Ecological site F092XY004WI
Seasonally Dry Floodplains

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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.

MLRA notes

Major Land Resource Area (MLRA): 092X–Superior Lake Plain

The Wisconsin portion of the Superior Lake Plain (MLRA 92) corresponds very closely to the Superior Coastal Plain Ecological Landscape published by Wisconsin Department of Natural Resources (WDNR 2015). The following brief overview of this MLRA is borrowed from that publication.

The Superior Coastal Plain is bordered on the north by Lake Superior and on the south by the Northwest Sands, Northwest Lowlands, and North Central Forest Ecological Landscapes. The total land area is approximately 1.2 million acres, which mostly consists of privately-owned forestland. The climate is strongly influenced by Lake Superior, resulting in cooler summers, warmer winters, and greater precipitation compared to more inland locations. The most extensive landform in this ecological landscape is a nearly level plain of lacustrine clays that slopes gently northward toward Lake Superior. The coastal plain is cut by deeply incised stream drainages and interrupted by the comparatively rugged Bayfield Peninsula.

During the Late Wisconsin glacial period, this area was covered with the advancing and retreating lobes of Superior and Chippewa. The landscape was rippled with moraines, but they were subdued by deposition of lacustrine materials. As the glaciers receded, glacial lakes riddled the landscape—most notably, Glacial Lake Duluth. The glacier receded eastward, exposing the western Lake Superior Basin. The ice covered the eastern basin, blocking the outlet of the lake, and continued to recede and contribute meltwaters that filled the glacial lake. The deep, red clays were deposited during this period of glacial lakes. The meltwaters from the glacier also contained sands which were deposited along the edge of the glacial lakes as beach deposits. Deep, narrow valleys have since been carved by rivers and streams flowing north into Lake Superior.

Historically, the Superior Coastal Plain was almost entirely forested. Various mixtures of eastern white pine (Pinus strobus), white spruce (*Picea glauca*), balsam fir (*Abies balsamea*), white birch (Betula papyrifera), balsam poplar (Populus balsamifera), quaking aspen (*Populus tremuloides*), and northern white-cedar (Thuja occidentalis) occurred on the fine-textured glacio-lacustrine deposits bordering much of the Lake Superior coast. Sandy soils, sometimes interlayered with clays, occur in some places. Such areas supported forests dominated by eastern white pine and red pine (Pinus resinosa). Eastern white pine was strongly dominant in some areas, according to mid-19th century notes left by surveyors of the federal General Land Office (Finley, R. 1976). Dry-mesic to wet-mesic northern hardwoods or hemlock-hardwood forests were prevalent on the glacial tills of the Bayfield Peninsula. Large peatlands occurred along the Lake Superior shoreline, associated with drowned river mouths.

Classification relationships

Habitat Types of N. Wisconsin (Kotar, 2002): All sites in this ES key out to Acer saccharum / Athyrium felix-femina – Rubus pubescens. [AAtRp]

Biophysical Setting (Landfire, 2014): This ES is mapped as Eastern Boreal Floodplain, Laurentian-Acadian Northern Hardwoods Forest-Hemlock; and Laurentian – Acadian Sub-boreal Mesic Balsam Fir-Spruce Forest. It is most

similar to Eastern Boreal Floodplain.

WDNR Natural Communities (WDNR, 2015): This ES is most similar to Mesic Floodplain Terrace.

USFS Subregions: Superior-Ashland Clay Plain Subsection (212Ya); May contain small areas of Ewen Dissected Lake Plain Subsection (212Jo), Winegar Moraines Subsection (212Jc), Gogebic-Penokee Iron Range Subsection (212Jb), and NorthShore Highlands Subsection (212Lb)*

Major Land Resource Area (MLRA): Superior Lake Plain (92)

Ecological site concept

Seasonally Dry Floodplain sites occur throughout the MLRA on active flood plains, natural levees, and bars located on alluvial plains of active streams flowing into Lake Superior. Landform shape can be linear, convex, or concave. These sites are characterized by very deep, somewhat poorly drained and moderately well drained soils that formed in sandy, loamy, and clayey alluvium. These sites are subject to brief periods of flooding throughout the growing season. Water source is primarily stream overflow, but precipitation, runoff from adjacent uplands, and groundwater discharge are common. Soils can range from strongly acid to neutral. Vegetation on this site can range but must be tolerant of occasional ponding.

