USDA Natural Resources
Conservation Service

Ecological site R047XC003UT
Interzonal Semi-wet Streambank (narrowleaf cottonwood)

Last updated: 2/11/2025
Accessed: 05/10/2025

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.

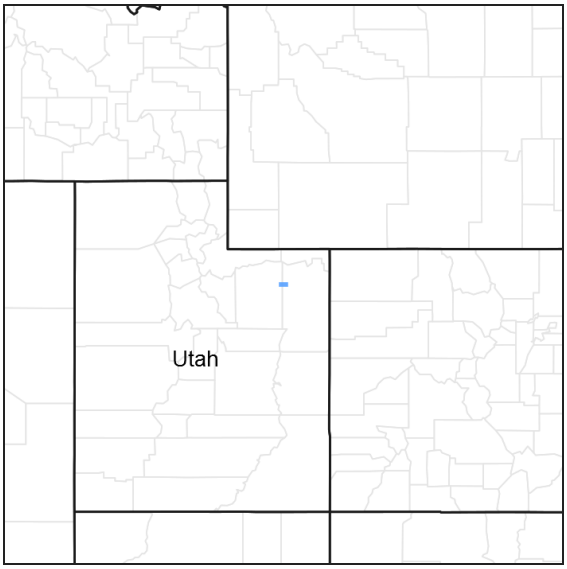


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 047X–Wasatch and Uinta Mountains

MLRA 47 occurs in Utah (86 percent), Wyoming (8 percent), Colorado (4 percent), and Idaho (2 percent). It encompasses approximately 23,825 square miles (61,740 square kilometers). The northern half of this area is in the Middle Rocky Mountains Province of the Rocky Mountain System. The southern half is in the High Plateaus of the Utah Section of the Colorado Plateaus Province of the Intermontane Plateaus. Parts of the western edge of this MLRA are in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The MLRA includes the Wasatch Mountains, which trend north and south, and the Uinta Mountains, which trend east and west. The steeply sloping, precipitous Wasatch Mountains have narrow crests and deep valleys. Active faulting and erosion are a dominant force in controlling the geomorphology of the area. The Uinta Mountains have a broad, gently arching, elongated shape. Structurally, they consist of a broadly folded anticline that has an erosion-resistant quartzite core. The Wasatch and Uinta Mountains have an elevation of 4,900 to about 13,500 feet (1,495 to 4,115 meters).

The mountains in this area are primarily fault blocks that have been tilted up. Alluvial fans at the base of the mountains are recharge zones for the basin fill aquifers. An ancient shoreline of historic Bonneville Lake is evident on the footslopes along the western edge of the area. Rocks exposed in the mountains are mostly Mesozoic and Paleozoic sediments, but Precambrian rocks are exposed in the Uinta Mountains. The Uinta Mountains are one of the few ranges in the United States that are oriented west to east. The southern Wasatch Mountains consist of

Tertiary volcanic rocks occurring as extrusive lava and intrusive crystalline rocks.

The average precipitation is from 8 to 16 inches (203 to 406 mm) in the valleys and can range up to 73 inches (1854 mm) in the mountains. In the northern and western portions of the MLRA, peak precipitation occurs in the winter months. The southern and eastern portions have a greater incidence of high-intensity summer thunderstorms; hence, a significant amount of precipitation occurs during the summer months. The average annual temperature is 30 to 50 degrees Fahrenheit (-1 to 15 C). The freeze-free period averages 140 days and ranges from 60 to 220 days, generally decreasing in length with elevation.

The dominant soil orders in this MLRA are Aridisols, Entisols, Inceptisols, and Mollisols. The lower elevations are dominated by a frigid temperature regime, while the higher elevations experience cryic temperature regimes. Mesic temperature regimes come in on the lower elevations and south facing slopes in the southern portion of this MLRA. The soil moisture regime is typically xeric in the northern part of the MLRA, but grades to ustic in the extreme eastern and southern parts. The minerology is generally mixed and the soils are very shallow to very deep, generally well drained, and loamy or loamy-skeletal.

