Ecological site R053BY018ND
Linear Meadow

Last updated: 1/11/2024
Accessed: 05/20/2024

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.

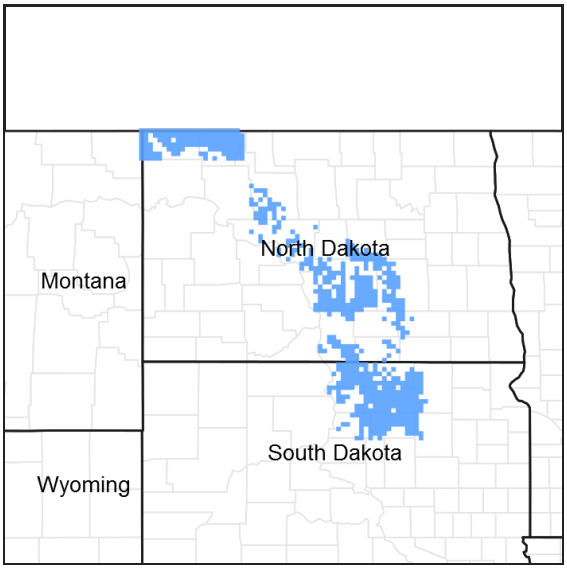


Figure 1. Mapped extent

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.

Classification relationships

Level IV Ecoregions of the Conterminous United States: 42a – Missouri Coteau; 42b – Collapsed Glacial Outwash; 42c – Missouri Coteau Slope; 42d – Northern Missouri Coteau; 42f – Southern Missouri Coteau Slope; 42g – Ponca Plains; and 42h – Southern River Breaks.

Associated sites

R053BY004ND	**Limy Subirrigated**
R053BY005ND	**Loamy Overflow**
R053BY006ND	**Saline Lowland**
R053BY012ND	**Subirrigated**
R053BY019ND	**Wet Meadow**

Similar sites

R053BY019ND	**Wet Meadow** [Poorly drained soils found adjacent to streams or in depressions, with water table at the surface or within 1.5 feet from the surface with no evidence of salts, noticeable redoximorphic features within 6 inches or just below the organic soil layer. Found upslope from Wet Land and downslope of Subirrigated or Loamy Overflow sites; can be located within the listed associated sites. Indicator species are prairie cordgrass, northern reedgrass and no shrub. This site has less production, far less slough sedge and far more prairie cordgrass, and a water table is present yearlong.]
R053BY025ND	**Shallow Marsh** [This site also ponds, and has a water table similar to the Wet Land site for portions of the year. However, this site will normally dry out each year sufficiently that agricultural operations such as haying are feasible in most years. This site typically occurs in larger, isolated concave positions. Indicator species: dominated by whitetop and sedges, with lesser amounts of prairie cordgrass, bulrush and spikerush. This site has similar species as the Wet Land site, but more whitetop, slightly more sedges, and higher production.]

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Scolochloa festucacea* (2) *Carex atherodes*

Physiographic features

This site occurs on concave or level to gently sloping low lying positions.

Table 2. Representative physiographic features

Landforms	(1) Lake plain (2) Depression (3) Drainageway
Flooding duration	Long (7 to 30 days)
Flooding frequency	None to frequent
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Occasional to frequent
Elevation	1,600–2,000 ft
Slope	0–2%
Ponding depth	0–24 in
Water table depth	0–6 in
Aspect	Aspect is not a significant factor

Climatic features

MLRA 53B is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature are characteristic. 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. The air masses move unobstructed across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 15 to 20 inches per year. The normal average annual temperature is about 41° F. January is the coldest month with average temperatures ranging from about 4° F (Powers Lake, ND) to about 10° F (Pollock, SD). July is the warmest month with temperatures averaging from about 67° F (Powers Lake, ND) to about 72° F (Pollock, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 62° F. This large annual range attests to the continental nature of this MLRA's climate. Winds average about 11 miles per hour annually, ranging from about 13 miles per hour during the spring to about 10 miles per hour

during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

Growth of native cool-season plants begins in late March and continues to early to mid July. Native warm-season plants begin growth in mid May and continue to the end of August. Green up of cool-season plants can occur in September and October when adequate soil moisture is present.

