USDA Natural Resources Conservation Service

# Ecological site R054XY033ND
# Thin Claypan

Accessed: 05/10/2025

## 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.

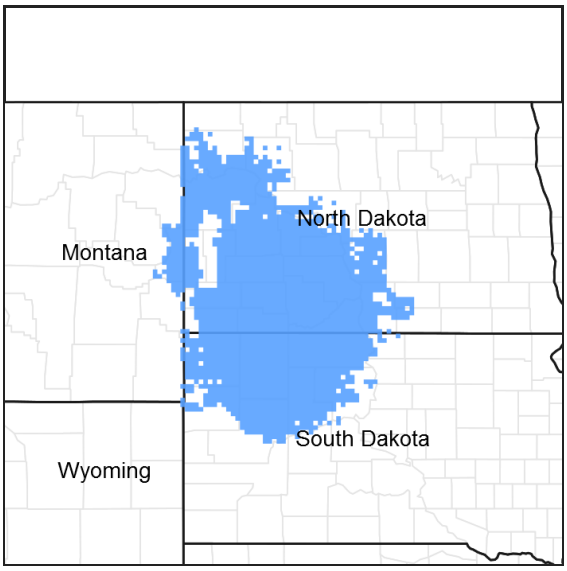



**Figure 1. Mapped extent**

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: 43a – Missouri Plateau.

## Associated sites

| | |
|---|---|
| R054XY020ND | **Clayey** |
| R054XY021ND | **Claypan** |
| R054XY022ND | **Closed Depression** |
| R054XY024ND | **Saline Lowland** |
| R054XY027ND | **Sandy Claypan** |

## Similar sites

| | |
|---|---|
| R054XY035ND | **Very Shallow**<br>[Excessively well drained soils less than 10 inches to scoria, gravels, shales, siltstone or sandstone bedrock that restricts root penetration, upslope of shallow clayey, shallow loamy or shallow sandy ecological sites. Indicator species are little bluestem, sideoats grama, blue grama, purple coneflower, pasqueflower and creeping juniper. This site has more little bluestem, steeper slopes, similar production, and a different restrictive layer.] |

| | |
|---|---|
| R054XY022ND | **Closed Depression**<br>[Poorly drained clayey soils with sodic subsoils and with noticeable redoximorphic features within depressions. Ponds periodically with no apparent water table. Indicator species: dominated by western wheatgrass with alkaligrass and foxtail barley intermixed, forb indicator is western dock, no shrubs. This site has no blue grama but more western wheatgrass, far more production, different landscape position, with dock or smartweed, does have a sodic soil layer at similar depths and will flood.] |
| R054XY021ND | **Claypan**<br>[Well drained soils on uplands or terraces that don't receive extra moisture with a dense sodic subsoil below 6 inches with salts below 16 inches. Indicator species are western wheatgrass with an understory of blue grama, heath aster, and western yarrow along with a few shrubs of fringed sagewort and Nuttall's Saltbush. This site has a deeper sodic subsoil layer, more production, similar species, less blue grama, more needleandthread and green needlegrass.] |
| R054XY028ND | **Shallow Clayey**<br>[Some what excessively well drained soils more than 10 less than 20 inches to unweathered shales that restricts root penetration. Upslope of clayey site, surface layer will ribbon greater than 2 inches, upslope of clayey ecological site. Indicator species: western wheatgrass dominates with little bluestem, plains muhly and sideoats grama, gayfeather. This site has little bluestem, plains muhly, sideoats grama, less green needlegrass, less blue grama and needleandthread, more production, different restrictive layer at less than 6 inches.] |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | Not specified |
| Herbaceous | (1) *Pascopyrum smithii*<br>(2) *Bouteloua gracilis* |

## Physiographic features

This site occurs on gently undulating to rolling sedimentary uplands.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Alluvial fan<br>(2) Alluvial flat<br>(3) Hill |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 1,600–3,600 ft |
| Slope | 0–15% |
| Water table depth | 48–72 in |
| Aspect | Aspect is not a significant factor |

## Climatic features

MLRA 54 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 14 to 18 inches per year. The normal average annual temperature is about 42° F. January is the coldest month with average temperatures ranging from about 13° F (Beach, ND) to about 16° F (Bison, SD). July is the warmest month with temperatures averaging from about 69° F (Beach, ND) to about 72° F (Timber Lake, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 57° F. This large annual range attests to the continental nature of this MLRA's climate. Hourly winds are estimated to 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) | 136 days |
| Freeze-free period (average) | 157 days |
| Precipitation total (average) | 18 in |

## Climate stations used

- (1) DUPREE [USC00392429], Dupree, SD
- (2) FT YATES 4 SW [USC00323207], Fort Yates, ND
- (3) HETTINGER [USC00324178], Hettinger, ND
- (4) SIDNEY [USC00247560], Sidney, MT

## Influencing water features

No significant water features influence this site.

## Soil features

The common features of soils in this site are the fine sandy loam to clay textured subsoils and slopes of 0 to 15 percent. The soils in this site are moderately well to well drained and formed in soft sandstone, siltstone, shales and alluvium. The fine sandy loam to clay loam surface layer is 2 to 6 inches thick. The extremely hard clayey Btn horizon has round-topped or “bun shaped” columnar or prismatic structured subsoil. These Btn horizons are high in sodium. The soils have a moderate to slow infiltration rate and very slow saturated hydraulic conductivity. Wet surface compaction can occur with heavy traffic. Waterflow paths are broken, irregular in appearance or discontinuous with numerous debris dams or vegetative barriers, and there is a high risk of rills and eventually gullies if vegetative cover is not adequate. Cryptobiotic crusts are present and a moderate pedestalling of plants occur.
These soils are mainly susceptible to water erosion. The hazard of water erosion greatly increases on slopes greater than about 9 percent. Loss of the soil surface layer can result in a shift in species composition and/or production.

