USDA Natural Resources Conservation Service

Ecological site R029XY114NV
LOAMY FAN 8-12 P.Z.

Last updated: 2/20/2025
Accessed: 05/13/2025

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): 029X–Southern Nevada Basin and Range

The Southern Nevada Basin and Range MLRA (29) represents the transition from the Mojave Desert to the Great Basin. It is cooler and wetter than the Mojave. It is warmer and typically receives more summer precipitation than the Great Basin. This area is in Nevada (73 percent), California (25 percent), and Utah (2 percent). It makes up about 26,295 square miles (68,140 square kilometers). Numerous national forests occur in the area, including the San Bernardino, Angeles, Sequoia, Inyo, Humboldt-Toiyabe, and Dixie National Forests. Portions of Death Valley National Monument, the Nuclear Regulatory Commission's Nevada Test Site, the Hawthorne Ammunition Depot, and the Nellis Air Force Range in Nevada and the China Lake Naval Weapons Center in California also are in this MLRA. The northeast part of the Paiute Indian Reservation and the southern third of the Walker River Indian Reservation are in the part of this MLRA in Nevada, and the Lone Pine, Fort Independence, and Big Pine Indian Reservations are in the part in California.
Physiography:
The entire area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The area of broad, nearly level, aggraded desert basins and valleys between a series of mountain ranges trending north to south. The basins are bordered by sloping fans and pluvial lake terraces. The mountains are uplifted fault blocks with steep side slopes and not well dissected due to limited annual precipitation. Most of the valleys in this MLRA are closed basins or bolsons containing sinks or playa lakes.
Geology:
The mountains are dominated by Pliocene and Miocene andesite and basalt rocks, Paleozoic and Precambrian carbonate rocks prominent in some areas. Scattered outcrops of older Tertiary intrusives and very young tuffaceous sediments (Pliocene and Miocene) are in the western and eastern thirds of this MLRA. The valleys consist mostly of alluvial fill and playa deposits at the lowest elevations in the closed basins.
Climate:
The average annual precipitation is 3 to 12 inches (75 to 305 millimeters) in most of this area. It may be as high as 29 inches (735 millimeters), on the higher mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. Summers are dry, but sporadic storms are common in July and August.
Water Resources:
Water resources are scarce. Ground water and surface water sources are limited. Streams are small and intermittent. Quality of surface water in naturally degraded as streams cross area of valley fill effected by dissolved salts. Irrigation water may raise the levels of dissolved salts and suspended sediments causing contamination.
Soils:
Dominant soil orders include Entisols and Aridisols.

Ecological site concept

The Loamy Fan 8-12 P.Z. site occurs on inset fans, drainageways, adjacent fan skirts and stream terraces. Slopes range from 0 to 8 percent, but slope gradients of 2 to 4 percent are typical. Elevations are 4,900 to about 8,300 feet. The soils are generally very deep, well drained to somewhat excessively drained. They have formed in silty alluvium from mixed rock sources.

Associated sites

R029XY006NV	**LOAMY 8-10 P.Z.** The Loamy 8-10 P.Z. ecological site is on fan remnants. Soils associated with this site are well drained, shallow to a duripan, and formed in alluvium derived from volcanic parent material. The soil profile is characterized by an ochric epipedon, a cemented duripan within 50 centimeters and an argillic horizon with no abrupt textural change.
R029XY018NV	**SODIC DUNE** This site is on partially stabilized sand dunes. Slopes range from 2 to 16 percent, but slope gradients of 2 to 8 percent are typical. Elevations are 4,500 to about 6,300 feet. The soils associated with this site are windblown fine sands, typically more than 40 inches in depth. The soil profile is excessively drained and available water capacity is low. The extremely loose and unstable surfaces soils and low fertility of these soils are not favorable to uniform stands of grass.