Table 3. Representative climatic features

Frost-free period (average)	135 days
Freeze-free period (average)	156 days
Precipitation total (average)	20 in

Influencing water features

Sub-class:
Permanently or Semipermanently or Seasonally Flooded or Saturated

Soil features

These are very deep, very poorly drained, coarse to fine textured soils. Salinity and sodicity are none to slight. Water tables on this site range from 2 feet above to 1/2 foot below the surface during most of the growing season. This site is in deep depressions on lake plains and drainageways. Slope ranges from 0 to 2 percent. This site should show no evidence of rills, wind scoured areas or pedestalled plants. The soil surface is stable and intact. Sub-surface soil layers are non-restrictive to water movement and root penetration.

These soils are not susceptible to water erosion. Ponded water conditions and slow permeability strongly influences the soil-water-plant relationship.

Major soil series correlated to this ecological site can be found in Section II of the Natural Resources Conservation Service Field Office Technical Guide or the following web sites:
http://www.nrcs.usda.gov/technical/efotg/

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Silty clay loam (3) Silty clay
Family particle size	(1) Loamy
Drainage class	Poorly drained
Permeability class	Very slow to moderate
Soil depth	80 in
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0%
Calcium carbonate equivalent (0-40in)	0–45%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	6.1–8.4

Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

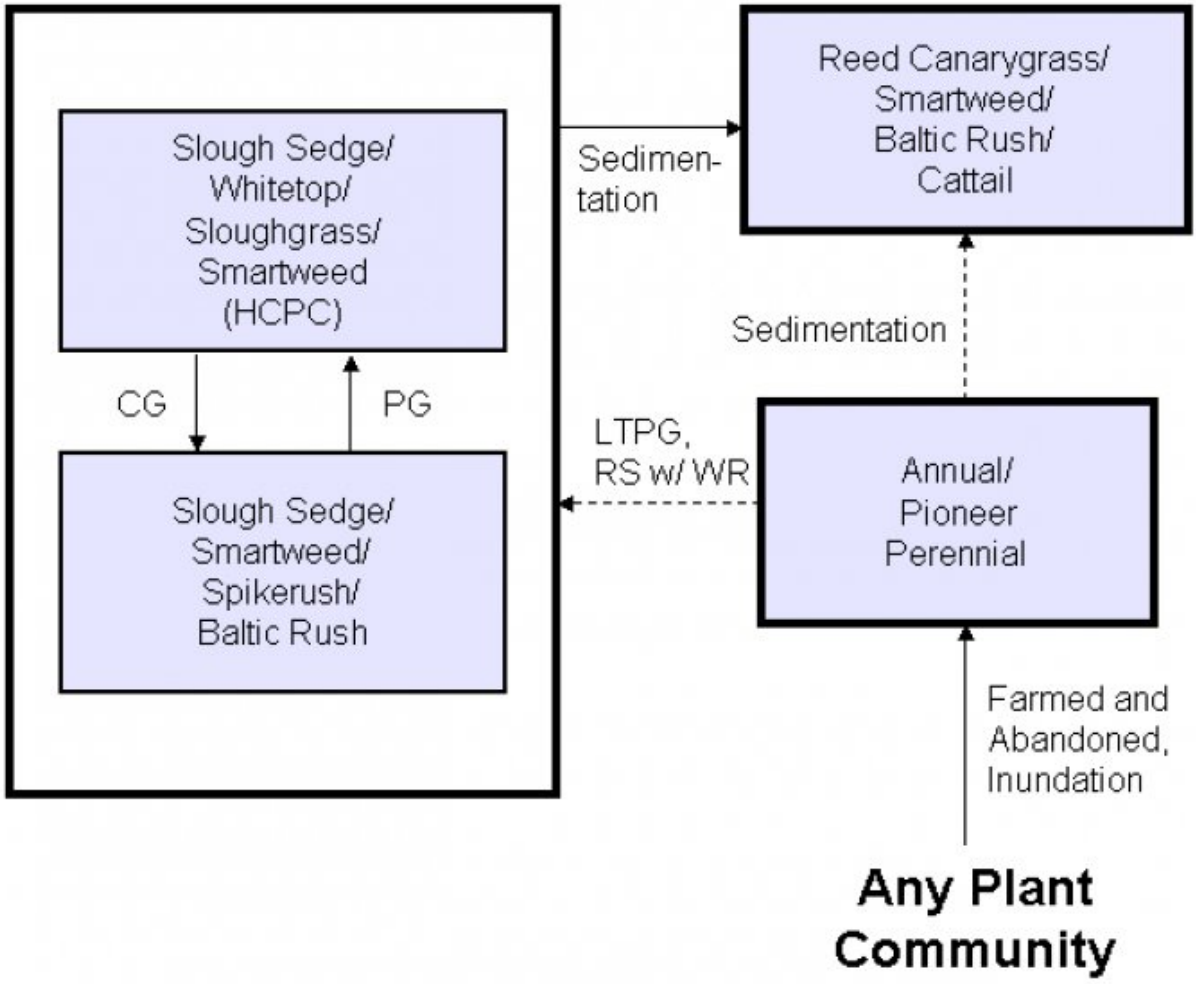
The site developed under Northern Great Plains climatic conditions, and included natural influence of large herbivores, occasional fire and yearly flooding events. Changes will occur in the plant communities due to management actions and/or climatic conditions. Due to the nature of the soils, the site is considered highly variable but very stable. Under continued adverse impacts, a slow decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments the site can rapidly recover to the Historic Climax Plant Community (HCPC). High variability of ponding levels and duration is the major cause of the fluctuating plant community. However, management can greatly influence the plant community dynamics during extended drought periods.

