

BREWER'S SPARROW

Spizella breweri

Description

Two subspecies are recognized. *S. b. breweri* breeds in the sagebrush shrublands of the intermountain west (1999).

Brewer's sparrow is the smallest North American sparrow, with a long, notched tail and short bill, a finely streaked brown crown and rump, a complete white eye ring, and a uniformly drab color with no other distinct markings (Sibley 2000). The iris is dark hazel or blackish, feet and legs are a pale pinkish or pale horn color; the bill is dull blackish or gray to pale brown or dull pink with a dusky tip. Males and females are similar in appearance (Rising 1996).

It is unclear whether nesters recorded by the Colorado BBA project in high country willows belong to a separate species proposed by some experts as timberline sparrow, *Spizella taverneri*, or to the subspecies, *S. b. taverneri* (Lambeth 1998).

Life history & behavior

An obligate shrubland nester and shrub canopy-foraging opportunistic omnivore.

Breeding males sing frequently and conspicuously from the tops of shrubs.

Brewer's sparrows begin arriving on their breeding grounds in mid-April and depart by mid-October (Andrews and Righter 1992). They nest primarily in shrubs. They begin nesting relatively late, and typically produce only one brood (Lambeth 1998), but they may occasionally raise two broods in a season with 3 to 4 eggs per clutch (Rotenberry et al. 1999). Clutch size is significantly larger following wetter winters (Rotenberry and Wiens 1991).

Breeding males sing frequently and conspicuously from the tops of shrubs, and are thought to typically return to breeding territories. Whether 25 percent return rates of breeding males in southeastern Idaho and central Oregon reflect dispersal or mortality during the non-breeding period is undetermined (Rotenberry et al. 1999).

Natal site fidelity appears to be low; none of 400 banded nestlings were observed breeding near natal sites (Rotenberry et al. 1999).

Brewer's sparrows forage mostly in shrub canopies, gleaning insects from stems, leaves, and bark. They will also glean seeds from plants or take them from the ground; Rotenberry et al. (1999) noted that they will fly up and capture insects on the wing.

Population trends

In decline rangewide; BBS trend estimates are significant.

Colorado trends tracked by MCB are as yet uncertain (T. Leukering, pers. comm.).

Standard BBS estimates (Sauer et al. 2004) show a pattern of significant long-term Brewer's sparrow declines throughout the BBS survey area. The following are selected annual average BBS trend estimates for the period of 1966 through 2003:

- 2.8% survey-wide ($P < 0.01$, $n = 481$, $RA = 7.91$)
- 0.5% in the Wyoming Basin ($P = 0.56$, $n = 51$, $RA = 27.4$)
- 3.4% in Colorado ($P < 0.01$, $n = 71$, $RA = 6.1$)

A recent spatial analysis by (Dobkin and Sauder 2004) comparing BBS data between two periods (1963 through 1983 and 1984 through 2001) suggests

BBS data should be interpreted with caution; the species may be poorly sampled in sagebrush ecosystems by BBS methods (Knick et al. 2003).

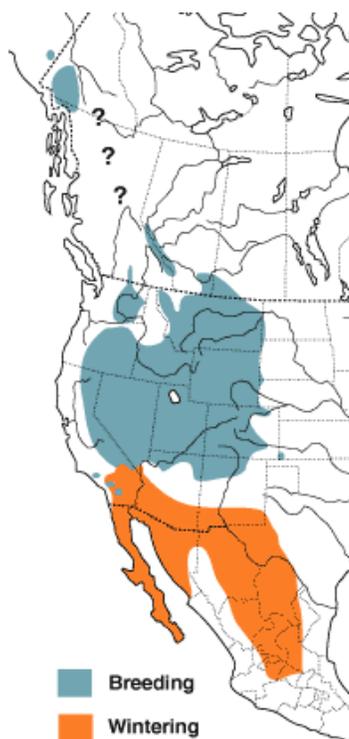
that Brewer's sparrows population trends are mixed; areas predicted to have more than 15 birds per route expanded by 12 percent in the western U.S. shrubsteppe ecoregions (in the core of Brewer's sparrow range), and routes with reduced abundances were located at the periphery of Brewer's sparrow range. When the authors compared shifts in detection frequencies on BBS routes during the same periods, the results suggested a decline in Brewer's sparrow abundances across southern and western Colorado, the northern extents of the Colorado Plateau, the southern Wyoming Basins, and the eastern extents of the Columbia Plateau.

Range

Brewer's sparrow remains extant in all states where it historically occurred. No data document historic continental-scale shifts in range.

