USDA Natural Resources
Conservation Service

Ecological site R027XY005NV
SALINE MEADOW

Last updated: 6/03/2024
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.

MLRA notes

Major Land Resource Area (MLRA): 027X–Fallon-Lovelock Area

Physiography
Found in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus this area is characterized by isolated uplifted fault block mountain ranges trending north to south that are separated by broad, hydrologically closed basins. The entire area occurs in the rain-shadow of the Sierra Nevada mountains and is influenced by Pleistocene Lake Lahontan which reached its most recent high stand about 12,000 years ago. There is substantial evidence suggesting the western Great Basin has been the site of pluvial-interpluvial cycles for at least the past two million years.
The mountains and valleys are dissected by the Humboldt, Truckee, Carson, and Walker Rivers and their tributaries, all of which terminate within MLRA 27. Extensive playas can be found throughout this area and are the result of drying of ancient Lake Lahontan. Elevation generally ranges from 3,300 to 5,900 feet (1,005 to 1,800 meters) in valleys, but on some mountain peaks it is more than 7,870 feet (2,400 meters).

Geology
Landforms and soils of this MLRA have been heavily influenced by fluctuating lake level over the last 40,000 years. There is a level line evident on the higher slopes marking the former extent of glacial Lake Lahontan. Almost half of this area has surface deposits of alluvial valley fill influenced by lacustrine sediment. The rest has andesite and basalt rocks of different ages. Mesozoic and Tertiary intrusives are concentrated along the western border of the area, and Lower Volcanic Rocks (17 to 43 million years old) are common on the eastern side of the area. Also, some scattered outcrops of Mesozoic sedimentary and volcanic rocks and tuffaceous sedimentary rocks are in the mountains within the interior of this MLRA.

Climate
The average annual precipitation is 5 to 10 inches (125 to 255 millimeters) in most of the area but is as much as 19 inches (485 millimeters) on high mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The amount of precipitation is very low from summer to midautumn. The precipitation in winter occurs mainly as snow. The average annual temperature is 43 to 54 degrees F (6 to 12 degrees C). The freeze-free period averages 155 days and ranges from 110 to 195 days, decreasing in length with elevation.

Water
The amount of precipitation is very low, and water for irrigation is obtained principally from diversions on the four large rivers in the area and from water stored in the Lahontan, Rye Patch, and Weber Reservoirs. Pyramid Lake and Walker Lakes are terminal lakes for the Truckee and Walker Rivers, respectively. Much of the annual flow of both rivers is diverted for irrigation, causing lake levels to fall and levels of dissolved salts to increase causing problems for the native Lahontan cutthroat trout.

Soils
The dominant soil orders are Aridisols and Entisols. The soils in the area are predominantly a mesic temperature

regime, aridic moisture regime, and have a mixed mineralogy. They are generally well drained, loamy or sandy, commonly skeletal, and shallow to very deep. Accumulation of salts, tufa deposits, and eolian sediments with soluble salts over lacustrine deposits influence most of the soils in the basin landforms of this MLRA. Soils on bedrock-controlled landforms are typically comprised of volcanic or tuffaceous sedimentary colluvium over residuum.

Biological Resources
This area supports extensive areas of salt-desert shrub vegetation. Shadscale and Bailey's greasewood are widespread, occurring both individually and together. Grasses are generally sparse, although Indian ricegrass is prominent, especially on the sandy soils. Fourwing saltbush, winterfat, spiny hopsage, wolfberry, ephedra, dalea, and bud sagebrush are common shrubs. Basin wildrye, creeping wildrye, alkali sacaton, saltgrass, black greasewood, rubber rabbitbrush, and big saltbush are important plants on saline bottom lands and terraces. A few marsh areas support cattail, bulrushes, sedges, and rushes. Big sagebrush, along with scattered Utah juniper and singleleaf pinyon, is associated with Thurber needlegrass, desert needlegrass, Sandberg bluegrass, and squirreltail on the higher elevation piedmont slopes and mountains.

Ecological site concept

The Saline Meadow site occurs on alluvial flats, lake plains, and axial stream floodplains. Slope gradients of less than 2 percent are typical. Elevations are 3500 to 5000 feet. The soils associated with this site are very deep and usually calcareous. These soils are moderately to strongly salt and sodium affected in the upper profile with soil reaction and salinity decreasing with depth. The site is poorly to somewhat poorly-drained and there is a water table near the surface for short periods in the early spring that usually stabilizes at depths below 40 inches during the early summer.

