Ecological site XA232X01Y206
Boreal Scrub Loamy Frozen Flood Plain Depressions

Last updated: 5/18/2020
Accessed: 05/16/2024

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): 232X–Yukon Flats Lowlands

The Yukon Flats Lowlands MLRA is an expansive basin characterized by numerous levels of flood plains and terraces that are separated by minimal breaks in elevation. This MLRA is in Interior Alaska and is adjacent to the middle reaches of the Yukon River. Numerous tributaries of the Yukon River are within the Yukon Flats Lowlands MLRA. The largest are Beaver Creek, Birch Creek, Black River, Chandalar River, Christian River, Dall River, Hadweenzic River, Hodzana River, Porcupine River, and Sheenjek River. The MLRA has two distinct regions—lowlands and marginal uplands. The lowlands have minimal local relief and are approximately 9,000 square miles in size (Williams 1962). Landforms associated with the lowlands are flood plains and stream terraces. The marginal uplands consist of rolling and dissected plains that are a transitional area between the lowlands and adjacent mountain systems. The marginal uplands are approximately 4,700 square miles in size (Williams 1962).

This MLRA is bounded by the Yukon-Tanana Plateau to the south, Hodzana Highlands to the west, Porcupine Plateau to the east, and southern foothills of the Brooks Range to the north (Williams 1962). These surrounding hills and mountains partially isolate the Yukon Flats Lowlands MLRA from weather systems affecting other MLRAs of Interior Alaska. As a result, temperatures are generally warmer in summer and colder in winter than is characteristic in other areas at comparable latitude. There is a moisture and temperature gradient in which the lowlands region tends to be drier and colder and the surrounding marginal uplands region tends to be moister and warmer (PRISM Climate Group 2006).

The Yukon Flats Lowlands MLRA is mostly undeveloped lands that are sparsely populated and not accessible by a road system. A number of villages, including Beaver, Birch Creek, Chalkyitsik, Circle, Fort Yukon, Stevens Village, and Venetie, are adjacent to the Yukon River or one of its major tributaries. The largest village is Fort Yukon, which according to the 2010 U.S. Census has 583 residents that are dominantly Gwich'in Alaska Natives.

LRU notes

Alaska has no officially recognized LRU. However, there appear to be two distinct LRU in the Yukon Flats Lowlands MLRA. These LRU are thought to have differing climatic regimes, landforms, and soil types (STATSGO and Jorgensen and Meidinger 2015). The two LRU were previously discussed in the MLRA notes section above and are termed the lowlands LRU and the marginal uplands LRU.

This ecological site is associated with the lowlands LRU.

Classification relationships

Yukon Flats Lowlands MLRA.

Ecological site concept

This ecological site is associated with closed depressions on flood plains in the Yukon Flats Lowlands MLRA. The reference state plant communities are associated with soils that both pond and flood. Ponding occurs occasionally (5 to 50 times in 100 years) for brief durations of time (between 2 and 7 days). Flooding occurs occasionally for brief durations of time. Associated soils are considered somewhat poorly drained. The reference state supports one documented plant community but fire likely results in additional plant communities.

Reference plant community 1.1 is characterized as open tall scrub (Viereck et al. 1992) and the overstory is primarily composed of willow (Salix spp.). White spruce (Picea glauca) commonly occurs but cover is low. Common species include little tree willow (Salix arbusculoides), Bebb willow (Salix bebbiana), thinleaf alder (Alnus incana ssp. tenuifolia), redosier dogwood (Cornus sericea), bluejoint (Calamagrostis canadensis), a mixture of sedges (Carex spp.), field horsetail (Equisetum arvense), and fireweed (Chamerion angustifolium).

