

## SONORAN DESERT

The Sonoran Desert Ecoregion in Arizona covers 22.3 million acres, and is dominated by desert scrub communities (Marshall and others 2000, Phillips and Comus 2000). Elevation ranges from about 70 to 5900 feet, averaging about 1350 feet. The ecoregion features Basin-and-Range topography, with broad valleys separated by rugged mountain ranges. Annual precipitation in the ecoregion ranges from about 3 to 17 inches, with slightly more annual rainfall within higher elevation inclusions of other vegetation types. Moving from east to west, total precipitation decreases and there is less influence from summer rains.

The most striking feature of this ecoregion is the cactus-dominated vegetation communities, with giant saguaros and chollas being the most conspicuous. Biodiversity of the Sonoran Desert is among the highest of any desert in the world (Phillips and Comus 2000) and can be manifested here in surprising ways. In one of the drier portions of the ecoregion, Rosenstock and others (2004) found over 200 species of native bees, one of the most diverse such communities in North America. In a review of several studies of breeding birds, Nabhan and Holdsworth (1999) concluded that in terms of breeding bird diversity and productivity, the Sonoran Desert's riparian habitats are among the richest in all of North America.

Land ownership is primarily federal and is dominated by Barry M. Goldwater Air Force Range and Yuma Proving Grounds (Army), Cabeza Prieta and Kofa National Wildlife Refuges, the Tohono O'odham Nation, and Organ Pipe Cactus National Monument. The majority of intervening land is owned by BLM. Irrigable lands along the Colorado, Gila, and Salt Rivers and in the Phoenix and Tucson valleys are mostly private or tribal lands. Important areas along the Colorado River are managed by Imperial, Cibola, and Bill Williams National Wildlife Refuges and by BR and BLM. Large tracts of State Trust land occur near Wickenburg and Tucson, and smaller parcels are scattered in areas of BLM and private lands. USFS and the San Carlos Apache Nation own tracts on the northeast periphery of the ecoregion.

Major land uses within the Sonoran Desert Ecoregion have historically been agriculture, urban and rural settlement, livestock grazing, mining, and military training. Agriculture became established where water was available, but in recent decades has given way in many areas to urban growth. In some portions of the ecoregion, large tracts of desert remain, and plant and animal communities are relatively intact. In other portions of the ecoregion, urban development and rural sprawl have significantly impacted the wildlands. Despite the inherent lack of water within the region, urban growth continues unabated in significant portions of the relatively flat ecoregion. This is largely due to impoundment of the major surface water drainages in Arizona, and significant withdrawals from the associated groundwater basins.

The scenic desert settings and warm, sunny climate continue to make the Sonoran Desert a favored destination for relocation and retirement. Population of the counties that comprise the Sonoran Desert Ecoregion increased from 1.0 million in 1960 to 4.1 million in 2000 (US Census Bureau 2000). This 300% increase far outpaced the 62% increase recorded for the nation as a whole during the same period (US Census Bureau 2000). Continued increases will create additional direct and indirect stresses on the ecoregion.

Major urban areas are the Phoenix and Tucson metropolitan areas, both of which are rapidly expanding into previously undeveloped desert. Other communities in the ecoregion are also growing rapidly, most notably: Green Valley, Casa Grande, Marana, Sahuarita, Buckeye, Wickenburg, and the Colorado River communities of San Luis, Yuma, and Lake Havasu City.

The primary river systems and riparian areas in the Sonoran Desert Ecoregion include: the lower reaches of the Colorado, Bill Williams, Big Sandy, Santa Maria, Hassayampa, Agua Fria, Gila, Verde, Salt, Santa Cruz, and San Pedro rivers. The eastern edge of the ecoregion contains a number of river impoundment reservoirs: Lake Pleasant, Bartlett, Horsehoe, Saguaro, Canyon, Apache, Roosevelt, and San Carlos. Recreation activities in the form of boating, fishing, and other water-sports are prevalent along the Colorado River and the ecoregion's larger reservoirs. Extensive water diversion projects occur in this ecoregion: the Central Arizona Project canal, the Salt River Project network of canals in and around the Phoenix metropolitan area, and the Mohawk-Welton network of canals along the lower Gila River. Along with groundwater sources, these projects divert surface water from the Colorado, Salt, and Gila rivers to support the ecoregion's municipal, industrial, and agricultural water needs.

The Sonoran Desert ecoregion has unique problems that result from its location along the border with Mexico. Borderlands traffic from illegal immigration and drug trafficking and the concomitant enforcement activities have caused further losses of habitat and reduction in terrestrial wildlife movement corridors. In many instances, border activities have completely converted, degraded, and fragmented wildlife habitat along the border. At the same time, the shared border also presents unique opportunities for collaboration with Mexican partners, which has resulted in benefits to wildlife on both sides of the border.

