Ecological site F041XB218AZ
Sandy Bottom 8-12" pz. woodland

Last updated: 4/09/2021
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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.

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 41.2 – Chihuahuan – Sonoran Desert Shrubs

Elevations range from 2600 to 4000 feet and precipitation ranges from 8 to 12 inches per year. Vegetation includes mesquite, palo verde, catclaw acacia, soaptree yucca, creosotebush, whitethorn, staghorn cholla, desert saltbush, Mormon tea, burroweed, snakeweed, tobosa, black grama, threeawns, bush muhly, dropseed, and burrograss. The soil temperature regime is thermic and the soil moisture regime is typic 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.

Ecological site concept

Sandy Bottom, woodland, 8"-12" p.z., is a gallery woodland dominated by cottonwood and willow. The plant community is shaped by the perennially high water table within 3-15' of soil surface.

Associated sites

F041XB221AZ	**Loamy Bottom 8-12" p.z. woodland**
F041XB222AZ	**Saline Bottom 8-12" p.z. woodland**

Table 1. Dominant plant species

Tree	(1) *Populus fremontii* (2) *Salix gooddingii*
Shrub	Not specified
Herbaceous	(1) *Sporobolus wrightii*

Physiographic features

This site occurs in the lowest elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs on floodplains, low stream terraces, and in the channels of major drainages like the Gila and San Pedro Rivers. 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	2,600–4,000 ft
Slope	0–2%
Water table depth	36–99 in
Aspect	Aspect is not a significant factor

Climatic features

Precipitation ranges from 8-12 inches annually. More than half falls during Jul-Sep in brief, but often heavy, thunderstorms. The rest of the moisture comes as light rain or snow that falls slowly for a day or more, but rarely lasts more than a day. May and June are normally the driest months. Humidity is generally very low.

Temperatures are mild throughout most of the year. Freezing temperatures are common at night Dec-Feb; brief 0 F may be observed some nights. During June, July & August, some days may exceed 100 F.

In years of average or greater winter precipitation, annual grasses and forbs occur abundantly in the interspaces.

Table 3. Representative climatic features

Frost-free period (average)	240 days
Freeze-free period (average)	
Precipitation total (average)	

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-662 Safford area MU's GfA Gila and Rh riverwash; SSA-663 Gila-Duncan area MU 42 torrifluvents; SSA-666 Cochise county NW part MU's 17 Cascabel & Quiburi, 19 Cascabel, Quiburi & Fluvaquents; SSA-671 Cochise county Douglas-Tombstone area MU 123 fluvaquents & Quiburi; SSA-675 San Carlos IR area MU's 20 Cascabel & Wetrock, 96 Wetrock Vinton & typic fluvaquents.

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam (2) Loamy sand (3) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained to well drained
Permeability class	Rapid to moderately rapid
Soil depth	60 in
Surface fragment cover <=3"	0–30%
Surface fragment cover >3"	0–20%
Available water capacity (0-40in)	2.4–4.8 in
Calcium carbonate equivalent (0-40in)	0–3%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	7–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–65%
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 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

