Ecological site R072XY102KS
Saline Subirrigated

Accessed: 08/31/2026

General information

Approved. An approved ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model, enough information to identify the ecological site, and full documentation for all ecosystem states contained in the state and transition model.

MLRA notes

Major Land Resource Area (MLRA): 072X–Central High Tableland

Major Land Resource Area (MLRA) 72--Central High Tableland. This area is in Kansas (54 percent), Nebraska (25 percent), and Colorado (21 percent). A very small part of the area is in Wyoming. The area makes up about 34,550 square miles (89,535 square kilometers). It includes the towns of Garden City, Goodland, and Colby, Kansas; Imperial, North Platte, Ogallala, and Sidney, Nebraska; and Holyoke and Wray, Colorado. Interstate 70 bisects the area, and Interstates 76 and 80 follow the south side of the South and North Platte Rivers, respectively. The Cimarron National Grasslands occur in the southwest corner of the MLRA.

Classification relationships

Major Land Resource Area (MLRA) 72--Central High Tableland.

Ecological site concept

The Saline Subirrigated ecological site occurs on nearly level areas, adjacent to streams having underground water movement. This site consists of alluvial soils that usually contain a high concentration of salts. A seasonal or perennial water table less than 6 feet from the surface characterizes this site. Due to the landform position this site is subject to flooding. This ESD was developed using the existing ESD's developed in 2001: Saline Subirrigated North R072XA020KS, Saline Subirrigated South R072XB020KS and Salt Meadow R072XY035CO. Changes were made in accordance with policy using the National Ecological Site Handbook. Text changes were made in regards to clarity and style. Content was changed reflecting the range of variability of the site.

Associated sites

R072XY103KS	**Subirrigated** Subirrigated site is located adjacent to Saline Subirrigated and has a seasonal or perennial high water table (<6 feet from surface).
R072XY104KS	**Saline Lowland** Saline lowland is located adjacent to Saline Subirrigated and does not have a seasonal or perennial high water table (>6 feet from surface).

Similar sites

R072XY104KS	**Saline Lowland** Saline Lowland and Saline Subirrigated will have similar vegetation and have soils with high concentration of salts. The significant differences between the sites is the depth to the seasonal or perennial high water table. The water table is greater than 6 feet from the surface on a Saline Lowland site and less than 6 feet from the surface on a Saline Subirrigated site.

Table 1. Dominant plant species

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

Physiographic features

The Saline Subirrigated site occurs on nearly level floodplains adjacent to streams and rivers. These soils are seasonally wet, have an accumulation of salts within the root zone, and are subject to flooding. These soils receive runoff from areas higher on the landscape.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up MLRA 72 is as follows: Republican (1025), 38 percent; Middle Arkansas (1103), 20 percent; Smoky Hill (1026), 15 percent; South Platte (1019), 13 percent; Upper Cimarron (1104), 11 percent; North Platte (1018), 2 percent; and Upper Arkansas (1102), 1 percent. The North Platte River forms the northern boundary of this MLRA. The South Platte River joins the North Platte River at the town of North Platte, Nebraska. The Arkansas River bisects the southern part of the MLRA. Other large rivers between the North Platte and Arkansas Rivers in the area include the Republican, Sappa, Prairie Dog, Solomon, Saline, and Smoky Hill Rivers. The Cimarron River is the southern boundary of MLRA 72 in the western part of this area.

Figure 1. MLRA 72 block diagram

Table 2. Representative physiographic features

Landforms	(1) Flood plain
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Ponding frequency	None
Elevation	760 – 1,520 m
Slope	0 %
Water table depth	30 – 120 cm

Climatic features

The average annual precipitation in this area ranges from 12 to 23 inches (305 to 584 millimeters). It fluctuates widely from year to year. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The maximum precipitation occurs from late spring through early autumn. Precipitation in winter occurs as snow. The annual snowfall ranges from about 16 inches (40 centimeters) in the southern part of the area to 35 inches (90 centimeters) in the northern part. The average annual temperature is 46 to 57 degrees F (8 to 14 degrees C). The freeze-free period averages 162 days and ranges from 135 to 210 days, increasing in length from northwest to southeast. Climate data comes from the Natural Resources Conservation Service (NRCS) National Water and Climate Center. The data set is from 1981-2010.

