

Ecological site R013XY040ID Limestone Gravelly 12-16 PZ ARNO4/PSSPS

Last updated: 9/23/2020
Accessed: 05/09/2024

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): 013X–Eastern Idaho Plateaus

Land Resource Unit: B (Northwestern Wheat and Range)
MLRA: 13 (Eastern Idaho Plateaus)

EPA EcoRegion: Level III (Middle Rockies)

LRU notes

013X-Eastern Idaho Plateaus

Precipitation or Climate Zone: 12-16" P.Z.
<https://soils.usda.gov/survey/geography/mlra/index.html>

Classification relationships

Artemisia nova/ Agropyron spicatum 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 any additional water.

Soils are:

not saline or saline-sodic.

moderately deep to very deep, with >35% gravels (<10") and cobbles (10-25") cover. skeletal within 20" of soil surface, fragment percentage increasing with depth

strongly or violently effervescent in surface mineral 10".

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

R013XY001ID	Loamy 12-16 PZ
R013XY002ID	Stony Loam 13-16 PZ ARTRV/PSSPS
R013XY004ID	Shallow Gravelly 12-16 PZ ARTRV/PSSPS
R013XY008ID	Steep South Slopes 12-16 PZ ARTRV/PSSPS

R013XY013ID	Stony 12-16 PZ ARTRV/FEID
R013XY028ID	Shallow Sand 12-16 PZ ARTRV/PSSPS

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia nova</i>
Herbaceous	(1) <i>Pseudoroegneria spicata</i>

Physiographic features

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Hill (3) Fan remnant
Flooding frequency	None
Elevation	1,829–2,134 m
Slope	10–65%
Water table depth	25–152 cm
Aspect	W

Climatic features

MLRA 13, the Eastern Idaho Plateaus, is part of the Northwestern Wheat and Range Region. Its elevation ranges from 4209 to 9331 feet above sea level, with an average elevation of 5787 feet. The average annual precipitation is 16.41 inches, with a range of 13.56 to 18.75 inches, based on ten long term climate stations located throughout the MLRA. A spike in precipitation amount often occurs in late spring, usually in May.

Temperatures vary widely in the MLRA throughout the year. A maximum temperature of 103° Fahrenheit occurred at the McCammon climate station (# 105716; elevation 4770 feet), while a minimum of -41° was recorded at the Kilgore station (#104908). At all stations temperatures throughout the year are usually below the national average. Kilgore also recorded the greatest annual snowfall amount of 217 inches. The average temperature is 41.4 degrees F. with an average high of 55.3 degrees and an average low of 27.5 degrees.

The frost-free period ranges from 64 to 90 days, while the freeze-free period can be 98 to 123 days.

Table 3. Representative climatic features

Frost-free period (average)	90 days
Freeze-free period (average)	123 days
Precipitation total (average)	483 mm

