

Sonoran Desertscrub



Sonoran Desert, photo by ©Adam Hannuksela

Key Habitat Characteristics Profile

Elevational Range ⁴	
100 – 2,000 feet (Lowland)	1,000 – 3,500 feet (Upland)
Vegetation Structure ⁸	
Lowland: low, open stands of microphyllous shrubs (up to 30% cover) ¹	
Upland: widely scattered trees and columnar cactuses approaching low-cover woodlands with understory shrubs ⁶	
Plant Species Composition ⁶	
Lowland: mostly creosote and white bursage, with saltbush in some areas; paloverde, mesquite and ironwood in washes ¹	
Upland: paloverde, ironwood, mesquites, acacia, and ocotillo; jojoba and crucifixion thorn in some areas; understory plants include creosote, triangle-leaf bursage, hackberry, and ratany. Saguaro and diverse cholla and other cactuses common ⁹	
Important Microhabitats ⁸	
Dry washes, esp. in lowlands where they provide the only trees Biotic soils and native litter in lowlands Cactuses and trees for nesting substrate Grassy swales that flood periodically in lowlands	
Fire Regime ^{2,10}	
Historically rare with no fire-adapted characteristics.	
NRCS Major Land Resource Areas	
<p>30 - Mohave Desert</p> <p>31 - Lower Colorado Desert</p> <p>40 - Sonoran Basin & Range</p>	

Conservation Profile

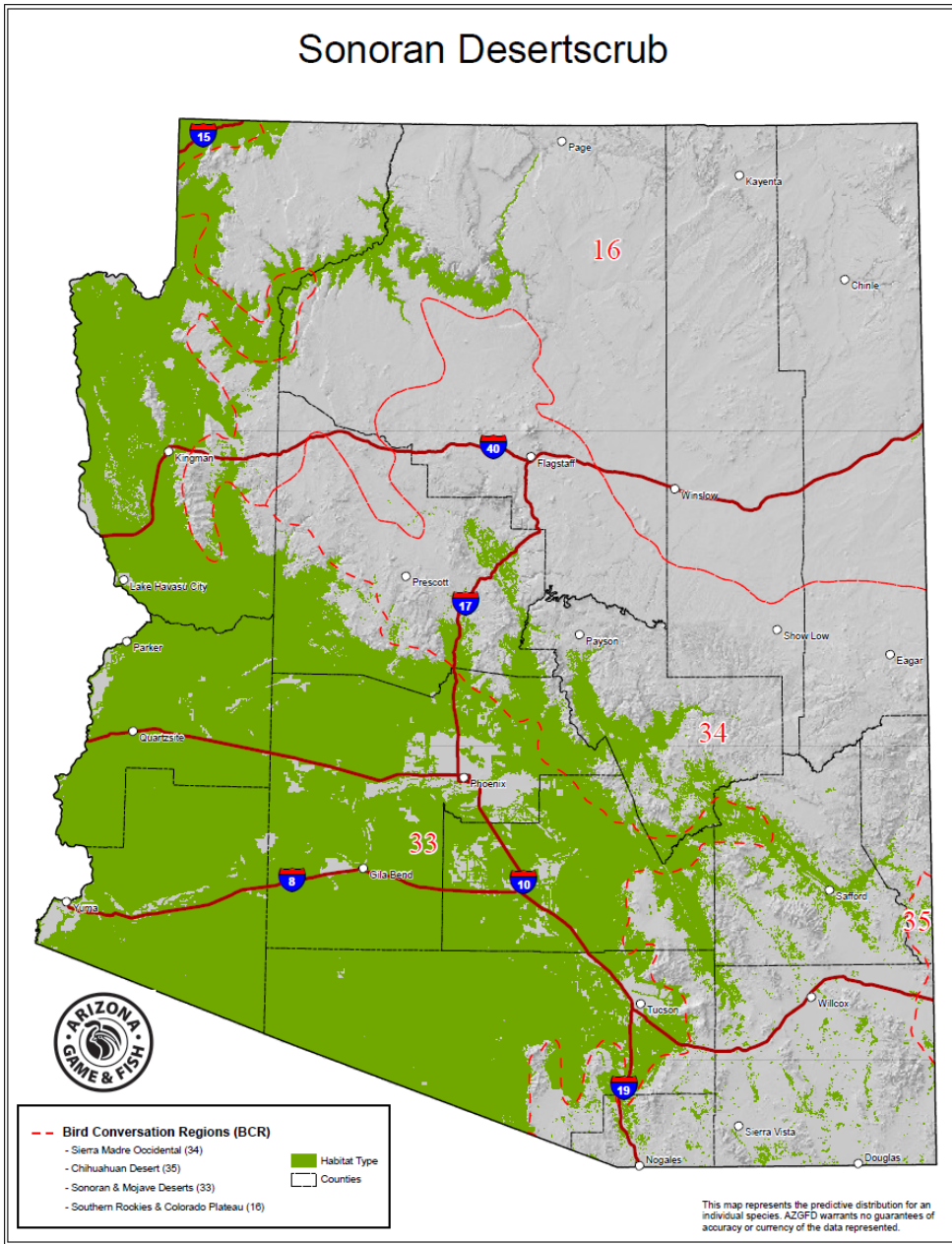
Estimated Cover in Arizona ⁴	
21,329,962.28 ac 29.23% of state	
Land Ownership Breakdown ⁴	
Federal	67.86%
Private	4.05%
Tribal	26.72%
State Trust	1.28%
Other	0.09%
Most Important Conservation Concerns	
Residential/commercial development Livestock grazing/conversion to agriculture Renewable energy development Recreational activities Increased fire frequency ³ Invasive plant species Climate change (drought, temperature extremes, fire)	
Habitat Recovery Time ^{2,3}	
Perennial cover in 40 years but species composition longer; Saguaro 70-100 years	
Vulnerability to Climate Change ^{1,5}	
Vulnerability	High
Effects	Invasive plants and drought increase fire frequency; saguaro, paloverde and ocotillo especially vulnerable.
Response	Loss or movement up slope of upland mixed cacti; invasive grasslands