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:
North Dakota http://www.nd.nrcs.usda.gov/
South Dakota http://www.sd.nrcs.usda.gov/
Montana http://www.mt.nrcs.usda.gov/

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Residuum–sandstone and siltstone<br>(2) Residuum–shale<br>(3) Slope alluvium |
| Surface texture | (1) Silt loam<br>(2) Loam<br>(3) Fine sandy loam |
| Family particle size | (1) Clayey |
| Drainage class | Moderately well drained to well drained |

| | |
|---|---|
| Permeability class | Very slow to slow |
| Soil depth | 6–16 in |
| Surface fragment cover <=3" | 0% |
| Surface fragment cover >3" | 0% |
| Available water capacity (0-40in) | 1–3 in |
| Calcium carbonate equivalent (0-40in) | 0–10% |
| Electrical conductivity (0-40in) | 8–16 mmhos/cm |
| Sodium adsorption ratio (0-40in) | 13–30 |
| Soil reaction (1:1 water) (0-40in) | 5.1–9.5 |
| Subsurface fragment volume <=3" (Depth not specified) | 0–20% |
| Subsurface fragment volume >3" (Depth not specified) | 0–10% |

## Ecological dynamics

The site developed under Northern Great Plains climatic conditions, and included natural influence of large herbivores and occasional fire. 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 quit fragile. Under continued adverse impacts, a rapid decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments the site can slowly return to the Reference Plant Community.

The plant community upon which the interpretations are primarily based is the Reference Plant Community. The Reference Plant Community 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 considered. Subclimax plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

Continuous grazing without adequate recovery periods following each grazing occurrence over several years causes this site to depart from the HCPC. Species such as blue grama, Sandberg bluegrass, and inland saltgrass will increase. Western wheatgrass and prairie junegrass will decrease in frequency and production. In time, heavy continuous grazing will likely cause blue grama to dominate and pioneer perennials, annuals, and club moss (in its range) to increase. This plant community is relatively stable and the competitive advantage prevents other species from establishing. This plant community is less productive than the Reference Plant Community. Runoff increases and infiltration will decrease. Soil erosion will be minimal.

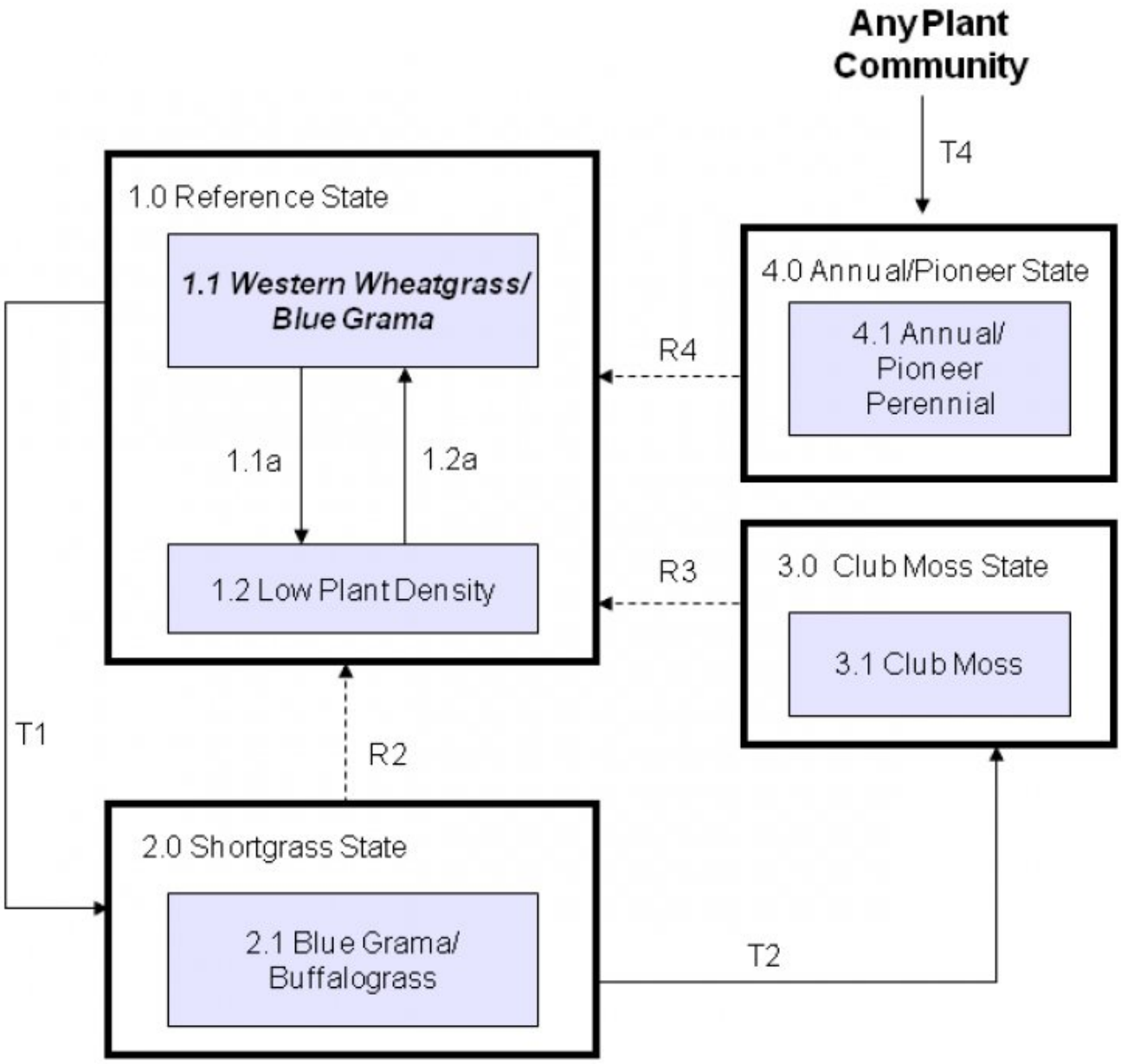
Extended periods of non-use and/or lack of fire will result in a plant community having low density, which favors an increase in Sandberg bluegrass, and in time, shrubs such as cactus.

