

Ecological site R034AA010UT

Riparian Complex Perennial Gravelly VIII/E4 (Geyers Willow/Northwest Territory Sedge)

Last updated: 4/10/2025

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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.

Classification relationships

Padgett, W.G., A.P. Youngblood, and A.H. Winward. Riparian community type classification of Utah and southeastern Idaho. US Dept. of Agriculture, Forest Service, Intermountain Region, 1989. Youngblood, A.P., W.G. Padgett, and A.H. Winward. Riparian community type classification of eastern Idaho-western Wyoming. US Dept. of Agriculture, Forest Service, Intermountain Region, 1985.

Ecological site concept

This site is located in MLRA 34A, but may also occur in the lower elevations of MLRA 47A. It occurs in a broad alluvial valley bottom. The stream within this site has a low water surface slope and high sinuosity. This site typically has 3 plant community components, graminoids/willow; graminoids/forb; and graminoids/willow. The three plant communities occur on three different fluvial surfaces; point bars, flood plains, and flood-plain steps. Beavers can be present in this site and have influence on the vegetation structure, hydrology, and channel form.

Similar sites

R034AA011UT	<p>Riparian Complex Perennial Gravelly VIII/E4 (Northwest Territory Sedge)</p> <p>This site also occurs in an alluvial valley, but the valley is narrower and there are smaller plant community components and fewer willows.</p>
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Salix geyeriana</i>
Herbaceous	(1) <i>Carex utriculata</i>

Physiographic features

This ecological site occurs in MRLA 34A and may also be found in the lower elevations of 47A where it borders 34A. This site is in the Bear River Basin in the Middle Rocky Mountain Province of the Rocky Mountain System. It typically occurs between 6500 and 6800 feet with valley slopes less than 2%. The water table can be found at the surface to over 60 inches below the surface depending on the distance from the stream channel and fluvial surface. The tables below represent the range in variability between all three fluvial surfaces present within this site: point bars/streambank, flood plain and flood-plain step.

Table 2. Representative physiographic features

Landforms	(1) Point bar (2) Flood plain (3) Flood-plain step
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Frequent to rare
Elevation	1,980 – 2,070 m
Slope	0 %
Water table depth	0 – 130 cm
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation is 10 to 15 inches. Peak precipitation occurs as snow from October through April. This site has cold winters and short summers. Occasional convective thunderstorms produce small amounts of rain from June through September. The average annual temperature is 25 to 55 degrees F. The freeze-free period ranges from 95 to 115 days.

Table 3 Representative climatic features

Frost-free period (average)	80 days
Freeze-free period (average)	120 days
Precipitation total (average)	360 mm

Influencing water features

The stream channel in reference condition is an E4 Rosgen stream type. The stream is typically narrow and deep with undercut banks and overhanging vegetation. This channel has a very low width/depth ratio and high sinuosity. The water surface slope is less than two percent. The water velocity in this channel is in balance with the sediment transport capability. Beaver in this site can slow water velocity, pond water behind dams and create multiple channels.

Rosgen Valley Type: VIII- Alluvial valley is typically wide with low valley slopes with well-developed flood plain features.

Reference Stream Type: E4- This channel has high sinuosity, low channel slope and low channel width/depth ratios. Under influence from beaver, the channel could shift to a ponded site directly above the beaver dam.

Channel Material: Gravel dominated bed with some cobble in riffles and sand in pools and on stream banks

Delineative Criteria (Low; High):

Entrenchment Ratio (floodprone width/bankfull width): 2.2; 100

Width/Depth Ratio (bankfull width/bankfull depth at riffle): 2.0;10

Sinuosity (stream length/valley length): 1.3; 2.6

Slope Range: 0.004; 0.02

Channel Materials D50 (particle size index, mm): 8; 12

Channel Materials D84 (particle size index, mm): 32; 48

Soil features

Soils are typically variable in stream valley bottoms because of the stream sediment deposition on flood plains and throughout the valley bottom as the channel naturally migrates. Soils on this site range from sandy to loamy on the surface. Point bars are typically sandy to very gravelly sand, flood plains and flood-plain steps are typically loamy. Sand and gravel lenses throughout the profile are common on all fluvial surfaces. Buried A horizons are also typically on fluvial influenced soils. The typical fluvial surfaces found on this site are point bars, flood plains and flood-plain steps. The tables below represent the variability between all fluvial surfaces

