USDA Natural Resources Conservation Service

Ecological site R070CY111NM
Salt Flats

Last updated: 10/21/2024
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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.

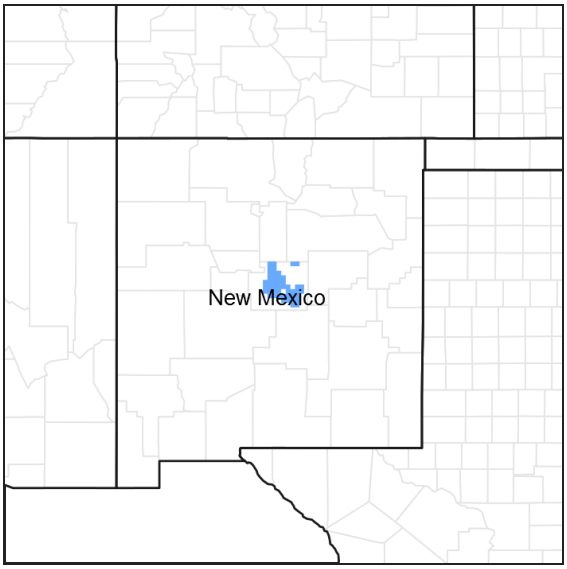

Figure 1. Mapped extent

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): 042C–Central New Mexico Highlands

Major Land Resource Area (MLRA): 070C–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 is not yet assigned to an LRU.

Ecological site concept

These sites typically occur on level to nearly level lake terraces, dry lake beds, or sediments from former or relict lacustrine deposits.The soils on this site are typically deep loams that are affected by both high pH and total soluble salts.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens* (2) *Atriplex confertifolia*
Herbaceous	(1) *Sporobolus airoides* (2) *Sporobolus wrightii*

Physiographic features

This site occurs on level to gently sloping land that averages 3 percent or less and rarely exceeds 8 percent. Exposures vary and are not significant. What is normally a uniform slope may be broken by natural playas, potholes, or arroyos. Elevations range from 4,600 to 7,000 feet above sea level.

The Duncan soils are on level to nearly level alkali flats bordering playas. Slopes range from 0 to .5 percent, but may have uneven microrelief due to wind shifting of the surface soil. The soils formed in old lake and fan deposited alluvium from mixed sources including rhyolite, andesite, quartzite, granite, and limestone. Duncan soils are at elevations of 3,800 to 4,300 feet.
Harvey soils are on hills, swales, plateaus, bajadas, mesas, and fan piedmonts. Slope gradients range from 0 to 15 percent. Elevation ranges from 4,700 to 7,800 feet
Karde soils are in eolian deposits principally on the leeward side of dry or intermittent lakes (playas). Slope ranges 1 to 10 percent. The soils formed in silty and very fine sandy material that is quite uniformly high in calcium carbonate with local areas high in soluble salts as well.
Pedrick soils develop on deltas or lake terraces in coarse to moderately coarse textured, strongly calcareous, moderately to strongly alkaline, lacustrine or delta deposits derived from a variety of parent rocks but predominated by sandstone quartzite, limestone, and granite.
The Willard soils are on level to nearly level lacustrine terraces. The soils formed in stratified, moderately fine textured lacustrine deposits from mixed alluvium. Slope ranges 0 to 1 percent.Elevation ranges from 5,400 to 7000 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat
Elevation	1,402–2,134 m
Slope	3–8%
Water table depth	23–30 cm
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 falling in early May and the first killing frost in

early October.

Both temperature and precipitation favor warm-season perenial species. However, approximately 40 percent of the annual precipitation falls at a time favorable for cool-season plant growth. This allows the cool-season species to occupy an important component of this site. Strong winds blow from the west and southwest from February to June and rapidly dry out the soil duing a critical stage for cool-season 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.