The plant community upon which interpretations are primarily based is the Historic Climax Plant Community under normal precipitation periods. The HCPC has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used.

Continuous grazing without adequate recovery opportunities between grazing events over several years will cause this site to depart from the HCPC. Species such as reed canarygrass, spikerush and Baltic rush will increase in frequency and density. Non-use (rest) and lack of fire will cause litter levels and plant decadence/mortality to increase. Cattails are greatly influenced by the fluctuating water regime.

The following is a diagram that illustrates the common plant communities that can occur on the site and the transition pathways between communities. The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

State and transition model



CG – Continuous grazing without adequate recovery periods; **HCPC** – Historic Climax Plant Community; **Inundation** – Long-term inundation; **LTPG** – Long-term prescribed grazing; **PG** – Prescribed grazing with adequate recovery opportunity; **RS** – Range seeding with prescribed grazing; **WR** – Wetland restoration.

USDI Fish and Wildlife Service. 1971. Classification of Natural Ponds and Lakes in the Glaciated Prairie Region. Resource Publication 92.

State 1
Slough Sedge/Whitetop/Sloughgrass/Smartweed (HCPC)

Community 1.1
Slough Sedge/Whitetop/Sloughgrass/Smartweed (HCPC)

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC). This plant community evolved with grazing by large herbivores, infrequent wild fires and periodic flooding events and is suited for grazing by domestic livestock. This plant community can be found on areas that are grazed and where the grazed plants receive adequate periods of rest during the growing season in order to recover. Historically, fires occurred infrequently. The potential vegetation is about 40% grasses, 40% grass-likes, and 20% forbs. The major grasses and grass-likes include whitetop, American sloughgrass, slough sedge, mannagrass, woolly sedge and spikerush. Key forbs include smartweeds, western dock and aster. The plant community is well adapted to the Northern Great Plains climatic conditions. It is a critical plant community, providing water and habitat for the surrounding area. The diversity in plant species provides a variety of habitats for wildlife. It is resistant to drought due to a dependable water supply. This is a sustainable plant community (soil stability, watershed function, and biologic integrity).

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2350	3300	3700
Shrub/Vine	1400	1950	2500
Forb	250	750	1300
Total	**4000**	**6000**	**7500**

Figure 5. Plant community growth curve (percent production by month). ND5307, Missouri Coteau, cool-season dominant, warm-season sub-dominant.. Cool-season dominant, warm-season sub-dominant, lowland..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	2	7	36	35	10	3	6	1	0	0

State 2
Reed Canarygrass/Smartweed/Baltic Rush/Cattail

Community 2.1
Reed Canarygrass/Smartweed/Baltic Rush/Cattail

This plant community develops from sedimentation occurring after a ponding or flooding event. When compared to the Historical Climax Plant Community, whitetop, prairie cordgrass, slough sedge, and northern reedgrass, have decreased. Reed canarygrass, spikerush, low-growing sedges, Baltic rush and cattails have increased. The abundant production and proximity to water make this plant community important for livestock and wildlife such as birds, mule deer, and antelope. The plant community is stable and protected from excessive erosion. The biotic integrity of this plant community is usually intact. The watershed is usually functioning.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1700	2500	3300
Shrub/Vine	1400	1750	2100
Forb	400	750	1100
Total	**3500**	**5000**	**6500**

