USDA Natural Resources
Conservation Service

Ecological site R034BY024UT
Wet Saline Meadow (Inland saltgrass)

Last updated: 3/05/2022
Accessed: 05/10/2025

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.

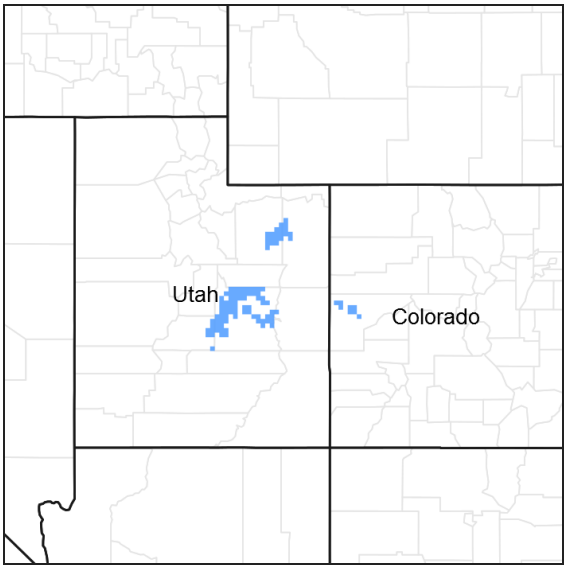


Figure 1. Mapped extent

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): 034B–Warm Central Desertic Basins and Plateaus

MLRA 34B occurs in is in Utah (70 percent) and Colorado (30 percent). It makes up about 12,850 square miles (33,290 square kilometers). A small part of the area is in the High Plateaus of Utah Section of the Colorado Plateaus Province of the Intermontane Plateaus. The northern part of the MLRA occurs in the Uinta Basin Section, which is bounded by the Uinta Mountains to the north, the Wasatch Range to the west, the Roan Plateau to the south, and the Rabbit Hills to the east. The southern part of the MLRA occurs in the northern third of the Canyon Lands Section. This section is bounded by the Roan Plateau to the north, the Wasatch Plateau to the west, the southern end of the San Rafael Swell to the south, and the western slope of the Rocky Mountains to the east. Elevation ranges from 4,100 feet (1,250 meters) near Green River, Utah, to 7,500 feet (2,285 meters) at the base of the Wasatch Range and the Roan Plateau.

Most of this area is covered by residual basin-floor materials and materials washed in from the surrounding mountains and plateaus. Shale and sandstone are the dominant rock types. The Tertiary-age Green River, Uinta, and Duchesne Formations dominate the northern part of the MLRA. The southern part is dominated by Cretaceous-age materials with lesser amounts of Jurassic and Triassic materials. The dominant Cretaceous formations are Mancos Shale, Dakota Sandstone, and the members of the Mesa Verde Group. The dominant Jurassic formations are the Morrison, Entrada, and Navajo. The dominant Triassic formations are the Chinle and Moenkopi. Quaternary alluvial, eolian, and glacial deposits occur in both parts of the MLRA.

The average annual precipitation in most of this area ranges from 6 to 10 inches (150 to 255 millimeters). A small part of this area receives as much as 24 inches of annual precipitation.
Much of the precipitation occurs as high-intensity, convective thunderstorms during the period July through September. May and June are usually the drier months. Precipitation is more evenly distributed throughout the year in the northern part of the MLRA than in the southern part, where there is a significant peak in late summer. The northern part of the MLRA receives more precipitation as snow during winter than the southern part. The average annual temperature ranges from 41 to 54 degrees F (5 to 12 degrees C). The freeze-free period averages 170 days and ranges from 110 to 235 days.

