USDA Natural Resources
Conservation Service

Ecological site R070CY103NM
Bottomland

Last updated: 10/21/2024
Accessed: 11/21/2024

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.

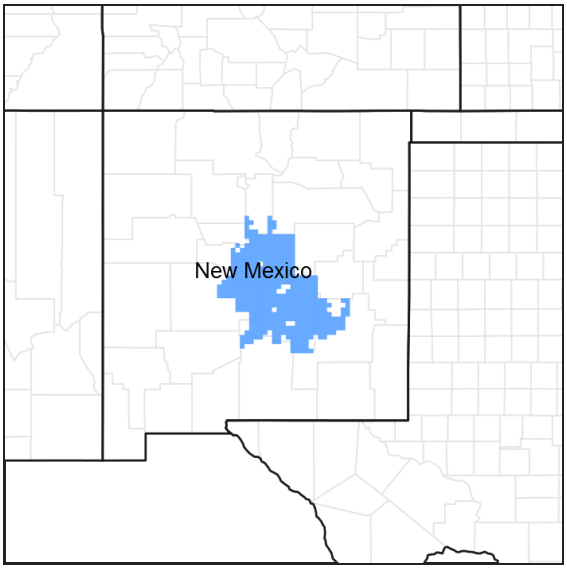


Figure 1. Mapped extent

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): 042C–Central New Mexico Highlands

Major Land Resource Area (MLRA) 70C - will become 42C - is a high elevation portion of central New Mexico that is the convergence of four major physiographic provinces: Basin and Range, Southern Rocky Mountains, Great Plains, and Colorado Plateau. As such, it contains parts or characteristics of each, though tectonically, as a region, it is the easternmost extent of the Basin and Range Province and, more specifically, a structural expression of the Rio Grande Rift. It consists mostly of rangeland with some forested areas associated with numerous disconnected mountain ranges such as the Guadalupe, Sacramento, and Manzano Mountains. Other major physiographic features include the Galisteo Basin or the enclosed Estancia Basin, the structural Chupadera and Glorieta Mesas, and the piedmonts of the Buchanan and Guadalupe Mesas.

LRU notes

This site does not yet have an LRU designation

Ecological site concept

This site occurs in the bottoms of broad major drainageways along mostly perennial stream systems. These sites receive additional runoff from surrounding uplands via upland groundwater discharge and surface runoff during

storm or wet season events and snowmelt.

0-3% slope, deep loams, silty clay loams. Vegetation includes sideoats grama, alkali sacaton, vine-mesquite, western wheatgrass, blue grama, galleta, tabosa, muhly, prairie coneflower, scarlet globemallow, New Mexico thistle, silverleaf nightshade, annual sunflowers, desert holly, fourwing saltbush, walkingstick cholla, and broom snakeweed.

Associated sites

R070CY101NM	**Swale**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens* (2) *Opuntia imbricata*
Herbaceous	(1) *Bouteloua curtipendula* (2) *Sporobolus airoides*

Physiographic features

This site occurs in the bottoms of broad major drainageways that receive additional runoff from surrounding uplands on a regular basis. Slopes range from 0 to 3 percent. Direction of slope is not significant. Elevations range from 5,000 to 6,500 feet above sea level.

The properties of this site will exist within the ranges of the following soil series, but are not necessarily characterized by their full range.
The Manzano soils are along drainageways, flood plains,valley floors, valley sides, and stream terraces, and the lower parts of alluvial fans. The soils formed in alluvium or slope alluvium derived from sedimentary rocks.
The La Fonda soils are on fan remnants and piedmont slopes. They formed in medium and moderately fine textured calcareous sediments derived principally from "redbed" formations of Jurassic, Triassic, Permian and Pennsylvanian age. These formation are mostly shales and fine grained sandstones. The sediments are readily susceptible to water erosion and areas of La Fonda soils are often cut by arroyos.
The Gabaldon soils are on alluvial fans and in swales. The soils formed in silty sediments derived from mixed sedimentary and igneous rocks.
Prewitt - Nearly level to gently sloping flood plains and low terraces.

Table 2. Representative physiographic features

Landforms	(1) River valley > Flood plain (2) River valley > Valley floor
Runoff class	Very low to low
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Elevation	1,524–1,981 m
Slope	0–3%
Aspect	Aspect is not a significant factor

Climatic features

The climate of the area is "semi-arid continental."

The average annual precipitation ranges from 13 to 16 inches. Variations of 5 inches, more or less, are not uncommon. Seventy-five percent of the precipitation falls from April to October. Most of the summer precipitation comes in the form of high intensity-short duration thunderstorms.