Table 3 Representative climatic features

Frost-free period (average)	150 days
Freeze-free period (average)	160 days
Precipitation total (average)	480 mm

- (1) LAKIN [USC00144464], Lakin, KS
- (2) GARDEN CITY RGNL AP [USW00023064], Garden City, KS
- (3) SHARON SPRINGS [USC00147397], Sharon Springs, KS
- (4) IDALIA [USC00054242], Idalia, CO
- (5) SYRACUSE 1NE [USC00148038], Syracuse, KS
- (6) CROOK [USC00051996], Crook, CO
- (7) JULESBURG [USC00054413], Julesburg, CO
- (8) BENKELMAN [USC00250760], Benkelman, NE

Influencing water features

A seasonal water table and adjacent perennial water table have influence on the kinds and amounts of vegetation on this site.

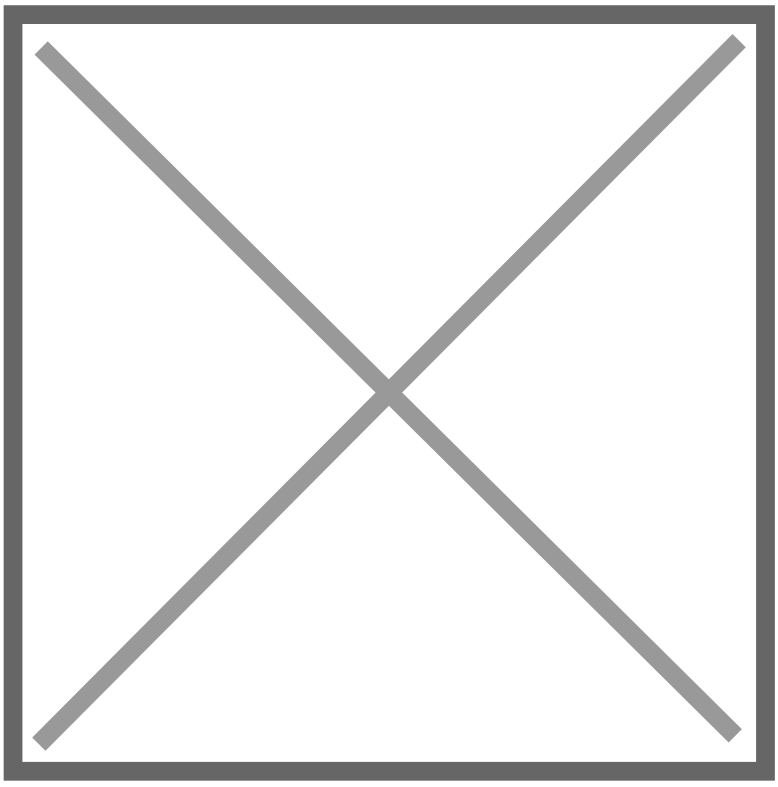

Figure 6. Fig. 7-1 from National Range and Pasture Handbook

Soil features

This site consists of deep to very deep saline and saline-alkali soils. The high concentration of salts affects both the kind and amount of vegetation present. Surface and subsoil layers have a seasonal high water table between 12 and 48 inches below the soil surface in normal to wet years. These soils are generally very deep, but some are shallow over gravelly coarse sand. The surface soil is generally darker colored and ranges from 7 to 24 inches thick. Less common are light colored soils with a surface soil less than 7 inches. Texture of the soil surface ranges widely from silt loam to fine sand. The underlying material is lighter colored than the surface soil, and commonly has redoximorphic concentrations in the upper part. It ranges widely in texture from loam to gravelly coarse sand. Some soils in this site are calcareous to the surface. Saline and alkali salts affect other soil properties such as available water capacity, soil structure, infiltration, and permeability. Soils in this site generally have a low to moderate content of organic matter.