LRU notes

E47C is the Uinta Mountains portion of MLRA 47 that run east and west which includes the Uinta Wilderness and The Flaming Gorge National Recreation Area and towns such as Evanston, Wyoming, Hanna and Tabiona, Utah. Structurally these mountains consist of a broadly folded anticline that has an erosion resistance quartzite core. The Duchesne River and many other tributaries to the Green River run through this range, as well as the headwaters of the Bear River.

Classification relationships

Modal Soil: Cumulic Haploborolls SL 1-3% — sandy-skeletal, siliceous Cumulic Haploborolls

Ecological site concept

This site occurs on floodplains and stream terraces, the runoff is very low and because of this site's proximity to streams it floods frequently. The water table for this site is within 12 to 18 inches from the surface.This soils are somewhat poorly drained. Soils are frequently flooded during high runoff and are affected by a fluctuating water table during parts of the plant growing season .

Associated sites

R047XA010UT	**Interzonal Wet Fresh Streambank (willow)**
R047XC005UT	**Semi-wet Streambank (lodgepole pine)**
R047XC007UT	**Semi-moist Stream Terrace (ponderosa pine)**

Similar sites

R047XA010UT	**Interzonal Wet Fresh Streambank (willow)**
R047XC007UT	**Semi-moist Stream Terrace (ponderosa pine)**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Betula occidentalis*
Herbaceous	(1) *Solidago missouriensis*

Physiographic features

This site occurs on floodplains and stream terraces at elevations between 5,900 to 6,300 feet. The slopes are

nearly level up to three percent, and the runoff is very low and because of this site's proximity to streams it floods frequently. The water table for this site is within 12 to 18 inches from the surface.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Stream terrace
Runoff class	Very low to low
Flooding duration	Very long (more than 30 days)
Flooding frequency	None to frequent
Ponding frequency	None
Elevation	5,900–6,300 ft
Slope	1–3%
Water table depth	12–18 in
Aspect	Aspect is not a significant factor

Climatic features

Climate is cold and snowy in the winter and cool and moist in the summer. On the average, the wettest months are March through July and the driest months are August through February. Average annual precipitation is 8 to 12 inches. The mean annual air temperature is 42 to 44 degrees fahrenheit and the soil temperatures are in the frigid regime.

Table 3. Representative climatic features

Frost-free period (average)	110 days
Freeze-free period (average)	
Precipitation total (average)	12 in

Influencing water features

It is found on very gentle slopes near streams where the water table is between 12 to 18 inches below the soil surface. Flooding may occur frequently on this site depending on stream hydrology. This site receives extra water from adjacent catchments each year.

Wetland description

Further review is required.

Soil features

This soils at this site are formed alluvium derived from quartzite and sandstone. Characteristic soils are somewhat poorly drained. Surface texture is sandy loam with no surface rock component and up to 21 percent rock fragments in the subsurface soil. Soils are frequently flooded during high runoff and are affected by a fluctuating water table during parts of the plant growing season (March through July). The available water capacity for this soil ranges between 2.2 to 2.9. The soil temperature regime is frigid and the soil moisture regime is ustic.

Soil Components that have been correlated to this site:
Uinta Area (UT047): Wonsits (86, 156)

Table 4. Representative soil features

Parent material	(1) Alluvium–quartzite (2) Alluvium–sandstone
Surface texture	(1) Sandy loam
Drainage class	Somewhat poorly drained
Permeability class	Moderately rapid
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	2.2–2.9 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–21%

Ecological dynamics

It is impossible to determine in any quantitative detail the Historic Climax Plant Community (HCPC) for this ecological site because of the lack of direct historical documentation preceding all human influence. In some areas, the earliest reports of dominant plants include the cadastral survey conducted by the General Land Office, which began in the late 19th century for this area (Galatowitsch 1990). However, up to the 1870s the Shoshone Indians, prevalent in northern Utah and neighboring states, grazed horses and set fires to alter the vegetation for their needs (Parson 1996). In the 1860s, Europeans brought cattle and horses to the area, grazing large numbers of them on unfenced parcels year-long (Parson 1996). Itinerant and local sheep flocks followed, largely replacing cattle as the browse component increased.