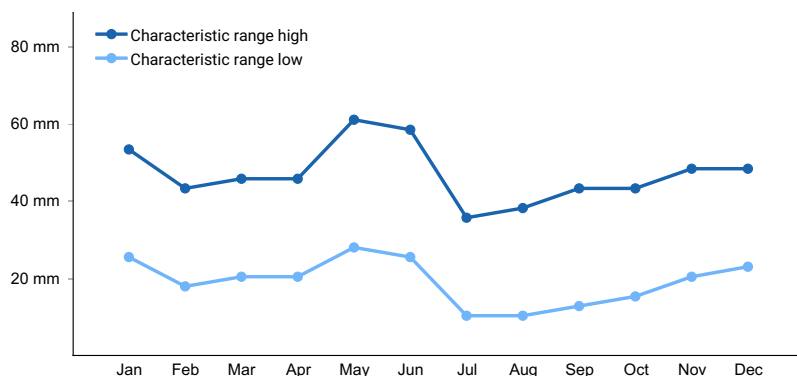


Figure 1. Monthly precipitation range

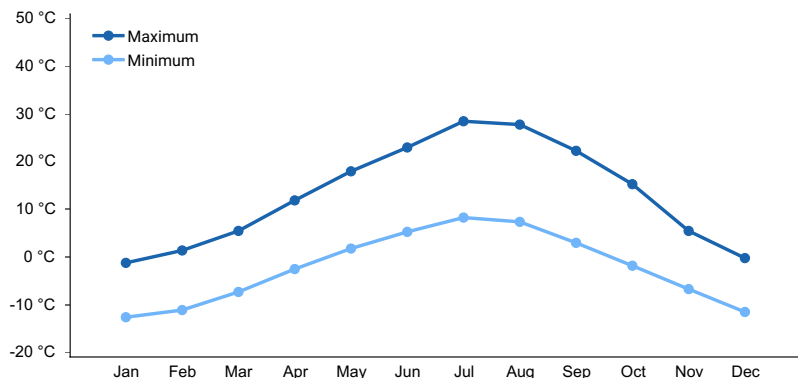


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

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

Soil features

The soils are well drained and moderately deep to very deep to bedrock. They occur on limestone hillslopes and mountain slopes and are formed in slope alluvium and residuum. Textures are dominantly gravelly loam, very gravelly loam, gravelly silt loam, and extremely gravelly loam. Available water holding capacity (AWC) is very low to low. Water erosion can be very high when the plant cover is reduced and slope increases. These soils are characterized by a xeric or an aridic bordering on xeric soil moisture regime. The soils are either a mesic or frigid soil temperature regime.

Soil Series Correlated to this Ecological Site

Crossley
Lonjon
Pinegap
Pyrat

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Very gravelly silt loam (3) Extremely gravelly
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	25–152 cm
Surface fragment cover ≤3"	15–40%
Surface fragment cover >3"	0–20%
Available water capacity (0-101.6cm)	2.29–12.7 cm
Calcium carbonate equivalent (0-101.6cm)	0–20%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5

Soil reaction (1:1 water) (0-101.6cm)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	35–60%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

Ecological Dynamics of the Site:

The dominant visual aspect is black sagebrush overstory with bluebunch wheatgrass in the understory. Composition by weight is approximately 45 to 55 percent grasses, 5 to 15 percent forbs, and 35 to 45 percent shrubs.

During the last few thousand years, this site has evolved in a semi-arid climate characterized by warm, dry summers and cold winters. Herbivory has historically occurred on the site at low levels of utilization. Herbivores include pronghorn antelope, mule deer, lagomorphs, and small rodents.

Fire has historically occurred on this site every 80 to 100 years. Fire occurs only in years with above normal precipitation.

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 black sagebrush in the overstory and bluebunch wheatgrass in the understory. Subdominant species usually include Sandberg bluegrass, Nevada bluegrass, Hoods phlox, and green rabbitbrush. There are a variety of other grasses, forbs, and shrubs that occur in the plant community 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 Kg/ha) in a normal year. Production in a favorable year is 800 pounds per acre (896 Kg/ha). Production in an unfavorable year is 350 pounds per acre (392 Kg/ha). 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 provides food for mule deer year long. It is best suited for livestock use in the late spring, early summer, and fall. The site provides little recreational value.

Due to the gravelly surfaces and relatively steep slopes on this site, it is fairly resistant to disturbances that can potentially degrade the site. But once degradation starts, steep slopes can accelerate degradation due to erosion.

Impacts on the Plant Community.

Influence of fire:

This site historically had a very low fire frequency, approximately every 80-100 years. Most of the shrubs evolved in the absence of fire, therefore they can be severely damaged or killed when burned. Bluebunch wheatgrass is usually maintained in the community. Sandberg bluegrass and bottlebrush squirreltail can increase in the community with fire. When fires become more frequent than the historic levels (80-100 years), annuals and noxious perennials can invade the plant community. Cheatgrass can be a troublesome invader at lower elevations on this site after fire, preventing perennial grass and shrub re-establishment and increasing the fire frequency. In the absence of fire, Utah juniper can invade the site if there is a seed source in the vicinity. See "Influence of juniper invasion" below.