Major soil series correlated to this ecological site include Las Animas (20%), Las (19%), Lawet (8%), Lebsack (6.5%), Caruso (6.2%), Marksbutte (5.7%), and Lesho (5.5%).

Figure 7. Las Animas OSD profile

Table 4. Representative soil features

Surface texture	(1) Loam (2) Sandy loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to moderately well drained
Permeability class	Moderately slow to rapid
Soil depth	150 – 200 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	7.11 – 25.4 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 40 %
Electrical conductivity (0-101.6cm)	0 – 20 mmhos/cm

Sodium adsorption ratio (0-101.6cm)	0 – 30
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 10
Subsurface fragment volume <=3" (Depth not specified)	0 – 50 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

The plant community for this site is dynamic due to the complex interaction of many ecological processes. The interpretive plant community for this site is the Reference Plant Community. This community has been determined by the study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing strategies. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

This site developed with occasional fires as part of the ecological processes. Historically, it is believed that the fires were infrequent, randomly distributed, and started by lightning at various times throughout the season when thunderstorms were likely to occur. It is also believed that pre-European inhabitants may have used fire as a management tool for attracting herds of large migratory herbivores (bison, elk, deer, and pronghorn). The impact of fire over the past 100 years has been relatively insignificant due to the human control of wildfires and the lack of acceptance of prescribed fire as a management tool in the semi-arid, High Plains area.

The Saline Subirrigated site occurs on nearly level areas adjacent to streams or rivers. The site is characterized as subirrigated as a result of groundwater ranging from 12 to 48 inches from the surface throughout the growing season. The availability of water has a major influence on the vegetation that will persist on this site. This site is subject to occasional flooding. Historically, the flooding potential on these sites was much greater. The control of river water over the past 80 years through the use of structures has greatly reduced the frequency of flooding.

Soils of this site are characterized by moderate to high salinity or alkaline conditions. There will often be white or gray deposits on the soil surface early in the spring or following wet periods. The degree of salinity or alkali condition has a major influence on the plant community that will persist on this site. Plants that can tolerate these conditions such as alkali sacaton, western wheatgrass, inland saltgrass, alkali cordgrass, slender wheatgrass, and salt tolerant rushes, and sedges will dominate these high pH sites. There may be areas with a moderate or lower pH interspersed that have plant communities similar to that of the Subirrigated ecological site or a combination of the two. Other soil inclusions may be present.

Continuous grazing without adequate recovery periods on this site will result in the loss of vigor and reproductive potential for such species as alkali sacaton, western wheatgrass, slender wheatgrass, and switchgrass on this site. The grazing management coupled with the high pH conditions has shifted many of these sites into a primarily inland saltgrass, with some western wheatgrass, plant community. Due to the lower stature and yield potential of these grasses, most of the sites are used for grazing rather than hay production. Once the plant community has moved to inland saltgrass, it is very difficult to reverse the shift.

The degree of herbivory (feeding on herbaceous plants) has a significant impact on the dynamics of the site. Historically, periodic grazing by herds of large migratory herbivores was a primary influence. Secondary influences of herbivory by species such as prairie dogs, grasshoppers, gophers, and root feeding organisms impacted the vegetation historically, and continue to this day.

The management of herbivory by humans through grazing of domestic livestock and/or manipulation of wildlife populations has been a major influence on the ecological dynamics of the site. This management coupled with the High Plains climate largely dictates the plant communities for the site.

Typically, drought cycles have not had a major impact upon the vegetation due to the presence of a water table. Depletion of ground water reserves may change species composition and possibly cause a shift in ecological sites.

Growth of native cool season plants begins about April 15, and continues to about June 15. Native warm season plants begin growth about May 15, and continue to about August 15. Green up of cool season plants may occur in September and October if adequate moisture is available.

The following state and transition model (STM) illustrates the common plant communities that can occur on the site and the pathways among communities.

