USDA Natural Resources
Conservation Service

Ecological site R058AC617MT
Riparian Subirrigated (RSb) RRU 58A-C 11-14" p.z.

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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.

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.

Associated sites

R058AC044MT	**Subirrigated (Sb) RRU 58A-C 11-14" p.z.**

Similar sites

R058AC044MT	**Subirrigated (Sb) RRU 58A-C 11-14" p.z.** The Subirrigated site differs mainly by not being saturated to the surface and not being in the flood-prone area.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix boothii* (2) *Salix lutea*
Herbaceous	(1) *Deschampsia caespitosa* (2) *Calamagrostis stricta ssp. inexpansa*

Physiographic features

This site occurs within the floodplain
adjacent to perennial streams and adjacent to flowing springs. Slopes are mainly 1-4%, but can range up to 15%. This site is also known as a "Lotic" (running water) riparian area. This site has a permanent water table
within approximately 3.5 feet of the surface. In addition, this site will receive
additional surface moisture from stream overflow. Surfaces above the water table will typically not remian flooded or saturated for prolonged periods of time.

Table 2. Representative physiographic features

Landforms	(1) Flood plain
Flooding duration	Long (7 to 30 days)
Flooding frequency	Frequent
Ponding frequency	None
Elevation	4,000–6,500 ft
Slope	1–15%
Ponding depth	0 in
Water table depth	36–42 in
Aspect	Aspect is not a significant factor

Climatic features

Major Land Resource Area (MLRA) 58AC in Montana is considered to have a continental climate characterized by cold winters, hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature are typical. The climate is the result of this MLRA's location in the geographic center of North America. There are few natural barriers on the northern Great Plains and the winds move freely across the plains and account for rapid changes in temperature. Seasonal precipitation is often limiting for plant growth. Annual fluctuations in species composition and total production are typical depending on the amount and timing of rainfall.
Temperatures can be very extreme in this part of Montana. Summer daytime temperatures are typically quite warm, generally averaging in the mid to upper 80º's F for July and August. Summertime temperatures will typically reach in the 100º's F at some point during the summer, and can reach 90º F any month between May and September. Conversely, winter temperatures can be cold, averaging in the mid teens to mid 20º's F for December and January. There will typically be several days of below zero temperatures each winter. It is not uncommon for temperatures to reach 30–40º F below zero, or even colder, most any winter.

Spring can be windy throughout this MLRA, with winds averaging over 10 mph about 15 percent of the time. Speeds of 50 mph or stronger can occasionally occur as a weather system crosses this part of Montana.

The majority of the rangeland in MLRA 58AC is within the 11 to 14 inch Mean Annual Precipitation (MAP) range. During an average year, 70 to 75 percent of the annual precipitation falls between April and September, which are the primary growing season months.

Snowfall is not heavy in the area, averaging 28 total inches in the Yellowstone Valley. Heavy snowfall occurs infrequently, usually late in the winter or early spring. Snow cover is typically 1 to 3 inches.

The frost-free (32º F.) season averages about 105 to 145 days each year in the uplands, to nearly 170 days along the Yellowstone River Valley.

For local climate station information, refer to http://www.wcc.nrcs.usda.gov/cgibin/state.pl?state=mt.

Table 3. Representative climatic features

Frost-free period (average)	135 days
Freeze-free period (average)	155 days

Precipitation total (average)	14 in

Influencing water features

Typically, these sites occur along streams of moderate energy as indicated by the presence of riffles. The floodplain/riparian area has a cross-section and profile which limits surface ponding. The upper part of the soil profile will begin to drain soon after an over-bank flow event has receded.

Stream Type: mainly B4, B5, B6, C2, C3, C4, C5, C6, DA3, DA4, DA5, DA6. (Rosgen Classification System)

Soil features

These soils are hydric due to frequent flooding. The soils associated with this site are mainly deep or very deep (>60 inches). They tend to be medium (loamy or silty) to lighter (sandy) textured. They are generally in the aquic moisture regime or aquic intergrade and somewhat poorly or poorly drained. They generally have a very gravelly layer and permanent water table within 3.5 feet of the surface. This ground water is normally available to the plants throughout the growing season.

