USDA Natural Resources Conservation Service

Ecological site R043BY011ID
Riparian SALIX/CAREX

Last updated: 2/03/2020
Accessed: 05/19/2024

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): 043B–Central Rocky Mountains

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434 – Central Rocky Mountains and Foothills – In 2016, a revision to Agricultural Handbook 296 was drafted, changing the MLRA naming convention. In response to these noted changes, Region 4 proactively drafted changes to MLRA 43A, 43B, and 43C. In these changes, 43B has been divided into subsequent MLRA's, LRU's and Subsets. The Central Rocky Mountains within Wyoming (southern extent of 43B) was divided into MLRA 434. (03 correlates to LRU C as of date 9/2018).

Further information regarding MLRAs, refer to: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.
Available electronically at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook.

Classification relationships

Major Land Resource Area (MLRA): 043B–Central Rocky Mountains
Land Resource Unit: E (Rocky Mountain Range and Forested)

EPA EcoRegion: Level III (Middle Rockies)

Ecological site concept

Site receives additional water.
Soils are:
not saline or saline-sodic.
Deep to very deep, not skeletal within 20" of soil surface.
Season water table <12" along seeps and springs
Not strongly or violently effervescent in surface mineral 10".
Slope is < 30%.
Clay content is = <35% in surface mineral 4".
Site does not have an argillic horizon with > 35% clay.

Associated sites

R043BY002ID	**Granitic 22+ PZ ARTRV/FEID**

R043BY004ID	**Shallow Fractured Stony Loam 16-22 PZ ARTRV/FEID**
R043BY007ID	**Meadow DECA18-CANE2**
R043BY008ID	**Dry Meadow PONE3-PHAL2**
R043BY009ID	**Loamy 16-22 PZ ARTRV/FEID**
R043BY014ID	**Wet Meadow (Muck) SALIX/CAREX**
R043BY017ID	**Shallow Stony 22+ PZ ARTRV/FEID**
R043BY018ID	**South Slope Stony 22+ PZ PSSP6-FEID**
R043BY019ID	**North Slope Loamy 16-22 PZ SYORU/FEID-PSSPS**
R043BY020ID	**South Slope Gravelly 16-22 PZ ARTRV/BRMA4-ELTRT**
R043BY022ID	**Windswept Mountain Ridge 22+ PZ FEID-CAREX**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix*
Herbaceous	(1) *Carex*

Physiographic features

This site occurs on level to nearly level valley floors. Slopes are less than 6 percent. Elevations are 6000 to 10000 feet (1800-3050 meters).

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Fan remnant (3) Valley floor
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Elevation	1,829–3,048 m
Slope	1–6%
Water table depth	5–30 cm
Aspect	Aspect is not a significant factor

Climatic features

The Central Rocky Mountains range in elevation from 6000 to 10000 feet above sea level with some peaks reaching over 12000 feet. The average annual precipitation, based on 10 long term climate stations located throughout the MLRA , is 21 inches. The annual average minimum is 18 and the annual average maximum recorded is 24 inches. The annual average temperature is 41.7 degrees Fahrenheit. The annual average low is 26.7 and the annual average high is 56.7 degrees F. The frost free period ranges from 58 to 80 days while the freeze free period ranges from 90 to 116 days.

Table 3. Representative climatic features

Frost-free period (average)	80 days
Freeze-free period (average)	116 days
Precipitation total (average)	610 mm