Associated sites

XA232X01Y207	**Boreal Herbaceous Peat Flood Plain Depressions** This ecological site is associated with high pH floating mats that occur most commonly in flood plain depressions in the Yukon Flats Lowlands MLRA. The reference state has soils that both pond and flood. The reference plant community is characterized as wet forb herbaceous (Viereck et al. 1992) and is composed of various obligate wetland species.
XA232X01Y209	**Boreal Tussock Loamy Frozen Terraces** This ecological site occurs on stream terraces in the lowlands region of the Yukon Flats Lowlands MLRA. Soils commonly have permafrost at moderate depth (20 to 40 inches) and pond frequently for very long durations. The reference plant community is characterized as open low mixed shrub-sedge tussock bog (Viereck et al. 1992).
XA232X01Y204	**Boreal Forest Loamy Flood Plain High** This ecological site occurs on the high flood plain of major tributaries in the Yukon Flats Lowlands MLRA. Flooding occurs occasionally (5 to 50 times in 100 years) for brief durations of time (between 2 and 7 days). The reference plant community is characterized as an open needleleaf forest (25 to 60 percent cover) primarily composed of mature white spruce (Picea glauca).
XA232X01Y218	**Boreal Woodland Loamy Frozen Terraces** This ecological site is associated with wet soils on the tread of stream terraces in Yukon Flats Lowlands MLRA. Soils generally have permafrost at moderate depth (20 to 40 inches) and pond occasionally for long durations of time. The reference plant community is characterized as a needleleaf woodland (10 to 25 percent cover; Viereck et al. 1992) composed of black spruce (Picea mariana) and white spruce (Picea glauca).
XA232X01Y202	**Boreal Forest Loamy Flood Plain Middle** This ecological site occurs on the middle flood plain of major tributaries in the Yukon Flats Lowlands MLRA. Flooding occurs occasionally (5 to 50 times in 100 years) for long durations of time (between 7 and 30 days). The reference plant community is characterized as a closed deciduous forest (60-100 percent cover; Viereck et al. 1992) primarily composed of mature balsam poplar (Populus balsamifera).
XA232X01Y219	**Boreal Forest Loamy Terraces Moist** This ecological site is associated with moderately well to somewhat poorly drained soils on the treads of stream terraces in Yukon Flats Lowlands MLRA. Flooding frequency ranges from rare to none. The reference plant community is characterized as an open needleleaf forest (25 to 60 percent cover) primarily composed of mature white spruce (Picea glauca).
XA232X01Y200	**Boreal Scrub Loamy Flood Plain Low** This ecological site is associated with the low flood plain of major tributaries in the Yukon Flats Lowlands MLRA. Flooding occurs frequently (greater than 50 times in 100 years) for long durations of time (between 7 and 30 days). The reference plant community is characterized as closed tall scrub (greater than 75 percent shrub cover; Viereck et al. 1992) primarily composed of a mixture of willow (Salix spp.) and alder (Alder spp.).

XA232X01Y205	**Boreal Grass Loamy Flood Plain Depressions** Flood plain depressions commonly support XA232X01Y205 and XA232X01Y206. The outer third, or lip, of flood plain depressions are generally willow-dominant, while the rest of the depression is composed of graminoid communities associated with XA232X01Y205. This ecological site is associated with depressions on flood plains in the Yukon Flats Lowlands MLRA. The reference state plant communities are associated with soils that both pond and flood. Ponding occurs occasionally (5 to 50 times in 100 years) for brief durations of time (between 2 and 7 days). Flooding occurs occasionally for brief durations of time. The reference plant community is characterized as open tall scrub (Viereck et al. 1992) and is primarily composed of willow (Salix spp.).
XA232X01Y280	**Boreal Scrub Loamy Flood Plain Wet** This ecological site occurs on the flood plain and adjacent terraces of minor, low-gradient tributaries in the lowlands region of the Yukon Flats Lowlands MLRA. The reference plant community is associated with soils that both pond and flood. The reference plant community phase is characterized as closed tall scrub (greater than 75 percent shrub cover; Viereck et al. 1992) primarily composed of a mixture of willow (Salix spp.).
XA232X01Y221	**Boreal Forest Loamy Terraces** This ecological site is associated with well drained soils on the treads of stream terraces in the Yukon Flats Lowlands MLRA. Flooding frequency ranges from rare to none. The reference plant community is characterized as an open needleleaf forest (25 to 60 percent cover) primarily composed of mature white spruce (Picea glauca).

