USDA Natural Resources Conservation Service

Ecological site F040XC328AZ
Loamy Bottom, Woodland 3"-7" p.z.

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Accessed: 05/13/2025

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 as desert scrub vegetation with a high percentage of desert pavement on relic fan remnants; trees are common only 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. The soil temperature regime is hyperthermic and the 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 Loamy 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, 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

Loamy Bottom, Woodland, 3"-7" p.z., occurs on floodplains and stream terraces, with a deep water table accessible to the plant community. Soil textures range from sandy to loamy. Redoximorphic features are not present. Trees are the dominant vegetation, with large shrubs and sparse perennial herbaceous components. Aspect is woodland.

Associated sites

F040XC327AZ	**Sandy Bottom, Woodland 3"-7" p.z.** adjacent stream channels, redox present in top 6' of soil surface
R040XC315AZ	**Saline Bottom 3"-7" p.z.** strongly saline soils, high water table

Similar sites

F040XB214AZ	**Loamy Bottom, Woodland 7"-10" p.z.** Elevations 1,200' - 2,000', precipitation zone 7
R040XA124AZ	**Loamy Bottom, Woodland 10"-13" p.z.** Elevations 2,000' - 3,800', precipitation zone 10

Table 1. Dominant plant species

Tree	(1) *Prosopis*
Shrub	(1) *Atriplex*
Herbaceous	Not specified

Physiographic features

This site occurs on floodplains and stream terraces of major drainageways. The site experiences regular flood events. Water table depths range from 10 to 50 feet, and slopes range from 0% to 5%.

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 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 enough available moisture.

