely with mowing would remove another important component of Henslow's Sparrow habitat. A third management practice, grazing, halts woody invasion and stimulates new growth yet may limit accumulation of the litter layer because biomass is removed: Therefore, managing grasslands solely with grazing also removes an important component of Henslow's Sparrow habitat. A fourth management technique, doing nothing, does allow the litter layer to accumulate but would eventually result in an area overgrown with woody vegetation and tall forbs within savanna tension zones.

To manage a grassland for Henslow's Sparrows, a combination of techniques must be applied. A practical management application is found in Appendix A. Beginning with a grassland habitat that is suitable for Henslow's Sparrow breeding, managers could do noting and still maintain a suitable grassland. But eventually managers would need to control invading woody and tall forb vegetation. At this time, it would become necessary to apply to most appropriate management tool to restore the area to its earlier grassland succession state. Therefore, larger grassland areas provide the best approach for maintaining Henslow's Sparrow breeding habitat. At Kipp, although a 23ha grassland was large enough to maintain a small population of Henslow's Sparrows for more tan 16 years, it may not be large enough to maintain a population indefinitely. A larger grassland is preferred because selected portions can be burned, mowed, or grazed on a rotational basis, leaving adequate areas of suitable habitat available during each breeding season.

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# APPENDIX A

## General Considerations for Management of Habitat for Henslow's Sparrows

1. I suggest dividing the proposed management areas into sections. By dividing the area and thus working with no more than 10% of the total area in a given year, the largest possible area could be left undisturbed and ensure adequate area available for nesting.
2. The work in the fields should be done before the sparrows arrive in spring or after they depart in fall.
3. To provide suitable habitat at all times, the entire area should never be burned, mowed, or disturbed during one breeding season.

## Management Recommendations for Fields at O. L. Kipp State Park, Winona County, Minnesota

The goal of the management plan is to maintain habitat that is suitable for Henslow's Sparrow within Kipp. The intent is to demonstrate how areas of use can be maintained or enhanced and how areas of non-use can be made more suitable for Henslow's Sparrows. Conditions are currently suitable for a limited population of sparrows, but those conditions will probably not remain suitable.

I suggest dividing the proposed management areas into 19 sections. I recommend beginning habitat enhancement work in areas not presently used by the sparrows. Each year, an area large enough for 10 to 12 territories should be left undisturbed. In Minnesota, no field work should be done between 15 April and 30 September.

The following steps provide a basis for managing the fields at Kipp for Henslow's Sparrows. Common and scientific names for species are found in Appendices B and C.

1. Remove all undesirable (prolific) trees and any successive sprouts. Because Henslow's Sparrows are grassland species, it is important to maintain a grassland habitat. Normally, trees limit available nesting area and provide potential perches for predators and therefore should be removed. Tree species included for removal include, but are not limited to, boxelder, sumac, and green ash. Both boxelder and green ash are very prolific seed producers and have the potential of becoming too numerous in the fields. A few woody plants that are native to savannas would be acceptable because they are occasionally used as song perches and escape sites. At Kipp,in particular, oaks , shagbark hickory, black cherry, paper birch, and northern white cedar found along the edges of fields and scattered throughout fields should not be removed. Blackberry and black raspberry bushes are used for perching and places of escape by the sparrow and therefore should remain.

2. Mow areas of goldenrod and Queen Anne's lace. Goldenrod, particularly *Solidago canadenis* and *Solidago rigida,* are colonial species and produce homogeneous patches with very little ground cover. They are the two most numerous forb species found at Kipp. The circles of goldenrod are scattered throughout the fields and are reducing the amount of area with appropriate ground cover. Queen Anne's lace is also concentrated in some areas, which have less ground cover than areas where graminoid species predominate. Mowing these areas and leaving the clippings would increase the amount of ground cover. The area between the dead furrow and woods bordering the contact station field (CS) is the only area where burning is the recommended management procedure for control of forbs. The fire must be contained within this area.

Forbs such as wild bergamot and woody plants such as roses do not appear to create a problem. These individual plants are widely spaced and provide some needed heterogeneity for the habitat. Grasses found in fields at Kipp are of cultivated origin, yet they provide the necessary litter layer that is an important part of the Henslow's Sparrow habitat.

## Specific Section Considerations

Recommendations for individual sections within contact station field (CS) and headquarters field (HQ) with sections distinguished between areas of use and non-use. (Fig. 1).

1) Contact Station Field

CS - Overall: The most important management practice for the contact station field at this time would be to burn the area between the woods and the dead furrow. Burning would control the forbs. The spread of goldenrod and Queen Anne's lace should be monitored and appropriate steps taken if they begin to cover more than 25% of any one section. I found that percent cover by either goldenrod or Queen Anne's lace did not exceed 25% in defined territories of Henslow's Sparrows.