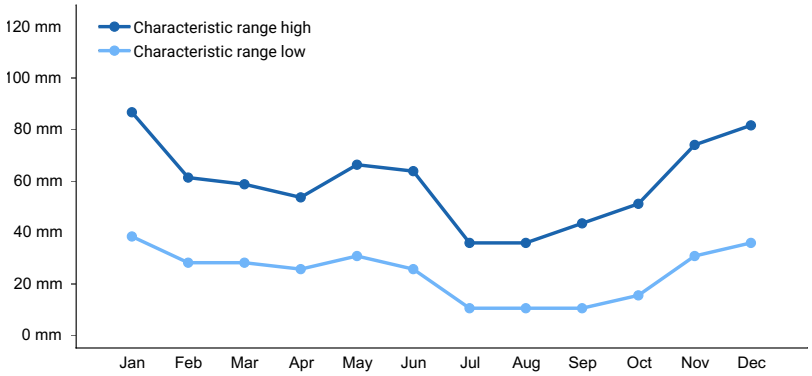


Figure 1. Monthly precipitation range

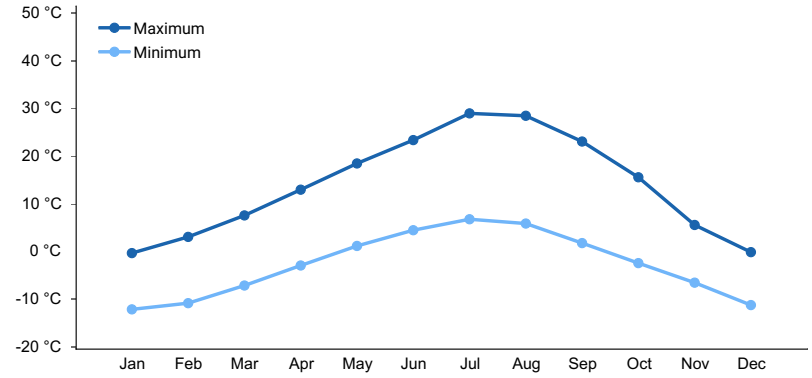


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

This site is dependent on a water table from near the surface to 12 inches. The willows are dependent on frequent flooding with brief to prolonged duration. The soils must be coarse to allow aerated water to pass by the root system.

Soil features

The soils in this site are usually poorly to very poorly drained and have moderate to rapid permeability. They are associated with water courses. Soil depth is usually very deep. The surfaces are dark colored. The soils are mainly of mixed gravelly and sandy alluvium with coarse fragments ranging from 5 to 40 percent. Surface textures are fine sandy loam, sandy loam, and loam. The soils usually have very little development. They have water tables near the surface to 12 inches depth through the growing season. These soils are commonly flooded for short periods in the spring. Deposition occurs during flooding. They are moist throughout the growing season. Plant growth depends more on the presence of the fluctuating water table than the moisture holding capacity of the soil.

Soil Series Correlated to this Ecological Site

Redfish Tepete

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Mucky sandy loam
Family particle size	(1) Sandy
Drainage class	Poorly drained
Permeability class	Moderate to moderately rapid
Soil depth	152 cm
Surface fragment cover <=3"	0–20%

Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	5.08–38.1 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	4.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–40%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

The dominant visual aspect of this site is a variety of willow species with a dominantly sedge understory. This site may occur in complex with dry meadow and meadow range sites in the flood plain. Composition by weight is approximately 30 to 40 percent grass, 5 to 15 percent forbs, and 50 to 60 percent shrubs.

During the last few thousand years, this site has evolved in a semi-arid climate characterized by dry summers and cold, wet winters. The site has evolved on flood plains that have occasional to frequent and brief to very brief flooding. This flooding scours some areas and deposits sediment in others. This disturbance is necessary to provide exposed, moist mineral soil with full sunlight to germinate willows. Depositional areas can bury parts of limbs and twigs to start new plants. Scouring can also expose existing tree roots that will sprout. A water table near the surface to within 12 inches of depth is necessary to provide season long moisture for the growth of the willow species. Herbivory has historically occurred on this site at low levels of utilization. Herbivores include mule deer, moose, Rocky Mountain elk, and beaver.

Fire has played a minimum role in maintaining the plant community. When fire does occur, almost all species resprout from the roots or crowns. Fire can cause some bare soil with full sunlight to germinate seed of willow species. The fire frequency on the site is dependent on the frequency of fire on adjacent range sites and moisture in the fuels on the site. The normal fire frequency is 50 to 100 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 an overstory of a variety of willow species. The herbaceous layer contains a variety of sedges and some tufted hairgrass. A variety of forbs occur on the site in minor amounts. The plant species composition of Phase A is listed later under “Reference Plant Community Phase Plant Species Composition”.