Duncan - soils are in a warm, semiarid continental climate. The mean annual temperature ranges from 58 degrees to 66 degrees F. The frost-free period ranges from 155 to 220 days. The annual precipitation ranges from 10 to 12 inches and occurs as thundershowers from July through September and as gentle fall and winter rains. The months of May and June are usually warm and dry.
Harvey - Mean annual precipitation typically ranges from 10 to 14 inches with a summer maximum. In some areas the series has ranged to 16 inches of precipitation. In Utah the annual precipitation ranges as low as 8 inches. Mean annual temperature ranges from 47 to 57 degrees F. The frost-free period ranges from 120 to 190 days.
Karde - Mean annual precipitation ranges from 12 to 18 inches and mean annual temperature ranges from 48 to 54 degrees F. The frost-free season ranges from 120 to 160 days and elevation ranges from 4,900 to 7,200 feet. Thornthwaite P-E Index is 26.
Pedrick - annual precipitation of 13 inches, a mean annual temperature of 50 degrees, and a mean summer temperature of 67 degrees.
Willard - . Average annual precipitation ranges from 11 to 13 inches with most being received during the summer months. Average annual temperature ranges from 52 to 54 degrees F. Frost free season ranges from 120 to 140 days.

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

This is an upland site, and is not associated with water features or wetlands. During heavy rain events, this site may receive run-on or throughflow moisture from landforms above and contribute runoff or throughflow to landforms below.
High salinity suggests that this site may be seasonally influenced by a water table. Future ESD work should seek to clarify this.

Soil features

The soils on this site are typically deep loams that are affected by both high pH and total soluble salts. Surface crusting and sealing are common, water intake rates and permeability are moderately slow to very slow, and ponding is common after summer thunderstorms. Total water-holding capacity is high but that available to plants is often low.
This site is most commonly correlated to components with the Willard series but the following is a list of the prominent soil series used in mapunit components correlated to this site:
Duncan FINE, MIXED, SUPERACTIVE, THERMIC TYPIC NATRIDURIDS
Harvey COARSE-LOAMY, MIXED, SUPERACTIVE, MESIC USTIC HAPLOCALCIDS
Karde FINE-SILTY, CARBONATIC, MESIC USTIC TORRIORTHENTS
Pedrick COARSE-LOAMY, MIXED, SUBACTIVE, CALCAREOUS, MESIC USTIC TORRIORTHENTS
Willard FINE-SILTY, MIXED, SUPERACTIVE, MESIC USTIC HAPLOCALCIDS

The Duncan series consists of moderately soils deep to a hardpan that formed in old lake and fan deposited alluvium from mixed sources including rhyolite, andesite, quartzite, granite, and limestone. Duncan soils are on level

to nearly level alkali flats bordering playas and have slopes from 0 to 0.5 percent. Well-drained; very slow runoff; very slow permeability.
The Harvey series consists of very deep, well drained, moderately permeable soils that formed in alluvium and windblown sediments derived dominantly from sandstone, shale, and limestone. Harvey soils are on hills, swales, plateaus, bajadas, mesas, and fan piedmonts . Slopes are 0 to 15 percent. Well drained. Permeability is moderate. Runoff is negligible on slopes less than 1 percent, low on 1 to 5 percent slopes, and medium on 5 to 15 percent slopes.
The Karde series consists of very deep, well drained, moderately permeable soils that formed in silt and very fine sand deposited on the leeward side of dry or intermittent lake beds. Slope ranges from 1 to 10 percent. Well drained. Permeability is moderate. Runoff is negligible on slopes less than 1 percent, very low on 1 to 3 percent slopes, low on 3 to 5 percent slopes, and medium on 5 to 8 percent slopes.
Pedrick series consists of light-colored, well-drained, coarse to moderately coarse textured moderately to strongly alkaline soils developing on deltas or lake terraces in coarse to moderately coarse textured, strongly calcareous, moderately to strongly alkaline, lacustrine or delta deposits derived from a variety of parent rocks but predominated by sandstone quartzite, limestone, and granite. Well drained at the present time. Evidence of relic poor drainage is generally associated with the parent material.
The Willard series consists of very deep, well drained, moderately slowly permeable soils that formed in stratified, moderately fine textured lacustrine deposits from mixed alluvium. These soils are typically on level to nearly level lake terraces. Slope ranges from 0 to 1 percent. Well drained. Permeability is moderately slow. Runoff is low.