Brewer's sparrow overall breeding range overlaps extensively with that of the sage sparrow (Rotenberry et al. 1999).

Overall range map reproduced from (Rotenberry et al. 1999) by permission.



Brewer's sparrow breeds in suitable habitat of the Intermountain West; the Great Plains east of the Rocky Mountains in Alberta, Saskatchewan, Montana, Wyoming and Colorado; portions of the Canadian Rockies in Alberta and British Columbia; and a mountainous region straddling the border of the Yukon and southeast Alaska (Rotenberry et al. 1999). Across its breeding range, centers of abundance are northern Nevada and southeastern Oregon, south-central Idaho, northeastern Utah, and northwestern Colorado (Sauer et al. 2004).

Winter range spans from southern and Baja California to west Texas, and south through northern Mexico (Rotenberry et al. 1999).

Colorado distribution patterns & abundance

In Colorado, Brewer's sparrows nest most commonly between 5,000 & 7,500 feet (Righter et al. 2004).

Colorado BBA ranked Brewer's sparrow as the twenty-sixth most numerous bird species in Colorado (Kingery 1998), with the majority of breeding bird confirmations in the state's northwestern corner (Lambeth 1998).

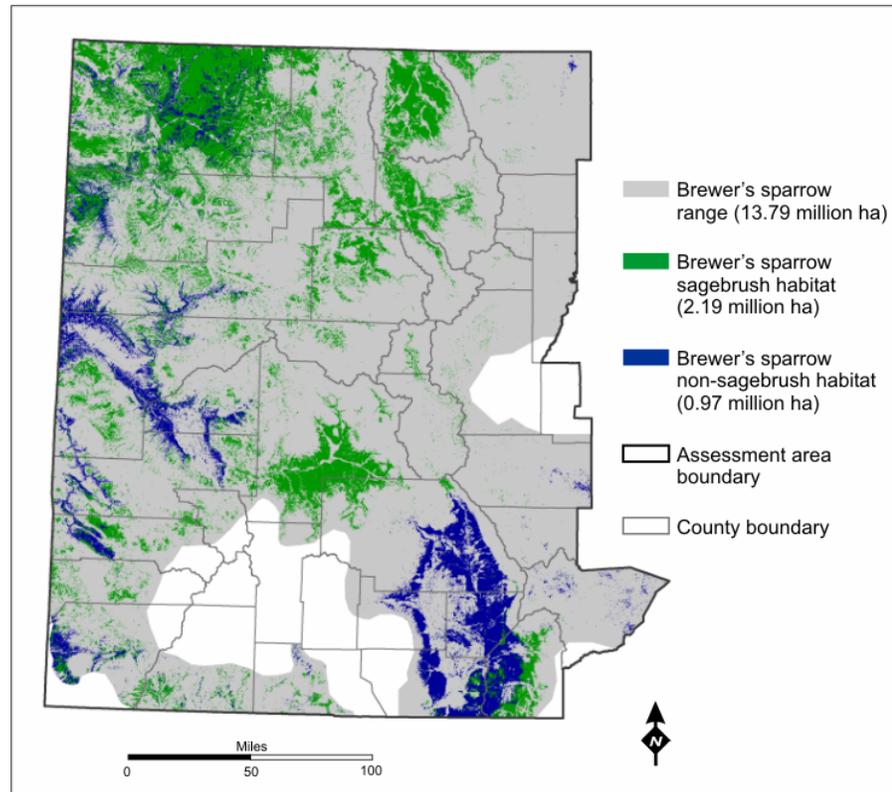
Breeding Brewer's sparrows are common on mesas and foothills throughout western Colorado, and locally common at lower montane elevations in suitable habitat. They are mostly absent from the San Juan Basin. Breeding pairs are generally uncommon or rare on Colorado's eastern plains and foothills, diminishing in abundance with decreasing latitude. Andrews and Righter (1992) and the Colorado BBA (Lambeth 1998) show similar summer distribution of this species.

The range of Brewer's sparrow in the assessment area encompasses approximately 13.79 million ha, with an estimated 3.16 million ha of suitable habitat.

Brewer's sparrows are often the most abundant bird on sagebrush shrubland breeding grounds (Rotenberry et al. 1999). In multiple studies reviewed by Rotenberry et al. (1999; none within Colorado), densities were 0.29 to 5.33 birds per ha. Between 1999 and 2003, MCB estimated Brewer's sparrow densities ranging from 0.428 to 0.900 birds per ha in sagebrush and 0.240 to 0.500 birds per ha in semi-desert shrublands (T. Leukering, pers. comm.).