For an expanded description of each habitat type and characterization of statewide threats to each, see "Statewide Condition of Arizona's Terrestrial and Riparian/Aquatic Habitat Types (Element 2)." See Appendix O for scoring of all stressors in each habitat type. The descriptions provided do not attempt to depict conditions on sovereign tribal lands. The nature of these stressors in Arizona is presented more fully under "Stressors that Impact Wildlife and Wildlife Habitats (Element 3)."

### **Species of Greatest Conservation Need (Element 1)**

For more information on these species, see "Conservation Actions to Address Stressors to SGCN (Elements 3, 4)." A complete list of species, including those of lower conservation priority and of undetermined vulnerability status can be found in Appendix K. For some species in Table 21, this part of their distribution may not represent a key area for conservation actions.

Table 21. Tier 1a and Tier 1b SGCN associated with each habitat type in the Sonoran Desert Ecoregion.

Scientific Name	Common Name	Desertscrub			Grass-land	Woodlands/ Forests		Human-dominated landscapes*	Aquatic/ Riparian		
		Lower Colorado River Sonoran Desertscrub	Upland Sonoran Desertscrub	Mohave Desertscrub	Semidesert Grassland	Interior Chaparral	Great Basin Conifer Woodland		Streams/ Rivers	Wetlands/ Springs	Lakes/ Reservoirs
<b>Amphibians</b>											
<i>Bufo microscaphus</i>	Arizona Toad	X	X	X	X				X	X	
<i>Gastrophryne olivacea</i>	Great Plains Narrow-mouthed Toad	X	X		X				X	X	
<i>Pterohyla fodiens</i>	Lowland Burrowing Treefrog	X	X						X	X	
<i>Rana yavapaiensis</i>	Lowland Leopard Frog	X	X		X	X			X	X	
<b>Birds</b>											
<i>Accipiter gentilis atricapillus</i>	Northern Goshawk					X	X				
<i>Aechmophorus clarkii</i>	Clark's Grebe							X	X	X	X
<i>Amazilia violiceps</i>	Violet-crowned Hummingbird							X			
<i>Ammodramus savannarum perpallidus</i>	Western Grasshopper Sparrow				X			X	X	X	
<i>Anthus spragueii</i>	Sprague's Pipit							X			
<i>Ardea alba</i>	Great Egret							X	X	X	X
<i>Asturina nitida maxima</i>	Northern Gray Hawk		X					X	X	X	X
<i>Botaurus lentiginosus</i>	American Bittern							X	X	X	X
<i>Buteo regalis</i>	Ferruginous Hawk				X			X			
<i>Buteogallus anthracinus</i>	Common Black-Hawk								X	X	X
<i>Caracara cheriway</i>	Crested Caracara	X	X		X			X			
<i>Catharus ustulatus</i>	Swainson's Thrush	X	X	X			X	X	X	X	
<i>Ceryle alcyon</i>	Belted Kingfisher							X	X	X	X

Table 21. Tier 1a and Tier 1b SGCN associated with each habitat type in the Sonoran Desert Ecoregion.

Scientific Name	Common Name	Deserts/scrub			Grass-land	Woodlands/ Forests		Human-dominated landscapes*	Aquatic/ Riparian		
		Lower Colorado River Sonoran Deserts/scrub	Upland Sonoran Deserts/scrub	Mohave Deserts/scrub	Semidesert Grassland	Interior Chaparral	Great Basin Conifer Woodland		Streams/ Rivers	Wetlands/ Springs	Lakes/ Reservoirs
<i>Charadrius alexandrinus nivosus</i>	Western Snowy Plover							X	X		X
<i>Coccyzus americanus occidentalis</i>	Western Yellow-billed Cuckoo		X						X	X	X
<i>Contopus cooperi</i>	Olive-sided Flycatcher	X	X	X	X	X	X	X	X	X	X
<i>Dendrocygna autumnalis</i>	Black-bellied Whistling-Duck							X	X	X	X
<i>Dumetella carolinensis</i>	Gray Catbird								X	X	X
<i>Egretta thula</i>	Snowy Egret							X	X	X	X
<i>Empidonax traillii extimus</i>	Southwestern Willow Flycatcher	X	X	X				X	X	X	X
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	X	X	X	X	X	X	X	X	X	X
<i>Glaucidium brasilianum cactorum</i>	Cactus Ferruginous Pygmy-Owl	X	X		X			X	X	X	X
<i>Haliaeetus leucocephalus</i>	Bald Eagle							X	X	X	X
<i>Ictinia mississippiensis</i>	Mississippi Kite							X	X	X	X
<i>Laterallus jamaicensis coturnic</i>	California Black Rail								X	X	X
<i>Oreoscoptes montanus</i>	Sage Thrasher	X	X	X	X		X	X			
<i>Pandion haliaetus</i>	Osprey							X	X	X	X
<i>Progne subis arboricola</i>	Western Purple Martin							X	X		X
<i>Rallus longirostris yumanensis</i>	Yuma Clapper Rail							X	X	X	X
<i>Sphyrapicus nuchalis</i>	Red-naped Sapsucker		X	X		X	X	X	X	X	X
<i>Tyrannus crassirostris</i>	Thick-billed Kingbird							X	X	X	





Table 21. Tier 1a and Tier 1b SGCN associated with each habitat type in the Sonoran Desert Ecoregion.