Similar sites

R029XY049NV	**SANDY LOAM 8-12 P.Z.** ACHY-HECO26 codominant grasses; LECI4 minor species, if present
R029XY006NV	**LOAMY 8-10 P.Z.** ACHY-HECO26 codominant grasses; LECI4 minor species, if present

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. wyomingensis*
Herbaceous	(1) *Leymus cinereus* (2) *Achnatherum hymenoides*

Physiographic features

The Loamy Fan 8-12 P.Z. site is on inset fans, drainageways, adjacent fan skirts, and stream terraces. Slopes range from 0 to 8 percent, but slope gradients of 2 to 4 percent are typical. Elevations are 4,900 to about 8,300 feet.

Table 2. Representative physiographic features

Landforms	(1) Inset fan (2) Fan skirt (3) Drainageway (4) Stream terrace
Runoff class	Very low to medium
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	4,900–8,300 ft
Slope	0–8%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate is semiarid with cool, moist winters and warm, dry summers. Average annual precipitation is 8 to 12 inches. Mean annual air temperature is 45 to 55 degrees F. The average growing season is about 70 to 150 days. There is no climate station available for this site.

Table 3. Representative climatic features

Frost-free period (average)	150 days
Freeze-free period (average)	
Precipitation total (average)	12 in

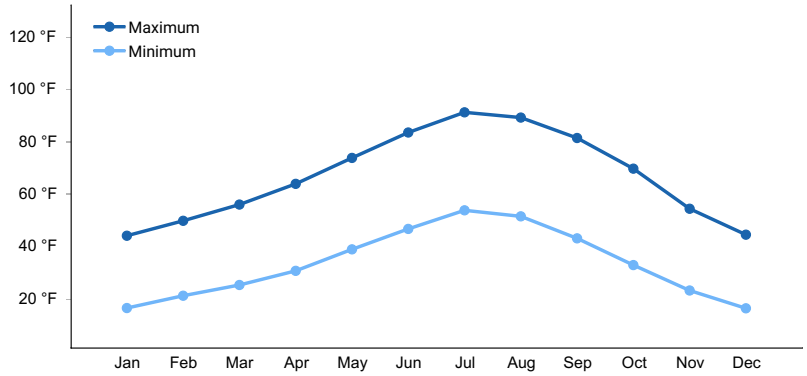


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils are generally very deep, well drained to somewhat excessively drained. They have formed in silty alluvium from mixed rock sources. Surface soils are fine-textured. As the soil surface dries, it often forms a vesicular crust. Soils have low to medium runoff and are moderately permeable. Soil series associated with this site include Annabella, Fanu, Fifteenmile, Flatnosewash, Heist, Patter, Ravendog, Sevenmile, and Woodrow.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Ashy fine sandy loam (2) Gravelly fine sandy loam (3) Ashy sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Very slow to moderately rapid
Soil depth	72–84 in
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	18–28%
Available water capacity (0-40in)	2.1–7.4 in
Calcium carbonate equivalent (0-40in)	0–20%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5

Soil reaction (1:1 water) (0-40in)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	5–30%
Subsurface fragment volume >3" (Depth not specified)	3–12%