Influence of improper grazing management:

Black sagebrush, spiny hopsage, and winterfat can all be impacted by improper grazing management. Relatively low levels of utilization by cattle and sheep are needed to maintain the shrub component. Cheatgrass can invade the site at lower elevations. Utah juniper can invade if there is a seed source in the vicinity.

Proper grazing management can maintain the integrity of the plant community.

Weather influences:

Above normal precipitation in April, May, and June can dramatically increase total annual production. These weather patterns can also increase viable seed production of desirable species to provide for recruitment. Extended periods of drought significantly impact this site due to the low water holding capacity and shallow soil. Extended drought reduces vigor of the perennial grasses and palatable shrubs. Extreme drought may cause plant mortality. An early, hard freeze can occasionally kill some plants.

Influence of Insects and disease:

Outbreaks can affect vegetation health. An outbreak of a particular insect is usually influenced by weather but no specific data is available for this site. Mormon cricket 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:

Annual and perennial invasive species compete with desirable plants for moisture and nutrients. The result is reduced production and change in composition of the understory. Cheatgrass can be an invasive plant on this site, especially after fire. Once it becomes established the fire frequency increases. As a result, the shrub component can be lost.

Influence of wildlife:

Relatively low numbers of wildlife use this site and have little impact on it. Mule deer are the dominant large herbivore using the site. They use the site yearlong but prefer it in the spring, fall, and early winter.

Watershed:

Decreased infiltration and increased runoff occur when black sagebrush is removed with frequent fires, particularly the year following the fire event. The increased runoff also increases sheet and rill erosion. 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 hydrologic 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. Improper grazing management could also be present. There is a juniper seed source near the site.

Phase A to C. Usually results from fire.

Phase A to D. Results from improper grazing management and no fire.

Phase B to C. Results from fire.

Phase B to A. Occurs with prescribed grazing.

Phase C to A. Results from prescribed grazing and no fire.

Phase D to A. Occurs with proper grazing management.

State 1 Phase C and D to State 2. Develops through frequent fire and improper grazing management. The site has crossed the threshold to this state. It is economically impractical 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. The site has crossed the threshold to this state. It is economically impractical to return this plant community to State 1 with accelerating practices.

