

Ecological site R012XY008ID

Gravelly

13-16 PZ ARTR4/PSSPS-FEID

Last updated: 9/21/2020

Accessed: 09/01/2026

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.

MLRA notes

Major Land Resource Area (MLRA): 012X—Lost River Valleys and Mountains

Land Resource Region: B (Northwestern Wheat and Range) MLRA: 12 (Lost River Valleys and Mountains) EPA EcoRegion: Level III (Middle Rockies)

LRU notes

012X-Lost River Valleys and Mountains Precipitation or Climate Zone: 13-16" P.Z.
<https://soils.usda.gov/survey/geography/mlra/index.html>

Classification relationships

Similar to *Artemisia tripartita*/Agropyron spicatum HT and *Artemisia tripartita*/Idaho fescue HT in "Hironaka, M., M.A. Fosberg, A. H. Winward. 1983. Sagebrush-Grass Habitat Types of Southern Idaho. University of Idaho. Moscow, Idaho. Bulletin Number 35".

Ecological site concept

Site does not receive additional water. Soils are: Not saline or saline-sodic. Deep to very deep. >35% (by volume) coarse fragments, skeletal within 20" of soil surface. Not strongly or violently effervescent in the to 20" of the soil profile. textures usually range from loam to silt loam in surface mineral 4". Slope is 30%. Clay content is = 35% in surface mineral 4". Site does not have an argillic horizon with > 35% clay

Associated sites

R012XY006ID	Windswept 8-16 PZ ARFR4/POSE
R012XY010ID	North Slope Loamy 12-16 PZ ARTR4/FEID
R012XY012ID	Loamy 12-16 PZ ARTRV/FEID-PSSPS
R012XY020ID	Clayey 13-16 PZ ARAR8/FEID

R012XY029ID	Clayey South Slope 12-16 PZ ARAR8/PSSPS
R012XY032ID	Loamy 8-12 PZ ARTRW8/PSSPS

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tripartita</i>
Herbaceous	(1) <i>Pseudoroegneria spicata ssp. spicata</i> (2) <i>festuca idahoensis</i>

Physiographic features

This site occurs on alluvial and colluvial foothills, mountain slopes and hillsides. Slopes are less than 30 percent and occur on all aspects. Elevation ranges from 5500 to 9000 feet (1600-2800 meters).

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Hill
Elevation	1,680 – 2,740 m
Slope	0 – 30 %

Climatic features

MLRA 12 is dominated by dramatic changes in elevation which, in turn, influence local weather patterns. The intermontane valleys have elevations as low as 3800 feet, while the adjacent mountains may reach more than 12,600 feet. The average annual precipitation for the entire MLRA, based on 10 long term climate stations located throughout the MLRA, is approximately 9.38 inches. However, the dry valleys may have averages as low as 6 inches, while the upper peaks may have averages that exceed 46 inches per year.

Temperatures vary considerably over the year. The average annual temperature is 42.25 degrees F. The average low is 27.4 degrees while the average high temperature is 57 degrees.

In the summer the sun shines 78% of the time, but drops to 40% in the winter. The prevailing wind is location-dependent, and generally flows parallel to the orientation of the dominant valleys. In the summer localized afternoon upslope winds and evening downslope winds are common. The average windspeed is greatest in the spring and early summer.

The frost free period ranges from 102 to 107 days while the freeze free period ranges from 134 to 139 days across the MLRA.

Table 3 Representative climatic features

Frost-free period (average)	110 days
Freeze-free period (average)	140 days

Precipitation total (average)	280 mm
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Influencing water features

This site is not influenced by adjacent wetlands, streams or run on.

Soil features

The soils of this site are gravelly to extremely gravelly loams and silt loams. They are very deep and well drained. The parent material is alluvium and colluvium from quartzite, limestone and metamorphic rock. Gravels often exceed 60 percent by volume in the soil profile below a depth of 10 to 15 inches. The soils have a moderately slow to moderately rapid permeability. The available water-holding capacity is very low to low. The soils have a xeric soil moisture regime, or a xeric bordering on aridic. The soil temperature regime is frigid to cryic.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Very gravelly silt loam (3) Extremely stony
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	150 cm
Surface fragment cover <=3"	10 – 40 %
Surface fragment cover >3"	0 – 50 %
Available water capacity (0-101.6cm)	3.3 – 14.22 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified

Soil reaction (1:1 water) (0-101.6cm)	6.1 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	30 – 60 %
Subsurface fragment volume >3" (Depth not specified)	0 – 30 %

Ecological dynamics

The dominant visual aspect of this site is threetip sagebrush in the overstory and bluebunch wheatgrass and Idaho fescue in the understory. The composition is approximately 55 to 65 percent grasses, 10 to 20 percent forbs and 20 to 30 percent shrubs by weight.