Associated sites

R027XY001NV	**WETLAND**
R027XY069NV	**WET MEADOW 4-8 P.Z.**

Similar sites

R027XY069NV	**WET MEADOW 4-8 P.Z.** POJU dominant grass
R027XY002NV	**MOIST FLOODPLAIN** LETR5 dominant grass; more productive site
R026XY002NV	**WET SODIC BOTTOM** DISP dominant plant
R027XY004NV	**WET MEADOW 8-12 P.Z.** PONE3 dominant grass; soils not saline/alkali

Table 1. Dominant plant species

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

Physiographic features

The Saline Meadow site occurs on alluvial flats, lake plains, and axial stream floodplains. Slope gradients of 0 to 2 percent are typical. Elevations are 3500 to 5000 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat (2) Flood plain (3) Lake plain
Runoff class	Very low to very high
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Rare
Ponding duration	Long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	3,500–5,000 ft
Slope	0–2%
Water table depth	0–51 in
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is arid, characterized by cool, moist winters and hot, dry summers. Average annual precipitation is 4 to 8 inches. Mean annual air temperature is 49 to 60 degrees F. The average growing season is about 100 to 140 days.

Table 3. Representative climatic features

Frost-free period (average)	140 days
Freeze-free period (average)	
Precipitation total (average)	8 in

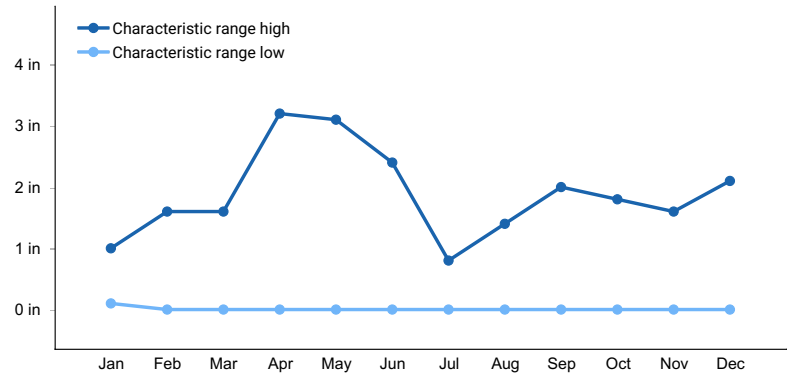


Figure 1. Monthly precipitation range

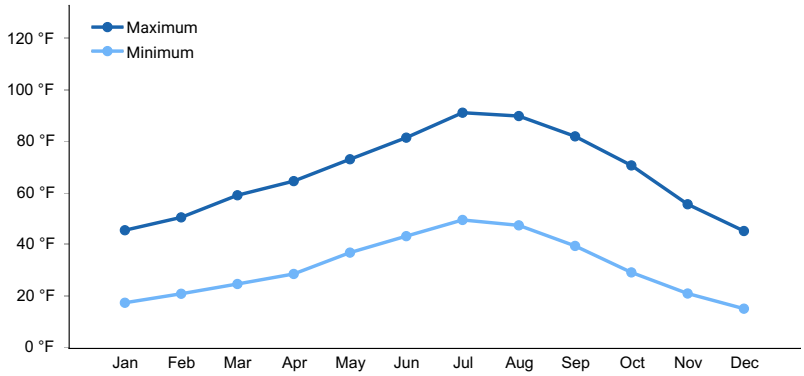


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

This site is associated with axial-stream floodplains.

