

## **Ecological site F040XC327AZ**

### **Sandy Bottom, Woodland 3"-7" p.z.**

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#### **General information**

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

#### **MLRA notes**

Major Land Resource Area (MLRA): 040X–Sonoran Basin and Range

Major Land Resource Area (MLRA) 40 is the portion of Sonoran Desert that extends from northwest Mexico into southwestern Arizona and southeastern California. This MLRA is hot desert characterized by bimodal precipitation coupled with hot summers and mild winters. These conditions give rise to a rich biological diversity visually dominated by columnar cactus (saguaro) and leguminous trees (palo verde). This unit occurs within the Basin and Range Physiographic Province and is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valleys and basins. Igneous and metamorphic rock classes dominate the mountain ranges, and basin sediments are combinations of fluvial, lacustrine, colluvial and alluvial deposits.

#### **LRU notes**

Land Resource Unit (LRU) 40-3, Colorado Sonoran Desert, is characterized by desert scrub vegetation and a high percentage of desert pavement on relic fan remnants. Trees are limited to large washes and hillslopes. Elevations range from 300 to 1200 feet and precipitation averages 3 to 7 inches per year. Vegetation includes creosotebush, white bursage, brittlebush, Mormon tea, teddybear cholla, elephant tree, smoke tree, ocotillo, and big galleta. Soil temperature regime is hyperthermic, and soil moisture regime is typic aridic.

#### **Classification relationships**

USDA-NRCS Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin: Western Range and Irrigated Region D Major Land Resource Area 40 - Sonoran Basin and Range Land Resource Unit 3 - Colorado Sonoran Desert Ecological Site Sandy Bottom, Woodland, 3"-7" p.z.

U.S. Environmental Protection Agency, Ecological Regions of North America: Level I, Region 10 North American Deserts Level II, 10.2 Warm Deserts Level III, Ecoregion 81, Sonoran Basin and Range Level IV, 81I, 81n, 81o

USDA-USFS Ecological Subregions: Sections of the Conterminous United States Section 322 American Semidesert and Desert Province Section 322B, Sonoran Desert

#### **Ecological site concept**

Sandy bottom, Woodland, 3"-7" p.z., occurs in stream channels with a shallow water table easily accessed by the plant community. Soils are sandy and exhibit redoximorphic features within 80" of the surface. Reference plant community is dominated by tall trees with a diverse understory; obligate and facultative wetland plants occur in reaches of surface water flow. Aspect is gallery woodland.

#### **Associated sites**

F040XC328AZ	<b>Loamy Bottom, Woodland 3"-7" p.z.</b> adjacent stream terrace, no visible soil redox features
R040XC318AZ	<b>Sandy Wash 3"-7" p.z.</b> large water courses with ephemeral flow, no visible soil redox features

## Similar sites

R040XA125AZ	<b>Sandy Bottom, Woodland 10"-13" p.z.</b> Elevations 2,000' - 3,200', precipitation zone 10
F040XB215AZ	<b>Sandy Bottom, Woodland 7" - 10" p.z.</b> Elevations 1,200' - 2,000', precipitation zone 7

**Table 1. Dominant plant species**

Tree	(1) <i>Populus fremontii</i> (2) <i>Salix gooddingii</i>
Shrub	(1) <i>Pluchea sericea</i>
Herbaceous	Not specified

## Physiographic features

This site occurs on floodplains and low stream terraces, and receives extra moisture from overbank flooding of the stream channel on a regular basis. Water table depth ranges from 3 to 10 feet, and slopes range from 0% to 3%.

## Climatic features

Annual precipitation ranges from 3 to 7 inches. Annual rainfall is bimodal, with distinct rainy seasons occurring from December to March (winter) and July to September (summer). Rainfall ratios range from 40:60 (winter:summer). Rainfall intensity differs between rainfall seasons. Winter frontal storms develop in the Pacific Ocean and Gulf of California, producing widespread, low-intensity and long duration precipitation events. Snowfall is very rare. During summer months, atmospheric activity in the Gulf of Mexico produces convective thunderstorms when crossing over the mountains in the afternoon. These storms travel across the plains and valleys, producing precipitation of short duration, usually less than 30 minutes, but of moderate to heavy intensity. Summer storms will sometimes produce only gusty winds and little precipitation. Between these two seasons, little to no effective precipitation can occur for several months at a time.

