# Sagebrush Sparrow

*Artemisiospiza nevadensis*

## REGULATORY STATUS

USFWS: Migratory Bird
USFS R2: Sensitive
USFS R4: No special status
Wyoming BLM: Sensitive
State of Wyoming: Protected Bird

## CONSERVATION RANKS

USFWS: Bird of Conservation Concern
WGFD: NSS4 (Bc), Tier II
WYNDD: G5, S3S4
Wyoming Contribution: HIGH
IUCN: Least Concern
PIF Continental Concern Score: 11

## STATUS AND RANK COMMENTS

The Wyoming Natural Diversity Database has assigned Sagebrush Sparrow (*Artemisiospiza nevadensis*) a state conservation rank ranging from S3 (Vulnerable) to S4 (Apparently Secure) because of uncertainty about the abundance and population trends of this species in Wyoming.

## NATURAL HISTORY

### Taxonomy:

In 2013, Sage Sparrow (*Artemisiospiza belli*, previously *Amphispiza belli* [1]) was split into two species based on genetic evidence and differences in ecology and morphology: Sagebrush Sparrow (*Artemisiospiza nevadensis*) and Bell's Sparrow (*Artemisiospiza belli*) [2, 3]. Only Sagebrush Sparrow is found in Wyoming. Due to the extremely recent nature of this taxonomic revision, most of the references cited in this account refer to Sage Sparrow as it was recognized before the split. There are currently no recognized subspecies of Sagebrush Sparrow [4].

### Description:

Identification of Sagebrush Sparrow is possible in the field. Adults weigh between 15.3–21.9 g, range in length from 12.1–15.0 cm, and have a wingspan of approximately 21.0 cm [3, 5]. The sexes are similar in appearance, but males are larger than females [3]. Adults have a pale grey head; black eyes with a complete white eye ring; white spots above the lores; white malars; gray bill; white throat and whitish underparts with an isolated dark spot on the breast; pale grayish brown upperparts with dark streaking on the mantle; dark brown tail; and brown legs [3, 5]. Sagebrush Sparrow is similar in size and appearance to several other sparrow species in its range. Unlike Sagebrush Sparrow, Brewer's Sparrow (*Spizella breweri*) has indistinct facial markings and an unmarked breast, Vesper Sparrow (*Pooecetes gramineus*) has vertical dark streaking on the breast, and Lark Sparrow (*Chondestes grammacus*) has bold black, white, and rufous facial markings [5].

**Distribution & Range:**
The breeding and year round distribution of Sagebrush Sparrow is spread widely across the Great Basin and interior western United States, while that of Bell's Sparrow is restricted to parts of California, San Clemente Island, and the Baja Peninsula [2]. The breeding ranges of these two species overlap in eastern California; however, interbreeding is believed to be limited [2, 6, 7]. Sagebrush Sparrow migrates through Wyoming in the spring and fall and is a summer resident [8, 9]. It has been observed across most of the state [8], but is most abundant in the southwestern counties [9]. Confirmed and suspected breeding has been documented in 17 of the 28 latitude/longitude degree blocks [8]. Sagebrush Sparrow winters in the southwestern United States, and south to central Baja California and northern mainland Mexico [2].

**Habitat:**
Sagebrush Sparrow is a sagebrush-obligate species that breeds preferentially in arid shrublands dominated by Big Sagebrush (*Artemisia tridentata*) [3, 9]. This species will breed in both pure sagebrush stands and those mixed with other arid shrub species such as Antelope Bitterbrush (*Purshia tridentata*), rabbitbrush (*Chrysothamnus* and *Ericameria* spp.), saltbush (*Atriplex* spp.), and Greasewood (*Sarcobatus vermiculatus*) [3]. Sagebrush Sparrow is typically found in sagebrush shrublands with tall, robust shrubs interspersed with open areas and limited herbaceous groundcover [3, 9]. Most nest sites are located in shrubs, especially those that are tall and healthy, with large canopies and at least 75% live foliage; however, this species may occasionally nest beneath shrubs or in clumps of bunchgrass [3]. Females construct open cup nests out of twigs, grasses, and other plant material, and may line the inside with feathers and animal hair [3].

