

Ecological site DX035X03B818  
Sandy Loam Slopes 17-25" p.z. Cobbly (PIPO, POTR5)

Accessed: 05/19/2024

General information

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.



Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 035X–Colorado Plateau

This ecological site occurs in Common Resource Area 35.8 - the Colorado Plateau Ponderosa Pine Forests

The Common Resource Area occurs within the Colorado Plateau Physiographic Province. Elevations range from 6800 to 8500 feet and precipitation averages 17 to 25 inches per year. Vegetation includes ponderosa pine, white fir, aspen, pinyon, juniper, Gambel oak, big sagebrush, ceanothus, blue elderberry, muttongrass, upland sedge, and big wildrye, mountain muhly, Arizona fescue, pine dropseed, and blue grama. The soil temperature regime ranges from mesic to frigid and the soil moisture regime is typic ustic. This unit occurs within the Colorado Plateau Physiographic Province and is characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Sedimentary rock classes dominate the plateau with volcanic fields occurring for the most part near its margin.

Table 1. Dominant plant species

Tree	(1) <i>Pinus ponderosa</i> (2) <i>Populus tremuloides</i>
Shrub	(1) <i>Symphoricarpos oreophilus</i>

Herbaceous	(1) <i>Carex geophila</i> (2) <i>Elymus elymoides</i>
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Legacy ID

F035XH818AZ

Physiographic features

This site is located on footslopes, sideslopes, backslopes of high plateaus, mesas, hills and structural benches.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain slope (3) Mountain valley
Flooding frequency	None
Ponding frequency	None
Elevation	2,316–2,591 m
Slope	15–60%
Aspect	N, S

Climatic features

Winter-Summer moisture ratios are typically 70:30 on the west side of this CRA and shift to 60:40 on the east side. Late spring is usually the driest period and early fall moisture can be sporadic. Summer rains fall from June through September; moisture originates in the Gulf of Mexico and creates convective, usually brief, intense thunderstorms. Cool season moisture from October through May tends to be frontal; it originates in the Pacific and the Gulf of California and falls in widespread storms with longer duration and lower intensity. Precipitation generally comes as snow from October into April. Snowpack can persist for 3-4 months, although it may disappear in exposed areas during prolonged dry weather. Summer daytime temperatures are typically 80-90 F but can exceed 95 F. Winter temperatures around 0 F are common and can reach -25 F.

Table 3. Representative climatic features

Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	635 mm

Influencing water features

Soil features

Soils on this site run are moderately deep to very deep. Surface textures range from very gravelly sandy loam to very flaggy loamy sand. Subsurface textures range from cobbly sandy clay loam to channery sandy loam. The soils are derived from alluvium, colluvium and residuum from sandstone. Hazard of erosion from water is moderate to high and from wind is high.

Soil survey map unit components that have been correlated to this ecological site include:

SSA-713 Chinle Area 1-Akhoni/Typic Argiustolls/Tuntsa, 58-Typic Haplustoll, moderately deep/Typic Ustipsamments;

SSA-715 Ft. Defiance Area AZ/NM 051-Klizhin family, 113-Washpass family/Viewpoint, 138 Zilditloi/Quamon family;

**Table 4. Representative soil features**

Parent material	(1) Alluvium–sandstone (2) Colluvium–basalt (3) Residuum–tuff breccia
Surface texture	(1) Fine sandy loam (2) Very flaggy loamy sand (3) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to moderately rapid
Soil depth	51–203 cm
Surface fragment cover <=3"	0–5%
Available water capacity (0-101.6cm)	12.7–25.4 cm
Soil reaction (1:1 water) (0-101.6cm)	6.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–10%

## Ecological dynamics

An ecological site is not a precise assemblage of species for which the proportions are the same from place to place or from year to year. In all plant communities, variability is apparent in productivity and occurrence of individual species. Spatial boundaries of the communities; however, can be recognized by characteristic patterns of species composition, association, and community structure. The historic climax plant community for this ecological site has been described by sampling relict or relatively undisturbed sites and/or reviewing historic records. The historic climax plant community is the plant community that evolved over time with the soil forming process and long term changes in climatic conditions of the area. It is the plant community that was best adapted to the unique combination of environmental factors associated with the site.