Scientific Name	Common Name	Desertscrub			Grass-land	Woodlands/ Forests		Human-dominated landscapes*	Aquatic/ Riparian		
		Lower Colorado River Sonoran Desertscrub	Upland Sonoran Desertscrub	Mojave Desertscrub	Semidesert Grassland	Interior Chaparral	Great Basin Conifer Woodland		Streams/Rivers	Wetlands/Springs	Lakes/Reservoirs
<i>Eumeces gilberti arizonensis</i>	Arizona Skink		X								
<i>Gopherus agassizii</i> (Sonoran Population)	Sonoran Desert Tortoise	X	X	X	X	X	X				
<i>Kinosternon arizonense</i>	Arizona Mud Turtle	X	X						X	X	X
<i>Kinosternon sonoriense longifemorale</i>	Sonoyta Mud Turtle		X							X	X
<i>Phrynosoma mcallii</i>	Flat-tailed Horned Lizard	X									
<i>Thamnophis eques megalops</i>	Northern Mexican Gartersnake								X	X	X
<i>Uma rufopunctata</i>	Yuman Desert Fringe-toed Lizard	X									
<i>Uma scoparia</i>	Mojave Fringe-toed Lizard	X									

\*Human-dominated landscapes here refer to agricultural areas and urban lakes. These habitat types are discussed under "Statewide Condition of Arizona's Terrestrial and Aquatic/Riparian Habitat Types," and in "Stressors to Arizona's Wildlife and Wildlife Habitat" under the stressor "Urban/rural development."

Terrestrial habitat types below are arranged in order of prevalence in this ecoregion. Where patches of uncharacteristic habitat types (not described in this section) occur in this ecoregion, conservation should reflect stressors and species identified in neighboring ecoregions.

**Lower Colorado River Sonoran Desertscrub**  
**(52.4% of acreage)**

*Habitat Condition (Element 2)*

This habitat occurs widely across the lower elevations within the hottest and driest portion of the state, generally filling the center and western portion of the Sonoran Desert Ecoregion in Arizona. This vegetation includes significant areas around the Tucson and Phoenix metropolitan areas, specifically the Santa Cruz, Salt, and Gila basins. Lower Colorado River Sonoran

Desertscrub is typically a shrub-dominated community, with creosotebush and white bursage dominating in most areas (Brown 1982). Washes provide xeroriparian habitat, which is critical to many resident desert and migratory wildlife species for forage and cover.

In the western portion of this vegetative community, large tracts of federal land are managed by the Department of Defense (Barry M. Goldwater and Yuma Proving Grounds military ranges), USFWS (Cabeza Prieta, Kofa, and several Colorado River wildlife refuges), BLM, and NPS (Organ Pipe Cactus National Monument). The federal tracts are relatively protected, although there are impacts from military actions on the military ranges from grazing where it occurs on BLM lands, from roads and other human activities that fragment habitat, from invasion of nonnative plants and resulting wildfires, and from unauthorized roads and trails, especially from OHV vehicles and all-terrain vehicles. Along the border, many of these federal areas are currently threatened from activities of illegal immigrants, drug smuggling, and related enforcement. If, at some time in the future, these federal lands lose their federal status (possibilities include BLM land exchanges or closure of military ranges), the threat of urban and rural development should not be overlooked. Because of significant losses of this vegetative community in the eastern portion of the Lower Colorado River Sonoran Desertscrub (see next paragraph), conservation of intact ecosystems should be a high priority on these federal land tracts. Significant tribal lands are also included in this vegetative community.

The eastern portion of this vegetative community is dominated by large tracts of private land and interspersed State Trust Land, and is greatly impacted and in many areas completely lost as wildlife habitat. The Phoenix metropolitan area was largely carved out of this vegetative community; areas northwest of Tucson and along the interstate corridors between Phoenix and Tucson and north and west of Phoenix will become largely developed over the next 10-20 years. The eastern portion of the Lower Colorado River Sonoran Desertscrub has been most heavily impacted by urban development, but also by rural development and agriculture. Even in the undeveloped areas, historic and current overgrazing and OHV use are causing significant impact to wildlife habitat. It is anticipated that impacts to the eastern portions of the Lower Colorado River Sonoran Desertscrub will increase as urban areas continue to expand; conservation here should focus on riparian areas, corridors, and community planning that will incorporate wildlife values.