During the last few thousand years, this site has evolved in an arid climate characterized by dry summers and cold, wet winters. Herbivory has historically occurred on this site at low levels of utilization. Herbivores include mule deer, Rocky Mountain elk, pronghorn antelope, big horn sheep and lagomorphs. Fire has historically occurred on the site at intervals of 60 to 80 years.

The Historic Climax Plant Community (HCPC), the Reference State (State 1), moves through many phases depending on the natural and man-made forces that impact the community over time. State 1, described later, indicates some of these phases. The Reference Plant Community Phase is Phase A. This plant community is dominated by threetip sagebrush with bluebunch wheatgrass and Idaho fescue. Subdominant herbaceous species include Sandberg bluegrass and Hoods phlox. There is a variety of other grasses, forbs and shrubs in the plant community that occur in minor amounts. The plant species composition of Phase A is listed later under "Reference Plant Community Phase Plant Species Composition".

Total annual production is 500 pounds per acre (560 kilograms per hectare) in a normal year. Production in a favorable year is 850 pounds per acre (952 kilograms per hectare). Production in an unfavorable year is 275 pounds per acre (308 kilograms per hectare). Structurally, cool season, deep-rooted perennial bunchgrasses are dominant, followed by medium shrubs being more dominant than perennial forbs while shallow rooted perennial bunchgrasses are subdominant.

FUNCTION:

This site is suited for grazing with domestic livestock in late spring, summer, and fall. The site is used by mule deer, Rocky Mountain elk, big horn sheep, lagomorphs, small rodents and predators. This site has limited recreation use for hiking, horseback riding, hunting, off-road vehicles and photography. Due to the low production potential and easy access by animals, this site is easily degraded by improper grazing management or frequent fires.

Impacts on the Plant Community.

Influence of fire:

Three-tip sagebrush exhibits variable sprouting abilities following fire. The specific response may depend on ecotypic differences, fire severity, soil moisture or a combination of these factors. Generally, it re-sprouts vigorously after fire. Three-tip sagebrush sprouts from shallow lateral roots or the root crown. It can also layer. Nearly pure stands can develop after the site burns.

In the absence of normal fire frequency three-tip sagebrush can gradually increase on the site. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, these shrubs can displace many of the primary understory species. Utah juniper can invade the site if a seed source is in the vicinity. See "Influence of juniper invasion" below.

When fires become more frequent than historic levels (60-80 years), three-tip sagebrush is reduced significantly. Rabbitbrush can increase slightly. Three-tip sagebrush may re-sprout vigorously after burning. With continued short fire frequency, three-tip sagebrush can be completely eliminated along with many of the desirable understory species such as bluebunch wheatgrass and Idaho fescue. These species may be replaced by Sandberg bluegrass along with a variety of annual and perennial forbs including noxious and invasive plants. Cheatgrass and medusahead will invade the site at lower elevations. These fine fuels will increase the fire frequency.

Influence of improper grazing management:

Season-long grazing and/or excessive utilization can be very detrimental to this site. This type of management leads to reduced vigor of the bunchgrasses. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to increase in three-tip sagebrush and noxious and invasive plants.

Continued improper grazing management influences fire frequency by increasing these fine fuels. As cheatgrass and/or medusahead increase and become co-dominant with Sandberg bluegrass and other annuals, fires become more frequent. Utah juniper can invade the site if a seed source is in the vicinity.

Proper grazing management that addresses frequency, duration, and intensity of grazing can also keep fine fuels from developing, thereby reducing fire frequency. This can lead to gradual increases in three-tip sagebrush. A planned grazing system can be developed to intentionally accumulate fine fuels in preparation for a prescribed burn. Any brush management should be carefully planned, as a reduction in shrubs without a suitable understory of perennial grasses can increase cheatgrass and/or medusahead which can lead to more frequent fire intervals.

