

## Ecological site R041XC317AZ Sandy Bottom, Woodland 12-16" p.z.

Last updated: 4/12/2021  
Accessed: 05/05/2024

### 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.

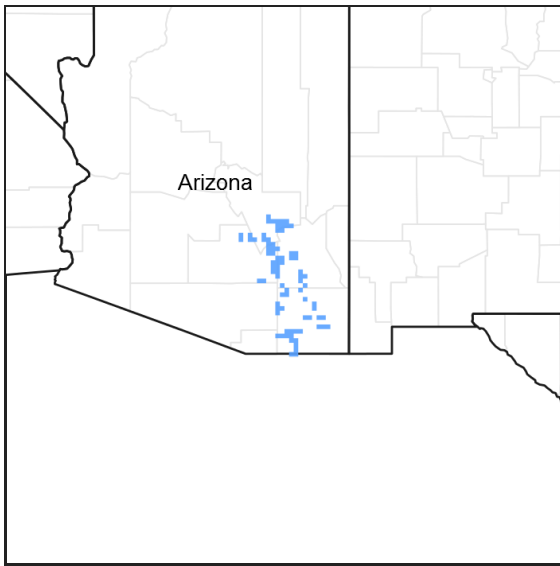


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

### MLRA notes

Major Land Resource Area (MLRA): 041X–Madrean Archipelago

AZ 41.3 – Chihuahuan – Sonoran Semidesert Grasslands

Elevations range from 3200 to 5000 feet and precipitation ranges from 12 to 16 inches per year. Vegetation includes mesquite, catclaw acacia, netleaf hackberry, palo verde, false mesquite, range ratany, fourwing saltbush, tarbush, littleleaf sumac, sideoats grama, black grama, plains lovegrass, cane beardgrass, tobosa, vine mesquite, threeawns, Arizona cottontop and bush muhly. The soil temperature regime is thermic and the soil moisture regime is ustic aridic. 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 sediments filling the basins represent combinations of fluvial, lacustrine, colluvial and alluvial deposits.

### Associated sites

R041XC312AZ	Loamy Bottom 12-16" p.z.
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### Similar sites

F041XA113AZ	<b>Sandy Bottom 16-20" p.z. woodland</b>
F041XB218AZ	<b>Sandy Bottom 8-12" pz. woodland</b>

**Table 1. Dominant plant species**

Tree	(1) <i>Populus fremontii</i> (2) <i>Salix gooddingii</i>
Shrub	Not specified
Herbaceous	(1) <i>Muhlenbergia rigens</i> (2) <i>Anemopsis californica</i>

## Physiographic features

This site occurs in the middle elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs on floodplains, low stream terraces, and in channels of major drainage ways and first and second order tributaries. It benefits on a regular basis from extra moisture received as over-bank flooding. It also benefits from shallow water tables at depths of 3-10 feet.

**Table 2. Representative physiographic features**

Landforms	(1) Flood plain (2) Stream terrace (3) Channel
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Frequent
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	Rare to occasional
Elevation	1,006–1,524 m
Slope	0–2%
Water table depth	91–251 cm
Aspect	Aspect is not a significant factor

## Climatic features

Precipitation in this common resource area ranges from 12-16 inches yearly in the eastern part with elevations from 3600-5000 feet, and 13-17 inches in the western part where elevations are 3300-4500 feet. Winter-Summer rainfall ratios are 40-60% in the west and 30-70% in the east. Summer rains fall July-September, originate in the Gulf of Mexico and are convective, usually brief, intense thunderstorms. Cool season moisture tends to be frontal, originates in the Pacific and Gulf of California, and falls in widespread storms with long duration and low intensity. Snow rarely lasts more than one day. May and June are the driest months of the year. Humidity is generally very low.

Temperatures are mild. Freezing temperatures are common at night from December-April; however temperatures during the day are frequently above 50 F. Occasionally in December-February, brief 0 F temperatures may be experienced some nights. During June, July and August, some days may exceed 100 F.