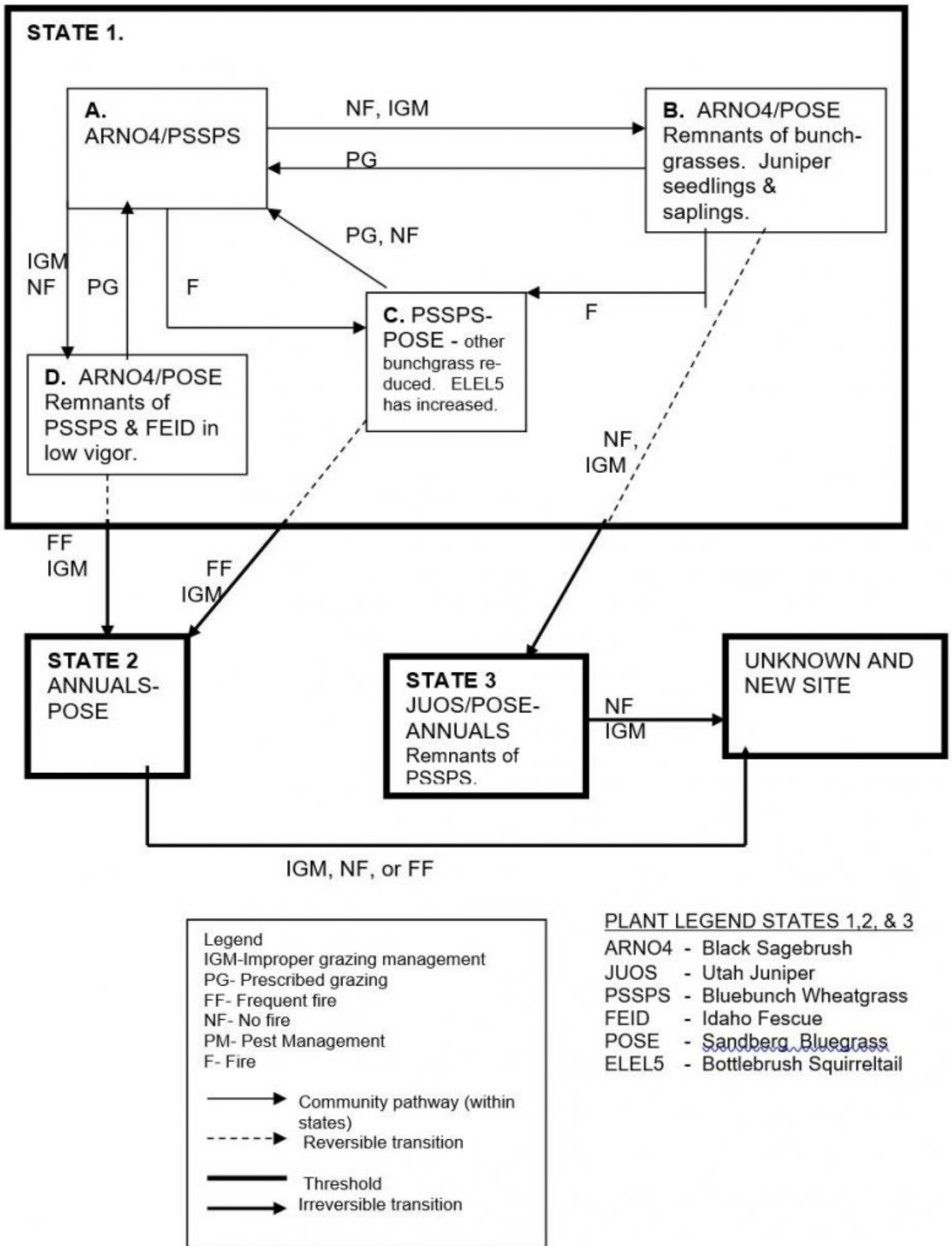
State 2 to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by improper grazing management and no fire or frequent fire cause this state to cross the threshold and retrogress to a new site with reduced potential. It is economically impractical to return this plant community to State 1 with accelerating practices.

State 3 to unknown site. Continued lack of fire and improper grazing management 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 economically impractical to return this plant community to State 1 with accelerating practices.

Practice Limitations:

Slight limitations exist for implementing vegetative management practices on this site. Slight to moderate limitations exist for implementing facilitating practices on this site due to steep slopes. Severe limitations exist for implementing rangeland seeding on this site due to steep slopes. Brush management practices are generally not recommended for use on this site.

State and transition model



State 1
 State 1 Phase A
 Community 1.1

State 1 Phase A

Reference Plant Community Phase. This plant community is dominated by black sagebrush in the overstory and bluebunch wheatgrass in the understory. Subdominant species usually include Sandberg bluegrass, Nevada bluegrass, Hoods phlox, and green rabbitbrush. There are a variety of other grasses, forbs, and shrubs that occur in the plant community in minor amounts. The natural fire frequency is about 80-100 years.

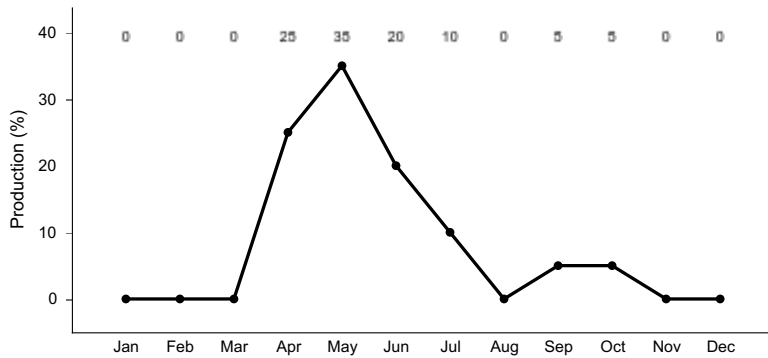


Figure 3. Plant community growth curve (percent production by month). ID0810, ARNO4/PSSPS.