Redoxomorphic features (mottles) in the soil profile indicate that the level of the seasonal water table will tend to fluctuate during the year. The seasonal water table is mainly because of the site's hydrologic connection with the stream, as well as the result of flooding events, and is generally present for only a relatively short period of time. These soils are non-saline and non-sodic. They are non-calcareous or only slightly calcareous in the upper part.

Table 4. Representative soil features

Surface texture	(1) Mucky loam (2) Gravelly silt (3) Cobbly sand
Drainage class	Somewhat poorly drained to poorly drained
Permeability class	Moderate to moderately slow
Soil depth	40–72 in
Surface fragment cover <=3"	0–1%
Soil reaction (1:1 water) (0-40in)	6.6–7.8

Ecological dynamics

The physical aspect of this site is a mixed shrub land. The plant community is typically dominated by a multi-layered structure of shrubs, grasses, sedges, rushes, and forbs. Willows and occasionally other shrubs such as Wood's rose, and currants/ gooseberries are conspicuous components of the site. Approximately 45 – 50% of the annual production is from grasses and grass-likes, 5 –10% is from forbs, and 40 - 45% is from willows and other shrubs.

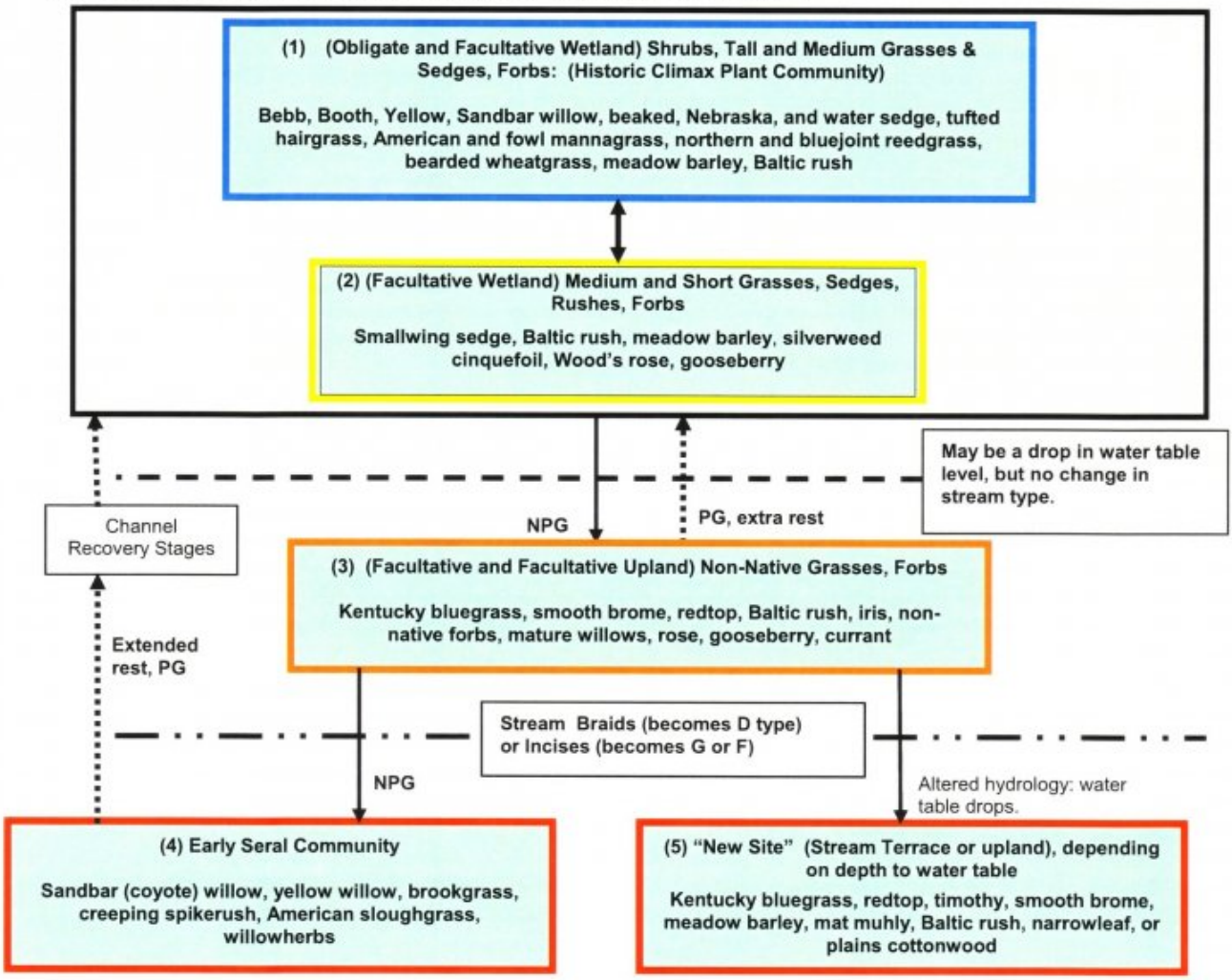
Disturbances to this site, including non-prescribed grazing, will result in the decrease of the taller, more palatable species such as the beaked, Nebraska, and water sedges, mannagrasses, prairie cordgrass, wheatgrasses and reedgrasses. These plants will be replaced by smaller sedges, Baltic rush, meadow barley, and forbs.