Figure 7. Plant community growth curve (percent production by month). ND5306, Missouri Coteau, lowland cool-season dominant.. Cool-season dominant, lowland..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	37	35	5	2	8	0	0	0

State 3
Slough Sedge/Smartweed/Spikerush/Baltic Rush

Community 3.1
Slough Sedge/Smartweed/Spikerush/Baltic Rush

This plant community developed with continuous grazing without adequate recovery periods between grazing events. Whitetop, mannagrass, prairie cordgrass and northern reedgrass have been reduced when compared to the HCPC. The plant community becomes dominated by grass-likes and forbs such as slough sedge, spikerush, Baltic rush, smartweed and curly dock. Annual grasses like American sloughgrass and short-lived perennials such as foxtail barley will increase. Quackgrass can invade on drier portions of the community. Areas of bare ground begin to appear throughout the site. A significant amount of production and diversity has been lost when compared to the HCPC. Loss or reduction of native grasses, grass-likes and forbs has negatively impacted energy flow and nutrient cycling. It will take a relatively long time to restore this plant community back to the HCPC with improved management.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	1640	1920	2400
Forb	950	1200	2000
Grass/Grasslike	710	1680	1900
Total	**3300**	**4800**	**6300**

Figure 9. Plant community growth curve (percent production by month). ND5306, Missouri Coteau, lowland cool-season dominant.. Cool-season dominant, lowland..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	37	35	5	2	8	0	0	0

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Grasses**			1200–2400	
	common rivergrass	SCFE	*Scolochloa festucacea*	900–1500	–
	mannagrass	GLYCE	*Glyceria*	120–600	–
	American sloughgrass	BESY	*Beckmannia syzigachne*	300–600	–
	northern reedgrass	CASTI3	*Calamagrostis stricta ssp. inexpansa*	0–180	–
	reed canarygrass	PHAR3	*Phalaris arundinacea*	0–180	–
	prairie cordgrass	SPPE	*Spartina pectinata*	0–180	–
	Grass, perennial	2GP	*Grass, perennial*	0–120	–
2	**Grass-Likes**			1500–2400	
	wheat sedge	CAAT2	*Carex atherodes*	900–2100	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	60–600	–
	woolly sedge	CAPE42	*Carex pellita*	120–420	–
	spikerush	ELEOC	*Eleocharis*	60–300	–
	chairmaker's bulrush	SCAM6	*Schoenoplectus americanus*	60–300	–
Forb					
3	**Forbs**			300–1200	
	water knotweed	POAM8	*Polygonum amphibium*	180–900	–
	bur-reed	SPARG	*Sparganium*	60–480	–
	northern water plantain	ALTR7	*Alisma triviale*	60–420	–
	Forb, perennial	2FP	*Forb, perennial*	0–300	–
	hemlock waterparsnip	SISU2	*Sium suave*	60–180	–
	duckweed	LEMNA	*Lemna*	60–180	–
	buttercup	RANUN	*Ranunculus*	0–120	–
	western dock	RUAQ	*Rumex aquaticus*	0–120	–
	arumleaf arrowhead	SACU	*Sagittaria cuneata*	0–120	–
	broadleaf cattail	TYLA	*Typha latifolia*	0–60	–