Brewer's sparrows are widely distributed at lower elevations throughout the state during migrations. One "accidental" winter record exists from Delta County (Andrews and Righter 1992).

Distribution of the species in the state likely reflects changing patterns of sagebrush habitat quality and distribution.



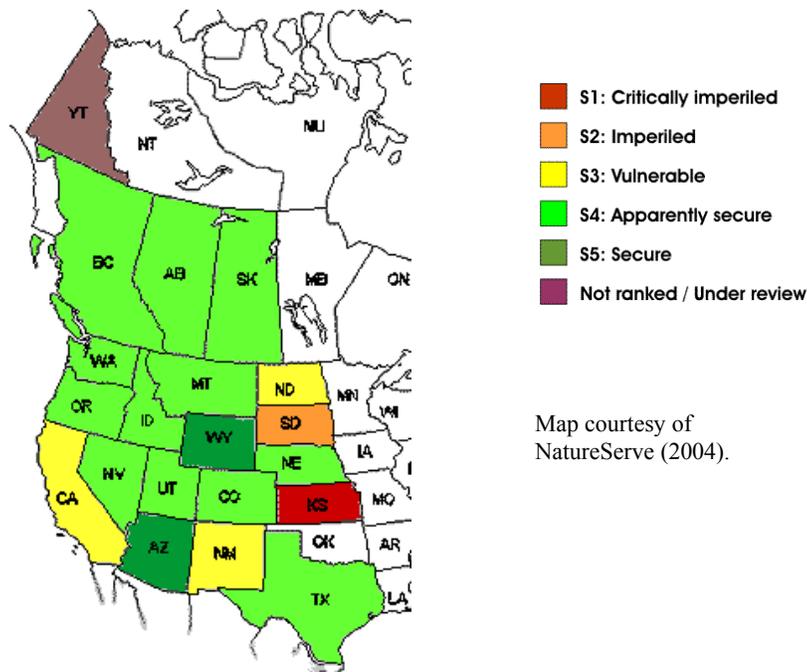
Conservation status

Ranked G5/S4, "demonstrably secure" rangewide and "apparently secure" in Colorado.

BLM species of concern in Wyoming and Idaho. A Forest Service Region 2 sensitive species.

Partners in Flight and Audubon watch-listed.

No legal status in any state.



Habitat

Experts consider Brewer's sparrow a sagebrush shrubland obligate (Braun et al. 1976; Knick and Rotenberry 2000; Rotenberry et al. 1999).

In the Colorado sagebrush assessment area, about 3.16 million ha of suitable habitat exists for Brewer's sparrow, 2.19 million ha of which is sagebrush shrublands (see figure in Colorado Distribution Patterns and Abundance).

Wiens and Rotenberry (1981) found a positive

Across their breeding range, Brewer's sparrows are shrubland specialists with a preference for sagebrush shrubsteppe (Rotenberry et al. 1999). In Colorado, Brewer's sparrows were recorded by the BBA project in 8 shrubland vegetation classes, with almost 60 percent of occurrences in sagebrush habitat (Lambeth 1998). The breakdown of Colorado BBA occurrences is as follows:

- 35% - mountain big sagebrush
- 25% - lowland sagebrush
- 12% - tall desert shrub
- 10% - shortgrass or tallgrass/sandsage
- 6% - montane grassland
- 7% - mountain shrub
- 2% - pinyon-juniper woodlands

From 1999 to 2003, MCB found the highest densities of Brewer's sparrow in sagebrush-dominated shrublands, the second-highest densities in semi-desert shrublands, followed by low densities in pinyon-juniper woodlands, grasslands, or mountain shrublands (T. Leukering, pers. comm.). Records of Brewer's sparrows in habitats other than shrublands may be artifacts of sampling procedures (R. Lambeth, pers. comm.).

Shrubs used by nesting Brewer's sparrows are principally subspecies of big sagebrush (*Artemisia tridentata*). Other shrubs are utilized if they meet physiognomic requirements of Brewer's sparrow, including spiny hopsage, bitterbrush, green rabbitbrush (Rotenberry et al. 1999), and mountain mahogany (Bailey and Niedrach 1965). However, Knick and Rotenberry (1995) found that probability of Brewer's sparrow occupancy increased in

distributional correlation between sage thrasher and Brewer's sparrow in the shrubsteppe of the northwestern United States, suggesting the two species have similar habitat affinities.

