

Ecological site F040XB215AZ Sandy Bottom, Woodland 7" - 10" 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) 40-2, Middle Sonoran Desert, is characterized by desert scrub vegetation with a moderate percentage of desert pavement on relic fan remnants; trees are common in all washes, bottoms and hillslopes. Elevation ranges from 1200 to 2000 feet and precipitation averages 7 to 10 inches per year. Upland vegetation includes saguaro, palo verde, creosotebush, white bursage, brittlebush, prickly pear, cholla, desert saltbush, wolfberry, and big galleta. The 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 2 - Middle Sonoran Desert Ecological Site Sandy Bottom, Woodland, 7"-10" 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, 81l, 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, 7"-10" p.z., occurs in stream channels with shallow water tables readily available to the plant community. Soils are sandy and exhibit redoximorphic features within 80" of the surface. Plant community is dominated by tall trees with a diverse understory; obligate and facultative wetland plants occur where surface or near surface water flows. Aspect is a gallery woodland.

Associated sites

F040XB214AZ	Loamy Bottom, Woodland 7"-10" p.z. adjacent stream terrace, no visible soil redox features
R040XB216AZ	Sandy Wash 7"-10" p.z. stream channels with ephemeral water flow, no visible soil redox features

Similar sites

F040XC327AZ	Sandy Bottom, Woodland 3"-7" p.z. Elevations 300' - 1,200', lower precipitation
R040XA125AZ	Sandy Bottom, Woodland 10"-13" p.z. Elevations 2,000' - 3,200', higher precipitation, soils thermic

Table 1. Dominant plant species

Tree	(1) <i>Populus fremontii</i> (2) <i>Salix gooddingii</i>
Shrub	(1) <i>Pluchea sericea</i>
Herbaceous	(1) <i>Paspalum distichum</i>

Physiographic features

This site occurs on floodplains and low stream terraces. It receives additional moisture from regular overbank flooding. Water table depth ranges from 3 to 10 feet, and slopes range from 0%–3%.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Stream terrace
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Climatic features

Annual precipitation ranges from 7 to 10 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) in the southern part, and 60:40 in the central and northern parts. 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. Winter precipitation is the most dependable water source for vegetation, and 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. Between these two seasons, little to no effective precipitation can occur for several months at a time. May and June are the driest months, and overall humidity is very low.

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 38% at Florence (east) to 46% at Aguila (west).

Winter temperatures are very mild, with very few days having short periods of freezing temperatures. Summertime temperatures are hot to very hot, with many days in June and July exceeding 105°F. The number of frost-free days ranges from 280 in major river valleys with cold air drainage to between 320 and 350 in upland areas.

Spring and the summer growing seasons are equally important for perennial grass, forb and shrub growth. With above average precipitation, cool and warm season annual forbs and grasses can be common in their respective seasons. Perennial forage species can remain green throughout the year with sufficient available moisture.

Table 3. Representative climatic features

Frost-free period (average)	350 days
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Freeze-free period (average)	
Precipitation total (average)	254 mm