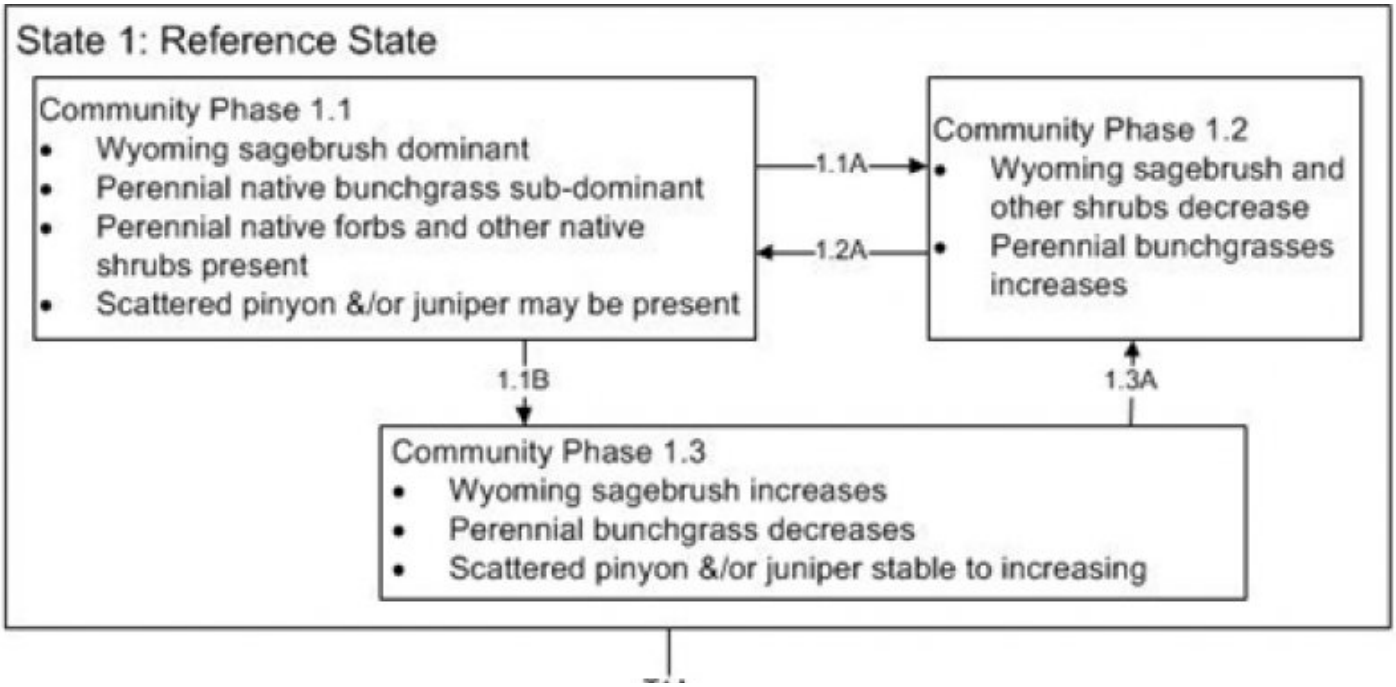
Ecological dynamics

Abusive livestock management on this site results in an increase of big sagebrush and rabbitbrush while basin wildrye, Indian ricegrass, and other desirable forage plants decrease. Winterfat is most prevalent where this species is the dominant plant on adjacent ecological sites. Species likely to invade this site are cheatgrass, Russian thistle, halogeton, and other annuals.

Fire Ecology:
The fire return interval for Wyoming big sagebrush communities ranges from 10 to 70 years. Fire is the principal means of renewal for decadent stands of Wyoming big sagebrush. Wyoming big sagebrush establishes after fire from a seedbank; from seed produced by remnant plants that escaped fire; and from plants adjacent to the burn that seed in. Fires in Wyoming big sagebrush communities are usually not continuous, and remnant plants are the principal means of postfire reproduction. 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. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas. Needle and thread grass is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needle and thread grass in sagebrush ecosystems is classified as slightly damaged by fire. Needle and thread grass sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years. 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.

The reference plant community is dominated by Wyoming or basin big sagebrush, basin wildrye and Indian ricegrass. Needle and thread and western wheatgrass are important species associated with this site. Potential vegetative composition is about 70 percent grasses, 5 percent forbs, and 25 percent shrubs. Approximate ground cover (basal and crown) is 20 to 30 percent.