Studies in the Great Basin and Columbia Plateau indicate that the relationship between patch size and sagebrush cover is a strong predictor of breeding Brewer's sparrow presence, and that breeding birds respond to landscape characteristics on scales much larger than individual territories (Knick and Rotenberry 1995).

sagebrush habitat vs. habitats dominated by other shrubs (i.e., shadscale or winterfat). Brewer's sparrows are not known to nest in forest habitats.

Breeding Brewer's sparrows choose shrublands on rolling or flat topography with average shrub canopy height less than 1.5 m (Rotenberry et al. 1999). Multivariate analyses in the northwestern Great Basin showed Brewer's sparrow abundance is positively correlated with percent shrub cover, percent bare ground, and percent forb cover, and negatively correlated with percent litter cover, percent grass cover, rocky outcrops, and shrub species diversity (Rotenberry and Wiens 1980; Wiens and Rotenberry 1981). A habitat selection model for southwestern Idaho predicted local shrub cover and patch size were important determinants of site occupancy, and found that bird abundance was positively correlated with increasing sagebrush and spatial similarity of habitat, and decreasing disturbance, with disturbance characterized as Russian thistle coverage (Knick and Rotenberry 1995). In northwestern Colorado (Piceance Basin), Brewer's sparrows selected open habitats with low shrub species richness and large shrubs on gentle slopes far from habitat edges (Sedgwick 1987). Brewer's sparrows may occur in large openings (greater than 20 ha) in 4 to 17-year old chainings in pinyon-juniper (Sedgwick 1987) or large parks within coniferous or deciduous forests (Rotenberry et al. 1999).

Brewer's sparrows select taller, denser shrubs compared with surrounding shrubs (Petersen and Best 1987). They prefer nest shrubs that are entirely alive or mostly alive (Petersen and Best 1987; Rotenberry et al. 1999). Mean nest shrub heights range from 67 to 71 cm +/- 15 cm (information synthesized by Rotenberry et al. 1999). In Montana, Brewer's sparrows used sagebrush with an average of 13 percent canopy cover (Bock and Bock 1987).

Brewer's sparrows are area sensitive. Knick and Rotenberry (1995) found that probability of habitat occupancy for Brewer's sparrow in southwestern Idaho sagebrush shrublands increased with increasing values of both shrub cover and patch size. Patch size was not as important in predicting occupancy as it was for sage sparrow, however. Knick and Rotenberry (1999) also showed that Brewer's sparrow habitats included large shrub patches and relatively lower amounts of edge between shrubland and grasslands than habitats associated with horned lark and western meadowlarks. Recent work in northern Utah by Wilson et al. (In prep) showed that small patches of sagebrush may be suitable for Brewer's sparrow if sufficient resources are available in nearby patches. No Brewer's sparrows were detected in sagebrush meadows smaller than 40 ha when no other sagebrush patches were within 200 m. The authors caution that the occupancy of small sagebrush patches by Brewer's sparrow may be the result of source-sink and/or meta-population phenomena, however.

Brewer's sparrow mean territory size is highly variable among sites and years, ranging from 0.1 to 2.36 ha in studies reviewed by Rotenberry et al. (1999). Territories can be tightly packed. Wiens et al. (1985) showed that territory sizes did not vary systematically in relation to any measured physiognomic or floristic habitat characteristics, and that territory size may be, at least partially, density dependent.

During spring and fall migrations, Brewer's sparrows use shrubland habitats

similar to their breeding habitats throughout Colorado's western valleys, foothills, and mountain parks, and riparian shrub corridors on the eastern plains near foothills (Andrews and Righter 1992). On their winter range, Brewer's sparrows occur in dry, shrubby, lowland habitats dominated by sagebrush or desert shrubs (Rotenberry et al. 1999).

Threats & sensitivities

In western Colorado, where sagebrush makes up about 69 percent of Brewer's sparrow suitable habitat, threats to sagebrush are a major concern.

See [Chapter 6](#) for more detail about habitat estimates and predictive threats modeling for Brewer's sparrow sagebrush habitat in the Colorado assessment area. [Chapter 4](#) presents rule sets for threats modeling in sagebrush habitat.

The effects of habitat fragmentation on Brewer's sparrow are significant, complex, and not yet well understood.

The effects of livestock grazing on Brewer's sparrow are likely mixed.

For Brewer's sparrows in the shrublands of the Intermountain West, loss, fragmentation, and degradation of sagebrush habitat are primary concerns (Knick and Rotenberry 2002; Paige et al. 1999; Paige and Ritter 1999).