Similar sites

XA232X01Y223	**Boreal Scrub Loamy Frozen Terrace Depressions** While possessing similar plant community phases as XA232X01Y223, flooding is believed to be a major factor that differentiates these two ecological sites and leads to subtle difference in plant community composition. For instance, flood plain indicator species are commonly associated with ecological site XA232X01Y206 (e.g. thinleaf alder and redosier dogwood),and are not typically associated with XA232X01Y223.
XA232X01Y280	**Boreal Scrub Loamy Flood Plain Wet** This ecological site supports similar willow dominant reference plant communities. XA232X01Y280 represent riparian primary succession on minor tributaries of the Yukon Flats Lowlands MLRA. While having similar communities, differences in landform, soils, disturbance regime, and reference state plant community composition led to these separate ecological site concepts.
XA232X01Y200	**Boreal Scrub Loamy Flood Plain Low** This ecological site supports similar willow dominant reference plant communities. XA232X01Y200 represent riparian primary succession on major tributaries of the Yukon Flats Lowlands MLRA. While having similar communities, differences in landform, soils, disturbance regime, and reference state plant community composition led to these separate ecological site concepts.

Figure 1. A bluejoint meadow community phase that is commonly associated with ecological site XA232X01Y205.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix* (2) *Alnus incana ssp. tenuifolia*
Herbaceous	(1) *Calamagrostis canadensis* (2) *Carex*

Legacy ID

R232XY206AK

Physiographic features

This ecological site and its associated plant communities commonly occur on flood plain depressions of major tributaries throughout the Yukon Flats Lowlands MLRA. Associated stream landforms include meander scrolls, abandoned channels, and oxbow lakes.

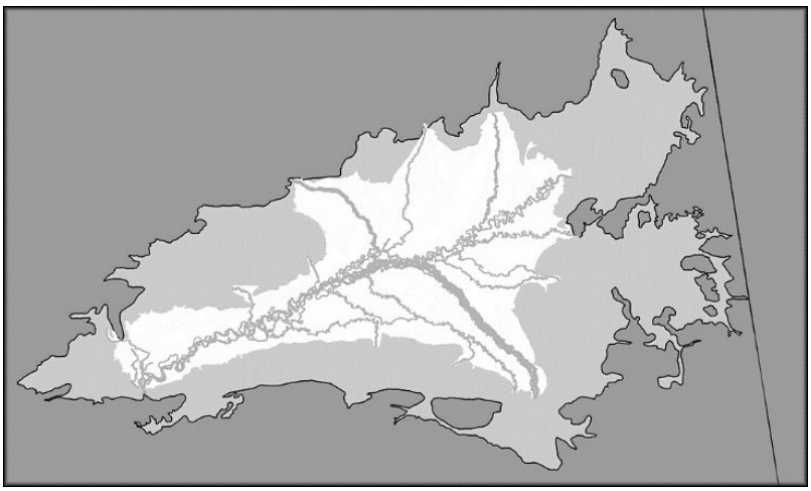

Figure 2. Lowlands region (white) and marginal uplands region (light gray) of the Yukon Flats Lowlands MLRA.

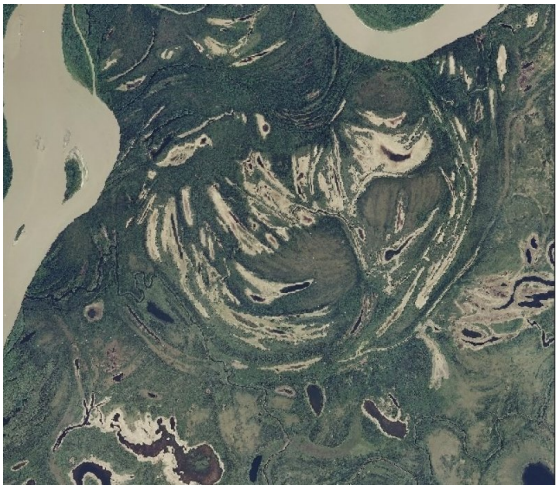

Figure 3. Aerial image of a meander scroll adjacent to the Yukon River in the Yukon Flats Lowlands MLRA. Depressions with light brown photo tones are most commonly associated with graminoid and shrubby communities associated with XA232X01Y205 and XA232X01Y206.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain > Closed depression
Flooding duration	Brief (2 to 7 days)