Bird Relationships Profile

Representative Bird Species with Accounts	
Elf Owl, Gilded Flicker, Gila Woodpecker, Costa's Hummingbird, LeConte's Thrasher, Brewer's Sparrow	
Other Associated Breeding Bird Species ⁷	
Gambel's Quail, White-winged Dove, Elf Owl, Burrowing Owl, Western Screech-Owl, Harris's Hawk, Crested Caracara, American Kestrel, Prairie Falcon, Greater Roadrunner, Lesser Nighthawk, Ash-throated Flycatcher, Brown-crested Flycatcher, Loggerhead Shrike, Verdin, Cactus Wren, Curve-billed Thrasher, Bendire's Thrasher, Crissal Thrasher, Black-tailed Gnatcatcher, Lucy's Warbler, Black-throated Sparrow, Phainopepla	
AZ Stewardship Responsibility ⁴	
Cactus Ferruginous Pygmy-Owl, Gilded Flicker, Gila Woodpecker, Five-striped Sparrow, Purple Martin	



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Habitat Codes Included in Sonoran Desertscrub

Arizona Breeding Bird Atlas

- DSL, DSU, WSR, DMO

USGS Southwestern ReGAP

- North American Warm Desert Wash
- Sonoran Paloverde-Mixed Cacti Desert Scrub
- Sonora-Mojave Creosotebush-White Bursage Desert Scrub
- Sonora-Mojave Mixed Salt Desert Scrub
- North American Warm Desert Active and Stabilized Dune
- Mohave Mid-elevation Mixed Desert Shrub



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General Information

Habitat Importance

Arizona contains approximately 34% of all Sonoran desertscrub of North America, and it therefore has the highest stewardship responsibility for this habitat type in the United States. This unique ecosystem is home to many bird species that are only found in Sonoran desertscrub, including Elf Owl, Gilded Flicker, Gila Woodpecker, Costa's Hummingbird, and LeConte's Thrasher.

Distribution in Arizona

Sonoran desertscrub in Arizona has its core range in the southwestern part of the state, with lowland Sonoran desertscrub occurring mostly in low elevations (< 2,000 feet) of the Colorado River Valley. Upland Sonoran desertscrub covers slightly higher elevations (\leq 3,500 feet) surrounding that region. The Sonoran desert biome expands into some parts of southeastern Arizona.

Habitat Description

Sonoran desertscrub is characterized by low and unevenly distributed rainfall that ranges from 0 – 13" per year. Lowland Sonoran desertscrub represents some of the driest regions of the state. Vegetation of the lowland Sonoran desert is dominated by either creosotebush-bursage or saltbush, whereas upland Sonoran desertscrub is characterized by scattered trees, mainly paloverdes, cactuses, and sloped terrain (Brown 1994). Plant communities include paloverde-cactus-mixed scrub, creosotebush, crucifixion thorn, and jojoba-mixed scrub (Brown 1994).