In the Colorado sagebrush assessment area, where sagebrush makes up about 69 percent of Brewer's sparrow suitable habitat, threats to sagebrush are major concerns also. Brewer's sparrow sagebrush habitat in the assessment area is at risk of four widespread threats modeled in the Colorado sagebrush conservation assessment and strategy: pinyon-juniper encroachment, encroachment by invasive herbaceous plants, residential development, and energy development.

Residential development probably poses the lowest threat of the four, with an estimated 2 percent of Brewer's sparrow sagebrush habitat at high risk, 2 percent at moderate risk, and 14 percent at low risk. About 82 percent of Brewer's sparrow sagebrush habitat is at no risk of residential development based on our predictive model. Residential development threats to sagebrush are fairly scattered, with hot spots around Craig, Steamboat Springs, Granby, the Eagle River Valley, Aspen Valley and the Roaring Fork Valley, Hotchkiss and Cedaredge in Delta County, Cortez, Mancos, and Durango.

Pinyon-juniper encroachment risk is also relatively low. Our predictive model estimated 18 percent of Brewer's sparrow sagebrush habitat is at high risk of pinyon-juniper encroachment, while 27 percent is at moderate or low risk, and 56 percent is at no risk. Removal of pinyon-juniper canopy where an understory of sagebrush or mixed shrub communities exists may benefit Brewer's sparrow in the long term (Sedgwick 1987).

Risk of energy development is broadly moderate. About 58 percent of Brewer's sparrow sagebrush habitat is at moderate risk of energy development in the Colorado sagebrush assessment area, 35 percent is at low or no risk, and 8 percent is at high risk. Energy development can result in destruction, degradation, and fragmentation of habitat via mechanisms described in [Chapter 2](#). Sagebrush habitat at highest risk of energy development is scattered throughout the western-most counties in the assessment area, with larger hot spots clustered in Rio Blanco, Garfield, and southern La Plata Counties. Brewer's sparrows are likely to be sensitive to habitat fragmentation, given that their rate of habitat occupancy increases with less edge and larger patch size.

Over 99 percent of Brewer's sparrow sagebrush habitat is at some degree of risk of encroachment by invasive herbaceous plants. Our model predicts 23 percent at high risk, 18 percent at moderate risk, and 58 percent at low risk. The effects of invasive herbaceous plant encroachment on Brewer's sparrow sagebrush habitat are probably significant. Knick and Rotenberry (1995) showed that Brewer's sparrow habitat occupancy decreased with increasing

Brewer's sparrow responses to sagebrush range treatments are likely negative overall.

The effects of cowbird parasitism on Brewer's sparrow nesting success have not been studied in Colorado.

percent cover of Russian thistle. Sagebrush habitat at moderate or high risk of invasive herbaceous plant encroachment in Brewer's sparrow range is mostly broadly scattered across the western-most counties at lower elevations. Moffat and Rio Blanco counties contain the largest contiguous patches of sagebrush habitat at high risk.

There are no long-term, comprehensive studies comparing avifaunas of ungrazed and grazed sagebrush shrubsteppe habitats in Colorado or elsewhere, but two recent literature reviews (Bock et al. 1993; Saab et al. 1995) tentatively concluded that the effects on Brewer's sparrow are mixed or negative. Saab et al. (1995) standardized relative mean abundances of Brewer's sparrows across studies (n=6) between grazed and ungrazed shrubsteppe habitats and determined Brewer's sparrows were about half as abundant on grazed sites, although the difference was not significant ($P=0.45$). Bock et al. (1993) concluded that grazing by cattle (intensity unspecified) in shrubsteppe during the growing season negatively affected Brewer's sparrow. The mechanisms of grazing impacts are uncertain. Impacts can be direct and short-term, such as nest disturbance or selective removal of understory cover; or indirect and long-term, influencing structural or floristic shifts in the plant community that make nesting conditions ultimately unfavorable. Livestock grazing is potentially associated with the introduction of exotic plants and higher densities of parasitic cowbirds in shrubland habitats.