Table 9. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Grasses**			1500–2000	
	reed canarygrass	PHAR3	*Phalaris arundinacea*	1000–1500	–
	quackgrass	ELRE4	*Elymus repens*	0–1000	–
	American sloughgrass	BESY	*Beckmannia syzigachne*	250–500	–
	Grass, annual	2GA	*Grass, annual*	0–250	–
	mannagrass	GLYCE	*Glyceria*	0–250	–
	foxtail barley	HOJU	*Hordeum jubatum*	50–250	–
	barnyardgrass	ECCR	*Echinochloa crus-galli*	50–250	–
	common rivergrass	SCFE	*Scolochloa festucacea*	50–250	–
	Grass, perennial	2GP	*Grass, perennial*	0–100	–
	northern reedgrass	CASTI3	*Calamagrostis stricta ssp. inexpansa*	0–50	–
2	**Grass-Likes**			1500–2000	
	spikerush	ELEOC	*Eleocharis*	500–1250	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	50–750	–
	woolly sedge	CAPE42	*Carex pellita*	100–500	–
	chairmaker's bulrush	SCAM6	*Schoenoplectus americanus*	100–400	–
	wheat sedge	CAAT2	*Carex atherodes*	50–250	–
Forb					
3	**Forbs**			500–1000	
	broadleaf cattail	TYLA	*Typha latifolia*	250–1000	–
	water knotweed	POAM8	*Polygonum amphibium*	100–500	–
	curly dock	RUCR	*Rumex crispus*	50–400	–
	northern water plantain	ALTR7	*Alisma triviale*	50–350	–
	Forb, annual	2FA	*Forb, annual*	0–250	–
	Forb, perennial	2FP	*Forb, perennial*	0–250	–
	bur-reed	SPARG	*Sparganium*	50–250	–
	western dock	RUAQ	*Rumex aquaticus*	0–150	–
	duckweed	LEMNA	*Lemna*	50–150	–
	buttercup	RANUN	*Ranunculus*	0–100	–
	hemlock waterparsnip	SISU2	*Sium suave*	0–100	–
	arumleaf arrowhead	SACU	*Sagittaria cuneata*	0–50	–

Table 10. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Grasses**			480–1200	
	American sloughgrass	BESY	*Beckmannia syzigachne*	240–720	–
	quackgrass	ELRE4	*Elymus repens*	0–720	–
	foxtail barley	HOJU	*Hordeum jubatum*	48–480	–
	reed canarygrass	PHAR3	*Phalaris arundinacea*	48–240	–
	barnyardgrass	ECCR	*Echinochloa crus-galli*	48–240	–
	Grass, annual	2GA	*Grass, annual*	0–240	–
	Grass, perennial	2GP	*Grass, perennial*	0–96	–
2	**Grass-Likes**			1680–2160	
	spikerush	ELEOC	*Eleocharis*	480–1200	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	48–720	–
	wheat sedge	CAAT2	*Carex atherodes*	240–720	–
	chairmaker's bulrush	SCAM6	*Schoenoplectus americanus*	96–480	–
	woolly sedge	CAPE42	*Carex pellita*	48–384	–
Forb					
3	**Forbs**			960–1440	
	curly dock	RUCR	*Rumex crispus*	480–960	–
	water knotweed	POAM8	*Polygonum amphibium*	96–720	–
	western dock	RUAQ	*Rumex aquaticus*	0–240	–
	Forb, annual	2FA	*Forb, annual*	0–240	–
	Forb, perennial	2FP	*Forb, perennial*	0–240	–
	northern water plantain	ALTR7	*Alisma triviale*	48–240	–
	broadleaf cattail	TYLA	*Typha latifolia*	0–240	–
	hemlock waterparsnip	SISU2	*Sium suave*	0–192	–
	bur-reed	SPARG	*Sparganium*	0–144	–
	duckweed	LEMNA	*Lemna*	0–48	–

Hydrological functions

Water ponding is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic groups C and D. Infiltration varies from moderate to slow and runoff potential for this site is negligible to medium. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An exception would be where short grasses form a dense sod and dominate the site. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational uses

This site provides hunting opportunities for upland and waterfowl game species. The wide variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Inventory data references

Information presented here has been derived from NRCS clipping and other inventory data. Also, field knowledge of range-trained personnel was used. All descriptions were peer reviewed and/or field-tested by various private, state and federal agency specialists. Those involved in developing this site description include: Stan Boltz, NRCS Range Management Specialist; Michael D. Brand, State Land Dept., Director Surface Management; David Dewald, NRCS State Biologist; Paul Drayton, NRCS District Conservationist; Jody Forman, NRCS Range Management Specialist; Dennis Froemke, NRCS Range Management Specialist; Jeff Printz, NRCS State Range Management Specialist; Josh Saunders, NRCS Range Management Specialist; Kevin Sedivec, Extension Rangeland Management Specialist; Darrell Vanderbusch, NRCS Resource Soil Scientist; and Lee Voigt, NRCS Range Management Specialist.
Data Source Number of Records Sample Period State County
SCS-RANGE-417 2 1968 – 1969 ND Burke

Other references

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Contributors

Jeff Printz/Stan Boltz

Approval

Suzanne Mayne-Kinney, 1/11/2024

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	05/20/2024
Approved by	Suzanne Mayne-Kinney
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:**