**Phenology:**
Spring arrival of migrating and breeding Sagebrush Sparrow in Wyoming occurs from mid- to late March, and peaks in April [9]. Most clutches are likely initiated from early April through mid-June. Clutch size ranges from 1–4 eggs, with most containing 3 eggs [3]. Eggs hatch after being incubated by the female for 10–16 days, and young fledge 9 or 10 days after hatching [3]. Sagebrush Sparrow typically has 2 broods per year, although some pairs may raise 3 broods in a single breeding season [3]. The timing of fall migration from Wyoming to wintering grounds is not well known [9].

**Diet:**
During the breeding season Sagebrush Sparrow is omnivorous, foraging on the ground around shrubs for insects and spiders, larvae, seeds, fruits, and succulent leaves [3]. This species is granivorous in the non-breeding season, but will opportunistically consume insects in addition to a main diet of seeds and plant matter [3].

## CONSERVATION CONCERNS

**Abundance:**
**Continental**: WIDESPREAD
**Wyoming**: COMMON
In 2013, Partners in Flight estimated that Sage Sparrow (i.e., combined populations of the currently recognized Sagebrush Sparrow and Bell's Sparrow, prior to the taxonomic split) had a global population of approximately 4 million individuals and a Wyoming population of approximately 400,000 [10]; however, this abundance estimate is based primarily on Breed Bird Survey (BBS) data and should be viewed with caution. The species has an estimated statewide abundance rank of COMMON and also appears to be common within suitable environments in

the occupied area [8]. From 1968–2015, annual Wyoming BBS detections of Sagebrush Sparrow ranged from 1 to 664 (average = 224), with 278 recorded in 2015 [11]. Annual detections of Sagebrush Sparrow ranged from 290 to 567 during surveys for the Integrated Monitoring in Bird Conservation Regions (IMBCR) program between 2009–2015 [12]. Estimated mean density across this same time period was 4.60 birds per $km^2$ (standard deviation 1.40, standard error 0.53) in suitable habitats in Wyoming [12].

**Population Trends:**

**Historic**: UNKNOWN

**Recent**: STABLE

Like other sagebrush-obligate birds in North America, Sagebrush Sparrow appears to be declining across much of its continental distribution, with especially large, significant declines recorded in Idaho and Oregon [13, 14]. However, Wyoming trend data from the North American BBS indicate that Sagebrush Sparrow numbers experienced a statistically significant annual increase of 1.98% from 1968–2013 and a non-significant annual increase of 2.10% from 2003–2013 [13]. Survey-wide BBS trend data indicate that Sage Sparrow (*A. belli*) declined annually by 0.67% from 1966–2013 and 0.13% from 2003–2013; however, neither trend estimate was statistically significant [13].

**Intrinsic Vulnerability:**

HIGH VULNERABILITY

Sagebrush Sparrow has high intrinsic vulnerability in Wyoming because it is restricted to a narrow range of habitats. As a sagebrush-obligate species it is likely to be affected, either directly or indirectly, by any natural or anthropogenic stressors that negatively impact sagebrush shrublands in Wyoming.

**Extrinsic Stressors:**

MODERATELY STRESSED

Sagebrush Sparrow is moderately stressed by extrinsic stressors in Wyoming. Sagebrush habitat is threatened across the western United States, primarily due to anthropogenic activities [14]. Sagebrush shrublands are the predominant habitat type in Wyoming, but they are increasingly vulnerable to development for energy and infrastructure, the spread of invasive plant species, encroachment by native conifer species, disturbance from off-road recreational activities, drought and climate change, and conflicting management goals and practices [14, 15]. A majority of Wyoming's oil and natural gas development occurs in sagebrush habitats [14]. Multiple studies have identified negative direct and indirect effects of energy development on breeding Sagebrush Sparrows in the state, including decreased abundance [16-18], decreased daily nest survival [16, 19, 20], increased risk of nest predation by rodents [19, 21], and decreasing occupancy at the landscape scale with increasing road density [22]. However, Sagebrush Sparrow landscape-scale occupancy was actually positively associated with well pad density at one natural gas field in southern Wyoming [22]. Invasive plant species such as Cheatgrass (*Bromus tectorum*) can fill in the understory and open areas between shrubs, potentially reducing foraging habitat and food availability for Sagebrush Sparrow [23], and can alter natural fire regimes leading to reduced sagebrush cover on the landscape [14, 24]. As a sagebrush-obligate species that preferentially selects large, mature shrubs for nesting, Sagebrush Sparrow will likely respond negatively to disturbance events and management activities that substantially reduce sagebrush cover and the availability of mature shrubs [23-26]. This species has also shown sensitivity to habitat fragmentation [27, 28].

