

Ecological site R024XY017OR

SHALLOW 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.

Ecological site concept

This site occurs on mountains. Soils are shallow to bedrock, well drained and formed in residuum. The soil profile is characterized by an ochric epipedon and an argillic horizon. Important abiotic factors contributing to the presence of this ecological site include the shallow depth that limits productivity and prevents the development of a mollic. Full consideration will be given to combining Shallow Loamy 10-14"PZ (024XY035NV), Shallow Loam 8-10"PZ (024XY047NV), Shallow Loam 8-10"PZ (024XY017NV). These sites do not compete on soil feature or landscape characteristics and may in fact be different community phases of the same ESC.

Associated sites

R024XY015OR	<p>DESERT LOAM 6-10 PZ</p> <p>Desert Loam 6-10 PZ (higher salts and carbonates, droughtier conditions, different composition – ATCO-PIDE4 dominant)</p>
R024XY016OR	<p>LOAMY 8-10 PZ</p> <p>Loamy 8-10 PZ (deeper soil, higher production)</p>
R024XY021OR	<p>THIN SURFACE 8-14 PZ</p> <p>Thin Surface 8-14 PZ (very shallow soil, different composition – ARNO4 dominant)</p>
R024XY653OR	<p>ARID FAN 8-10 PZ</p> <p>Arid Fan 8-10 PZ (lithic toe slope position, different composition - LECI4 common)</p>

Similar sites

R024XY653OR	<p>ARID FAN 8-10 PZ</p> <p>Arid Fan 8-10 PZ (lithic toe slope position, different composition - LECI4 common)</p>
R024XY016OR	<p>LOAMY 8-10 PZ</p> <p>Loamy 8-10 PZ (deeper soil, higher production)</p>

R024XY015OR	DESERT LOAM 6-10 PZ Desert Loam 6-10 PZ (higher salts and carbonates, droughtier conditions, different composition – ATCO-PIDE4 dominant)
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata subsp. wyomingensis</i>
Herbaceous	(1) <i>Achnatherum thurberianum</i> (2) <i>Achnatherum hymenoides</i>

Physiographic features

This site occurs on upland fan remnants, terraces, fans and rolling hills. It is typically found on topography with gentle slopes. Slopes typically range from 2 to 15 percent. Elevation varies from 3800 to 5000 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Terrace (3) Hill
Elevation	1,160 – 1,520 m
Slope	0 – 20 %
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 associated with this site are shallow to bedrock, well drained and formed in residuum. Soils are characterized by an ochric epipedon, an agrillic horizon and greater than 35% rock fragments by volume. Available water capacity of these soils is low but a surface cover of coarse fragments helps to reduce evaporation and conserve soil moisture. Runoff is medium and potential for sheet and rill erosion is slight to moderate depending on slope.

Table 4. Representative soil features

Parent material	(1) Eolian deposits – rhyolite
Surface texture	(1) Cobbly loam (2) Gravelly clay loam
Family particle size	(1) Clayey
Drainage class	Well drained to moderately well drained
Permeability class	Moderate to moderately slow
Soil depth	30 – 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 and Thurber needlegrass. Indian ricegrass and bluebunch wheatgrass are prominent. Bottlebrush squirreltail and Sandberg bluegrass are common. Spiny hopsage and a variety of forbs are present. Vegetative composition of the community is approximately 70 percent grasses, 5 percent forbs and 25 percent shrubs. The approximate ground cover is 30-40% (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:

Production will increase in areas with greater soil depth to a restrictive layer. Thurber's needlegrass increases on loamy surfaces, Indian ricegrass increases on sandy gravelly surfaces and bluebunch wheatgrass increases on a silty surfaces. Bottlebrush squirreltail will increase on older higher terraces with stable erosion pavement. The old erosion pavement has developed a distinctive desert varnish. The distinctive dark color is due to precipitated concentrates of manganese and lesser amounts of iron.

Response to Disturbance - States:

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Response to Disturbance - States

If the condition of the site deteriorates as a result of over grazing, Thurber's needlegrass, Indian ricegrass and bluebunch wheatgrass will decrease in the stand. Wyoming big sagebrush, Sandberg bluegrass and squirreltail will increase. With further deterioration, minor amounts of annuals invade, bare ground increases, vesicular crusts enlarge, erosion accelerates and site productivity decreases. The invasion of annuals and the reestablishment of perennials are limited in areas of strong vesicular crusts and heavy erosion pavement.