Table 4. Representative soil features

Surface texture	(1) Loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to well drained
Permeability class	Very slow to moderately slow
Soil depth	25–183 cm
Available water capacity (0-101.6cm)	2.54–12.7 cm
Electrical conductivity (0-101.6cm)	0–16 mmhos/cm
Soil reaction (1:1 water) (0-101.6cm)	7.9–9.6

Ecological dynamics

This site is suitable for grazing by all kinds and classes of livestock during all seasons of the year. This site frequently is more productive than surrounding sites and can best be managed separately by fencing. This site will respond well to intensive grazing for short periods of time. Site deterioration results in a decline in alkali sacaton, western wheatgrass, vine-mesquite, and fourwing saltbush, with an increase in inland saltgrass, alkali muhly, buffalograss, and shadscale. This causes a decrease in production and ground cover. Under continued deterioration, woody species will dominate the site and erosion will increase.

Duncan - Native vegetation is alkali sacaton, saltgrass, tobosa, scattered mesquite, annual weeds and grasses with many barren areas.
Harvey - used for livestock grazing and irrigated cropland. Common crops are alfalfa, melons, truck crops and small grains. Blue grama, galleta, sand dropseed, winterfat, cactus, yucca, sagebrush, and juniper are the principal plants.
Karde - Used exclusively for rangeland. Principal native plants are blue grama, bottlebrush squirreltail, sand dropseed, ring muhly, snakeweed, and where the soil is saline alkali sacaton, chamiza and wolfberry.
Willard - Used mainly as native rangeland, recreation, wildlife and some localities are irrigated with some success. Native vegetation mainly black grama, western wheatgrass, sideoats grama, and fourwing saltbush. Alkali sacaton, giant sacaton and inland saltgrass may also occur on the saline phases.

State and transition model

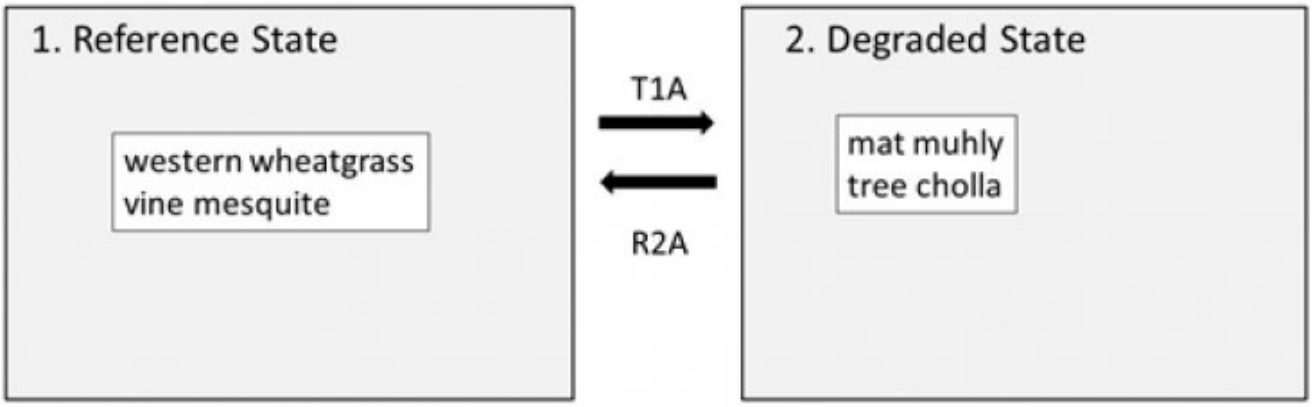

Figure 4. Generalized STM for run-on sites in 70C

State 1
Reference State

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

Resilience management. This site will respond well to intensive grazing for short periods of time.