Below is a State and Transition Model diagram to illustrate the “phases” (common plant communities), and “states” (aggregations of those plant communities) that can occur on the site. Differences between phases and states depend primarily upon observations of a range of disturbance histories in areas where this ESD is represented. These situations include grazing gradients to water sources, fence-line contrasts, patches with differing dates of fire, herbicide treatment, tillage, etc. Reference State 1 illustrates the common plant communities that probably existed just prior to European settlement.

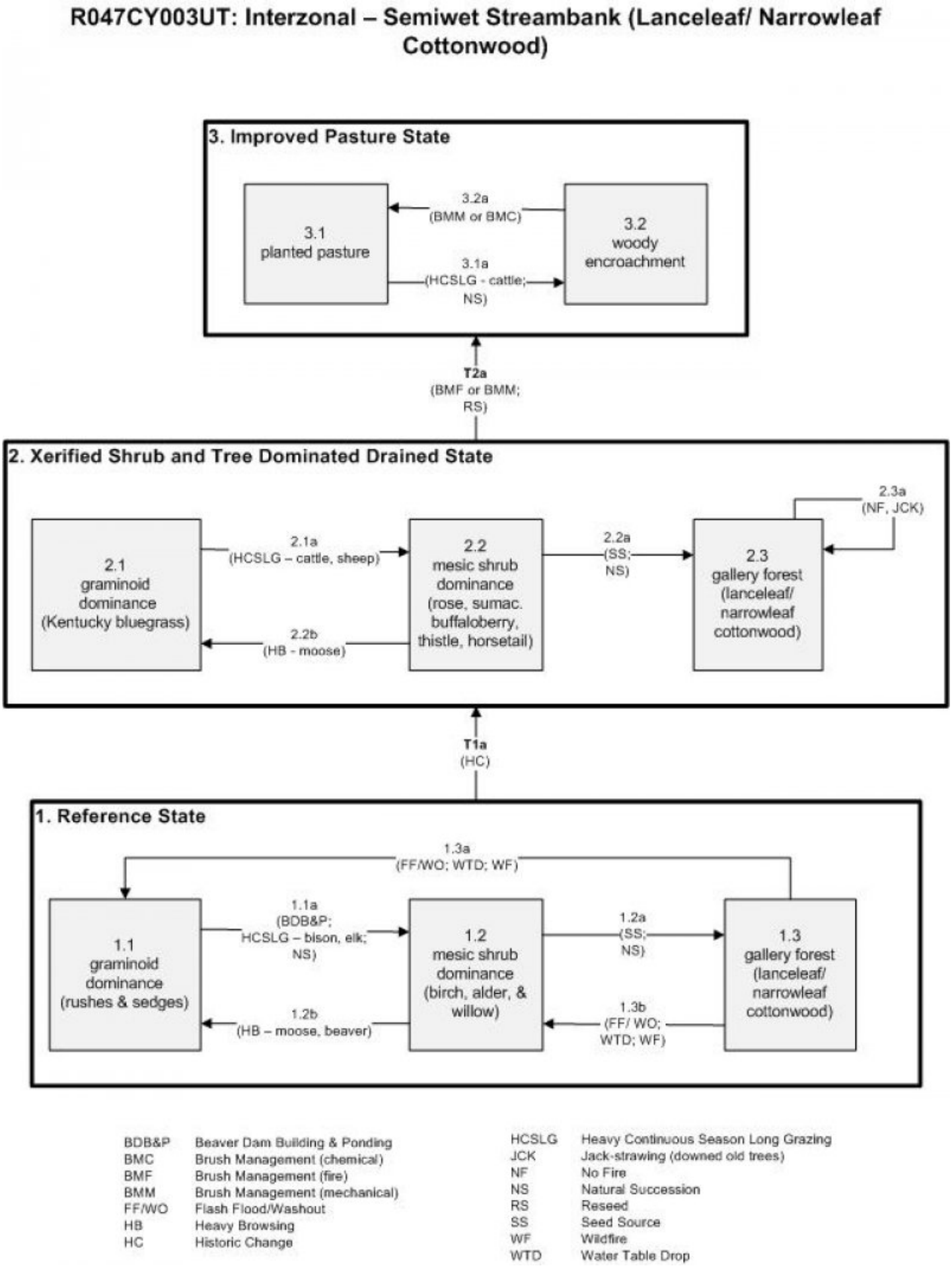
The major successional pathways within states, (“community pathways”) are indicated by arrows between phases. “Transitions” are indicated by arrows between states. The drivers of these changes are indicated in codes decipherable by referring to the legend at the bottom of the page and by reading the detailed narratives that follow the diagram. The transition between Reference State 1 and State 2 is considered irreversible because of the naturalization of exotic species of both flora and fauna, possible extinction of native species, and climate change. There may have also been accelerated soil erosion.

