

Cold-Temperate Desertscrub



Arizona Strip, photo by @Wikimedia Commons

Key Habitat Characteristics Profile

Elevational Range ¹
3,000 to 6,500 feet
Vegetation Structure ⁵
Scattered small-leafed shrubs with few or no trees and little or no landscape fragmentation; herbaceous layer important, but often low cover ($\leq 10\%$). Shrub cover 10 – 45%. Sagebrush < 7' tall, but some birds prefer tall shrubs (> 3'). Sites with little or no cheatgrass preferred.
Plant Species Composition ⁴
Dominated by big sagebrush, shadscale, or blackbrush; other species often present: Mormon-tea, four-wing saltbush, greasewood, rabbitbrush, horsebrush, and winterfat ¹ . Plant diversity usually low, but high diversity benefits several bird species.
Important Microhabitats ⁷
Most priority birds nest in dense, tall, clumped shrub stands. Vigorous shrubs ($\geq 75\%$ live branches) preferred by shrub-nesting birds. Native grass and forb cover likely critical to most birds. Bare ground avoided by some birds.
Fire Regime ⁶
Historic fire-return intervals in the sagebrush-steppe estimated to be 60 – 200 years. Sagebrush is not adapted to fire.
NRCS Major Land Resource Areas
35 Colorado Plateau

Conservation Profile

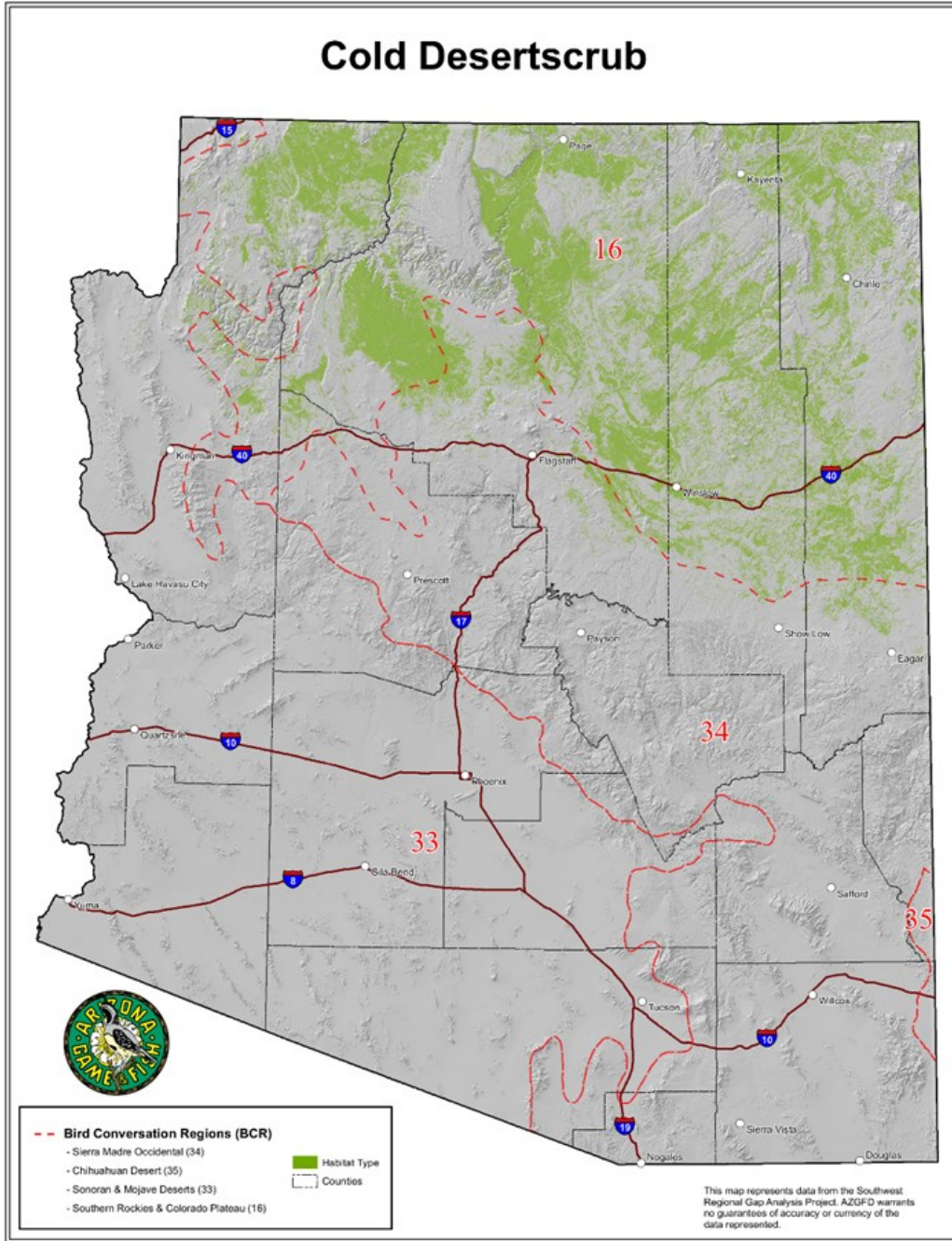
Estimated Cover in Arizona ¹	
8,251,977 ac 11.30% of state	
Land Ownership Breakdown ¹	
Federal	18.37%
Private	16.62%
Tribal	54.24%
State	10.66%
Other	0.11%
Most Important Conservation Concerns	
Livestock farming and ranching Renewable energy Increased frequency of fire Invasive non-native plants Climate change (drought)	
Habitat Recovery Time ²	
25 – 100 years	
Vulnerability to Climate Change ³	
Vulnerability	High
Effects	Loss of native understory to prolonged drought and landscape uses; decreased vigor of shrubs; increased fire occurrence; increase in invasive grasses
Response	Loss of suitable sagebrush habitats in Arizona

