USDA Natural Resources Conservation Service

Ecological site F041XB221AZ
Loamy Bottom 8-12" p.z. woodland

Last updated: 4/09/2021
Accessed: 02/10/2025

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.

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

Loamy bottom, woodland, 8"-12" p.z., is a gallery mesquite woodland. Sub-surface water table is up to 50' below soil surface.

Associated sites

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

Table 1. Dominant plant species

Tree	(1) *Prosopis glandulosa var. torreyana* (2) *Prosopis velutina*
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 stream terraces of the Gila and San Pedro Rivers. It does not benefit regularly from over-bank flooding. Some extra moisture may be received from the valleyside drainages. Shallow water tables exist at depths of 20-50 feet. Stream channels are deeply entrenched.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Terrace
Flooding frequency	None to rare
Ponding frequency	None to rare
Elevation	2,600–4,000 ft
Slope	0–3%
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

There are no water features associated with this site.

Soil features

These soils are young and have formed in loamy or silty alluvium of mixed origin. Plant-soil moisture relationships are excellent for deep-rooted trees due to the presence of shallow ground water. Soils may be calcareous or even slightly saline. They can have 1 to 5% gypsum (by volume) in the soil profile.

Soil series mapped on this site include: SSA-663 Gila-Duncan area MU 14 Gila; SSA-666 Cochise county NW part MU's 40 Gila & Glendale, 43 Glendale & Hantz, 48 Hantz and 84 Vinton & Gila; SSA-671 Cochise county Douglas-Tombstone part MU 72 Glendale VFSL; SSA-675 San Carlos IR area MU's 4 & 92 Glendale and 36 Glendale & Gila.

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Loam (3) Silt loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately slow
Soil depth	60 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–1%
Available water capacity (0-40in)	6.8–10.8 in
Calcium carbonate equivalent (0-40in)	0–10%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–13
Soil reaction (1:1 water) (0-40in)	7–8.2
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0–1%