When available, monitoring data (of various types) were employed to validate more subjective inferences made in this diagram. See the complete files in the office of the State Range Conservationist for more details.

The plant communities shown in this State and Transition Model may not represent every possibility, but are probably the most prevalent and recurring plant communities. As more monitoring data are collected, some phases or states may be revised, removed, or new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities.” According to the USDA NRCS National Range and Pasture Handbook (USDA-NRCS 2003), Desired Plant Communities (DPC’s) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including

descriptions of a plant community is to capture the current knowledge at the time of this revision.

State and transition model



BDB&P	Beaver Dam Building & Ponding
BMC	Brush Management (chemical)
BMF	Brush Management (fire)
BMM	Brush Management (mechanical)
FF/WO	Flash Flood/Washout
HB	Heavy Browsing
HC	Historic Change

HCSLG	Heavy Continuous Season Long Grazing
JCK	Jack-strawing (downed old trees)
NF	No Fire
NS	Natural Succession
RS	Reseed
SS	Seed Source
WF	Wildfire
WTD	Water Table Drop

Figure 2. State and Transition Model

State 1
Reference State

Community 1.1
Reference State

The Reference State is a description of this ecological site just prior to Euro-American settlement but long after the arrival of Native Americans. The description of the Reference State was determined by NRCS Soil Survey Type Site Location information and familiarity with rangeland relict areas where they exist. The Reference State would have been in any of three phases depending on stream gradient and how recently fire had occurred or when beavers had last been present. Along steeper stream gradients, succession would have rapidly proceeded from low-statured graminoids (1.1), to shrubs (1.2), and lastly to trees that reproduce in their own shade (1.3). A complete list of species by lifeform for the Reference State is available in accompanying tables in the “Plant Community Composition by Weight and Percentage” section of this document. Along gentle gradients beavers would have consumed all the largely deciduous woody stems and constructed dams. Once the nearby food and building materials were exhausted, the colony of beavers would have moved to another reach of the stream, making the abandoned dams and depleted stretch vulnerable to blow out from the next large convectional storm. This phase is short since most of the woody species re-sprout and are dominant again within a decade or so. The resulting drop in the water table would have stressed the moisture-demanding woody species and favored the graminoids, allowing the graminoids to eventually reclaim the drier streamside banks. Thus, rather than one plant community becoming stable, these stretches of stream would have been in a continual state of change. Fur trapping in the 1820s to 1830s resulted in the reduction of beaver by about 95 percent (Parson 1996). Without these animals to maintain their stair-step configuration of dams, the whole hydrologic regime of these drainages changed. What were once small perennial streams became ephemeral, and succession was truncated. Beaver have not returned in number until recent decades (when the fur trade diminished and furbearers began to be raised on farms). Thus, by the time of the European settlement period, huge changes in these systems had already taken place. Community Phase 1.1: graminoid dominance (rushes & sedges) This early seral phase would have been dominated by rushes (Juncus spp.), sedges (Carex spp.), and native perennial water-demanding species such as reed canarygrass (*Phalaris