State 2 State 1 Phase B

Community 2.1 State 1 Phase B

This plant community is dominated by black sagebrush with Sandberg bluegrass in the understory. Bluebunch wheatgrass and other deep-rooted perennial bunchgrasses are present but in reduced amounts and in low vigor. Utah juniper has invaded the site in the form of seedlings and saplings because a juniper seed source is in the vicinity. Some annual grasses have invaded. This phase has developed due to no fire and improper grazing management.

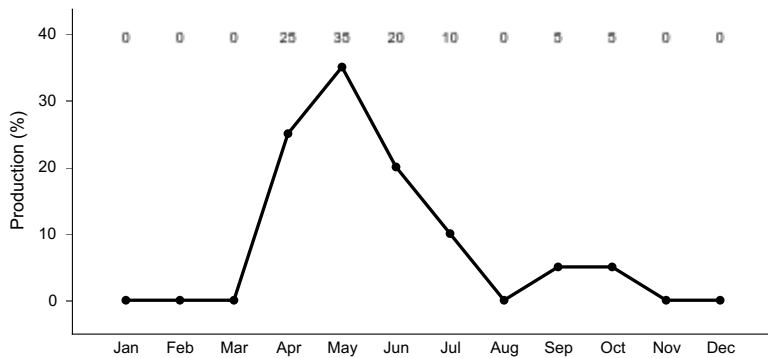


Figure 4. Plant community growth curve (percent production by month). ID0810, ARNO4/PSSPS.

State 3 State 1 Phase C

Community 3.1 State 1 Phase C

This plant community is dominated by bluebunch wheatgrass and Sandberg bluegrass. Bottlebrush squirreltail has increased and a variety of forbs are present. Rabbitbrush and horsebrush may have increased. Some annual grasses may have invaded at lower elevations. This phase has developed due to fire.

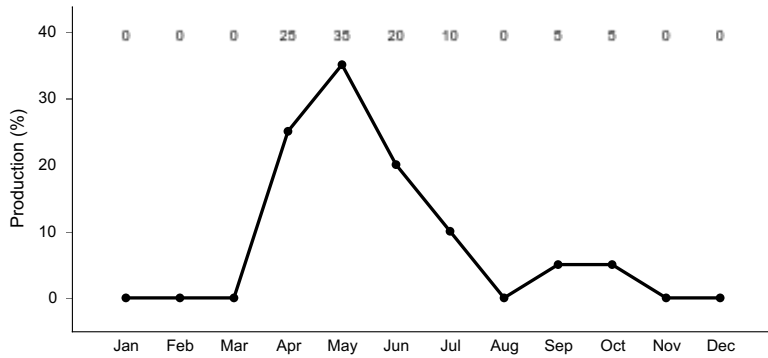


Figure 5. Plant community growth curve (percent production by month). ID0810, ARNO4/PSSPS.

**State 4
State 1 Phase D**

**Community 4.1
State 1 Phase D**

This plant community is dominated by black sagebrush with Sandberg bluegrass in the understory. Bluebunch wheatgrass and other deep-rooted perennial bunchgrasses are present but in reduced amounts and in low vigor. Some annual grasses have invaded. There is no juniper seed source in the vicinity. This phase has developed due to improper grazing management and no fire.

