

# High-Elevation Grasslands



Crescent Lake, Arizona, photo by @Tice Supplee

## Key Habitat Characteristics Profile

| Elevational Range <sup>1</sup>   |  |
|--|--|
| Subalpine Grassland: 8,500 – 9,500 feet<br>Great Basin Grassland: 5,000 – 7,500 feet   |  |
| Vegetation Structure <sup>5</sup>  |  |
| Scattered bunchgrasses, often interspersed with mats of sod-forming vegetation, scattered forbs (principally annuals), and scattered low shrubs; more forbs and wetland graminoids in subalpine than in Great Basin grasslands <sup>6</sup>  |  |
| Plant Species Composition <sup>2</sup>   |  |
| Blue, black, and sideoats grammas are important; other important grasses include buffalograss, Indian rice grass, prairie Junegrass, Plains lovegrass, and alkali sacaton; forbs are abundant; shrubs such as four-wing saltbush, sagebrush, winterfat, and rabbitbrush may be scattered throughout; junipers have invaded large areas |  |
| Important Microhabitats <sup>5</sup>   |  |
| Isolated trees or knolls   |  |
| Moist microsites in depressions; soft soils  |  |
| Patches of dense, tall (2 – 3') grass, patches of bare ground, and diversity of forbs  |  |
| Fire Regime <sup>6,7</sup>   |  |
| Frequent, low-intensity, but often large fires, sufficient to keep shrubs from expanding   |  |
| NRCS Major Land Resource Areas   |  |
| <a href="#">39 - AZ &amp; NM Basin &amp; Range Mountains</a><br><a href="#">35 Colorado Plateau</a>  |  |

## Conservation Profile

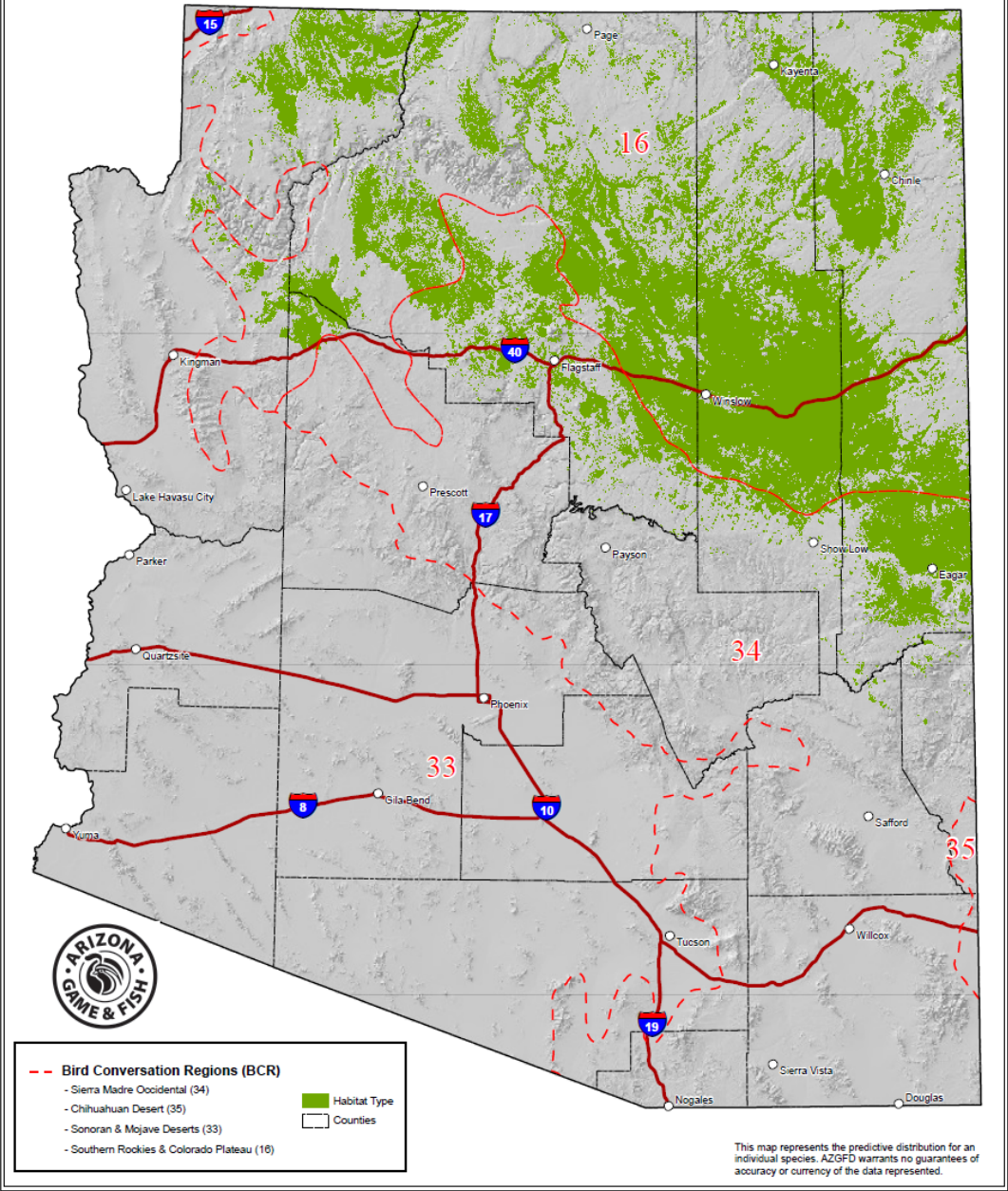
| Estimated Cover in Arizona <sup>1</sup>   |  |
|---|--|
| 2,943,793.93 ac<br>4.03 % of state  |  |
| Land Ownership Breakdown <sup>1</sup>   |  |
| Federal   | 13.07%   |
| Private   | 26.89%   |
| Tribal  | 39.57%   |
| State   | 20.37%   |
| Other   | 10.00%   |
| Most Important Conservation Concerns  |  |
| Livestock farming and ranching<br>Non-native invasive plants (Cheatgrass)<br>Climate Change (Drought) |  |
| Habitat Recovery Time   |  |
| A few years for most grasslands, if recoverable   |  |
| Vulnerability to Climate Change <sup>4</sup>  |  |
| Vulnerability   | Subalpine: high; Great Basin: moderate   |
| Effects   | Wet meadows vulnerable to drought; warming may increase shrub and tree encroachment                  |
| Response  | Loss of forbs and grasses and moist microsites. Replaced by desert shrubland and/or desert grassland |