arundinacea*), mat muhly (*Muhlenbergia richardsonis*), and mountain brome (*Bromus marginatus*). Heavy local utilization by moose or beaver would have kept back the woody species, allowing this graminoid phase to persist. Community Pathway 1.1a: Along gentler stream gradients, ponding caused by construction of beaver dams would have brought the water table up in areas that would have otherwise been dry. Heavy grazing by bison and elk would have reduced the graminoids, giving way first to some taller forbs such as Missouri goldenrod (*Solidago missouriensis*) and feathery false lily of the valley (*Maianthemum racemosum*). Quickly following were a set of water-loving shrubs and small trees including water birch (*Betula occidentalis*), yellow willow (*Salix lutea*), and gray alder (*Alnus incana*). The same successional process would have taken place along steeper gradients, but at a more rapid rate. Community Phase 1.2: mesic shrub dominance (birch, alder, & willow) A set of mesic shrubs including water birch, yellow willow, and gray alder would have quickly overtopped the graminoids, unless shrubs were cropped by moose or beaver. Community Pathway 1.2a: The presence of lanceleaf cottonwood (*Populus ×acuminata*) and/or narrowleaf cottonwood (*Populus angustifolia*) seeds being carried by water would have provided for the rapid succession from shrubs to a gallery forest. Community Pathway 1.2b: As the supply of palatable deciduous shrubs and trees increased, beaver numbers would also have increased. With time, a heavy concentration of beaver and moose would have reduced the woody component, with the exception of the less palatable shrubs (e.g. Woods’ rose (*Rosa woodsii*) and hawthorn (*Crataegus douglasii*)), causing the canopy to open up. Community Phase 1.3: gallery forest (lanceleaf/ narrowleaf cottonwood) Without beaver, tree cutting, and fire, a thick streamside (gallery) forest dominated by shade-tolerant lanceleaf or narrowleaf cottonwood would have developed. Community Pathway 1.3a: A strong convectional storm associated with flash flooding would have blown out existing beaver dams. Unless the beavers were still occupying the area and rebuilt their dams, the water table would have eventually returned to previously lower levels. This would have allowed the graminoids to reclaim the site. Wildfire would have had a similar effect by removing most of the woody vegetation and debris, thereby re-opening the site to graminoids. Community Pathway 1.3b: This community pathway would be similar to 1.2b, except less intense. Flash flooding may blow out existing beaver dams following convectional storm events, but some smaller-statured trees and shrubs would persist, leaving enough woody material such that beavers could subsist and rebuild their dams. Transition T1a: from State 1 to State 2 (Reference State to Xerified Shrub and Tree Dominated Drained State) The simultaneous introduction of European livestock and exotic plant species, the near extirpation of beaver along with its influence on the hydrologic regime, and a warmer drier climate were all factors

involved in the transition to State 2. A return to State 1 would not be impractical because of these issues.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	780	920	1060
Forb	585	690	795
Shrub/Vine	585	690	795
Total	**1950**	**2300**	**2650**

Table 6. Ground cover

Tree foliar cover	4-6%
Shrub/vine/liana foliar cover	49-51%
Grass/grasslike foliar cover	14-16%
Forb foliar cover	9-11%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	–
>0.5 <= 1	–	–	14-16%	–
>1 <= 2	–	–	–	9-11%
>2 <= 4.5	–	–	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	49-51%	–	–
>40 <= 80	4-6%	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