Finley (1976), in his interpretation of the federal General Land Office public land survey information concluded that in the mid 1800s about 28 percent of the forest cover in the Superior Coastal Plain could be classified as northern hardwoods. Based on our current understanding of site/plant community relationships, the occurrence of this historic northern hardwood community occurred primarily on the AAtRp and the closely associated, sand over clay, ASnMi habitat type. The two habitat types together support a wide range of tree species. Today's forest stands on both habitat types are most often dominated by red maple, trembling aspen, white birch and balsam fir. However, the presence of sugar maple Acer saccharum most clearly distinguishes this Ecological Site from other wet-mesic forest communities of lower productivity and different succession dynamics. In addition to sugar maple, red oak (Quercus rubra), American basswood, (Tilia Americana) and white ash (Fraxinus Americana) are sporadic associates on this Ecological Site.

Shrub layer typically is only moderately well developed, but can include many species. Most often present are beaked hazelnut (Corysus cornuta), bush honeysuckle (Diervilla lonicera), gooseberries (Rhibes spp.) and dwarf raspberry (Rubus pubescens).

Herb layer is well developed and species rich. Bracken fern (Pteridium aquilinum), big-leaf aster (Eurybia macrophylla), lady fern (Athyrium felix-femina) and wild sarsaparilla (Aralia nudicaulis) typically are most abundant. Other common species include spinulous shield fern (Dryopteris spinulosa), interrupted fern (Osmunda claytoniana), yellow bead-lily (Clintonia borealis), wild lily-of-the-valley (Maianthemum canadense), starflower (Trientalis borealis), and bunchberry (Cornus Canadensis).

This ES differs from Wet Floodplain mostly by position and drainage class. Wet Floodplains are palustrine wetlands with poorly drained soils and a slope of 0 to 1 percent. The Seasonally Dry Floodplains are moderately well to somewhat poorly drained soils and have a slope of 0 to 6 percent. The Wet Floodplains are subject to more flooding and are saturated throughout the year.

Associated sites

F092XY013WI	**Sandy Uplands** These sites are moderately well to excessively drained and formed in deep sandy deposits. Soils are often acidic. These sites are often adjacent to Seasonally Dry Floodplains and are higher in the drainage sequence.

Similar sites

F092XY005WI	**Wet Floodplains** These sites are poorly drained soils formed in loamy alluvium. They are palustrine wetlands that are saturated throughout the year. Sites receive water from stream overflow, but remain saturated with poor drainage and high groundwater tables. Sites are slightly acidic. These sites are near Seasonally Dry Floodplains, on the same landscape. These sites have a finer texture, so the soils remain saturated throughout the year.

Table 1. Dominant plant species

Tree	(1) *Acer saccharum* (2) *Acer rubrum*
Shrub	(1) *Corylus cornuta* (2) *Diervilla*
Herbaceous	(1) *Eurybia macrophylla* (2) *Pteridium aquilinum*

Physiographic features

This site occurs on active flood plains, natural levees, and bars located on alluvial plains of active streams flowing into Lake Superior. Landform shape can be linear, convex, or concave. Elevation of the landforms range from 185 to 330 meters above sea level. Slopes are 0 to 6 percent.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain (2) Alluvial plain > Natural levee (3) Alluvial plain > Bar
Runoff class	Negligible to low
Flooding frequency	Rare to frequent
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to occasional
Elevation	185–330 m
Slope	0–6%
Ponding depth	0–38 cm
Water table depth	15–91 cm
Aspect	Aspect is not a significant factor

Climatic features

The Seasonally Dry Floodplain PESD has a wide geographic distribution throughout the entire MLRA, except on the Apostle Islands. It is located along all the streams that cut through the landscape and empty into Lake Superior. The annual average precipitation is 29-33 inches, with a range of 56-167 inches of snowfall. The annual average minimum temperatures range from 29-32oF, and the maximum temperatures range from 49-52oF. The freeze-free period ranges from 156-197 days, with an average of 172 days. The frost-free period ranges from 130-169 days, with an average of 145 days. This PESD has such wide distribution, so it has large ranges for climatic features. Since these sites are located on floodplains, they are subject to flooding, especially in spring with snow melt runoff, and intense thunderstorms throughout the summer.