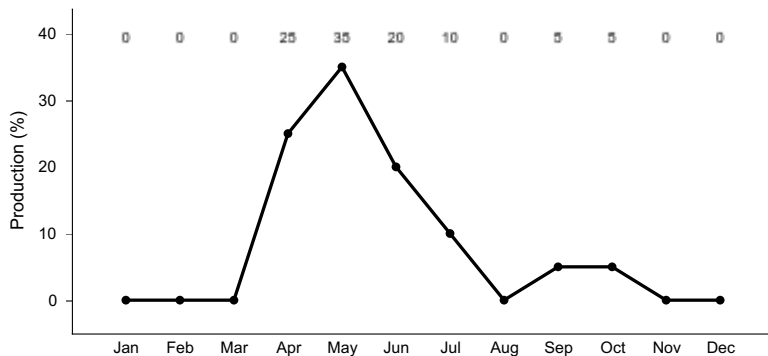


Figure 6. Plant community growth curve (percent production by month). ID0810, ARNO4/PSSPS.

**State 5
State 2**

**Community 5.1
State 2**

This plant community is dominated by annuals and Sandberg bluegrass. Cheatgrass may be present at lower elevations along with a variety of forbs including noxious plant species. The community has developed due to frequent fire and continued improper grazing management. Some soil loss has occurred. The site has crossed the threshold. It is not economical to return this site to State 1 with accelerating practices.

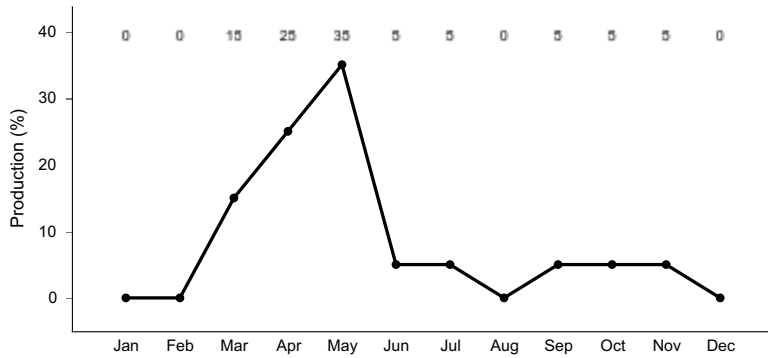


Figure 7. Plant community growth curve (percent production by month). ID0811, POSE-BRTE/ANNUALS.

**State 6
State 3**

**Community 6.1
State 3**

This plant community is dominated by Utah juniper. Remnants of bluebunch can be found in the understory usually near the trees. Shallow rooted grasses, such as Sandberg bluegrass and annuals can be found in the interspaces. Few shrubs are present. When shrub cover is below 10-15%, bare ground is above 25-30%, and juniper cover is greater than 20% the site has crossed the threshold. It is economically impractical to return this plant community to State 1 with accelerating practices. This state has developed in the absence of fire. Improper grazing management can contribute to this state.

**State 7
State 4**

**Community 7.1
State 4**

Unknown Site. This plant community has gone over the threshold to a new site. Site potential has been reduced. Significant soil loss has occurred. Infiltration has been reduced and run-off has become more rapid. This community has developed due to continued improper grazing management and no fire, or frequent fires from State 2 or with no fire and improper grazing management from a juniper invaded phase of State 3. It is economically impractical to return this plant community to State 1 with accelerating practices.