State 2
Xerified Shrub and Tree Dominated Drained State

Community 2.1
Xerified Shrub and Tree Dominated Drained State

State 2 is similar to State 1 in form and function, with the exception of the presence of non-native plants and animals, possible extinctions, and a different climate. State 2 is a description of the ecological site shortly following Euro-American settlement. This state can be regarded as the current potential. Depending on the size of the watershed above, the stream could well have changed from a perennial to ephemeral drainage. Many of the same

species of plants found in the Reference State continue to exist in the latter situation because of hyporheic (i.e. below ground) movement of water, although the period of greenery and its productivity are lessened. The introduction of cattle put pressure on the graminoids (2.1a) and hastened the conversion to shrubs (2.2). The lack of beaver dams meant that sediment moved more rapidly downstream with flashy (short duration, high intensity) precipitation events. Stream channelization occurred with increased rates of flow, leading to xerification of the streamside. With beaver temporarily absent, livestock numbers relatively reduced due to lack of forage, and lack of natural disturbances (2.2a), the shrubs and trees grow larger and shade out many of the forage species favored by livestock (2.3). The most disturbed phase of this State would be the graminoid-dominant phase (2.1), which occurs if moose effectively browse out the shrubby vegetation (2.2b). Kentucky bluegrass (*Poa pratensis*) was introduced at some sites for livestock forage; however it is not capable of holding the stream banks together during convectional storms. Community Phase 2.1: graminoid dominance This graminoid-dominated phase is frequently dominated by Kentucky bluegrass. The Forest Service regards this as an introduced species, but it is preferred by livestock over other native graminoids. It is, however, less able to protect stream banks than its native counterparts because of its shallower, weaker roots. Community Pathway 2.1a: Heavy season-long use by cattle will diminish the grass component and allow an increase in tall forbs. Sheep will consume most of the forbs and shrubs, but will leave the thistles (Cirsium spp.), horsetail (Equisetum spp.), Woods' rose, skunkbush sumac (*Rhus trilobata*), and silver buffaloberry (*Shepherdia argentea*). Community Phase 2.2: mesic shrub dominance This plant community will be dominated by unpalatable mesic shrubs such as Woods' rose, sumac, and silver buffaloberry, with an understory of unpalatable herbs including thistles and horsetail. Species composition will depend upon the type of livestock utilizing the area. Community Pathway 2.2a: Without moose and/or beaver consumption of shrubs and sapling trees, the shrub phase quickly transforms to a gallery forest. Community Pathway 2.2b: Moose have become more abundant of late and focus their attention on yellow willow and water birch, especially during the winter. This will cause a retardation of the shift to shrub and tree dominance. Community Phase 2.3: gallery forest (lanceleaf/ narrowleaf cottonwood) This plant community is dominated by lanceleaf and/or narrowleaf cottonwood, a shade-tolerant species, which will persist in the absence of wildfire, wood cutting, and/or large storm events. Community Pathway 2.3a: A gallery forest can persist in the absence of fire or wood cutting, creating a jack-strawing of downed trees that will make access to the site difficult for large animals. Transition T2a: from State 2 to State 3 (Xerified Shrub and Tree Dominated Drained State to Improved Pasture State) Since there is diminished forage production in the woody plant-dominated phases of State 2, some private landholders have, through prescribed fire and mechanical treatments, cleared out the streamside vegetation and planted exotic species such as smooth brome (*Bromus inermis*) or orchardgrass (*Dactylis glomerata*) to replace the native species.

State 3
Improved Pasture State

Community 3.1
Improved Pasture State

Some private land owners have bulldozed the streamside vegetation to remove trees needed by beavers to pond up the stream or to remove shade to increase forage production for livestock. Introduced species such as orchardgrass and smooth brome have been planted as the site became xerified, but more conducive to cattle grazing. The early seral vegetation created constitutes Phase 3.1. With time and heavy cattle grazing (3.1a), the tendency is for the original shrubs and trees to return (3.2). If introduced grass dominance is desired, mechanical or chemical re-treatment to reduce the woody plants will be required (3.2a). Community Phase 3.1: planted pasture This plant community will be dominated by introduced species such as orchardgrass and smooth brome. Community Pathway 3.1a: In order to maintain an herbaceous-dominant phase, the native woody species may require re-treatment using mechanical or chemical means. Community Phase 3.2: woody encroachment This plant community will be a mix of introduced grasses and native shrubs that have re-established following a period of heavy continuous season-long grazing. Community Pathway 3.2a: Some re-establishment of native shrubs will occur if the site is heavily grazed during the growing season of the grasses.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					

