Ecological site R024XY020OR
SHRUBBY LOAM
8-10 PZ

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Associated sites

R024XY015OR	**DESERT LOAM 6-10 PZ** Desert Loam 6-10 PZ (higher salts and carbonates, restrictive layer not highly fractured, different composition – ATCO-PIDE4 dominant)
R024XY016OR	**LOAMY 8-10 PZ** Loamy 8-10 PZ (deeper soil, higher production, different composition – EPVI absent)
R024XY017OR	**SHALLOW LOAM 8-10 PZ** Shallow Loam 8-10 PZ (restrictive layer not highly fractured, different composition – EPVI absent)
R024XY030OR	**LOAMY SLOPES 6-10 PZ** Loamy Slopes 6-10 PZ (steeper site, restrictive layer not highly fractured, different composition – EPVI absent)
R024XY113OR	**SODIC FAN 6-10 PZ** Sodic Fan 6-10 PZ (deeper soil, fan position, different composition – ARTRT-SAVE4/ACHY-LECI4 association, EPVI absent)

Similar sites

R024XY016OR	**LOAMY 8-10 PZ** Loamy 8-10 PZ (deeper soil, higher production, different composition – EPVI absent)
R024XY030OR	**LOAMY SLOPES 6-10 PZ** Loamy Slopes 6-10 PZ (steeper site, restrictive layer not highly fractured, different composition – EPVI absent)
R024XY017OR	**SHALLOW LOAM 8-10 PZ** Shallow Loam 8-10 PZ (restrictive layer not highly fractured, different composition – EPVI absent)

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. wyomingensis* (2) *Ephedra viridis*
Herbaceous	(1) *Achnatherum thurberianum* (2) *Pseudoroegneria spicata ssp. spicata*

Physiographic features

This site occurs on dissected rock pediments, mid slope, adjacent to dry pluvial lake basins. It is typically found on topography with gentle slopes. Slopes typically range from 2 to 25 percent. Elevation varies from 4300 to 5000 feet.

Table 2. Representative physiographic features

Landforms	(1) Pediment (2) Hill (3) Fan remnant
Elevation	1,310 – 1,520 m
Slope	0 – 30 %
Aspect	Aspect is not a significant factor

Climatic features

The annual precipitation ranges from 8 to 10 inches, most of which occurs in the form of snow and rain during the months of December through March. The soil temperature regime is mesic to frigid near mesic. Air temperature extremes range from 110 to -20 degrees F. The frost free period ranges from 90 to 120 days. The optimum growth period for native plants is from the first of April through early June.

Table 3 Representative climatic features

Frost-free period (average)	120 days
Freeze-free period (average)	0 days
Precipitation total (average)	250 mm

Influencing water features

Soil features

The soils of this site are typically shallow over highly fractured weathered bedrock. Surface textrues vary from loams to cobbly clay loams. Permeability is moderate. the available water holding capacity (AWC) is about 2 to 9 inches for the profile. The potential for erosion is moderate to severe. Depth to a water table is greater than 72 inches. See Appendix II for soils on which this site occurs.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Clay loam
Permeability class	Moderate
Soil depth	10 – 40 cm
Available water capacity (0-101.6cm)	5.08 – 10.16 cm

Ecological dynamics

The reference native plant community is dominated by Wyoming big sagebrush, mormon tea (green ephedra) and Thurber needlegrass. Bluebunch wheatgrass is prominent. Basin wildrye, bottlebrush squirreltail, Sandberg bluegrass and a variety of forbs are present. Vegetative composition of the community is approximately 55 percent grasses, 10 percent forbs and 35 percent shrubs. The approximate ground cover is 50-60 percent (basal and crown).

Four states have been identified for this site: a reference state; a state with the presence of annuals; a state with a shrub/annual co-dominance; and a state with annual dominance.

Reference: Plant community phase change is driven by infrequent fire. Wyoming and basin big sagebrush decline after fire while Thurber's needlegrass, Indian ricegrass and other grasses increase. May see a temporary increase in rabbitbrush after fire. Time facilitates the reintroduction of sagebrush. The introduction of invasive annual grasses and forbs transitions into the state 2.

State 2: Compositionally similar to the reference state with a trace of cheatgrass and weedy forbs. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Prescribed grazing and infrequent fire (> 50 year return interval) maintain state dynamics. The timing and/or intensity of grazing or prolonged drought favors Wyoming and basin big sagebrush, squirreltail and Sandberg's bluegrass. Prescribed grazing and/or release from drought may reverse the decline in needlegrass and Indian ricegrass production. Infrequent fire reduces the shrub community and promotes the bunchgrass component. Mismanaged grazing and/or prolonged drought leads to a biotic threshold and into state 3.

State 3: Wyoming and basin big sagebrush is decadent with little recruitment. The perennial grass component is significantly reduced in both density and productivity. Cheatgrass and/or annual forbs and/or Sandberg's bluegrass along with sagebrush control site resources and drive ecological dynamics. Bare ground is abundant. Spatial and temporal energy capture and nutrient cycling has been truncated. Infiltration may be reduced due to lack of ground cover. Risk of soil erosion by both wind and water is increased. Catastrophic wildfire will lead to an abiotic threshold and into state 4.

State 4: Cheatgrass and/or annual weed dominated plant community with limited to no shrub or perennial grass component. Soil erosion and redistribution along with changes in dynamic soil properties affect the hydrologic cycle and thus the nutrient cycle. Harsh environmental factors increase state resiliency to change.