Additional community tables

Animal community

Wildlife Interpretations.
Animal Community – Wildlife Interpretations

This rangeland ecological site provides habitat for select native wildlife species that can tolerate cold sites, high in elevation, with a sparse plant community. Large herbivore use of the reference plant community is dominated by mule deer and pronghorn antelope. The site can provide winter habitat for these large mammals. The rangeland provides important seasonal habitat for resident and migratory animals including western toad, sagebrush lizard, western rattlesnake, shrews, bats, jackrabbits, ground squirrels, mice, coyote, red fox, badger, sage-grouse, Ferruginous hawk, prairie falcon, horned lark, and western meadowlark. Sage-grouse and Idaho pocket gopher are area sensitive species that may be present on this site. In isolated areas encroachment of noxious and invasive plant species (cheatgrass and tumbled mustard) 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 – Black Sagebrush/ Bluebunch Wheatgrass 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 common sagebrush lizard, western rattlesnake, northern leopard frog, and western toad. 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. Birds that may be resident or migratory include mountain bluebird, lazuli bunting, vesper sparrow, grasshopper sparrow, and lesser goldfinch. Nesting cover, brood-rearing habitat, winter cover, and winter food for sage-grouse are provided by this plant community. Black sagebrush is desirable browse for mule deer and pronghorn. The plant community provides spring, fall, and winter food for mule deer and pronghorn. A diverse small mammal population may include golden-mantled ground squirrels and chipmunks.

State 1 Phase 1.2 - Black Sagebrush/ Sandberg Bluegrass/ Utah Juniper Plant Community: This plant community is the result of improper grazing management and no fire. An increase in canopy cover of sagebrush and juniper 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 the State 1 Phase 1.1 community represented by common sagebrush lizard and western rattlesnake. The reduced diversity of insects and understory cover may reduce the quality of food and cover for reptile populations. As juniper increases, habitat for Brewer's sparrow, sage thrasher, and sage sparrow may increase. Black sagebrush provides brood-rearing habitat, winter cover, and winter food for sage-grouse, but as juniper encroaches the quality of this habitat is severely reduced or eliminated. As juniper encroaches the site will provide additional thermal and young of year cover for mule deer. A small mammal population including golden-mantled ground squirrels, chipmunks, and yellow-bellied marmots may utilize this site.

State 1 Phase 1.3 – Bluebunch Wheatgrass/ Sandberg Bluegrass Plant Community: This phase has developed due to fire. The plant community, dominated by herbaceous vegetation with little or no sagebrush provides less vertical structure for animals. Insect diversity would be reduced with the loss of sagebrush but a native forb plant community similar to the one in State 1 Phase 1.1 would still support select pollinators. Encroachment of rabbitbrush and horsebrush would add fall pollinator habitat to the site. Until rabbitbrush is established diversity and populations of reptiles would be limited. The dominance of herbaceous vegetation with no sagebrush canopy cover would eliminate use of this area for nesting, winter cover, and winter feeding for sage-grouse. This plant community provides limited brood-rearing habitat for sage-grouse when site is adjacent to sagebrush cover. The dominant herbaceous vegetation improves habitat for grassland bird species (horned lark and western meadowlark). Winter habitat for large mammals would be reduced or eliminated with the loss of black sagebrush. Small mammal diversity and populations would be reduced due to a loss of cover and subsequent increase in success of hunting by predators.

State 1 Phase 1.4- Black Sagebrush/ Sandberg Bluegrass Plant Community: This phase has developed due to improper grazing management and no fire. The animal community would be similar to that in State 1 Phase 1.1. The reduced vigor and canopy cover of forbs would lower the quality of habitat for pollinators. The reptile community includes sagebrush lizard and western rattlesnake. The reduced diversity of insects and understory cover may reduce the quality of food and cover for reptile populations. The site would provide winter cover and winter food for sage-grouse. The quality of brood-rearing habitat and nesting cover for sage-grouse would be reduced as the herbaceous understory is depleted. Mule deer and pronghorn may utilize this site for winter habitat. A small mammal population including golden-mantled ground squirrels, chipmunks, and yellow-bellied marmots may utilize this site.

State 2 - Annuals/ Sandberg Bluegrass Plant Community:

This plant community is the result of continued improper grazing management and fire. The reduced forb and shrub components in the plant community would support a very limited population of pollinators. Most reptilian species identified in State 1 Phase 1.1 are not supported with food, water, or cover. This plant community does not support the habitat requirements for sage-grouse. Diversity of grassland avian species is reduced due to poor cover and available food. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Hunting success by raptors may increase. 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. Small mammal populations and diversity would be reduced due to poor quality cover, forage, and an increase in the success of hunting by predators.