State and transition model



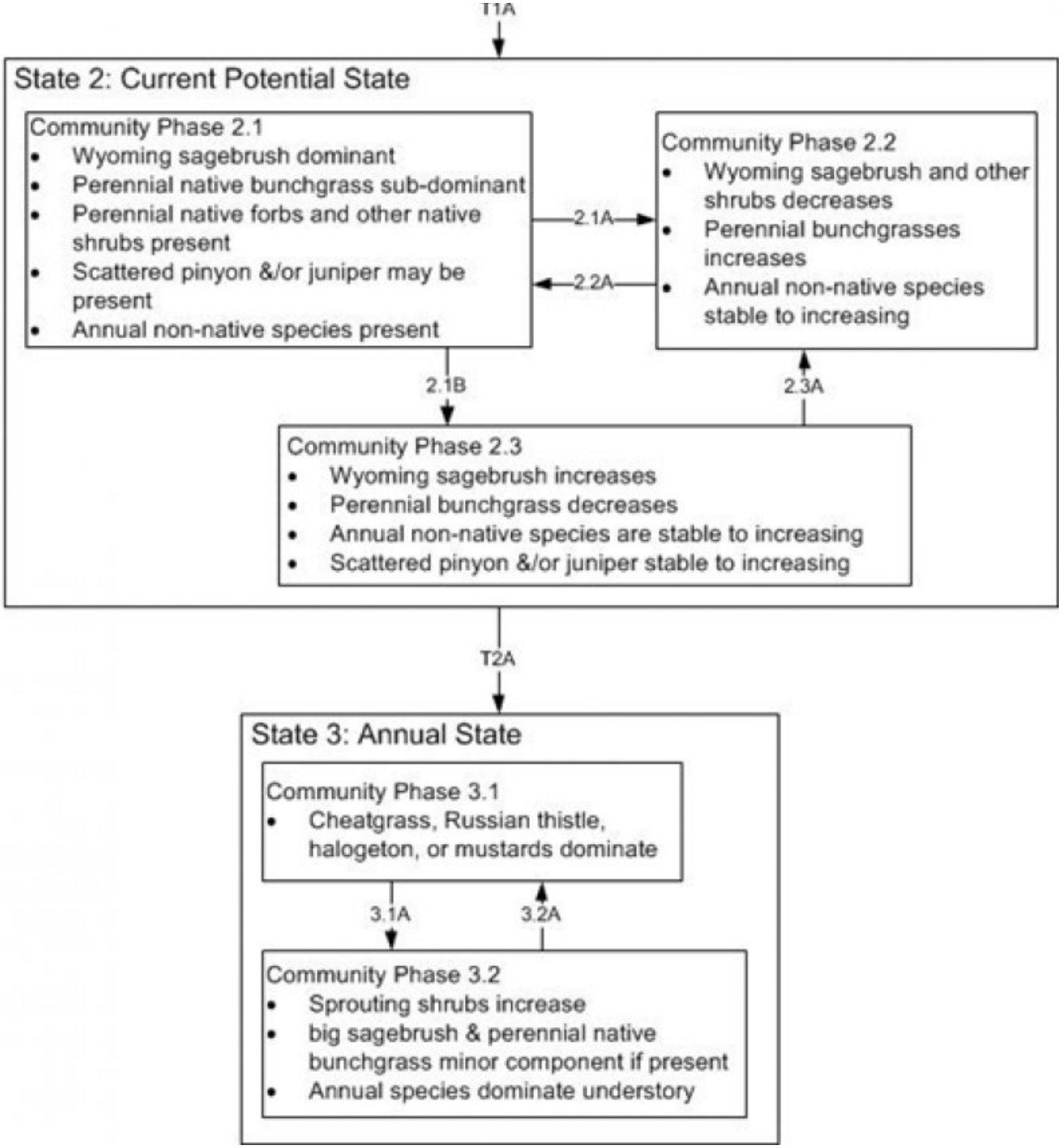


Figure 2. DRAFT STM

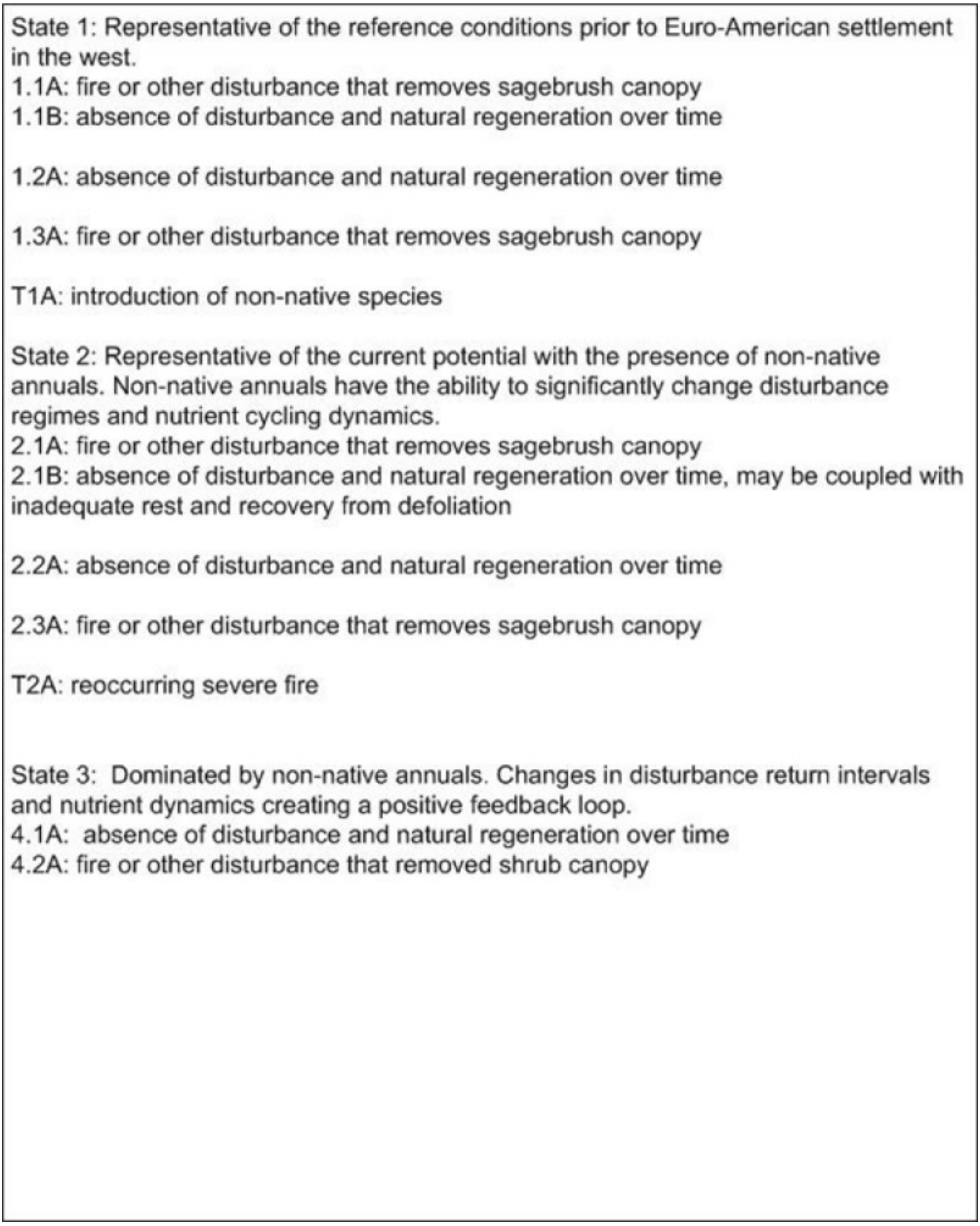


Figure 3. DRAFT STM LEGEND

State 1
Reference State

Representative of the reference conditions prior to Euro-American settlement in the west.