Weather influences:

Above normal precipitation in April, May and June can dramatically increase total annual production of the plant community. These weather patterns can also increase viable seed production of desirable species to provide for recruitment. Likewise, below normal precipitation during these spring months can significantly reduce total annual production and be detrimental to viable seed production. Overall plant composition is normally not affected when perennials have good vigor.

Below normal temperatures in the spring can have an adverse impact on total production regardless of the precipitation. An early, hard freeze can occasionally kill some plants. Prolonged drought adversely affects this plant community in several ways. Vigor, recruitment and production are usually reduced. Mortality can occur. Prolonged drought can lead to a reduction in fire frequency.

Influence of insects and disease:

Outbreaks can affect vegetation health. Mormon crickets and grasshopper outbreaks occur periodically. Outbreaks seldom cause plant mortality since defoliation of the plant occurs only once during the year of the outbreak.

Influence of noxious and invasive plants:

Many of these species add to the fine-fuel component and lead to increased fire frequency. Perennial and annual invasive species compete with desirable plants for moisture and nutrients. The result is reduced production and change in composition of the understory.

Influence of wildlife:

Big game animals use this site in the spring, summer and fall and in moderate winters. Their numbers are seldom high enough to adversely affect the plant community.

Watershed:

Decreased infiltration and increased runoff occur with an increase in three-tip sagebrush. Desired understory species can be reduced. This composition change can affect nutrient and water cycles. Increased runoff also causes sheet and rill erosion. Abnormally short fire frequency also gives the same results, but to a lesser degree. The long-term effect is a transition to a different state.

Influence of juniper invasion:

The following discussion deals with Utah juniper.

In plant communities that are invaded by juniper, the species has a competitive advantage for the following reasons:

- Juniper is very drought tolerant.
- It has the ability to extract soil moisture from a wide range of soil depths.
- Juniper has high evapo-transpiration rates.
- The species intercepts rain and snow before it reaches the soil surface.
- It has the ability to grow as long as there is soil moisture and the temperature is above freezing.
- Juniper has a relatively rapid growth rate and is long-lived. It can readily over-top shade intolerant species which leads to mortality.
- Nutrient cycling is reduced.
- As the canopy closes, juniper gains control of energy capture.

As juniper extracts water, other plants are unable to acquire sufficient water and nutrients to sustain growth and reproduction, thus reducing cover and biomass in the interspaces. After the canopy closes, there is sufficient soil moisture available for shallow-rooted, shade tolerant species to persist directly under the tree.

The following hydrological impacts occur on sites invaded by juniper:

- Infiltration in the interspaces is reduced.
- Run-off increases resulting in increased sheet and rill erosion with elevated sediment loads.
- Soil temperatures increase in the interspaces which results in accelerated drying of the soil surface.
- Increased bare ground in the interspaces.
- Soil moisture storage is reduced.

As bare ground and interconnectiveness of bare ground increases, flow rates are accelerated (reduction of flow sinuosity) and run-off out of the area increases.

Degradation of these systems can result in the formation of a feedback cycle in which greater juniper cover and density results in greater

plant and soil disturbance between the canopies.

In summary, a closed juniper community takes control of the following ecological processes: (1) hydrology, (2) energy capture and (3) nutrient cycling. The changes are primarily driven by the hydrological processes. The development of a closed juniper canopy always results in a transition across the threshold to a different state. Generally, when juniper canopy cover nears 20%, the plant community is approaching the threshold.

Plant Community and Sequence:
Transition pathways between common vegetation states and phases:

- State 1.
- Phase A to B. Develops in the absence of fire and improper grazing management. There is a Utah juniper seed source present in the vicinity near the site.
 - Phase A to C. Results from a fire.
 - Phase A to D. Results from improper grazing management and no fire. There is no Utah juniper seed source present in the vicinity.
 - Phase B to C. Results from a wildfire or brush management.
 - Phase B to A. Occurs with prescribed grazing and brush management or prescribed burning.
 - Phase C to A. Results from prescribed grazing and no fire.
 - Phase D to A. Occurs with prescribed grazing.
 - Phase D to C. Occurs with fire or prescribed burning and prescribed grazing.
 - Phase C to D. Occurs with no fire and improper grazing management.

State 1 Phase C and D to State 2. Develops through frequent fire and improper grazing management. This site has crossed the threshold. It is not economically practical to return this plant community to State 1 with accelerating practices.

State 1, Phase B to State 3. Develops with no fire and improper grazing management from a juniper invaded phase of State 1. This site has crossed the threshold. It is not economically practical to return this plant community to State 1 with accelerating practices.

State 2 to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by improper grazing management and no fire or frequent fire cause this state to cross the threshold and retrogress to a new site with reduced potential. It is not economically practical to return this plant community to State 1 with accelerating practices.

State 3 to unknown site. Continued improper grazing management and lack of fire cause this state to cross the threshold and retrogress to a new site with reduced potential due to significant soil loss and changes in hydrology. It is not economically practical to return this plant community to State 1 with accelerating practices.

Practice Limitations:
Slight limitations exist on this site for implementing vegetative management and facilitating practices. Slight to moderate limitations exist for implementing rangeland seedings due to low available water holding capacity of gravelly soils. Slight limitations also exist for implementing brush management.

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 (%)
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Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 6.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 7.1 plant community composition

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

Wildlife Interpretations Animal Community – Wildlife Interpretations This rangeland ecological site provides diverse habitat for many native wildlife species. Large herbivore use of this ecological site is dominated by mule deer, pronghorn antelope, and elk. Important seasonal habitat is provided for resident and migratory animals including western toad, sagebrush lizard, shrews, bats, jackrabbits, ground squirrels, mice, coyote, red fox, badger, sage-grouse, Ferruginous hawk, prairie falcon, horned lark, and western meadowlark. Changes in the plant community composition can reduce the number and diversity of wildlife species in the area. With reduced shrub cover, shrub-steppe obligate bird species become rare including sage-grouse, brewer's sparrow, sage sparrow, and sage thrasher. Encroachment of noxious and invasive plant species (cheatgrass and medusahead) can replace native plant species which provide critical feed, brood-rearing, and nesting cover for a variety of native wildlife. Water is limited, being provided only by seasonal runoff, artificial water catchments, and spring sites . State 1 Phase 1.1 - Three-tip Sagebrush/ Bluebunch Wheatgrass/ Idaho Fescue/ Sandberg Bluegrass Reference Plant Community (RPC): This plant community provides a diversity of grasses, forbs, and shrubs used by native insect communities that assist in pollination. The reptile and amphibian community is represented by leopard lizard, short horned lizard, sagebrush lizard, western skink, western toad, and northern leopard frog. Amphibians are associated with springs and isolated water bodies adjacent to this plant community. Spring developments that capture all available water would preclude the use of these sites by amphibians. Area sensitive species reliant on the native shrub-steppe plant community include the Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. Habitat (nesting areas, brood-rearing, winter cover and food) for sage-grouse is provided by this diverse plant community. The plant community supports the spring and fall forage and cover needs of mule deer, elk, and pronghorn. The dominant shrub, three-tip sagebrush, provides limited forage for large mammals. A diverse small mammal population including golden-mantled ground squirrels, Great Basin ground squirrel, Idaho pocket gopher, and Merriam's shrew may utilize these areas. State 1 Phase 1.2 - Three-tip Sagebrush / Sandberg Bluegrass/ Utah Juniper Plant Community: This plant community is the result of improper grazing and no fire. An increase in canopy cover of sagebrush and junipers contributes to a sparse herbaceous understory. A reduced herbaceous understory results in lower diversity and numbers of insects. The reptile community will be similar to State 1 Phase 1.1, represented by leopard lizard, short horned lizard, sagebrush lizard, and western skink. The reduced diversity of insects and understory cover may reduce quality of food and cover for reptile populations. As juniper increases, habitat cover for Brewer's sparrow, sage thrasher, and sage sparrow may increase. Remaining sagebrush provides brood-rearing, winter cover, and winter food for sage-grouse but as juniper encroaches the quality of this habitat is severely reduced or eliminated. The plant community supports limited forage habitat during spring and fall for mule deer, elk, and pronghorn. As juniper encroachment occurs, the site will provide additional thermal cover and young of year cover for large mammals. A small mammal population including golden-mantled ground squirrels, jackrabbits, deer mice, and Great Basin kangaroo rats may utilize this site. State 1 Phase 1.3 - Bluebunch Wheatgrass/ Sandberg Bluegrass/ Plant Community: This plant community is the result of fire. The plant community, dominated by herbaceous vegetation with little or no sagebrush provides less vertical structure for animals. Large areas of Phase 1.3 would fragment the reference plant community and would reduce the quality of habitat for shrub-steppe obligate animal species. Insect diversity would be reduced but a diverse native forb plant community would still support select pollinators. The reptiles including short horned lizard and sagebrush lizard would be limited or excluded. As three-tip sagebrush re-establishes, vertical structure for these reptiles will return. The dominance of herbaceous vegetation with little sagebrush canopy cover would prevent use of these areas for nesting by Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. This plant community provides limited brood-rearing habitat for sage-grouse when sagebrush cover habitat is nearby. The plant community would not provide suitable winter cover or winter food for sage-grouse. The dominant herbaceous vegetation improves habitat for grassland avian species (horned lark, vesper sparrow, savannah sparrow, and western meadowlark). Large mammal (mule deer, pronghorn, and elk) use would be seasonal but the site would offer little thermal or young of year cover. State 1 Phase 1.4 - Three-tip Sagebrush/ Sandberg Bluegrass Plant Community: This plant community is the result of improper grazing management and no fire. An increase in canopy cover of sagebrush contributes to a sparse herbaceous understory. Grasses, forbs, and shrubs are used by native insects that assist in pollination but the reduced herbaceous understory results in lower diversity of insects. The reptile community is represented by leopard lizard, short horned lizard, sagebrush lizard, and western skink. The reduced diversity of insects may reduce reptile diversity and populations. Reduced herbaceous understory limits the use of this plant community by avian species. Shrub-steppe obligate bird species include Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. Quality of brood-rearing habitat and nesting cover for sage-grouse is reduced due to low herbaceous canopy cover. The reduced vigor of understory vegetation provides for a shorter forage season for mule deer. The dominant shrub, three-tip sagebrush, provides limited forage value for large mammals. Young of year cover would be provided for deer and pronghorn. A small mammal population including golden-mantled ground squirrels, jackrabbits, and deer mice may utilize this plant community. State 2 - Sandberg Bluegrass/ Cheatgrass and Annual Plant Community: This plant community is the result of improper grazing management and frequent fire. Large areas of State 2 would fragment the reference plant community and would reduce the quality of the habitat for shrub-steppe obligate animal species. The plant community does not support a diverse insect community. The reduced forb component in the plant community would support a very limited population of pollinators. Most native reptilian species would not be supported by this plant community due to loss of sagebrush. As three-tip sagebrush re-establishes, vertical structure for these reptiles will return. The plant community does not support the habitat