Major Stressors Affecting Habitat (Element 3)

**Stressor Category: Border issues**

- Illegal dumping/littering along the border
- Unauthorized roads & trails created by illegal immigrants and smugglers
- Dispersed camping along the border
- Enforcement activities along the border

**Stressor Category: Changes in Ecological Processes**

- Soil erosion
- Habitat fragmentation/barriers
- Habitat degradation/shrub invasions

**Stressor Category: Climate Change**

Drought  
Shift to warmer climate

***Stressor Category:* Consumptive use of biological resources**

Harvesting/collecting animals  
Grazing by ungulates  
Harvesting/collecting plants

***Stressor Category:* Habitat conversion**

Livestock management  
Urban growth  
Military bases, defoliation, munitions testing

***Stressor Category:* Invasive species**

Feral animals  
Nuisance plants  
Disease/pathogens/parasites

***Stressor Category:* Non-consumptive resource use**

Motorized recreation off-trail

***Stressor Category:* Pollution**

Light pollution  
Illegal dumping/littering  
Noise pollution

***Stressor Category:* Transportation and infrastructure**

Air traffic corridors/overflights  
Right-of-way fencing along roadways  
Unauthorized roads & trails  
Roads for motorized vehicles

**Upland Sonoran Desertscrub**  
**(46.7% of acreage)**

***Habitat Condition (Element 2)***

This habitat occurs at the higher elevations of the Sonoran Desert Ecoregion, where slightly cooler temperatures and increased precipitation result in more verdant and diverse vegetation. This community abuts other ecoregions, and pockets are scattered within the Lower Colorado River Sonoran Desertscrub. Fingers of Upland extend the Sonoran Desert Ecoregion into other ecoregions, particularly surrounding the river drainages of the San Pedro, Gila, Salt, Verde, Agua Fria, Big Sandy, and Santa Cruz. In the Upland Sonoran Desertscrub, trees are less confined to drainages than in the Lower Colorado River Sonoran Desertscrub, giving this habitat a greater overall arboreal component and therefore a greater vertical and structural diversity. The most extensive community is paloverde-mixed cacti (Brown 1982). In recent years there has been an increased understanding of the importance of the ironwood tree in the Upland. Ironwood functions as a habitat modifying keystone species, exhibiting strong influences on the distribution and abundance of associated species.

In Upland, strips of riparian habitat exist along drainages with perennial or near-perennial flows. These riparian deciduous woodlands and marshlands were formerly much more extensive and their decline represents a significant loss to wildlife.

Land ownership in the Upland Sonoran Desertscrub community is mixed. Several areas of tribal lands are included, including large areas of the Tohono O'odham Nation and the San Carlos Apache Nation. Large sections are federal lands managed by the USFWS (Kofa and Cabeza Prieta NWRs), NPS (Organ Pipe Cactus National Monument and Saguaro National Park), USFS (Tonto National Forest), and BLM (including Sonoran Desert National Monument, Ironwood Forest National Monument, and Agua Fria National Monument). As in the Lower Colorado River Sonoran Desertscrub community, these federal lands are largely protected as long as they remain in federal ownership. Stressors to these federal lands include military activities, habitat fragmentation from roads and other human activities, unauthorized roads and trails, border issues, wildfires (largely from introduced nonnative grasses), overgrazing where it occurs, and feral animals (for example, impacts to the Silver Bell bighorn sheep population due to disease outbreak from feral goats in 2004). Wildfire in this vegetative community is increasingly common, but was not so formerly. Many Upland native plants are not adapted to fire and where it occurs, type conversion to a community more similar to the Lower Colorado River Sonoran Desertscrub, augmented with nonnative grasses and forbs, is often the result. Increased pressure from recreational use, particularly unregulated OHV use, also is a threat in many places. The federal lands are increasingly important for conservation of the Upland, and ecosystem integrity and connectivity should be a high priority.

Upland Sonoran Desertscrub vegetation outside of the large federal land blocks are interspersed BLM, State Trust Land, and private lands. Here, threats are more diverse and immediate, including current and future urban and rural development, agricultural development, overgrazing, and increasing recreational pressure. The scenic deserts typical of Upland Sonoran Desertscrub are favored areas for urbanization and recreation. Around the urban centers of Phoenix and Tucson, immense areas of this habitat are being lost completely to human activity. Recreational impacts close to the urban areas are also increasing. Population pressures will continue to increase, with Arizona projected to have the second largest increase in population (108%) of any state in the nation during 2000-2030 (U.S. Census Bureau 2005; <http://www.census.gov/population/www/projections/projectionsagesex.html>).