The total annual production is 3300 pounds per acre (3696 kilograms per hectare) in a normal year. Production in an unfavorable year is approximately 2800 pounds per acre (3136 kilograms per hectare). In a favorable year, production is approximately 3800 pounds per acre (4256 kilograms per hectare). Structurally, shrubs are very dominant followed by grass-like species which are more dominant than forbs.

FUNCTION:

This site is suited for livestock grazing in late spring, summer, and fall. This site is usually heavily used by livestock, particularly in the summer. Prescribed grazing must be planned to avoid degradation of the site. Special management should be used to protect the adjacent water courses and the associated values. This is an important site for wildlife for cover and food. If the site is associated with perennial streams, a fisheries resource could also be present. The site has high value for recreation such as camping and picnicking. Hunting opportunities are good

where the site is isolated from human activity. Degradation of the site can occur with high recreational use, improper grazing management, and down cutting of the adjacent stream course or upper watershed conditions that alter the flood frequency or duration.

Impacts on the Plant Community:

Influence of fire:

This site can burn from wildfire. Burning usually occurs from fire spreading from an adjacent ecological site when the fuel moisture levels are low in this site. Since the plant community in this site is strongly influenced by a water table allowing deep-rooted plants to grow throughout most of the summer, the fuels often are not dry enough to burn. The fire frequency is usually longer than adjacent range sites. Most of this site is associated with the sagebrush steppe. The normal fire frequency on the site is estimated at 50-100 years. A wildfire can kill most of the above ground plant material. Most of the shrubs adapted to the site are root-sprouting plants and regenerate rapidly. The herbaceous layer is mostly rhizomatous species and will resprout. Fire can provide some areas of exposed mineral soil for willows to establish new plants.

Influence of improper grazing management:

Season-long grazing and/or excessive utilization can be very detrimental to this site. Fall use, year after year, will result in excessive utilization on the willow regeneration. This may lead to a single age class stand of shrubs that are tunneled. Uncontrolled beaver populations may eliminate some willows. Due to improper grazing management grasses, forbs, and shrubs can all decline in the plant community. Shrubs usually increase initially, but with continued improper management, will decline.

Continued improper grazing management will result in a stand of forbs and Kentucky bluegrass with reduced vigor. The ability of the community to withstand seasonal flooding is reduced and down cutting of an adjacent stream channel can result. This down cutting will lower the water table and thereby reduce the potential of the site. This site is particularly difficult to manage because animals seek out the site for shade and it is usually adjacent to water.

Proper grazing management that addresses frequency, duration, and intensity of grazing can maintain the integrity of the plant community and the water table on which it is dependent. Upstream watershed conditions must be maintained to have normal run-off events including moderate flooding.

Weather influences:

Because of the deep soils, the influence of the water table, seasonal flooding, and run-on, the production of this site changes little during wet or dry precipitation years. The overall production can be influenced adversely with prolonged drought. Prolonged drought can increase fire frequency. 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 run-off and flooding. An early, hard freeze can occasionally kill some plants. An early frost can stop the growth on the shrubs. Low temperatures can result in lower total production.

Influence of Insects and disease:

Periodic disease and insect outbreaks can affect vegetation health. An outbreak of a particular insect is usually influenced by weather but no specific data for this site is available.

Influence of noxious and invasive plants:

Annual and perennial invasive species can compete with desirable plants for moisture and nutrients. The result is reduced production and change in composition of the understory. There are several noxious or invasive plants that are adapted to this site. Some invasive species include whitetop, leafy spurge, dock, Canadian thistle, reed canarygrass, foxtail barley, perennial pepperweed, and teasel. Other invasive species may include meadow foxtail, redtop, and Kentucky bluegrass

Influence of wildlife:

This site is important for many species of mammals and birds for food and life cycles. Total numbers are seldom high enough to adversely affect the plant community. The site is primarily used in the late spring, summer, and fall by big game. Many birds use the site for food, nesting, or brood rearing in the late spring, summer, and fall.