Plants not a part of the potential natural community that are most likely to invade include Kentucky, fowl, and Canada bluegrass, timothy, smooth brome, redtop, quackgrass, Canada thistle, dandelion, non-native clovers, leafy spurge, knapweeds, sulfur cinquefoil, annuals and other weed species. Russian olive and salt cedar are common invader shrubs.

State and transition model

MLRA: 58AC – Sedimentary Plains, Central
R058AC617MT

5c. Plant Communities and Transitional Pathways (diagram)



Smaller boxes within a larger box indicate that these communities will normally shift among themselves with slight variations in precipitation and other disturbances. Moving outside the larger box indicates the community has crossed a threshold (heavier line) and will require intensive treatment to return to Community 1 or 2. Dotted lines indicate a reduced probability for success. Yellow boxes indicate caution that the community may be in danger of crossing a threshold. Orange boxes represent communities that have crossed over thresholds from the HCPC and may be difficult to restore with grazing management alone. Red boxes represent communities that have severely shifted away from the HCPC and probably cannot be restored without significant inputs.

NOTE: Not all species present in the community are listed in this table. Species listed are representative of the plant functional groups that occur in the community.

PG = Prescribed Grazing: Use of a planned grazing strategy to balance animal forage demand with available forage resources. Timing, duration, and frequency of grazing are controlled and some type of grazing rotation is applied to allow for plant recovery following grazing.

NPG = Non-Prescribed Grazing: Grazing which has taken place that does not control the factors as listed above, or animal forage demand is higher than the available forage supply.

State 1
Obligate and Facultative Wetland Shrubs, Tall and Medium Grasses and Sedges, Forbs (HCPC)

Community 1.1
Obligate and Facultative Wetland Shrubs, Tall and Medium Grasses and Sedges, Forbs (HCPC)

Figure 2. 58AC Riparian Subirrigated 11-14" MAP Plant Commun

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC) for this site. This plant community contains a high diversity of willows (Bebb, Booth, Yellow, Sandbar), tall sedges (beaked, Nebraska, and water), and grasses (tufted hairgrass, American and fowl mannagrass, Northern and bluejoint reedgrass). There are several other grasses, sedges, and rushes (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, but the general proportions should remain somewhat constant. This site is considered highly resilient to disturbance as it has minimal soil limitations for plant growth, plus a permanent water table within rooting depth. Changes may occur to the Historic Climax Plant Community due to management actions and/or climatic conditions. Under continued adverse impacts, a moderate decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments, this site can more readily return to the Historic Climax Plant Community (HCPC). Streams and their associated riparian areas are highly dynamic systems and are subject to events that other rangeland ecological sites are not, such as flooding. Major changes to the stream's geomorphology as a result of a significant flood event (e.g., a 100 year event) can be potentially catastrophic. Should the change to the geomorphology be severe enough (e.g., be changed from a C type to a D or G type), this site will cease to exist in that reach of stream until the channel progresses through several stages in its recovery, usually taking several years. Maintaining good vegetative cover, especially the willow component, is critical to maintaining the integrity, function and stability of this site.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2200	2270	2350
Shrub/Vine	1870	1935	1998
Forb	330	345	352
Total	**4400**	**4550**	**4700**

Table 6. Ground cover

Tree foliar cover	0-5%
Shrub/vine/liana foliar cover	50-60%
Grass/grasslike foliar cover	50-60%
Forb foliar cover	1-10%
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. Soil surface cover