Table 3. Representative climatic features

Frost-free period (characteristic range)	82-107 days
Freeze-free period (characteristic range)	119-132 days
Precipitation total (characteristic range)	787-813 mm

Frost-free period (actual range)	69-112 days
Freeze-free period (actual range)	108-136 days
Precipitation total (actual range)	762-889 mm
Frost-free period (average)	92 days
Freeze-free period (average)	125 days
Precipitation total (average)	813 mm

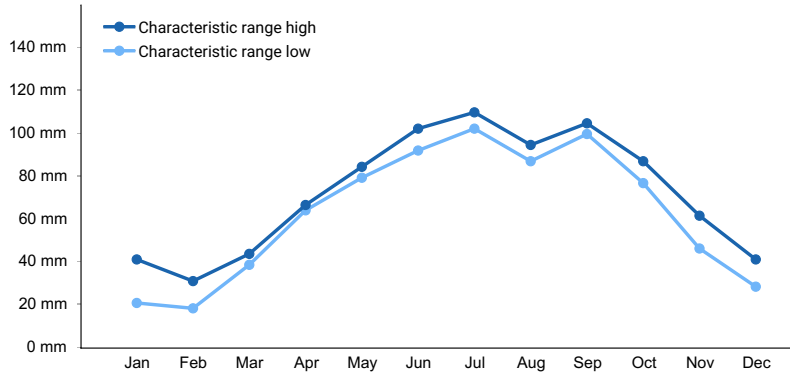


Figure 1. Monthly precipitation range

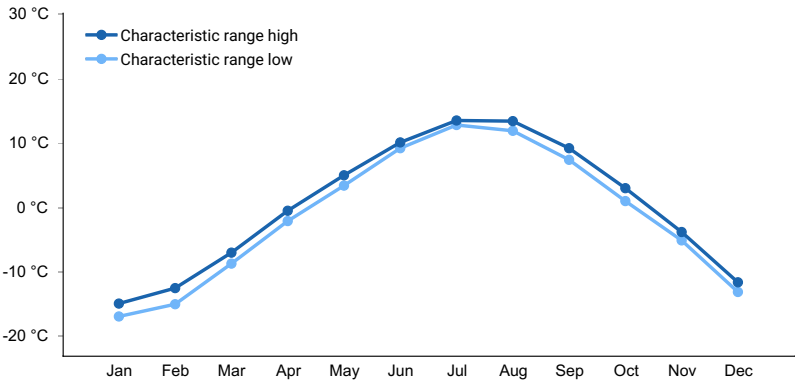


Figure 2. Monthly minimum temperature range

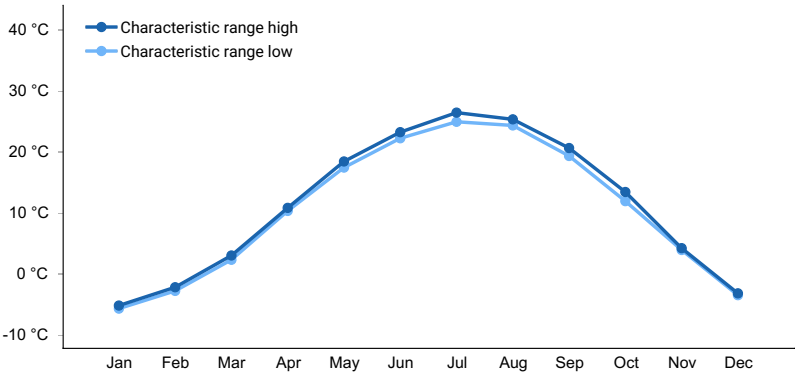


Figure 3. Monthly maximum temperature range

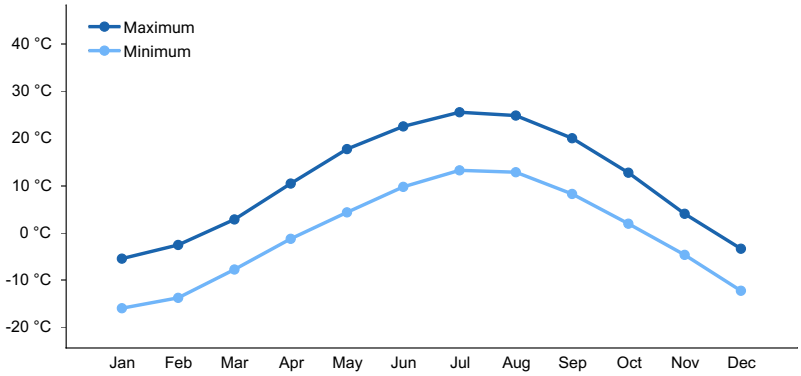


Figure 4. Monthly average minimum and maximum temperature

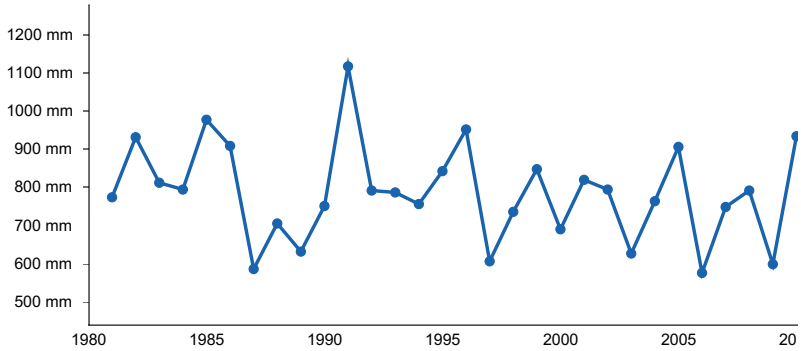


Figure 5. Annual precipitation pattern

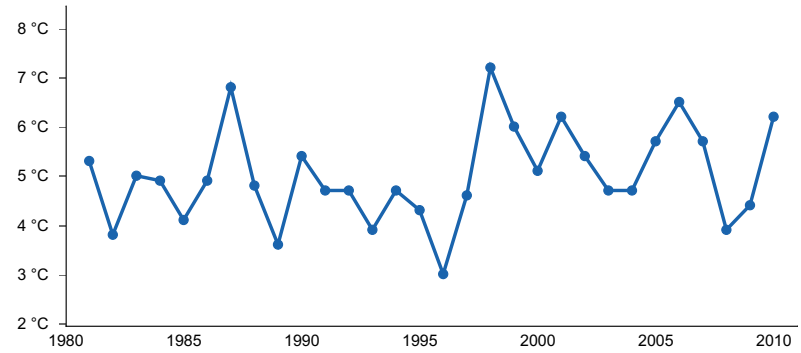


Figure 6. Annual average temperature pattern

Climate stations used

- (1) ASHLAND 3S [USC00470347], Ashland, WI
- (2) ASHLAND KENNEDY MEM AP [USW00094929], Ashland, WI
- (3) ASHLAND EXP FARM [USC00470349], Ashland, WI
- (4) BAYFIELD 6 N [USC00470603], Bayfield, WI
- (5) FOXBORO [USC00472889], Foxboro, WI
- (6) SUPERIOR [USC00478349], Superior, WI
- (7) HURLEY [USC00473800], Ironwood, WI

Influencing water features

Water is received characteristically through stream overflow, but also through precipitation, runoff from adjacent uplands, stream inflow, and ground water. Water is lost from the site primarily through surface outflow, subsurface outflow, evapotranspiration, and ground water recharge.

Permeability of the soil is slow to rapid. Runoff is negligible to low. The hydrologic group of this site is either A or A/D.

These sites are subject to rare to frequent flooding with brief duration year round. Some sites are subject to occasional ponding for a brief period during the spring with water depths up to 15 cm above the surface. Enough water will percolate into the soil resulting in an apparent seasonally high water table (endosaturation) that is at a depth of 15 to 91 cm throughout the year. Water within the soil is generally lost through subsurface outflow, along with plant uptake and evapotranspiration. There is a high potential for significant ground water recharge.