*Major Stressors Affecting Habitat (Element 3)*

***Stressor Category: Abiotic resource use***

Groundwater depletion and springhead use

***Stressor Category: Border issues***

Unauthorized roads & trails created by illegal immigrants and smugglers

Dispersed camping along the border

Illegal dumping/littering along the border

Enforcement activities along the border

***Stressor Category: Changes in Ecological Processes***

Habitat fragmentation/barriers

Habitat degradation/shrub invasions  
Soil erosion

**Stressor Category: Climate Change**

Shift to warmer climate  
Drought

**Stressor Category: Consumptive use of biological resources**

Harvesting/collecting animals  
Harvesting/collecting plants  
Grazing by ungulates

**Stressor Category: Habitat conversion**

Livestock management  
Urban growth

**Stressor Category: Invasive species**

Nuisance plants  
Disease/pathogens/parasites

**Stressor Category: Non-consumptive resource use**

Battles, maneuvers, war games, military camps, guerilla insurgencies  
Motorized recreation off-trail

**Stressor Category: Pollution**

Illegal dumping/littering  
Light pollution  
Noise pollution

**Stressor Category: Transportation and infrastructure**

Right-of-way fencing along roadways  
Unauthorized roads & trails  
Air traffic corridors/overflights  
Roads for motorized vehicles

**Mohave Desertscrub**  
**(0.6% of acreage)**

*Habitat Condition (Element 2)*

A small, remnant patch of this habitat occurs in the northern part of the ecoregion, isolated from the large expanses to the northwest. Dominant plants are creosotebush and Joshua tree. Land ownership is almost entirely State Trust with some BLM. Urban and agricultural development is almost nonexistent in these areas, but some impacts have resulted from livestock grazing. Overall, however, the ecological functions of this habitat remain intact and its condition is considered to be healthy. Its small area and isolation from other areas of Mohave Desertscrub make this patch vulnerable to loss or disturbance. Located on the southern extremity of Mohave Desertscrub distribution, it may be vulnerable to any increase of aridity through drought or warming.

*Major Stressors Affecting Habitat (Element 3)*

**Stressor Category: Changes in Ecological Processes**

- Soil erosion
- Stressor Category: Climate Change**
- Drought
- Shift to warmer climate
- Stressor Category: Consumptive use of biological resources**
- Grazing by ungulates
- Stressor Category: Habitat conversion**
- Livestock management
- Stressor Category: Invasive species**
- Nuisance plants

**Semidesert Grassland**  
**(0.2% of acreage)**

*Habitat Condition (Element 2)*

A dozen very small inclusions of Semidesert Grassland exist in the ecoregion, sometimes on isolated mountains, other times in lowland valleys. Some have suffered from overgrazing but most remain intact. Their small sizes and isolation make them particularly vulnerable to loss or disturbance. Grasslands located in valley bottoms will be particularly susceptible to urbanization as Arizona's population continues to grow.

Larger patches of this habitat type are found in neighboring Apache Highlands North and South ecoregions. The following major stressors were assessed for Upland Sonoran Desertscrub habitat that largely surrounds patches of Semidesert Grassland in the Sonoran Desert ecoregion.

*Major Stressors Affecting Habitat (Element 3)*

- Stressor Category: Abiotic resource use**
- Groundwater depletion and springhead use
- Stressor Category: Border issues**
- Illegal dumping/littering along the border
- Enforcement activities along the border
- Dispersed camping along the border
- Unauthorized roads & trails created by illegal immigrants and smugglers
- Stressor Category: Changes in Ecological Processes**
- Soil erosion
- Habitat fragmentation/barriers
- Habitat degradation/shrub invasions
- Stressor Category: Climate Change**
- Drought
- Shift to warmer climate
- Stressor Category: Consumptive use of biological resources**
- Harvesting/collecting plants
- Harvesting/collecting animals
- Grazing by ungulates

***Stressor Category: Habitat conversion***

Urban growth  
Livestock management

***Stressor Category: Invasive species***

Nuisance plants  
Disease/pathogens/parasites

***Stressor Category: Non-consumptive resource use***

Battles, maneuvers, war games, military camps, guerilla insurgencies  
Motorized recreation off-trail

***Stressor Category: Pollution***

Noise pollution  
Light pollution  
Illegal dumping/littering

***Stressor Category: Transportation and infrastructure***

Unauthorized roads & trails  
Right-of-way fencing along roadways  
Air traffic corridors/overflights  
Roads for motorized vehicles

**Interior Chaparral**  
**(0.1% of acreage)**

***Habitat Condition (Element 2)***

At higher elevations, several small pockets of chaparral habitat add diversity to the ecoregion. They are afforded a large degree of protection by their location in rugged, remote areas and on lands administered by BLM and USFWS, and they remain largely intact. However, their small sizes and isolation from other areas of similar habitat make them particularly vulnerable to loss or disturbance. Located on the southern fringe of Interior Chapparal distribution, they may be vulnerable to any increase of aridity through drought or warming.