Tree basal cover	0-2%
Shrub/vine/liana basal cover	10-20%
Grass/grasslike basal cover	15-25%
Forb basal cover	1-5%
Non-vascular plants	0%
Biological crusts	0-5%
Litter	55-75%
Surface fragments >0.25" and <=3"	0-1%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	1-5%

Table 8. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	–
>0.5 <= 1	–	–	–	1-10%
>1 <= 2	–	–	50-60%	–
>2 <= 4.5	–	–	–	–
>4.5 <= 13	–	50-60%	–	–
>13 <= 40	0-5%	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

State 2
Facultative Wetland Medium and Short Grasses, Sedges, and Rushes, Forbs

Community 2.1
Facultative Wetland Medium and Short Grasses, Sedges, and Rushes, Forbs

Slight disturbances and degradation to the HCPC typically results in a community dominated primarily of smallwing sedge, Baltic rush, meadow barley, along with forbs such as silverweed cinquefoil. Shrubs, such as Wood’s rose and gooseberry often increase in this situation. Non-native grasses such as Kentucky bluegrass and redtop tend to become more abundant. Plant biomass production and litter become reduced on the site as the taller grasses and some of the larger willows disappear, increasing evaporation and reducing moisture retention. Additional open space in the community can result in undesirable invader species. This plant community provides for moderate soil stability.

State 3
Facultative and Facultative Upland, Non-Native Grasses, Forbs

Community 3.1
Facultative and Facultative Upland, Non-Native Grasses, Forbs

The plant community can experience some dramatic shifts with changes to the water table or flood frequency. As the permanent water table becomes lower as the result of a disturbance, the understory vegetation will begin to reflect the change with a reduction in the amounts of sedges, rushes, mannagrasses, and reedgrasses. These species are often replaced by such non-native grasses such as Kentucky bluegrass, smooth brome, timothy, quackgrass, and redtop. Species with a wider tolerance of wetness, such as Baltic rush, may persist with even limited available ground water. Dandelion, iris, Canada thistle, and other weed species also tend to increase under these conditions. The willows should persist provided the water table is still within their rooting zone. This plant community is less productive than Plant Community 1 or 2 (< 1300 pounds per acre). The lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and high evapotranspiration, which gives plants like Kentucky bluegrass, redtop, and Baltic rush a competitive advantage over the deeper rooted cool season tall and medium sedges and grasses. This community has lost many of the attributes of a healthy rangeland, including good infiltration, minimal erosion and runoff, nutrient cycling and energy flow. There are limitations to using seeding on this site because of the location of this site and the frequency of flooding. Brush control is not recommended as the willows and other shrubs are critical for the stability and function of this site.

State 4
Early Seral Species

Community 4.1
Early Seral Species

After a major disturbance to the stream, there will be a period of time when the riparian plant community will be composed of pioneer or disturbance induced species as it begins to re-establish and stabilize. Species such as sandbar (coyote) willow, yellow willow, creeping spikerush, brookgrass, American sloughgrass and some forbs such as willowherbs are typically some of the first species to colonize a site.

State 5
New site

Community 5.1
New site

If disturbance to Community 3 continues, the potential for excessive lateral streambank erosion or stream incisement increases. Plants like Kentucky bluegrass do not possess the root mass necessary to protect the streambanks and riparian area from the erosive forces of the stream. With this lack of protection, the usual progression is for the stream to become braided and no longer have a functioning flood plain (e.g., becomes a Rosgen D channel type). (These can also sometimes degrade to a F or G channel type if the channel is not vertically stable.) The area may again stabilize after a period of time (often several years). The result is that the area that had been the Riparian Subirrigated no longer possesses the hydrology needed to support the Historic Climax or Potential Plant Community. A new riparian area is established at a lower elevation, typically having a plant community similar to 5 initially. On sites that no longer frequently flood, the age class of willows will shift over time towards being predominately mature, provided there is still a permanent water table within their root zone. The sedges and rushes tend to be replaced by increasing amounts of Kentucky bluegrass, redtop, timothy, and smooth brome, as well as some native species such as meadow barley and mat muhly. Baltic rush often remains as a significant component. These sites will often become a Stream Terrace ecological site, which is typically located on low stream terraces in river systems. The willows will tend to be replaced by increasing amounts of rose, gooseberry, or other shrubs as the site tends to become drier. Tree species such as cottonwood and Rocky Mountain juniper often begin to occupy or dominate the site, eventually converting it to a forested site.