Temperatures are characterized by distinct seasonal changes and large annual and diurnal temperature changes. The average annual temperature is about 50 degrees F with extremes of -29 degrees F in the winter and 103 degrees F in the summer.

The average frost-free season is 130 to 160 days. The last killing frost is in early May and the first killing frost is in early October.

The majority of precipitation falls when temperatures favor warm-season plant growth. However, about 40 percent of the precipitation is also available for cool-season plant growth. This allows the cool-season species to occupy a very important component in this site. The effective precipitation of this site is increased due to its position on the landscape, by runoff from adjoining sites. This site also serves as a cold air drainageway. These two factors are both favorable to cool-season species and also increase the variety of production of the vegetative community. Strong winds from the west and southwest blow across the area from February to June and dry the soil during a critical period for plant growth.

Climate data was obtained from http://www.wrcc.sage.dri.edu/summary/climsmnm.html web site using 50% probability for freeze-free and frost-free seasons using 28.5 degrees F and 32.5 degrees F respectively.

The properties of this site will exist within the ranges of the following soil series, but are not necessarily characterized by their full range.
Manzano - Mean annual precipitation ranges from 11 to 14 inches and mean annual temperature ranges from 47 to 57 degrees F. The frost-free season ranges from 100 to 180 days and elevation ranges from 4,700 to 8,000 feet. Precipitation range as low as 10 inches in Arizona.
La Fonda - The climate is semiarid and continental. Mean annual precipitation ranges from 10 to 13 inches, but does range to 16 inches in some areas with a pronounced summer maximum characterized by frequent heavy thunderstorms of short duration. Mean annual air temperature ranges from 50 to 58 degrees F. The frost-free period ranges from 120 to 180 days and elevation ranges from 4,200 to 7,000 feet.
Gabaldon - The climate is semiarid continental. Mean annual precipitation ranges from 11 to 17 inches with a pronounced summer maximum. Mean annual temperature temperature ranges from 45 to 57 degrees F. Frost free season ranges from 140 to 180 days and elevation ranges from 4,000 to
7,800 feet.

Table 3. Representative climatic features

Frost-free period (average)	173 days
Freeze-free period (average)	187 days
Precipitation total (average)	406 mm

Influencing water features

Where this site occurs on floodplains and drainageway bottoms, it can be expected to experience periodic flooding, and to benefit from high water tables.

Soil features

The soils on this iste are deep and well drained. The surface textures are loams, silt loam, and silty clay loams. Permeability is slow to moderately slow. The available water-holding capacity is high. The effective rooting depth is 60 inches or more. These soils can store water for relatively long period.
The Manzano series consists of very deep, well drained, moderately slowly or moderately permeable soils that formed in alluvium or slope alluvium derived from limestone, shale, and sandstone. Manzano soils are along drainageways, on valley floors, valley sides, stream terraces and the lower parts of the alluvial fans. Slope ranges from 0 to 10 percent. Mean annual precipitation is about 13 inches and mean annual air temperature is about 52 degrees F.
The La Fonda series consists of very deep, well drained, moderately permeable soils that formed in medium and moderately fine textured calcareous sediments derived from sandstone and shale. La Fonda soils are on fan

remnants and piedmont slopes. Slope ranges from 0 to 15 percent. Mean annual precipitation is about 12 inches and mean annual air temperature is about 55 degrees F.
The Gabaldon series consists of very deep, well drained, moderately slowly permeable soils that formed in silty sediments derived from mixed sedimentary and igneous rocks. These soils are on alluvial fans and swales. Slope ranges from 0 to 8 percent. Mean annual precipitation is about 15 inches and mean annual air temperature is about 51 degrees F.
The Prewitt series consists of moderately dark colored, well drained, calcareous alluvial soils developing on flood plains and low terraces in stratified, but predominantly moderately fine textured, calcareous alluvium. The parent materials are mixed alluvium consisting mainly of sediments from redbeds of Jurassic, Triassic, and Permian Age but containing minor amount of materials washed from Cretaceous sedimentary deposits. Prewitt soils occur in areas having average annual precipitation ranging from about 12 to 18 inches, with mean annual temperatures of about 57 degrees F. They normally have an A1 - AC - C horizon sequence with moderately dark colored A1 horizons and weak or no horizon of lime accumulation.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Sandy loam (3) Clay loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderately slow
Soil depth	152–183 cm
Available water capacity (0-101.6cm)	22.86–30.48 cm
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–4
Soil reaction (1:1 water) (0-101.6cm)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	5–56%