Due to a general invasion of exotic species (such as Kentucky bluegrass and smooth bromegrass) across the MLRA within this site, returning to the 1.1 Western Wheatgrass/Blue Grama Plant Community Phase may not be possible.

Following the state and transition diagram are narratives for each of the described states and community phases. These may not represent every possibility, but they are the most prevalent and repeatable states/community phases. The plant composition tables shown below have been developed from the best available knowledge at the time of this revision. As more data are collected, some of these community phases and/or states may be revised or removed, and new ones may be added. The main purpose for including the descriptions here is to capture the

current knowledge and experience at the time of this revision.

### State and transition model




### State 1
### Reference

The State narrative is under development.

### Community 1.1
### Western Wheatgrass/Blue Grama

This is the interpretive plant community for this site, and it is also considered the Reference Plant Community. This site evolved with grazing by large herbivores and occasional prairie fires. This plant community can be found on areas having a history of proper grazing management, including adequate recovery periods between grazing events. The potential vegetation is about 84% grasses or grass-like plants, 10% forbs, 5% shrubs and 1% cryptograms. Cool season grasses dominate the site, but warm season short grasses are also prevalent. The co-dominant grasses are western wheatgrass and blue grama. Other grasses and grass-like plants occurring on the site include needleandthread, buffalograss, Sandberg bluegrass and sedges. Significant forbs may include prairie coneflower, scarlet globemallow, Lambert's crazyweed, and western yarrow. In other areas, silver sagebrush is the

dominant shrub and occurs more evenly dispersed across the site. Other shrubs include Nuttall's saltbush, broom snakeweed, brittle cactus and fringed sagewort. This plant community is well adapted to the Northern Great Plains climatic conditions. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Community dynamics, nutrient cycle, water cycle and energy flow are functioning properly. Plant litter is properly distributed with some movement off-site and natural plant mortality is low. The diversity in plant species allows for some drought tolerance. This is a fragile, but sustainable plant community. Low to moderate available water capacity coupled with high accumulations of sodium and slow permeability strongly influences the soil-water-plant relationships.

**Table 5. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 340 | 704 | 1060 |
| Forb | 55 | 68 | 85 |
| Shrub/Vine | 5 | 24 | 45 |
| Moss | 0 | 4 | 10 |
| **Total** | **400** | **800** | **1200** |

**Figure 7. Plant community growth curve (percent production by month). ND5402, Missouri Slope, Native Grasslands, Cool/Warm-season Mix. Cool-season/warm-season dominant.**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 2 | 6 | 21 | 40 | 20 | 6 | 4 | 1 | 0 | 0 |

## Community 1.2
## Low Plant Density

This plant community develops after an extended period of 20 or more years of non-use by herbivores and exclusion of fire. This plant community is dispersed throughout the pasture, encircling spot grazed areas, and areas distant from water sources. This is a typical pattern found in properly stocked pastures grazed season-long. Plant litter may accumulate as this plant community first develops. Due to a lack of tiller stimulation and sunlight, native bunchgrasses typically develop dead centers and native rhizomatous grasses are limited to colonies. Standing decadent plants and moderate litter covers shorter understory species (i.e. short grasses and sedges), restricting their ability to capture adequate sunlight for photosynthesis. Vigor and diversity of native plants are reduced. Annual and/or biennial forbs, annual grasses, and cryptogams commonly fill interspaces once occupied by desirable species. Cheatgrass and sweetclover tend to invade this plant community only when moisture conditions are favorable for these species. Sandberg bluegrass tends to increase along with needleandthread, prairie junegrass and shrubs like broom snakeweed and brittle cactus. Other grasses present include western wheatgrass and sedges with lesser amounts of blue grama and inland saltgrass. The common forbs include Missouri goldenrod, prairie coneflower, silverleaf scurfpea, western yarrow, and heath aster. Fringed sagewort, silver sagebrush, rubber rabbitbrush, Nuttall's saltbush, broom snakeweed, and may be the principal shrubs. This plant community is resistant to change without prescribed grazing or fire. Prescribed grazing is most effective in moving this plant community towards the Reference Plant Community. Soil erosion is low. Compared to the Reference Plant Community, infiltration is reduced to the lower root zone. Runoff is similar to the Reference Plant Community. This plant community tends to favor early cool season plant species which are moisture loving and usually tends to utilize the spring moisture quickly causing the soil to become dry and not very productive early in the summer. Once this plant community is reached, any of the preferred treatments can readily return the diversity and production of the site.

**Table 6. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 310 | 572 | 885 |
| Forb | 40 | 55 | 70 |
| Shrub/Vine | 0 | 20 | 35 |
| Moss | 0 | 3 | 10 |
| **Total** | **350** | **650** | **1000** |

**Figure 9. Plant community growth curve (percent production by month). ND5406, Missouri Slope, Introduced Cool-season Grasses. Introduced cool-season grasses.**

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

## Pathway 1.1a
## Community 1.1 to 1.2

Non-use and no fire for extended periods of time will convert this plant community to the Low Plant Density Plant Community.

## Pathway 1.2a
## Community 1.2 to 1.1

Prescribed grazing or prescribed burning followed by prescribed grazing, will move this plant community toward the Western Wheatgrass/Blue Grama Plant Community. This would require long-term management with prescribed grazing and/or prescribed burning under controlled conditions.

**Conservation practices**

| |
|---|
| Prescribed Burning |
| Prescribed Grazing |

## State 2
## Shortgrass

The State narrative is under development.