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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 Commercial and industrial areas 	<ul style="list-style-type: none"> Increasing housing and urban development Conversion of native desert to urban areas 	High
Agriculture: <ul style="list-style-type: none"> Annual and perennial nontimber crops Livestock farming and ranching 	<ul style="list-style-type: none"> Conversion to agriculture Unsustainable livestock grazing 	High
Energy Production and Mining: <ul style="list-style-type: none"> Renewable energy 	<ul style="list-style-type: none"> Renewable energy fields 	Medium
Human Intrusions and Disturbance: <ul style="list-style-type: none"> Recreational activities Work and other activities 	<ul style="list-style-type: none"> Recreational activities Border patrol activities 	Medium
Natural System Modifications: <ul style="list-style-type: none"> Fire and fire suppression 	<ul style="list-style-type: none"> Fire and fire suppression (mainly increase in fire cycle from non-native grasses/annuals) 	High
Invasive and Problematic Species: <ul style="list-style-type: none"> Invasive non-native/alien species 	<ul style="list-style-type: none"> Invasive buffelgrass and red brome increasing fire occurrence 	High
Climate Change: <ul style="list-style-type: none"> Changes in temperature regimes Changes in precipitation and hydrological regimes (drought) 	<ul style="list-style-type: none"> Increasing temperatures and decreasing moisture 	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 six representative bird species reviewed to create this account, the effects of climate change, increases in fire frequency, urban/rural development, invasive plant species, and livestock grazing constitute the greatest current threats to bird habitat quality in Sonoran desertscrub in Arizona.

Residential and Commercial Development:

- Housing and urban areas
- Commercial and industrial areas

Human population growth in Arizona, particularly in Maricopa and Pima counties, is leading to conversion of Sonor-



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an desertscrub to suburban-urban. Many native bird species are intolerant of urban landscapes (Beissinger and Osborne 1982); for instance, even common species such as Black-throated Sparrow and Black-tailed Gnatcatcher are associated with native vegetation and avoid urban areas in the state (Germaine et al. 1998). Removal of cactus landscapes for development and the lack of recruitment of saguaros elsewhere is also a source of habitat loss for Gilded Flicker (Germaine et al. 1998) and Costa's Hummingbird (Baltosser and Scott 1996).

Recommended Actions:

1. During project planning focus on identifying and incorporating large tracts of saguaro landscapes as greenbelts and open space.
2. Identify and protect from development key stronghold areas of both upland and lowland Sonoran desertscrub.
3. Increase public understanding and appreciation of Sonoran Desert birds and their unique ecological needs, particularly where native landscapes are adjacent to urban areas.
4. Encourage strategies that avoid or minimize urban development in high quality habitat.
5. Promote maintenance of minimum habitat patches of desertscrub that are rich in flowering plants. Especially if located near urban areas, raise public awareness of the value of wildflowers and pollinators.
6. Work with counties and municipalities for urban landscaping options that use native, dry-adapted plants, especially those featuring tubular flowers.

Agriculture:

- Annual and perennial non-timber crops
- Livestock farming and ranching

The effects of livestock grazing on Sonoran desertscrub vary from site to site depending on soil type, plant community, rainfall, and intensity and duration of grazing. Continuous heavy grazing results in the removal of palatable species, facilitates the spread of exotic weeds, and disturbs organisms that maintain soil health. The long recovery period of Sonoran desertscrub to its mature stage requires significant rest periods during which grazing should be minimized, particularly where other stressors are also present. Desert vegetation in some areas, especially in western Arizona, is also subject to browsing by feral burros.

Recommended Actions:

1. Raise awareness of resource managers and the public about livestock grazing impacts to desert landscapes that are not adapted to the presence of large ungulates.
2. Develop grazing strategies avoid the main growing season of native desert plants and have the lowest impact on the integrity of the plant communities and biotic soils.
3. Manage wild horse and burro populations to reduce habitat damage, particularly in desert wash riparian habitats.
4. Manage livestock grazing to not to disturb or compact fragile soils and biocrusts. Maintain native shrub species.
5. Use exclosures or non-fence methods to prevent livestock/wildlife vegetation trampling.

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 facilities in the Sonoran desert. For example, the Bureau of Land Management (BLM) has identified solar energy de-



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velopment zones in [Arizona](#) and the State Land Department is seeing an increasing number of applications for solar energy development.

Recommended Actions:

1. Develop mitigation guidelines for desert birds with particular emphasis on protecting and minimizing impacts to desert washes and other sensitive habitats of desert scrub landscapes.
2. Review and consider adopting the Arizona Game and Fish Department suggested [guidelines for solar and wind energy development](#).
3. Study the response of desert birds to solar and wind energy projects.