Ecological dynamics

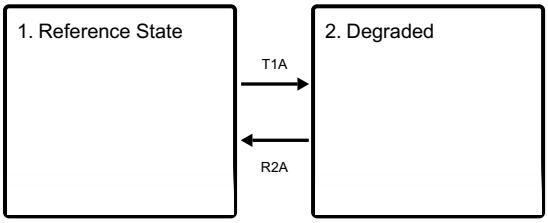
This site is characterized by its moisture collecting position in the landscape, and therefore has associated soil features that help define the plant community dynamics. Its deep, organic rich materials encourage moisture retention, nutrient cycling, and organic carbon storage and in some places can help jumpstart anaerobic conditions during short periods of the season where areas of soils become saturated. Any smaller patches of hydric soils are important for helping attenuate dissolved nutrient loads in groundwater such as nitrates or sulfates and can further encourage higher plant diversity.
The extra moisture availability promotes plant species diversity and density by extending the growing period when the uplands become dry or by allowing more drought sensitive species to inhabit the site. A dense vegetative canopy shades the ground, keeping it cooler, armored from rainsplash erosion, and erosion during overland flow events. In these conditions, where soil surfaces are plant-armored and shallow roots are somewhat dense, infiltration is higher, runoff is lower, allowing more moisture to be absorbed and thus retained in the landscape, and which further encourages resilience to drought periods.
This higher diversity and density of plant foliar and rooting activity further encourages the turnover of organic matter and therefore cycling of nutrients in what is functionally a positive feedback loop of fertility. Long-term rates of erosion and organic matter cycling are in equilibrium and only fluctuate slightly year-to-year due to normal climatic variability. Fire is a natural cycle that also encourages recycling of nutrients and helps maintain a grass and forb advantage over shrub encroachment.
In a degraded state, shrubs and forbs increase. They gain a competitive advantage, primarily by out-competing the

grasses for water and nutrients, especially during periods of short and long duration drought. Fire had been a natural event in these areas thwarting shrub species from gaining a competitive advantage and facilitating greater colonization by grasses. Historic continuous grazing has prevented the fuel loads in these grasslands from being able to carry a fire, therefore giving shrubs and annuals their advantage.
As shrubs increase, root density and turnover in the soil begins to lessen causing a decrease in decomposition rates which are a source of nutrient supply to plants. In return, storage of labile and sequestered carbon pools decline causing a decrease in soil organic matter. Soil organic matter decline coincides with lower infiltration capacity, water holding capacity, and higher bulk density, all which lead to decreased resiliency to drought and heat stress. It also increases erosion rates and may lead to gully formation.

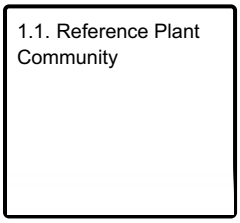
Grazing:
This site provides forage suitable for grazing by all classes of cattle and sheep at any season of the year. In cases where this site has been invaded by woody plants, goats can be used as a management tool to help control these plants. Mismanagement of grazing on this site will cause a decrease of the more palatable grasses and forbs such as vine-mesquite, western wheatgrass, and alkali sacaton, and a subsequent increase in grasses, forbs, and shrubs with low grazing value and much lower forage production potential such as mat muhly, New Mexico thistle, and cholla cactus. Continued severe mismanagement can lead to reduced ground cover. It will also increase gully erosion which will channel runoff that would nomally spread over the entire site. This further lowers productivity, and extensive structural erosion control measures may be needed to restore productivity on these severely deteriorated sites. Because of the inherent high productivity of bottomland range sites, they could respond very well to grazing management which includes deferment from grazing during the growing season of the desirable forage plants. This site also lends itself well to management as a separate unit fenced to separate it from surrounding uplands.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Reference State

This state includes vine-mesquite, western wheatgrass, and alkali sacaton

Community 1.1
Reference Plant Community

The aspect of this site is that of a grassland. Mid- and tall-grasses are dominant with occasional shrubs or half-shrubs. This site occurs in a position which receives surface runoff from surrounding uplands on a regular basis. This additional runoff makes the vegetation noticeably taller and more dense than adjacent upland sites. Other grasses that could appear on this site include: burrograss, ring muhly, threeawn, sand dropseed, wolftail, buffalograss, Indian ricegrass, Indiangrass, Canada wildrye, Hall's panicum, prairie junegrass, red muhly, plains lovegrass, and black grama. Other shrubs include: wolfberry, yucca, fringed sagewort, Apacheplume, ephedra spp., and winterfat. Other forbs include: buffalobur, buffalo gourd, whorled milkweed, California bricklebush, tansymustard and threadleaf groundsel.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1473	2373	3273
Forb	161	260	359
Total	**1634**	**2633**	**3632**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	2-5%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	40%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	20%