## KEY ACTIVITIES IN WYOMING

Sagebrush Sparrow is classified as a Species of Greatest Conservation Need (SGCN) by the Wyoming Game and Fish Department (WGFD), and as a Level I Priority Bird Species requiring conservation action in the Wyoming Bird Conservation Plan [29]. Current statewide activities for monitoring annual detections and population trends for Sagebrush Sparrow in Wyoming include the BBS program conducted on 108 established routes since 1968 [13], and the multi-agency IMBCR program initiated in 2009 [12]. In 2004 and from 2008 to present, the WGFD has funded graduate research at the University of Wyoming, in conjunction with the Wyoming Cooperative Fish and Wildlife Research Unit, to examine potential effects of oil and natural gas development on Sagebrush Sparrow and other sagebrush-obligate songbirds in Wyoming [16-21]. From 2011 to present, the WGFD has funded graduate research to determine if state-wide efforts to conserve the Greater Sage-Grouse (*Centrocercus urophasianus*) may simultaneously benefit other SGCN species, including Sagebrush Sparrow [30]. In 2016, the WGFD funded an additional project to examine the effects of climate on nongame sagebrush bird demography and populations. Field work is scheduled to begin in 2017. The United States Bureau of Land Management funded research from 2010–2012 to examine the potential effects of natural gas extraction infrastructure (i.e., roadways and well pads) on the distribution of sagebrush-obligate songbirds, including Sagebrush Sparrow, at a natural gas field in southern Wyoming [22].

## ECOLOGICAL INFORMATION NEEDS

Past and current research on Sagebrush Sparrow in Wyoming has focused on anthropogenic disturbance and the direct and indirect effects of various forms of energy development. Sagebrush Sparrow would benefit from research to determine its detailed distribution and actual abundance in the state, as well as how the species may be impacted by current and future management activities aimed at improving and conserving sagebrush habitat for livestock and wildlife (e.g., burning, chemical treatments, mowing, etc.).

## MANAGEMENT IN WYOMING

*This section authored solely by WGFD; Zachary J. Walker*. Sagebrush Sparrow is classified as a SGCN in Wyoming due to habitat loss and fragmentation. Currently, there are two separate but compatible survey programs in place to monitor populations of many avian species that breed in Wyoming. The first is the long-term BBS started in Wyoming in 1968 with 108 established routes in Wyoming [13]. Species must be detected on at least 14 routes for data analyses to be significant for tracking population status and trend over time. The IMBCR program was established in 2009 in Wyoming with many state, federal, and nongovernmental organization partners that contribute funding, field personnel, technical assistance, or in-kind services. Data analyses produce density, occupancy, and population estimates at various scales; present habitat associations; and provide decision support tools for managers [12]. It is recommended that these survey programs be continued into the future. If population declines are detected in Sagebrush Sparrow populations, targeted surveys should be conducted. Results from completed research should be used to refine management practices. Land managers should work to maintain large blocks of unfragmented sagebrush where Sagebrush Sparrow is known to breed. Habitats should include a variety of shrub cover of varying heights with a high level of live canopy foliage. Habitats should be managed to avoid conflicts with incompatible land use practices and to reduce the risk of fire.