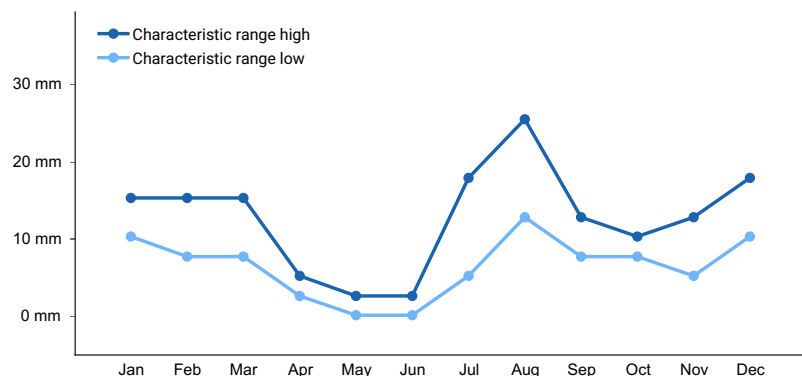
Overall, average annual rainfall is variable, but increases in variability from east to west across the region. For long-term precipitation data, the coefficient of variation, the ratio of the standard deviation to the mean expressed as a percentage, increases from 44% at Gila Bend (east) to 65% at Mohawk(west).

Winter temperatures are mild, with an average January temperature of 53°F. Summer temperatures are hot to very hot, averaging 93°F in July. Record extreme temperatures range from 125°F to 10°F.

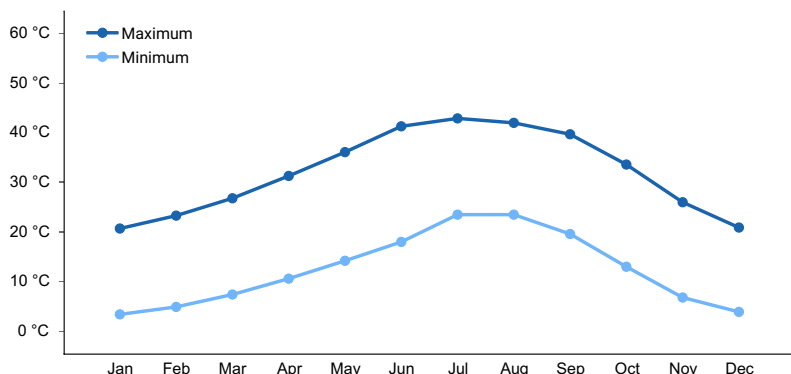
Winter and summer rainfall is equally important for germination and growth of perennial grasses, annuals, and forbs. Shrubs and trees also respond to seasonal precipitation. Several perennial forbs are visible only following rainfall, while most perennial grasses can remain green throughout the year with sufficient available moisture.

**Table 2. Representative climatic features**

Frost-free period (average)	303 days
Freeze-free period (average)	348 days
Precipitation total (average)	178 mm



**Figure 1. Monthly precipitation range**



**Figure 2. Monthly average minimum and maximum temperature**

## Influencing water features

### Soil features

These are very young soils on sandy and gravelly alluvium of mixed origin. Subsurface texture group may also be loamy. Soils are deep, light colored and have excellent plant-soil moisture relationships due to extra moisture received from flooding and shallow water tables. Soil families associated with this ecological site include Oxyaquic Torrifluvents, Typic Torrifluvents, and Aquic Torrifluvents.