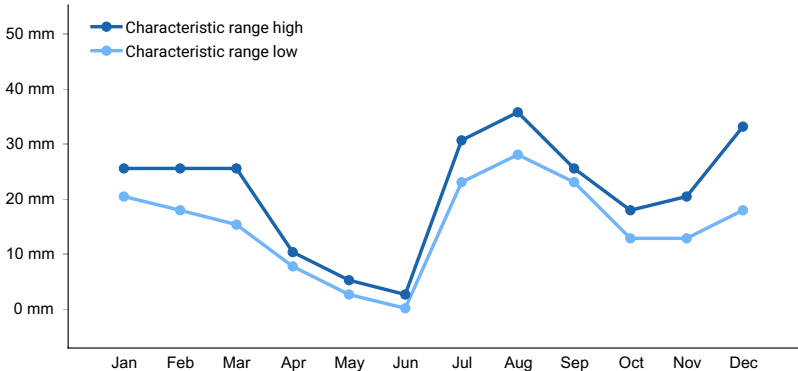


Figure 1. Monthly precipitation range

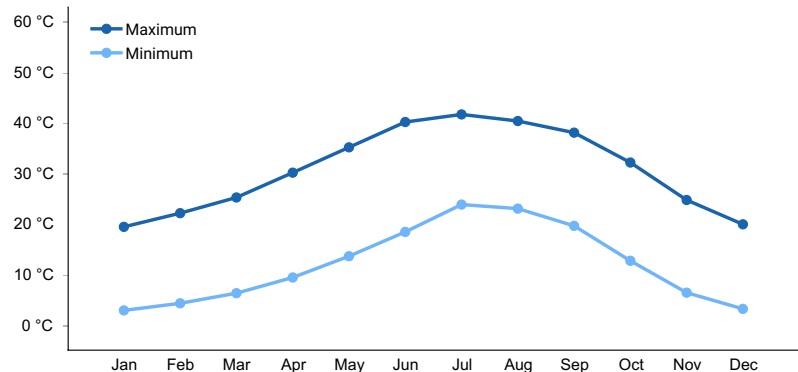


Figure 2. Monthly average minimum and maximum temperature

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. They 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 and Aquic Torrifluvents.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Gravelly sand (2) Very gravelly loamy sand (3) Sandy loam
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to very rapid
Soil depth	152 cm
Surface fragment cover <=3"	5–45%
Available water capacity (0-101.6cm)	6.1–18.29 cm
Calcium carbonate equivalent (0-101.6cm)	1–10%

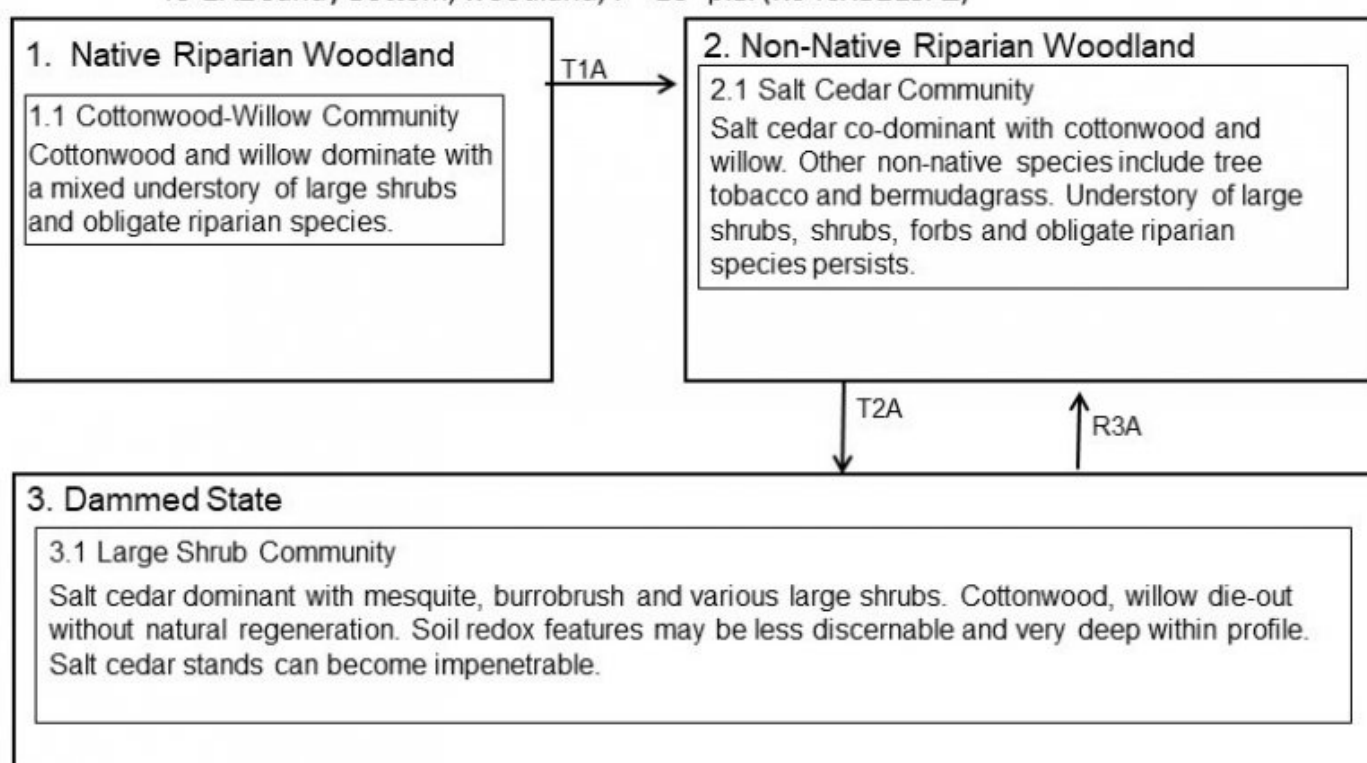
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–45%

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. Obligate and facultative wetland plants occur where surface or near surface water flows. State 1, Native Riparian Woodland, is presumed to no longer occur in this LRU given the pervasive extent of non-native shrubs. State 2 is considered the current reference condition, with native species maintaining cover dominance, and saltcedar and other non-native species intermixed. State 3, a near monoculture of saltcedar, commonly occurring in response to altered flooding and scouring regimes. Aspect is a gallery woodland.