## CONTRIBUTORS

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Figure 1: Adult Sagebrush Sparrow in Sweetwater County, Wyoming. (Photo courtesy of Shawn Billerman)

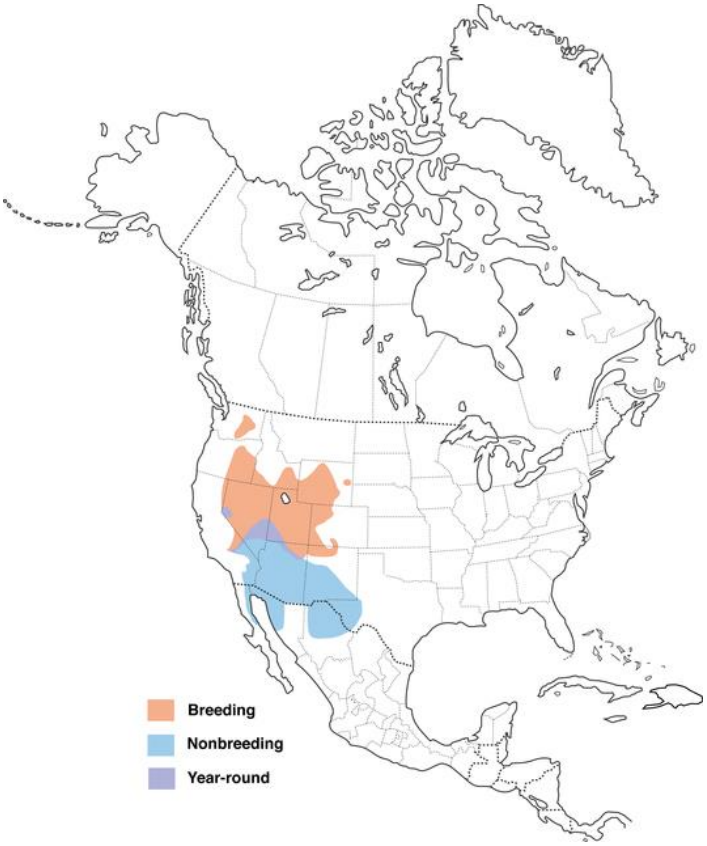


Figure 2: North American range of *Artemisiospiza nevadensis*. (Map courtesy of Birds of North America, http://bna.birds.cornell.edu/bna, maintained by the Cornell Lab of Ornithology)

Figure 3: Wyoming Big Sagebrush habitat in Sweetwater County, Wyoming. (Photo courtesy of Ian M. Abernethy)

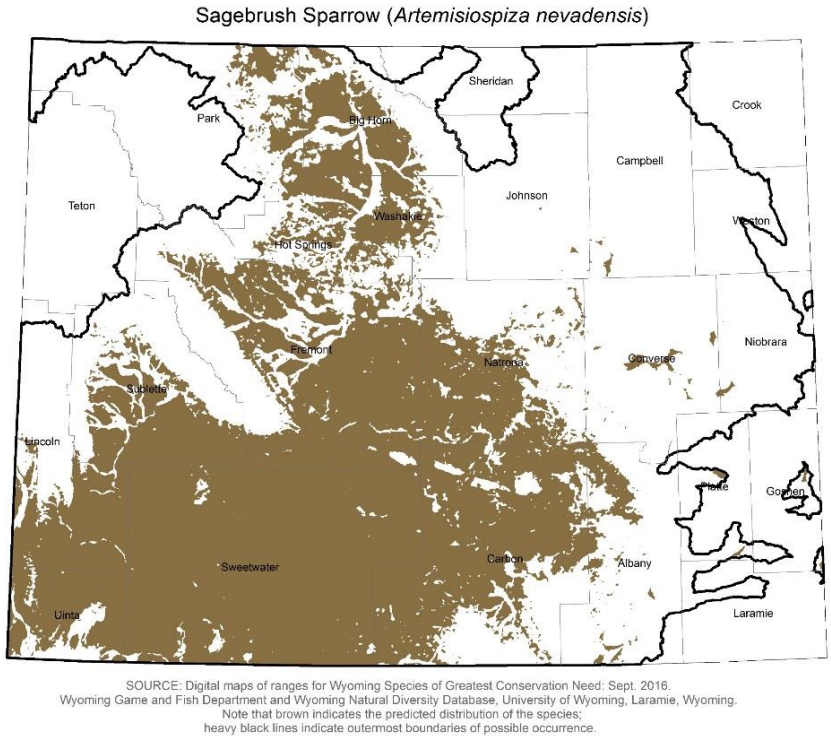


Figure 4: Range and predicted distribution of *Artemisiospiza nevadensis* in Wyoming.