Table 2. Representative climatic features

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

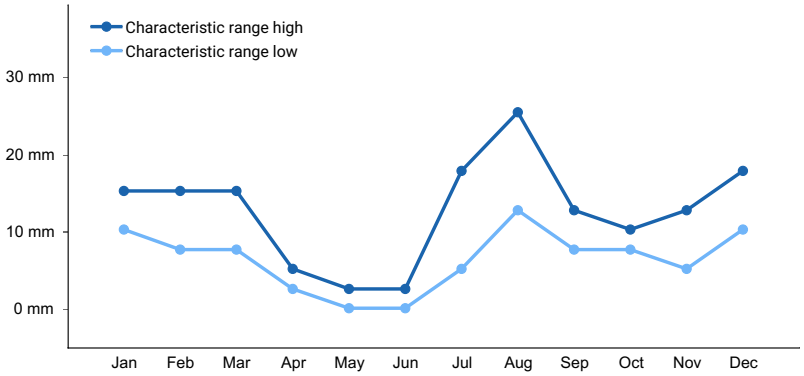


Figure 1. Monthly precipitation range

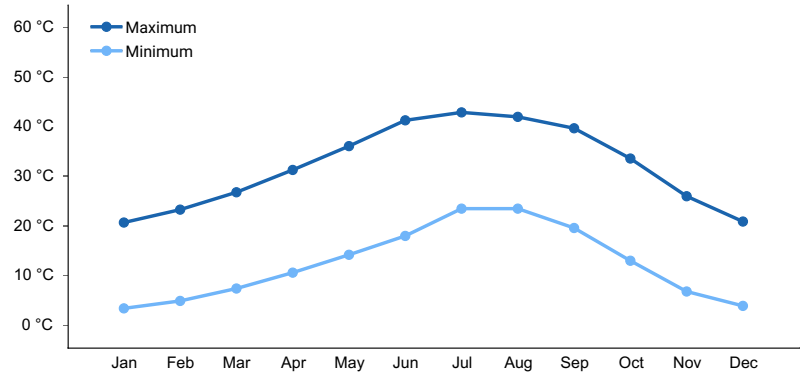


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

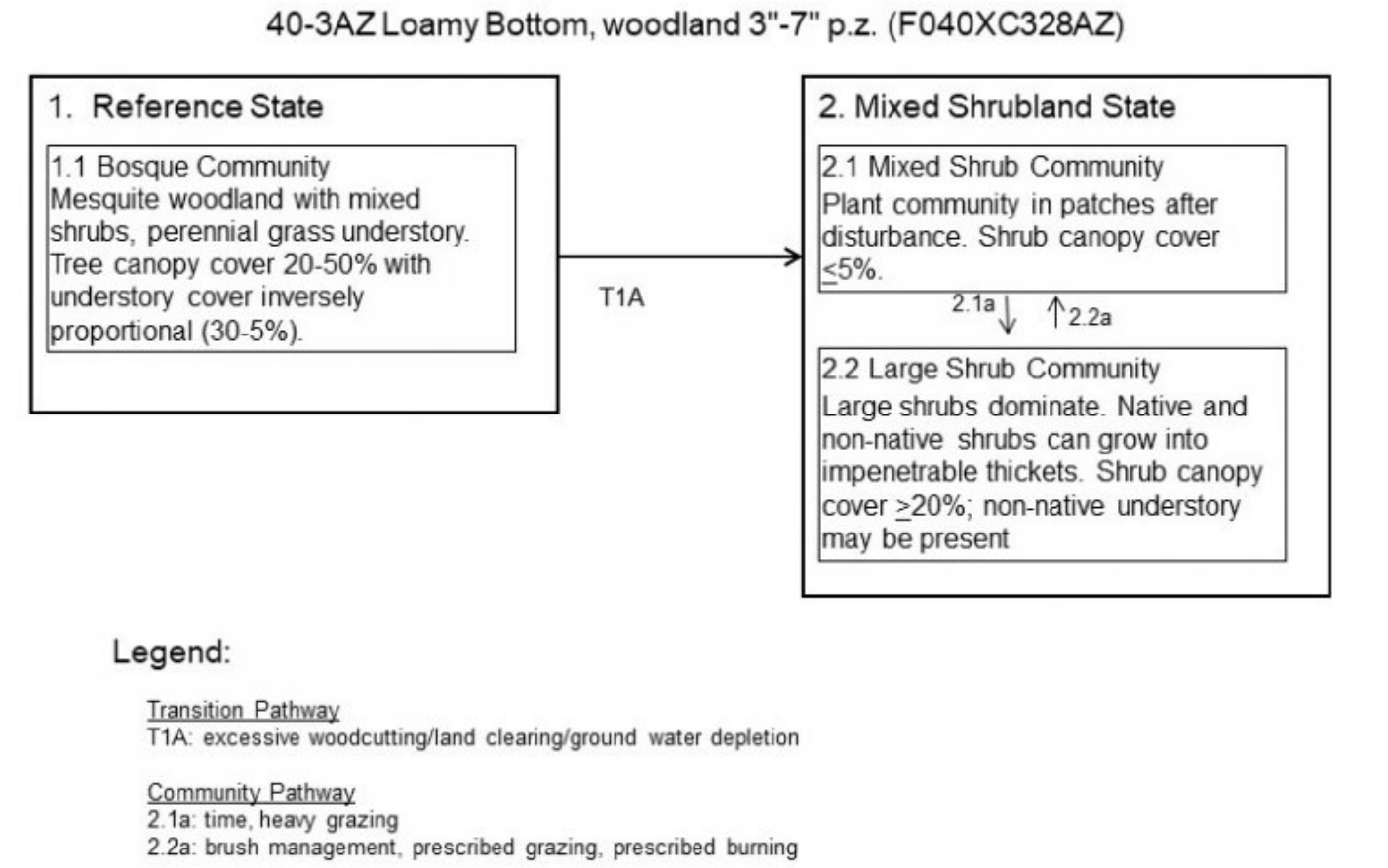
Soil features

These are young soils formed in loamy, sandy or silty alluvium of mixed origin. Surface textures may include silty loam, sandy loam, fine sandy loam, silty clay loam, or loam. Subsurface texture groups vary widely, dependent on alluvium origin. Soils are deep and well drained. Plant-soil moisture relationships are excellent for deep-rooted trees and shrubs due to the extra water received as runoff from surrounding landscapes. Rapid infiltration of runoff water through the surface soils severely limits available moisture for shallow-rooted plants. In the reference state, large mesquite are dominant due to a deep water table.

Ecological dynamics

Loamy Bottom, Woodland, 3”-7” p.z. is a robust site with few natural disturbance events. The reference plant community is a mesquite bosque, and the aspect is deciduous woodland. Velvet mesquite is the primary dominant species, with western honey or screwbean mesquites locally present. A mixed understory of half shrubs, shrubs and perennial grasses regularly occur, but diminish in cover as the mesquite canopy increases. When the mesquite canopy is removed or significantly altered, understory shrubs come to dominance in Mixed Shrubland. Saltcedar, a common non-native shrub that dominates watercourses, can readily establish. Non-native annual forbs and grasses will establish and flourish during wet seasons. Fire is an uncommon disturbance on this ecological site, but Mixed Shrubland has the potential to produce continuous fine fuels.

State and transition model



State 1
Reference

The Reference state for this site is a dense mesquite overstory with an understory of sub-shrubs, and perennial and annual grasses and forbs. Leaf-out for mesquite occurs midspring, after the last frost, produces flowers in late spring, and mature fruits begin dropping by July. The trees lose their leaves in the fall with the first hard frost. The aspect is deciduous woodland.

Community 1.1
Bosque

Figure 3. Loamy Bottom, Woodland, Bosque Community

The Bosque Community is mesquite dominated.

State 2
Mixed Shrubland

Figure 4. Loamy Bottom, Woodland, Mixed Shrubland State

Mesquite canopy ranges from 5% to 15%. If the mesquite overstory is removed, shrubs (such as greythorn, saltbush, burroweed, and alkalai goldenweed) can become the dominant vegetative cover. Herbaceous understory varies greatly depending on canopy cover. Mesquite sprouts vigorously after fire or manual cutting. Excessive groundwater pumping can, over time, lower water tables beyond the reach of tree roots and cause extensive tree loss on stream terraces. In high water table areas, saltcedar can establish on the site and become dominant with alteration of native tree cover. Bermudagrass and Johnson grass are introduced perennials commonly found on this site. Foxtail barley, London rocket mustard and Carolina canarygrass are common, introduced annuals on this site. Cocklebur can become undesirable with overgrazing of the understory.

Community 2.1
Mixed Shrub

Figure 5. Loamy Bottom, Woodland, Mixed Shrub State

Community 2.2
Large Shrub

Without recurring disturbance, mesquite and saltcedar will become the dominant canopy species, and open areas will decrease in size.

Additional community tables

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

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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	05/13/2025
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):**

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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:**