Figure 5. Plant community growth curve (percent production by month). NM4303, R070CY103NM Bottomland HCPC. R070CY103NM Bottomland HCPC Mixed cool and warm-season mid and talll grass species with scattered shrubs. .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	7	10	15	25	25	8	5	0	0

State 2
Degraded

Mismanagement of grazing on this site will cause a decrease of the more palatable grasses and forbs such as vine-mesquite, western wheatgrass, and alkali sacaton, and a subsequent increase in grasses, forbs, and shrubs with low grazing value and much lower forage production potential such as mat muhly, New Mexico thistle, and cholla cactus. Continued severe mismanagement can lead to reduced ground cover. It will also increase gully erosion which will channel runoff that would nomally spread over the entire site. This further lowers productivity, and extensive structural erosion control measures may be needed to restore productivity on these severely deteriorated sites.

Characteristics and indicators. increase in grasses, forbs, and shrubs with low grazing value and much lower forage production potential such as mat muhly, New Mexico thistle, and cholla cactus.

Resilience management. Because of the inherent high productivity of bottomland range sites, they could respond very well to grazing management which includes deferment from grazing during the growing season of the desirable forage plants. This site also lends itself well to management as a separate unit fenced to separate it from surrounding uplands.

Transition T1A
State 1 to 2

Season-long grazing providing little rest and recovery for preferred grazed plants during critical growing periods, coupled with high utilization.

Restoration pathway R2A
State 2 to 1

Legacy Statement: "Restoration pathway resulting from the implementation of prescribed grazing." It should be noted that prescribed grazing alone will not necessarily repair gullies. Erosion control measures might also be required.

Conservation practices

Grazing Management Plan - Applied

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				325–488	
	sideoats grama	BOCU	*Bouteloua curtipendula*	325–488	–
2				488–1138	
	alkali sacaton	SPAI	*Sporobolus airoides*	488–1138	–
3				488–650	
	vine mesquite	PAOB	*Panicum obtusum*	488–650	–
4				488–1138	
	western wheatgrass	PASM	*Pascopyrum smithii*	488–1138	–
5				163–325	
	blue grama	BOGR2	*Bouteloua gracilis*	163–325	–
6				163–325	
	James' galleta	PLJA	*Pleuraphis jamesii*	163–325	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	163–325	–
7				163–325	
	creeping muhly	MURE	*Muhlenbergia repens*	163–325	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	163–325	–
8				325–650	
	big sacaton	SPWR2	*Sporobolus wrightii*	325–650	–
9				98–163	
	squirreltail	ELEL5	*Elymus elymoides*	98–163	–
10				163–228	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	163–228	–
	silver bluestem	BOSA	*Bothriochloa saccharoides*	163–228	–
11				163–325	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	163–325	–
Forb					
12				98–163	
	upright prairie coneflower	RACO3	*Ratibida columnifera*	98–163	–

	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	98–163	–
13				98–163	
	New Mexico thistle	CINE	*Cirsium neomexicanum*	98–163	–
14				65–163	
	dwarf desertpeony	ACNA2	*Acourtia nana*	65–163	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	65–163	–
15				65–163	
	common sunflower	HEAN3	*Helianthus annuus*	65–163	–
16				33–98	
	prairie sagewort	ARFR4	*Artemisia frigida*	325–98	–
17				33–98	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	33–98	–
Shrub/Vine					
18				163–260	
	fourwing saltbush	ATCA2	*Atriplex canescens*	163–260	–
19				33–163	
20				33–98	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	33–98	–
21				33–98	
	Shrub, deciduous	2SD	*Shrub, deciduous*	33–98	–

Type locality

Location 1: Chaves County, NM
Location 2: De Baca County, NM
Location 3: Guadalupe County, NM
Location 4: Lincoln County, NM
Location 5: San Miguel County, NM
Location 6: San Miguel County, NM
Location 7: Santa Fe County, NM
Location 8: Torrance County, NM

Other references

Data collection for this site was done in conjunction with the progressive soil surveys within the Pecos-Canadian Plains and Valleys 70 Major Land Resource Area of New Mexico. This site has been mapped and correlated with soils in the following soil surveys: Chaves, De Baca, Guadalupe, Lincoln, Sna Miguel, Santa Fe, Torrance.

Characteristic Soils Are:
Gabaldon, La Brier, La Fonda, Manzano, Prewitt, Riverwash

Other Soils included are:
Tours

Contributors

Christine Bishop
Elizabeth Wright
John Tunberg

Approval

Kendra Moseley, 10/21/2024

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	11/21/2024
Approved by	Kendra Moseley
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):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

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):**

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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:**
