

Evaluation of Bias in Roadside Point Count Surveys of Passerines in Shrubsteppe and Grassland Habitats in Southwestern Idaho¹

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Abstract: Breeding passerine abundances in Great Basin shrubsteppe and grassland habitats were surveyed in southwestern Idaho by using 73 pairs of 200-m radius circular point counts. Points were placed along roads and paired with points 400 m away from roads but in similar habitat. Grassland species such as Horned Larks (*Eremophila alpestris*) and Western Meadowlarks (*Sturnella neglecta*) accounted for 65 percent and 21 percent of the total number of individuals counted in both habitat types. Typical shrubsteppe bird species such as Sage (*Amphispiza belli*) and Brewer's sparrows (*Spizella breweri*), and Sage Thrashers (*Oreoscoptes montanus*) were less common (11 percent of the total counted). Except for Western Meadowlarks ($P < 0.05$), all comparisons between the number of individuals of a species counted at points on- versus off-roads were statistically insignificant ($P > 0.20$). Meadowlarks were likely over-sampled along roads because of the presence of adjacent fences, which provide conspicuous song perches.

Passerine birds are a conspicuous element of Great Basin shrubsteppe habitats (Rotenberry and Wiens 1978, 1980; Smith and others 1984; Wiens and Rotenberry 1981). Because of several important ecological attributes that these species exhibit, monitoring their abundances over relatively large spatial scales can be of interest. For example, because their position is relatively high in the food chain, and because several species may exhibit rather narrow habitat associations, songbirds may serve as sensitive indicators of ecosystem disturbance or other habitat changes.

Before any monitoring scheme can be implemented, however, its methodology must be verified. One sampling method widely used throughout North America is the USDI Fish and Wildlife Service's Breeding Bird Survey (BBS) (Bystrak 1981, Droege 1990). Each survey route is a series of 50 3-min point counts conducted along a 25-mi (40-km) stretch of road. One potential bias of surveying from roads, however, is the inevitable edge, or discontinuity in habitat, created by the road itself. The potential difference between the species and their abundance detected from roads and those detected in similar habitat away from roads ("roadside bias") has only rarely been examined (Hutto and Hejl, Keller and Fuller, Ralph and others, in these Proceedings).

We systematically surveyed breeding passerine abundances at paired on- and off-road sites throughout the Snake River Birds of Prey Area (SRBOPA) in southwestern Idaho. We asked if abundances of species surveyed along roads were the same as those surveyed in similar habitat but away from roadsides. Our results provide estimates of any

bias due to sampling along roads associated with BBS or similar large-scale surveys conducted in shrubsteppe habitats.

Methods

Study Area

The 195,325-ha SRBOPA, located south of Boise and west of Mountain Home on the Snake River Plains of southwestern Idaho, contains a mosaic of native shrubsteppe and grassland habitat types interspersed with large patches of disturbed (mostly burned) areas dominated by exotic annual plants (fig. 1). Common shrubby species include big sagebrush (*Artemisia tridentata*), winterfat (*Ceratoides lanata*), shadscale (*Atriplex confertifolia*), and russian thistle (*Salsola iberica*). The dominant grasses are *Bromus tectorum*, *Poa secunda*, *Sitanon hystrix*, and *Vulpia octoflora*.

Point Selection

During the April-June 1991 passerine breeding season, we established 73 pairs of points scattered throughout the SRBOPA. One member of each pair was located ≤ 25 m from a road, and each was matched with a companion point > 400 m away from the road but in similar habitat. One point in the pair was selected first from existing vegetation survey transects randomly located throughout the SRBOPA (Knick 1990), then matched with a companion. All points were permanently marked and their location determined within $\pm 2-5$ m with a Global Positioning System. Habitat within a 200-m radius of each point was classified into a discrete type (grassland or shrubsteppe), based on the physiognomy of the dominant vegetation. If necessary, the final location of a sampling point was adjusted to maintain homogeneity of major habitat type within a 200-m radius. Road types ranged from paved to two-tracked, well-traveled dirt roads.

Survey Methods

At each point, counts were made of all birds [excluding Common Ravens (*Corvus corax*) and falconiforms] seen or heard within a 200-m radius during a 3-minute period. Previous experience indicates good detectability of most shrubsteppe passerines out to this distance. All surveys were conducted between 0600 and 1000 on mornings with little wind (0 to 5 km/h) and no rain. On days when two observers were used, on- and off-road sampling responsibilities were randomly assigned to avoid bias.