## Community 2.1
## Blue Grama/Buffalograss

This plant community can quickly develop from the adverse effects of heavy continuous grazing and/or annual, early spring seasonal grazing. Annual grazing too early in the spring depletes stored carbohydrates, resulting in weakening and eventual death of the cool season mid-grasses. Short grasses and forbs increase to dominate the site and annual production decreases dramatically. Lack of litter and reduced vigor result in higher soil temperatures, poor water infiltration rates, and high evapotranspiration, which gives blue grama a competitive advantage over cool season mid-grasses. This plant community can occur throughout the pasture, on spot grazed areas, and around water sources where season-long grazing patterns occur. Blue grama and buffalograss are the dominant species with the balance being a few species of cool-season grasses and warm-season grasses including buffalograss, inland saltgrass, needleandthread, prairie junegrass, and annual grasses. Forbs such as broom snakeweed, cudweed sagewort, heath aster and western yarrow may also be present. There is usually more than 25% bare ground. This plant community is quite resilient. The thick sod and competitive advantage prevents other species from establishing. This plant community is less productive than the Reference Plant Community. Runoff increases and infiltration will decrease. Soil erosion will be minimal due to the sod forming habit of blue grama and buffalograss.

**Table 7. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 130 | 208 | 280 |
| Forb | 10 | 19 | 30 |
| Shrub/Vine | 10 | 19 | 30 |
| Moss | 0 | 4 | 10 |
| **Total** | **150** | **250** | **350** |

**Figure 11. Plant community growth curve (percent production by month). ND5405, Missouri Slope, Warm-season Short Grass. Warm-season, short grass dominant, and some sedge.**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 7 | 18 | 33 | 26 | 10 | 4 | 1 | 0 | 0 |

## State 3
## Club Moss

The State narrative is under development.

## Community 3.1
## Club Moss

This plant community typically occurs in the western portion of MLRA 54. A dense sod of club moss dominates this plant community. Club moss occupies bare soil areas within deteriorated or disturbed higher successional plant communities due to long-term repeated disturbances. Club moss cover is often 25% or greater. Club moss creates a more arid microclimate, resulting in extreme competition for available moisture. Vigor and production of other species is reduced dramatically. Blue grama, western wheatgrass and Sandberg bluegrass are the dominant grass species with the balance being a few species of cool & warm season grasses including, inland saltgrass, buffalograss, and prairie junegrass. Sedges are typically not found. Forbs commonly found in this plant community include heath aster, Lambert’s crazyweed, scarlet globemallow, scurfpea, curlycup gumweed and western yarrow will also be present. There is usually less than 15% bare ground. This plant community is very resistant to change. The thick sod and competitive advantage of both the clubmoss and the blue grama prevents other species from expanding and establishing. This plant community is far less productive than the Reference Plant Community. Initial runoff rates are low but then increase as clubmoss becomes saturated. Once clubmoss has been saturated then runoff increases and infiltration decreases as compared to the Reference Plant Community. Soil erosion will be minimal.

**Table 8. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 135 | 155 | 225 |
| Moss | 5 | 15 | 25 |
| Shrub/Vine | 5 | 15 | 25 |
| Forb | 5 | 15 | 25 |
| **Total** | **150** | **200** | **300** |

**Figure 13. Plant community growth curve (percent production by month). ND5404, Missouri Slope, Warm-season Dominant, Cool-season Subdominant. Short warm-season dominant, mid cool-season subdominant & club moss..**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 5 | 20 | 38 | 25 | 8 | 3 | 0 | 0 | 0 |

### State 4
### Annual/Pioneer

The State narrative is under development.

### Community 4.1
### Annual/Pioneer Perennial

This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock or wildlife concentration, and cropping abandonment (go-back land). The dominant vegetation includes pioneer annual grasses, forbs, invaders, and early successional biennial and perennial species. Grasses may include sixweeks fescue, crested wheatgrass, annual bromegrass, needleandthread, prairie junegrass and western wheatgrass. The dominant forbs include curlycup gumweed, kochia, pussytoes, prostrate verbena and other early successional species. Shrubs that may be present include prairie rose, fringed sagewort and broom snakeweed. Plant species from adjacent ecological sites may become minor components of this plant community. The community also is susceptible to invasion of non-native annual and perennial forbs due to severe soil disturbances and relatively high percent of bare ground. Compared to the HCPC, western wheatgrass, green needlegrass, needleandthread, and blue grama have decreased. This plant community is resistant to change, as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession. Soil erosion is potentially high in this plant community. Reduced surface cover, low plant density, low plant vigor, loss of root biomass, and soil compaction, all contribute to decreased water infiltration, increased runoff, and accelerated erosion rates. Significant economic inputs, management and time would be required to move this plant community toward a higher successional stage and a more productive plant community. Secondary succession is highly variable, depending upon availability and diversity of a viable seed bank of higher successional species within the existing plant community and neighboring plant communities. This plant community can be renovated to improve the production capability, but management changes would be needed to maintain the new plant community. The total annual production ranges from 100 to 500 lbs./ac. (air-dry weight) depending upon growing conditions.

### State 5
### Go-Back State

This state is the result of severe soil disturbance such as cropping, recreational activity or concentrated livestock activity for a prolonged time period. Following cessation of disturbances, the resulting plant community is dominated by early pioneer annual and perennial plant species. The composition and production of this state is highly variable.

**Characteristics and indicators.** To Be Added

**Resilience management.** To Be Added

### Community 5.1
### Annual/Pioneer Perennial/Exotics

This plant community is characterized by a dominance of early pioneer annual and perennial plant species. Plant species composition and production is highly variable.

**Resilience management.** To Be Added

### Transition T1
### State 1 to 2

Heavy, continuous grazing will convert the plant community to the Blue Grama/Buffalograss Plant Community. Continuous seasonal grazing (annual, early spring) will convert the plant community to the Blue Grama/Buffalograss Plant Community.

### Transition T2
### State 2 to 3

Heavy, continuous grazing may cause further deterioration resulting in a shift to the Club Moss Plant Community.

### Restoration pathway R3
### State 3 to 1

Mechanical renovation or range seeding, followed by prescribed grazing, will reduce club moss, increase western wheatgrass, and eventually shift this plant community back toward the Western Wheatgrass/Blue Grama Plant Community. Prescribed burning followed by prescribed grazing may eventually convert this plant community back to the Western Wheatgrass/Blue Grama Plant Community. Long-term prescribed grazing may eventually move this plant community through the successional stages leading toward the Western Wheatgrass/Blue Grama Plant Community.