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

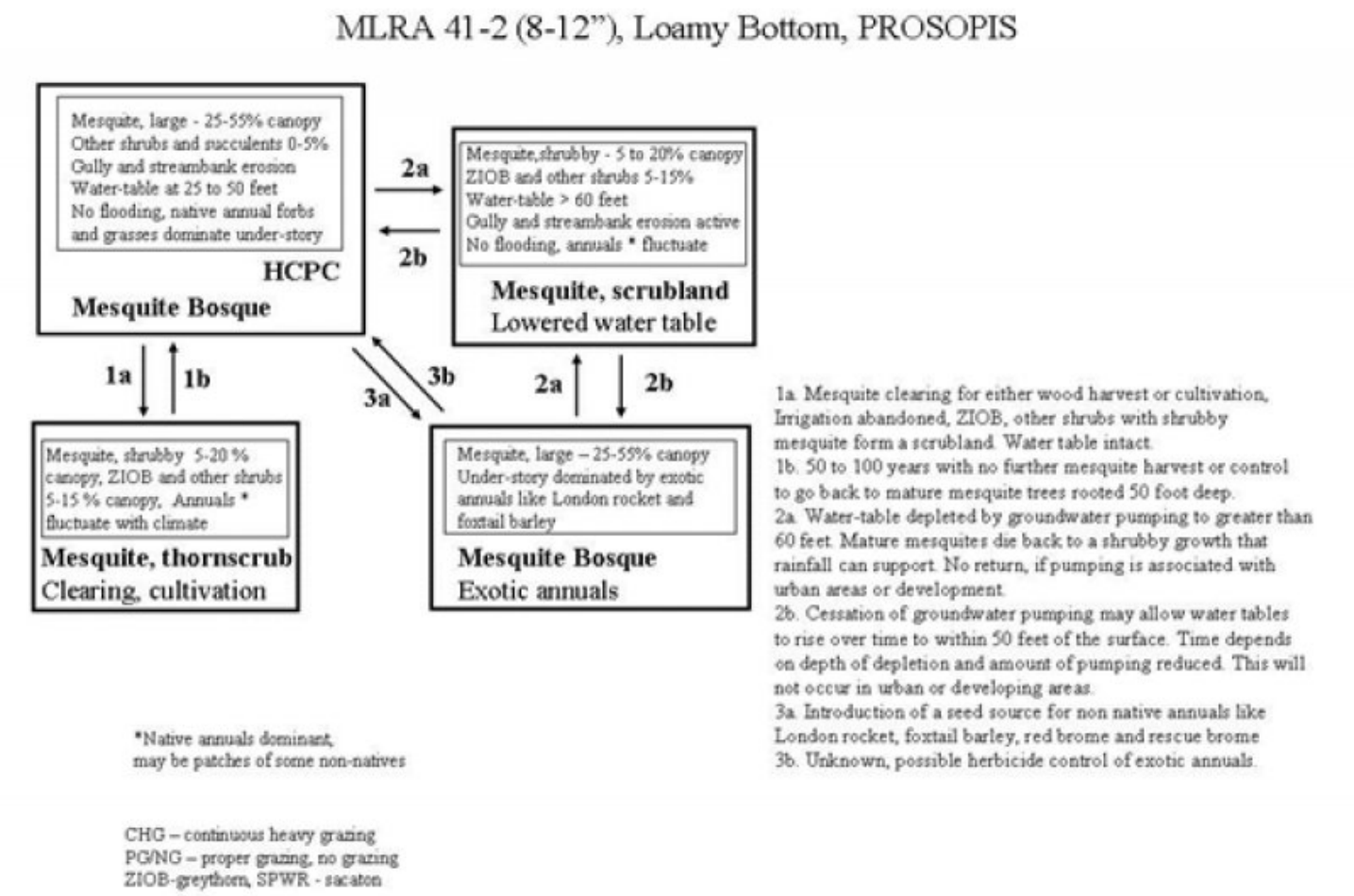

Figure 4. Loamy Bottom, woodland, STM

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 mesquite and an under-story of perennial grasses, shrubs and annuals. Other tree species usually occur in clumps or along the banks of stream channels. Mesquite leafs out in mid-to-late spring after the last frost, flowers in early summer, and has mature fruits ready to drop by early July. The trees lose their leaves with the first hard freeze in the fall. The aspect is deciduous woodland. The site is very susceptible to channel and stream bank erosion. Drainage-ways are deeply entrenched and, if streamside vegetation is disturbed, bank cutting becomes a serious problem. If the over-story of mesquite is reduced, plants such as greythorn and wait-a-bit bush can quickly increase to dominate the plant community. Herbaceous under-story varies greatly with different percent canopy cover. Excessive groundwater pumping can, over time, lower water tables beyond the reach of tree roots and cause extensive loss of trees. Tree species present on the site are vigorous sprouters after fire or woodcutting. Natural fire may have been important in maintaining herbaceous under-stories. Salt cedar can invade and become a minor component of the plant community, usually growing on or near the banks of the stream channel. 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 velvet mesquite and / or western honey mesquite. Overstory canopy cover varies from 25 to 65% in mature stands of trees. Trees reach maximum

size on this site (40-50 feet). Note; The percent composition in the following table is percent by canopy cover (not frequency).

Forest understory. The production of under-story plants can vary greatly with canopy cover. Open canopy areas will be dominated by shrubs and perennial grasses. Closed canopy areas will be dominated by annual forbs and grasses. Cool season annual forbs and grasses grow very well as mesquite is defoliated in the winter and spring. They can make tremendous production in El Nino years.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	3000	4000	5500
Forb	450	170	60
Grass/Grasslike	500	160	50
Shrub/Vine	345	145	35
Total	**4295**	**4475**	**5645**

Table 6. Soil surface cover

Tree basal cover	1%
Shrub/vine/liana basal cover	0-1%
Grass/grasslike basal cover	0-5%
Forb basal cover	0-5%
Non-vascular plants	0%
Biological crusts	0-10%
Litter	60-80%
Surface fragments >0.25" and <=3"	0-5%
Surface fragments >3"	0-1%
Bedrock	0%
Water	0%
Bare ground	0-40%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	0-2%	0-5%
>0.5 <= 1	–	–	1-10%	1-10%
>1 <= 2	–	0-5%	1-10%	1-20%
>2 <= 4.5	–	0-5%	1-20%	0-10%
>4.5 <= 13	0-10%	1-2%	0-5%	0-5%
>13 <= 40	25-55%	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

State 2
Mesquite thorn-scrub

Community 2.1
Mesquite thorn-scrub

This state occurs where mesquite has been cleared for cultivation and subsequently abandoned; or where mesquite has been cut for fuel-wood. The water table is intact. Mesquite re-growth and / or sprouts form a thorn-scrub with a 25-50% canopy 15 years after wood harvest or clearing that leaves root systems alive. Mesquite will take much longer to re-colonize areas that have been cleared and cultivated. Mesquite seeds need to be introduced to these areas and new plants will take 15 to 20 years for roots to reach the water table. It will take from 50 to 100 years with no further mesquite harvest for trees to reach maturity on the site.