Watershed:

The largest threat to degradation of this site is the lowering of the water table and changes in flooding characteristics either from incised channels or upstream conditions. Off-site conditions can affect the gradient of adjacent stream channels that can affect the water table. If the perennial grass, sedge and shrub cover is depleted, down cutting can be accelerated within the site. High run-off events from the adjacent uplands can severely damage or change the normal stream channel on the site. As the water table is lowered, productive potential is lost. Eventually the water table is below the root zone of the adapted perennial grasses and shrubs. These are ultimately replaced by perennial forbs and shallow rooted grasses. Extreme down cutting and lowering of the water table can move the site across the threshold to a new, less productive site. Severe down-cutting can result in a plant community that resembles an upland site. Reducing the frequency of flooding can adversely effect the regeneration of willows, leading to a decadent or dead overstory of old shrubs with no regeneration.

Plant Community and Sequence:

Transition pathways between common vegetation states and phases:

State 1.
Phase A to B. Develops with much reduced flooding frequency.
Phase A to C. Develops with improper grazing management.
Phase A to D. Develops with wildfire.
Phase A to E. Develops with uncontrolled beaver populations.
Phase B to A. This will occur with normal flooding frequency returning and prescribed grazing.
Phase C to A. This results from prescribed grazing.
Phase D to A. Results from no recent fires and prescribed grazing.
Phase E to A. Results from controlling the beaver population and prescribed grazing.

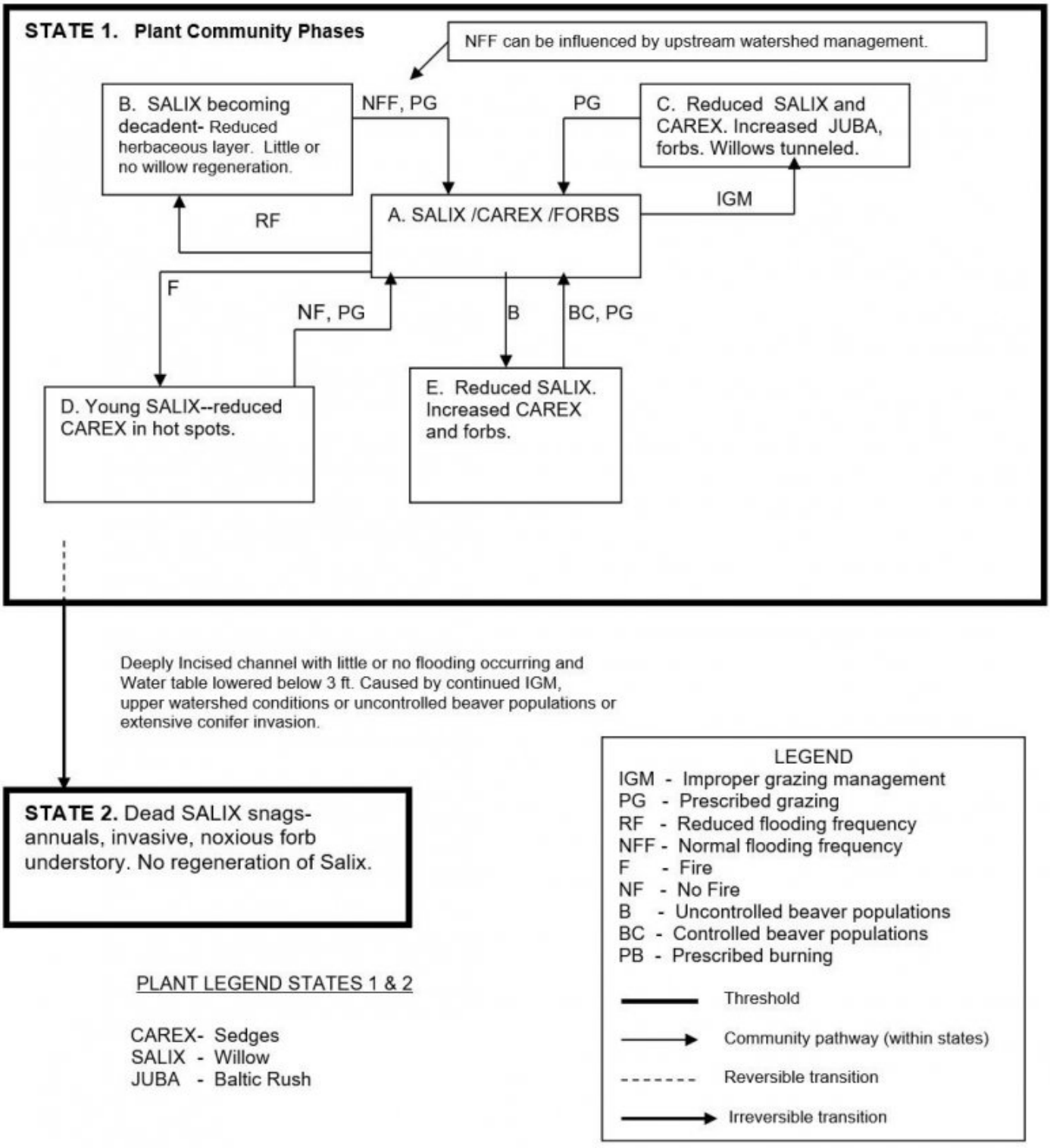
State 1 to State 2. This results from a deeply incised channel that lowers the water table and significantly reduces the flood frequency. The flood frequency can also be reduced from significant changes in the upper watershed that significantly changes runoff events, such as increased conifers, instream water diversions and prolonged drought. Improper grazing management has continued. Uncontrolled beaver populations can take out all willows and some understory plants. Improper grazing management can cause down cutting which results in a lowered water table. There is reduced scouring and sediment deposition.