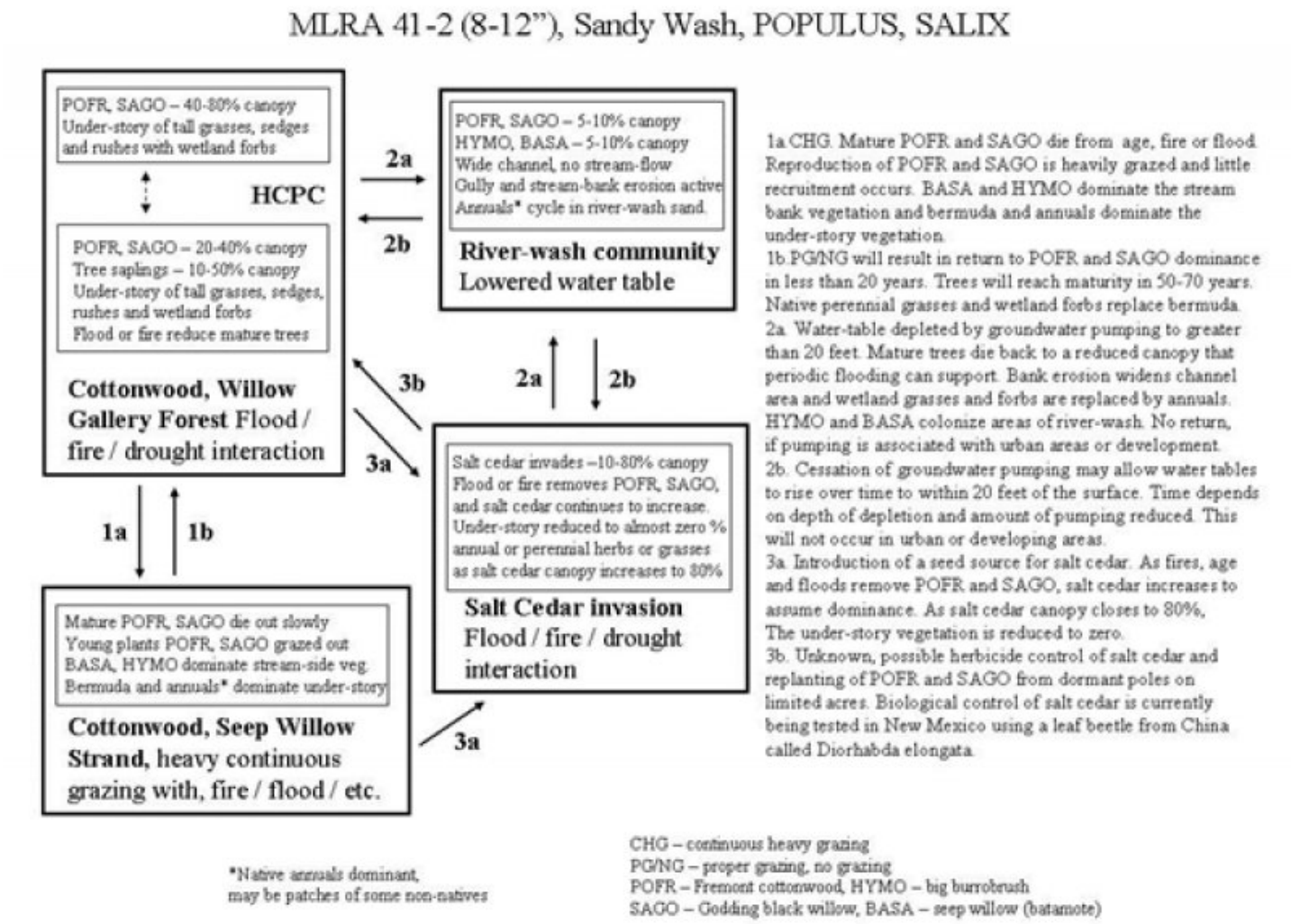

Figure 4. Sandy bottom, woodland, STM

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

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 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 (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	4000	5500	7000
Grass/Grasslike	300	150	20
Forb	270	100	20
Shrub/Vine	250	50	10
Total	**4820**	**5800**	**7050**

Table 6. Soil surface cover

Tree basal cover	1%
Shrub/vine/liana basal cover	1-2%
Grass/grasslike basal cover	1-5%
Forb basal cover	1-5%
Non-vascular plants	0%
Biological crusts	0-5%
Litter	45-85%
Surface fragments >0.25" and <=3"	0-50%
Surface fragments >3"	0-20%
Bedrock	0%
Water	0-20%
Bare ground	0-50%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	0-5%	1-10%
>0.5 <= 1	–	–	1-5%	1-10%
>1 <= 2	–	0-1%	1-10%	0-5%
>2 <= 4.5	–	0-2%	1-5%	0-2%
>4.5 <= 13	0-5%	1-10%	0-1%	0-1%
>13 <= 40	5-20%	–	–	–
>40 <= 80	40-60%	–	–	–
>80 <= 120	0-5%	–	–	–
>120	–	–	–	–

State 2
Cottonwood, seep willow strand

Community 2.1
Cottonwood, seep willow strand

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

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

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, cottonwood and willow die from age, fire or flood. Reproduction of them is heavily grazed and little recruitment occurs. Seepwillow and burrobrush dominate the streambank vegetation and bermudagrass and annuals dominate the understory 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 replace by annuals. Burrobrush and seepwillow colonize areas of riverwash. 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 understory 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 bermuda.

Transition T2A
State 2 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 understory 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 introduction of seed source for salt cedar. 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.

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 replace by annuals. Burrobrush and seepwillow colonize areas of riverwash. 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	*POFR2*	60	80	35	50	–	–	–	

Contributors

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Approval

Curtis Talbot, 4/09/2021

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	04/26/2024
Approved by	Curtis Talbot
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:**

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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):**

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:**