Natural disturbances, such as drought, fire, grazing of native fauna, and insects, are inherent in the development and maintenance of these plant communities. The effects of these disturbances are part of the range of characteristics of the ecological site. Fluctuations in plant community structure and function caused by the effects of natural disturbances help establish the boundaries and characteristics of an ecological site. They are accounted for as part of the range of characteristics of the ecological site. Recognizable plant community phases are identified in the reference state of the ecological site. Some sites may have a small range of variation, while others have a large range. Some plant community phases may exist for long periods of time, while others may only occur for a couple of years after a disturbance.

Deterioration of the plant community, hydrology, or soil site stability on an ecological site can result in crossing a threshold or potentially irreversible boundary to another state, or equilibrium. This can occur as a result of the loss of soil surface through erosion, the loss of the stability of the site due to disturbances that cause active erosion on the site, increases in the amounts and/or patterns or runoff from rainstorms, changes in availability of surface and subsurface water, significant changes in plant structural and functional types, or the introduction of non-native species. When these thresholds are crossed, the potential of the ecological site to return to the historic climax plant community can be lost, or restoration will require significant inputs. There may be multiple states possible for an ecological site, determined by the type and or severity of disturbance.

The known states and transition pathways for this ecological site are described in the state and transition model. Within each state, there may be one or more known plant community phases. These community phases describe the different plant community that can be recognized and mapped across this ecological site. The state and

transition model is intended to help land users recognize the current plant community on the ecological site, and the management options for improving the plant community to the desired plant community.

Plant production information in this site description is standardized to the annual production on an air-dry weight basis in near normal rainfall years.