The site has crossed the threshold. This state cannot be returned to State 1 without raising the water table and restoring flood frequency. This might be done over time using structures or bio-engineering practices, but the plant community may take many years to approach the plant community in State 1.

Practice Limitations:

Use of equipment is usually not feasible for seeding. Hand seeding or aerial seeding can be considered following a fire or other disturbance. Brush management is not recommended. The shrubs have high value for stream bank stabilization, channel protection, and wildlife habitat. Special management practices need to be used to protect this site from deterioration. There are slight limitations to implement vegetative management practices except for avoidance of grazing on wet soils.

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 an overstory of a mixed age stand of a variety of willow species. The herbaceous layer contains a variety of sedges and some tufted hairgrass. A variety of forbs occur on the site in minor amounts. Dominant willow species can include Booth, Geyer, wolf, and Drummond. The herbaceous layer can be dominated by beaked and water sedge, tufted hairgrass, and Baltic rush. Flooding is frequent and the duration can be brief to prolonged. Fire can occur when adjacent sites burn and the normal fire frequency is estimated at 50-100 years.

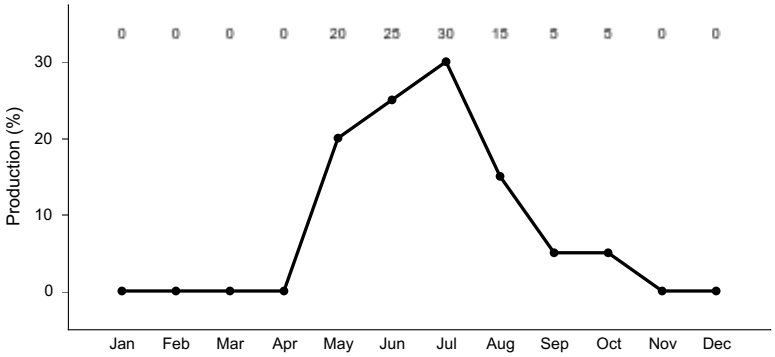


Figure 3. Plant community growth curve (percent production by month). ID1217, SALIX. State 1.

State 2
State 1 Phase B

Community 2.1
State 1 Phase B

This plant community has reduced overstory of willows and most are decadent or dying. Sedges and tufted hairgrass are reduced. Forbs have increased. There is little or no willow regeneration. This community has developed due to a much reduced flooding frequency due to channel down cutting, upstream water diversions or other upper watershed conditions. The water table is lower than in Phase A.