Community 1.1
Reference Plant Community

The reference plant community is dominated by Wyoming and/or basin big sagebrush, basin wildrye and Indian ricegrass. Needleandthread and western wheatgrass are important species associated with this site. Potential vegetative composition is about 70% grasses, 5% forbs and 25% shrubs. Approximate ground cover (basal and crown) is 20 to 30 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	420	560	700
Shrub/Vine	150	200	250
Forb	30	40	50
Total	**600**	**800**	**1000**

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**			280–600	
	basin wildrye	LECI4	*Leymus cinereus*	120–240	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	80–200	–
	needle and thread	HECO26	*Hesperostipa comata*	40–80	–
	western wheatgrass	PASM	*Pascopyrum smithii*	40–80	–
2	**Secondary Perennial Grasses**			40–80	
	blue grama	BOGR2	*Bouteloua gracilis*	4–24	–
	squirreltail	ELEL5	*Elymus elymoides*	4–24	–
	James' galleta	PLJA	*Pleuraphis jamesii*	4–24	–
	Sandberg bluegrass	POSE	*Poa secunda*	4–24	–
	alkali sacaton	SPAI	*Sporobolus airoides*	4–24	–
Forb					
3	**Perennial**			16–80	
	basin wildrye	LECI4	*Leymus cinereus*	120–240	–
	lupine	LUPIN	*Lupinus*	4–24	–
Shrub/Vine					
4	**Primary Shrubs**			120–200	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	120–200	–
	blue grama	BOGR2	*Bouteloua gracilis*	4–24	–
5	**Secondary Shrubs**			40–120	
	western wheatgrass	PASM	*Pascopyrum smithii*	40–80	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	8–24	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	8–24	–
	rubber rabbitbrush	ERNAO	*Ericameria nauseosa ssp. consimilis var. oreophila*	8–24	–
	spiny hopsage	GRSP	*Grayia spinosa*	8–24	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	8–24	–
	pricklypear	OPUNT	*Opuntia*	8–24	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	8–24	–

Animal community

Livestock Interpretations:
This site is suited to livestock grazing. Grazing management should be keyed to perennial grass production. 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. Indian ricegrass has good forage value for domestic sheep, cattle and horses. Heavy early spring grazing may sharply reduce the vigor of Indian ricegrass and decrease the stand. However, there are reports that Indian ricegrass can survive or even benefit by heavy grazing. Needle and thread is important to livestock, especially in the spring. 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. Livestock browse Wyoming big sagebrush, but may use it only lightly when palatable herbaceous species are available.

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:
Wyoming big sagebrush is preferred browse for wild ungulates, and Wyoming big sagebrush communities are important winter ranges for big game. Pronghorn usually browse Wyoming big sagebrush heavily. Wyoming big sagebrush communities are critical habitat for the birds. Sagebrush-grassland communities provide critical sage-grouse breeding and nesting habitats. Open Wyoming sagebrush communities are preferred nesting habitat. Meadows surrounded by sagebrush may be used as feeding and strutting grounds. Sagebrush is a crucial component of their diet year-round, and sage-grouse select sagebrush almost exclusively for cover. Leks are often located on low sagebrush sites, grassy openings, dry meadows, ridgetops, and disturbed sites. Sage-grouse prefer mountain big sagebrush and Wyoming big sagebrush communities to basin big sagebrush communities. The early growth and abundant production of basin wildrye may make it a valuable source of forage for wildlife. Though unpalatable during the winter, basin wildrye may be utilized more frequently by wildlife when snow has covered low shrubs and other grasses. Basin wildrye is intolerant of heavy or repeated grazing, especially if grazed before reaching maturity. Indian ricegrass is eaten by pronghorn, desert bighorns, elk, and mule deer in "moderate" amounts whenever available. A number of heteromyid rodents inhabiting desert rangelands show preference for seed of Indian ricegrass. It is considered an important component of jackrabbit diets in spring and summer. Indian ricegrass seed provides food for many species of birds. Doves, for example, eat large amounts of shattered Indian ricegrass seed lying on the ground. Needle and thread is moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available. Elk consume western wheatgrass during the fall, winter, spring, and summer. Western wheatgrass is used by various small mammals.