#### Conservation practices

| |
|---|
| Prescribed Burning |
| Prescribed Grazing |

## 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 | | | | 160–240 | |
| | western wheatgrass | PASM | *Pascopyrum smithii* | 160–240 | – |
| | thickspike wheatgrass | ELLAL | *Elymus lanceolatus ssp. lanceolatus* | 0–80 | – |
| 2 | | | | 160–240 | |
| | blue grama | BOGR2 | *Bouteloua gracilis* | 120–200 | – |
| 3 | | | | 40–112 | |
| | needle and thread | HECOC8 | *Hesperostipa comata ssp. comata* | 8–40 | – |
| | prairie Junegrass | KOMA | *Koeleria macrantha* | 8–40 | – |
| | Sandberg bluegrass | POSE | *Poa secunda* | 8–40 | – |
| 4 | **Other Native Grasses** | | | 16–40 | |
| | saltgrass | DISP | *Distichlis spicata* | 8–40 | – |
| | Grass, perennial | 2GP | *Grass, perennial* | 8–40 | – |
| | plains reedgrass | CAMO | *Calamagrostis montanensis* | 0–16 | – |
| | green needlegrass | NAVI4 | *Nassella viridula* | 0–16 | – |
| | tumblegrass | SCPA | *Schedonnardus paniculatus* | 0–16 | – |
| | dropseed | SPORO | *Sporobolus* | 0–16 | – |
| | Grass, annual | 2GA | *Grass, annual* | 0–8 | – |
| 5 | **Grass-Likes** | | | 16–40 | |
| | needleleaf sedge | CADU6 | *Carex duriuscula* | 8–40 | – |
| | Grass-like (not a true grass) | 2GL | *Grass-like (not a true grass)* | 0–24 | – |
| | threadleaf sedge | CAFI | *Carex filifolia* | 8–16 | – |
| **Forb** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 7 | **Forbs** | | | 56–80 | |
| | Forb (herbaceous, not grass nor grass-like) | 2FORB | *Forb (herbaceous, not grass nor grass-like)* | 0–16 | – |
| | Forb, perennial | 2FP | *Forb, perennial* | 0–16 | – |
| | common yarrow | ACMI2 | *Achillea millefolium* | 8–16 | – |
| | purple locoweed | OXLA3 | *Oxytropis lambertii* | 8–16 | – |
| | silverleaf Indian breadroot | PEAR6 | *Pediomelum argophyllum* | 8–16 | – |
| | upright prairie coneflower | RACO3 | *Ratibida columnifera* | 8–16 | – |
| | white heath aster | SYER | *Symphyotrichum ericoides* | 8–16 | – |
| | Nuttall's violet | VINU2 | *Viola nuttallii* | 8 | – |
| | scarlet globemallow | SPCO | *Sphaeralcea coccinea* | 8 | – |
| | spiny phlox | PHHO | *Phlox hoodii* | 0–8 | – |
| | woolly plantain | PLPA2 | *Plantago patagonica* | 8 | – |
| | sticky cinquefoil | POGL9 | *Potentilla glandulosa* | 8 | – |
| | onion | ALLIU | *Allium* | 8 | – |
| | rosy pussytoes | ANRO2 | *Antennaria rosea* | 8 | – |
| | white sagebrush | ARLU | *Artemisia ludoviciana* | 0–8 | – |
| | wavyleaf thistle | CIUN | *Cirsium undulatum* | 0–8 | – |
| | rush skeletonplant | LYJU | *Lygodesmia juncea* | 8 | – |
| | leafy wildparsley | MUDI | *Musineon divaricatum* | 8 | – |
| **Shrub/Vine** | | | | | |
| 8 | **Shrubs** | | | 8–40 | |
| | prairie sagewort | ARFR4 | *Artemisia frigida* | 8–16 | – |
| | Nuttall's saltbush | ATNU2 | *Atriplex nuttallii* | 8–16 | – |
| | Subshrub (<.5m) | 2SUBS | *Subshrub (<.5m)* | 0–16 | – |
| | brittle pricklypear | OPFR | *Opuntia fragilis* | 8–16 | – |
| | plains pricklypear | OPPO | *Opuntia polyacantha* | 0–16 | – |
| | silver sagebrush | ARCA13 | *Artemisia cana* | 0–8 | – |
| | rubber rabbitbrush | ERNA10 | *Ericameria nauseosa* | 0–8 | – |
| | spinystar | ESVIV | *Escobaria vivipara var. vivipara* | 0–8 | – |
| | broom snakeweed | GUSA2 | *Gutierrezia sarothrae* | 8 | – |
| | winterfat | KRLA2 | *Krascheninnikovia lanata* | 0–8 | – |
| **Moss** | | | | | |
| 9 | **Cryptogams** | | | 0–8 | |
| | lesser spikemoss | SEDE2 | *Selaginella densa* | 0–8 | – |

**Table 10. Community 1.2 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | | | | 98–163 | |
| | western wheatgrass | PASM | *Pascopyrum smithii* | 98–163 | – |
| | thickspike wheatgrass | ELLAL | *Elymus lanceolatus ssp. lanceolatus* | 0–65 | – |
| 2 | | | | 65–98 | |