Soil features

The soils associated with this site are very deep and usually calcareous. These soils are moderately to strongly salt and sodium affected in the upper profile with soil reaction and salinity decreasing with depth. The soils are poorly to somewhat poorly-drained and there is a water table near the surface for short periods in the early spring that usually stabilizes at depths below 40 inches during the early summer. Capillary rise of this ground-water enhances soil moisture during the growing season. Additional moisture is received on this site as run-in from higher landscapes or as overflow from adjacent streams. These soils are poorly aerated and are slowly to moderately-rapid permeable. The soil series associated with this site include Dithod, East Fork, Fallon, Kodac, Louderback, Lovelock, Nuyobe, Obanion, Orizaba, Rustigate, Ryepatch, Sagouspe, and Wabuska.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Volcanic ash
Surface texture	(1) Sandy loam (2) Clay loam (3) Silt loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Slow to moderately rapid
Soil depth	72–84 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	2.8–8 in
Calcium carbonate equivalent (0-40in)	0–30%
Electrical conductivity (0-40in)	0–32 mmhos/cm
Sodium adsorption ratio (0-40in)	5–90
Soil reaction (1:1 water) (0-40in)	7.4–11
Subsurface fragment volume <=3" (Depth not specified)	2–12%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

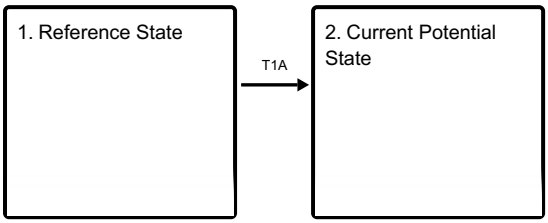
As ecological condition deteriorates, alkali sacaton decreases as inland saltgrass and Baltic rush becomes more dominant. With further site degradation, shrubby species such as black greasewood, seepweed, and rabbitbrush increase. Continued site degradation may result in serious gully erosion. Species likely to invade this site are thistles and annual forbs and grasses.

Fire Ecology:
There is very little fire frequency information available for saline meadow communities prior to presettlement times. It is estimated that fire may have occured every 7 to 10 years. Alkali sacaton is classified as tolerant of, but not resistant to, fire. Top-killing by fire is probably frequent, and the plants can be killed by severe fire. Saltgrass rhizomes occur deep in the soil where they are insulated from the heat of most fires. Saltgrass survives fire by

sending up new growth from rhizomes. Baltic rush is fire tolerant when dormant and top-killed by fire during the growing season. It establishes after fire through seed and/or lateral spread by rhizomes. Basin wildrye is top-killed by fire. Older basin wildrye plants with large proportions of dead material within the perennial crown can be expected to show higher mortality due to fire than younger plants having little debris. Basin wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions. The major adaptation of western wheatgrass to fire is its rhizomatous growth form. During a fire the coarse culms usually burn fast with little or no heat transferred to the roots. Recovery takes about 2 to 5 years after a fire.

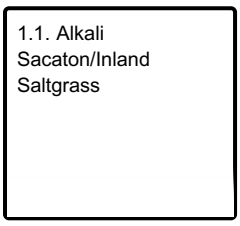
State and transition model

Ecosystem states

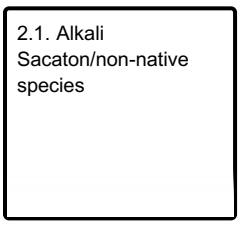


T1A - T1A - Establishment of non-native plant species.

State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The reference state is generally dominated by alkali sacaton and inland saltgrass. 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.

Community 1.1
Alkali Sacaton/Inland Saltgrass

The reference plant community is dominated by alkali sacaton, inland saltgrass and Baltic rush. Potential vegetative composition is about 85 percent grasses, 10 percent forbs, and less than 5 percent shrubs. Approximate ground cover (basal and crown) is 40 to 55 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1020	1870	2550
Forb	120	220	300
Shrub/Vine	60	110	150
Total	**1200**	**2200**	**3000**

State 2
Current Potential State

The Current Potential State is similar to the Reference State, however invasive grasses and/ or forbs are now present in all community phases. Alkali sacaton is still the primary perennial grass species however, saltgrass, Baltic rush, cheatgrass and other less palatable species make up a larger portion of the herbaceous layer. Primary disturbance mechanisms include native herbivore grazing and proper 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.

Community 2.1
Alkali Sacaton/non-native species

The Alkali Sacaton/non-native species community phase is characterized by alkali sacaton still dominating the herbaceous layer. Non-native species are present. Other grasses and grasslikes including saltgrass, Douglas sedge and Baltic rush are increasing.