Hydrological functions

Rills and water flow patterns are rare, but a few can be expected on steeper slopes in areas subjected to summer convection storms or rapid spring snowmelt. Pedestals are rare. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered a "normal" condition. Gullies are rare in areas of this site that occur on stable landforms. Where this site occurs on inset fans, gullies and head cuts associated with ephemeral channel entrenchment are common. Gullies and head cuts should be healing or stable. Fine litter (foliage from grasses and annual and perennial forbs) is expected to move the distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during catastrophic events. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., basin wildrye and Indian ricegrass] slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.

Recreational uses

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

Other products

Native Americans made tea from big sagebrush leaves. They used the tea as a tonic, an antiseptic, for treating colds, diarrhea, and sore eyes and as a rinse to ward off ticks. Big sagebrush seeds were eaten raw or made into meal.
Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand.
Indian ricegrass was traditionally eaten by some Native American peoples. The Paiutes used seed as a reserve food source. The large-seeded panicle is often used in dry floral arrangements

Other information

Wyoming big sagebrush is used for stabilizing slopes and gullies and for restoring degraded wildlife habitat, rangelands, mine spoils and other disturbed sites. It is particularly recommended on dry upland sites where other shrubs are difficult to establish.

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.

Indian ricegrass is well-suited for surface erosion control and desert revegetation although it is not highly effective in controlling sand movement.

Inventory data references

NASIS data used for abiotic narratives and tables.

Other references

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

United States Department of Agriculture, Natural Resources Conservation Service. 2022. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture, Agriculture Handbook 296.

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

Contributors

DBP/GKB

Approval

Kendra Moseley, 2/20/2025

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	02/21/2007
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are rare. A few can be expected on steeper slopes in areas subjected to summer convection storms or rapid spring snowmelt.

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2. **Presence of water flow patterns:** Water flow patterns are rare but can be expected in areas subjected to summer convection storms or rapid snowmelt.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered a "normal" condition.

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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 ± 40%; surface rock fragments less than 35%; shrub canopy 15 to 25%; foliar cover of perennial herbaceous plants ±40%.

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5. **Number of gullies and erosion associated with gullies:** Gullies are rare in areas of this site that occur on stable landforms. Where this site occurs on inset fans, gullies and head cuts associated with ephemeral channel entrenchment are common. Gullies and head cuts should be healing or stable.

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) is expected to move the distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during catastrophic events.

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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):** Soil stability values should be 3 to 6 on most soil textures found on this site. Areas of this site occurring on soils that have a physical crust will probably have stability values less than 3. (To be field tested.)

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically thin to thick platy or massive. Soil surface colors are light and soils are typified by an ochric epipedon. Organic carbon of the surface 2 to 3 inches is typically 1.5 to 2 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., basin wildrye & Indian ricegrass] slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on 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):** Compacted layers are not typical. Platy or massive sub-surface horizons, subsoil argillic horizons or hardpans shallow to the surface are not to be interpreted as compacted 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: Reference Plant Community: Deep-rooted, cool season, perennial bunchgrasses >> Wyoming big sagebrush. (By above ground production)

Sub-dominant: Associated shrubs = shallow-rooted, cool season, perennial bunchgrasses > deep-rooted, cool season, perennial forb = fibrous, shallow-rooted, cool season, perennial forbs = annual forbs. (By above ground production)

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs are common and standing dead shrub canopy material may be as much as 25% of total woody canopy; some of the mature bunchgrasses (<20%) have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Within plant interspaces (± 15%) and depth of litter is ±¼ inch.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (end of May) ± 800 lbs/ac; Spring moisture significantly affects total 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:** Douglas" rabbitbrush is an increaser on this site. Cheatgrass, snakeweed, halogeton, Russian thistle, bassia, annual mustards, galleta, and Utah juniper are invaders on this site.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years.