Bird Relationships Profile

Representative Bird Species with Accounts
Sage Thrasher Brewer's Sparrow Sagebrush Sparrow
Other Associated Breeding Bird Species ⁵
Northern Mockingbird, Black-throated Sparrow, Lark Sparrow, Western Meadowlark
AZ Stewardship Responsibility ¹
none



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Habitat Codes Included in Cold Desert Scrub

Arizona Breeding Bird Atlas

- DGB

USGS Southwestern ReGAP

- Colorado Plateau Blackbrush-Mormon-tea Shrubland
- Inter-Mountain Basins Big Sagebrush Shrubland
- Inter-Mountain Basins Mixed Salt Desert Scrub
- Inter-Mountain Basins Montane Sagebrush Steppe



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General Information

Habitat Importance

The breeding ranges of the Sage Thrasher, Sagebrush Sparrow, and Brewer's Sparrow in Arizona are restricted to cold-temperate desertscrub. Additional sensitive birds frequently using this habitat include Ferruginous Hawk, Swainson's Hawk, Golden Eagle, and Loggerhead Shrike.

Most of what is currently known about the habitat requirements of birds of the Arizona cold-temperate desertscrub comes from studies conducted in far-northern Arizona, and information from the southern edge of the distribution of this habitat in Arizona is currently lacking. This information would be useful for predicting and monitoring effects of climate change on this habitat type.

Distribution in Arizona

In Arizona, cold-temperate desertscrub occurs mostly on the Colorado Plateau north of the Mogollon Rim. This habitat type dominates lands of the Navajo and Hopi Nations and the northwestern "strip" of Arizona (Latta et al. 1999). It covers approximately 5.3 million acres of land in Arizona (Kuchler 1964) at elevation of 3,000 – 6,500' (AZGF 2012).

Habitat Description

Cold-temperate desertscrub vegetation consists of scattered low (< 7' tall), small-leaved shrubs, usually without trees or succulents. Dominant species include big sagebrush and shadscale, but blackbrush, Mormon tea, four-wing saltbush, greasewood, rabbitbrush, horsebrush, and winterfat may also be present (AZGF 2012). Species diversity is characteristically low in this habitat type, and elevation, aspect, and soil type determine which species dominate. Extensive expanses of blackbrush and shadscale are found at low elevations, while sagebrush dominates at high elevations on deep loamy soils (Brown 1994). The most common invasive species include red brome, cheatgrass, and Russian thistle, all of which can become dominant when soils are disturbed extensively.

Annual and perennial forbs, and perennial grasses form an important herbaceous layer, particularly at high elevations. Grasses, particularly grama, galleta, needlegrass, Indian rice grass and wheatgrass often appear as part of the herbaceous component although they may form only a low cover (0 – 10%) (Brown 1994). Presence of an understory layer is beneficial both to birds and to increased resilience against invasive weeds (Anderson and Inouye 2001), and some bird species avoid bare ground in their microhabitat selection.