## Bird Relationships Profile

| Representative Bird Species with Accounts  |  |
|--|--|
| Ferruginous Hawk<br>Savannah Sparrow   |  |
| Other Associated Breeding Bird Species <sup>3</sup>  |  |
| Swainson's Hawk, Cassin's Kingbird, Loggerhead Shrike, Horned Lark, Lark Sparrow, Vesper Sparrow, Black-throated Sparrow, Chihuahuan Meadowlark, Western Meadowlark, Mountain Bluebird |  |
| AZ Stewardship Responsibility <sup>1</sup>   |  |
| None   |  |



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## Habitat Codes Included in High Grasslands

### Arizona Breeding Bird Atlas

- GSA, GMM, GGB, GPL

### USGS Southwestern ReGAP

- Rocky Mountain Subalpine Mesic Meadow
- Rocky Mountain Alpine-Montane Wet Meadow
- Southern Rocky Mountains Montane-Subalpine Grassland
- Invasive Annual Grassland (Cheatgrass)
- Inter-Mountain Basins Semi-Desert Grassland



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## General Information

### Habitat Importance

Although Arizona is home to a small proportion of the global populations for the two primary species for high-elevation grasslands, both of them depend on this habitat type for breeding in the state. Furthermore, Ferruginous Hawks breed sporadically throughout Great Basin grasslands across northern Arizona and require large landscapes that are primarily grasslands with some specific habitat features (Latta 1999), and thus major losses or degradation of grasslands are detrimental to their Arizona populations. Swainson's Hawks and Chihuahuan Meadowlarks also occur in Great Basin grasslands, but are more abundant in the semi-desert grasslands of southeastern Arizona. The Savannah Sparrow breeding population is restricted to the subalpine grasslands in Arizona and is especially associated with moist microclimates (Corman and Wise-Gervais 2005). The associated breeding birds are all found in the Great Basin grasslands, although Vesper Sparrow also breeds in subalpine grasslands (Corman and Wise-Gervais 2005).