Community 1.1
Reference Plant Community

The aspect of this phase is grassland mixed with scattered shrubs. Forbs production is variable and can assume the aspect dominate during years of abundant moisture. However, generally forbs are a minor component of this phase. Other grasses which would appear on this phase include: sand dropseed, threeawn, bottlebrush squirreltail, plains bristlegrass, common reedgrass, carex spp., wolftail and Halls panicum. Other shrubs would include: yucca spp., rubber rabbitbrush, broom snakeweed, Bigelow sagebrush, and cacti spp.. Other forbs would include: fetid marigold, bladderpod, locoweed, and annual sunflowers.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	252	547	841
Forb	27	58	90
Total	**279**	**605**	**931**

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	12-15%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	55-65%

Figure 6. Plant community growth curve (percent production by month). NM4311, R070CY111NM Salt Flats HCPC. R070CY111NM Salt Flats HCPC Mixed warm/cool season grassland with scattered shrubs and a minor component of forbs. .

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

increasers: inland saltgrass, alkali muhly, buffalograss, and shadscale.

Characteristics and indicators. Site deterioration results in a decline in alkali sacaton, western wheatgrass, vine-mesquite, and fourwing saltbush, with an increase in inland saltgrass, alkali muhly, buffalograss, and shadscale. This causes a decrease in production and ground cover. Under continued deterioration, woody species will dominate the site and erosion will increase.

Resilience management. This site will respond well to intensive grazing for short periods of time.

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 the legacy statement does not specify a timescale, not does it indicate other practices or factors that might be required. Future work should seek to clarify this.

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				183–256	
	alkali sacaton	SPAI	*Sporobolus airoides*	183–256	–

	big sacaton	SPWR2	*Sporobolus wrightii*	183–256	–
2				110–146	
	western wheatgrass	PASM	*Pascopyrum smithii*	110–146	–
3				73–110	
	vine mesquite	PAOB	*Panicum obtusum*	73–110	–
4				73–110	
	blue grama	BOGR2	*Bouteloua gracilis*	73–110	–
	James' galleta	PLJA	*Pleuraphis jamesii*	73–110	–
5				37–73	
	black grama	BOER4	*Bouteloua eriopoda*	37–73	–
6				52–73	
	saltgrass	DISP	*Distichlis spicata*	52–73	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	52–73	–
7				8–37	
	salt sedge	CAHA5	*Carex hassei*	8–37	–
8				8–37	
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	8–37	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	8–37	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	8–37	–
9				8–22	
	burrograss	SCBR2	*Scleropogon brevifolius*	8–22	–
10				8–22	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	8–22	–
Forb					
11				8–22	
	buckwheat	ERIOG	*Eriogonum*	8–22	–
12				8–22	
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	8–22	–
13				8–22	
	threadleaf ragwort	SEFLF	*Senecio flaccidus var. flaccidus*	8–22	–
	threadleaf ragwort	SEFLF	*Senecio flaccidus var. flaccidus*	80–22	–
14				8–22	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	8–22	–
Shrub/Vine					
15				73–87	
	fourwing saltbush	ATCA2	*Atriplex canescens*	73–87	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	73–87	–
16				37–73	
	prairie sagewort	ARFR4	*Artemisia frigida*	37–73	–
	jointfir	EPHED	*Ephedra*	37–73	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	37–73	–
17				22–37	
	Shrub, deciduous	2SD	*Shrub, deciduous*	22–37	–

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: Santa Fe County, NM
Location 7: 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:
Harvey, Karde, Willard

Other Soils included are:
Duncan

Contributors

Christine Bishop
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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:**

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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):**

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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):**

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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:**