| | | | | | |
|---|---|---|---|---|---|
| | blue grama | BOGR2 | *Bouteloua gracilis* | 65–98 | – |
| 3 | | | | 65–98 | |
| | needle and thread | HECOC8 | *Hesperostipa comata ssp. comata* | 65–98 | – |
| | Sandberg bluegrass | POSE | *Poa secunda* | 33–65 | – |
| | prairie Junegrass | KOMA | *Koeleria macrantha* | 20–33 | – |
| 4 | **Other Native Grasses** | | | 13–33 | |
| | Grass, perennial | 2GP | *Grass, perennial* | 7–33 | – |
| | saltgrass | DISP | *Distichlis spicata* | 7–20 | – |
| | green needlegrass | NAVI4 | *Nassella viridula* | 0–13 | – |
| | tumblegrass | SCPA | *Schedonnardus paniculatus* | 0–13 | – |
| | dropseed | SPORO | *Sporobolus* | 0–13 | – |
| | plains reedgrass | CAMO | *Calamagrostis montanensis* | 0–13 | – |
| | Grass, annual | 2GA | *Grass, annual* | 0–7 | – |
| 5 | **Grass-Likes** | | | 33–65 | |
| | needleleaf sedge | CADU6 | *Carex duriuscula* | 26–52 | – |
| | Grass-like (not a true grass) | 2GL | *Grass-like (not a true grass)* | 0–20 | – |
| | threadleaf sedge | CAFI | *Carex filifolia* | 0–7 | – |
| 6 | **Non-Native Grasses** | | | 46–91 | |
| | bluegrass | POA | *Poa* | 33–65 | – |
| | cheatgrass | BRTE | *Bromus tectorum* | 0–26 | – |
| | crested wheatgrass | AGCR | *Agropyron cristatum* | 0–20 | – |
| | smooth brome | BRIN2 | *Bromus inermis* | 0–20 | – |
| **Forb** | | | | | |
| 7 | **Forbs** | | | 46–65 | |
| | Forb (herbaceous, not grass nor grass-like) | 2FORB | *Forb (herbaceous, not grass nor grass-like)* | 0–65 | – |
| | Forb, perennial | 2FP | *Forb, perennial* | 0–13 | – |
| | common yarrow | ACMI2 | *Achillea millefolium* | 7–13 | – |
| | white sagebrush | ARLU | *Artemisia ludoviciana* | 7–13 | – |
| | purple locoweed | OXLA3 | *Oxytropis lambertii* | 7–13 | – |
| | silverleaf Indian breadroot | PEAR6 | *Pediomelum argophyllum* | 7–13 | – |
| | upright prairie coneflower | RACO3 | *Ratibida columnifera* | 7–13 | – |
| | white heath aster | SYER | *Symphyotrichum ericoides* | 7–13 | – |
| | yellow salsify | TRDU | *Tragopogon dubius* | 0–7 | – |
| | Nuttall's violet | VINU2 | *Viola nuttallii* | 7 | – |
| | scarlet globemallow | SPCO | *Sphaeralcea coccinea* | 7 | – |
| | spiny phlox | PHHO | *Phlox hoodii* | 0–7 | – |
| | woolly plantain | PLPA2 | *Plantago patagonica* | 7 | – |
| | sticky cinquefoil | POGL9 | *Potentilla glandulosa* | 7 | – |
| | wavyleaf thistle | CIUN | *Cirsium undulatum* | 0–7 | – |
| | rush skeletonplant | LYJU | *Lygodesmia juncea* | 7 | – |
| | leafy wildparsley | MUDI | *Musineon divaricatum* | 7 | – |
| | onion | ALLIU | *Allium* | 7 | – |

| | | | | | |
|---|---|---|---|---|---|
| | rosy pussytoes | ANRO2 | *Antennaria rosea* | 7 | – |
| **Shrub/Vine** | | | | | |
| 8 | **Shrubs** | | | 7–33 | |
| | prairie sagewort | ARFR4 | *Artemisia frigida* | 7–13 | – |
| | Nuttall's saltbush | ATNU2 | *Atriplex nuttallii* | 0–13 | – |
| | rubber rabbitbrush | ERNA10 | *Ericameria nauseosa* | 0–13 | – |
| | Subshrub (<.5m) | 2SUBS | *Subshrub (<.5m)* | 0–13 | – |
| | brittle pricklypear | OPFR | *Opuntia fragilis* | 7–13 | – |
| | plains pricklypear | OPPO | *Opuntia polyacantha* | 0–13 | – |
| | silver sagebrush | ARCA13 | *Artemisia cana* | 0–7 | – |
| | spinystar | ESVIV | *Escobaria vivipara var. vivipara* | 0–7 | – |
| | broom snakeweed | GUSA2 | *Gutierrezia sarothrae* | 7 | – |
| | winterfat | KRLA2 | *Krascheninnikovia lanata* | 0–7 | – |
| **Moss** | | | | | |
| 9 | **Cryptogams** | | | 0–7 | |
| | lesser spikemoss | SEDE2 | *Selaginella densa* | 0–7 | – |

**Table 11. Community 2.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | | | | 25–38 | |
| | western wheatgrass | PASM | *Pascopyrum smithii* | 25–38 | – |
| | thickspike wheatgrass | ELLAL | *Elymus lanceolatus ssp. lanceolatus* | 0–13 | – |
| 2 | | | | 75–88 | |
| | blue grama | BOGR2 | *Bouteloua gracilis* | 63–88 | – |
| 3 | | | | 38–50 | |
| | Sandberg bluegrass | POSE | *Poa secunda* | 25–38 | – |
| | needle and thread | HECOC8 | *Hesperostipa comata ssp. comata* | 13–25 | – |
| | prairie Junegrass | KOMA | *Koeleria macrantha* | 3–5 | – |
| 4 | **Other Native Grasses** | | | 8–18 | |
| | saltgrass | DISP | *Distichlis spicata* | 8–13 | – |
| | dropseed | SPORO | *Sporobolus* | 5–8 | – |
| | Grass, perennial | 2GP | *Grass, perennial* | 0–5 | – |
| | plains reedgrass | CAMO | *Calamagrostis montanensis* | 0–3 | – |
| | Grass, annual | 2GA | *Grass, annual* | 0–3 | – |
| | tumblegrass | SCPA | *Schedonnardus paniculatus* | 0–3 | – |
| 5 | **Grass-Likes** | | | 3 | |
| | Grass-like (not a true grass) | 2GL | *Grass-like (not a true grass)* | 0–3 | – |
| | needleleaf sedge | CADU6 | *Carex duriuscula* | 3 | – |
| | threadleaf sedge | CAFI | *Carex filifolia* | 0–3 | – |
| **Forb** | | | | | |
| 7 | **Forbs** | | | 13–25 | |