Some of the birds characteristic of cold-temperate desertscrub avoid either trees or habitat edges. Large swathes of sagebrush without significant tree invasion are likely the most valuable. Some bird species may respond to surface water availability, but it is more likely that vegetation with access to more water has increased vigor, better structure, and more diverse composition, which then attracts birds.



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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.

Most Important Conservation Concerns	Details	Threat Level
Agriculture: <ul style="list-style-type: none"> Livestock farming and ranching 	<ul style="list-style-type: none"> Improper management removing needed shrub cover for nesting birds 	High
Energy Production and Mining: <ul style="list-style-type: none"> Renewable energy 	<ul style="list-style-type: none"> Renewable energy (solar and wind) have become a concern on federal lands in NW corner of the state. 	Medium
Natural System Modifications: <ul style="list-style-type: none"> Fire and suppression 	<ul style="list-style-type: none"> Sagebrush ecosystems not fire adapted, long recovery time (60 – 200 years) 	High
Invasive and Problematic Species: <ul style="list-style-type: none"> Invasive non-native/alien species 	<ul style="list-style-type: none"> Invasive non-native/alien species (red brome and cheatgrass) 	High
Climate Change: <ul style="list-style-type: none"> Ecosystem encroachment Changes in precipitation and hydrological regimes (drought) 	<ul style="list-style-type: none"> Ecosystem at southern-most extent, likely reduction as temperatures warm and dry 	High

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 three representative bird species we reviewed to create this account, we conclude that climate change, livestock grazing, habitat loss and degradation, invasive plants, and increase in fire frequency are the current primary threats to bird-habitat quality and quantity in cold-temperate desertscrub.

Agriculture:

- Livestock farming and ranching

Habitat loss or alteration poses a major threat to the priority bird species of cold-temperate desertscrub. The combined effects of altered fire regimes, grazing, and invasive weeds, particularly cheatgrass, may have stressed at least some sagebrush areas beyond their ability to naturally recover (Knick et al. 2003). Although large tracts of sagebrush remain in northern Arizona, sagebrush shrublands throughout the west have been degraded at landscape scales (Rich et al. 2005) and removal of big sagebrush to benefit grasses for livestock may continue to reduce this habitat. Generally, disturbance to native grasses and removal of sagebrush threatens the long-term success of the birds that depend on cold-temperate desertscrub (Latta et al. 1999), although some studies of grazing



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effects on sagebrush birds have shown mixed results (Paige and Ritter 1999, Saab et al. 1995). Ecosystem modifications such as livestock grazing primarily affect the important native forb and grass understory, but chronic livestock use also reduces the vigor of the shrubs used for nesting by several priority bird species, which reduces suitability as a nest substrate.

Recommended Actions:

1. Use spatially explicit methods to inventory sagebrush; include measures of integrity of biotic community.
2. Identify areas of greatest value given the area and habitat requirements of the priority bird species.
3. Identify specific and local sources of large-scale habitat loss or encroachment by other habitat types or infrastructure. Prioritize areas for stewardship that provide large uninterrupted landscapes of sagebrush.
4. Manage at a landscape scale of 500 acres or larger, if possible. The sagebrush landscape should be allowed to vary in size classes, shrub densities, and amount of understory at a natural scale, depending on soil conditions and fire history.
5. Negotiate sustainable levels of livestock use that avoid loss of shrub vigor.
6. If treatments that remove native shrubs are necessary, undertake them in narrow strips or small blocks to maintain a mosaic pattern of edge and useable habitat for birds.
7. Decrease livestock grazing impacts by allowing grazing primarily during the dormant season and by protecting the current season's growth from grazing during the bird nesting season.
8. Manage to retain at least 50% of annual vegetative growth (Paige and Ritter 1999).
9. Manage sagebrush and other shrublands occupied by Sage Thrashers with the goal of a 10% minimum shrub cover (Reynolds et al. 1999 and Reynolds 1981)
10. Protect tall shrubs with dense crowns from removal and fire.
11. Within large expanses of high-quality sagebrush with few invasive plants, minimize and manage activities that promote establishment or maintenance of cheatgrass, including improper livestock grazing and high volume OHV use.

Energy Production and Mining:

- Renewable energy

With a shift to renewable energy from fossil fuels, there will be increased construction of solar and wind energy farms in the west. The Arizona State Land Department is seeing an increasing number of applications for solar energy development. The Arizona Game and Fish Department provides comments on these applications and has suggested [guidelines for solar and wind energy development](#).

Recommended Actions:

1. Develop mitigation guidelines for sagebrush birds with particular emphasis on protecting and avoiding impacts to sagebrush steppe.
2. Develop management guidelines for sagebrush birds, with special attention to Sagebrush Sparrow and Sage Thrasher.
3. Study the response of desert and sagebrush steppe birds to solar and wind energy projects.

Natural System Modifications:

- Fire and fire suppression



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The historical fire regimes in sagebrush ecosystems have changed during the past century (Knick et al. 2005). Historical fire-return intervals in Great Basin sagebrush steppe have been variously estimated to be 60-200 years (Whisenant 1990, Baker 2006), but are likely to have been even longer in Arizona where few fine fuels can carry fires. Sagebrush is not adapted to fire, and fire usually kills sagebrush plants, which cannot resprout from roots. Because of this, recovery from fires can take 25 – 100 or more years (Baker 2006). Historical fires varied in frequency and severity across the landscape and resulted in a mosaic of sagebrush and interspersed grassland communities in different stages of succession (Young et al. 1979). Bird populations that are obligate to sagebrush habitats are not typically affected by fire as long as > 50% of the original shrub cover remains (Petersen and Best 1987). The effects of fire on the herbaceous components of big sagebrush communities are small and short-lived when invasive weeds are absent (Holmes et al. 2013). In fact, native herbaceous species would have increased in the absence of shrubs following fire (Knick et al. 2005).

In the modern era, however, cheatgrass invasion has increased fire frequency to the point that native shrubsteppe plants cannot re-establish naturally in many places (Whisenant 1990). Fire is likely to be detrimental to sagebrush dependent birds if intact sagebrush ecosystems have not had time to fully recover from previous disturbances, or if fire destroys native understory plants beyond recovery (Baker 2006). Birds that use sagebrush as their primary habitat decline dramatically in landscapes where shrub removal occurs at large scales (Knick and Rotenberry 1995), but beyond this there has been limited research on the direct effects of fire on sagebrush birds, and none of it occurred in Arizona.

Recommended Actions:

1. Determine initial strategies and longer-term fire strategies to prevent catastrophic, stand-converting fires in cold-temperate desertscrub. This is particularly important in soils that are vulnerable to cheatgrass invasion.
2. Prevent fires that reduce > 50% of sagebrush stands .
3. Avoid nesting season (April – early July) when treating sagebrush with fire, herbicides, or mechanical means.
4. Consider the use of green belts and firebreaks to prevent catastrophic fires in sagebrush habitat.
6. If sagebrush and other cold-temperate desertscrub habitat types must be treated with prescribed fire or mechanical clearing, limit it to areas of < 40 acres and schedule it to avoid bird nesting (April – early July) (Braun et al. 1976).
7. Determine current fire regimes in Sagebrush Sparrow areas and manage fires so as to allow local burns but at sufficiently large time intervals to allow shrub stands to recover to 3 – 7' in height.

Invasive and Problematic Species:

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

The presence of cheatgrass has made many cold-temperate desertscrub areas more susceptible to wildfire, and this effect has become a significant management concern throughout the region occupied by sagebrush steppe (Whisenant 1990).

Recommended Actions:

1. Inventory, model, and monitor status of invasive weeds to assess their threat level locally and throughout the cold-temperate desertscrub region of Arizona.
2. Implement aggressive fire management, including fire suppression, in areas that are most vulnerable to cheatgrass invasion after wildfires.



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- Promote timed targeted grazing on cheatgrass downy brome (*Bromus tectorum*) and Japanese brome (*Bromus japonicas*).
- Work with land management agencies and local ranchers to study and apply cheatgrass control strategies on their lands.

Climate Change:

- Ecosystem Encroachment
- Changes in precipitation and hydrological regimes

Cold-temperate desertscrub currently reaches its southernmost distribution in northern Arizona. It is therefore one of the bird habitat types that is likely to be reduced in extent with continuing warming and drying trends. Changes are expected to be most obvious at low elevations and at the southern boundaries of the habitat type.

Recommended Actions:

- Monitor southern and low-elevation portions of cold-temperate desertscrub for signs of stand conversion to other habitat types in order to determine presence and rate of climate change effects.
- Preserve areas that are most useful to sagebrush dependent birds, particularly those in high elevations and near surface water or highwater tables.
- Develop a habitat assessment and monitoring protocol that includes shrub vigor metrics as a measure of habitat quality for Brewer's Sparrows. Implement it to document effects of prolonged droughts and climate change.

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