Distribution and Habitat Associations of Birds Wintering in Mexican Grasslands: 1996 Pilot Season Report

Submitted to:

Howard Ness
Director, Mexico Affairs Office
National Park Service
P.O. Box 30001
New Mexico State University
Las Cruces, NM 88003-0001

Submitted by:

James S. Bradley
Anthony Leukering

Colorado Bird Observatory
13401 Piccadilly Road
Brighton, CO 80601

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INTRODUCTION

Effective conservation of bird populations requires knowledge of their geographic distribution and habitat requirements on both breeding and non-breeding grounds. In the United States and Canada, the distribution of breeding grassland birds is relatively well-known and numerous efforts are underway to determine productive breeding habitats. The distribution and habitat requirements of grassland birds during the winter months, however, are largely unknown. This information gap makes it difficult to determine if population declines in grassland birds are attributable to processes on the breeding grounds, wintering grounds, or both.

In January, 1996, Colorado Bird Observatory began a long-term project in grassland-dominated areas of Chihuahua and Durango, Mexico. The long-term objectives of the study are to: 1) conduct a plateau-wide inventory to determine distributional patterns of grassland birds wintering on the Chihuahuan Plateau; 2) determine habitat characteristics associated with each target species; and 3) monitor population trends of wintering birds over time. The short-term goals of the 1996 pilot season were to: 1) develop and test bird and vegetation survey methods appropriate for wintering grassland birds in Mexico; 2) Examine potential study sites for more intensive future work; and 3) collect preliminary data on distribution and bird/habitat associations.

METHODS

Bird Surveys- We used the Area Search survey method created by the Royal Australian Ornithologists Union to census wintering birds. This method was preferable over other census techniques (*e.g.* Point counts, strip transects, etc.) because it allowed observers to flush skulking sparrows and pursue them for more accurate identification. The ability to flush birds is essential to detecting grassland species during winter because they are extremely secretive during this season.

Each survey area was 173 m by 173 m (3 ha.) and was surveyed by an individual observer for 20 min. The goal of the area searching method is to cover a designated area in an allotted amount of time. Preliminary observervations indicated that 20 min. was a sufficient amount of time to cover the 3 ha. area. Observers were required to pursue unidentified birds in an effort to identify them.

A single observer counted and recorded all birds detected. Birds flushed from the plot upon approach were counted as if they were in the plot during the survey period. Birds that flew over the plot, but never landed in it were recorded separately as "fly overs."

Placement of Survey plots- Survey plots were placed in grassland and grass/shrub habitats along an approximately 1200 km route beginning near Janos, Chihuahua in northern Mexico and ending near Durango, Durango (Fig. 1). Because one of our objectives was to document broad distribution patterns, we placed survey plots fairly uniformly across the area of interest. We sampled a variety of land-use practices to determine gradients of abundance associated with different land-use patterns.

Vegetation Surveys- Vegetation surveys were designed to provide information about vegetative cover and structure at each area search plot. Within each area search plot, four sub-plots were selected for vegetation analysis. To locate the vegetation survey plots, the observer marked his or her location at 5 min. intervals during the area search. This provided four random sub-samples within the entire area search unit. After the bird survey was completed, the following procedures were performed at each of the sampling plots:

1) Four 1 m long, 8 mm diameter wooden dowels were tossed blindly to locate sub-sample points.

2) Each dowel was marked at decimeter (dm) intervals. The ground cover class located directly under each mark (point-intercept) was recorded to provide cover information (Table 1).

3) An 8 mm diameter dowel marked at decimeter (dm) intervals was passed vertically through vegetation at three locations along each tossed stick. Frequency of contacts made by each structural class within each decimeter interval was recorded (Table 1).

In addition to the above measurements, ocular estimates of percent cover of various structural classes (e.g. shrubs, grasses, forbs, etc.) for the entire 3 ha. area search plot were made. Information obtained by ocular estimation has not been examined yet.

Data Analysis- Because the 1996 season was a pilot year, exploratory variables were examined using descriptive statistics only. The objective of data examination in the pilot year was to determine if proposed variables provide biologically plausible results for bird/habitat associations. Such preliminary data exploration will allow us to generate testable hypotheses for future research.

RESULTS

Indices of detection frequencies reflecting sample sizes are presented in Table 2. An estimate of the total number of area search plots required to ensure that each target species is detected on at least 50 plots was calculated (reported as Pts.(50)). Means and standard errors of vegetation variables for plots occupied by each species were calculated (Tables 3 and 5). Responses of each species to vegetation variables were estimated (Tables 4 and 6). A response of (+) for a given species to a particular vegetation variable indicates that the species was present in area search plots with higher than average values for the variable. For example, that Baird's Sparrow has a positive response (+) to VGRASS, indicates that this species was detected on area search plots with more grass hits than average. Species were selected for analysis based on conservation concern and on our ability to detect them in the pilot season. Expansion of the project in future years will allow us to address more species.

CONCLUSIONS AND EVALUATION OF PILOT WORK

Objective 1. To develop and test bird and vegetation survey methods appropriate for wintering grassland birds in Mexico.

Placement of Survey Plots-- The route explored in 1996 provided valuable insight to the distribution of wintering birds on the Central Mexican Plateau. Several target species, however, were either not detected on surveys (Mountain Plover, Cassin's Sparrow, McCown's Longspur) or were detected on few plots (Lark Bunting and Eastern Meadowlark). To obtain adequate sample size for all target species, future efforts should continue along the current survey route, but should also be expanded to unexplored areas.

Bird Survey Technique-- The area search method is, possibly, the only technique appropriate for surveying wintering grassland birds in Mexico. As expected, the technique allowed observers to flush secretive birds. Detection of many species (*e.g.* Baird's Sparrow, Grasshopper Sparrow, and Sprague's Pipit) would have been virtually impossible using standard point count methodology. Use of the area search method should continue.

Vegetation Survey Technique-- The current technique used for quantifying vegetation variables at each area search plot provided biologically plausible results for bird/habitat associations. Researchers were confident that collected data accurately represented true vegetative characteristics in the field. Use of the current habitat protocol should continue.

Objective 2. To examine potential study sites for more intensive future work.

Survey Route-- (see above)
Potential Research Sites for Individual Species and/or Communities-- Several areas were identified as "hot-spots" for certain species. For example, the ranch operated by Jorge Chavez Vega at the Ricardo Flores Magon Ejido in central Chihuahua contained high densities of Baird's Sparrow, Grasshopper Sparrow, and Sprague's Pipit. As was the case with all landowners in Mexico, we were invited to return in future years.

Objective 3. To collect preliminary data on distribution and bird/habitat associations.

Bird Distribution-- Broad-scale surveys in 1996 provided insight to the distribution of wintering grassland birds in Mexico. More work is needed in this area to address the distribution of under-represented species. Detailed species distribution maps will be prepared as adequate information is obtained in future field seasons.

Bird/habitat Associations-- Preliminary data for selected birds are presented in Tables 3-6. Increased survey effort will provide adequate sample size to address habitat

associations of all target species. Both total number of area searches performed and the geographic scope of surveys will need to be expanded to obtain this objective.

FUTURE RESEARCH

A preliminary examination of information collected in 1996 indicates that expanding survey effort using the field methods developed herein will provide essential information concerning the distribution and habitat associations of grassland birds wintering in Mexico. Expanding the geographic scope of the project will allow us to collect basic inventory information, habitat association data, and monitor populations simultaneously.

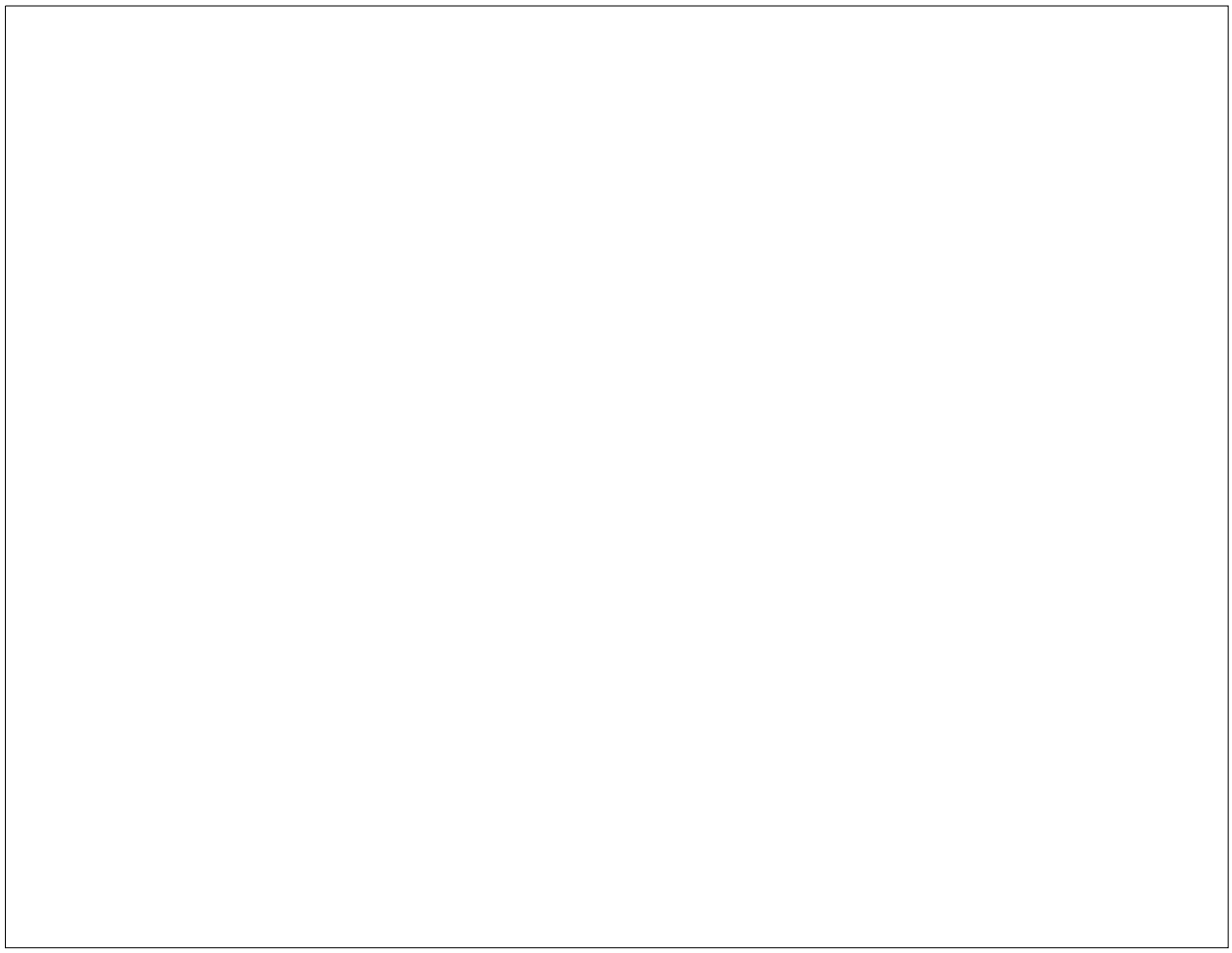

Table 1. Description of examined habitat variables.

Variable	Code	Collection Method
Coverage (horizontal plane)		
1. Number of bare ground intersections	HBARE	Point-intercept
2. Number of grass intersections	HGRASS	Point-intercept
3. Number of forb intersections	HFORB	Point-intercept
4. Number of litter intersections	HLITTER	Point-intercept
5. Number of shrub intersections	HSHRUB	Point-intercept
Structure (vertical plane)		
1. Number of grass contacts	VGRASS	Vertical pole intercept
2. Number of forb contacts	VFORB	Vertical pole intercept
3. Number of shrub contacts	VSHRUB	Vertical pole intercept

Table 2. Detection frequencies for selected birds wintering in Mexico.

Species	# plots†	% plots‡	# ind.*	Pts.(50)**
Northern Harrier	9	9.2	9	545
Mourning Dove	22	22.4	147	223
Say's Phoebe	24	24.5	24	205
Horned Lark	15	15.3	164	327
Sprague's Pipit	11	11.2	18	446
Loggerhead Shrike	16	16.3	27	307
Chipping Sparrow	14	14.3	122	350
Clay-colored Sparrow	6	6.1	8	817
Brewer's Sparrow	23	23.5	179	214
Vesper Sparrow	60	61.2	446	82
Lark Bunting	4	4.1	125	1225
Baird's Sparrow	18	18.4	53	273
Grasshopper Sparrow	25	25.5	49	196
Chestnut-collared Longspur	43	43.9	1719	114
Eastern Meadowlark	8	8.2	56	613
Western Meadowlark	14	14.3	31	350

†Number of plots upon which each species was detected.

‡Percent of total plots upon which each species was detected.

*Total number of individuals of each species detected.

**Projected number of area search plots required to detect each species at 50 plots.

Table 3. Mean (± SE) values for vegetation variables in the horizontal plane. Means for species were calculated only from plots at which that species was detected.

Species	HBARE	HGRASS	HFORB	HLITTER	HSHRUB
OVERALL MEAN	**60.97 ± 30.25**	**50.10 ± 29.22**	**7.20 ± 8.76**	**39.05 ± 19.33**	**1.40 ± 5.18**
Northern Harrier	54.00 ± 21.02	55.86 ± 26.72	13.63 ± 6.41	36.63 ± 12.44	10.25 ± 13.63
Mourning Dove	52.07 ± 23.41	47.60 ± 21.68	8.13 ± 8.24	49.33 ± 13.58	1.40 ± 2.69
Say's Phoebe	71.65 ± 35.30	43.74 ± 32.41	7.26 ± 9.11	33.48 ± 24.89	0.26 ± 1.25
Horned Lark	75.50 ± 20.89	44.20 ± 22.63	5.84 ± 6.16	32.40 ± 10.43	1.60 ± 5.06
Sprague's Pipit	50.30 ± 18.43	63.20 ± 20.53	13.10 ± 6.95	33.00 ± 15.71	0.00 ± 0.00
Loggerhead Shrike	71.54 ± 37.08	44.23 ± 35.71	3.46 ± 4.54	39.85 ± 25.38	1.23 ± 4.44
Chipping Sparrow	51.31 ± 25.12	48.92 ± 23.33	3.23 ± 4.83	55.31 ± 16.66	0.23 ± 0.60
Clay-colored Sparrow	42.17 ± 23.17	62.17 ± 34.15	3.83 ± 4.36	50.83 ± 17.97	4.50 ± 8.17
Brewer's Sparrow	59.36 ± 26.37	50.68 ± 25.47	7.50 ± 6.00	37.55 ± 19.72	1.73 ± 4.75
Vesper Sparrow	53.86 ± 26.88	54.68 ± 30.41	8.63 ± 10.26	41.63 ± 18.33	2.29 ± 6.67
Lark Bunting	65.00 ± 12.19	40.75 ± 28.10	12.00 ± 6.53	41.50 ± 20.53	0.00 ± 0.00
Baird's Sparrow	48.89 ± 21.52	64.17 ± 31.86	5.67 ± 5.63	35.00 ± 16.65	0.39 ± 0.98
Grasshopper Sparrow	46.52 ± 27.93	69.36 ± 29.53	6.32 ± 5.23	36.48 ± 18.59	1.24 ± 4.32
Chestnut-collared Long.	52.14 ± 22.17	60.48 ± 27.50	8.67 ± 7.61	33.57 ± 14.10	1.19 ± 3.56
Eastern Meadowlark	54.50 ± 26.58	52.67 ± 36.50	12.17 ± 12.70	41.67 ± 25.45	5.67 ± 13.88
Western Meadowlark	61.07 ± 31.21	43.79 ± 31.28	14.36 ± 15.43	40.21 ± 19.85	0.07 ± 0.27

Table 4. Relationship of each horizontal vegetation variable to the overall mean for that variable. (-) indicates that the value is lower than the overall mean, (+) indicates that the value is higher than the global mean, and (0) indicates that the values are equal. Relationships are based on direct comparison of means--no statistical tests were performed because the comparison is only exploratory.