Larger patches of this habitat type are found in neighboring Apache Highlands North. The following major stressors were assessed for Upland Sonoran Desertscrub habitat that largely surrounds patches of Interior Chaparral in this ecoregion.

***Major Stressors Affecting Habitat (Element 3)***

***Stressor Category: Abiotic resource use***

Groundwater depletion and springhead use

***Stressor Category: Border issues***

Enforcement activities along the border  
Unauthorized roads & trails created by illegal immigrants and smugglers  
Dispersed camping along the border  
Illegal dumping/littering along the border

***Stressor Category: Changes in Ecological Processes***

Habitat degradation/shrub invasions

Habitat fragmentation/barriers

Soil erosion

**Stressor Category: Climate Change**

Drought

Shift to warmer climate

**Stressor Category: Consumptive use of biological resources**

Grazing by ungulates

Harvesting/collecting animals

Harvesting/collecting plants

**Stressor Category: Habitat conversion**

Urban growth

Livestock management

**Stressor Category: Invasive species**

Nuisance plants

Disease/pathogens/parasites

**Stressor Category: Non-consumptive resource use**

Battles, maneuvers, war games, military camps, guerilla insurgencies

Motorized recreation off-trail

**Stressor Category: Pollution**

Noise pollution

Illegal dumping/littering

Light pollution

**Stressor Category: Transportation and infrastructure**

Unauthorized roads & trails

Right-of-way fencing along roadways

Roads for motorized vehicles

Air traffic corridors/overflights

**Great Basin Conifer Woodland**  
**(0.03% of acreage)**

**Habitat Condition (Element 2)**

There is one small inclusion of this habitat type in the ecoregion in the Poachie Range north of Alamo Lake. It is afforded a large degree of protection by its location in a rugged, remote area and on lands administered by BLM, and it remains largely intact. However, its small size and isolation from other areas of similar habitat make it particularly vulnerable to loss or disturbance. Located on the southern extremity of Great Basin Conifer Woodland distribution, it may be vulnerable to any increase of aridity through drought or warming.

Larger patches of this habitat type are found in neighboring Apache Highlands North and in the Mohave Desert ecoregions. The following major stressors were assessed for Upland Sonoran Desertscrub habitat that largely surrounds this patch of Great Basin Conifer Woodland in this ecoregion.

Major Stressors Affecting Habitat (Element 3)

**Stressor Category: Abiotic resource use**

Groundwater depletion and springhead use

**Stressor Category: Border issues**

Dispersed camping along the border

Unauthorized roads & trails created by illegal immigrants and smugglers

Illegal dumping/littering along the border

Enforcement activities along the border

**Stressor Category: Changes in Ecological Processes**

Habitat fragmentation/barriers

Soil erosion

Habitat degradation/shrub invasions

**Stressor Category: Climate Change**

Drought

Shift to warmer climate

**Stressor Category: Consumptive use of biological resources**

Harvesting/collecting plants

Harvesting/collecting animals

Grazing by ungulates

**Stressor Category: Habitat conversion**

Military bases, defoliation, munitions testing

Livestock management

Urban growth

**Stressor Category: Invasive species**

Nuisance plants

Disease/pathogens/parasites

**Stressor Category: Non-consumptive resource use**

Motorized recreation off-trail

**Stressor Category: Pollution**

Noise pollution

Light pollution

Illegal dumping/littering

**Stressor Category: Transportation and infrastructure**

Right-of-way fencing along roadways

Unauthorized roads & trails

Roads for motorized vehicles

Air traffic corridors/overflights

Riparian and aquatic systems in the Sonoran Desert include:

Wetlands/Springs/Seeps

Habitat Condition (Element 2)

Wetlands, springs, and seeps are rare in the Sonoran Desert but are critical to a number of rare species. Extensive cattail and bulrush marshes occur along the Lower Colorado River. These were thought to be much more restricted before the creation of dams and the cessation of annual flooding (Rosenberg and others 1991. Birds of the Lower Colorado River. The University of Arizona Press, Tucson, Arizona. 416 p.). They are of critical importance to many marsh species, most notably the Yuma clapper rail and California black rail. These habitats are threatened in some areas by efforts to dredge or straighten the river channel but the vast majority are protected within Bill Williams, Cibola, and Imperial National Wildlife Refuges and Mittry Lake Wildlife Area. Most springs and seeps are located in mountains or other areas of rugged terrain and remain largely intact. These areas are administered primarily by BLM, FWS Refuges, and NPS, which have afforded protection in the past and should continue to do so. Quitobaquito Spring and the associated man-made pond at Organ Pipe Cactus National Monument is a prominent site of great historical importance. Some springs and seeps in the Sonoran Desert have been degraded or lost completely due to development or diversion for use by livestock or crops or groundwater pumping, particularly those in flatter topographies. Agua Caliente Spring in Tucson, for example, has been developed into an urban park. An increase in aridity, should it occur, would obviously have severe impacts to many springs and seeps in the Sonoran Desert.