State 3
Mesquite scrub-land

Community 3.1
Mesquite scrub-land

This state occurs where groundwater pumping has lowered the water table beyond the reach of mesquite roots (60 ft.). Mature mesquites die back to a sparse canopy (10-20%) of shrubby trees (10-15 ft. tall) which rainfall can support. Other shrubs like greythorn, catclaw acacia, wolfberry and whitethorn can make up considerable part of the perennial plant community. Annual grasses and forbs dominate the herbaceous layer. If the pumping is associated with urban areas or other commercial development, this state is not reversible.

State 4
Mesquite bosque, exotic annuals

Community 4.1
Mesquite bosque, exotic annuals

This state occurs where the under-story has been invaded and dominated by non-native annual forbs and grasses. The mature mesquite bosque is unaffected by this change in the under-story vegetation. These species are mostly winter annuals like London rocket, foxtail barley, red brome, rescue brome that can produce tremendous amounts of herbage in wet winters. Other non-native annuals include tumbleweed, stinkgrass, barnyard grass, annual bristlegrass, junglerice and horseweed. These annuals species can, over time, diminish the seed-bank of native annual species and may persist as the new under-story.

Transition T1A
State 1 to 2

Mesquite clearing for either wood harvest or cultivation, Irrigation abandoned, greythorn, other shrubs with shrubby mesquite form a scrubland. Water table intact.

Transition T1B
State 1 to 3

Water-table depleted by groundwater pumping to greater than 60 feet. Mature mesquites die back to a shrubby growth that rainfall can support. No return, if pumping is associated with urban areas or development.

Transition T1C
State 1 to 4

Introduction of a seed source for non native annuals like London rocket, foxtail barley, red brome and rescue brome

Restoration pathway R2A
State 2 to 1

50 to 100 years with no further mesquite harvest or control to go back to mature mesquite trees rooted 50 foot deep.

Restoration pathway R3A
State 3 to 1

Cessation of groundwater pumping may allow water tables to rise over time to within 50 feet of the surface. Time depends on depth of depletion and amount of pumping reduced. This will not occur in urban or developing areas.n, possible herbicide control of exotic annuals.

Restoration pathway R3A
State 3 to 4

Cessation of groundwater pumping may allow water tables to rise over time to within 50 feet of the surface. 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 exotic annuals.

Transition T4A
State 4 to 3

Water-table depleted by groundwater pumping to greater than 60 feet. Mature mesquites die back to a shrubby growth that rainfall can support. No return, if pumping is associated with urban areas or development.

Additional community tables

Animal community

If mesquite bean crops are harvested with cattle in the summer growing season, care should be taken to prevent overgrazing the perennial grasses. Closed canopy areas of the site are useable by cattle when beans are available or in wet winters when annuals are abundant. Open canopy areas have enough perennial grass to be used throughout the year. Horses should not be grazed when dry beans are in the trees or on the ground. Dry beans (that are re-hydrated by rain), can cause compaction and death in horses.

This site, being well wooded and adjacent to free water in streambeds for part or all of the year, is extremely important to a wide variety of wildlife species.

Hydrological functions

This site occurs on high stream terraces that no longer flood. Only in exceptional flood events (1983, 1993) will this site flood and contribute to water and sediment retention in the stream system.

Recreational uses

Hunting, hiking, photography, bird-watching, picnicking

Wood products

This site produces an abundance of mesquite for fire wood, posts and lumber. Fuel-wood harvest should not reduce the mature tree canopy to less than 25% to prevent increase of undesirable shrubs like greythorn and wolfberry or invasion by salt cedar. Tree limbing (pollarding) can yield good amounts of wood on a sustainable basis without removing the mature tree canopy. Coppice sprouts assume dominance quicker if stump heights are no less than 30 inches. Coppice production indicates cutting cycles of 30-50 years. Trees should not be cut near stream banks. There are no soil-site factors limiting wood production. A safe yield for large areas of this site is 0.13 cords per acre per year.

Other products

Mesquite beans for animal feed and mesquite flour or meal.

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
velvet mesquite	*PRVE*	35	50	8	20	–	–	–	

Type locality

Location 1: Cochise County, AZ	
Township/Range/Section	T19S R21E S34
General legal description	San Pedro River 1 mi. north of Fairbanks, Arizona

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	02/10/2025
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:**

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:**

17. **Perennial plant reproductive capability:**