State 3 – Utah Juniper/ Sandberg Bluegrass/ Annuals Plant Community: This state has developed due to improper

grazing management and no fire. The loss of native understory vegetation will reduce insect diversity on the site. The lack of flowering plants reduces use by pollinators like butterflies and moths. Reptilian species present would be similar to the species identified in State 1 Phase 1.1. This plant community does not support the habitat requirements for sage-grouse. Resident and migratory birds using this site include Juniper titmouse, western bluebird, and Virginia's warbler. The Juniper titmouse relies heavily on juniper seeds for winter food. Hunting success by raptors may decrease due to a heavy overstory of juniper. The plant community supports limited forage habitat for mule deer in the spring and fall. Winter cover and food is provided for mule deer. As juniper encroaches the site will provide additional thermal cover for large mammals.

Grazing Interpretations.

This site is best adapted for livestock grazing in the late spring, early summer, and fall. Natural water supply is limited or absent; however, water is generally available on adjacent sites.

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 D. They have high runoff potential.

Recreational uses

This site is open space on steep terrain with low growing vegetation and generally offers little recreational activities.

Wood products

None.

Other products

None.

Other information

Field Offices

American Falls

Blackfoot

Burley

Driggs

Idaho Falls

Malad

Pocatello

Rexburg

Soda Springs

St. Anthony

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
Kristen May, Resource Soil Scientist, NRCS, Idaho

Type locality

Location 1: Bear Lake County, ID	
Location 2: Bear Lake County, ID	
Township/Range/Section	T15S R45E S13

Other references

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USDI Bureau of Land Management, US Geological Survey; USDA Natural Resources Conservation Service, Agricultural Research Service; Interpreting Indicators of Rangeland Health. Technical Reference 1734-6; Version 4-2005.

Approval

Kendra Moseley, 9/23/2020

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	04/30/2008
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** rarely occur on this site due to the gravelly surface soils.

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2. **Presence of water flow patterns:** rarely occur on this site. When they do occur they are short and disrupted by cool season grasses, shrubs and surface stones. They are not extensive.
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3. **Number and height of erosional pedestals or terracettes:** can occur on the site especially where water-flow patterns are present
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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** ranges from 30-40 percent but additional data is needed.
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5. **Number of gullies and erosion associated with gullies:** none.
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6. **Extent of wind scoured, blowouts and/or depositional areas:** usually not present.
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7. **Amount of litter movement (describe size and distance expected to travel):** fine litter in the interspaces typically moves up to three feet. Coarse litter generally does not move.
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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):** values should range from 4 to 6 but needs to be tested.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** structure ranges from weak and moderate fine granular to moderate medium and thick platy. Soil organic matter (SOM) ranges from 1 to 4 percent. Surface color ranges from dark grayish brown to brown to dark yellowish brown. The A or A1 horizon is typically 2 to 10 inches thick.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** bunchgrasses, especially deep rooted perennials, slow runoff and increase infiltration. Medium height shrubs accumulate some snow in the interspaces.
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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):** not present.
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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: cool season deep rooted perennial bunchgrasses

Sub-dominant: medium shrubs

Other: perennial forbs

Additional: shallow rooted bunchgrasses

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** very little mortality or decadence is expected on this site. Mortality of shallow rooted grasses may occur from extended periods of drought.
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14. **Average percent litter cover (%) and depth (in):** additional data is needed but is expected to be low and at a shallow depth.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** is 500 pounds per acre (560 Kg/ha) in a year with normal precipitation and temperatures. Perennial grasses produce 45-55 percent of the total production, forbs 5-15 percent and shrubs 35-45 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:** includes cheatgrass at lower elevations, rush skeletonweed, musk thistle, scotch thistle, leafy spurge, tansymustard, Jim Hill mustard, yellow salsify, burr buttercup, and diffuse and spotted knapweed.
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17. **Perennial plant reproductive capability:** all functional groups have the potential to reproduce in normal and favorable years.
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