**Table 3. Representative soil features**

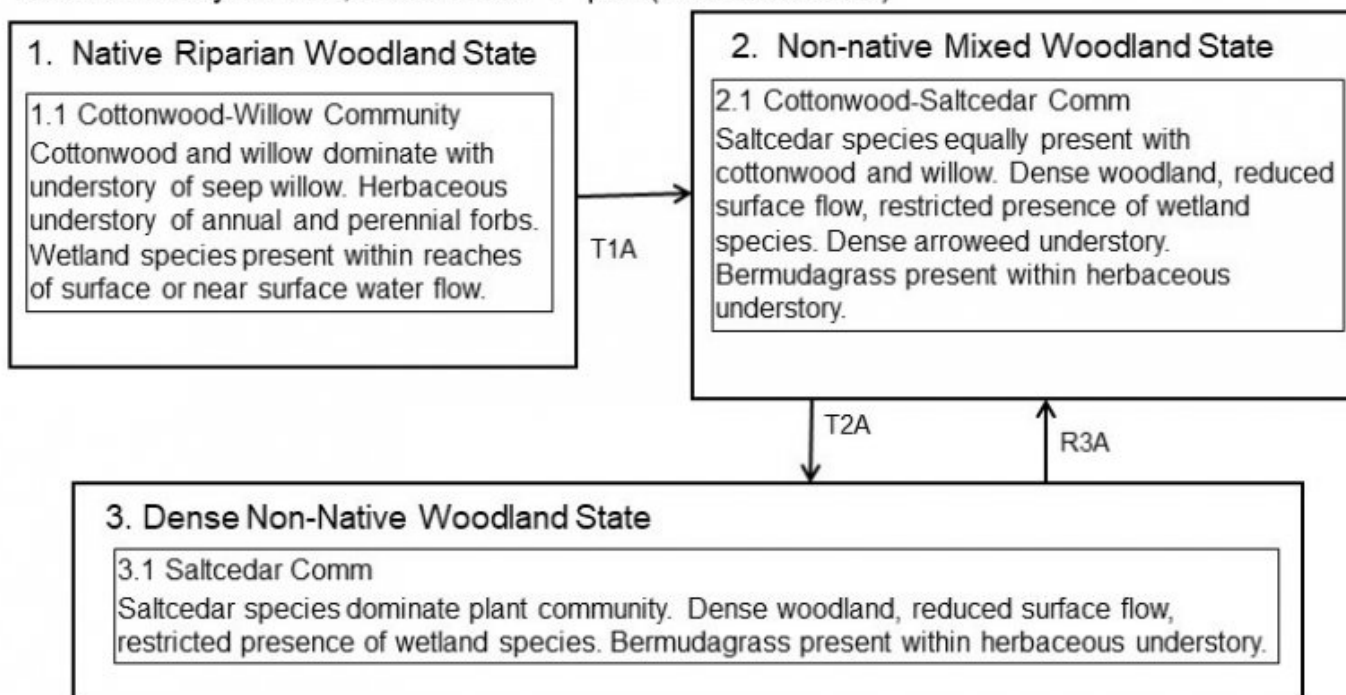
Surface texture	(1) Loamy sand
Family particle size	(1) Sandy
Drainage class	Somewhat poorly drained to somewhat excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	102–152 cm
Available water capacity (0-101.6cm)	0–6.35 cm

## Ecological dynamics

The plant community on this site is dominated by tall trees, primarily cottonwood and willow, with a diverse understory of tree seedlings, perennial and annual grasses and forbs, and some shrubs. State 1, Native Riparian Woodland, rarely occurs given the pervasive extent of non-native trees and shrubs in the MLRA. State 2, Non-Native Mixed Woodland, has saltcedar and other non-native species present within the native community, though non-natives are not dominant. State 3, Dense Non-Native Woodland, is a dense, near monoculture of saltcedar. Natural fire is not common in State 1, however, State 2 and State 3 have the potential to accumulate sufficient fuels to carry a fire. When fire does occur, high heat intensity can radiate outward, killing cactus (saguaro and cholla) growing up to 100 yards away from the narrow river channel.

