CHAPTER 7

SPECIES GROUPS AND SPECIES RICHNESS

In this chapter, we place the 11 species of concern into three groups and map species of concern richness in sagebrush habitat in the assessment area for each group. This regional-level mapping of species richness, together with sagebrush patch size data from Chapter 3 and the risk analysis presented in Chapter 4, is incorporated into the regional multi-species conservation planning approach presented in Chapter 8.

The conservation vision statement set forth in CDOW's strategic plan emphasizes the development of management approaches encompassing multi-species communities across the landscape. The species group approach is a practical method of addressing the needs of individual species with overlapping ranges and similar habitat requirements.

Methods

Designating Species Groups

We reviewed the literature to identify habitat requirements for each species of concern (see Chapter 5 and species profiles in the Appendix). We explored grouping species by level of sagebrush dependence, principal habitat associations, range overlap, and physiognomic, floristic, and landscape-scale requirements in sagebrush habitat. Our species group designations were ultimately driven by a combination of these factors and by similarities in management requirements. Landscape-scale factors such as total amount of suitable habitat in sagebrush and patch-size requirements were the most influential in our group designations, while habitat features important at the local scale, such as shrub height and percent canopy cover preferences, were less important but helped us refine the groups. Table 7-1 presents the primary factors we considered when forming species groups, roughly in order of importance.

Species Richness Analysis

To identify geographic areas of focus for conservation planning, we initially performed a watershed-level (USGS hydrounit-level) analysis of habitat abundance vs. habitat risk (composite conditions mapping) for each species group across the assessment area, an approach used in similar habitat assessments and planning efforts in the western U.S. (Beever and Pyke 2002; Wisdom et al. 2003a; Wisdom et al. 2003b). However, we ultimately found the watershed-level analysis too coarse for describing and prioritizing the most important or most at-risk sagebrush habitats, primarily because of the discontinuous distribution of sagebrush in the assessment area. For instance, the Gunnison Basin, a significant sagebrush stronghold, is divided between several watersheds, with sagebrush constituting only a fraction of each watershed. As a result, the analysis ranked the Gunnison Basin watersheds at low or moderate sagebrush habitat abundance, which did not reflect on-the-ground conditions within the Basin, and created biased management priority rankings. We therefore ultimately abandoned this approach and used a species richness analysis to identify and prioritize areas for conservation planning.

The species richness analysis is similar to the procedure used by Knick et al. (2003) to assess conservation and research needs for sagebrush avifauna. For this approach, we used the sagebrush habitat maps for each species of concern developed in Chapter 6. For each species group, we used GIS to count the number of species in each group with sagebrush habitat in each 30 x 30 meter sagebrush cell. Richness values ranged from 0 to the total number of

species in the group (3 or 4). We then depicted sagebrush habitat for each group, classified by the species richness value.

Results

Species Groups

The members of the three species groups are listed on Table 7-1. We refer to Brewer's sparrow, sage sparrow, sage thrasher, and sagebrush vole as Group 1; black-throated sparrow, kit fox, northern harrier, and vesper sparrow as Group 2; and green-tailed towhee, lark sparrow, and Merriam's shrew as Group 3. Each of the three species groups falls within a distinct set of habitat requirements and preferences.

Group 1 species are widely considered sagebrush obligates; significantly more of the total habitat for each of these species in the assessment area is sagebrush than non-sagebrush land cover types. Group 1 birds are also believed to be area-sensitive, requiring relatively large patches of sagebrush for breeding habitat. Group 1 species generally prefer fairly monotypic shrub stands, taller shrubs, and more shrub canopy cover than many of the other species of concern.

Group 2 species are less strongly associated with sagebrush in the assessment area (about 20 to 60 percent of their suitable habitats were identified as sagebrush). They tolerate a spectrum of patch sizes, shrub heights, and types of shrub stands, while generally preferring less shrub canopy and possibly more herbaceous ground cover than other species of concern.

Group 3 is moderately associated with sagebrush in the assessment area (31 to 60 percent of their suitable habitats were identified as sagebrush), and its two avian members are associated with habitat edges, ecotones, relatively high shrub diversity, and habitat patchiness. All three members of Group 3 tolerate scattered trees in shrublands, whereas most of the other species of concern, with the possible exception of black-throated sparrow (Group 2), do not. We placed Merriam's shrew in Group 3 based on its modeled degree of association with sagebrush in the assessment area, and on published habitat descriptions, which seemed to fit well with, or at least did not conflict with, descriptions of green-tailed towhee habitat.

Species Richness in Sagebrush Habitat for Groups

Species richness in sagebrush habitat across the assessment area for each species group is shown in Figures 7-1, 7-2, and 7-3. For Group 1, maximum species richness (n=4) occurs in the northern part of the assessment area, in Moffat and western Rio Blanco counties and North Park. This reflects the somewhat limited distributions of sage sparrow and sagebrush vole. The next most species-rich areas (n=3) are concentrated in the same areas, as well as in the Laramie River drainage, Middle Park, Routt and Mesa counties, Dry Creek Basin in San Miguel County, the San Luis Valley in Costilla County, and lower elevations of the Gunnison Basin.