CS -1. Use: Area extending from King's Bluff Trail to the far east edge of the drainage pond. This area is predominantly grasses, and forbs are not yet a problem. No alterations are needed presently.

CS - 2. Use: Area extending from drainage pond to road. This area has a few small sumac and black ash trees that should be removed within the next five to ten years.

CS - 3. Non-use: This area is bordered on the northwest by a very large patch of Queen Anne's lace. The grasses in this area are generally not as tall or dense as in other areas.

No alterations are recommended at this time other than burning along the northwest edge to control forbs.

CS - 4. Use: This area contains very dense, very tall brome grass. It is adjacent to the old homestead foundation. I suspect that this was the area where the hen house or other small animal enclosure was located. Hence the more fertile soil. No alterations are needed at this time other than burning along the northwest edge to control forbs.

CS - 5. Use: This area is a large expanse of unbroken brome, timothy, and bluegrass. One or two territories were located on this area in each of the three years of the study. No alterations are needed at this time other than possible burning along the bottom edge below the dead furrow along the northwest edge to control forbs.

CS - 6. Non-use: This area, at the top of the knoll, is a short grass dry prairie. It is drier and rockier than other areas in the CS field, and the vegetative composition would not accumulate a substantial litter layer. It does not have the potential to meet the habitat requirements of this species.

Therefore, no alterations are needed or desired:

CS -7. Non-use: This area has a very different species composition than the rest of the field. It is separated from the rest of the field by a dead furrow and was most recently under cultivation. When cultivation ceased, it was planted in orchard grass. When this area was burned in 1988, the small amount of accumulated litter was removed, making it unsuitable Henslow's Sparrows habitat.

2.) Headquarters Field

HQ - Overall:1V lore alterations and modifications are needed in the headquarters field than in the contact station field. Overall, boxelder and green ash should be removed, patches of goldenrod and Queen Anne's lace should be mowed, and sumac should be slashed and burned.

HQ -1. Use: This area should be given the highest priority and should be the first area mowed in the headquarters field. The most dramatic change was observed in this section during the three years of the study. Forbs increased and woody plants became more noticeable. In this area, the northwest- and northeast-facing slopes are extensively covered with goldenrod. This area should be mowed but does not need to be raked. Woody plants in this area are predominantly black raspberry and blackberry. These plants should be left because they provide both for foraging and escape cover.

HQ - 2. Non-use: Sumac has overtaken this area. Although it probably would never be suitable for Henslow's Sparrows, this area should be slashed and burned to halt the advance of sumac into areas used by the sparrows.

HQ - 3. Use: This area contains many medium-sized green ash trees (8 meters tall) that should be removed. Woody vegetation removal techniques used in other parts of the park would be suitable here.

HQ - 4. Use: Goldenrod is becoming a problem in this area. The area is still used by the sparrows, but I think they are using a larger territory in this area due to the greater amount of forb cover. The patches of goldenrod should be mowed in the third or fifth year of management.

HQ - 5. Use: This area extends from the top of the first incline to the north end of the drainage pond and blackberry patch. No alterations are needed at this time.

HQ - 6. Non-use: This area is essentially a blackberry and wild bergamot patch. It was not used by the species and no alterations are needed.

HQ - 7. Use: Goldenrod cover on this area is beginning to increase. These patches should be mowed within the next five years.

HQ - 8. Use: If boxelder is to be eradicated from the park, those in this section could also be removed. If the eradication plans are not carried through, the boxelder and scattered ash do not present a problem and have occasionally provided additional song perches for the sparrows. Sumac along the northwest edge should be eliminated with a slash and burn method, but the burning must not extend beyond the sumac.

HQ - 9. Non-use: This area is a prairie remnant that has not been heavily disturbed. The patch is on a steeper grade than the land around it. Sumac is becoming a serious problem on the southwest corner, and steps should be taken to halt the problem. This area does not appear to be used by the sparrows but should be maintained for its native prairie significance. This remnant dry prairie does not have the accumulated litter layer important to Henslow's Sparrow habitat.

HQ -10. Use: Although this is a large section, both goldenrod and Queen Anne's lace could become a problem here soon. This area should be mowed only in the fall because tractor tire impressions leading to the section would be visible across the field throughout summer and may then encourage others to drive out into the field. Such a disturbance would have a negative effect on the sparrow population. The boxelder and sumac in the area should be eliminated, but not the cherry, black raspberry, and blackberry:

HQ -11. Use: The sumac on the east and south sides is spreading fast. During the three years of the study, this increase was observed but not quantified. Appropriate steps as used throughout the park to control these species should be taken in this area also.

HQ -12. Non-use: This also is prairie remnant that has not been heavily disturbed. This area is not suitable for Henslow's Sparrows, but steps should be taken to maintain it for its prairie significance. Sumac is becoming a problem here also.