Cool season plants start growth in early spring and mature in early summer. Warm season plants take advantage of summer rains and are growing and nutritious July-September. Warm season grasses may remain green throughout the year.

**Table 3. Representative climatic features**

Frost-free period (average)	220 days
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Freeze-free period (average)	
Precipitation total (average)	406 mm

## Influencing water features

These soils are wet in part of the profile most of the time. They are associated with perennial stream-flow except for the months of May and June in drought years.

## Soil features

These soils are very young soils on sandy and gravelly alluvium of mixed origin. They are deep soils with excellent plant-soil moisture relationships due to water-tables at depths ranging from 3 to 10 feet.

Soil series mapped on this site include: SSA-661 E Pinal & S Gila counties MU 72 Oxyaquic torrifluvents; SSA-665 Wilcox area MU To torrifluvents; SSA-666 Cochise county NW part MU 63 Oxyaquic torrifluvents; SSA-671 Cochise county Douglas-Tombstone part MU 17 Brookline & Fluvaquents; SSA-675 San Carlos IR area MU 65 Oxyaquic torrifluvents.

**Table 4. Representative soil features**

Family particle size	(1) Sandy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Rapid to moderately rapid
Soil depth	152 cm
Surface fragment cover <=3"	5–50%
Surface fragment cover >3"	0–20%
Available water capacity (0-101.6cm)	6.1–12.19 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–45%
Subsurface fragment volume >3" (Depth not specified)	0–20%

## Ecological dynamics

The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The Historical Climax Plant Community represents the natural potential plant communities found on relict or relatively undisturbed sites. Other plant communities described here represent plant communities that are known to occur when the site is disturbed by factors such as fire, grazing, or drought.

Production data provided in this site description is standardized to air dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity index is determined by comparing the production and composition of a plant community to the production and composition of a plant community described in this site description. To determine Similarity index, compare the production (air dry weight) of each species to that shown in the plant community description. For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the maximum amount shown for each group. Divide the resulting total by the total normal year production shown in the plant community description. If the rainfall has been significantly above or below normal, use the total production shown for above or below normal years. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