| | | | | | |
|---|---|---|---|---|---|
| | Forb (herbaceous, not grass nor grass-like) | 2FORB | *Forb (herbaceous, not grass nor grass-like)* | 3–13 | – |
| | common yarrow | ACMI2 | *Achillea millefolium* | 8–13 | – |
| | curlycup gumweed | GRSQ | *Grindelia squarrosa* | 5–13 | – |
| | purple locoweed | OXLA3 | *Oxytropis lambertii* | 5–13 | – |
| | upright prairie coneflower | RACO3 | *Ratibida columnifera* | 8–13 | – |
| | white heath aster | SYER | *Symphyotrichum ericoides* | 8–13 | – |
| | scarlet globemallow | SPCO | *Sphaeralcea coccinea* | 5–8 | – |
| | silverleaf Indian breadroot | PEAR6 | *Pediomelum argophyllum* | 5–8 | – |
| | rush skeletonplant | LYJU | *Lygodesmia juncea* | 5–8 | – |
| | rosy pussytoes | ANRO2 | *Antennaria rosea* | 5–8 | – |
| | white sagebrush | ARLU | *Artemisia ludoviciana* | 3–8 | – |
| | wavyleaf thistle | CIUN | *Cirsium undulatum* | 5–8 | – |
| | onion | ALLIU | *Allium* | 3–5 | – |
| | Forb, perennial | 2FP | *Forb, perennial* | 0–5 | – |
| | woolly plantain | PLPA2 | *Plantago patagonica* | 3–5 | – |
| | yellow salsify | TRDU | *Tragopogon dubius* | 3–5 | – |
| | Nuttall's violet | VINU2 | *Viola nuttallii* | 0–3 | – |
| | sticky cinquefoil | POGL9 | *Potentilla glandulosa* | 0–3 | – |
| | spiny phlox | PHHO | *Phlox hoodii* | 0–3 | – |
| | leafy wildparsley | MUDI | *Musineon divaricatum* | 0–3 | – |
| **Shrub/Vine** | | | | | |
| 8 | **Shrubs** | | | 13–25 | |
| | prairie sagewort | ARFR4 | *Artemisia frigida* | 18–20 | – |
| | broom snakeweed | GUSA2 | *Gutierrezia sarothrae* | 8–18 | – |
| | brittle pricklypear | OPFR | *Opuntia fragilis* | 10–15 | – |
| | rubber rabbitbrush | ERNA10 | *Ericameria nauseosa* | 5–13 | – |
| | silver sagebrush | ARCA13 | *Artemisia cana* | 0–10 | – |
| | plains pricklypear | OPPO | *Opuntia polyacantha* | 0–8 | – |
| | winterfat | KRLA2 | *Krascheninnikovia lanata* | 0–3 | – |
| | spinystar | ESVIV | *Escobaria vivipara var. vivipara* | 0–3 | – |
| | Nuttall's saltbush | ATNU2 | *Atriplex nuttallii* | 0–3 | – |
| **Moss** | | | | | |
| 9 | **Cryptogams** | | | 3–5 | |
| | lesser spikemoss | SEDE2 | *Selaginella densa* | 3–5 | – |

**Table 12. Community 3.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | | | | 10–20 | |
| | western wheatgrass | PASM | *Pascopyrum smithii* | 10–20 | – |
| | thickspike wheatgrass | ELLAL | *Elymus lanceolatus ssp. lanceolatus* | 0–10 | – |
| 2 | | | | 70–80 | |
| | blue grama | BOGR2 | *Bouteloua gracilis* | 60–80 | |

| | | | | | |
|---|---|---|---|---|---|
| | blue grama | BOGR2 | *Bouteloua gracilis* | 60–80 | – |
| 3 | | | | 10–20 | |
| | Sandberg bluegrass | POSE | *Poa secunda* | 10–20 | – |
| | needle and thread | HECOC8 | *Hesperostipa comata ssp. comata* | 4–14 | – |
| | prairie Junegrass | KOMA | *Koeleria macrantha* | 4–6 | – |
| 4 | **Other Native Grasses** | | | 10–18 | |
| | saltgrass | DISP | *Distichlis spicata* | 6–18 | – |
| | dropseed | SPORO | *Sporobolus* | 2–10 | – |
| | Grass, annual | 2GA | *Grass, annual* | 0–6 | – |
| | Grass, perennial | 2GP | *Grass, perennial* | 0–4 | – |
| | plains reedgrass | CAMO | *Calamagrostis montanensis* | 0–2 | – |
| | tumblegrass | SCPA | *Schedonnardus paniculatus* | 0–2 | – |
| 5 | **Grass-Likes** | | | 2 | |
| | Grass-like (not a true grass) | 2GL | *Grass-like (not a true grass)* | 0–2 | – |
| | needleleaf sedge | CADU6 | *Carex duriuscula* | 2 | – |
| | threadleaf sedge | CAFI | *Carex filifolia* | 0–2 | – |
| **Forb** | | | | | |
| 7 | **Forbs** | | | 10–20 | |
| | white heath aster | SYER | *Symphyotrichum ericoides* | 6–10 | – |
| | silverleaf Indian breadroot | PEAR6 | *Pediomelum argophyllum* | 6–10 | – |
| | upright prairie coneflower | RACO3 | *Ratibida columnifera* | 6–10 | – |
| | scarlet globemallow | SPCO | *Sphaeralcea coccinea* | 4–6 | – |
| | woolly plantain | PLPA2 | *Plantago patagonica* | 4–6 | – |
| | purple locoweed | OXLA3 | *Oxytropis lambertii* | 4–6 | – |
| | Forb (herbaceous, not grass nor grass-like) | 2FORB | *Forb (herbaceous, not grass nor grass-like)* | 0–6 | – |
| | common yarrow | ACMI2 | *Achillea millefolium* | 4–6 | – |
| | white sagebrush | ARLU | *Artemisia ludoviciana* | 4–6 | – |
| | wavyleaf thistle | CIUN | *Cirsium undulatum* | 2–4 | – |
| | curlycup gumweed | GRSQ | *Grindelia squarrosa* | 0–4 | – |
| | onion | ALLIU | *Allium* | 2–4 | – |
| | rosy pussytoes | ANRO2 | *Antennaria rosea* | 2–4 | – |
| | leafy wildparsley | MUDI | *Musineon divaricatum* | 2–4 | – |
| | yellow salsify | TRDU | *Tragopogon dubius* | 2–4 | – |
| | Nuttall's violet | VINU2 | *Viola nuttallii* | 0–2 | – |
| | spiny phlox | PHHO | *Phlox hoodii* | 0–2 | – |
| | sticky cinquefoil | POGL9 | *Potentilla glandulosa* | 0–2 | – |
| | Forb, perennial | 2FP | *Forb, perennial* | 0–2 | – |
| | rush skeletonplant | LYJU | *Lygodesmia juncea* | 0–2 | – |
| **Shrub/Vine** | | | | | |
| 8 | **Shrubs** | | | 10–20 | |
| | prairie sagewort | ARFR4 | *Artemisia frigida* | 6–14 | – |
| | silver sagebrush | ARCA13 | *Artemisia cana* | 0–10 | – |
| | brittle pricklypear | OPFR | *Opuntia fragilis* | 4–8 | – |