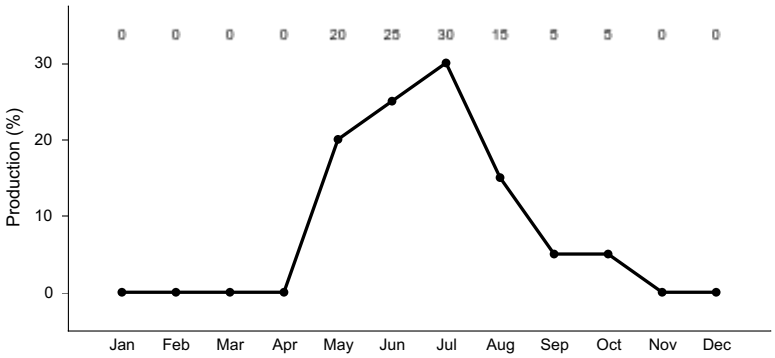


Figure 4. Plant community growth curve (percent production by month). ID1217, SALIX. State 1.

State 3
State 1 Phase C

Community 3.1
State 1 Phase C

This plant community is dominated in the overstory with willow species but in reduced amounts. Tunneling is apparent or obvious in the willows. The shrubs have reduced vigor and there are twigs or branches that have sprouted from the base. Sedges still dominant the understory but are in reduced vigor and amounts. Tufted hairgrass has been significantly reduced and Baltic rush has increased. Forbs are increasing. Some Kentucky bluegrass has invaded the site. This community has developed with improper grazing management.

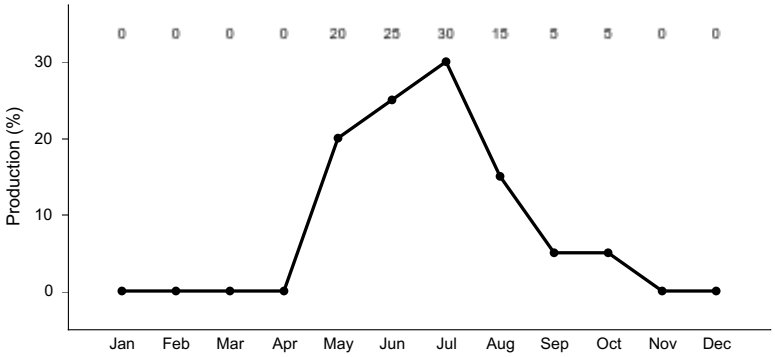


Figure 5. Plant community growth curve (percent production by month). ID1217, SALIX. State 1.

State 4
State 1 Phase D

Community 4.1
State 1 Phase D

This plant community has an overstory of dead willows and young willow regeneration. The understory is little changed from Phase A, except a few “hot” spots may have killed some of the herbaceous layer. Most sedges are in reduced vigor but are re-sprouting. A few shrubs may have died from the fire. This plant community has developed with a recent wildfire.

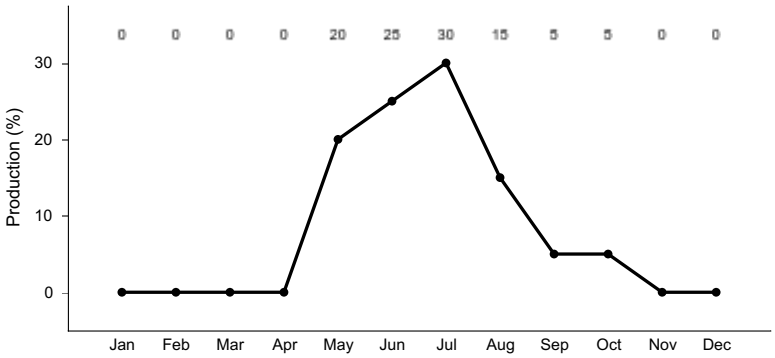


Figure 6. Plant community growth curve (percent production by month). ID1217, SALIX. State 1.