## State and transition model

### MLRA 41-3 (12-16"), Sandy Bottom, POPULUS, SALIX

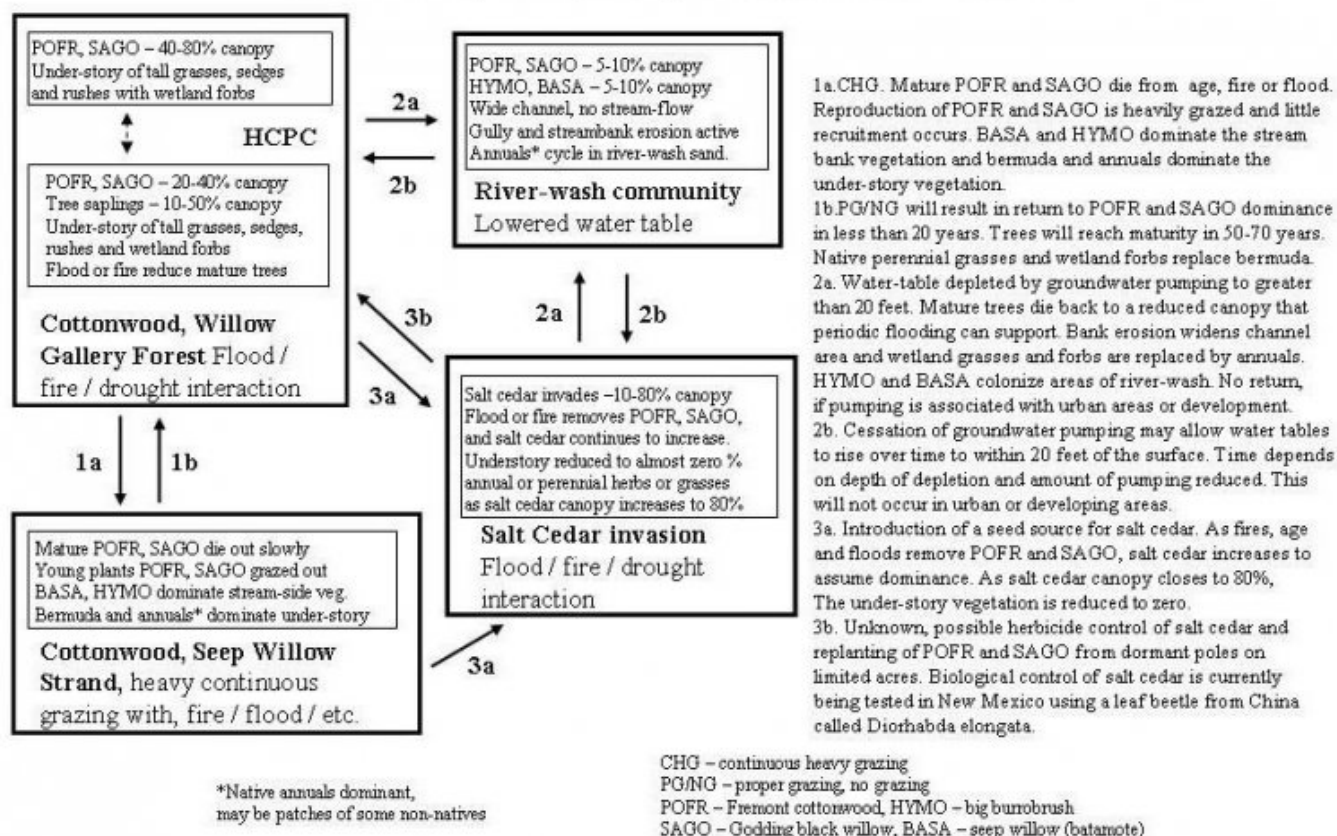


Figure 4. State and Transition, Sandy Bottom, woodland

## State 1

### Historic Climax Plant Community

## Community 1.1

### Historic Climax Plant Community



Figure 5. Sandy Bottom, subirrigated POFR, 12-16" pz.

This site has a mixed plant community with an over-story of cottonwood and willow and an under-story 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 first frost. The aspect is deciduous riparian woodland. Channel and stream-bank erosion and sedimentation are natural features of this site. Tree species present are vigorous root and stem sprouters after cutting or injury from floods. Establishment of the major species from seed can only occur with sedimentation. Both cottonwood and willow seedlings pioneer sandbars and beds of coarse textured alluvium left after large floods. Under-story production varies greatly with different percent of canopy cover. Canopy cover ranges from 60-80%. Trees reach maximum size on the site. Excessive ground water pumping can, over time, lower water tables beyond the loss of tree roots and cause excessive loss of trees. Natural fire may have been important in maintaining herbaceous under-stories. Salt cedar can invade and become dominant with destruction of the native tree cover. Bermuda and Johnson grasses are introduced species commonly found on this site.

**Forest overstory.** The over-story part of the plant community is dominated by Fremont cottonwood and Godding black willow. Over-story canopy cover varies along the stream from 50 to 80% in mature stands of trees. Sub-dominate over-story include species like Arizona ash, Arizona black walnut, coyote willow, Bonpland willow, Arizona sycamore, netleaf hackberry and mesquite. Note; the percent composition by species in the following table is percent by canopy cover (not frequency).