Brewer's sparrow is probably sensitive in both short- and long-term to range treatments. In southern Oregon, Brewer's sparrow abundance dropped sharply the year following chemical treatment (19 to 26 percent sagebrush cover was reduced to 4 percent cover), doubled the second year to near pre-treatment levels, then dropped off again in the third year when sagebrush cover had stabilized at 10 percent for an overall decline in abundance (Wiens and Rotenberry 1985). In Wyoming, nesting bird abundances were reduced by 67 percent the first year and 99 percent the second year after spraying defoliated and killed sagebrush (Schroeder and Sturges 1975). Birds were significantly less abundant on study sites in Wyoming where sagebrush cover was significantly reduced by herbicides (from 36 percent pre-treatment to 15 percent post-treatment) 22 years previously (Kerley and Anderson 1995). In Idaho, densities declined for two years following a prescribed burn that left 50 percent of the sagebrush in a mosaic pattern of burned and unburned sagebrush, but recovered thereafter (sagebrush cover was reduced from an overall average of 21 percent to an average of 12 percent). Nest success rates were apparently unaffected during the study period (Petersen and Best 1987).

The effects of predation on Brewer's sparrow nest success and have not been studied in Colorado. Documented predators are Townsend's ground squirrel, gopher snake, loggerhead shrike, common raven, black-billed magpie, long-tailed weasel, least chipmunk, American kestrel, prairie falcon. Nest predation may play a major role in local reproductive success (Rotenberry et al. 1999).

Brewer's sparrows are relatively sensitive to brown-headed cowbird nest parasitism. However, no records of brood parasitism in Brewer's sparrow nests in Colorado exist (Chace and Cruz 1996). Parasitized nests are usually abandoned (Rotenberry et al. 1999). Visits to Brewer's sparrow nests by human observers do not appear to cue predators to nest locations. The

species seems to tolerate daily nest visits by researchers, but may desert nests if disturbed during construction process (Rotenberry et al. 1999).

Research needs

Brewer's sparrow densities do not necessarily imply preference for habitat conditions or correlation with nest success. Population monitoring should be coupled with investigation of nest success (including brood parasitism and predation) under alternate rangeland management and grazing regimes, over a spectrum of habitat conditions and geographic areas in Colorado. Further study of direct and indirect impacts of herbicides and pesticides typically used in sagebrush rangelands is needed.

Information is needed regarding landscape-scale patterns of habitat use, effects of habitat fragmentation, patch size dynamics, and habitat connectivity requirements of Brewer's sparrow. Since management of sage-grouse is such a rising issue, an understanding of the differences between the habitat requirements of sage-grouse and Brewer's sparrow would be helpful.

Study is needed to gain better understanding of wintering ecology and the effects of winter habitat degradation on Colorado's breeding populations.

Management issues

The history of sagebrush perceived as a weed is long. Acceptance of sagebrush as a desirable component of the range is coming in stages. Negotiating the acceptable acreage, height, and percent canopy cover of sagebrush is an ongoing issue in range management. Research and resolution of this issue is significant to the conservation of Brewer's sparrows and other sagebrush obligates.

Preservation, restoration, and beneficial management of sagebrush habitat may improve breeding conditions for Brewer's sparrows. Because patch size requirements for Brewer's sparrow are important but not completely understood, maintaining the largest patches possible (e.g., "bigger is better") should be a priority for fragmentation and area-sensitive species such as Brewer's sparrow. See [Chapter 3](#) for a discussion of patch size distribution of sagebrush in the Colorado sagebrush assessment area.

About 44 percent of Brewer's sparrow sagebrush habitat in the Colorado sagebrush assessment area is controlled by private landowners, posing a challenge for effective, integrated habitat management for the species. Nevertheless, about 73 percent of the sagebrush habitat managed by non-private entities is managed by the BLM, making it the public entity best-positioned to have a positive impact on the species.

Our threats analysis did not consider non-sagebrush vegetation types, which provide a significant amount (about 31 percent) of Brewer's sparrow habitat. Ideally, conservation planning and management of species of concern should consider all significant habitat types. Such an approach is beyond the scope of this assessment.

Several Brewer's sparrow characteristics present challenges for managers: 1) Suitable habitat may be unoccupied in one year, and occupied at high densities the next; assumptions derived from small-scale or short-term studies, especially where habitat correlations are to be used in conservation considerations, must be handled with extreme caution (Rotenberry et al. 1999). 2) Breeding adults have high site tenacity and return to previous breeding locations even after the habitat has been manipulated, potentially leading to biased conclusions about habitat preferences and effects of management activities (Wiens and Rotenberry 1985). 3) Males become

quieter after pairing; increased singing after failed nesting or delayed pairing due to weather fluctuations might falsely indicate relatively high populations (Lambeth 1998).

Removal of pinyon-juniper canopy where an understory of sagebrush or mixed shrub communities exists may benefit Brewer's sparrow in the long term (Sedgwick 1987).

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