Statistical Analysis

A datum was the number of individuals of a species counted within a 200-m radius of a sampling point (12.57 ha) during 3 minutes. Differences in species abundances between on- and off-road counts were compared using a nonparametric

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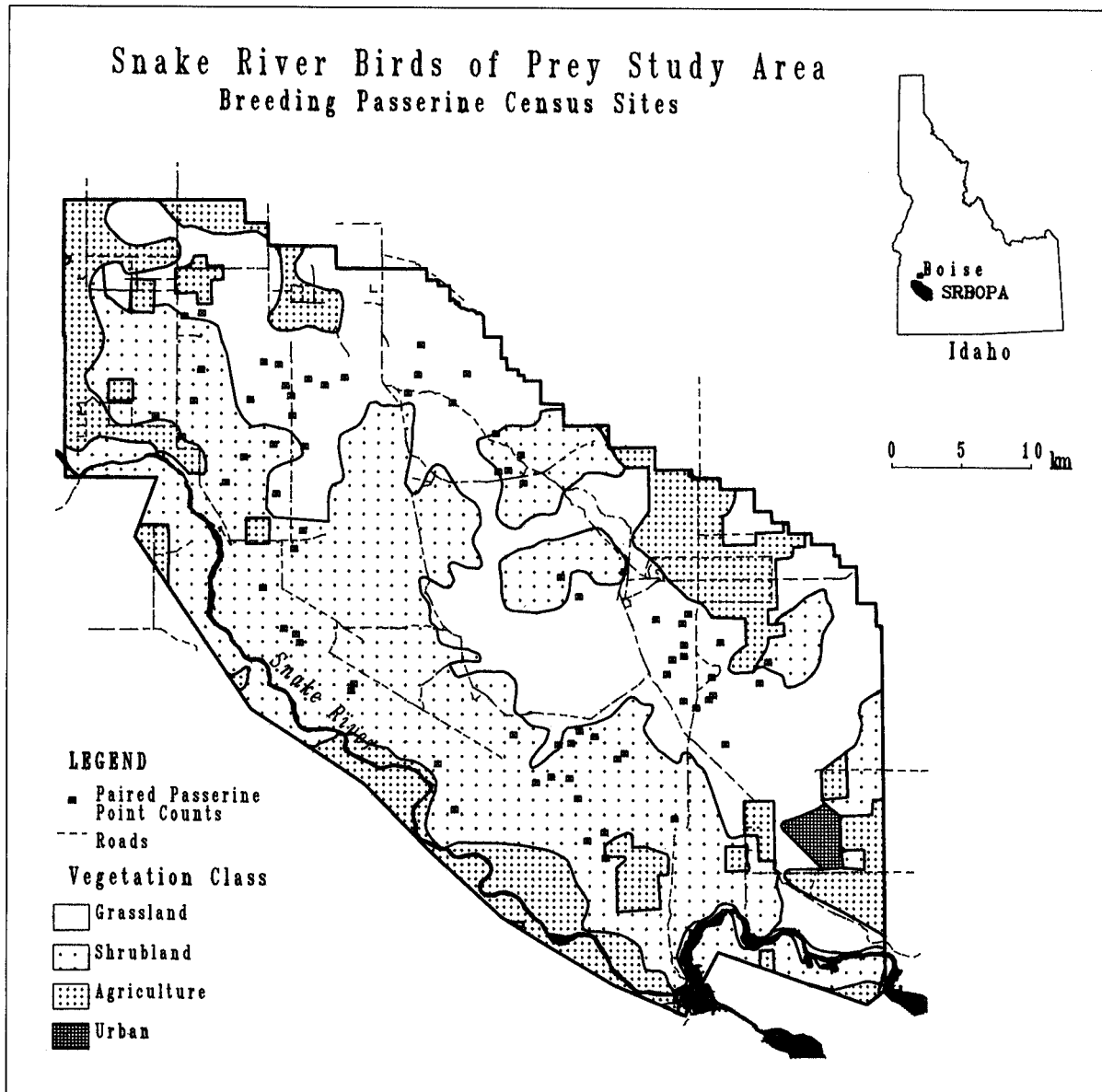


Figure 1—Distribution of paired passerine point counts throughout the Snake River Birds of Prey Area. For clarity, only graveled roads are shown.

paired Wilcoxon test, whereas associations in abundances between on- and off-road counts were assessed using a nonparametric Spearman rank correlation (Sokal and Rohlf 1981). All analyses were performed on untransformed data.