Following the state and transition model are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. The plant composition table shown below has been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities will be determined by the decision-makers and will meet minimum quality criteria established by NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Warm season grass (salts)**			897-1457	
	alkali sacaton	SPAI	*Sporobolus airoides*	504-841	–
	saltgrass	DISP	*Distichlis spicata*	504-785	–
	alkali cordgrass	SPGR	*Spartina gracilis*	0-168	–
2	**Cool season grass**			448-897	
	western wheatgrass	PASM	*Pascopyrum smithii*	448-673	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	0-168	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0-45	–
3	**Warm season tallgrass**			112-504	
	switchgrass	PAVI2	*Panicum virgatum*	168-448	–
	Indiangrass	SONU2	*Sorghastrum nutans*	0-303	–
	prairie cordgrass	SPPE	*Spartina pectinata*	0-78	–
4	**Grasslike**			17-146	
	sedge	CAREX	*Carex*	17-78	–
	rush	JUNCU	*Juncus*	17-78	–
5	**Warm season midgrass**			0-140	
	vine mesquite	PAOB	*Panicum obtusum*	0-112	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0-78	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0-45	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0-45	–
6	**Warm season shortgrass**			0-78	
	buffalograss	BODA2	*Bouteloua dactyloides*	0-45	–
	blue grama	BOGR2	*Bouteloua gracilis*	0-45	–
Forb					
7	**Forbs**			67-336	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	6-34	–
	pussytoes	ANTEN	*Antennaria*	0-34	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0-34	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	6-34	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	6-34	–

	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0-34	–
	swamp smartweed	POHY2	*Polygonum hydropiperoides*	6-34	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0-34	–
	white heath aster	SYER	*Symphyotrichum ericoides*	6-34	–
Shrub/Vine					
8	**Shrubs**			0-34	
	willow baccharis	BASA	*Baccharis salicina*	0-34	–

Table 6. Community 1.2 plant community composition

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

Table 7. Community 2.1 plant community composition

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

Table 8. Community 3.1 plant community composition

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

Table 9. Community 3.2 plant community composition

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

Animal community

Grazing Interpretations The following table lists relative production values based on plant communities. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. Plant Community Alkali Sacaton, Western Wheatgrass (Reference plant community) Production (lbs/acre) - 3,000 Western Wheatgrass, Inland Saltgrass w/Remnant A. Sacaton Production (lbs/acre) - 2,200 Inland Saltgrass Sod, Foxtail Barley Productin (lbs/acre) - 1,500 Grazing by domestic livestock is one of the major income-producing industries in the area. Rangelands in this area provide yearlong forage under prescribed grazing for cattle, sheep, horses, and other herbivores. During the dormant period, livestock may need supplementation based on reliable forage analysis. Wildlife: Saltgrass is a larval foodplant for the Wandering Skipper (Panoquina panoquinoides errans) butterfly. It is also an important food in the diet of waterfowl and the Florida salt marsh vole (Microtus pennsylvanicus dukecampbelli). Ducks are reported to occasionally eat the dried seeds and controlled burning provides tender forages for wild geese. Distichlis spicata (inland saltgrass) is significant in the salt marshes, which provide nesting grounds for birds, fish, and larvae of many species of marine invertebrate animals. As salt marsh plants decompose, their stored nutrients provide a steady source of food for clams, crabs, and fish.

Hydrological functions

Water is the principal factor limiting forage production on this site. Infiltration is moderate. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff.

Recreational uses

The wide variety of plants which bloom from spring until fall have an aesthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Other information

Site Development and Testing Plan. Future work (for approved ESD) includes field visits to verify ES site concepts with field staff. Field staff include but are not limited to project office leader, area soil scientist, state soil scientist, ecological site specialist, state rangeland

conservationist, area rangeland management specialist, and local field personnel. This site includes collaboration between Kansas, Colorado and Nebraska. Field visits are to be determined by spatial extent of the site as well as personal knowledge of the site. Activity during field visits will include but are not limited to identifying the soil, landform, plant community, and verifying existing site concepts.

