

Ecological site R023XY316OR

DROUGHTY LOAM

11-13 PZ

Accessed: 04/20/2026

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

R023XY212OR	LOAMY 10-12 PZ Loamy 10-12" PZ
R023XY216OR	CLAYPAN 12-16 PZ Claypan 12-16" PZ
R023XY301OR	DROUGHTY SOUTH SLOPES 11-13 PZ South Slopes 11-13" PZ
R023XY318OR	LOAMY 12-16 PZ Loamy 12-16" PZ

Similar sites

R023XY212OR	LOAMY 10-12 PZ Loamy 10-12" PZ (lower production, different composition)
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata</i> ssp. <i>tridentata</i> (2) <i>Artemisia tridentata</i> ssp. <i>vaseyana</i>
Herbaceous	(1) <i>Festuca idahoensis</i> (2) <i>Achnatherum thurberianum</i>

Physiographic features

This site occurs on plateaus and tablelands. Slopes range from 2 to 30%. Elevations range from 4200 to 5500 feet.

Table 2. Representative physiographic features

Landforms	(1) Plateau (2) Hill (3) Alluvial fan
Flooding frequency	None
Ponding frequency	None
Elevation	1,280 – 1,680 m
Slope	0 – 30 %
Aspect	Aspect is not a significant factor

Climatic features

The annual precipitation ranges from 11 to 13 inches, most of which occurs in the form of snow during the months of December through March. Localized convection storms occasionally occur during the summer. The soil temperature regime is frigid with a mean annual air temperature of 47 degrees F. Temperature extremes range from 100 to -30 degrees F. The frost free period for native plants is from mid-April through June.

Table 3 Representative climatic features

Frost-free period (average)	80 days
Freeze-free period (average)	0 days
Precipitation total (average)	330 mm

Influencing water features**Soil features**

The soils of this site are shallow or moderately deep to a duripan and/or bedrock. The soils have a dark colored medium textured surface 10 to 20 inches thick. The subsoil and/or substratum is typically medium to fine textured and free of coarse fragments. Permeability is moderate. The available water holding capacity (AWC) is about 2 to 5 inches for the profile. The potential for wind or water erosion is moderate.

Table 4. Representative soil features

Parent material	(1) Colluvium – basalt (2) Residuum – andesite
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Surface texture	(1) Cobbly very fine sandy loam (2) Cobbly loam (3) Loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately slow
Soil depth	40 – 100 cm
Surface fragment cover <=3"	0 – 30 %
Surface fragment cover >3"	0 – 20 %
Available water capacity (0-101.6cm)	3.81 – 12.19 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 7.8
Subsurface fragment volume <=3" (Depth not specified)	0 – 20 %

Subsurface fragment volume >3" (Depth not specified)	0 – 20 %
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Ecological dynamics

Range in Characteristics:

The reference native plant community is dominated by Idaho fescue and Thurber's needlegrass. Basin big sagebrush is prominent. Bluebunch wheatgrass and Sandberg bluegrass are common. The vegetative composition of the community is approximately 85 percent grasses, 5 percent forbs, and 10 percent shrubs.

Variability in plant composition and production results from variation in soil depth, depth to a clay subsoil, and the percent clay in the subsoil. Idaho fescue, basin big sagebrush and production will increase as the soil depth and/or depth to a heavy clay subsoil increases. Thurber's needlegrass increases on a gravelly surface. Production decreases and Wyoming big sagebrush increases as the soil becomes shallower and at the lower end of the precipitation range.

Five states have been identified for this site: a reference state; a state with the presence of annuals; a state that has juniper dominating site resources; a state that is juniper dominant; and a state with annual dominance.

Reference State: Plant community phase change is driven by fire. Mountain and basin big sagebrush declines after fire while Idaho fescue, Thurber's needlegrass 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 state 2.

State 2: Compositionally similar to the reference state with a trace of cheatgrass and annual weeds. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Prescribed grazing maintains state dynamics. Mismanagement of grazing favors sagebrush and Sandberg bluegrass. Cheatgrass increases. Prescribed grazing can reverse the trend. Reduction in fire frequency facilitates juniper encroachment in both poor and good condition communities. Fire reduces or eliminates juniper and with time sagebrush reestablishes. Juniper can out-compete sagebrush and the herbaceous plant community which brings the site to state 3.

State 3: Juniper dominates site resources. Sagebrush is dead or dying and bitterbrush lacks vigor. Sandberg bluegrass is the dominant species in the interspace and bare ground is significant. The perennial grass component is significantly reduced in both density and productivity. Idaho fescue may be present under the canopy of trees (north slope typically). Spatial and temporal energy capture and nutrient cycling has been truncated. Infiltration may be reduced due to lack of ground cover. Juniper woodland development is complete and soil loss and erosion drive site processes as the site goes into state 4.

State 4: Juniper dominated state. Soil loss is evident and erosion is active. All ecological processes, hydrologic cycle, nutrient cycle and energy capture have been significantly changed preventing the establishment of perennial plants. An abiotic threshold has been crossed. With catastrophic wildfire, state 5 is achieved.