For Group 2, maximum species richness (n=4) occurs in only a few places in the southwestern part of the assessment area, due to the restricted distributions of kit fox and black-throated sparrow habitat. Maximum species richness occurs in relatively small areas of primarily Mesa, Montrose, San Miguel, and Montezuma counties. The next most species-rich areas (n=3) occur in mostly the same areas, with additional concentrations in central Garfield and western Rio Blanco and Moffat counties.

For Group 3, maximum species richness (n=3) is very extensive throughout the assessment area, reflecting the wide distribution of all Group 3 species and to some extent the smaller number of species in this group compared to the other groups. All of the principal sagebrush areas in the assessment area contain large areas of maximum species richness for Group 3.

Discussion

Management of specific areas on behalf of a species group will not equally benefit all species in the group. Nevertheless, groups can be adaptively used to address the needs of both individual species and groups of species by first setting management for groups, then testing the benefits of that management for individual species, and then adjusting management direction (or groups) as necessary to best benefit all species of concern (Wisdom et al. 2004; Wisdom et al. 2003a).

The species richness maps (Figures 7-1, 7-2, and 7-3) indicate important differences between species groups in the location of maximum and near-maximum species richness. High species richness occurs for Group 1 in northern counties, for Group 2 in southwestern counties, and for Group 3 broadly throughout the assessment area. While managing all sagebrush areas is important, the species richness analysis indicates that management efforts in the northern counties will provide the most benefit to Group 1 species (sagebrush obligates) as a whole. Areas of low, medium, and high management emphasis are designated for each species group in Chapter 8.

Assumptions and Limitations

- Species groups are imperfect proxies for individual species of concern. How these groups will perform as manageable units on behalf of individual species will need periodic evaluation.

- The species richness maps were derived from GIS analyses described in previous chapters, including the estimation of current sagebrush extent (Chapter 3) and species ranges and habitats (Chapter 6). As a consequence, the species richness maps are subject to the same assumptions and limitations as the source data used to create them. Habitat mapping for the species of concern is probably good at the coarse scale appropriate for this assessment, at least for the better-known species (see Chapter 6 for limitations).

Key Findings

- We designated three species groups: Group 1 - Brewer's sparrow, sage sparrow, sage thrasher, and sagebrush vole; Group 2 - black-throated sparrow, kit fox, northern harrier, and vesper sparrow; and Group 3 - green-tailed towhee, lark sparrow, and Merriam's shrew.

- We used GIS to estimate species richness in the assessment area for each species group, using data developed in previous chapters on sagebrush extent and individual species' ranges and habitat.

- Areas of maximum and near-maximum species richness in sagebrush habitat vary substantially among species groups. High species richness is concentrated for Group 1 in the northern counties, for Group 2 in the southwestern counties, and for Group 3 broadly throughout the assessment area. These differences reflect the differing habitat distributions among the species in the groups, and to a lesser extent the smaller number of species (3) in Group 3 compared to the other groups (4 species).

Literature Cited

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Table 7-1. Species groups based on a spectrum of sagebrush habitat characteristics and preferences in the assessment area.

Group	Species Groups	<30% habitat in sagebrush	>31% and <60% in sagebrush	>61% habitat in sagebrush	smaller patches	spectrum of patch sizes ok	larger patches	edge or ecotone	either edge or interior ok	interior	patchy shrub distribution	range of shrub distribution patterns ok	uniform shrub distribution	monotypic shrub stands	either shrub stand type ok	mixed shrub stands	shorter shrubs	spectrum of shrub heights ok	taller shrubs	lower % shrub cover	range of shrub cover ok	higher % shrub cover	lower % herbaceous cover	range of herbaceous cover ok	higher % herbaceous cover	no trees	either no trees or scattered trees ok	requires scattered trees
Group 1	Brewer's sparrow		x			x			x			x		x				x			x		x			x		
Group 1	Sage sparrow		x			x			x			x		x				x			x		x			x		
Group 1	Sage thrasher		x			x			x			x		x				x			x		x			x		
Group 1	Sagebrush vole		x		x			x			x			x			x			x			x			x		
Group 2	Black-throated sparrow	x				x			x				x	x			x			x			x				x	
Group 2	Kit fox	x					x	x				x		x			x			x			x			x		
Group 2	Northern harrier		x				x	x				x		x			x				x			x		x		
Group 2	Vesper sparrow		x		x			x				x		x			x			x			x			x		
Group 3	Green-tailed towhee	x			x			x			x					x		x				x	x					x
Group 3	Lark sparrow	x			x			x			x				x		x			x			x					x
Group 3	Merriam's shrew	x			x			x			x				x		x				x		x					x