Inventory data references

Information presented for Saline Subirrigated North has been derived from NRCS clipping data, numerous ocular estimates, and other inventory data. Field observations from experienced range personnel was used extensively to develop this ecological site description. Those involved in developing the ESD Saline Subirrigated North include, Harvey Sprock from Colorado. Carol Eakins, Chuck Markley, Jeff Nichols, and Mary Schrader from Nebraska. Joan Gienger and Ted Houser from Kansas. Information presented for Saline Subirrigated South has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel was also used. Those involved in developing this site include: Tim Watson, Amanda Shaw, Susan Francis, Jon Deege, Harvey Sprock, Robert Schiffner, and Josh Saunders. All of this ESD information was developed using the 2001 ESD's (Saline Subirrigated North and South and Salt Meadow site in Colorado). Updates and data entry were completed by Chris Tecklenburg in accordance with National Ecological Site Handbook.

Other references

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Contributors

Chris Tecklenburg

Acknowledgments

The ecological site development process is a collaborative effort, conceptual in nature, dynamic, and is never considered complete. I thank all those who set the foundational work in the early 2000s in regards to this ESD. I thank all those who contributed to the development of this site. In advance, I thank those who would provide insight, comments, and questions about this ESD in the future.

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)	Original reference sheet created by David Kraft, John Henry, Doug Spencer, and Dwayne Rice in February 2005. Entered information and made minor revisions on #5, #12, #15 by Chris Tecklenburg 1-8-2016.

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Date	01/08/2016
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** **There is little, if any, evidence of soil deposition or erosion. Water generally flows evenly over the entire landscape.**

3. **Number and height of erosional pedestals or terracettes:** **There is no evidence of pedestaled plants or terracettes on the site.**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **Less than 3% bare ground is found on this site. Cover can be defined as live plants, litter, rocks, moss, lichens, etc.**

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** **There is no evidence of wind erosion creating bare areas or denuding vegetation.**

7. **Amount of litter movement (describe size and distance expected to travel):** **Plant litter is distributed evenly throughout the site.**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** **Plant canopy is large enough to intercept the majority of raindrops. A soil fragment will not "melt" or lose its structure when immersed in water for 30 seconds. There is no evidence of pedestaled plants or terracettes. Soil stability scores will range from 5-6.**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The topsoil layer has not been disturbed or eroded. Site is consistent with published soil survey description. A horizon 0 to 6 inches; dark gray (N 4/0) moist, moderate fine granular structure; soft, very friable; strongly effervescent, moderately alkaline (pH 8.2).

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** There is no negative effect on water infiltration and/or runoff due to plant composition or distribution. Plant composition and distribution are adequate to prevent any rill formation and/or pedastalling. Inter-spacial distribution is consistent with expectation for the site.

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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):** There is no evidence of compacted soil layers due to cultural practices. Soil structure is conducive to water movement and root penetration.

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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: Warm season grass (salts): inland saltgrass = alkali sacaton >> alkali cordgrass

    Sub-dominant: Cool season grasses: western wheatgrass >> slender wheatgrass >> Canada wildrye

    Other: Warm season tallgrasses (switchgrass, indiangrass, prairie cordgrass) > Grasslike (sedge, rush) = warm season midgrass > warm season shortgrass

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** The majority of plants are alive and vigorous. Some mortality and decadence is expected for the site. This in part is due to drought, unexpected wildfire or a combination of the two events. This would be expected for both dominant and sub-dominant groups.

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14. **Average percent litter cover (%) and depth (in):** Plant litter is distributed evenly throughout the site. There is no restriction to plant regeneration due to depth of litter. When prescribed burning is practiced there will be little litter the first half of the growing season. 50-70% litter cover at 1.0 - 1.5 inch depth.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 3000 lbs. Vegetative production is 95-100% of normal based upon the range site description and the weather the past year. (refer to ecological site description for favorable or unfavorable growing conditions)

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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: There are no noxious weeds present. Invasive plants make up a small percentage of plant community, and invasive brush species are < 5% canopy.

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17. **Perennial plant reproductive capability: Plants on site exhibit the required vigor and growth to be able to reproduce vegetatively or by seed.**
