Ecological site R039XA140AZ
Canyon Bottom (Riparian)
18-22" p.z.

Last updated: 4/06/2020
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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): 039X–Mogollon Transition North

MLRA CHARACTERISTICS-THESE ARE GENERAL STATEMENTS AZ 39.1 Mogollon Plateau Coniferous Forests Elevations range from 7000 to 12,500 feet and precipitation averages 20 to 35 inches per year. Vegetation includes ponderosa pine, Gambel oak, Arizona walnut, sycamore, Douglas fir, blue spruce, Arizona fescue, sheep fescue, mountain muhly, muttongrass, junegrass, pine dropseed, and dryland sedges. The soil temperature regime ranges from mesic to frigid and the soil moisture regime ranges from typic ustic to udic ustic. This unit occurs within the Colorado Plateau Physiographic Province and is characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Sedimentary rock classes dominate the plateau with volcanic fields occurring for the most part near its margin. SITE FEATURES This is a relict site that occurs across MLRAs with the type location on Walnut Canyon National Monument near Flagstaff, Arizona. This is the same site as R035XG724AZ Semi-Riparian Canyon Bottom.

Associated sites

F039XA139AZ	**Limestone/Sandstone Upland 17-22"** This site occurs above the limestone cliffs on the benches of Walnut Canyon National Monument. This site is forested with Ponderosa Pine and Douglas Fir.
R035XG723AZ	**Limestone/Sandstone Upland (Pinyon-Juniper) 14-18" p.z.** This site occurs above the limestone cliffs on the bench of Walnut Canyon National Monument. This site occurs in pinyon-juniper in the Ustic Aridic east end of the park.

Similar sites

R035XG724AZ	**Semi-Riparian Canyon Bottom 14-18" p.z.** This site occurs on the abandoned stream terrace site. The area no longer floods because of recent damming of Upper Lake Mary upstream. This site is actually the same ESD but in a different MLRA. This is because of the continuity of the stream corridor.

Table 1. Dominant plant species

Tree	(1) *Symphoricarpos oreophilus* (2) *Prunus virginiana*
Shrub	Not specified

Herbaceous	Not specified

Physiographic features

This site occurs in a bottom position. The site benefits from run-in moisture due to the geomorphologic position of the site as a channel at the base of limestone cliffs. The cliffs allow the site to be protected and trap moisture.

Table 2. Representative physiographic features

Landforms	(1) Channel (2) Flood-plain step
Ponding frequency	None
Elevation	1,680 – 2,130 m
Slope	0 – 10 %
Water table depth	90 – 100 cm
Aspect	Aspect is not a significant factor

Climatic features

About 40% of the moisture in this Common Resource Area (CRA), or Land Resource Unit (LRU) comes as rain from June to September. The remainder comes from October to May as snow or light rain. Extreme temperatures of 97 and -37 degrees Fahrenheit have been recorded. Some moisture is usually received every month.

Table 3 Representative climatic features

Frost-free period (average)	120 days
Freeze-free period (average)	
Precipitation total (average)	560 mm

Influencing water features

This site collects water from adjacent sedimentary cliffs.

Soil features

Map Units are on Walnut Canyon National Monument Soil Survey.

MU 36 Oxyaquic Ustifluvents, 2 to 6 percent slopes

Table 4. Representative soil features

Parent material	(1) Alluvium – limestone and sandstone
Surface texture	(1) Extremely cobbly loamy sand
Drainage class	Somewhat excessively drained
Soil depth	150 cm
Surface fragment cover <=3"	60 – 80 %
Surface fragment cover >3"	60 – 80 %
Subsurface fragment volume <=3" (Depth not specified)	60 – 80 %
Subsurface fragment volume >3" (Depth not specified)	60 – 80 %