APPENDIX B

Animals Observed Using Fields or Edges of Fields for Nesting or Feeding
at O. L. Kipp State Park, Winona County, Minnesota

**Birds**

**Nesting**

| | |
|---|---|
| Red-winged Blackbird | *Agelaius phoeniceus* |
| Mallard | *Anas platyrhynchos* |
| Sedge Wren | *Cistothorus platensis* |
| Yellow warbler | *Dendroica potechia* |
| Gray Catbird | Du *metella carolinensis* |
| Wild Turkey | *Meleagris gallopavo* |
| Savannah Sparrow | *Passerculussandwichensis* |
| Indigo Bunting | *Passerina cyanea* |
| American Woodcock | *Philohela minor* |
| Eastern Bluebird | *Sialia sialis* |
| Field sparrow | *Spizella pusilla* |
| Eastern Meadowlark | *Sturnella magna* |
| Brown Thrasher | *Toxostoma rufum* |

**Feeding**

| | |
|---|---|
| Cooper's Hawk | *Accipter cooperii* |
| Ruffed Grouse | *Bonasa umbellus* |
| Red-tailed Hawk | *Buteo jamaicensis* |
| Turkey Vulture | *Cathartes aura* |
| American Crow | Corvus *brachyrhynchos* |
| Blue Jay | *Cyanocitta cristata* |
| Pileated Woodpecker | *Dryocopus pileatus* |
| Barn Swallow | *Hirundo rustica* |
| Northern Oriole | *Icterus galbula* |
| Tree Swallow | *Iridoprocne bicolor* |
| Brown-headed Cowbird | *Molothrus ater* |
| Rufous-sided Towhee | *Pipilo erythrophthalmus* |
| Scarlet Tanager | *Piranga olivacea* |
| American Goldfinch | *Spinus tristis* |
| Northern Rough-winged Swallow | *Stelgidopteryx serripennis* |

**Mammals**

| | |
|---|---|
| Coyote | *Canis latrans* |
| Striped Skunk | *Mephitis mephitis* |
| White-tailed Deer | *Odocoileus virginianus* |
| Raccoon | *Procyon lotor* |

**Reptiles**

| | |
|---|---|
| Timber rattlesnake | *Crotalus horridus* |
| Bullsnake | *Pituophis melanoleucus* |
| Eastern garter snake | *Thamnophis sirtalis* |

**Amphibians**

| | |
|---|---|
| American toad | *Bufo americanus* |
| Eastern gray treefrog | *Hyla versicolor* |
| Northern spring peeper | *Pseudacris crucifer* |
| Western chorus frog | *Pseudacris triseriata* |

APPENDIX C

Vegetation Found in Fields or Edges of Fields at 0. L. Kipp State Park, Winona County, Minnesota

| | |
|---|---|
| Boxelder | *Acer negundo* |
| Common Quack Grass | *Agropyron repens* |
| Leadplant | *Amorpha cnescens* |
| Big Bluestem | *Andropogon gerardi* |
| Little Bluestem | *Andropogon scoparium* |
| Paper Birch | *Betula papyrifera* |
| Brome | *Bromus sp.* |
| Shagbark Hickory | *Carya ovata* |
| Queen Anne's Lace | *Daucus carota* |
| Green Ash | *Fraxinus pennsylvanica* |
| Eastern Red Cedar | *Juniperus virginiana* |
| Rough Blazing Star | Liatris *aspera* |
| Hoary Puccoon | *Lithospermum canesions* |
| Wild Bergamot | *Monarch latulosa* |
| Red Pine | *Pinus resinosa* |
| Eastern White Pine | *Pinus strobus* |
| Black Cherry | *Prunus serotina* |
| White Oak | *Quercus albs* |
| Red Oak | *Quercus rubra* |
| Northern Pin Oak | *Quercus ellipsoidalis* |
| Bur Oak | *Quercus macrocarpa* |
| Black Oak | *Quercus velutina* |
| Prairie Coneflower | *Ratibida pinnata* |
| Smooth Sumac | *Rhus glabra* |
| Poison Ivy | *Rhus radicans* |
| Staghorn Sumac | *Rhus typhina* |
| Meadow Rose | *Rosa carolina* |
| Black Raspberry | *Rubus allegheniensis* |
| Blackberry | *Rubus occidentalis* |
| Black-eyed Susan | *Rudbeckia hirta* |
| False Solomon' Seal | *Smilacina racemosa* |
| Canada Goldenrod | *Solidago canadenis* |
| Stiff Goldenrod | *Solidago rigida* |
| Showy Goldenrod | *Solidago speciosa* |
| American Vetch | *Vicia americana* |
| Bird's-foot Violet | *Viola pedata* |
| Wild Grape | *Vitis palmata* |