Range in Characteristics:
The depth to a restrictive layer and the extent of bedrock fracturing influences the composition and total production of this site. Mormon tea, a CAM photosynthetic species, increases over highly fractured bedrock in warmer mesic areas. As a dioecious species having separate male and female plants, it also appears to segregate with male plants increasing on drier slopes and female plants increasing in more moist areas. Thurber's needlegrass increases on a loamy surface. Bluebunch wheatgrass increases on slight north aspects with an increase of silt on the surface. Bottlebrush squirrel tail will increase on older surfaces with stable erosion pavement. Old erosion pavement develops a desert varnish, a distinctive dark color resulting from precipitated concentrates of manganese and lesser amounts of iron.

Response to Disturbance - States:

If the condition of the site deteriorates as a result of over grazing, Thurber’s needlegrass and bluebunch wheatgrass will decrease in the stand. Thurber’s needlegrass is the preferred species during all seasons. Wyoming big sagebrush, Sandberg bluegrass and squirreltail increase. With continued overgrazing mormon tea decreases. Under deteriorated conditions minor amounts of annuals invade, bare ground increases, erosion accelerates and inherent site productivity decreases.

States: ARTRW8-EPVI/ELEL5-POSE-bare ground; ARTRW8/ELEL5-POSE-Annuals-bare ground; Annuals-bare ground following fire under deteriorated conditions

State and transition model

Figure 3. Group 6, STM

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant, moderate rooted bunchgras**			202-336	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	202-336	–
2	**Sub-dominant, moderate rooted bunchgrass**			34-135	
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	34-135	–
3	**Occasional, deep-rooted bunchgrass**			13-34	
	basin wildrye	LECI4	*Leymus cinereus*	13-34	–
5	**Other perennial grasses**			17-56	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	6-17	–
	squirreltail	ELEL5	*Elymus elymoides*	6-17	–
	needle and thread	HECO26	*Hesperostipa comata*	0-17	–
	Sandberg bluegrass	POSE	*Poa secunda*	6-13	–
	foxtail wheatgrass	PSSA2	*×Pseudelymus saxicola*	0-6	–
Forb					
9	**Perennial forbs**			17-67	
	milkvetch	ASTRA	*Astragalus*	2-11	–
	serrate balsamroot	BASE2	*Balsamorhiza serrata*	0-11	–
	buckwheat	ERIOG	*Eriogonum*	2-11	–
	lupine	LUPIN	*Lupinus*	2-11	–
	granite prickly phlox	LIPU11	*Linanthus pungens*	0-6	–
	desertparsley	LOMAT	*Lomatium*	2-6	–
	hawksbeard	CREPI	*Crepis*	2-6	–
	common yarrow	ACMI2	*Achillea millefolium*	2-4	–
	phlox	PHLOX	*Phlox*	2-4	–
	fleabane	ERIGE2	*Erigeron*	2-4	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0-2	–
	foothill deathcamas	ZIPA2	*Zigadenus paniculatus*	1-2	–
	silverpuffs	MICRO6	*Microseris*	0-2	–
	beardtongue	PENST	*Penstemon*	0-2	–
	pussytoes	ANTEN	*Antennaria*	0-2	–
	Douglas' dustymaiden	CHDO	*Chaenactis douglasii*	0-2	–
	larkspur	DELPH	*Delphinium*	0-2	–
Shrub/Vine					

11	**Dominant, evergreen, non-sprouting shrubs**			45-135	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	34-101	–
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	11-34	–
12	**Sub-dominant, deciduous, sprouting shrub**			34-101	
	mormon tea	EPVI	*Ephedra viridis*	34-101	–
15	**Other shrubs**			22-56	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	6-22	–
	spiny hopsage	GRSP	*Grayia spinosa*	0-17	–
	littleleaf horsebrush	TEGL	*Tetradymia glabrata*	6-17	–

Animal community

Livestock Grazing: This site is suitable for livestock grazing use in the spring, fall and early winter under a planned grazing system. Use should be postponed until the soils are firm enough to prevent trampling damage and soil compaction. Grazing management should be keyed for Thurber's needlegrass, bluebunch wheatgrass and mormon tea. The bunchgrasses can be severely damaged if heavily grazed during periods of flowering and grass seed formation before root reserves have accumulated and soil moisture is low. Mormon tea can be severely damaged if heavily grazed in the late winter and early spring during periods of "bark slippage". Deferred grazing or rest is recommended at least once every three years. Wildlife: This site is commonly used by mule deer, pronghorn antelope, rabbits, rodents, sage grouse, other upland birds and various predators. It is an important wintering area for mule deer and antelope. Wyoming big sagebrush and associated perennial bunchgrasses provide excellent winter forage and cover. Mormon tea having medium palatability furnishes a fair supply of browse.

Hydrological functions

The soils of this site have a high runoff potential. The hydrologic cover condition is fair to good when the deep rooted bunchgrass component is greater than 70 percent of potential. The soils are in hydrologic group D.

Other information

This site has low potential for range seeding because it is droughty and has a stony surface. In areas where a heavy erosion pavement exists, the potential for natural seeding reestablishment is low.

Contributors

J.Joye(OSU)
NRCS/BLM Team - Vale
SCS/BLM Team - Burns 1985/1994
SCS/BLM Team, Hines

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	
Approved by	

Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

   _____

2. **Presence of water flow patterns:**

   _____

3. **Number and height of erosional pedestals or terracettes:**

   _____

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

   _____

5. **Number of gullies and erosion associated with gullies:**

   _____

6. **Extent of wind scoured, blowouts and/or depositional areas:**

   _____

7. **Amount of litter movement (describe size and distance expected to travel):**

   _____

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

   _____

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

   _____

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

    _____

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

    _____

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

Dominant:

Sub-dominant:

Other:

Additional:

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

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**