**Forest understory.** The production of under-story plants varies greatly with canopy cover. Open canopy areas will be dominated by grasses, sedges and rushes in the under-story. Closed canopy areas will be dominated by wetland forbs in the under-story.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	4483	6165	7846
Grass/Grasslike	34	168	504
Forb	22	112	303
Shrub/Vine	6	56	291
<b>Total</b>	<b>4545</b>	<b>6501</b>	<b>8944</b>

Table 6. Soil surface cover

Tree basal cover	1%
Shrub/vine/liana basal cover	0-1%
Grass/grasslike basal cover	1-15%
Forb basal cover	1-10%
Non-vascular plants	0%

Biological crusts	0-5%
Litter	50-90%
Surface fragments >0.25" and <=3"	0-50%
Surface fragments >3"	0-20%
Bedrock	0%
Water	0-15%
Bare ground	0-20%

**Table 7. Canopy structure (% cover)**

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	0-5%	1-10%
>0.15 <= 0.3	–	–	1-10%	1-10%
>0.3 <= 0.6	–	0-1%	1-10%	0-5%
>0.6 <= 1.4	–	0-1%	1-15%	0-5%
>1.4 <= 4	5-10%	1-10%	–	0-5%
>4 <= 12	5-20%	–	–	–
>12 <= 24	40-60%	–	–	–
>24 <= 37	0-5%	–	–	–
>37	–	–	–	–

## State 2

### Cottonwood, seep willow strand

#### Community 2.1

#### Cottonwood, seep willow strand



**Figure 7. Sandy Bottom, subirrigated POFR, strand vegetation**

This site occurs where continuous grazing has greatly reduced the reproduction of cottonwood and willow. Seedlings of cottonwood and willow species are relished by livestock. As mature trees are lost to old age, fire or flooding, the plant community is reduced to a shrubby strand along the stream-banks with a variety of native and non-native grasses and forbs on the stream terraces. Seep willow, burrobrush and other shrubs line the banks along with occasional saplings of cottonwood and / or willow. Introduced grasses like bermuda grass, yellow nutsedge and Johnson grass are common on the floodplain. Non-native annuals grasses like rabbitfoot grass, annual bristlegrass, barnyard grass, stinkgrass and junglerice are common in this state. Introduced forbs include horehound, dandelion, horseweed, hoary cress, sow thistle, prickly lettuce and plantain.

### **State 3**

#### **Riverwash community**

#### **Community 3.1**

##### **Riverwash community**



**Figure 8. Sandy Bottom, subirrigated POFR, riverwash**

This state occurs where groundwater pumping has dropped the water-table below the roots of the riparian tree species and stream-flow has been greatly reduced to flash floods following large storms. Stream-banks are largely unprotected. Channel areas widen, deepen and are colonized in places by shrubs like burrobrush, seep willow, mesquite and desert broom. Floodplain areas are lost to stream-bank erosion.

### **State 4**

#### **Salt Cedar invaded**

#### **Community 4.1**

##### **Salt Cedar invaded**



**Figure 9. Sandy Bottom, subirrigated POFR, salt cedar**

This state occurs where salt cedar has invaded the plant community. As mature native trees are lost to old age, fire and / or flooding, salt cedar increases to dominate the plant community. As salt cedar canopies approach 70-80% the under-story is reduced to zero. Salt cedar concentrates salts in it's leaves, which return to the soil surface in litter-fall and increase surface salinity.

### **Transition T1A**

#### **State 1 to 2**

Continuous Heavy Grazing. Mature cottonwood and willow die from age, fire or flood. Saplings of cottonwood and

willow are heavily grazed and little recruitment occurs. Seepwillow and burrobrush dominate the streambank vegetation while bermudagrass and annuals dominate the under-story vegetation.

### **Transition T1B**

#### **State 1 to 3**

Water-table depleted by groundwater pumping to greater than 20 feet. Mature trees die back to a reduced canopy that periodic flooding can support. Bank erosion widens channel area and wetland grasses and forbs are replaced by annuals. Seepwillow and burrobrush colonize areas of river-wash. No return if pumping is associated with urban areas or development.

### **Transition T1C**

#### **State 1 to 4**

Introduction of a seed source for salt cedar. As fires, age and floods remove cottonwood and willow, salt cedar increases to assume dominance. As salt cedar canopy closes to 80%, the under-story vegetation is reduced to zero.