Major Stressors Affecting Habitat (Element 3)

**Stressor Category: Abiotic resource use**

Groundwater depletion and springhead use  
Water diversion/water catchments

**Stressor Category: Changes in Ecological Processes**

Altered river flow regimes  
Habitat degradation/shrub invasions  
Soil erosion  
Unnatural fire regimes

**Stressor Category: Climate Change**

Drought  
Shift to warmer climate

**Stressor Category: Consumptive use of biological resources**

Grazing by ungulates

**Stressor Category: Habitat conversion**

Livestock management

**Stressor Category: Invasive species**

Nuisance animals  
Nuisance plants  
Disease/pathogens/parasites

**Stressor Category: Non-consumptive resource use**

Motorized recreation off-trail

**Stressor Category: Transportation and infrastructure**

Unauthorized roads & trails

## **Streams/Rivers**

### *Habitat Condition (Element 2)*

The condition of aquatic and riparian systems within this ecoregion has been greatly degraded by human activities. This ecoregion includes the lower portions of major rivers, including the Colorado, Gila, Verde and Salt rivers, all of which originate at higher elevations outside this ecoregion. These rivers have all been impounded, diverted, and/or channelized. Along the Lower Colorado and the Gila rivers, associated marshes provide significant wildlife habitat. Changes in instream flow in these systems and the elimination of annual flooding cycles have reduced the capability of riparian systems to sustain themselves, especially during drought. These changes have reduced nutrient input and the leaching of salts that floods provide, and have affected reproduction of riparian plants by reducing the establishment of necessary seed beds. These same changes have favored undesirable nonnative competitors such as salt cedar. Many smaller rivers (for example: Santa Cruz, New River, and Aqua Fria) no longer flow, except during storm events, due to groundwater pumping, dncutting, and other factors. Some perennial reaches are maintained only by effluent discharge for short stretches (the Santa Cruz, and the Gila River west of Phoenix). The Bill Williams River falls entirely within this ecoregion and provides a lingering example of the riparian woodlands that once stretched for miles across the broad floodplains of major rivers. The loss of these extensive reaches of lower Sonoran deciduous riparian and marshland habitat has been arguably the greatest detrimental effect of modern western civilization on the Sonoran Desert Ecoregion. The lower San Pedro River remains one of the few dam-free rivers in the State, but it too is impacted and further threatened by human uses, such as agricultural diversion, groundwater pumping, and overgrazing.

Streams are relatively few in the ecoregion, but include: Date Creek, New River, Aravaipa Creek, Bonita Creek, Eagle Creek, Rillito River, Sabino Creek, and the Hassayampa River. Natural functions of these systems have been seriously altered in most areas by lowering of ground water levels, by diversion and channelization, by dam building and resulting inundation and cessation of flood cycles, and by invasion of nonnative plants. Arizona is unlikely to see additional water projects on the scale of those built in the last century. However, the state's ever-increasing population and demands for water make any improvement unlikely. Extended drought such as is currently being experienced will result in continued loss of instream flows and further degradation of riparian and aquatic habitats.

### *Major Stressors Affecting Habitat (Element 3)*

***Stressor Category:* Abiotic resource use**

- Groundwater depletion and springhead use
- Water diversion/water catchments

***Stressor Category:* Border issues**

- Altered fire regime as a result of border activities
- Illegal dumping/littering along the border
- Dispersed camping along the border
- Unauthorized roads & trails created by illegal immigrants and smugglers

***Stressor Category:* Changes in Ecological Processes**

Management for game animals and sport fish  
Streambank alteration/channelization  
Altered river flow regimes  
Soil erosion  
Habitat fragmentation/barriers  
Unnatural fire regimes  
Habitat degradation/shrub invasions

***Stressor Category: Climate Change***

Shift to warmer climate  
Drought

***Stressor Category: Consumptive use of biological resources***

Grazing by ungulates

***Stressor Category: Habitat conversion***

Rural development  
Urban growth  
Dams/reservoirs/impoundments  
Agricultural conversion  
Livestock management  
Recreational sites/facilities

***Stressor Category: Invasive species***

Nuisance animals  
Bait-bucket dumping/illegal stocking  
Disease/pathogens/parasites  
Nuisance plants  
Feral animals