## State and transition model

40-3AZ Sandy Bottom, woodland 3"-7" p.z. (F040XC327AZ)



### Legend:

#### Transition Pathway

T1A: non-native species become entrenched within community

T2A: nonspecific

#### Restoration Pathway

R3A: return of shallow water table and flash flood events, pole-planting, brush management, prescribed grazing, prescribed burning

## State 1

### Native Riparian Woodland



Figure 3. Native Riparian Woodland State

Sandy Bottom Woodland, 3"-7" p.z., is a cottonwood-willow dominated riparian gallery woodland. Perennial surface water occurs in long reaches, with sufficient flow to sustain native obligate wetland plants. Flash floods regularly occur, resulting in overbank flow and bank scour. Cottonwood and willow seeds germinate on wet sands along the braided watercourses, and seedlings quickly establish before water levels return to normal. Natural fire is not a



regular occurrence, as indicated by old-growth cactus, like saguaro, growing adjacent to the site. Saguaro are extremely sensitive to heat from burning.

## **Community 1.1**

### **Cottonwood-Willow**

Cottonwood and willow dominate the plant community, with an understory of seep willow and arrowweed. The herbaceous understory of annual and perennial forbs fluctuates with the seasons. Wetland obligate species are present where surface or near surface water is available.

## **State 2**

### **Non-native Mixed Woodland**



Non-native Mixed Woodland is similar in function and composition to Native Riparian. Saltcedar and other non-natives (such as tree tobacco, bermudagrass, and cocklebur) are intermixed with native species. Native tree recruitment can be affected by a reduction of flash flooding events, lowering of the water table, or saltcedar competition.

## **Community 2.1**

### **Cottonwood-Saltcedar**

Cottonwood-willow-saltcedar community is a dense woodland with understory thickets of arrowweed. Non-native species present include saltcedar, tree tobacco, and bermudagrass.

## **State 3**

### **Dense Non-Native Woodland**



Figure 4. State 3 showing decadence of saltcedar dominated community



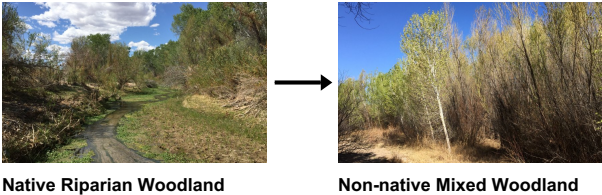
Figure 5. Saltcedar dominated community 1 yr post-burn; fire ignition from welding pipeline on extremely dry and windy day.

The Dense, Non-native Woodland State is a near monoculture of saltcedar.

**Community 3.1**  
**Saltcedar**

Several Tamarix species are represented in this MLRA; saltcedar (*T. ramosissima*) is the species that most commonly forms monoculture communities.

**Transition T1A**  
**State 1 to 2**



Non-native species introduction by various mechanisms including animal transport, wind, and flooding.

**Transition T2A**  
**State 2 to 3**





Non-native Mixed Woodland



Dense Non-Native Woodland

Transition processes can include fire, channel-scouring flooding, or disturbance of normal flooding regime.

Restoration pathway R3A  
State 3 to 2



Dense Non-Native Woodland



Non-native Mixed Woodland

Return of shallow water table and flash flooding events, pole planting, brush management, or prescribed grazing.

Additional community tables

Contributors

Karlynn Huling, original author  
Wilma Renken, revisions

Approval

Kendra Moseley, 10/17/2024

Acknowledgments

Griffith, G.E., Omernik, J.M., Johnson, C.B., and Turner, D.S., 2014, Ecoregions of Arizona (poster): U.S. Geological Survey Open-File Report 2014-1141, with map, scale 1:1,325,000, <https://dx.doi.org/10.3133/ofr20141141>. ISSN 2331-1258 (online)

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	11/24/2024
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

Dominant:

Sub-dominant:

Other:



Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
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14. **Average percent litter cover (%) and depth ( in):**
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
- 

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**
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17. **Perennial plant reproductive capability:**
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