



Sonoita Grasslands, photo by Tice Supplee

Semi-desert Grasslands

Conservation Profile

Estimated Cover in Arizona ¹	
6,887,462.62 ac 9.44% of state	
Land Ownership Breakdown ¹	
Federal	31.16%
Private	27.89%
Tribal	11.53%
State	29.28%
Other	0.14%
Most Important Conservation Concerns ³	
Low density residential development Prolonged heavy grazing Fire suppression Climate change (drought) Non-native invasive plants	
Habitat Recovery Time ⁶	
A few years for most grasslands, if recoverable 20 years for senescent sacaton	
Vulnerability to Climate Change	
Vulnerability	Moderate
Effects	Loss of perennial grasses, incr. in invasive plants, loss of native riparian grasses
Response	Shrub encroachment, increased soil erosion

Key Habitat Characteristics Profile

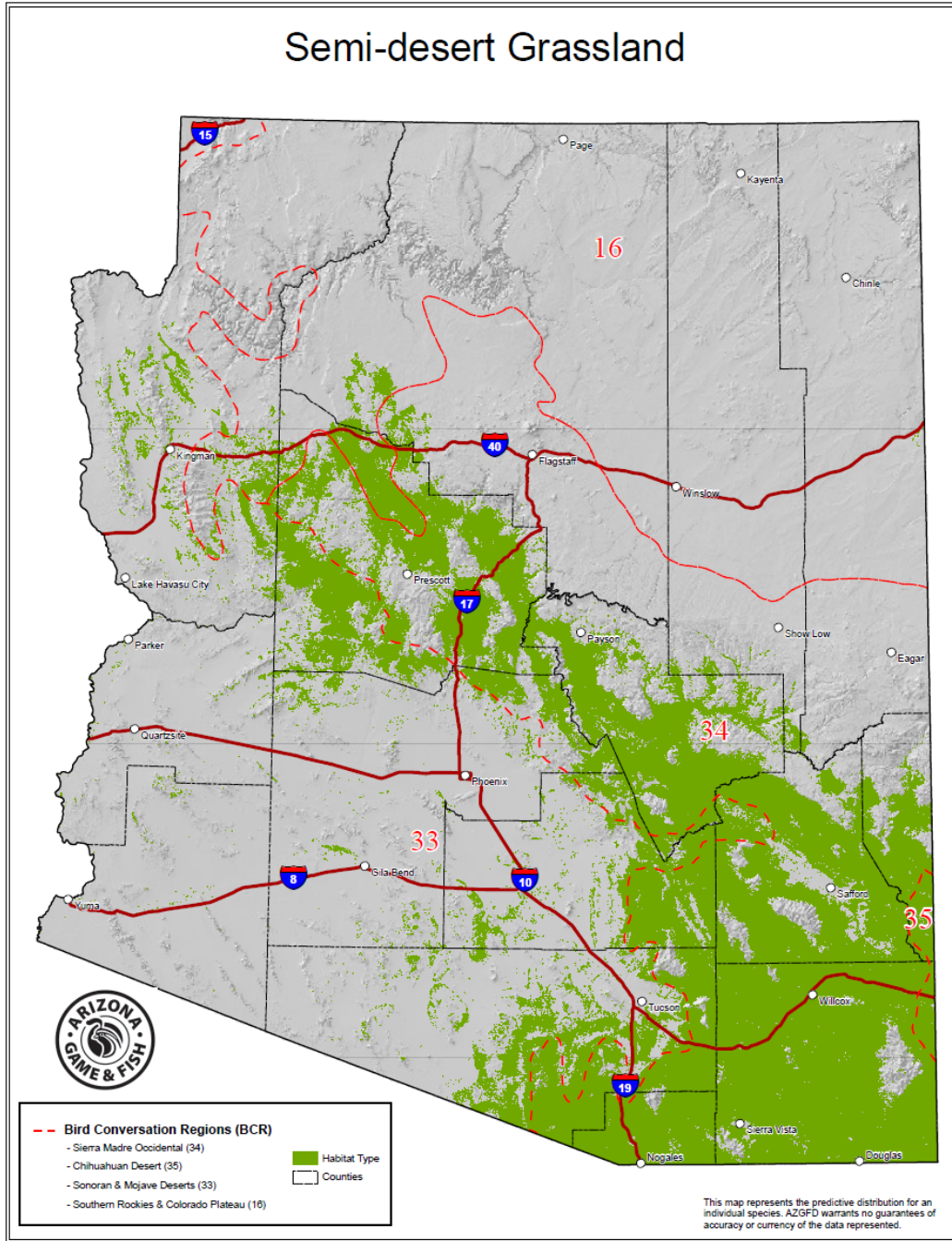
Elevational Range ¹
3,500 – 4,500 feet (Sonoran Savanna: < 3,500 feet)
Vegetation Structure ^{7,9}
High-cover patches (50 – 65%) of tall perennial grass, interspersed with patches of low cover patches, some bare ground and forbs; scattered shrubs important but cover should stay at < 20%; sacaton stands can be pure or almost pure
Plant Species Composition ⁴
Tobosa, grama grasses, sacaton, three-awns, and Lehman's lovegrass are dominant, depending on elevation and geographic locations; intermixed with various forbs and half-shrubs in understory; scattered thornscrub and in southeastern Arizona in mountain foothills, live oak
Important Microhabitats ^{6, 7}
Tall dense grass Sacaton riparian grasslands Isolated trees or tree clumps Bare ground interspersed
Fire Regime ^{6, 8}
Frequent low-intensity fires; 4 – 10 year intervals historically
NRCS Major Land Resource Areas
38 - Mogollon Transition 41 - SE AZ Basin & Range