The dominant soil orders in this MLRA are Aridisols and Entisols. Mollisols occur at the higher elevations, particularly in the northern part of the MLRA. The dominant soil temperature regime is mesic, and the dominant soil moisture regime is aridic. The soils receiving less than 8 inches (205 millimeters) of precipitation annually have an aridic soil moisture regime. The soils receiving 8 to 12 inches (205 to 305 millimeters) have an aridic soil moisture regime that borders on ustic. The soils receiving 12 to 16 inches (305 to 405 millimeters) generally have an ustic soil moisture regime that borders on aridic. The dominant soil mineralogy is mixed and soils are formed in slope alluvium or residuum derived from shale or sandstone. Many of the soils are shallow or moderately deep to shale or sandstone bedrock. The soils at the lower elevations generally have significant amounts of calcium carbonate, salts, and gypsum

Ecological site concept

This site occurs on alluvial flats and somewhat poorly drained flood plains. Slopes are mostly 0 to 3 percent. Elevations range from 4,500 feet to 6,500 feet. Characteristic soils in this site are deep and somewhat poorly drained. They formed in mixed alluvium derived mainly from sedimentary parent materials. The soils are affected by salt and alkali (moderately to strongly alkaline) and have a fluctuating watertable that is generally within 20 to 40 inches of the surface. Textures range from loam to clay. Average annual soil loss in potential is negligible. The soil moisture regime is mesic and the soil moisture regime is typic aridic to ustic aridic. Annual precipitation ranges from 5-12 inches annually.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Distichlis spicata* (2) *Sporobolus airoides*

Physiographic features

This site occurs on alluvial flats and somewhat poorly drained flood plains. Slopes are mostly 0 to 3 percent. Elevations range from 4,500 feet to 6,500 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat (2) Flood plain
Runoff class	Medium to high
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	None to very rare
Elevation	4,500–6,500 ft
Slope	0–3%
Ponding depth	Not specified
Water table depth	20–40 in
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Average annual precipitation is 5 to 12 inches. Approximately 55 percent occurs as rain from march through may. On the average, June through October are the driest months and March through May are the wettest months. The mean annual air temperature is 7 Celsius and the soil temperatures are in the mesic regime. The average freeze-free period is 110 to 125 days. Most of the moisture for plant growth is obtained from a water table which is near the surface (within 50 cm.) through the plant growth period. In average years, plants begin growth around April 15 and end growth in October.

Table 3. Representative climatic features

Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	110-125 days
Precipitation total (characteristic range)	5-12 in

Influencing water features

This site has a fluctuating water table that is generally within 20 to 40 inches of the surface.

Soil features

Characteristic soils in this site are deep and somewhat poorly drained. They formed in mixed alluvium derived mainly from sedimentary parent materials. The soils are affected by salt and alkali (moderately to strongly alkaline) and have a fluctuating water table that is generally within 20 to 40 inches of the surface. Textures range from loam to clay. Average annual soil loss in potential is negligible. The soil moisture regime is mesic and the soil moisture regime is typic aridic to ustic aridic. Annual precipitation ranges from 5-12 inches annually.

Modal Soil: Turzo SiCL Saline, 0-2% – fine-loamy, mixed (calcareous), mesic Typic Torriorthents

Table 4. Representative soil features

Parent material	(1) Alluvium–sedimentary rock
Surface texture	(1) Silty clay (2) Sandy clay loam (3) Loam
Family particle size	(1) Fine-silty
Drainage class	Poorly drained
Permeability class	Moderately rapid to slow
Depth to restrictive layer	20–60 in
Soil depth	20–60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	4.3–6.8 in
Calcium carbonate equivalent (Depth not specified)	3–20%
Electrical conductivity (Depth not specified)	4–16 mmhos/cm
Sodium adsorption ratio (Depth not specified)	1–15

Soil reaction (1:1 water) (Depth not specified)	7.9–9
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

State 1 Reference State
The reference state represents the plant communities and ecological dynamics of the wet saline meadow site. This state includes the biotic communities that become established on the ecological site if all successional sequences are completed under the natural disturbance regime. The reference state is generally dominated by saltgrass and mountain rush (Baltic rush). The reference state is self sustaining and resistant to change due to high resistance to natural disturbances and high resilience following natural disturbances. When natural disturbances occur, the rate of recovery is variable due to disturbance intensity. Once invasive plants establish, return to the reference state may not be possible.

Reference State: Saltgrass/Baltic rush state with natural fluctuations that form either a mixed grass meadow or a saltgrass dominated meadow depending on the sites natural disturbance history.

Indicators: A community dominated by saltgrass and Baltic rush.