Additional community tables

Table 9. Community 1.1 plant community composition

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

Grass/Grasslike					
1	**Native grasses, sedges and rushes**			1980–2115	
	northern reedgrass	CASTI3	*Calamagrostis stricta ssp. inexpansa*	220–705	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	220–470	–
	American mannagrass	GLGR	*Glyceria grandis*	220–470	–
	fowl mannagrass	GLST	*Glyceria striata*	220–470	–
	water sedge	CAAQA	*Carex aquatilis var. aquatilis*	220–470	–
	bluejoint	CACA4	*Calamagrostis canadensis*	220–470	–
	woollyfruit sedge	CALA11	*Carex lasiocarpa*	0–470	–
	Nebraska sedge	CANE2	*Carex nebrascensis*	220–470	–
	woolly sedge	CAPE42	*Carex pellita*	0–470	–
	beaked sedge	CARO6	*Carex rostrata*	220–470	–
	beardless wheatgrass	PSSPI	*Pseudoroegneria spicata ssp. inermis*	220–470	–
	American sloughgrass	BESY	*Beckmannia syzigachne*	44–235	–
	water whorlgrass	CAAQ3	*Catabrosa aquatica*	0–235	–
	swordleaf rush	JUEN	*Juncus ensifolius*	0–235	–
	Torrey's rush	JUTO	*Juncus torreyi*	0–235	–
2	**Native grasses, sedges and rushes**			0–235	
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–235	–
	Grass, perennial	2GP	*Grass, perennial*	0–235	–
	smallwing sedge	CAMI7	*Carex microptera*	0–235	–
	meadow barley	HOBR2	*Hordeum brachyantherum*	0–235	–
Forb					
3	**Native forbs**			220–470	
	Forb, perennial	2FP	*Forb, perennial*	0–235	–
	silverweed cinquefoil	ARAN7	*Argentina anserina*	0–235	–
	willowherb	EPILO	*Epilobium*	0–235	–
	largeleaf avens	GEMA4	*Geum macrophyllum*	0–235	–
	Rocky Mountain iris	IRMI	*Iris missouriensis*	0–235	–
	wild mint	MEAR4	*Mentha arvensis*	0–235	–
	slender cinquefoil	POGR9	*Potentilla gracilis*	0–235	–
	alpine leafybract aster	SYFOF	*Symphyotrichum foliaceum var. foliaceum*	0–235	–
	goldenbanner	THERM	*Thermopsis*	0–235	–
Shrub/Vine					
4	**Native shrubs and trees**			1760–2115	
	Booth's willow	SABO2	*Salix boothii*	440–940	–
	Geyer willow	SAGE2	*Salix geyeriana*	0–470	–
	sandbar willow	SAIN3	*Salix interior*	220–470	–
	yellow willow	SALU2	*Salix lutea*	220–470	–
	Pacific willow	SALUL	*Salix lucida ssp. lasiandra*	0–235	–
	Missouri gooseberry	RIMI	*Ribes missouriense*	44–235	–
	Woods' rose	ROWO	*Rosa woodsii*	44–235	–

	Bebb willow	SABE2	*Salix bebbiana*	0–235	–
	Shrub, broadleaf	2SB	*Shrub, broadleaf*	0–235	–
	Drummond's willow	SADR	*Salix drummondiana*	0–235	–
	mountain alder	ALVIC	*Alnus viridis ssp. crispa*	0–1	–
	water birch	BEOC2	*Betula occidentalis*	0–1	–
	redosier dogwood	COSE16	*Cornus sericea*	0–1	–

Animal community

Livestock Grazing Interpretations:

Managed livestock grazing is suitable on this site as it has the potential to produce a large amount of high quality forage. This site is sensitive to inappropriate grazing management. Management objectives should include maintenance or improvement of the plant community that is specific to this riparian/wetland area. Heavy stocking and season long use of this site is detrimental and will alter the plant community composition resulting in potential stream and riparian area degradation over time.