requirements for sage-grouse, sage thrasher, Brewer's sparrow, or sage sparrow. Diversity of grassland avian species is reduced due to poor cover and food. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Large mammals may utilize the herbaceous vegetation in the early part of the year when the invasive annuals (cheatgrass) are more palatable. At other times of the year large mammals would not regularly utilize these areas due to poor food and cover conditions. The diversity and populations of small mammals may change due to poor food and cover, and more successful hunting by predators. State 3 - Utah Juniper/ Sandberg Bluegrass/ Annuals Plant Community: This plant community has developed due to continued improper grazing management and lack of fire. An increase in canopy cover of junipers contributes to a sparse shrub (sagebrush) layer and reduced herbaceous understory. A reduced herbaceous understory results in lower diversity and numbers of insects. The reptile community will be represented by leopard lizard, short horned lizard, sagebrush lizard, and western skink but the reduced diversity of insects and understory cover reduces the quality of food and cover for reptile populations. Birds using this site as resident or migratory habitat include Juniper titmouse, western bluebird, and Virginia's warbler. The Juniper titmouse relies heavily on juniper seeds for winter food. As juniper increases and sagebrush decreases, the quality of habitat for Brewer's sparrow, sage thrasher, and sage sparrow will decrease. Habitat for sage-grouse will not be provided by this plant community. The plant community provides limited forage habitat during spring and fall for mule deer, elk, and pronghorn. As juniper encroachment occurs, the site will provide additional thermal and young of year cover for large mammals. Quality of habitat will decline for the small mammal populations including golden-mantled ground squirrels, jackrabbits, deer mice, and Great Basin kangaroo rats. Grazing Interpretations This site is best adapted to livestock grazing in the late spring, summer and fall. Water is usually available in nearby streams or springs. Some areas, especially in limestone hills, may be lacking in natural water. Estimated initial stocking rate will be determined with the landowner or decision-maker. They will be based on the inventory which includes species, composition, similarity index, production, past use history, season of use and seasonal preference. Calculations used to determine estimated initial stocking rate will be based on forage preference ratings.