T1 Catastrophic Wilfire or clear cut timber Harvest

R1 Tree Planting

## State and transition model

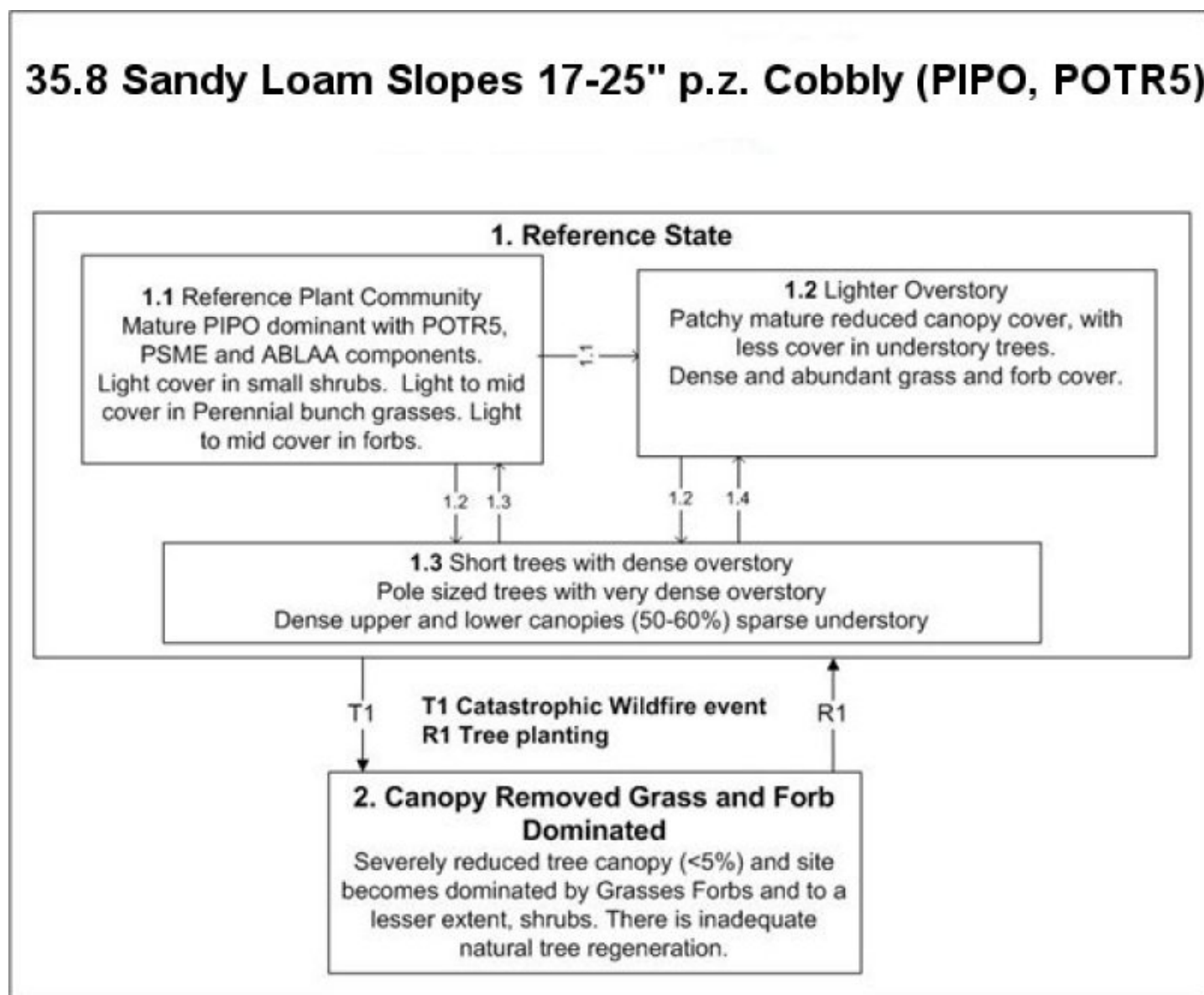


Figure 4. 358 SandyLoamSlopesCobbly S&T

## State 1

### Reference Plant Community

The reference plant community is dominated by tall trees including Ponderosa pine, Douglas fir and Quaking aspen. North facing slopes can be more mesic with Corkbark fir and Colorado blue spruce. The understory consists of grasses and grass-like plants such as Kentucky bluegrass and White Mountain sedge, forbs such as geranium and senecio with shrubs such as mountain snowberry and Gambel oak and scattered tree reproduction.

## Community 1.1

### Historic Climax Plant Community

Mature ponderosa pine is dominant with quaking aspend and Douglas fir. Medium cover in small shrubs. Light to mid cover in Perennial bunch grasses. Light to mid cover in forbs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	90	179	269
Shrub/Vine	67	135	202
Forb	45	90	135
Tree	28	50	73
Total	230	454	679

Figure 6. Plant community growth curve (percent production by month). AZ3581, 35.8 17-25" p.z. all sites. Growth begins in the spring, most growth occurs during the summer rainy season..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	4	10	24	21	23	13	5	0	0

Figure 7. Plant community growth curve (percent production by month). AZ3902, 35.8 17-25" p.z. Arizona fescue. Growth begins in the late spring and extends through the summer rainy season..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	5	20	30	30	10	5	0	0

Community 1.2  
Lighter Overstory

Patchy mature reduced canopy cover, with less cover in understory trees. Dense and abundant grass and forb cover.

Community 1.3  
Short trees with dense overstory

Pole sized trees with very dense overstory Dense upper and lower canopies (50-60%) sparse understory

Pathway 1.1  
Community 1.1 to 1.2

Partial removal of mature tree canopy through timber harvest, or Bark beetle infestation. The reduced canopy results in higher production on the forest floor of grass, forb and to some extent shrubs.

Conservation practices

Forest Land Management
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Pathway 1.2  
Community 1.1 to 1.3

The majority of mature trees are removed leaving only short immature trees.

Conservation practices

Forest Land Management
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Pathway 1.2  
Community 1.2 to 1.3

The majority of mature trees are removed leaving only short immature trees.

Conservation practices

Forest Land Management
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Pathway 1.3  
Community 1.3 to 1.1

Trees mature and are thinned either naturally or through Pre-commercial thinning forming a mature canopy.

Conservation practices

Forest Stand Improvement
Forest Land Management

Pathway 1.4  
Community 1.3 to 1.2

Trees mature and are thinned more heavily than 1.3, through fire or timber harvest forming a patchy and mature canopy.