Vegetation is important for this site to maintain its proper function and stability. A plant community having a strong, healthy root system is important for maintaining this ecological site and the integrity of the associated streambank. Vegetation also acts as a filter for sediment and nutrients that may be carried by surface runoff from the adjacent uplands to the stream.

Soil compaction and/or streambank shearing can occur because of the wet soils often associated with this ecological site. Grazing should occur after soils have dried unless the amount of time the livestock spend on this site can be managed. Plant communities 1 and 2 will shift back and forth with variations in weather/climate, frequency and duration of flooding, depth to water table, and soils, as well as grazing use.

These communities can be maintained or improved by: providing occasional rest during the growing period, grazing for a shorter period of time, limiting duration of use during the hot season. Grazing when the upland vegetation is green and high quality can help reduce livestock use of this site. Strategically locating livestock supplements, such as low moisture block, can help attract livestock away from riparian areas. Several studies as well as experience have shown that providing off-stream stock water can significantly reduce the amount of time livestock will spend at this site.

Recommended grazing periods for the hot season (generally July 1 through September 15) is generally no more than 14 days. During the other times of the grazing season, the recommended grazing period can be up to 28 days. A switch to browse use can indicate the need to move livestock from this site to maintain or improve the shrub community.

When Plant Community 2 occurs as a result of non-prescribed grazing, management strategies need to be implemented soon to avoid further deterioration. This community is still stable, productive, and healthy provided it receives proper management. Improved grazing management alone can usually move this community back to one more similar to potential fairly quickly, or at least prevent any further degradation. However, continuation of non-prescribed grazing will eventually cause the community to cross a threshold whereby returning to a community similar to either 1 or 2 becomes more difficult.

Plant Community 3 is the result of long-term, continuous season long grazing; annual, early spring seasonal grazing; repeated long duration hot season use; a lowering of the water table; or a combination of these.

This community is typically comprised of non-native grasses such as Kentucky bluegrass or redtop. Additional rest is a recommended treatment as it often helps facilitate replacement of these with desired native obligate species. Extra rest is intended to maintain more above ground production and help restore some of the stability and natural hydrology of the site. This growth helps trap sediment during flood events. Over time, the trapped sediment begins to restore the stream banks. The stream’s cross section often becomes narrower and deeper as a result. This often leads to the water column/water table in the system raising. Restored natural hydrology will cause a shift back to the native species of the site.

Sites having mainly over-mature and decadent willows 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, such as temporary fencing to restrict access to the riparian area.

Plant Community 3 has significantly reduced forage production. It will respond positively to improved grazing management but prescribed grazing management alone is seldom enough to return it to one resembling either Community 1 or 2 once it has degraded to this point. Additional rest is often necessary for re-establishment of the desired species and to restore the stability and health of the site. Prescribed grazing usually needs to be coupled with other practices which generally require sizeable economic inputs, such as temporary fencing, along with a significant amount of time, usually many years.

There are sometimes situations where the stream has become braided or incised and there is minimal potential for restoring original hydrology, yet there is still a significant component of willows and other woody species that are desirable to maintain. Rest should be included in the management plan to aid with the maintenance of the woody species that are present and to establish multiple age classes. Without frequent flooding providing habitat for new seedling establishment, these plants will depend on vegetative means for reproduction. Rest allows that to happen. The rest period needs to be long enough (often 3-5 years or more, depending on their growth rate) to allow the new sprouts to grow out of reach of the grazing/browsing animal. These areas can often be safely utilized at a time of year when the herbaceous component is lush. Consider techniques to either help attract the animals out of these areas or restrict their access.

A site dominated by an early seral plant community (community 4) will also need rest annually sometime during the growing season until the site has stabilized and the plant community begins to move towards mid or late seral. Mid to late seral species on this ecological site are predominantly obligate and facultative-wet.

Riparian ecological sites need to be managed as part of a plan for all grazing lands and not treated as a separate entity. Otherwise, some component of the ecosystem will not be properly managed.