State 5
State 1 Phase E

Community 5.1
State 1 Phase E

The plant community has an overstory of dead or dying willows with new regeneration of willows from crowns. Sedges are increasing. Forbs are about in the same proportion as Phase A. This community is the result of uncontrolled beaver populations.

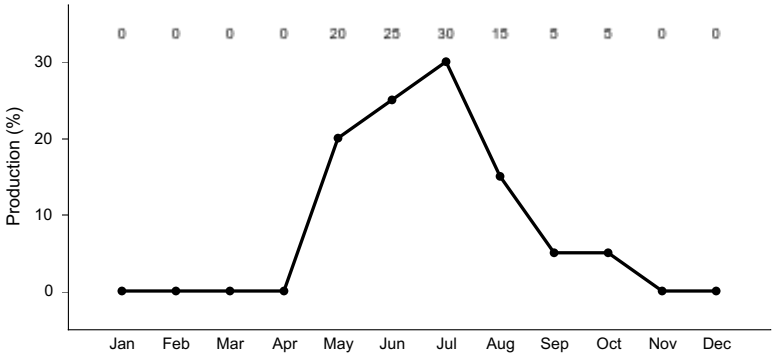


Figure 7. Plant community growth curve (percent production by month). ID1217, SALIX. State 1.

State 6
State 2

Community 6.1
State 2

This plant community has dead willows in the overstory. There is no regeneration of willows. Perennial grasses and grass-like species have been removed and forbs and invasive species (such as Kentucky bluegrass) have increased. Conifers may have invaded the site. This plant community has developed through continued improper grazing management, lowered water table, and reduced frequency of flooding. The reduced water table and/or reduced flooding are caused by an incised channel and/or upstream conditions that have changed the flooding frequency. The community has crossed the threshold to a new state. It is not economically feasible to return this state to State 1. It can only be accomplished over time using structures or bio-engineering practices, but the plant community may take many years to approach the plant community in State 1.

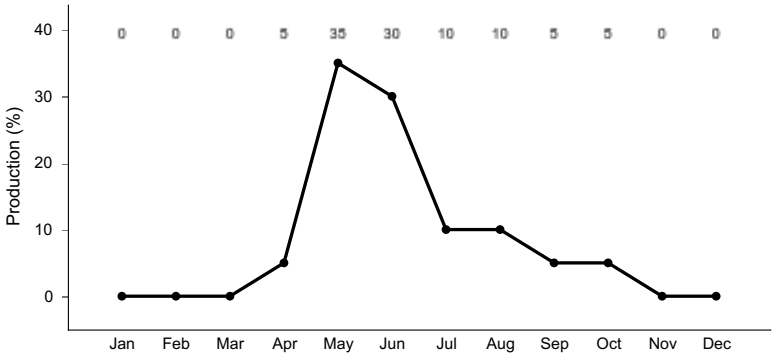


Figure 8. Plant community growth curve (percent production by month). ID1209, ANNUALS. State 2.

Additional community tables

Animal community

Wildlife Interpretations.

This is an important site for many species of wildlife for food, cover, brooding, and rearing. Mule deer, moose, and Rocky Mountain elk use the site in the spring, summer, and fall. Many birds use the site for feeding and nesting. If the site is associated with a perennial stream, a fisheries resource could also be present as well as beavers.

Grazing Interpretations.

This site is suited for livestock grazing in late spring, summer, and fall. This site is usually heavily used by livestock, particularly in the summer. Prescribed grazing must be planned to avoid degradation of the site. Special management should be used to protect the adjacent water courses and the associated values. Avoid grazing when soils are saturated.

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.

Recreational uses

This site has high value for recreation such as camping, picnicking, hunting, and possibly fishing. This site provides visual diversity to the range ecosystem.