Figure 3. Point bar/streambank soil core

Table 4. Representative soil features

Surface texture	(1) Loamy sand (2) Very gravelly sand (3) Loam
Drainage class	Poorly drained to well drained
Soil depth	150 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Subsurface fragment volume <=3" (Depth not specified)	0 – 60 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The stream channel on this site is sinuous, has a very low width to depth ratio, is slightly entrenched, and the dominant substrate size is gravel (E4 Rosgen channel). The valley bottom is moderately wide for the area. This site typically occurs further downstream in the watershed. The stream channel in this site appears to move from a low width to depth ratio stream channel ("E") under reference conditions to a "C" channel under the impacts of continuous season-long livestock grazing. Grazing impacts vegetation throughout the riparian area, although some vegetation is more sensitive to grazing impacts, such as Northwest Territory sedge. Grazing can also shift the vegetation composition or create open space for different plants to establish, such as Kentucky bluegrass or reed canary grass. Kentucky blue grass does not have the same root characteristics as Nebraska sedge or Northwest Territory sedge. Riparian meadow communities dominated by sedges and rushes have a much greater root densities than grasses (Manning et al. 1989). So when these communities are degraded and loses the sedges and Kentucky bluegrass moves in, it decreases the stream bank stability. As stream bank stability decreases, fine sediment on the stream bank is eroded, thus creating different channel morphology.

This ecological site has been found in one location in Rich County Utah. It is found in a valley bottom with a perennial stream channel with a slope less than 2%. The channel in the valley bottom is highly sinuous and can be ponded through beaver activity. High water typically occurs in May with a mean annual flow recorded of 16 cubic feet per second. The channel is typically a Rosgen "E" channel when not under the influence of beaver and upstream of beaver dams, the channel can take on "DA" morphology (Rosgen 1996). Vegetation in a low width to depth ratio channel is essential in holding the stream banks together. Typical stream bank vegetation on this site is Nebraska sedge (*Carex nebrascensis*) and Northwest Territory sedge (*Carex utriculata*). These herbaceous roots growing on the stream banks in this site have an important effect in reducing erosion rates of channel banks (Smith 1976), developing new stream banks, and in providing stability to mature stream banks (Kleinfelder et al. 1992). The root structure of these rhizomatous sedges makes them particularly effective at bank stabilization in fine sediment soils (Steed & DeWald 2003) by binding the soil and adding extra cohesion to the stream bank (Thorne 1990).

Plant communities on this site are arranged according to proximity to channel and depth to water. Willows, sedges and rushes are typically found adjacent to the channel (plant community component 1). They have characteristics that allow them to tolerate long periods of inundation and flooding. Graminoids, including grasses, sedges and rushes, can be found growing on the flood plain (plant community component 2) and willows and graminoids can be found on the flood-plain step (plant community component 3). This arrangement is typical without the presence of beaver. The vegetation composition and arrangement on the valley bottom will change with beaver influence. Beaver dams can temporarily change a lotic to a lentic environment (Cooper et al. 2006). Dam building and foraging activities of beaver can alter the riparian ecosystem by ponding and diverting water and selectively foraging on certain trees or shrubs (Rosell et al. 2005; Gurnell 1998). Ponding and diverting water can then affect stream bank hydrology, impact of flood events, local velocity above and below a dam, and scour and deposition sediment patterns (Gurnell 1998). The stream channel above a beaver dam can take on a stable multithread channel (Rosgen "DA") (Gurnell 1998). Beaver dams will also change vegetation by creating wetter habitat above a dam, increasing the area that can be colonized by obligate wetland species. Vegetation dynamics are also altered from the foraging preferences of beaver (Rosell et al. 2005). They preferentially use willow and aspen if available (Rosell et al. 2005). This foraging behavior can create a patchy landscape and may eventually lead to food source scarcity, forcing the beaver to leave the area, temporarily. Site abandonment by beavers can cause failure of beaver dams, allowing the impounded water to be released and fine sediment to be carried downstream. Bare sediment left behind the beaver dam can then be colonized by willows that would have been unlikely to establish with the presence of an active beaver dam because of the saturated/anaerobic soil (Cooper et al. 2006). This site will have more wetland obligate species present upstream of a beaver dam and there will be more open water than downstream of a dam. Plant community component 1 represents the wettest habitat and this suite of species is generally found in more abundance with the influence of beaver.

State and transition model

Figure 4. State and Transition Model for R034AA010UT

Figure 5. R034AY010 STM Legend

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Shrub/Vine					
1	PCC1 Shrubs			0-56	
	Booth's willow	SABO2	<i>Salix boothii</i>	0-56	0-20
	Shrub, broadleaf	2SB	<i>Shrub, broadleaf</i>	0-11	0-5
3	PCC3 Shrubs			168-504	
	Booth's willow	SABO2	<i>Salix boothii</i>	56-336	1-30
	Geyer willow	SAGE2	<i>Salix geyeriana</i>	112-336	15-25
	Shrub, deciduous	2SD	<i>Shrub, deciduous</i>	0-112	0-15
	currant	RIBES	<i>Ribes</i>	0-56	0-5
	Woods' rose	ROWO	<i>Rosa woodsii</i>	0-56	0-5
Grass/Grasslike					
1	PCC1 Graminoids			560-2242	
	Northwest Territory sedge	CAUT	<i>Carex utriculata</i>	6-1681	1-50
	mountain rush	JUARL	<i>Juncus arcticus ssp. littoralis</i>	112-560	5-20
	Nebraska sedge	CANE2	<i>Carex nebrascensis</i>	0-224	0-10