***Stressor Category: Non-consumptive resource use***

Motorized recreation off-trail  
Watercraft operation

***Stressor Category: Pollution***

Sediment/ash flows  
Noise pollution  
Pesticides/herbicides  
Contaminants from waste water and runoff

***Stressor Category: Transportation and infrastructure***

Unauthorized roads & trails  
Roads for motorized vehicles

**Lakes/Reservoirs**

***Habitat Condition (Element 2)***

Significant areas of open water in the Sonoran Desert were originally confined to the Lower Colorado River. Some were inundated by Havasu and Imperial Reservoirs but backwater lakes such as Cibola, Ferguson, and Mittry remain and provide important wildlife habitat. Elsewhere, reservoirs impounded by dams constructed in the 1900s include Horseshoe and Bartlett on the Verde River; Roosevelt, Apache, Canyon, and Saguaro on the Salt River; San Carlos and Painted

Rock on the Gila River; Pleasant on the Agua Fria River; and Alamo on the Bill Williams River. Most of these lakes were primarily intended for water retention or power production, but are important for sport fishing and watercraft recreation, and for their areas of marsh habitat. Roper Lake near Safford was created for sport fishing, and Picacho Reservoir was created for water retention. These both can provide important bird habitat. However, wildlife value of reservoirs is typically low, particularly away from the Colorado River, and fluctuates with water levels. Levels in the Lower Colorado River reservoirs tend to be stable, buffered by upstream reservoirs. Elsewhere, however, fluctuations can be severe and recent trends have been downward because of extended drought. Increasing demand for water by rapidly expanding urban areas guarantee that demands on water stored in these reservoirs will continue to increase, except to the extent that they are offset by retirement of agricultural lands.

Major Stressors Affecting Habitat (Element 3)

**Stressor Category: Changes in Ecological Processes**

- Altered river flow regimes
- Habitat degradation/shrub invasions
- Management for game animals and sport fish
- Unnatural fire regimes

**Stressor Category: Climate Change**

- Shift to warmer climate
- Drought

**Stressor Category: Consumptive use of biological resources**

- Grazing by ungulates

**Stressor Category: Habitat conversion**

- Recreational sites/facilities

**Stressor Category: Invasive species**

- Feral animals
- Disease/pathogens/parasites
- Bait-bucket dumping/illegal stocking
- Nuisance animals
- Nuisance plants

**Stressor Category: Non-consumptive resource use**

- Watercraft operation
- Motorized recreation off-trail

**Stressor Category: Pollution**

- Heavy metals/mine tailings
- Sediment/ash flows
- Noise pollution

**Stressor Category: Transportation and infrastructure**

- Unauthorized roads & trails

**Stressors that act in this ecoregion at the species- but not habitat-scale (Element 3)**

In some cases, a stressor may have significant impacts to individual SGCN, but impacts are not felt throughout the habitat. Regardless of the extent of ecosystem-wide impacts, in any habitat type where these stressors act on SGCN, the appropriate conservation actions apply (see “Conservation Actions to Address Stressors to SGCN (Elements 3, 4)”). The following stressors have significant ecosystem-level impacts in some habitat types in this ecoregion, but not in all habitat types where the SGCN occur. Note that for wide-ranging species, impacts from some stressors may be quite significant, but may not act on the species throughout its range.

Stressor Category	Stressor	Scientific Name	Common Name
International border issues			
	Poaching along the border		
		<i>Antilocapra americana sonoriensis</i>	Sonoran Pronghorn
		<i>Gopherus agassizii</i> (Sonoran Population)	Sonoran Desert Tortoise
	Unauthorized roads & trails created for law enforcement along the border		
		<i>Phrynosoma mcallii</i>	Flat-tailed Horned Lizard
		<i>Uma rufopunctata</i>	Yuman Desert Fringe-toed Lizard
Habitat conversion			
	Aquaculture		
		<i>Kinosternon arizonense</i>	Arizona Mud Turtle
	Wetland filling for mosquito control		
		<i>Ardea alba</i>	Great Egret
		<i>Coccyzus americanus occidentalis</i>	Western Yellow-billed Cuckoo
		<i>Dendrocygna autumnalis</i>	Black-bellied Whistling-Duck
		<i>Egretta thula</i>	Snowy Egret
		<i>Gastrophryne olivacea</i>	Great Plains Narrow-mouthed Toad
		<i>Kinosternon arizonense</i>	Arizona Mud Turtle
		<i>Pternohyla fodiens</i>	Lowland Burrowing Treefrog
Transportation and infrastructure			
	Railroads		
		<i>Gopherus agassizii</i> (Sonoran Population)	Sonoran Desert Tortoise