Flooding frequency	Occasional
Ponding duration	Brief (2 to 7 days)
Ponding frequency	Occasional
Elevation	91–198 m
Slope	0–3%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Short, warm summers and long, very cold winters characterize the subarctic continental climate of the area. The surrounding hills and mountains of this MLRA partially isolate it from weather systems affecting other interior lowlands. As a result, temperatures are generally warmer in summer and colder in winter than is characteristic in other areas of comparable latitude. The average annual temperature ranges from about 20 to 25 degrees F (-7 to -4 degrees C). The freeze-free period averages 70 to 120 days. The temperature usually remains above freezing from early June through late August. The average annual precipitation ranges from about 6 inches (150 millimeters) in the central basin to 15 inches (380 millimeters) along the boundary with the surrounding highlands. The maximum precipitation occurs in late summer, mainly as a result of thunderstorms. The average annual snowfall is about 45 to 55 inches (115 to 140 centimeters) (USDA, NRCS 2006).

All of the tabular data below was calculated from the PRISM dataset (1971-2000) and is specific to the Lowlands LRU in the Yukon Flats Lowlands MLRA.

Table 3. Representative climatic features

Frost-free period (characteristic range)	45-97 days
Freeze-free period (characteristic range)	70-120 days
Precipitation total (characteristic range)	203-330 mm
Frost-free period (average)	75 days
Freeze-free period (average)	
Precipitation total (average)	254 mm