### **Restoration pathway R2A**

#### **State 2 to 1**

Prescribed Grazing/No Grazing will result in return to cottonwood and willow dominance in less than 20 years. Trees will reach maturity in 50-70 years. Native perennial grasses and wetland forbs replace bermudagrass.

### **Transition T2A**

#### **State 2 to 4**

Introduction of a seed source for salt cedar. As fires, age and floods remove POFR and SAGO, salt cedar increases to assume dominance. As salt cedar canopy closes to 80%, the under-story vegetation is reduced to zero.

### **Restoration pathway R3A**

#### **State 3 to 1**

Cessation of groundwater pumping may allow water tables to rise over time to within 20 feet of the surface. Time depends on depth of depletion and amount of pumping reduced. This will not occur in urban or developing areas.

### **Transition T3A**

#### **State 3 to 4**

Cessation of groundwater pumping and salt cedar introduction. Time depends on depth of depletion and amount of pumping reduced. This will not occur in urban or developing areas.

### **Restoration pathway R4A**

#### **State 4 to 1**

Unknown. Possible herbicide control of salt cedar and replanting of POFR and SAGO from dormant poles on limited acres.

### **Transition T4A**

#### **State 4 to 3**

Water-table depleted by groundwater pumping to greater than 20 feet. Mature trees die back to a reduced canopy that periodic flooding can support. Bank erosion widens channel area and wetland grasses and forbs are replaced by annuals. Seepwillow and burrobrush colonize areas of river-wash. No return if pumping is associated with urban areas or development.



## Additional community tables

### Animal community

Grazing must be managed to allow for periodic reproduction of the woody dominants, Fremont cottonwood and Godding willow. Seeds germinate in beds of alluvium left after spring or summer floods. Spring seedlings require one full season to grow out of reach of grazing stock. Summer seedlings may require two seasons to reach a height where the terminal bud is out of reach. Seedlings of both species are very palatable to cattle. Insects and boggy areas can negatively affect livestock performance in the heat of the summer rainy season.

Perhaps the most used habitat by wildlife in southern Arizona. The two-tiered tree canopy and the presence of free water most or all of the year, make this site home to a tremendous array of native wildlife.

### Hydrological functions

This site is very important in the hydrology of southwestern stream systems. Large amounts of coarse woody debris form dams in large floods and spread waters over the floodplain. Beavers helped maintain a mosaic of marshy areas. Dense vegetation shade floodplains and stream channels to reduce evaporation. Vegetation traps sediment improving water quality and building floodplains.

### Recreational uses

Hunting, bird-watching, hiking, photography, picnicking.

### Wood products

The value of this plant community for wildlife is many times greater than its value for wood products. Cutting should be limited to flood damaged and fallen trees and driftwood.

### Other products

Yerba mansa and other medicinal herbs.

Table 8. Representative site productivity

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
Fremont cottonwood	<i>POFR2</i>	60	80	35	50	–	–	–	

### Inventory data references

Range 417s include 2 in good condition.

### Type locality

Location 1: Cochise County, AZ	
Township/Range/Section	T23S R22E S9
General legal description	San Pedro River between Fairbank and Hereford
Location 2: Santa Cruz County, AZ	
Township/Range/Section	T22S R15E S14
General legal description	Sonoita Creek Preserve
Location 3: Cochise County, AZ	
Township/Range/Section	T21S R19E S3
General legal description	Key Area 24 on Babocomari Ranch

Location 4: Pima County, AZ	
Township/Range/Section	T18S R17E S23
General legal description	Mattie canyon enclosure #2 on Empire Ranch, Las Cienegas National Conservation Area.

## Contributors

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## Approval

Curtis Talbot, 4/12/2021

## 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	05/05/2024
Approved by	Curtis Talbot
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):**
- 
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:**
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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):**
- 
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:**
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17. **Perennial plant reproductive capability:**

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