	Grass-like, perennial	2GLP	<i>Grass-like, perennial</i>	0-56	0-10
	Grass, annual	2GA	<i>Grass, annual</i>	0-28	0-5
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-22	0-5
	water whorlgrass	CAAQ3	<i>Catabrosa aquatica</i>	0-17	0-2
2	PCC2 Graminoids			560-2242	
	mountain rush	JUARL	<i>Juncus arcticus ssp. littoralis</i>	280-1233	5-25
	woolly sedge	CAPE42	<i>Carex pellita</i>	0-560	0-15
	clustered field sedge	CAPR5	<i>Carex praegracilis</i>	0-280	0-20
	Nebraska sedge	CANE2	<i>Carex nebrascensis</i>	0-168	0-15
	Grass-like, perennial	2GLP	<i>Grass-like, perennial</i>	0-56	0-15
	meadow barley	HOB2	<i>Hordeum brachyantherum</i>	0-56	0-10
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-56	0-5
	Grass, annual	2GA	<i>Grass, annual</i>	0-56	0-5
3	PCC3 Graminoids			1121-2242	
	mountain rush	JUARL	<i>Juncus arcticus ssp. littoralis</i>	785-1681	10-25
	clustered field sedge	CAPR5	<i>Carex praegracilis</i>	224-560	10-25
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	112-336	5-15
Forb					
1	PCC1 Forbs			0-168	
	starry false lily of the valley	MAST4	<i>Maianthemum stellatum</i>	0-56	0-10
	mountain goldenbanner	THMO6	<i>Thermopsis montana</i>	0-56	0-2
	willowherb	EPILO	<i>Epilobium</i>	0-34	0-2
	Forb, annual	2FA	<i>Forb, annual</i>	0-17	0-5
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-17	0-5
	field horsetail	EQAR	<i>Equisetum arvense</i>	0-11	0-2
	wild mint	MEAR4	<i>Mentha arvensis</i>	0-11	0-2
	alkali buttercup	RACY	<i>Ranunculus cymbalaria</i>	0-6	0-5
	speedwell	VERON	<i>Veronica</i>	0-6	0-2
2	PCC2 Forbs			56-168	
	starry false lily of the valley	MAST4	<i>Maianthemum stellatum</i>	0-56	0-5
	mountain goldenbanner	THMO6	<i>Thermopsis montana</i>	0-56	0-5
	Forb, annual	2FA	<i>Forb, annual</i>	0-28	0-5
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-28	0-5
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0-28	0-5
	thistle	CIRSI	<i>Cirsium</i>	0-11	0-2
3	PCC3			56-392	
	starry false lily of the valley	MAST4	<i>Maianthemum stellatum</i>	56-168	2-5
	mountain goldenbanner	THMO6	<i>Thermopsis montana</i>	56-168	2-5
	Forb, annual	2FA	<i>Forb, annual</i>	0-56	0-5
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-28	0-5
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0-28	0-5
	milkvetch	ASTRA	<i>Astragalus</i>	0-17	0-5
	largeleaf avens	GEMA4	<i>Geum macrophyllum</i>	0-17	0-1

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.2 plant community composition

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

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 3.2 plant community composition

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

There are three dominant species of game fish, rainbow trout, Yellowstone cutthroat trout and eastern brook char. There are two non-game species sculpin and sucker (Platts and Nelson 1989).

Other information

Observed influence of poor grazing management (continuous season-long grazing) on this site has been attributed to wider shallower and finer sediment stream channel (Platts & Nelson 1989). Grazing was also observed to change the plant community and decrease canopy cover (Platts & Nelson 1989). Northwest Territory sedge was not found in areas that were grazed, while it was found in areas that had not been grazed. Nebraska sedge was found in grazed and ungrazed areas. Shrubs were also only found in areas that were not grazed. Kentucky bluegrass dominated the stream bank plant community under grazing pressure, while Northwest Territory sedge and Nebraska sedge dominated ungrazed areas (Platts & Nelson 1989). This shift in plant communities has an effect on stream bank stability. Riparian meadow communities dominated by sedges and rushes have a much greater root densities than grasses (Manning et al. 1989). When these communities are degraded and lose the sedges and Kentucky bluegrass established, it decreases the stream bank stability (Manning et al. 1989).

Type locality

Location 1: Rich County, UT	
General legal description	The type location is located up Big Creek Road and is within the upper most enclosure.

Other references

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Contributors

Sarah Quistberg

Approval

Kirt Walstad, 4/10/2025

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	04/10/2025
Approved by	
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):

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:

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

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

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

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:

17. Perennial plant reproductive capability:
