USDA Natural Resources Conservation Service

Ecological site R043BP801MT
Bottomland Group

Last updated: 3/01/2024
Accessed: 04/19/2024

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

The Central Rocky Mountains (MLRA 43B) of Montana occupy some 28,850 square miles and exist primarily in Central and SW portions of the state. The climate is extremely variable with precipitation lows of 9 to 100 inches per year and frost free days of less than 30 to over 110 days. The geology of the region is also highly variable. The combination of variable climate and geology create a complex relationship of plant communities. MLRA 43B elevations typically exist between 6000 and 12,799ft at Granite Peak (the highest point in Montana).

The Continental Divide runs through this MLRA effectively splitting its watershed to contribute to either the Missouri River to the East and the Columbia River to the West.

Ecological site concept

• This site occurs in flood plains of perennial and intermittent streams, near springs and seeps, or other areas having a permanent or perched water table with riparian area
• Dominant Cover: mixed vegetation
• Moisture Regime: ustic to udic
• Temperature Regime: frigid to cryic
• Elevation Range: 3800-10000ft (typically 5200-7500ft)
• Site receives additional water
• Soils are
o Not saline or saline-sodic
o Moderately deep, deep, or very deep
o Typically less than 5% stone and boulder cover (<10% max)
• Seasonal high water table within 40” (approx. 100cm) of soil surface.
• Area of rugged mountain, hills, plateaus, and valleys of the Central Rocky Mountains in Southwest Montana.
• Parent material is recent alluvium
• Slope: 0-8% (typically less than 4%)

Site Development and Testing Plan
This Provisional Ecological Site Description was developed to meet the criteria as defined in Soil Survey National Instruction part 306 (430-306-NI, April 2015) as interpreted by Regional Ecological Site Specialist. Information in this description are first approximations based on broad groupings of soil properties and vegetation characteristics associated with those groupings. Although this description has been through the quality control and quality assurance review process it has not been certified for use in conservation planning.

Associated sites

R043BP815MT	**Subirrigated Grassland Group** The Subirrigated Grassland is located next to and often intermixed with the Bottomland site. These sites have similar hydrological influences namely water table and have similar soils however these sites do not share plant communities. The Subirrigated Grassland is dominated by grass species with some shrubs while the Bottomland site is dominated by an overstory of deciduous trees with an understory of shrubs, grasses, and forbs.
R043BP817MT	**Subirrigated Shrubland Group** The Subirrigated Shrubland is located next to and often intermixed with the Bottomland site. These sites have similar hydrological influences namely water table and have similar soils however these sites do not share plant communities. The Subirrigated Shrubland is dominated by native shrub species with grass while the Bottomland site is dominated by an overstory of deciduous trees with an understory of shrubs, grasses, and forbs.
F043BP906MT	**Subirrigated Cold Woodland Group** The Subirrigated Cold Woodland is located next to the Bottomland site. These sites have similar hydrological influences namely water table however these sites do not share plant communities. The Subirrigated Cold Woodland site is located in the colder portions of the MLRA where the Bottomland site is beginning to reduce in amounts due to the cold temperatures. The Subirrigated Cold Woodland is dominated by coniferous tree species with an understory of grass with forbs and shrubs while the Bottomland site is dominated by an overstory of deciduous trees with an understory of shrubs, grasses, and forbs.
F043BP907MT	**Subirrigated Cool Woodland Group** The Subirrigated Cool Woodland is located next to the Bottomland site. These sites have similar hydrological influences namely water table however these sites do not share plant communities. The Subirrigated Cool Woodland is dominated by coniferous tree species with an understory of grass with forbs and shrubs while the Bottomland site is dominated by an overstory of deciduous trees with an understory of shrubs, grasses, and forbs.
F043BP917MT	**Subirrigated Cool Moist Woodland Group** The Subirrigated Cool, Moist Woodland is located next to the Bottomland site. These sites have similar hydrological influences though the water table of the Subirrigated Cool, Moist Woodland is higher in the profile. These sites do not share plant communities. The Subirrigated Cool, Moist Woodland is dominated by coniferous tree species with an understory of grass with forbs and shrubs while the Bottomland site is dominated by an overstory of deciduous trees with an understory of shrubs, grasses, and forbs.

Similar sites

R043BP817MT	**Subirrigated Shrubland Group** The Subirrigated Shrubland is located next to and often intermixed with the Bottomland site. These sites have similar hydrological influences namely water table and have similar soils however these sites do not share plant communities. The Subirrigated Shrubland closest resembles the Bottomland Site as it has taller shrub species and may, in limited cases, have a deciduous tree canopy as part of the State and Transition Model. Fringes of these two sites do overlap significantly.

Table 1. Dominant plant species

Tree	(1) *Salix* (2) *Populus*
Shrub	(1) *Salix*
Herbaceous	(1) *Leymus cinereus*

Physiographic features

This site occurs in flood plains of perennial and intermittent streams, near springs and seeps, or other areas having a permanent or perched water table with riparian area. Site is gently sloping from nearly level up to 8 percent (typically less than 5 percent).

Table 2. Representative physiographic features

Landforms	(1) Valley > Flood plain (2) Valley > Stream terrace
Runoff class	High to low
Flooding frequency	Rare to frequent
Elevation	5,200–7,500 ft
Slope	0–8%
Water table depth	10–40 in
Aspect	Aspect is not a significant factor

Climatic features

Climate is variable across the MLRA. Precipitation will vary from a low of 10 to a high over 65 inches. Frost-free Days vary from 20 to120 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	6-47 days
Freeze-free period (characteristic range)	43-99 days
Precipitation total (characteristic range)	14-21 in
Frost-free period (actual range)	3-63 days
Freeze-free period (actual range)	40-109 days
Precipitation total (actual range)	12-23 in
Frost-free period (average)	26 days
Freeze-free period (average)	72 days
Precipitation total (average)	18 in

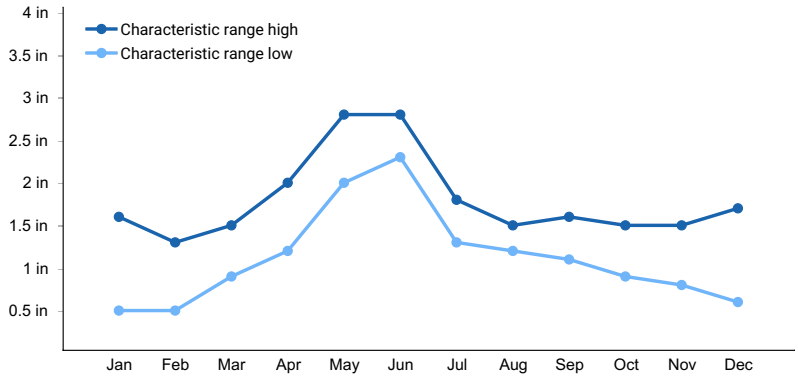


Figure 1. Monthly precipitation range

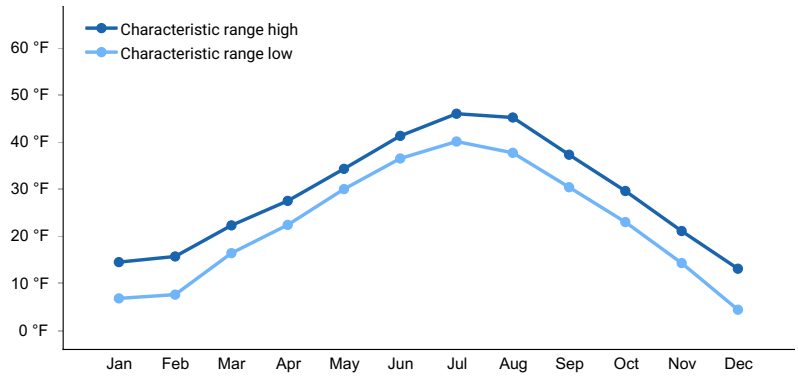


Figure 2. Monthly minimum temperature range

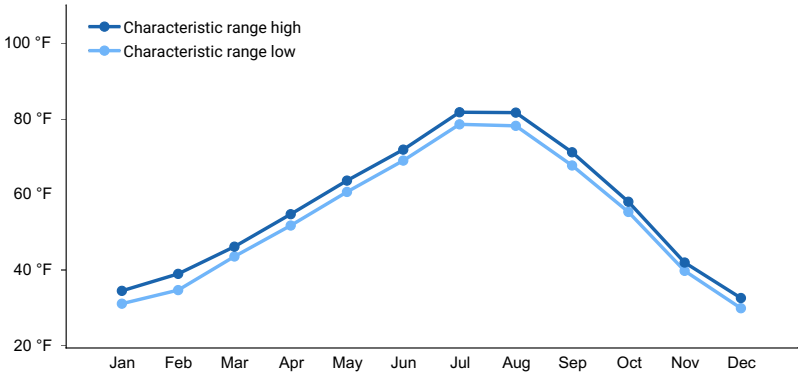


Figure 3. Monthly maximum temperature range

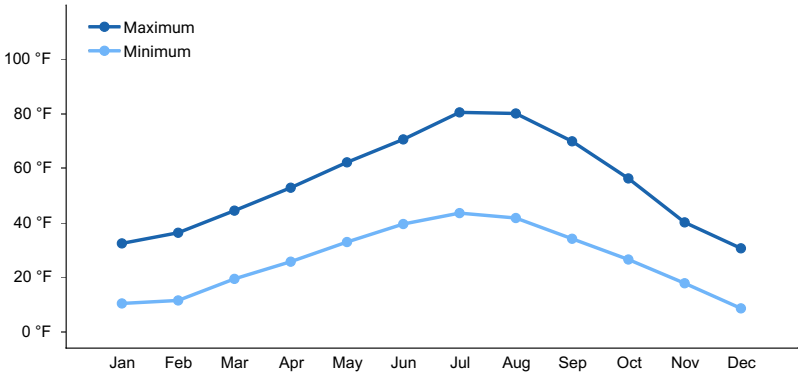


Figure 4. Monthly average minimum and maximum temperature

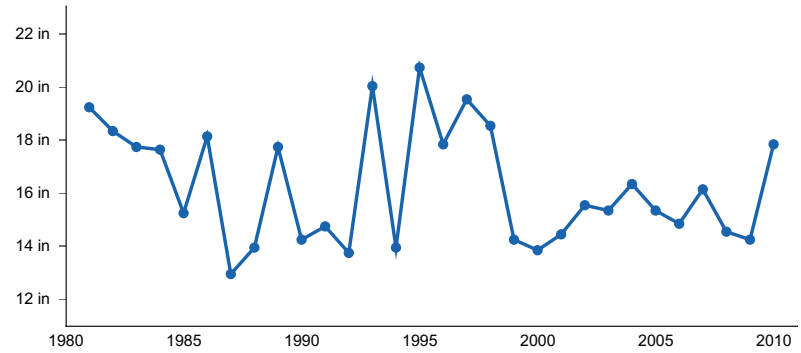


Figure 5. Annual precipitation pattern

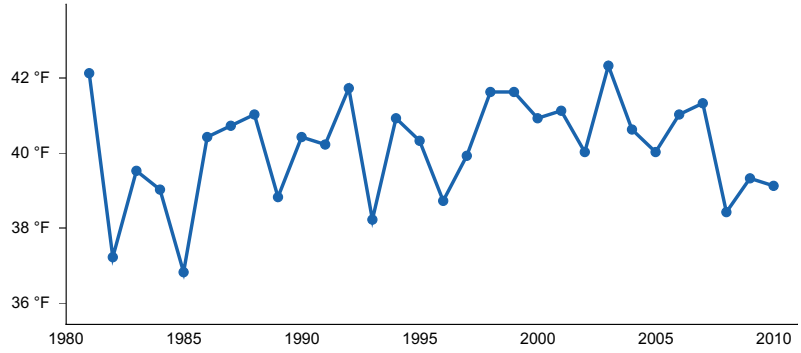


Figure 6. Annual average temperature pattern

Climate stations used

- (1) LINCOLN RS [USC00245040], Lincoln, MT
- (2) NEIHART 8 NNW [USC00246008], Monarch, MT
- (3) WEST YELLOWSTONE [USC00248857], West Yellowstone, MT

- (4) PONY [USC00246655], Cardwell, MT
- (5) WISE RIVER 3 WNW [USC00249082], Wise River, MT
- (6) BUTTE BERT MOONEY AP [USW00024135], Butte, MT
- (7) SULA 14 NE [USC00247967], Sula, MT
- (8) SULA 3 ENE [USC00247964], Sula, MT

Influencing water features

Site is in an active floodplain, along permanent streams and low wet areas associated with riparian systems

Wetland description

Site will often have classic redoximorphic features in the soil.

Soil features

Soils may or may not express hydric characteristics of reduction and oxidation. Water table is within 100cm of soil surface and often at or near the surface. Soil textures will vary based on local geology. Parent material is recent alluvium.

Table 4. Representative soil features

Parent material	(1) Alluvium–igneous, metamorphic and sedimentary rock
Drainage class	Well drained to poorly drained

Ecological dynamics

1 - Reference State (as represented by active floodplain).
Due to active stream dynamics, no one community can describe the reference state and it is common for multiple communities to exist in a relatively small area.
1.1 This plant community is primarily composed of colonizing grasses and sedge and is relatively unstable due to shallow-rooted plants and frequent flooding. Willows may exist on site but are typically in small clumps or as single plants.

1.1a Site becomes more stable over time, deeper rooted plants increase
1.1b Site experiences flooding that exceeds rooting strength of plant community, heavy grazing reduces shrub component

1.2 This plant community contains a high diversity of willows, dogwood, sedges (beaked, Nebraska, and water), and grasses (tufted hairgrass, American and fowl mannagrass, reedgrass). There are several other grasses and grass-likes (bearded wheatgrass, meadow barley, American sloughgrass, and Baltic rush), along with a variety of forbs. Slight variations in climate and elevation may cause some minor shifting of the willow species. This site is moderately stable and typically can withstand occasional flooding.

1.2a Site becomes more stable over time, stream dynamics change (possibly man made structure) causing floodplain to shift to a drier site
1.2b Site experiences catastrophic flooding often associated with extreme weather events and ice jams.

1.3 Mid-statured trees become more prevalent with interspersed coniferous trees possible. Site is very stable but drying due to natural stream dynamics. Willows remain the primary shrub; however, ninebark, chokecherry, and buffaloberry are increasing. Grasses and sedges remain as the understory.

1.3b Site experiences catastrophic flooding often associated with extreme weather event and ice jam.
T1a Long term stability created by nearly complete lack of wild flooding (either natural or man created), Improper grazing promotes grass growth.
T1b Improper grazing (overgrazing or repeated spring grazing), extended drought.
T1c Natural stream dynamics creates a dry site that was once wetter. Improper grazing creates accelerated stream downcutting

2 - Mature Tree State
2.1 Mature Tree Dominated state where large cottonwood, spruce, chokecherry, aspen, and birch trees comprise overstory. Grasses often control the understory with dry shrubs. Site is very stable, drying, and has lost nearly all of its stream dynamic (often associated with a down-cutting of the stream or loss of stream meandering).

R2 Site experiences catastrophic flooding often associated with extreme weather events and ice jams; Brush management, grazing management will also be necessary

3 - Baltic Rush State
3.1 Wetland characteristics of site altered. Baltic rush and increaser species become prevalent. Site drying due to stream downcutting. Hummocking by livestock possible.

R3 Improved grazing practices (change of season of use, conservative stocking rates), tree/shrub establishment, water impoundments (beaver dams, log jams, or dam analogs)
T3a Drying of system as a result of loss of hydrology and increase in drier shrub species encroaching.

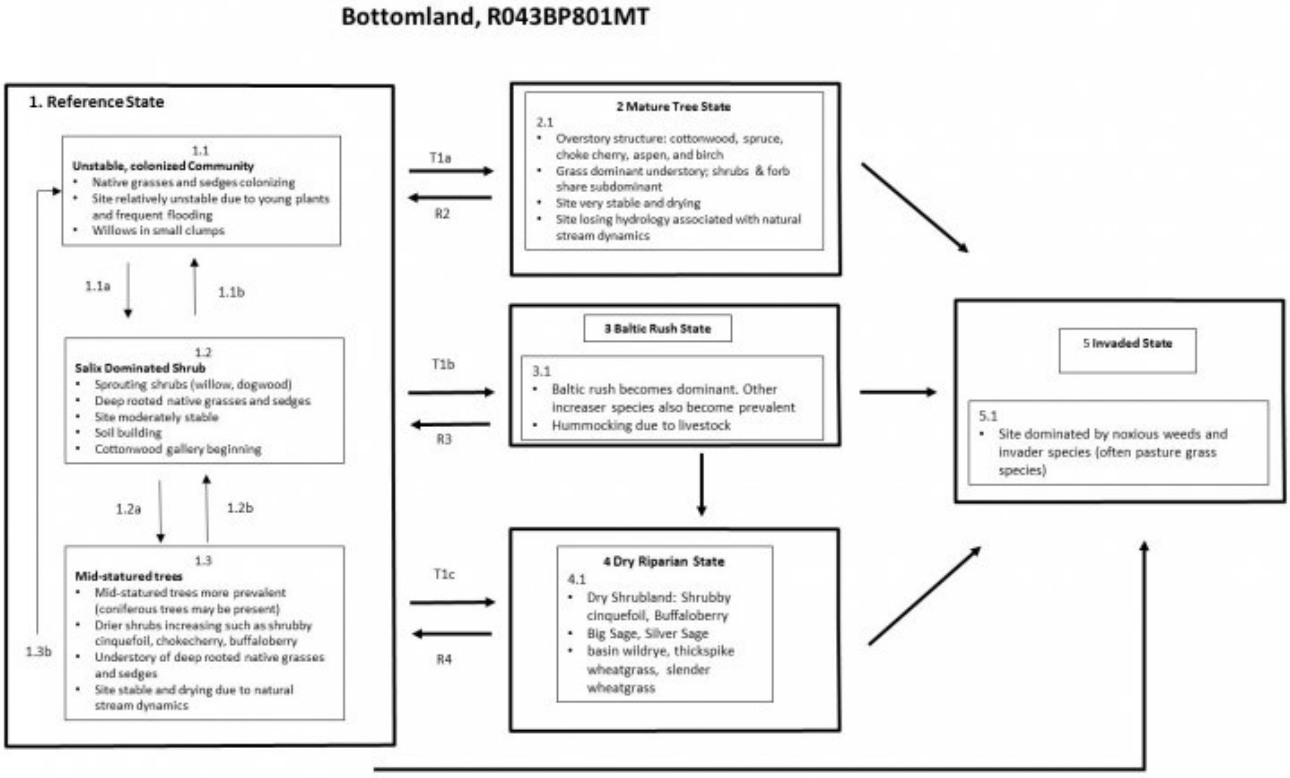
4 - Dry Riparian State
4.1 Site is typically dominated by native grasses such as basin wildrye, thickspike wheatgrass, and slender wheatgrass. Shrubby cinquefoil, buffaloberry, Big sagebrush, and silver sagebrush are dominant shrubs. Site loses hydrology due to downcutting of stream or stream meandering.

R4 Grazing management (timing and amount to improve shrub and tree establishment), brush management to remove unwanted drier species

5 - Invade State
5.1 This includes many non-native species that have come to dominate riparian areas. Some species may include: orchardgrass, timothy, Kentucky bluegrass, non-native thistles, Russian olive, leafy spurge, spotted knapweed, houndstounge, foxtail barley, whitetop mustard. Often sites are a combination both pasture grasses and invading weeds. Site is often a terminal state; meaning these sites are likely to never return to Reference regardless of management.

T1d, T2a, T3b, T4a Sites are invaded by noxious weeds or introduced pasture grasses. Pasture grasses may be planted or a result of invasion from neighboring sites. Improper grazing may be a trigger for invasion however flooding may transport seeds to freshly deposited alluvium.

State and transition model



1 Reference State (as represented by active floodplain). Due to active stream dynamics, no one community can describe the reference state and it is common for multiple communities to exist in a relatively small area.

1.1 This plant community is primarily composed of colonizing grasses and sedge and is relatively unstable due to shallow rooted plants and frequent flooding. Willows may exist on site but are typically in small clumps or as single plants

1.1a Site becomes more stable over time, deeper rooted plants increase

1.1b Site experiences flooding that exceeds rooting strength of plant community, heavy grazing reduces shrub component

1.2 This plant community contains a high diversity of willows, dogwood, sedges (beaked, Nebraska, and water), and grasses (tufted hairgrass, American and fowl mannagrass, reedgrass). There are several other grasses and grasslikes (bearded wheatgrass, meadow barley, American sloughgrass, and Baltic rush), along with a variety of forbs. Slight variations in climate and elevation may cause some minor shifting of the willow species. This site is moderately stable and typically can withstand occasional flooding

1.2a Site becomes more stable over time, stream dynamics change (possibly man made structure) causing floodplain to shift to a drier site

1.2b Site experiences catastrophic flooding often associated with extreme weather event and/or ice jam

1.3 Mid-statured trees become more prevalent with interspersed coniferous trees possible. Site is very stable but drying due to natural stream dynamics. Willows remain the primary shrub however Ninebark, chokecherry, and buffaloberry are increasing. Grasses and sedges remain as the understory.

1.3b Site experiences catastrophic flooding often associated with extreme weather event and/or ice jam

2.1 Mature Tree Dominated state where large cottonwood, spruce, chokecherry, aspen, and birch trees comprise overstory. Grasses often control the understory with dry shrubs. Site is very stable, drying, and has lost nearly all of its stream dynamic (often associated with a down cutting of the stream or loss of stream meandering)

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3.1 Wetland characteristics of site altered. Baltic rush and increaser species become prevalent. Site drying due to stream downcutting. Hummocking by livestock possible

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R3 Improved grazing practices (change of season of use, conservative stocking rates), tree/shrub establishment, water impoundments (beaver dams, log jams, or dam analogs)

4.1 Dry riparian site: Site is typically dominated by native grasses such as basin wildrye, thickspike wheatgrass, and slender wheatgrass. Shrubby cinquefoil, buffaloberry, Big sagebrush, and silver sagebrush are dominant shrubs. Site loses hydrology due to downcutting of stream or stream meandering.

T1c Natural stream dynamics creates a dry site that was once wetter. Improper grazing creates accelerated stream downcutting

T3a Drying of system as a result of loss of hydrology and increase in drier shrub species encroaching.

R4 Grazing management (timing and amount to improve shrub and tree establishment), brush management to remove unwanted drier species

5.1 Invaded State: This includes many non-native species that have come to dominate riparian areas. Some species may include: orchardgrass, timothy, Kentucky bluegrass, non-native thistles, Russian olive, leafy spurge, spotted knapweed, houndstounge, foxtail barley, whitetop mustard. Often sites are a combination both pasture grasses and invading weeds. Site is often a terminal state; meaning these sites are likely to never return to Reference regardless of management

T1d, T2a, T3b, T4a Sites are invaded by noxious weeds or introduced pasture grasses. Pasture grasses may be planted or a result of invasion from neighboring sites. Improper grazing may be a trigger for invasion however flooding may transport seeds to freshly deposited alluvium.

Animal community

Livestock grazing is suitable on this site. These areas can often be safely utilized at a time of year when the herbaceous component is lush.

Management objectives should include maintenance or improvement of the vegetation community. Shorter grazing periods and adequate re-growth after grazing are recommended for plant recovery and maintenance. A switch to browse use can indicate the need to move livestock off site to maintain or improve the shrub and tree community.

Management considerations can include: rotation grazing, rest, prescribed utilization levels, off-site water

development, varying the season of use, developing riparian pastures, providing additional forage sources (i.e. new seedings/special use pastures, brush management, prescribed burning, and using supplements as ways to attract livestock to other areas of a pasture), using appropriate stocking rates & stock density, armoring water gaps, using a different breed or class of livestock, culling animals that spend too much time in the riparian area, alternating pasture entry locations, and herding. Season-long use of this site can be detrimental and will alter the plant community over time.

The shrub and tree component can be increased by providing rest during the critical growing period, managing the livestock to avoid a switch from grazing to browsing, grazing for a shorter period of time, or providing rest (generally 3 to 5 years) to promote seedling development and growth. Grazing a pasture when the upland vegetation is green and higher quality may help reduce livestock use of this site. Avoiding or limiting use during the hotter time of the year is also recommended.

Rest needs to be included in the management plan to aid with the maintenance of the woody species and to help establish various age classes. The cottonwoods and willows depend largely on vegetative means for reproduction in the absence of frequent flooding, which provides the conditions needed for new seedling establishment. Rest allows vegetative sprouting to happen. The rest period needs to be long enough to allow the new sprouts to grow out of reach of the grazing and browsing animal.

Flood and overflow channels are often common on this ecological site. When present, they can sometimes provide a suitable habitat for establishment of woody species.

Even though a minor component of the potential plant community, it is often desirable to maintain the herbaceous component in a vigorous, healthy condition. This can often be accomplished by providing rest on a regular basis, followed by late season use the next year. This treatment helps restore the desired plants' vigor and aids seed dispersal.

A site dominated by a low seral plant community will need rest annually until the site has stabilized and the plant community begins to move towards mid-seral. Mid- to late-seral species on this ecological site are predominantly facultative-wet.

Sites having mainly over-mature and decadent cottonwoods need a treatment strategy that will allow for establishment of younger plants. Often, depending on the site and situation, treatments in addition to grazing management may be necessary. The results of some treatments have not been satisfactorily tested. A study in Southeastern Montana to test mechanical treatment to encourage root sprouting has not resulted in appreciable increase in the amount of young plains cottonwoods.

Calculating Safe Stocking Rates
Initial stocking rates will be determined with the landowner or decision-maker and should be consistent with management objectives and resource needs. They will be based on preliminary calculations determined by ecological status and trend of the vegetation, and past use histories. They will also be based on a management strategy that protects the resource, and maintains rangeland health and function. Adjustments to stock densities will be needed if season-long grazing is used. Additional adjustments may be needed because of accessibility and forage value.

Calculations used to determine a suggested initial stocking rate are based on the amount of usable forage produced and the ecological status (similarity index) of the site, taking into account harvest efficiency of the animal. As ecological status and similarity index decline, less productive, palatable, and nutritious plant species are favored.

This ecological site provides important habitat for many wildlife species. It is an important source of forage for grazing animals (herbivores). The seeds produced by the sedges and other plants are an important source of food for waterfowl and other birds. The cottonwoods, willows and other shrubs provide shelter, cover, and nesting sites. The cottonwoods also often provide a critical source of protein for migrating neotropical birds.

If the associated stream is large enough, animals such as muskrats and beavers may also use the woody and herbaceous vegetation on this site.

There have been no special emphasis species identified specific to this site. However, bald eagles and peregrine

falcons will use the habitats provided by this ecological site, adjacent sites, and associated stream for portions of their life cycle.

Standing dead trees provide good habitat for cavity dwellers.

Hydrological functions

Soils have been classified into hydrologic soil groups and are defined by NRCS soil scientists. The soils associated with this ecological site are generally in Hydrologic Soil Group B. The infiltration rates for these soils will normally be moderate. The runoff potential for this site is low. Runoff curve numbers generally range from 61 to 79.

This site typically receives and generates runoff. It typically has abundant sub-surface water, resulting from its hydrologic connection with streamflow and water table fluctuations.
Runoff is characterized by occasional, rare, or very rare surface flooding from overbank flow and on site precipitation. Subsurface return flows as the streamflow subsides also generates runoff.

Plant cover affects runoff in several ways. The foliage and litter maintain the soil's infiltration potential by preventing the impact of raindrops from sealing the soil surface. Some of the precipitation will be intercepted by the plants and withheld from the initial runoff. Vegetation, including litter, forms barriers to water flow lengthening the time of concentration, dissipating energy, and reducing the peak discharge.

The hydrologic condition of this site has a significant affect on runoff. The hydrologic condition considers the effects of cover, including litter, and management on infiltration. Good hydrologic condition indicates that the site usually has a lower runoff potential. Good hydrologic condition for this site also indicates that this site and adjacent streambanks will remain stable and functioning after high flow events.

Sites in high similarity generally have enough cover and litter to optimize infiltration, minimize runoff and erosion, minimize streambank erosion, and have a good hydrologic condition. The deep root systems of the trees, shrubs, sedges and grasses in the Historic Climax Plant Community (HCPC) will help maintain or increase infiltration rates and reduce erosion

Sites in low similarity are generally considered to be in less than good hydrologic condition. Sites in low similarity may have a high percentage of cover, but from shallow rooted species (e.g., Kentucky bluegrass or redtop).

Erosion is minor for sites in high similarity. Rills and gullies should not be present. Water flow patterns, if present, will be barely observable. There are typically overflow or flood channels present and these should be stable and not eroding. Soil surfaces should not be compacted or crusted. Limbs and downed trees often provide barriers to overland flows, further dissipating energy and reducing erosion.

On-site precipitation will often be necessary to keep the root zone of the shallow rooted plants at field capacity during the growing season. The root zone of the larger shrubs, trees and other deep-root plants should have free water available from the water table throughout the year. Plant cover and litter helps retain soil moisture for use by the plants.

(reference: Engineering Field Manual, Chapter 2 and Montana Supplement 4)

Recreational uses

This site provides recreational opportunities for big game and bird hunting. The forbs have flowers that appeal to photographers. The associated stream often provides good fish habitat. Shade provided by the trees provides favored locations for activities such as picnics.

Wood products

This site is capable of producing commercially valuable wood products, including paper, plywood, pallets, and stock for furniture. The value of the trees for maintaining riparian stability and function is probably more important.

Inventory data references

Data from National Resources Inventory, field observations, and professional expertise from Agency and NGO staff.

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Contributors

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Approval

Kirt Walstad, 3/01/2024

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	04/19/2024
Approved by	Kirt Walstad
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:

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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):**

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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:**