Results

General Patterns

We conducted 73 pairs of point-count censuses (146 total censuses) between April 30 and June 21, 1991. Of these, 27 pairs were in grassland habitat and 46 in shrub habitat (*table 1*). Only five species in this low-diversity ecosystem occurred on counts frequently enough to make statistical analyses meaningful. By far, the most abundant and widely distributed birds were Horned Larks; they accounted for 65 percent of the total number of individuals counted ($n = 1,534$) and appeared on

138 of 146 point counts. Western Meadowlarks were also common, accounting for 22 percent of the total number of individuals and occurring on over 70 percent of the counts.

Although most counts were conducted in shrub-dominated habitat types (*table 1*), typical shrubsteppe bird species such as Sage and Brewer's sparrows, Sage Thrashers, Rock Wrens (*Salpinctes obsoletus*), and Lark Sparrows (*Chondestes grammacus*) were much less common, representing only 11 percent of the total counted. Of the group, only Brewer's Sparrows occurred on more than 10 percent of the shrub habitat counts (54 of 92).

On-Road and Off-Road Comparisons

Except for Western Meadowlarks, all comparisons between the number of individuals of a species counted at

Table 1--Numbers of individuals seen on 3-minute, 200-m radius-point counts on- versus off-roads in different habitat types on the SRBOPA, April-June, 1991. Entries are the average (and standard deviation) of numbers of individuals counted. Values <0.05 are not shown.

Species	Shrublands (n = 46 pairs)		Grasslands (n = 27 pairs)		Total (n = 73 pairs)	
	On-road	Off-road	On-road	Off Road	On-road	Off-road
Grassland Species						
Horned Lark	5.9 (3.31)	6.2 (3.98)	8.1 (3.77)	8.4 (4.27)	6.7 (3.62)	7.0 (4.21)
Western Meadowlark	2.7 (2.25)	2.5 (2.32)	2.1 (1.82)	1.5 (1.78)	2.5 (2.10)	2.1 (2.17)
Shrubland Species						
Brewer's Sparrow	1.4 (1.57)	1.4 (1.57)	0.2 (0.79)	0.1 (0.32)	0.9 (1.44)	0.9 (1.41)
Sage Sparrow	0.2 (0.66)	0.2 (0.70)	-	-	0.1 (0.53)	0.1 (0.56)
Sage Thrasher	-	0.1 (0.31)	-	-	-	0.1 (0.25)

points on- versus off-roads (table 1) were statistically insignificant (paired Wilcoxon test; all $P > 0.20$). These comparisons were made both throughout the SRBOPA as a whole and within each of the two major habitat types. Additionally, the Spearman rank correlations between the number of individuals counted at each location on- versus off-roads were highly significant for all species except Sage Thrashers (Horned Lark $r_s = 0.46$, Brewer's Sparrow $r_s = 0.69$, Sage Sparrow $r_s = 0.57$, all $P < 0.001$; Sage Thrasher $r_s = -0.03$, $P = 0.8$; all $df = 71$), indicating a good agreement between the two.

The number of Western Meadowlarks differed significantly between on- versus off-road counts only when pooled over both habitat types. However, the Spearman rank correlation between the two sets of counts was highly significant ($r_s = 0.69$, $df = 71$, $P < 0.001$), implying that on-road counts were likely a reliable index to meadowlark abundances determined from off-road ones.

Discussion

The absence of a "road effect" (except for Western Meadowlarks) may have several explanations. For one, roads likely represent much less of a habitat discontinuity in grasslands and shrubsteppes than they do in more physiognomically developed woodlands or forests. This may be particularly true in the SRBOPA where many of the roads are unpaved and have relatively narrow associated rights-of-way. For another, many shrubsteppe species have relatively large territories and may be more able to incorporate small patches of unsuitable habitat than species with smaller territories (Wiens and others 1985). Finally, for Sage Thrashers, which were encountered

only infrequently, our sample size is likely too small to generate sufficient statistical power to detect any but the most obvious of differences.

We suspect that the "road effect" associated with Western Meadowlarks is really more of a "fence effect." Many roadway rights-of-way in western rangelands are delimited by fences to reduce access by livestock, and many tertiary roads are developed along pre-existing fence-lines. The posts and wires of these fences, which usually protrude above the average vegetation height in these short-statured habitats, provide elevated song perches favored by this species, thus increasing their conspicuousness (Lanyon 1957).

In summary, our analysis suggests that point counts distributed alongside secondary and tertiary roads in Great Basin shrubsteppe and grassland habitats tend to overrepresent abundances of Western Meadowlarks compared to points located away from roads, but otherwise appear to be unbiased surveys of other common species. Even for meadowlarks, the numbers counted off-road and on-road at a site were highly correlated and thus may provide a suitable index. We conclude that a network of roadside point counts can serve adequately to monitor regional population abundance patterns for common passerine species in Great Basin shrubsteppe and grassland habitats.

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