### Distribution in Arizona

High-elevation grasslands classified as Great Basin grasslands primarily occur on the Colorado Plateau and the Arizona Strip, although scattered areas also exist in the southeastern portion of the state. Subalpine grasslands are largely restricted to small high mountain ranges in the White Mountains in far-eastern central Arizona and the San Francisco Peaks and North Kaibab Plateau in northern Arizona.

### Habitat Description

#### *Subalpine Grasslands*

Subalpine grasslands are dominated by perennial bunchgrasses and have variable amounts of forbs and bare ground interspersed. They receive more moisture from snowmelt and precipitation than do Great Basin grasslands. Low-lying patches have vegetation associated with wet meadows, and these are important to some birds. Also important to some species are sparsely distributed trees, cliffs, or occasional tall shrubs used for perches and nesting.

#### *Great Basin Grasslands*

More widely distributed and in lower elevations than subalpine grasslands, Great Basin grasslands of Arizona are dominated by perennial grasses such as grama, buffalo-grass, Indian rice grass, and other species. While dominated by grasses, this habitat type also features scattered shrubs, particularly sagebrush, saltbush, cholla, and rabbit-brush, which are important habitat features for birds. The average annual precipitation is 6 – 18". About half of the precipitation falls from July through September. April, May, and June are the driest months. Most of the rainfall occurs as high-intensity, convective thunderstorms late in summer. Light snow falls in winter.



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## Conservation Concerns and Management Actions

### Threats Assessment

This table is organized by Salafsky et al.'s (2008) standard lexicon for threats classifications. Threat level is based on expert opinion of Arizona avian biologists and reviewers. We considered the full lexicon but include only medium and high threats in this account.

In the following section, we provide more detail about threats, including recommended management actions. Threats with similar recommended actions are grouped.

| Threat   | Details   | Threat Level |
|--|---|--------------|
| <b>Agriculture:</b> <ul style="list-style-type: none"> <li>Livestock farming and ranching</li> </ul>   | <ul style="list-style-type: none"> <li>Habitat loss and degradation</li> <li>Reduction of bunchgrasses</li> </ul>   | Medium       |
| <b>Invasive and Problematic Species:</b> <ul style="list-style-type: none"> <li>Invasive non-native/alien species</li> <li>Problematic native species</li> </ul>     | <ul style="list-style-type: none"> <li>Cheatgrass and other annuals outcompete native perennial grass and promote short fire cycles</li> <li>Juniper invasion of historic grasslands</li> </ul> | Medium       |
| <b>Climate Change:</b> <ul style="list-style-type: none"> <li>Ecosystem encroachment</li> <li>Changes in precipitation and hydrological regimes (drought)</li> </ul> | <ul style="list-style-type: none"> <li>Prolonged droughts interrupting breeding cycles</li> <li>Southern boundary of this association</li> </ul>  | High         |

Based on the habitat needs of the two representative bird species reviewed to create this account, high-elevation grasslands are particularly under the pressure of the conservation concerns climate change (droughts) and livestock grazing. We recommend [Bringing Birds Home: A Guide to Enhancing Grasslands for Birds and Other Wildlife](#).

### Agriculture:

- Livestock farming and ranching

Habitat loss and degradation are a principal concern for bird species in high-elevation grasslands. Excessive livestock grazing that leads to high shrub density, compacted soils, and bare ground cover, or that reduces bunchgrass cover or forb diversity and increases invasive weed cover, reduces habitat quality and availability for grasslands obligate birds (Bock et al. 1993).

### Recommended Actions:

- Develop a grassland conservation strategy for public and private lands that addresses the main habitat criteria for grassland birds and their food sources.
- Explore options for strategic conservation easements and public lands protection in areas that are important to priority species, and develop management plans for these areas.
- Determine natural fire regimes in native grasslands and reinstate fire management that maintains their integrity (low shrub cover, high herbaceous cover).
- Determine grazing regimes that allow for herbaceous vegetation to recover sufficiently to prevent shrub and weed invasion.