| | | | | | |
|---|---|---|---|---|---|
| | plains pricklypear | OPPO | *Opuntia polyacantha* | 4–8 | – |
| | rubber rabbitbrush | ERNA10 | *Ericameria nauseosa* | 0–6 | – |
| | broom snakeweed | GUSA2 | *Gutierrezia sarothrae* | 4–6 | – |
| | Subshrub (<.5m) | 2SUBS | *Subshrub (<.5m)* | 2–4 | – |
| | Nuttall's saltbush | ATNU2 | *Atriplex nuttallii* | 0–2 | – |
| | winterfat | KRLA2 | *Krascheninnikovia lanata* | 0–2 | – |
| | spinystar | ESVIV | *Escobaria vivipara var. vivipara* | 0–2 | – |
| **Moss** | | | | | |
| 9 | **Cryptogams** | | | 10–20 | |
| | lesser spikemoss | SEDE2 | *Selaginella densa* | 10–20 | – |

## Animal community

Animal Community – Wildlife Interpretations:
Under development.

Animal Community – Grazing Interpretations:
This site is well adapted to managed grazing by domestic livestock. The predominance of herbaceous plants across all plant community phases best lends these sites to grazing by cattle but other domestic grazers with differing diet preferences may also be a consideration depending upon management objectives. Often, the current plant community does not entirely match any particular plant community (as described in the ecological site description). Because of this, a resource inventory is necessary to document plant composition and production. Proper interpretation of this inventory data will permit the establishment of a safe, initial stocking rate for the type and class of animals and level of grazing management. More accurate stocking rate estimates should eventually be calculated using actual stocking rate information and monitoring data.

## Hydrological functions

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic group D. Infiltration varies from moderate to very slow and runoff potential varies from medium to very high depending on soil hydrologic group and ground cover. 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 game species.

## 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 specialist.
Those involved in developing this site description include: Dennis Froemke, NRCS Range Management Specialist;

Jeff Printz, NRCS State Range Management Specialist; Stan Boltz, NRCS Range Management Specialist; Darrell Vanderbusch, NRCS Resource Soil Scientist; L. Michael Stirling, NRCS Range Management Specialist; Dean Chamrad, NRCS State Range Management Specialist; David Dewald, NRCS State Biologist; and Brad Podoll, NRCS Biologist.
Data Source Number of Records Sample Period State County
SCS-RANGE-417 0
Ocular estimates 7 1985 – 2001 ND Adams, Bowman, Dunn, Morton

## Other references

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (http://hpccsun.unl.edu)
USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (http://wcc.nrcs.usda.gov)
USDA, NRCS. National Range and Pasture Handbook, September 1997
USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (http://nasis.nrcs.usda.gov)
USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
USDA, NRCS, Various Published Soil Surveys.

## Contributors

Jeff Printz
Jeff Printz/Stan Boltz

## 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) | J. Printz, S. Boltz, R. Kilian, D. Froemke, M. Rasmusson |
| Contact for lead author | jeff.printz@nd.usda.gov 701-530-2080 |
| Date | 05/24/2011 |
| Approved by | |
| Approval date | |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:** Rills should not be present.

---

2. **Presence of water flow patterns:** Broken, irregular in appearance or discontinuous with debris dams.

---

3. **Number and height of erosional pedestals or terracettes:** Not evident on slopes < 8%. Erosional pedestals may be present with small terracettes present at debris dams on slopes >9%.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 40 to 60%. “Slick” spots of varying size are a naturally occurring on this site and would be present in the reference state.

5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement. If litter movement occurs, it is only for a short distance on “slick” spots.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Plant cover and litter is at 35% or greater of soil surface and maintains soil surface integrity. Stability class anticipated to be 3 or greater.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use soil series description for depth, color and structure of A-horizon.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Moderately sparse plant canopy (30 to 50% maximum), very slow to slow infiltration rates, and the high amount of bare ground contribute to a naturally high runoff rate even 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 would be expected except for the naturally occurring pan within 6 inches of the soil surface.

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: Mid, cool-season rhizomatous grass = short, warm-season grass >

    Sub-dominant: mid and short, cool-season bunchgrasses >

    Other: forbs > grass-likes = shrubs

    Additional: Due to differing root structure and distribution, Kentucky bluegrass and smooth bromegrass do not fit into reference plant community F/S groups.

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Some plant mortality and decadence (5 to 10%) is expected on this site.

14. **Average percent litter cover (%) and depth ( in):** Litter cover is in contact with soil surface.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Representative value = 900 lbs/ac with a range of 500 lbs/ac to 1200 lbs/ac (air dry weight) depending upon growing conditions

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:** State and local noxious, Kentucky bluegrass, smooth bromegrass

17. **Perennial plant reproductive capability:** No limitations.