State 5: Cheatgrass 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.

Response to Disturbance:

If the condition of the site deteriorates as a result of overgrazing, Idaho fescue and other bunchgrasses will decrease while basin big sagebrush, bottle brush squirreltail and Sandberg bluegrass will increase. Idaho fescue is the preferred species during all seasons. With further deterioration, annuals will invade and bareground will markedly increase. Excessive erosion in the bare soil interspaces reduces the site productivity and contributes to downstream sedimentation.

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	Perennial, bunch grass, deep-rooted			303-404	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	303-404	–

2	Perennial, bunch grass, moderately deep-rooted			202-303	
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	202-303	-
3	Perennial, bunch grass, deep-rooted			101-202	
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata ssp. spicata</i>	101-202	-
4	Perennial, tall bunch grass, deep-rooted			20-50	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	20-50	-
5	Perennial, bunch grass, shallow-rooted			20-50	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	20-50	-
6	Perennial			20-101	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0-20	-
	Ross' sedge	CARO5	<i>Carex rossii</i>	0-20	-
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0-20	-
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-20	-
	Cusick's bluegrass	POCU3	<i>Poa cusickii</i>	0-20	-
Forb					
10	Perennial			10-20	
	buckwheat	ERIOG	<i>Eriogonum</i>	10-20	-
11	Perennial			10-20	
	milkvetch	ASTRA	<i>Astragalus</i>	10-20	-
12	Perennial			10-20	
	lupine	LUPIN	<i>Lupinus</i>	10-20	-
13	Perennial, all			10-50	
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0-10	-
	agoseris	AGOSE	<i>Agoseris</i>	0-10	-
	onion	ALLIU	<i>Allium</i>	0-10	-
	pussytoes	ANTEN	<i>Antennaria</i>	0-10	-
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	0-10	-
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0-10	-
	larkspur	DELPH	<i>Delphinium</i>	0-10	-
	fleabane	ERIGE2	<i>Erigeron</i>	0-10	-
	Lava aster	IOAL	<i>Ionactis alpina</i>	0-10	-
	granite prickly phlox	LIPU11	<i>Linanthus pungens</i>	0-10	-
	stoneseed	LITHO3	<i>Lithospermum</i>	0-10	-
	desertparsley	LOMAT	<i>Lomatium</i>	0-10	-
	phacelia	PHACE	<i>Phacelia</i>	0-10	-
	phlox	PHLOX	<i>Phlox</i>	0-10	-
	ragwort	SENEC	<i>Senecio</i>	0-10	-
	deathcamas	ZIGAD	<i>Zigadenus</i>	0-10	-
Shrub/Vine					
15	Evergreen			50-151	
	basin big sagebrush	ARTRT	<i>Artemisia tridentata ssp. tridentata</i>	50-101	-
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	20-50	-
16	Deciduous			0-20	
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	0-20	-
17	Evergreen			0-20	
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	0-10	-

	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0-10	-
Tree					
20	Evergreen			0-10	
	western juniper	JUOC	<i>Juniperus occidentalis</i>	0-10	-

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Perennial, bunch grass, deep-rooted			303-404	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	303-404	-
2	Perennial, bunch grass, moderately deep-rooted			202-303	
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	202-303	-
3	Perennial, bunch grass, deep-rooted			101-202	
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata ssp. spicata</i>	101-202	-
4	Perennial, tall bunch grass, deep-rooted			20-50	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	20-50	-
5	Perennial, bunch grass, shallow-rooted			20-50	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	20-50	-
6	Perennial			20-101	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0-20	-
	Ross' sedge	CARO5	<i>Carex rossii</i>	0-20	-
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0-20	-
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-20	-
	Cusick's bluegrass	POCU3	<i>Poa cusickii</i>	0-20	-
Forb					
10	Perennial			10-20	
	buckwheat	ERIOG	<i>Eriogonum</i>	10-20	-
11	Perennial			10-20	
	milkvetch	ASTRA	<i>Astragalus</i>	10-20	-
12	Perennial			10-20	
	lupine	LUPIN	<i>Lupinus</i>	10-20	-
13	Perennial, all			10-50	
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0-10	-
	agoseris	AGOSE	<i>Agoseris</i>	0-10	-
	onion	ALLIU	<i>Allium</i>	0-10	-
	pussytoes	ANTEN	<i>Antennaria</i>	0-10	-
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	0-10	-
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0-10	-
	larkspur	DELPH	<i>Delphinium</i>	0-10	-
	fleabane	ERIGE2	<i>Erigeron</i>	0-10	-
	Lava aster	IOAL	<i>Ionactis alpina</i>	0-10	-
	granite prickly phlox	LIPU11	<i>Linanthus pungens</i>	0-10	-
	stoneseed	LITHO3	<i>Lithospermum</i>	0-10	-
	desertparsley	LOMAT	<i>Lomatium</i>	0-10	-
	phacelia	PHACE	<i>Phacelia</i>	0-10	-
	phlox	PHLOX	<i>Phlox</i>	0-10	-