Species	HBARE	HGRASS	HFORB	HLITTER	HSHRUB
Northern Harrier	-	+	+	+	+
Mourning Dove	-	+	+	+	-
Say's Phoebe	+	-	-	-	-
Horned Lark	+	+	-	-	-
Sprague's Pipit	-	+	+	-	-
Loggerhead Shrike	+	+	+	0	-
Chipping Sparrow	-	-	-	+	-
Clay-colored Sparrow	-	+	-	+	+
Brewer's Sparrow	0	-	+	+	+
Vesper Sparrow	-	+	+	+	+
Lark Bunting	+	-	+	+	-
Baird's Sparrow	+	+	-	-	-
Grasshopper Sparrow	-	+	-	-	-
Chestnut-collared Long.	-	+	+	-	-
Eastern Meadowlark	-	-	+	+	+
Western Meadowlark	+	-	+	+	-

Table 5. Mean (± SE) values for vegetation variables in the vertical plane. Means were calculated only from plots at which the species in question was detected.

Species	VGRASS	VFORB	VSHRUB
OVERALL MEAN	**84.51 ± 73.19**	**11.47 ± 12.97**	**2.42 ± 6.30**
Northern Harrier	124.88 ± 77.95	18.63 ± 6.48	1.25 ± 2.55
Mourning Dove	107.80 ± 69.48	19.53 ± 12.53	8.87 ± 10.75
Say's Phoebe	53.52 ± 49.82	9.91 ± 12.01	1.09 ± 4.00
Horned Lark	53.60 ± 34.09	8.50 ± 13.71	1.00 ± 2.83
Sprague's Pipit	89.50 ± 48.71	14.60 ± 12.32	0.20 ± 0.42
Loggerhead Shrike	82.23 ± 106.18	3.54 ± 7.99	0.00 ± 0.00
Chipping Sparrow	111.62 ± 84.91	6.92 ± 8.11	3.54 ± 7.87
Clay-colored Sparrow	140.67 ± 77.30	14.83 ± 13.35	8.17 ± 10.46
Brewer's Sparrow	84.50 ± 67.14	14.77 ± 11.90	5.23 ± 9.01
Vesper Sparrow	102.54 ± 82.28	14.50 ± 15.19	3.25 ± 7.20
Lark Bunting	105.75 ± 90.21	24.25 ± 15.33	0.00 ± 0.00
Baird's Sparrow	127.56 ± 74.18	12.06 ± 12.00	3.67 ± 7.73
Grasshopper Sparrow	127.04 ± 77.45	13.40 ± 10.41	2.80 ± 5.58
Chestnut-collared Long.	100.90 ± 59.90	10.76 ± 9.85	1.52 ± 4.70
Eastern Meadowlark	81.33 ± 65.05	19.00 ± 15.14	1.17 ± 2.86
Western Meadowlark	114.07 ± 117.40	21.57 ± 20.80	1.64 ± 5.58

Table 6. Relationship of each vertical vegetation variable to the overall mean for that variable. (-) indicates that the value is lower than the overall mean, (+) indicates that the value is higher than the global mean, and (0) indicates that the values are equal. Relationships are based on direct comparison of means--no statistical tests were performed because the comparison is only exploratory.

Species	VGRASS	VFORB	VSHRUB
Northern Harrier	+	+	-
Mourning Dove	+	+	+
Say's Phoebe	-	-	-
Horned Lark	-	-	-
Sprague's Pipit	-	+	-
Loggerhead Shrike	-	-	-
Chipping Sparrow	+	-	+
Clay-colored Sparrow	+	+	+
Brewer's Sparrow	-	+	+
Vesper Sparrow	+	+	+
Lark Bunting	+	+	-
Baird's Sparrow	+	-	+
Grasshopper Sparrow	+	0	0
Chestnut-collared Long.	+	-	-
Eastern Meadowlark	-	+	-
Western Meadowlark	+	+	-

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