Soil features

The soils of this site are represented by the Dechamps, Moquah, and Pelkie soil series. These soils are classified as Udifluvents (Dechamps and Moquah) and Udipsamments (Pelkie). On some sites where there is significant variability of the soil, the soil is simply referred to, and classified as, Udifluvents.

This ecological site is characterized by very deep, somewhat poorly drained (Dechamps and Udifluvents) and moderately well drained (Moquah, Pelkie, and Udifluvents) soils formed in sandy (Pelkie), loamy (Dechamps, Moquah, and Udifluvents), and clayey (Udifluvents) alluvium.

The average gravel content within the soil can be as much as 7 percent, while the average content of cobbles and stones can be as much as 1 percent. Soil reaction (pH) in the upper 100 cm ranges from strongly acid to neutral. Carbonates are generally absent within 200 cm, but can be as shallow as 0 cm in some soil areas.

Table 4. Representative soil features

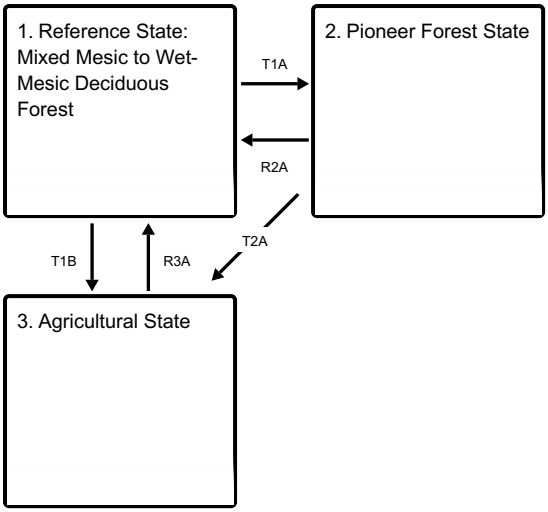
Parent material	(1) Alluvium
Surface texture	(1) Fine sandy loam (2) Loamy fine sand (3) Loamy very fine sand
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Slow to rapid
Soil depth	203 cm
Available water capacity (0-152.4cm)	8.99–17.12 cm
Soil reaction (1:1 water) (0-101.6cm)	5.5–6.7
Subsurface fragment volume <=3" (0-101.6cm)	0–7%
Subsurface fragment volume >3" (0-101.6cm)	0–1%

Ecological dynamics

This Ecological Site represents transitional physical conditions for several important tree species, which results in highly variable community dynamics. Sugar maple, the most aggressive successional species on mesic sites, is somewhat limited in its development by relatively wet and nutrient-moderate soil conditions. Although with time and low disturbance regime it still reaches dominant position, due to its high shade tolerance. it typically shares dominance with red maple, which is much better adapted to soil conditions of this ecological site. Balsam fir, a species, which finds its optimal competitive conditions in still wetter and nutrient poorer soils, also is found as a common associate on this ecological site, but typically only as a sub-canopy member. Small scale canopy disturbances, such as sporadic wind throw, snow and ice breakage tend to maintain this species composition and stand structure indefinitely. Large scale disturbances, especially fire, are necessary to introduce pioneering communities of trembling aspen and white birch. Historically, white pine has also been found on this ecological site, most often as scattered individuals, rather than pure stands. Old stumps can still be found today as evidence of such conditions.

State and transition model

Ecosystem states



T1A - Stand replacing disturbance that includes fire

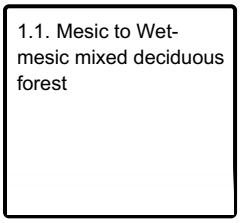
T1B - Removal of forest cover and tilling for agricultural crop production

R2A - Deciduous forest community is slowly invaded by conifers and sugar maple.

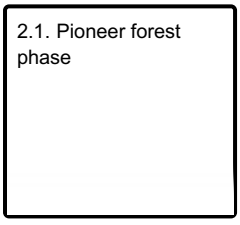
T2A - Removal of forest cover and tilling for agricultural crop production

R3A - Cessation of agricultural practices leads to natural reforestation, or site is replanted.