Wildlife Interpretations:

The Riparian Subirrigated Ecological Site is among the most important wildlife habitats in Montana. In fact, the wildlife value of this site is far greater than its limited occurrence the landscape (5% at the most) would indicate. Somewhere around 75% of all of our wildlife species use this site at some point in their life cycle. The winding, linear nature of stream corridors provides travel corridors and connectivity between numerous upland habitats and the seasonal ranges of many wildlife species. The combination of succulent green forage, complex habitat structure and water make this site exceptionally attractive to both resident and migratory wildlife. Riparian shrub lands provide migration stop-over habitat for Neotropical migratory birds as they travel between northern breeding ranges and winter habitats as far south as Central and South America. Other species, moose, for example, use riparian habitat year-round. Invasive weeds often degrade this ecological site. Notable weeds include Canada thistle, leafy spurge, hound’s tongue, poison hemlock, burdock and Russian olive. Uncontrolled livestock grazing has degraded many miles of Riparian Subirrigated and contributed to the spread of noxious weeds. On the other hand, long-term non-use may also result in noxious weed infestation. The condition of riparian subirrigated habitat often determines the health of fisheries in associated streams.

Plant Community 1: Obligate and Facultative Wetland Shrubs, Tall and Medium Grasses & Sedges, Forbs:
The diversity of succulent forbs along with grass and shrub variety provides substrate for numerous insect, and other invertebrate species. Streams associated with this ecological site support native salmonids and other fish species, which depend on overhead cover, overhanging banks, and insects - all produced by woody and herbaceous plants growing in this community. Three species of garter snakes frequent the moist habitat available here, along with the racer, a bluish-tinged snake. Numerous breeding and migratory birds use the complex habitat in this willow-sedge community. Examples include common yellowthroats, MacGillivray’s warbler and gray catbirds. Sage grouse broods forage for insects and succulent forbs in this type. Moose, elk and deer make significant use of this community as a forage source and travel corridor. Representative small mammals include the mountain cottontail and western jumping mouse.

Plant Community 2: Facultative Wetland Medium and Short Grasses, Sedges, and Rushes, Forbs: Insect diversity declines with the reduction in forb and shrub variety. Native fish habitat suffers from a reduction in bank cover and,

often, a somewhat higher width-depth ratio in the stream. Breeding bird diversity declines as the taller shrub component is lost. Cover values for big game species and small mammals decreases for the same reason.

Plant Community 3: Facultative and Facultative Upland, Non-Native Grasses, Forbs:
Wildlife habitat values are considerably reduced in this low successional plant community. A lowered water table follows the loss of root mass in the soil and, in some cases, a down-cut stream surface. The resulting loss of plant diversity supports fewer insect species. Cover and food supplies are significantly reduced for most wildlife. Fish habitat is poor following removal of bank cover and development of a wider, shallower stream. Mature willows may still provide some cover but shrub reproduction is insignificant.

Plant Community 4: Early Seral Species:
This community is much less diverse than the HCPC. However, recovery of willows and native herbaceous species provides more habitat diversity than Community 3, above. Fish habitat is poor because stream habitat features such as deep pools and overhanging banks are not yet available. Breeding birds and a wide variety of mammals find improving cover with the development of pioneer plant species.

Plant Community 5: "New" site: Down cutting of the stream dries out the site. Resulting habitat values for species depending on riparian habitat largely disappear. Over time, a new HCPC community may develop adjacent to the down-cut stream but will be significantly narrower than the original community. Fish habitat is very poor; bank cover and pool-riffle complexes are limited. Terrestrial wildlife species find little cover and food in this community.

Hydrological functions

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 ecological site typically receives and generates runoff. The site is typically wet, receiving the majority of its moisture by its hydrologic connection with stream flow and water table fluctuations.

Runoff is characterized by frequent surface flooding from over bank flows. On site precipitation is generally considered a minor source of runoff from this site. As the stream flow subsides, runoff typically becomes subsurface return flows.

Any condition that would cause an increased instantaneous runoff peak (e.g., poorly designed clear cutting in the upper watershed) could degrade the channel causing either lateral instability or head cutting. A braided (Rosgen D type) or an incised stream (G or F type) is typically the result.

Down cutting (incisement) would be a catastrophic event to this ecosystem. Channel down cutting will increase subsurface drainage, lower the seasonal water table, reduce frequency of over bank flow, and reduce duration of near surface saturation. Bank erosion will increase.