States: ARTRW8/ELEL5-POSE-bare ground;

Annuals-bare ground with fire

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	moderate-rooted bunchgrasses			224-448	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	56-168	-
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	112-168	-
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata ssp. spicata</i>	56-112	-
2	moderate-rooted bunchgrass			17-45	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	17-45	-
3	Other perennial grasses			28-84	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0-28	-
	foxtail wheatgrass	PSSA2	<i>xPseudelymus saxicola</i>	0-28	-
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-28	-
Forb					
4	Perennial forbs			11-56	
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0-11	-
	pussytoes	ANTEN	<i>Antennaria</i>	0-11	-
	woollypod milkvetch	ASPU9	<i>Astragalus purshii</i>	0-11	-
	Douglas' dustymaiden	CHDO	<i>Chaenactis douglasii</i>	0-11	-
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0-11	-
	fleabane	ERIGE2	<i>Erigeron</i>	0-11	-
	buckwheat	ERIOG	<i>Eriogonum</i>	0-11	-
	granite prickly phlox	LIPU11	<i>Linanthus pungens</i>	0-11	-

	desertparsley	LOMAT	<i>Lomatium</i>	0-11	-
	lupine	LUPIN	<i>Lupinus</i>	0-11	-
	silverpuffs	MICRO6	<i>Microseris</i>	0-11	-
	phlox	PHLOX	<i>Phlox</i>	0-11	-
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	0-11	-
	deathcamas	ZIGAD	<i>Zigadenus</i>	0-11	-

Shrub/Vine

5	evergreen, non-sprouting, shrub			56-112	
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	56-112	-
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-17	-
6	evergreen, non-sprouting shrub			28-56	
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	28-56	-
7	Other shrubs			17-56	
	basin big sagebrush	ARTRT	<i>Artemisia tridentata ssp. tridentata</i>	0-11	-
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	0-11	-
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0-11	-
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0-11	-
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0-11	-
	bud sagebrush	PIDE4	<i>Picrothamnus desertorum</i>	0-11	-
	littleleaf horsebrush	TEGL	<i>Tetradymia glabrata</i>	0-11	-
	shortspine horsebrush	TESP2	<i>Tetradymia spinosa</i>	0-11	-

Animal community

Livestock Grazing: This site is suitable for livestock grazing use in 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, Indian ricegrass and bluebunch wheatgrass. These 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. Deferred grazing or rest is recommended at least once every three years. Wildlife: This site offers food and cover for antelope, mule deer, sage grouse and a variety of other birds, rodents and their associated predators. It is an important spring, fall and winter use area for sage grouse, antelope, mule deer and desert bighorn sheep.

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 very droughty and stony. In areas where a heavy erosion pavement exists, the potential for natural seeding reestablishment is low.

Contributors

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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)	Jeff Repp
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Date	11/17/2016
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None, moderate sheet & rill erosion hazard.

2. **Presence of water flow patterns:** None, except following high intensity storms when short (less than 1 meter) flow patterns may appear on steeper slopes. Minimal evidence of past or current soil deposition or erosion.

3. **Number and height of erosional pedestals or terracettes:** None, except few pedestals or terracettes on steeper slopes.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10-35% bare ground. Typically bare patches are associated with shrubs. Larger bare patches maybe associated with ant mounds, rodent, and/or other natural disturbances.

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** None. Wind erosion hazard is slight to moderate.

7. **Amount of litter movement (describe size and distance expected to travel):** Litter size is Small/Fine. Litter movement is limited, minimal, and short, associated with water flow patterns following extremely high intensity storms. Litter also may be moved during intense wind storms.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Site is Moderately resistant to erosion. Stability class (Herrick et al. 2001) anticipated to be 3-6 at surface under perennial vegetation. Stability class at surface in the interspaces is anticipated to be less than or equal to that under perennial vegetation.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface layer structure is single grain to moderately thick platy. The A horizon has a dry color of 4 - 6 and is 2 - 12 inches thick. The Soil Organic Matter (SOM) content is low (0.2 to 2.0%).

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant foliar cover and basal cover with moderate to large gaps between plants should slightly reduce raindrop impact and slow overland flow, providing some increased time for infiltration to occur. Low herbaceous vegetation on this site will retain some water from precipitation. Low ground cover (30-40%) and gentle slopes (2-15%) slightly to moderately limit rainfall impact and 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.

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: Deep rooted bunchgrasses

Sub-dominant: Evergreen shrubs > deciduous shrubs

Other: Other perennial grasses = perennial forbs

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Grasses will nearly always show some mortality and decadence. Normal decadence and mortality expected on other plants.

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Low 300 lbs/acre, Representative Value 500 lbs/acre, High 700 lbs/acre

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: Annuals (Cheatgrass, Medusahead, and forbs) invade sites that have lost deep rooted perennial grass functional groups.

17. Perennial plant reproductive capability: All species should be capable of reproducing annually.