Transition T1A
State 1 to 2

This transition is from the native perennial warm-season and cool season grasses and grasslike understory in the reference state to a state that contains non-native, invasive species. Events may include the establishment of invasive grasses and forbs, and an increase in black greasewood, basin big sagebrush, and/or rubber rabbitbrush. Factors that drive such events include: improper livestock grazing of perennial grasses, prolonged drought, and the presence of a seed source for invasive species. Fire may also be a driver for this change in some instances. Invasive species such as cheatgrass, 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.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			1188–1760	
	alkali sacaton	SPAI	*Sporobolus airoides*	770–990	–
	saltgrass	DISP	*Distichlis spicata*	220–330	–
	basin wildrye	LECI4	*Leymus cinereus*	44–110	–
	western wheatgrass	PASM	*Pascopyrum smithii*	44–110	–
2	**Secondary Perennial Grasses**			110–330	
	sedge	CAREX	*Carex*	11–66	–
	spikerush	ELEOC	*Eleocharis*	11–66	–
	foxtail barley	HOJU	*Hordeum jubatum*	11–66	–
	beardless wildrye	LETR5	*Leymus triticoides*	11–66	–
	common reed	PHAU7	*Phragmites australis*	11–66	–
	arrowgrass	TRIGL	*Triglochin*	11–66	–
Forb					
3	**Perennial**			110–330	
	arrowgrass	TRIGL	*Triglochin*	11–66	–
	sedge	CAREX	*Carex*	11–66	–
	spikerush	ELEOC	*Eleocharis*	11–66	–
	horsetail	EQUIS	*Equisetum*	11–66	–
	Rocky Mountain iris	IRMI	*Iris missouriensis*	11–66	–
Shrub/Vine					
4	**Secondary Perennial Shrubs**			1–110	
	basin wildrye	LECI4	*Leymus cinereus*	44–110	–
	Torrey's saltbush	ATTO	*Atriplex torreyi*	11–44	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	11–44	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	11–44	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	11–44	–
	seepweed	SUAED	*Suaeda*	11–44	–

Animal community

Livestock Interpretations:
This site is suited to livestock grazing. Grazing management should be keyed to alkali sacaton production and all other perennial grasses. Alkali sacaton is fair to good forage for cattle and horse, poor for sheep and wildlife while actively growing, poor for all animals when dry. Saltgrass's value as forage depends primarily on the relative availability of other grasses of higher nutritional value and palatability. It can be an especially important late summer grass in arid environments after other forage grasses have deceased. Saltgrass is rated fair to good as a forage species only because it stays green after most other grasses dry. Baltic rush is a fair to poor forage source for all grazing animals. Its stems are so tough that they pull free from the rootstocks when grazed by livestock, especially cattle. When young, palatability is usually good for cattle and fairly good for sheep and wild herbivores. The early growth and abundant production of basin wildrye make it a valuable source of forage for livestock. It is important forage for cattle and is readily grazed by cattle and horses in early spring and fall. Though coarse-textured during the winter, basin wildrye may be utilized more frequently by livestock and wildlife when snow has covered low shrubs and other grasses. Western wheatgrass provides important forage for domestic sheep. Fall regrowth cures

well on the stem, so western wheatgrass is good winter forage for domestic livestock.

Stocking rates vary over time depending upon season of use, climate variations, site, and previous and current management goals. A safe starting stocking rate is an estimated stocking rate that is fine tuned by the client by adaptive management through the year and from year to year.

Wildlife Interpretations:
Alkali sacaton is a valuable forage species in arid and semiarid regions. Plants are tolerant to moderate grazing and can produce abundant herbage utilized by livestock. Saltgrass's value as forage depends primarily on the relative availability of other grasses of higher nutritional value and palatability. It can be an especially important late summer grass in arid environments after other forage grasses have deceased. Saltgrass is rated as a fair to good forage species only because it stays green after most other grasses dry. Livestock generally avoid saltgrass due to its coarse foliage. Saltgrass is described as an “increaser” under grazing pressure. Baltic rush is described as a fair to good forage species for cattle. On average, Baltic rush palatability is considered medium to moderately low. Baltic rush is considered palatable early in the growing season when plants are young and tender, but as stems mature and toughen palatability declines. Basin wildrye provides winter forage for mule deer, though use is often low compared to other native grasses. Basin wildrye provides summer forage for black-tailed jackrabbits. Because basin wildrye remains green throughout early summer, it remains available for small mammal forage for longer time than other grasses.