	ragwort	SENEC	<i>Senecio</i>	0-10	-
	deathcamas	ZIGAD	<i>Zigadenus</i>	0-10	-
Shrub/Vine					
15	Evergreen			0-40	
	basin big sagebrush	ARTRT	<i>Artemisia tridentata ssp. tridentata</i>	0-20	-
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	0-20	-
16	Deciduous			0-20	
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	0-20	-
17	Evergreen			11-22	
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	11-22	-
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	0-10	-
Tree					
20	Evergreen			0-10	
	western juniper	JUOC	<i>Juniperus occidentalis</i>	0-10	-

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Perennial, bunch grass, deep-rooted			202-303	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	202-303	-
2	Perennial, bunch grass, moderately deep-rooted			101-202	
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	101-202	-
3	Perennial, bunch grass, deep-rooted			101-202	
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata ssp. spicata</i>	101-202	-
4	Perennial, tall bunch grass, deep-rooted			20-50	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	20-50	-
5	Perennial, bunch grass, shallow-rooted			20-50	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	20-50	-
6	Perennial			20-101	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0-20	-
	Ross' sedge	CARO5	<i>Carex rossii</i>	0-20	-
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0-20	-
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-20	-
	Cusick's bluegrass	POCU3	<i>Poa cusickii</i>	0-20	-
7	Annual Grasses			101-202	
	cheatgrass	BRTE	<i>Bromus tectorum</i>	101-202	-
Forb					
10	Perennial			10-20	
	buckwheat	ERIOG	<i>Eriogonum</i>	10-20	-
11	Perennial			10-20	
	milkvetch	ASTRA	<i>Astragalus</i>	10-20	-
12	Perennial			10-20	
	lupine	LUPIN	<i>Lupinus</i>	10-20	-
13	Perennial, all			10-50	
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0-10	-
	agoseris	AGOSE	<i>Agoseris</i>	0-10	-

	onion	ALLIU	<i>Allium</i>	0-10	-
	pussytoes	ANTEN	<i>Antennaria</i>	0-10	-
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	0-10	-
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0-10	-
	larkspur	DELPH	<i>Delphinium</i>	0-10	-
	fleabane	ERIGE2	<i>Erigeron</i>	0-10	-
	Lava aster	IOAL	<i>Ionactis alpina</i>	0-10	-
	granite prickly phlox	LIPU11	<i>Linanthus pungens</i>	0-10	-
	stoneseed	LITHO3	<i>Lithospermum</i>	0-10	-
	desertparsley	LOMAT	<i>Lomatium</i>	0-10	-
	phacelia	PHACE	<i>Phacelia</i>	0-10	-
	phlox	PHLOX	<i>Phlox</i>	0-10	-
	ragwort	SENEC	<i>Senecio</i>	0-10	-
	deathcamas	ZIGAD	<i>Zigadenus</i>	0-10	-
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15	Evergreen			50-151	
	basin big sagebrush	ARTRT	<i>Artemisia tridentata ssp. tridentata</i>	50-101	-
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	20-50	-
16	Deciduous			0-20	
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	0-20	-
17	Evergreen			0-20	
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	0-10	-
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0-10	-
Tree					
20	Evergreen			0-10	
	western juniper	JUOC	<i>Juniperus occidentalis</i>	0-10	-

Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 5.1 plant community composition

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

Livestock Grazing: This site is suitable for use by cattle, sheep and hroses in late spring, summer and fall under a planned grazing system. Use should be postponed until the soils are firm enough to avoid trampling damageand soil compaction. **Wildlife:** This stie will offer food and cover for antelope, mule deer, rodents and a variety of birds. It is important wintering area for antelope and mule deer. **Native Wildlife Associated With The Potentail Climax Community:** Deer, Antelope, Hawks, Songbirds, and Rodents.

Hydrological functions

The soils of this site have moderately high runoff potential. The hydrologic soil group is C.

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, Bruce Franssen
Contact for lead author	State Rangeland Management Specialist
Date	01/01/2004
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:** None

3. **Number and height of erosional pedestals or terracettes:** None

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**
5 - 15%

5. Number of gullies and erosion associated with gullies: 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 - limited movement

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):
Moderately resistant to erosion: aggregate stability = 3-5

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): weak fine granular structure to weak thin platy structure, 6-10 inches thick; Low OM (1-2%)

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Significant ground cover (60-80%) and gentle to moderate slopes (2-15%) effectively 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: Perennial, deep-rooted bunchgrasses >> perennial, shallow to moderately deep-rooted bunchgrasses

Sub-dominant: Evergreen shrubs

Other: Perennial forbs

Additional:

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

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):
900 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: Western Juniper readily invades the site. Cheatgrass and Medusahead invade sites that have lost deep rooted perennial grass functional groups

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