Feedbacks: Improper livestock grazing of perennial grasses and/or other disturbances that may allow for the establishment of invasive species.

At-risk Community Phase: This state is at risk when palatable native plants are stressed and nutrients become available for invasive plants to establish.

Trigger: The establishment of invasive plant species.

Community 1.1 Saltgrass meadow with other Grasses & Grass-likes.
This community is characterized by an open grassland aspect with saltgrass, Baltic rush, and foxtail barley dominating the herbaceous layer. Other commonly occurring grasses and grass-likes include alkali bluegrass, spikerush, and tufted hairgrass. Other perennial grasses, shrubs, and forbs are also present. A stable water table is present at 20 inches or less, providing season long moisture for plant growth.

State 2 Current Potential Community
The current potential state is similar to the reference state, however invasive grasses and/ or forbs are now present in all community phases. This state still has the visual aspect of a saltgrass meadow. Foxtail barley, Baltic rush and alkali bluegrass are other primary perennial grass or grass-like species present. Fivehorn bassia, povertyweed and other less palatable species now make up a large portion of the herbaceous layer.

Primary disturbance mechanisms include native herbivore and domestic livestock grazing. Timing of these disturbances dictates the ecological dynamics that occur. The current potential state is still self sustaining; but is losing resistance to change due to lower resilience following disturbances. When disturbances occur, the rate of recovery is variable depending on severity.

Current Potential State: Saltgrass meadow state with various other native and non-native grasses and forbs present.

Indicators: A community dominated by saltgrass and Baltic rush where other native perennial grasses and forbs are also present. Invasive grasses and/or forbs are present.

Feedbacks: Frequent disturbances that may allow annual invasive species such as fivehook bassia to dominate.

At-risk Community Phase: As increased disturbance frequency allows for the increase and/or dominance of annual

grasses and forbs, this community is at greater risk.

Trigger: Reoccurring disturbance that results in a dominance of annual grasses and/or forbs in the herbaceous layer.

Community 2.1 Saltgrass meadow with Invasive Species.
This community is characterized by an open grassland aspect with saltgrass, Baltic rush, and foxtail still dominating the herbaceous layer. Other commonly occurring grasses and grass-likes include alkali bluegrass (Sandberg bluegrass), spikerush, and tufted hairgrass. Non-native species including fivehorn bassia, poverty weed,and/or salt cedar are also present. A stable water table is present at 20 inches or less, providing season long moisture for plant growth.

Community 2.2 Deteriorated Saltgrass meadow with Invasive Species.
This community is characterized by an open grassland aspect with saltgrass, Baltic rush, and foxtail still dominating the herbaceous layer. Palatable grasses and grass-likes including alkali bluegrass, spikerush, and tufted hairgrass are much reduced. Non-native species including fivehorn bassia, poverty weed,and/or salt cedar are also present and may dominate the site. Water table may be unstable and when deeper than 30 inches may allow annuals to out compete perennials.

Pathway 2.1A Community 2.1 to 2.2
This pathway occurs when events favor a decrease in palatable perennial grasses and grass-likes and an increase in less palatable species such as saltgrass and Baltic rush. Non-native annuals including mustards and fivehorn smotherweed may eventually dominate the community. Events may include, improper livestock grazing, and a declining water table that may favor annuals and decrease desirable perennials.

Pathway 2.2A Community 2.2 to 2.1
This pathway occurs when events favor a increase in palatable perennial grasses and grass-likes and a decrease in less palatable species such as saltgrass and Baltic rush. Non-native annuals including mustards and fivehorn smotherweed may eventually be reduced in the community. Events may include, carefully managed livestock grazing over long periods, and a stable water table that is within 20 inches of the soil surface. These conditions generally favor desirable perennials and decrease annual weeds.

State 3 Disturbed State.
This state occurs when the site is burned or chemically treated to reduce saltgrass and other unwanted herbaceous species. The resulting plant communities can be highly variable ranging from the recovery of desired native species to the dominance of of invasive weeds such as salt cedar, fivehorn bassia, poverty weed and various mustard species.

Invasive Forb State: Burned or chemically treated community phases influenced by livestock grazing practices and fluctuating water tables.

Indicators: Perennial, annual, invasive grasses, grass-likes and forbs present in various amounts.

Feedbacks: Livestock grazing practices and fluctuating water tables that maintain or degrade or desirable species and increase non-native, weedy species present in the community.

Trigger: The further establishment of salt cedar, fivehorned bassia and/or other weedy species decrease perennial production and increase bare ground.

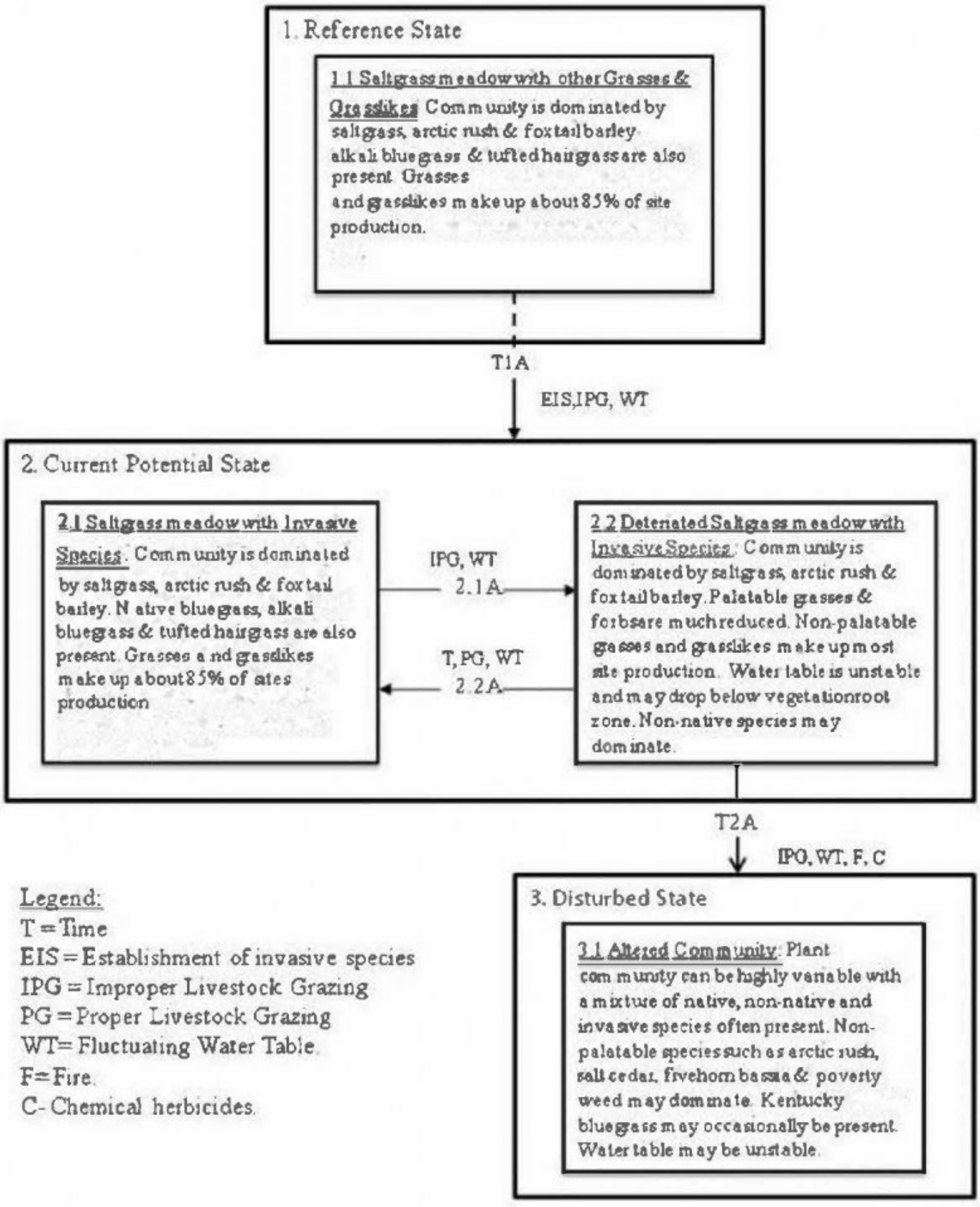
Community 3.1 Altered Community.
This community phase occurs when the site is chemically treated and/or furned to remove unwanted species. Results can be highly variable ranging from a mixture of native, non-native and invasive species being present. Non-palatable species such as Baltic rush, salt cedar, fivehorn bassia & poverty weed may dominate. Kentucky bluegrass may occasionally be present. Water table may be unstable and when deeper than 30 inches may allow annuals to out compete perennials.