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5. Explore options for livestock utilization rates that preserve key habitat components, including mid-successional native grass and forb cover and low shrub cover.
6. Conduct shrub reduction programs in a manner that does not increase invasive grasses.
7. Control harmful invasive plant species and noxious weeds, with particular emphasis on cheatgrass.
8. Schedule management activities that remove grass cover so as to avoid the breeding season (April through the summer rains).

### Invasive and Problematic Species:

- Invasive non-native/alien species (cheatgrass, annual oat, and mustard species)
- Problematic native species (Utah and one-seed juniper)

The invasion of grasslands by juniper trees has been documented since the early 20th century (Johnsen 1962). Dense juniper stands reduce light and water availability, leading to the decline of native grasses and herbaceous plants. Cheatgrass and invasive mustards increase the intensity and frequency of fire and out compete native grasses.

### *Recommended Actions:*

1. Implement restoration projects that favor the native bunchgrasses.
2. Remove juniper in known historic grasslands.
3. Work with land management agencies and local ranchers to study and apply juniper and invasive plant species control strategies on their lands.

### Climate Change:

- Ecosystem encroachment
- Changes in precipitation and hydrological regimes (drought)

All bird species of high-elevation grasslands are susceptible to the most commonly predicted effects of warming temperatures: loss of snowpack, contraction of alpine plant communities, and subsequent local extirpations of wildlife at the southern boundaries of their distribution. Prolonged droughts have already been suspected as the cause for irregular breeding by Savannah Sparrows on the Kaibab Plateau (Corman and Wise-Gervais 2005). Prolonged droughts carry the risk of long-term bird population declines if wet periods are short and infrequent enough for a full population recovery. For Ferruginous Hawks, the effects of climate change are primarily a concern for their impacts on prey populations, such as ground squirrels, prairie dogs, and rabbits.

### *Recommended Actions:*

1. Use birds of high-elevation grasslands as examples for discussing climate change with the public and share the importance of land stewardship decisions that can mitigate for its effects on wildlife.
2. Identify strongholds of Ferruginous Hawks at a landscape scale and determine habitat conditions for small mammals, particularly ground squirrels, prairie dogs, and rabbits.
3. Assess Savannah Sparrow and Chihuahuan Meadowlark populations periodically to determine current population status, including areas near the currently known breeding sites (Savannah Sparrow may require species-specific survey visits to known small, isolated populations).
4. Evaluate land use practices that compound effects of prolonged droughts. Determine possibilities for adjusting compatible use rates or setting aside high-priority areas as conservation easements or protected public lands.



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- <sup>2</sup>Brown, D.E. 1994. Biotic communities: Southwestern United States and northwestern Mexico. University of Utah Press, Salt Lake City, UT.
- <sup>3</sup>Corman, T.E. and C. Gervais-Wise, eds. 2005. The Arizona Breeding Bird Atlas. University of New Mexico Press.
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- <sup>4</sup>Friggens, M.M., M.V. Warwell, J.C. Chambers, and S.G. Kitchen. 2012. Modeling and predicting vegetation response of western USA grasslands, shrublands, and deserts to climate change. *In* Finch, D. M., ed.. Climate change in grasslands, shrublands, and deserts of the interior American west: a review and needs assessment. Gen. Tech. Rep. RMRS-GTR-285. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Pp. 1 – 20.
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- <sup>5</sup>Latta, M.J., C.J. Beardmore, and T.E. Corman. 1999. Arizona Partners in Flight Bird Conservation Plan, Version 1.0. Nongame and Endangered Wildlife Program Technical Report 142. Arizona Game and Fish Department, Phoenix, AZ.
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<sup>7</sup>Schussman, H., C. Enquist, and M. List. 2006. Historic fire return intervals for Arizona and New Mexico: a regional perspective for southwestern land managers. USDA Forest Service and The Nature Conservancy in Arizona.

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### Recommended Citation

Arizona Bird Conservation Initiative and Sonoran Joint Venture. 2023. High-Elevation Grasslands Habitat Account. Available at <https://sonoranjv.org/accounts/high-elevation-grasslands.pdf>