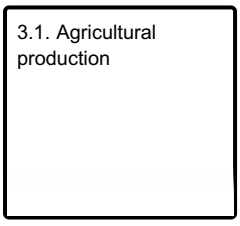
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Reference State: Mixed Mesic to Wet-Mesic Deciduous Forest

Reference State is a Mesic to Wet-mesic mixed deciduous forest. Tree species composition and age structure vary in space and time. Principal deciduous species are red maple (*Acer rubrum*) and sugar maple (A.Saccharum). Less common associates are basswood (*Tilia americana*), white ash (*Fraxinus americana*), or black ash (*F. nigra*). In some stands scattered old specimens of trembling aspen (*Populus tremuloides*), or white birch (Betula papyriphera) are present. There often is an admixture of conifers, most commonly balsam fir (*Abies balsamea*) and White spruce (*Picea glauca*), especially in the seedling and sapling layers. White pine (P. strobus) has also been a component historically, and old white pine tree stumps, as well as sporadic old trees can be found in today's communities. In

the absence of catastrophic disturbances this mixture of species is maintained by regeneration in canopy gaps, resulting from natural mortality and small-scale blow-downs. For additional description, including shrub and herb layers see “Ecological Site Concept” above.

Community 1.1
Mesic to Wet-mesic mixed deciduous forest

This community phase is highly variable due to periodic disturbance from the site being present on a seasonally dry floodplain. As such dominance of any particular species is difficult to predict. Tree species present vary from red maple and sugar maple in the sites that see the least frequent disturbance to black ash and balsam fir on sites that

may have wetter conditions more often. Basswood white birch and white spruce may occur in these stands though they do not often dominate. It is possible to have a few old white birch or trembling aspen from a previous pioneering phase.

State 2
Pioneer Forest State

Aspen and paper birch have a very narrow window of environmental and ecological conditions for successful establishment. Main requirements are exposed mineral soil and elimination, most effectively by fire, of on site seed sources of potential competing vegetation. In addition, continual adequate soil moisture must be available for initial seedling development. Once seedlings are firmly established height growth of both species is relatively rapid and able to outgrow most of competing species. Paper birch seedlings and saplings tolerate partial shade and often become members of mixed species communities. This is not true for aspen, which requires continuous full-sun exposure for survival. Aspen stands are initially very dense due to sprouting from extensive lateral roots, but rapid natural thinning ensues as stems compete for available light.

Community 2.1
Pioneer forest phase

The pioneer forest phase occurs after some type of disturbance that removes all or most of the previous vegetation allowing more sunlight so that either aspen or white birch may dominate the canopy. These pioneer forests may include white spruce, balsam fir, and basswood as they age and progress in succession. Tree species present in

this phase are dependent on seed source, type of disturbance, and previous condition (namely were white birch or aspen present previously).

State 3
Agricultural State

Cultivation of agricultural crops. In this region most often hay production.

Community 3.1
Agricultural production

Farming in seasonally dry floodplains is a possible land use and while it might include agricultural crops it would mostly likely be in hay production.

Transition T1A
State 1 to 2

Stand replacing disturbance that may include blow-down or ice storm, but must include fire to eliminate slash and competing vegetation and expose mineral soil to allow aspen and/or white birch to colonize the site by seed. Alternatively, if the disrupted reference state community included aspen trees, the species may become re-established by vegetative means, which typically is more successful and more common than colonization by seed.

Transition T1B
State 1 to 3

Removal of forest cover and introduction of tilling for agricultural crop production.

Restoration pathway R2A
State 2 to 1

Aspen – Birch dominated forest community is slowly invaded by more shade tolerant species, initially by red maple and, depending on seed source availability, by sugar maple, basswood, white ash, or white pine.

Transition T2A
State 2 to 3

Removal of forest cover and introduction of tilling for agricultural crop production.

Restoration pathway R3A
State 3 to 1

Cessation of agricultural practices leads to natural reforestation, or site is replanted.

Additional community tables

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Approval

Chris Tecklenburg, 4/09/2020

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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	11/21/2024
Approved by	Chris Tecklenburg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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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):**

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:**