The stream, in time, will adjust to a lower base elevation. However, the result of down cutting will be a new floodplain at a lower elevation, lower water table elevation, less flood prone width, and less adjacent riparian/wetland area. The dominant vegetation in the previous riparian/wetland area will change (i.e., from Obligate and Facultative-wet to Facultative, etc.). Given enough time, these conditions will eventually result in this site becoming either a Stream Terrace, or upland site, depending on resulting depth to the water table

The vegetative community can also be changed for other reasons, such as if the water table drops during the growing season due to a lowering of base elevation of adjacent streams, or several years of drought conditions.

Other information

The following is an example of how to calculate the recommended stocking rate. This example does not use production estimates from this specific ecological site. You will need to adjust the annual production values and run the calculations using total annual production values from the ecological sites encountered on each individual ranch/pasture. Before making specific recommendations, an on-site evaluation must be made.

Example of total annual production amounts by type of year:
Favorable years = 2200 lbs/acre
Normal years = 1480 lbs/acre
Unfavorable years = 1200 lbs/acre

It is recommended that on slopes of 30% or less, stocking rate should be derived from the total annual production pounds minus 500 pounds for residual dry matter and 25% harvest efficiency. On slopes over 30%, stocking rate is derived from total annual production pounds minus 800 pounds for residual dry matter and 25% harvest efficiency. Refer to the NRCS National Range and Pasture Handbook for a list of Animal Unit Equivalents.

Sample Calculations using Favorable Year production amounts:

< 30% slopes: AUM/AC = [(2200-500)(0.25)]/915 lbs/month for one AU = 0.46 AUM/AC
AC/AUM = (1.0 AU)/(0.46AUM/AC) = 2.2 AC/AUM

> 30% slopes: AUM/AC = [(2200-800)(0.25)]/915 lbs/month for one AU = 0.38 AUM/AC
AC/AUM = (1.0 AU)/(0.38 AUM/AC) = 2.6 AC/AUM

NOTE: 915 lbs/month for one Animal Unit is used as the baseline for maintenance requirements. This equates to 30 lbs/day of air-dry forage (1200 lb cow at 2.5% of body weight).

Inventory data references

Supporting Data for Site Development:

NRCS Production & Composition Record for Native Grazing Lands (Range-417): 2

BLM Soil & Vegetation Inventory Method (SVIM) Data: 0

NRCS Range Condition Record (ECS-2): 7

NRCS Range/Soil Correlation Observations & Soil 232 notes: 12

Field Offices where this site occurs within the state:

Big Sandy
Big Timber
Billings
Chinook
Columbus
Crow Agency
Fort Belknap
Hardin
Harlowton
Joliet
Lewistown
Malta
Roundup
Stanford
White Sulphur Springs
Winnett

Other references

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Contributors

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Approval

Kirt Walstad, 5/01/2024

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)	Loretta Metz
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Date	04/11/2005
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Minor rills (less than 0.5 to 1.0 inches in depth; less than 2.5 feet long) may be present in the reference state.

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2. **Presence of water flow patterns:** Water flow patterns may be evident, especially following storms of greater intensity than “normal”.

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3. **Number and height of erosional pedestals or terracettes:** These should not be evident in the reference state.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is less than 5% in the reference state.

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5. **Number of gullies and erosion associated with gullies:** Gully erosion may be evident in the reference state, but only following storms of greater intensity than “normal”.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** These are not present in the reference state.

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7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement varies by size and depth of litter. In the reference state, litter consists of both herbaceous and woody species. Litter will generally not move more than a 8-12 feet from where it originated.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability values of 4-5 in plant interspaces. Stability values of 5-6 under plant canopies and at plant bases.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Granular structure, brown to dark brown color. Organic matter in A-horizon can exceed 8%.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Deep-rooted native perennial grasses and the co-dominant woody species (willow) optimize infiltration and runoff. Grasses should be spaced approx 0.5-1.0 feet apart, and woody species spaced several feet apart in the reference state.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer present in the reference state.

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: native perennial sedges > cool season, mid-height, native perennial bunchgrasses >= native shrubs > native forbs.

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant mortality is very low; decadence is minimal except in prolonged periods of drought (>5-6 years).

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):** 4400 – 4700 #/acre.

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:** yellow willow, American sloughgrass, brookgrass, creeping spikerush, Kentucky bluegrass, timothy, smooth brome, leafy spurge, spotted knapweed, thistles, etc.

17. **Perennial plant reproductive capability:** This is not impaired in the reference state. Except in extended periods of drought, plants are able to reproduce sexually or vegetatively.