Human Intrusions and Disturbance:

- Recreational activities

Motorized recreation in LeConte's Thrasher habitat leads to destruction or loss of required soft soil substrates, litter layers, insect prey species, and shrubs that produce litter and insects, as well as those that serve as nest sites (Sheppard 1973). Preferred habitat for this species is also in areas preferred by OHV users (i.e. unobstructed travel, sparse and smaller vegetation).

Recommended Actions:

1. Identify and conserve the most important occupied habitats of LeConte's Thrashers at a landscape scale (patches of hundreds of acres).
2. Consider LeConte's Thrasher breeding season and year-round occupied habitat patches when developing OHV management plans.
3. Develop and distribute public outreach materials that explain the fragility of the desert environment and the inadvertent impacts that can occur with the use of OHVs.
4. Inoculate disturbed soils with material from surrounding biological crusts to hasten recovery time (often > 10 years if left to restore naturally).
5. Encourage use of established sites (e.g., trails) and roads for recreational use (Nicholoff 2003).

Natural System Modifications:

- Fire and fire suppression – See Invasive and Other Species below

Invasive and Other Species:

- Invasive non-native/alien species

In recent years, the number and intensity of fires in Upland Sonoran desertscrub have increased from the effects of human activities on fuel condition and fire ignition (Alford et al. 2005). The sparseness of ground and shrub cover historically limited the spread of fires, resulting in a plant community that is not adapted to fire (Alford et al. 2005). The widespread establishment of red brome and other exotic annuals has increased ground cover in the desert and thus promotes fire spread (Brooks and Pyke 2001). The more recent invasion of buffelgrass creates an even more consistent annual fuel load than do annual grasses (McDonald and McPherson 2013). Cactuses, trees, and shrubs, such as paloverde and ironwood, are frequently killed by fire or else are slow to recover (Esque et al. 2013). Fire also promotes further establishment of weeds that take advantage of the lack of competition from native plants, thus further jeopardizing recovery (Brooks and Pyke 2001).



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Recommended Actions:

1. Develop and implement fire management strategies, including full suppression, that prevent catastrophic fires in landscapes with mature cactuses and trees typical of Upland Sonoran desertscrub.
2. Reduce fuel loads along roadways to reduce fire risk.
3. Explore options for enhancing large tracts of mature cactus landscapes to reduce fire risk and increase habitat value by aggressively combating weeds, especially buffelgrass and other non-native perennials, and re-vegetating with native understory species.
4. Use landscape assessments such as Sonoran Rapid Ecoregional Assessment 2010 to inform priorities and assess threats such as fire, invasive plants, development, and climate change.
5. Establish long-term monitoring of high quality habitat blocks and bird populations to develop a baseline to evaluate change.

Climate Change:

- Changes in temperature regimes
- Changes in precipitation and hydrological regimes (drought)

Long-term warming trends, coupled with a projected decrease in precipitation, are expected to cause an even drier climate in southwestern North America (Seager and Vecchi 2010). Climate change exacerbates many of the already existing stressors on ecosystems, and their resilience to changing temperature and precipitation is affected by the intensity of other pressures (Comer et al. 2012). Water availability is predicted to be lower throughout the year, and increased mortality is expected for mature saguaro and paloverde, the latter of which is already known to die off during droughts (Bowers and Turner 2001). Additional impacts of climate change are expected through its facilitation of invasive plants (especially red brome and buffelgrass) and increased fire frequency that exacerbates the effects of non-native plant invasions (Abatzoglou and Kolden 2011).

Recommended Actions:

1. Identify risks from land uses that may compound the effects of prolonged droughts on cactus and riparian woodland landscapes, particularly in arroyo settings.
2. Monitor likely effects of climate change on Gilded Flicker habitats by determining ground insect availability during drought years and Gilded Flicker nest success.
3. Monitor phenology and mistletoe availability in mesquite and acacia stands in Gila Woodpecker occupied areas.
4. Consider a climate-change sensitive program for monitoring flowering plant abundance and phenology (use tools provided by the National Phenology Network at <https://www.usanpn.org/>). This program is particularly suitable for a contributory (“citizen”) science approach.
5. Identify and map high quality habitat for LeConte’s Thrasher across jurisdictional boundaries. Focus effort to prevent or minimize habitat loss.
6. Develop public outreach materials that explain the fragility and importance of southwestern environments and the need for conservation action in light of climate change.

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