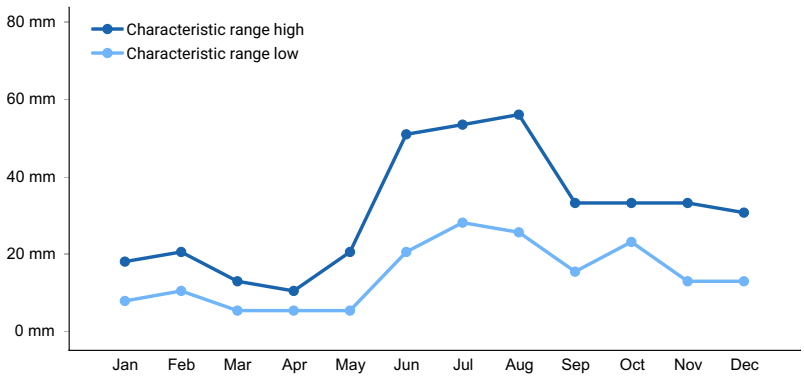

Figure 4. Monthly precipitation range

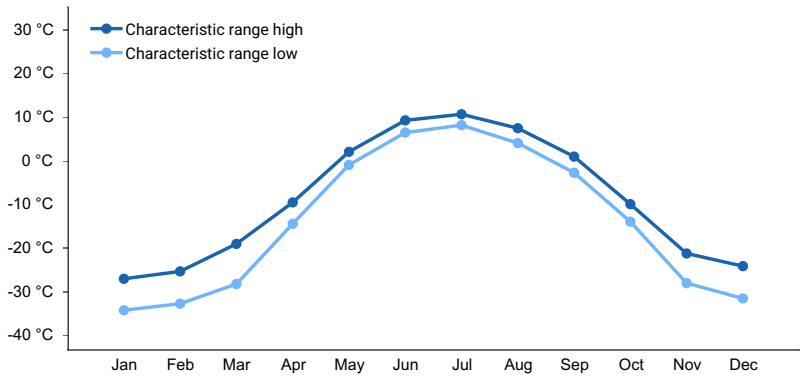

Figure 5. Monthly minimum temperature range

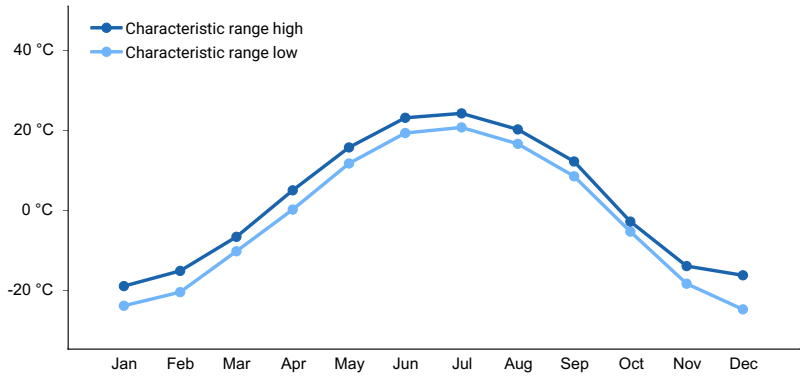

Figure 6. Monthly maximum temperature range

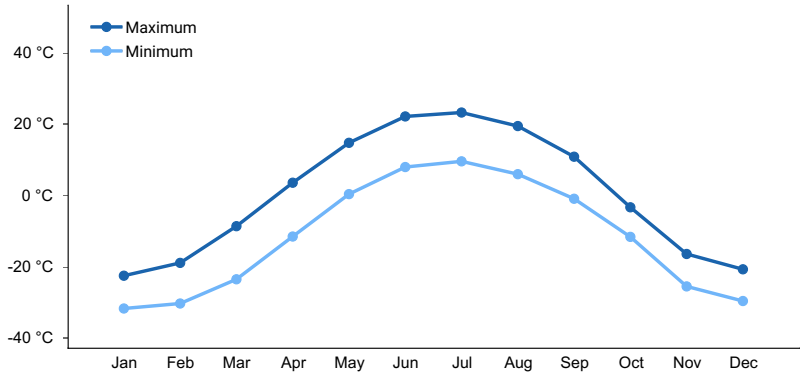

Figure 7. Monthly average minimum and maximum temperature

Influencing water features

During the early portion of the growing season (May and June), a perched water table is over the seasonal frost in the soil profile resulting in wet soils at shallow depth (between 10 ad 20 inches). During this period of time, associated soils are thought to pond occasionally for brief durations of time. As the seasonal frost melts, the water drains from these soils. During long portions of the growing season (July through September), a water table commonly occurs at moderate depth (20 to 40 inches) in the soil profile.

Due to the depth and persistence of this water table, wetland indicator plants are commonly observed in the reference state. Ponding duration and the typical depth to the water table was determined through field observations.

Soil features

Correlated soil components for the Yukon Flats Area, Alaska soil survey (AK685): Chetlechak.

Figure 8. Typical soil profile associated with Chetlechak soil component.

Table 4. Representative soil features

Parent material	(1) Organic material (2) Alluvium
Family particle size	(1) Coarse-silty
Drainage class	Somewhat poorly drained
Soil depth	203 cm

Ecological dynamics

Flooding

Associated soils are thought to flood occasionally for brief periods of time. Flooding is thought to occur during the months of May and June. Flooding is believed to be a major factor that differentiates this ecological site from XA232X01Y223.

Other Observations

While the cause is likely incredibly complex, arctic and subarctic lakes have been decreasing in size. This has been linked to changes in regional climate. When the climate was wetter, certain lakes in the Yukon Flats area had more water (Anderson et al. 2013). As the regional climate has become drier, certain lakes have decreased significantly in size (Anderson et al. 2013). As water level rises and falls in depressions, so does the dominance of certain ecological sites and plant communities. This shrubby ecological site may expand into flood plain depressions during drier climatic periods, and the expansion can lead to permafrost aggradation (Briggs et al. 2014). However, occasional flooding with subsequent recharge may result in these flood plain depressions being more resilient to changes in regional climate then closed terrace depressions (i.e. XA232X01Y222 and XA232X01Y223).

Animal use (browsing and grazing) of this ecological site primarily consists of moose browse on willow and tree regeneration. Severity of moose browse ranged from slight to moderate in sample plots. A browse severity rating of slight is defined as a majority of willow with no signs of browse, while moderate browsing indicates the majority of willow have signs of browse but generally lack broomed architecture.

No alternative states for this ecological site were documented.

State and transition model

Ecosystem states

1. Reference

State 1 submodel, plant communities

1.1. willow / bluejoint-sedge

State 1
Reference

Figure 9. Aerial image of the flood plain and terrace adjacent to the Porcupine River. This ecological site occurs in flood plain depressions.

The reference state has one documented plant community that is thought to both pond and flood. Fire is thought to be a disturbance regime that influences references state plant communities but this disturbance regime went undocumented during field work. This report provides baseline vegetation inventory data for the ecological site. More data collection is needed to provide further information about existing plant communities and the disturbance regimes that would result in transitions from one community to another. The common and scientific plant names are from the USDA PLANTS database. All community phases in this report are characterized using the Alaska Vegetation Classification (Viereck et al. 1992).