0	**Dominant Shrubs**			432–720	
	water birch	BEOC2	*Betula occidentalis*	240–360	–
	yellow willow	SALU2	*Salix lutea*	120–240	–
	gray alder	ALIN2	*Alnus incana*	72–120	–
3	**Sub-Dominant Shrubs**			312–840	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	72–120	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	24–72	–
	redosier dogwood	COSE16	*Cornus sericea*	24–72	–
	black hawthorn	CRDO2	*Crataegus douglasii*	24–72	–
	twinberry honeysuckle	LOIN5	*Lonicera involucrata*	24–72	–
	narrowleaf cottonwood	POAN3	*Populus angustifolia*	24–72	–
	skunkbush sumac	RHTRT	*Rhus trilobata var. trilobata*	24–72	–
	gooseberry currant	RIMO2	*Ribes montigenum*	24–72	–
	Woods' rose	ROWO	*Rosa woodsii*	24–72	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	24–72	–
	western poison ivy	TORY	*Toxicodendron rydbergii*	24–72	–
Grass/Grasslike					
0				456–840	
	clustered field sedge	CAPR5	*Carex praegracilis*	120–240	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	72–120	–
	creeping bentgrass	AGST2	*Agrostis stolonifera*	72–120	–
	mountain brome	BRMA4	*Bromus marginatus*	72–120	–
1	**Sub-Dominant Grasses**			192–384	
	Grass, annual	2GA	*Grass, annual*	72–120	–
	Grass, perennial	2GP	*Grass, perennial*	72–120	–
	field horsetail	EQAR	*Equisetum arvense*	24–72	–
	reed canarygrass	PHAR3	*Phalaris arundinacea*	24–72	–
Forb					
0	**Dominant Forbs**			384–600	
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	240–360	–
	northern bedstraw	GABO2	*Galium boreale*	72–120	–
	feathery false lily of the valley	MARAR	*Maianthemum racemosum ssp. racemosum*	72–120	–
2	**Sub-Dominant Forbs**			432–1104	
	Forb, annual	2FA	*Forb, annual*	72–120	–
	Forb, perennial	2FP	*Forb, perennial*	72–120	–
	common yarrow	ACMI2	*Achillea millefolium*	24–72	–
	spreading dogbane	APAN2	*Apocynum androsaemifolium*	24–72	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	24–72	–
	meadow thistle	CISC2	*Cirsium scariosum*	24–72	–
	sticky purple geranium	GEVI2	*Geranium viscosissimum*	24–72	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	24–72	–
	common cowparsnip	HEMA80	*Heracleum maximum*	24–72	–
	Rocky Mountain iris	IRMI	*Iris missouriensis*	24–72	–

	Nevada pea	LALA3	*Lathyrus lanszwertii*	24–72	–
	common dandelion	TAOF	*Taraxacum officinale*	24–72	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	24–72	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	24–72	–

Animal community

This site provides forage for cattle and sheep in late spring, summer, and fall. Palatable shrubs provide a high protein diet.
The site provides food, cover, and water for wildlife.
Wildlife using this site include rabbit, coyote, mule deer, elk, moose, and song birds.

Hydrological functions

The soil series are in hydrologic group c. The hydrologic curve number is 74 when the vegetation is in good condition.

Recreational uses

This site offers color and aesthetic appeal in all seasons. Recreation activities include hiking, picnicking, and hunting.

Wood products

None

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used.

Other references

Galatowitsch, S.M. 1990. Using the original land survey notes to reconstruct pre-settlement landscapes in the American West. Great Basin Naturalist: 50(2): 181-191. Keywords: [Western U.S., conservation, history, human impact]

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Contributors

Jim Brown, RHT

Approval

Sarah Quistberg, 2/11/2025

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem

condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/10/2025
Approved by	Sarah Quistberg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

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

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:

    Sub-dominant:

    Other:

    Additional:

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

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