State and transition model

40-2AZ Sandy Bottom, woodland, 7"-10" p.z. (R040XB215AZ)



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

Community 1.1

Cottonwood-Willow



The site's mixed plant community has an overstory of cottonwood and willow, with an understory of tree seedlings, perennial and annual grasses and forbs, and some shrubs. Both cottonwood and willow flower in spring and leaf out shortly after. Both lose their leaves in the fall with the first frosts. The aspect is deciduous riparian woodland. Channel and streambank erosion and sedimentation are typical disturbance processes for this site. Tree species vigorously sprout from roots and stems exposed from cutting or floods. Both cottonwood and willow seedlings aggressively pioneer sandbars and beds of coarse-textured alluvium that result from large floods, however subsequent scouring events can remove a high percentage of new seedlings and saplings. Tree canopy cover ranges from 60% to 80%, and understory growth varies depending on canopy cover. Tree species can reach their maximum size on this site. Excessive groundwater pumping can lower water tables beyond the reach of tree roots, resulting in extensive canopy loss. Saltcedar can invade and become dominant if native tree species are removed. Natural fire may have been important in maintaining herbaceous understories. Bermudagrass and Johnson grass are introduced species commonly found on this site.

State 2

Non-native Riparian Woodland



Non-native Riparian Woodland reflects the presence of saltcedar and other non-natives within all waterways in this MLRA. System functions are similar to State 1; frequent flooding and scouring disturbance is needed for cottonwood-willow regeneration; saltcedar does not dominate community.

Community 2.1

Salt cedar-Cottonwood-Willow

Saltcedar (*Tamarisk* spp.) is present throughout the MLRA. Other non-native species commonly occurring on this ecological site include tree tobacco and bermudagrass.

State 3

Plant community is dominated by saltcedar; flooding and scouring seldom occurs. Site is excellent source for fence staves.

Transition T1A

State 1 to 2

Non-native species introduction

Transition T2A

State 2 to 3

Nonspecific transition process. Several mechanisms, including upstream dam construction and groundwater pumping, can alter site hydrology. Saltcedar is known to colonize site after flood events.

Restoration pathway R3A

State 3 to 2

Return of perennial shallow water table and flood events, pole-planting, brush management, prescribed grazing, prescribed burning

Additional community tables

Animal community

The multi-tiered tree canopy, cover, shade, water availability and diversity of forage species make it very desirable habitat for a large variety of lower Sonoran Desert wildlife. As seedlings of both cottonwood and black willow are very palatable, grazing must be managed to allow for periodic reproduction of woody dominants. Young stands will need two growing seasons of deferment from grazing to grow to a height where the terminal bud is out of reach. Grazing should be designed to leave enough understory vegetation to protect soils from summer flooding and to trap sediment.

Wood products

A high water table and very erodible soils limit the use of this site for wood production. Cutting should be limited to flood-damaged, fallen trees, and driftwood to maintain viability of the more valuable wildlife habitat.

Type locality

Location 1: Maricopa County, AZ	
Township/Range/Section	T1N R2W S36
General legal description	Phoenix FO - Salt River below the confluence with the Gila River
Location 2: Maricopa County, AZ	
Township/Range/Section	T2S R2E S16
General legal description	Chandler FO - Gila River Indian Community at Gila Crossing
Location 3: Maricopa County, AZ	
Township/Range/Section	T2N R7E S18
General legal description	Chandler FO - Salt River above Granite Reef diversion
Location 4: Pima County, AZ	
Township/Range/Section	T4S R11E S8
General legal description	Tucson FO - Gila River below Ashurst diversion

Other references

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.

Contributors

Dan Robinett, original author
Karlynn Huling, revisions
Wilma Renken, revisions

Approval

Kendra Moseley, 10/17/2024

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	11/21/2024
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

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

5. Number of gullies and erosion associated with gullies:

-
6. **Extent of wind scoured, blowouts and/or depositional areas:**
-
7. **Amount of litter movement (describe size and distance expected to travel):**
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**
-
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**
-
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:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
-
14. **Average percent litter cover (%) and depth (in):**
-
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:

17. **Perennial plant reproductive capability:**