Community 1.1
willow / bluejoint-sedge

Figure 10. Typical plant community associated with community 1.1.

Community Phase 1.1 Canopy Cover Table

Vegetation data is aggregated from all sample plots for this community phase. The data is provided as frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species. Canopy cover is represented as a mean with the range in parentheses.

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
T	white spruce	*Picea glauca*	PIGL	56	3 (0-20)
S	willow	*Salix spp.*	SALIX	100	60 (30-80)
S	prickly rose	*Rosa acicularis*	ROAC	44	2 (0-10)
S	thinleaf alder	*Alnus incana* ssp. *tenuifolia*	ALINT	39	3 (0-25)
S	redosier dogwood	*Cornus sericea*	COSE16	39	1 (0-4)
G	bluejoint	*Calamagrostis canadensis*	CACA4	89	15 (0-45)
G	sedge	*Carex spp.*	CAREX	61	15 (0-55)
F	field horsetail	*Equisetum arvense*	EQAR	61	2 0-10)
F	fireweed	*Chamerion angustifolium*	CHAN9	56	1 (0-5)
F	largeleaf avens	*Geum macrophyllum*	GEMA4	39	1 (0-5)
B	*Pohlia* moss	*Pohlia nutans*	PONU70	28	5 (0-90)

This dataset includes data from 18 sample plots. The plots are distributed across the survey area and are independent of one another.

Values for tall, medium, regenerative, and stunted tree strata are used to calculate mean canopy cover and range values. Regenerative trees are not considered part of the overstory canopy.

Plant functional group classifications—T = trees, S = shrubs, G = graminoids, F = forbs, B = bryophytes, L = lichens

Canopy cover data is rounded, except trace (0.1 percent) cover. Data ranging from 1 to 9 percent cover is rounded to the nearest integer. Data ranging from 10 to 100 percent cover is rounded to the nearest factor of 5.

Figure 11. Canopy cover table for community 1.1.

Reference plant community 1.1 is characterized as open tall scrub and is primarily composed of willow. White spruce commonly occurs but cover is low. Common species include little tree willow, Bebb willow, thinleaf alder, redosier dogwood, bluejoint, a mixture of sedges (most commonly *Carex aquatilis* and *Carex atherodes*), field horsetail, and fireweed. The stratum that characterizes this community is medium shrubs (between 3 and 10 feet in height). The soil surface is covered with a mixture of herbaceous litter, woody debris, and bryophytes.

Forest understory. The majority of shrub cover falls within the medium shrub stratum (3-10 feet) but alder and willow commonly occurred in the tall shrub stratum (10+ feet).

Dominant plant species

- white spruce (*Picea glauca*), tree
- littletree willow (*Salix arbusculoides*), shrub
- Bebb willow (*Salix bebbiana*), shrub
- willow (*Salix*), shrub

- prickly rose (*Rosa acicularis*), shrub
- thinleaf alder (*Alnus incana ssp. tenuifolia*), shrub
- redosier dogwood (*Cornus sericea*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- water sedge (*Carex aquatilis*), grass
- sedge (*Carex*), grass
- field horsetail (*Equisetum arvense*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous
- largeleaf avens (*Geum macrophyllum*), other herbaceous
- pohlia moss (*Pohlia nutans*), other herbaceous

Additional community tables

Inventory data references

NASIS User Site ID / Modal Datasets
08DM05206 plant community 1.1
10BB03001 plant community 1.1
10BB02902 plant community 1.1
10BB03103 plant community 1.1
10BB03302 plant community 1.1
10BB00501 plant community 1.1
10BL04702 plant community 1.1
10BL01802 plant community 1.1
10BL03002 plant community 1.1
10BL03003 plant community 1.1
10BL03501 plant community 1.1
10DM02002 plant community 1.1
12BB00804 plant community 1.1
12BB00805 plant community 1.1
11BB07202 plant community 1.1
14NR00204 plant community 1.1
2015AK290716 plant community 1.1
2015AK290717 plant community 1.1

Other references

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Contributors

Blaine T. Spellman

Approval

Michael Margo, 5/18/2020

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	05/11/2020
Approved by	Michael Margo
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:**