Bird Relationships Profile

Representative Bird Species with Accounts
Scaled Quail Swainson's Hawk Rufous-winged Sparrow Botteri's Sparrow Grasshopper Sparrow Chihuahuan Meadowlark
Other Associated Breeding Bird Species ⁵
Western Kingbird, Chihuahuan Raven, Horned Lark, Black-tailed Gnatcatcher, Cactus Wren, Curve-billed Thrasher, Canyon Towhee, Vesper Sparrow, Cassin's Sparrow, Black-throated Sparrow, Lark Sparrow, Pyrrhuloxia
AZ Stewardship Responsibility ¹
Northern (Masked) Bobwhite, Five-striped Sparrow, Grasshopper (Arizona) Sparrow, Rufous-winged Sparrow



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Habitat Codes Included in Semi-desert Grasslands

Arizona Breeding Bird Atlas

- GSD, GGB

USGS Southwestern ReGAP

- Apacherian-Chihuahuan Mesquite Upland Scrub
- Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe
- Chihuahuan Sandy Plains Semi-Desert Grassland
- Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (Sacaton/Tobosa)
- Invasive Perennial Grassland



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General Information

Habitat Importance

Low-elevation semi-desert grasslands provide important wintering grounds for many birds, particularly sparrows. About 90% of the historic extent of these grasslands has been lost or degraded (AGFD 2012) due to various landscape-level impacts such as unsustainable livestock grazing, decreased fire frequency from fire suppression and shrub encroachment, urban/suburban development, and prolonged drought. The lowest-elevation semi-desert grasslands, also called the Sonoran savanna grasslands, are the main habitat type for Rufous-winged Sparrow. The entire U.S. population of Rufous-winged Sparrows is confined to Arizona, and semi-desert grasslands are their primary nesting habitat. Higher elevation semi-desert grasslands provide the primary habitat for Swainson's Hawk and Scaled Quail in Arizona. In these areas, grasslands dominated by big sacaton are thought to be especially important for nesting Botteri's Sparrow.

Distribution in Arizona

The majority of semi-desert grasslands in Arizona are located in the uplands of the southeastern and central highlands portion of the state, extending northwest to below the Mogollon Rim.

Habitat Description

Semi-desert grasslands were once dominated by perennial bunchgrasses, such as tobosa and black grama, intermixed with other grass species, forbs, and patches of bare ground. They were maintained by frequent, low-intensity fires that left many bunchgrasses alive and prevented shrubs and trees from becoming established. Big sacaton dominated the extensive floodplains of southeastern Arizona, where it sometimes formed almost-pure stands. Sonoran savanna grasslands included grass species such as sideoats grama, blue grama, and three-awns, along with scattered trees and shrubs, such as ironwood, paloverde, and velvet mesquite. Most of the grasslands are now dominated by non-native Lehmann lovegrass. Dense clumps of tall grasses are important for nesting Scaled Quail, as well as Grasshopper, Botteri's and Rufous-winged sparrows. Having a diversity of microhabitats in the ground vegetation layer is particularly important, including small patches of bare ground, only a few scattered shrubs or small trees, and patches with forbs. Swainson's Hawks need habitat conditions that support its main prey (small mammals such as ground squirrels), as well as trees that provide structure for nests. Scaled Quail require an interspersed shrub component for roosting and escape cover. Botteri's Sparrow abundance and site fidelity has been shown to be associated with grass height and was greatest in sacaton, intermediate in exotics, and lowest in native upland grasslands (Jones and Bock 2005).



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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.

Threat	Details	Threat Level
Residential and Commercial Development: <ul style="list-style-type: none"> Housing and urban areas 	<ul style="list-style-type: none"> Low density residential 	Medium
Agriculture: <ul style="list-style-type: none"> Livestock farming and ranching 	<ul style="list-style-type: none"> Prolonged heavy grazing 	Medium
Natural System Modifications: <ul style="list-style-type: none"> Fire and fire suppression 	<ul style="list-style-type: none"> Fire Suppression 	Medium
Invasive and Other Problematic Species: <ul style="list-style-type: none"> Invasive non-native/alien species Problematic native species 	<ul style="list-style-type: none"> Introduced non-native grasses (Lehmann and Boer's lovegrasses, yellow bluestem, buffelgrass) 	High
Climate Change: <ul style="list-style-type: none"> Ecosystem encroachment Changes in precipitation and hydrological regimes (drought) 	<ul style="list-style-type: none"> Shrub invasion and loss of grassland dependent birds 	Medium

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

Based on the habitat needs of the six representative bird species considered to create this account, semi-desert grasslands of Arizona face climate change (drought), livestock grazing, invasive native and non-native plant species, and urban/rural development as their primary conservation concerns. We recommend [Bringing Birds Home: A Guide to Enhancing Grasslands for Birds and Other Wildlife](#).

Residential and Commercial Development:

- Housing and urban areas
- Commercial and industrial areas

Urban sprawl and dispersed rural developments are important threats to semi-desert grasslands in Arizona, particularly Santa Cruz Valley and in the Sonoita Valley and upper San Pedro Valley, which are largely privately owned (Latta et al. 1999). Conversion of native grasslands or agricultural hay fields to woody perennial crops or urban areas also eliminates habitat for Swainson's Hawk (Bechard et al. 2010).

Recommended Actions:

- Explore options for conservation easements, open space, and greenbelts that are large enough to preserve significant amounts of grasslands at a scale of > 75 acres.
- Conduct public outreach to private landowners & the public on values of grasslands to native wildlife & people.



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3. Explore options for light public uses in easement areas, such as hiking trails, to provide opportunity for interpretive outreach.
4. Identify important bird breeding habitat and work with landowners to preserve these sites from development and for other conservation actions.
5. Determine the extent to which native grasslands are under review for habitat conversion due to urban/suburban development.
6. Educate the public in developed areas near native grasslands on the value of fire in maintaining these ecosystems so that fire regimes can be restored through prescribed fires. Promote Fire Wise practices.
7. Explore options for restoring tall bunchgrass and sacaton communities in floodplains to benefit Rufous-winged and Botteri's Sparrow.

Agriculture:

- Livestock farming and ranching

Livestock grazing in riparian areas may have led to the historic loss of riparian stronghold populations of Rufous-winged Sparrows (Merola-Zwartjes 2005), which is mostly attributed to the loss of tall bunchgrasses. Prolonged, heavy grazing can lead to high shrub density, reduced bunchgrass cover and forb diversity, and increased invasive weed cover, all of which reduce habitat quality and availability for birds. Some species tolerate light grazing activity or grazing outside the growing and nesting season. Impacts from grazing are particularly serious during consecutive drought years, when the vigor of plants is already compromised and livestock use levels may be more intense.

Recommended Actions:

1. Implement livestock grazing management practices, especially in grasslands occupied by the Rufous-winged, Botteri's, or Grasshopper sparrows.
2. Where livestock grazing occurs in potential bird habitat, rotate pasture use to allow for recovery between seasons to minimize impacts to semi-desert grasslands.
3. Exclude restoration areas that target recovery of native bunchgrasses from grazing.
4. Implement grazing management practices in grasslands to allow for natural fire regimes to return and to reduce undesirable vegetation.
5. Restore natural fire regimes (frequency, intensity, and mosaic pattern) in both grazed and ungrazed areas to combat effects of shrub invasion and nonnative grasses.
6. Control harmful invasive plant species and noxious weeds, with particular emphasis on Lehmann's lovegrass and buffelgrass.
7. Limit forage utilization to 35 – 40% in years of good rainfall and reduce stocking rates in drought years (Merola-Zwartjes 2005).
8. Delay livestock grazing on restoration sites after shrub-removal treatments so that new grasses can become established (Gottfried 2004).
9. Use stocking rates that preserve key habitat components for Scaled Quail, including mid-successional native grass and forb cover and low shrub cover.
10. Continue to assess and address shrub encroachment in areas such as Sulphur Springs and San Bernardino valleys.
11. Maintain mature sacaton grasslands, mesquite grasslands, and tobosa swales in the regions from the Altar Valley east to New Mexico and south of Interstate Highway 10 (Latta et al. 1999).



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Natural System Modifications:

- Fire Suppression

Historically, semi-desert grasslands were maintained by frequent low-intensity fires that left many bunchgrasses alive and prevented many shrubs and trees from becoming established. Suppression of fire has favored invasive woody species establishment. Paradoxically, the introduction of non-native grasses has altered fire intensity to hotter fire events that are more frequent and favor the invasive plants. Research is ongoing to better understand the proper role of fire in maintaining a grasslands ecosystem.

Recommended Actions:

1. Allow natural fire to burn when human life and buildings are not at risk.
2. Use prescribed fire to maintain grasslands post woody plant removals.
3. Educate the public in developed areas near native grasslands of the value of fire in maintaining these ecosystems so that fire regimes can be restored through prescribed fires.
4. Promote Fire Wise practices.

Invasive and Other Problematic Species

- Invasive non-native/alien species
- Problematic native species

Historic introduction of non-native grasses has altered the native grasslands composition in Arizona. The most pervasive is Lehmann lovegrass. More recent introduced species that have the potential to out compete native grasses include buffelgrass, Boer's lovegrass and yellow bluestem. Exotic dominant grasslands in southeastern Arizona has poorer species richness than nearby native dominant grasslands (McLaughlin and Bowers 2005). Research has discovered that exotic lovegrasses apparently are providing essential cover for the Botteri's Sparrow in Arizona (Jones and Bock 2005). The similarity in densities of songbirds between areas of native grasses relative to areas invaded by non-native grasses with similar vegetation structure suggests that many grassland birds select areas for nesting based more on structural rather than floristic cues (Steidl et al. 2013). Factors that favor invasive grasses include an increased frequency and intensity of fire and intensive livestock grazing, particularly during times of drought. The introduction and conversion of native grasslands to buffelgrass to enhance livestock pasture has primarily occurred in Sonora, Mexico. Buffelgrass is more of a problem in the Sonoran desert than in the grasslands of southeastern Arizona. Buffelgrass is able to clone and is highly drought tolerant, and eradication is difficult once established.

Recommended Actions:

1. Implement livestock management practices that reduce grazing pressures in native grass dominant pastures.
2. Herbicide and mechanical removal of new invasives when detected. Establish native grass stands within a matrix of native and non-native dominant sites.
3. Purposeful introduction of these grasses should be avoided.

Climate Change:

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



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Prolonged droughts carry the risk of long-term population declines if wet periods are short and infrequent enough for a full population recovery of resident species such as Scaled Quail. Droughts are also considered one of the major causes of a 95% loss of sacaton grasslands that provide breeding habitat of Botteri's Sparrow. Droughts lead to death or loss of vigor in perennial grasses and small shrubs, both of which are important habitat elements for birds. These effects are compounded by land uses that also have impacts on plant vigor, such as unsustainable livestock grazing.

Recommended Actions:

1. Determine what mitigating actions can be taken to counteract the main impacts of prolonged droughts on sacaton grasslands, Sonoran savannah grasslands, and other semi-desert grasslands.
2. Identify high-priority breeding areas of Scaled Quail and Botteri's and Rufous-winged sparrows for prioritizing stewardship action.
3. Evaluate land-use practices that compound the effects of prolonged droughts on semi-desert grasslands and determine possibilities for adjusting compatible livestock use rates, or setting aside high-priority areas completely as conservation easements or protected public lands.
4. Evaluate which areas would benefit from shrub reduction programs that would restore a perennial grass cover and keep shrub cover very low.
5. Implement grazing management on state and federal administered lands that enhances Rufous-winged Sparrow habitat.

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