Hydrological functions

The soils in this site are in hydrologic group B and C. They have moderately low to moderately high runoff potential.

Recreational uses

This site has limited recreation use for hiking, horseback riding, hunting, off-road vehicles and photography.

Wood products

None.

Other products

None.

Inventory data references

Information presented here has been derived from NRCS clipping and other inventory data. Also, field knowledge of range-trained personnel was used. Those involved in developing this site description include: Dave Franzen, co-owner, Intermountain Rangeland Consultants, LLC Jacy Gibbs, co-owner, Intermountain Rangeland Consultants, LLC Jim Cornwell, Range Management Specialist, IASCD Brendan Brazee, State Rangeland Management Specialist, NRCS, Idaho Lee Brooks, Range Management Specialist, IASCD Kirsten May, Resource Soil Scientist, NRCS, Idaho

Other references

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USDI Bureau of Land Management, U.S.

Geological Survey; USDA Natural Resources Conservation Service, Agricultural Research Service; Interpreting Indicators of Rangeland

Approval

Kendra Moseley, 9/21/2020

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.

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Date	01/18/2008
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** Rills rarely occur on this site. If rills are present, they are most likely to occur on slopes greater than 10 percent and immediately following wildfire. Rills are most likely to occur on soils with surface textures of silt loam and clay loam. Gravels on the surface reduce rill development.

- 2. Presence of water flow patterns:** Water flow patterns rarely occur on this site except on slopes greater than 10 percent. When they do occur, they are short, disrupted by cool season perennial grasses and tall shrubs and are not extensive. Gravels reduce water flow patterns and promote infiltration.

- 3. Number and height of erosional pedestals or terracettes:** Pedestals are rare on this site. In areas where slopes are greater than 10% and where flow patterns and /or rills are present, few pedestals may be expected. Terracettes are rare.

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):
Data not available. On sites in mid-seral status, bare ground may range from 30-40 percent but more data is needed.

5. Number of gullies and erosion associated with gullies: Gullies do not occur on this site.

6. Extent of wind scoured, blowouts and/or depositional areas: Wind scoured, blowouts and/or depositional areas usually don't occur. Some wind erosion may occur immediately following a wildfire on soils that have fine textured surface soils.

7. Amount of litter movement (describe size and distance expected to travel): Fine litter in the interspaces may move up to 2 feet or further on slopes greater than 10 percent following a significant run-off event. Coarse litter generally does not move.

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):
Values should range from 3 to 5 but need to be tested.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): The A or A1 horizon is typically 2 to 10 inches thick. Structure ranges from weak very fine and fine granular to weak thin and medium or moderate very thick platy to weak very fine, fine and medium subangular blocky. Soil organic matter (SOM) ranges from 1 to 4 percent.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Bunchgrasses, especially deep-rooted, slow run-off and increase infiltration. Shrubs accumulate snow in the interspaces. Terracettes provide a favorable micro-site for vegetation establishment which further increases infiltration.

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): Compaction layer does not occur.

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: Cool season deep-rooted perennial bunchgrasses >>

Sub-dominant: Tall shrubs=perennial forbs> shallow rooted grasses

Other:

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):
Grass and forb mortality will occur as tall shrubs increase.

14. **Average percent litter cover (%) and depth (in):** Annual litter cover in the interspaces will be 20-30 percent to a depth of <0.1 inches. Under the mature shrubs litter is greater than 0.5 inches. Fine litter can accumulate behind bunchgrasses and shrubs on slopes greater than 10 percent.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual production is 500 lbs. per acre in a year with normal precipitation and temperatures. Perennial grasses produce 55-65 percent of the total, forbs 10-20 percent and shrubs 20-30 percent.
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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: Invasive species include cheatgrass, medusahead, bulbous bluegrass, rush skeletonweed, scotch thistle, spotted and diffuse knapweed.
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17. **Perennial plant reproductive capability:** All functional groups have the potential to reproduce in most years.
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