Wood products

None

Other products

None

Other information

Field Offices

Grangeville, ID
Nezperce, ID
Cascade, ID
Weiser, ID
Emmett, ID
Mtn. Home, ID
Salmon, ID
Challis, ID
Shoshone, ID
Arco, ID
St. Anthony, ID
Lewiston, ID
Orofino, ID

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
Bruce Knapp, Resource Soil Scientist, NRCS, Idaho
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Type locality

Location 1: Blaine County, ID	
Township/Range/Section	T8N R14E S28

General legal description	U.S. Sheep Experiment Station, summer range in the Centennial Mountains of Idaho and Montana. SE 1/4

Other references

USDA Forest Service, Rocky Mountain Research Station. 2004. Restoring Western Ranges and Wildlands. General Technical Report RMRS-GTR-136-vols. 1-3.
USDA, NRCS.2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov.). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
USDA, Forest Service, Fire Effects Information Database. 2004. www.fs.fed.us/database.
USDI Bureau of Land Management, US Geological Survey; USDA Natural Resources Conservation Service, Agricultural Research Service; Interpreting Indicators of Range Health. Technical Reference 1734-6; Version 4-2005.

Approval

Scott Woodall, 2/03/2020

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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Contact for lead author	Brendan Brazee, State Rangeland Management Specialist USDA-NRCS 9173 W. Barnes Drive, Suite C, Boise, ID 83709
Date	06/05/2009
Approved by	Scott Woodall
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** rills do not occur on this site.

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2. **Presence of water flow patterns:** water flows over and through the plant community due to frequent flooding. Flows can scour the soil surface or deposit sediments. Rarely are flows detrimental to the shrub component of the plant community. These plants have adapted or evolved with this occurrence. Understory species can be damaged, removed, or buried but usually recover.

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3. **Number and height of erosional pedestals or terracettes:** neither occurs on this site as classically defined. Scouring can expose some roots. Shrubs species have evolved with this occurrence and will sprout from the roots. Deposition areas can give a hummocky surface and may look similar to terracettes.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** data is not available. On sites in mid-seral status bare ground may range from 2-10 percent. Immediately following a significant flood event, bare ground may be as higher.

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5. **Number of gullies and erosion associated with gullies:** gullies do not exist on this site.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** scouring from wind does not occur. Scouring and deposition areas do occur from flooding.

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7. **Amount of litter movement (describe size and distance expected to travel):** fine litter in the interspaces may move 6 feet or more or off the site due to seasonal flooding. Coarse litter can move within the site or off the site due to flooding. Some debris may hang up or be deposited in piles within the site.

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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):** The thickness of organic layers very and are black when moist. The A horizon when present are 1 to 5 inches thick and are grayish brown moist. Soil organic matter (SOM) ranges from over 90% in the muck material and 2 to12 percent in the mineral surface horizons. The soils may not show distinct horizons due to poorly developed soils.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** a mixed-age stand of shrubs and grasses is needed to slow run-off and increase infiltration. The plant community is more dependent on moisture from the fluctuating water table than on infiltration. The water table controls rooting depth.

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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):** a compaction layer is 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: shrubs

    Sub-dominant: perennial grasses

    Other: forbs

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** normal mortality of grass, grass-like, and forbs occur with scouring and deposition from flooding. Some mortality can occur in the herbaceous layers as shrub canopy closes. Disease can increase as a result of shrub damage from flooding. Most shrubs re-sprout at or below the area of damage on the root or stem.

14. **Average percent litter cover (%) and depth (in):** additional litter cover data is needed but is expected to be ___percent to a depth of 0.5-1.5 inches at the end of the growing season, but may be removed from the site following flooding.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** is 3200 pounds per acre (3584 Kg/ha) in a year with normal precipitation and temperatures. Perennial grasses and sedges produce 30-40 percent of the total production, forbs 5-15 percent, and shrubs 50-60 percent.

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 whitetop, leafy spurge, dock, Canadian thistle, reed canarygrass, foxtail barley, perennial pepperweed, and teasel. Other invasive species may include meadow foxtail, redtop, and Kentucky bluegrass.

17. **Perennial plant reproductive capability:** all functional groups have the potential to reproduce in most years. Many of the plants reproduce vegetatively. Willows require flooding to scour the surface or provide sediment deposition to germinate seeds.