Hydrological functions

There are no rills or waterflow patterns. There are no pedestals and/or terracettes.
"Hummocky" appearance of surface salt crusts (if present) are not soil erosion features. Gullies are rare to common depending on severity of associated stream channel entrenchment. Gullies and head cuts are healing or stable. Where this site is not associated with perennial or ephemeral channels, gullies are none. Basal cover of perennial grasses and grass-like plants will act to slow runoff. Deep-rooted bunchgrasses increase infiltration. Relatively dense foliar cover of perennial grasses and associated litter break raindrop impact and slow overland flow.

Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition and the colorful flowering of wild flowers during the spring and early summer. This site is used for camping and hiking and has potential for upland and big game hunting.

Other products

The stems of Baltic rush were historically used by Native Americans as a foundation for coiled basketry. Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand.

Other information

Alkali sacaton is one of the most commonly used species for seeding and stabilizing disturbed lands. Due to alkali sacaton’s salt tolerance, is recommended for native grass seeding on subirrigated saline sites. Given its extensive system of rhizomes and roots which form a dense sod, saltgrass is considered a suitable species for controlling wind and water erosion. Baltic rush's production of deep and fibrous roots originating from a mass of coarse and creeping rhizomes makes it a valuable species for stabilizing streambanks and protecting against soil erosion. Basin wildrye is useful in mine reclamation, fire rehabilitation and stabilizing disturbed areas. Its usefulness in range seeding, however, may be limited by initially weak stand establishment. Western wheatgrass is a good soil binder and is well suited for reclamation of disturbed sites such as erosion control and soil stabilization.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Churchill County, NV	
Township/Range/Section	T24N R37E S7
General legal description	About 1.7 miles east of Settlement Road Junction, Dixie Valley area, Churchill County, Nevada. This site also occurs in Lyon, Mineral and Pershing Counties, Nevada.

Other references

Fire Effects Information System (Online; http://www.fs.fed.us/database/feis/plants/).

USDA-NRCS Plants Database (Online; http://www.plants.usda.gov).

Contributors

DK/GED

Approval

Kendra Moseley, 6/03/2024

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)	GK BRACKLEY
Contact for lead author	State Rangeland Management Specialist
Date	06/20/2006
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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2. **Presence of water flow patterns:** None

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3. **Number and height of erosional pedestals or terracettes:** None. "Hummocky" appearance of surface salt crusts (if present) are not soil erosion features.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground ± 30%; surface rock fragments minimal; shrub canopy less than 5%; foliar cover of perennial herbaceous plants ± 75%.

5. **Number of gullies and erosion associated with gullies:** Gullies are rare to common depending on severity of associated stream channel entrenchment. Gullies and head cuts are healing or stable. Where this site is not associated with perennial or ephemeral channels, gullies are none.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage of grasses and annual & perennial forbs) is only expected to move during periods of flooding by adjacent streams. Persistent litter (large woody material) will remain in place except during peak flooding periods.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values will range from 2 to 4. (To be field tested.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is platy or massive. Soil surface colors are light and the soils have ochric epipedons. Organic carbon can range from 1 to 2 percent in the upper 10 inches. (OM values derived from lab characterization data.)

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Basal cover of perennial grasses and grass-like plants will act to slow runoff. Deep-rooted bunchgrasses increase infiltration. Relatively dense foliar cover of perennial grasses and associated litter break raindrop impact and slow overland flow.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Platy or massive subsurface layers are not to be interpreted as compaction.

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: Reference Plant Community: Deep-rooted, perennial, bunchgrasses >> rhizomatous grasses and grass-like plants = deep-rooted, cool season, perennial forbs. (By above ground production)

    Sub-dominant: Fibrous, shallow-rooted, perennial forbs = shallow-rooted, perennial grasses > shrubs. (By above ground production)

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Herbaceous plant mortality or decadence is uncommon.

14. **Average percent litter cover (%) and depth (in):** Litter cover within plant interspaces (± 80%) and depth (±1-inch)

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (September thru July) ± 2500 lbs/ac; Spring flooding significantly affects total 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:** Foxtail barley, thistle, tall whitetop, and knapweed are invaders on this site. Black greasewood and rubber rabbitbrush are increasers on this site.

17. **Perennial plant reproductive capability:** All functional groups should reproduce in most years.