Conservation practices

Forest Stand Improvement
Forest Land Management

State 2  
Canopy removed

Community 2.1  
Canopy removed

Trees removed to less than 5% overstory. Grasses, forbs and shrubs dominate.

Transition 1  
State 1 to 2

Catastrophic Wildfire or clear cut timber Harvest removes tree component from community.

Restoration pathway 1  
State 2 to 1

Tree planting restores tree component to community.

Conservation practices

Forest Land Management
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Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
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Tree					
0	Trees - understory (4.5')			22–67	
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	11–34	–
	quaking aspen	POTR5	<i>Populus tremuloides</i>	6–17	–
	Rocky Mountain Douglas-fir	PSMEG	<i>Pseudotsuga menziesii</i> var. <i>glauca</i>	6–17	–
Grass/Grasslike					
1	Grasses and Grasslikes			90–269	
	White Mountain sedge	CAGE	<i>Carex geophila</i>	11–67	–
	Kentucky bluegrass	POPR	<i>Poa pratensis</i>	22–45	–
	squirreltail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	10–39	–
	Arizona fescue	FEAR2	<i>Festuca arizonica</i>	10–22	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	10–22	–
	muttongrass	POFE	<i>Poa fendleriana</i>	10–22	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	10–22	–
	nodding brome	BRAN	<i>Bromus anomalus</i>	10–22	–
	Ross' sedge	CARO5	<i>Carex rossii</i>	10–22	–
Forb					
2	Common Forbs			45–135	
	western yarrow	ACMIO	<i>Achillea millefolium</i> var. <i>occidentalis</i>	4–17	–
	nodding brome	BRAN	<i>Bromus anomalus</i>	0–17	–
	Arizona fescue	FEAR2	<i>Festuca arizonica</i>	0–17	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–17	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0–17	–
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	4–17	–
	geranium	GERAN	<i>Geranium</i>	4–17	–
	pingue rubberweed	HYRI	<i>Hymenoxys richardsonii</i>	4–12	–
	silvery lupine	LUAR3	<i>Lupinus argenteus</i>	4–12	–
	hairy brackenfern	PTAQP2	<i>Pteridium aquilinum</i> var. <i>pubescens</i>	4–12	–
	ragwort	SENEC	<i>Senecio</i>	4–12	–
	Fendler's meadow-rue	THFE	<i>Thalictrum fendleri</i>	4–12	–
	pale agoseris	AGGL	<i>Agoseris glauca</i>	4–12	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	4–12	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–11	–
Shrub/Vine					
3	Shrubs			67–202	
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	11–39	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	9–28	–
	kinnikinnick	ARUV	<i>Arctostaphylos uva-ursi</i>	9–28	–
	common juniper	JUCO6	<i>Juniperus communis</i>	9–28	–
	creeping barberry	MARE11	<i>Mahonia repens</i>	9–28	–
	Gambel oak	QUGA	<i>Quercus gambelii</i>	9–28	–

	Woods' rose	ROWO	<i>Rosa woodsii</i>	9–28	–
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**Table 7. Community 1.1 forest overstory composition**

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
<b>Tree</b>							
ponderosa pine	PIPO	<i>Pinus ponderosa</i>	Native	3–25.9	45–55	20.3–38.1	–
quaking aspen	POTR5	<i>Populus tremuloides</i>	Native	4.6–21.3	10–15	12.7–25.4	–
Rocky Mountain Douglas-fir	PSMEG	<i>Pseudotsuga menziesii</i> var. <i>glauca</i>	Native	1.5–21.3	5–10	10.2–25.4	–

## Animal community

Suitability for grazing by livestock is good before canopy exceeds 50%. Cattle, sheep, goats and horses can use this site in summer and early fall. Management considerations include use of Prescribed Grazing, water developments and reseeding grass following harvest operations for forage and to reduce erosion, grazing should not damage young trees.

Site factors affecting wildlife:

Water: Frequently found in scattered natural wetlands and springs.

Cover: good for most species.

Food: Good potential except where grazing is unmanaged.