Transition T1A State 1 to 2
This transition is from the native perennial grass and grass-like community in the reference state to a state that

contains non-native, invasive species. Events typically include the establishment of invasive grasses and forbs, and an increase in saltgrass, Baltic rush and other less palatable species. Factors that drive such events may include any combination of improper livestock grazing, a fluctuating water table, and the presence of a seed source for invasive species. Invasive species such as fivehorn bassia however have been known to invade intact perennial plant communities with little to no disturbance. Once invasive species are found in the plant community a threshold has been crossed.

Transition T2A State 2 to 3
This transition is from the current potential state to an altered state created by chemical treatment or fire. Results can vary widely from little site production to a healthy mixed perennial grass and grass-like community.Non-native, invasive species may also dominate the site. Factors that drive such events include, improper livestock grazing of palatable perennial grasses, fluctuating water tables and the availability of invasive weeds.

State and transition model



State 1
Reference State

Community 1.1
Reference State

The dominant aspect of this plant community is inland saltgrass and alkali sacaton. The composition by air-dry weight is approximately 85 percent perennial grasses, 10 percent forbs, and 5 percent shrubs. The plant community consists mainly of plants that are water and salt tolerant.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	807	1232	1657
Forb	95	145	195
Shrub/Vine	48	73	98
Total	**950**	**1450**	**1950**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	4-6%
Grass/grasslike foliar cover	79-81%
Forb foliar cover	4-6%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	–
>0.5 <= 1	–	–	79-81%	4-6%
>1 <= 2	–	–	–	–
>2 <= 4.5	–	4-6%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Figure 3. Plant community growth curve (percent production by month). UT0241, PNC. Excellent Condition.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	40	30	5	5	0	0	0	0

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
0	**Dominant Grasses**			750–1200	
1	**Sub-Dominant Grasses**			225–675	
	Grass, annual	2GA	*Grass, annual*	75–150	–
	Grass, perennial	2GP	*Grass, perennial*	75–150	–
	creeping bentgrass	AGST2	*Agrostis stolonifera*	15–75	–
	Nebraska sedge	CANE2	*Carex nebrascensis*	15–75	–
	common spikerush	ELPA3	*Eleocharis palustris*	15–75	–
	meadow barley	HOBR2	*Hordeum brachyantherum*	15–75	–
	mountain rush	JUARL	*Juncus arcticus ssp. littoralis*	15–75	–
Forb					
2	**Sub-Dominant Forbs**			210–480	
	Forb, annual	2FA	*Forb, annual*	75–150	–
	Forb, perennial	2FP	*Forb, perennial*	75–150	–
	silverscale saltbush	ATAR2	*Atriplex argentea*	15–45	–
Shrub/Vine					
3	**Sub-Dominant Shrubs**			120–225	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	45–75	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	15–30	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	15–30	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	15–30	–
	skunkbush sumac	RHTRT	*Rhus trilobata var. trilobata*	15–30	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	15–30	–

Animal community

This site provides proper grazing in the winter and spring for cattle and sheep.

This site provides food and limited cover for wildlife. Wildlife using this site include deer, elk, moose, coyotes, rabbit, muskrat, beaver, and many birds including raptors.

Hydrological functions

The soil is in hydrologic group B. The runoff curve numbers are 61 through 79 depending on the condition of the watershed.

Recreational uses

Natural beauty exists in the more favorable plant growth condition on this site when compared to adjacent sites. Recreation activities are hiking and hunting.