Ecological dynamics

This site occurs across two MLRAs. This site has both Riparian Canyon Bottoms and Semi-Riparian Canyon bottoms. Due to acreage limitations, the sites were combined to demonstrate hydrology differences due to anthropogenic disturbance, moisture, and temperature differences. There has been a change in the hydrology of the site. Walnut Canyon historically ran as an ephemeral stream. In 1940-1941 Upper Lake Mary dam was constructed upstream as a drinking water reservoir for the city of Flagstaff. In the canyon bottoms the riparian vegetation is maintained by seepage and runoff from the steep canyon walls. Since the building of Upper Lake Mary dam the channel is no longer periodically scoured and the riparian vegetation has been allowed to flourish unchecked. In the areas affected by the dam upstream, which have limited availability of water from seepage from the canyon sides, the vegetation has turned either semi-riparian or almost fully upland. The semi-riparian indicators are limited to a few box-elders (Acer negundo) and scattered shrubs. The majority of the upland vegetation is blue grama (Bouteloua gracilis) and other upland species. There is now only flooding in the area when there is sufficient precipitation as either rain or snowmelt cause an overflow at Lake Mary. There is an additional dam at the east end of Walnut Canyon National Monument built by the Santa Fe Railroad in 1885-1886 but it appears to have little effect on the hydrology of the area and has failed to hold water for any length of time. Lower Lake Mary Dam was completed in 1905 but again appears to have little influence on the hydrology.

State and transition model

Figure 3. Canyon Bottom Site

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					

1	**Grass**			0-101	
	sideoats grama	BOCU	*Bouteloua curtipendula*	0-101	–
	bluegrass	POA	*Poa*	0-9	–
Shrub/Vine					
2	**Shrub/Vine**			0-45	
	western white clematis	CLLI2	*Clematis ligusticifolia*	0-45	–
	Woods' rose	ROWOU	*Rosa woodsii var. ultramontana*	0-30	–
	snowberry	SYMPH	*Symphoricarpos*	0-7	–
	canyon grape	VIAR2	*Vitis arizonica*	0-1	–
	redosier dogwood	COSE16	*Cornus sericea*	0-1	–
Tree					
3	**Tree**			54-242	
	chokecherry	PRVI	*Prunus virginiana*	27-112	–
	New Mexico locust	RONE	*Robinia neomexicana*	27-54	–

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Type locality

Location 1: Coconino County, AZ	
UTM zone	N
UTM northing	3892796
UTM easting	459099
General legal description	The type location for this ESD is located on Walnut Canyon National Monument, with limited public access.

Other references

Brian, N.J. 1992. Historical Review of Water Flow and Riparian Vegetation at Walnut Canyon National Monument, Arizona. National Park Service Cooperative National Park Resources Studies Unit Technical Report NPS/WRUA/NRTR-92/44, 48 p.

Contributors

Jennifer Puttere

Approval

Scott Woodall, 4/06/2020

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.

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Contact for lead author	Flagstaff MLRA Soil Survey Office
Date	03/27/2012
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **None**

2. **Presence of water flow patterns:** **Water flow patterns are currently limited to the edges of the site-near limestone cliffs where water seeps through and maintains the current riparian state.**

3. **Number and height of erosional pedestals or terracettes:** **None**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **0-5 percent bare ground. This site is heavily vegetated with riparian overstory and understory.**

5. **Number of gullies and erosion associated with gullies:** **None**

6. **Extent of wind scoured, blowouts and/or depositional areas:** **Wind scoured, blowouts, and depositional areas are limited to the edges of the site near limestone canyon walls where there is exposed bedrock.**

7. **Amount of litter movement (describe size and distance expected to travel):** **Very low litter monement. Most litter will stay in place except in the case of a rare flood, in which case litter will be moved downstream.**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** 1-2

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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:** Heavy plant cover due to lack of periodic scouring by water has permitted high infiltration and low 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):** No compaction layer 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: Shrubs>trees>grasses

    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):** Low mortality on this site due to water from water table and water coming in from the limestone cliff sides.

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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:** No invasives on this site.

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17. **Perennial plant reproductive capability:** Reproduction on site is normal.