Other: Snowfall causes shifts in wildlife populations.

## Recreational uses

Landscape quality is good and recreational activities include hiking, camping, horseback riding, wildlife observations and photography

## Wood products

Gambel oak and Ponderosa pine provide opportunities for firewood collection when dead and down.

## Other information

Woodland Overstory Production:

PIPO PSMEG POTRT

Site Index: 83 72 73

Fuelwood (Cords/Ac):

Fence posts (7ft)/Ac:

Christmas Trees/Ac:

CMAI\* per year:(bd ft/ac)440 290 255

Productivity Class: 5 3 3

\* CMAI is the "Culmination of Mean Annual Increment" or highest average growth rate of the stand in the units specified.

Woodland Uses and Interpretations

Equipment Suitability:

Harvesting: On Slopes greater than 20% use crawler-type equipment

Site Preparation: Same

Tree Planting: Best done by hand

Precommercial thinning: use crawler-type equipment

Equipment Limitations:

Slope: Moderate-Severe for all equipment



Unsurfaced roads: Slope most limiting factor  
 Stoniness/Rock Outcrop: Some stones and rock outcrop present  
 Water Table/Flooding: None  
 Erosion potentials:  
 Cutover areas/bare ground: Water - moderate-high  
 Wind - slight-high  
 Roads/Trails/Landings: Water - moderate-high soil compaction  
 Wind - slight-high  
 Soil Management:  
 Compaction potential: Good - soil workable, has good shear strength  
 Rutting potential: Some rutting may occur when wet  
 Revegetation potential: Good - slope most limiting  
 Silviculture potentials & limitations:  
 Harvest Cutting: harvest select mature trees on slopes less than 30%. Final removal cuts and intermediate cuts are desirable.  
 Thinning & Improvement: Thick stands need thinned to improve growth rates of trees left.  
 Prescribed burning: Periodic ground fires will reduce any understory build up. Slope may limit any fire control  
 Mechanical Tree Removal: Slope would prohibit use of heavy equipment.  
 Pest Control: Control pests to prevent tree damage & loss  
 Fire Hazard: Fire hazard may become extreme if understory fuel load builds up.  
 Suitability for replanting: Fair - slope is prohibitive.  
 Seedling Mortality: Slight-moderate slope exposure may be prohibitive.  
 Natural Regeneration: Slight limitations.  
 Seedling Protection: Seedlings should be protected from grazing and trampling  
 Plant competition: Dense grass and forb cover may impede regeneration.  
 Windthrow Hazard: Slight-moderate rooting depth is generally greater than 30 inches.

**Table 8. Representative site productivity**

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
ponderosa pine	<i>PIPO</i>	80	85	420	440	83	601	—	
ponderosa pine	<i>PIPO</i>	75	83	430	440	—	—	50BH	Monserud, Robert A. 1985. Applying height growth and site index curves for inland Douglas-fir. USDA, Forest Service. Intermountain Research Station Research Paper INT-347.
Rocky Mountain Douglas-fir	<i>PSMEG</i>	70	74	275	290	72	771	—	
Rocky Mountain Douglas-fir	<i>PSMEG</i>	70	72	285	290	—	—	50BH	Monserud, Robert A. 1985. Applying height growth and site index curves for inland Douglas-fir. USDA, Forest Service. Intermountain Research Station Research Paper INT-347.
quaking aspen	<i>POTR5</i>	70	75	240	255	73	730	—	
quaking aspen	<i>POTR5</i>	70	73	250	255	—	—	50BH	Monserud, Robert A. 1985. Applying height growth and site index curves for inland Douglas-fir. USDA, Forest Service. Intermountain Research Station Research Paper INT-347.

## Type locality

Location 1: San Juan County, NM	
Township/Range/Section	T22N R20W S11

## Other references

Updates and revisions for this ESD were conducted as part of a 2007-2012 Interagency Technical Assistance Agreement between the Bureau of Indian Affairs–Navajo Region and the NRCS-Arizona.

## Contributors

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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	
Approved by	
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):**
- 
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:**
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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):**
- 
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:**
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17. **Perennial plant reproductive capability:**

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