Wood products

None

Contributors

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Approval

Kirt Walstad, 3/05/2022

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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Date	05/30/2012
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None. A very slight amount of rill development may be observed following large storm events or spring runoff periods, but they should heal within the following growing season. Slight rill development may also be observed where the site is adjacent to ecological sites that produce large amounts of runoff (i.e. steeper sites, slickrock, etc.).

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2. **Presence of water flow patterns:** None to rare. Any flow patterns present should be sinuous and wind around perennial plant bases. They should be short (5 to 10 feet), < one foot wide, and spaced from 20 to 30 feet apart. They should be stable with only minor evidence of deposition. This site is periodically inundated with runoff water from adjacent sites. It also acts as a filter and trap sediment.

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3. **Number and height of erosional pedestals or terracettes:** None to rare. A few plants may show very minor pedestalling where they are adjacent to any water flow patterns present, but there will be no exposed roots. Terracettes are not present.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 0 to 10% bare ground. Any bare ground openings present should be < 1 foot in size and should not be connected.

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5. **Number of gullies and erosion associated with gullies:** None at site level. Widely scattered landscape level gully channels, however, are a normal component of desert environments. Where landscape gullies are present, they should be stable, vegetated on both sides and bottoms, with no evidence of head-cutting. Some slight increase in disturbance may be evident following significant weather events or when gullies convey considerable runoff from higher elevation

rocky or naturally eroding areas.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** No evidence of wind generated soil movement. Wind scoured (blowouts) and depositional areas are not present.

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7. **Amount of litter movement (describe size and distance expected to travel):** The majority of litter accumulates in place at the base of plant canopies. Slight movement of the finest material (< 1/8 inch) may move 1 to 2 feet downslope when transported by water. Little accumulation is observed behind obstructions.

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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):** This site should have a soil stability rating of 5 to 6 under plant canopies and a rating of 4 to 5 in any interspaces present. The average should be 5. Surface textures typically vary from silt loams silty clay loams.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** (Ferron) Soil surface is typically 0 to 4 inches deep. Surface texture is a silt loam with a 1 inch peaty surface, and structure is weak thick platy parting to weak medium granular. The A-horizon color is light brownish gray (2.5YR 6/2). Soils have an Ochric epipedon that extends 3 inches into the soil profile. Use the specific information for the soil you are assessing found in the published soil survey to supplement this description.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial vegetation breaks raindrop impact and reduces splash erosion. Dense distribution of plants slows runoff by obstructing surface flows, allowing time for increased infiltration. With the physiographic location of this site being in low lying areas, it often acts as a terminal accumulation site for runoff. The amount of sodium in the soil can affect infiltration and facilitate puddling on the surface.

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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):** None. This site will normally have textural changes within its' profile. These should not be mistaken for compaction layers.

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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: Perennial Grasses (saltgrass, alkali sacaton, tufted hairgrass) > Perennial Forbs (curly dock).

    Sub-dominant: Sprouting Shrubs (black greasewood, four-wing saltbush > Rhizomatous Grasselikes (arctic rush, Nebraska sedge) >> Perennial Forbs (silverscale).

    Other: Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state. Biological soil crust is variable in its' expression where present on this site and is measured as a component of ground cover. Perennial and annual forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.

    Additional: Disturbance regimes include insects, infrequent fire, and flooding. Temporal variability can be caused by

fires, droughts, insects, etc. Spatial variability can be caused by runoff, soil pH, and topography.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** During years with average to above average precipitation, there should be no mortality or decadence in either perennial grasses or grasslikes. During severe (multi-year) droughts that affect groundwater levels, up to 10% of the perennial plants may die. There may be partial mortality of individual grasses and grasslikes during less severe droughts.

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14. **Average percent litter cover (%) and depth (in):** Litter cover ranges from 40 to 60%. Depth should be 1 inch thickness in any interspaces and from 2 to 2.5 inches under perennial plant canopies.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual production in air-dry herbage should be approximately 1400 to 1500 pounds per acre on an average year. Production could vary from 900 to 2000 pounds per acre during drought or above-average years.

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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:** Phragmites, kochia, smotherweed, whitetop and other non-native forbs and grasses.

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17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce sexually or asexually in most years, except in drought years.
