Ecological site DX035X03B804
Shallow Sandy Loam 17-25" p.z. (PIPO)

Accessed: 04/23/2024

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) *Pinus ponderosa* (2) *Pseudotsuga menziesii var. glauca*
Shrub	(1) *Arctostaphylos uva-ursi* (2) *Quercus gambelii*

Herbaceous	(1) *Festuca arizonica* (2) *Pteridium aquilinum*

Legacy ID

F035XH804AZ

Physiographic features

This ecological site occurs nearly level plateaus and structural benches. The soils are shallow over sedimentary bedrock. Slopes range from 0 to 15 percent, but there can be steeper spots within the site. Soil surface textures range from fine sandy loam to gravelly loam. Subsurface textures range from fine sandy loam to very cobbly sandy clay loam. This site does not receive significant run-on moisture from adjacent ecological sites.

Table 2. Representative physiographic features

Landforms	(1) Knoll (2) Plateau (3) Structural bench
Elevation	7,800–8,500 ft
Slope	0–15%
Aspect	Aspect is not a significant factor

Climatic features

Winter-summer moisture ratios are typically 70:30 on the west side of this LRU 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 Ocean 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 but can exceed 95 degrees F. Winter temperatures of around 0 degrees F are common and can reach -25 degrees F.

Table 3. Representative climatic features

Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	25 in

Influencing water features

The soil moisture on this ecological site comes from precipitation. The site does not benefit significantly from run-on moisture. Shallow bedrock areas will concentrate water in deeper soil pockets, where most of the vegetation production occurs. Because of the shallow soils, larger rainfall events will not be entirely captured by the site. This site contributes runoff to other ecological sites.

Soil features

The soil here consists of shallow, well drained soils on footslopes of hills and summits of high plateaus, mesas, and structural benches. Surface textures range from fine sandy loam to gravelly loam. Subsurface textures range from fine sandy to very cobbly sandy clay loam.

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

SSA-713 Chinle Area 56-Ahkoni family and 57-Akhoni;

SSA-715 Fort Defiance area MU's 1-Akhoni, 123 Viewpoint;

SSA-717 Shiprock area 700 & 710 Akhoni, 706 & 712 Viewpoint.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone (2) Residuum–basalt
Surface texture	(1) Fine sandy loam (2) Gravelly loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately rapid to rapid
Soil depth	5–20 in
Surface fragment cover <=3"	5–25%
Surface fragment cover >3"	2–5%
Available water capacity (0-40in)	0–2.5 in
Soil reaction (1:1 water) (0-40in)	6.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	10–25%
Subsurface fragment volume >3" (Depth not specified)	0–15%

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 Wildfire event
R1 Tree planting

State and transition model

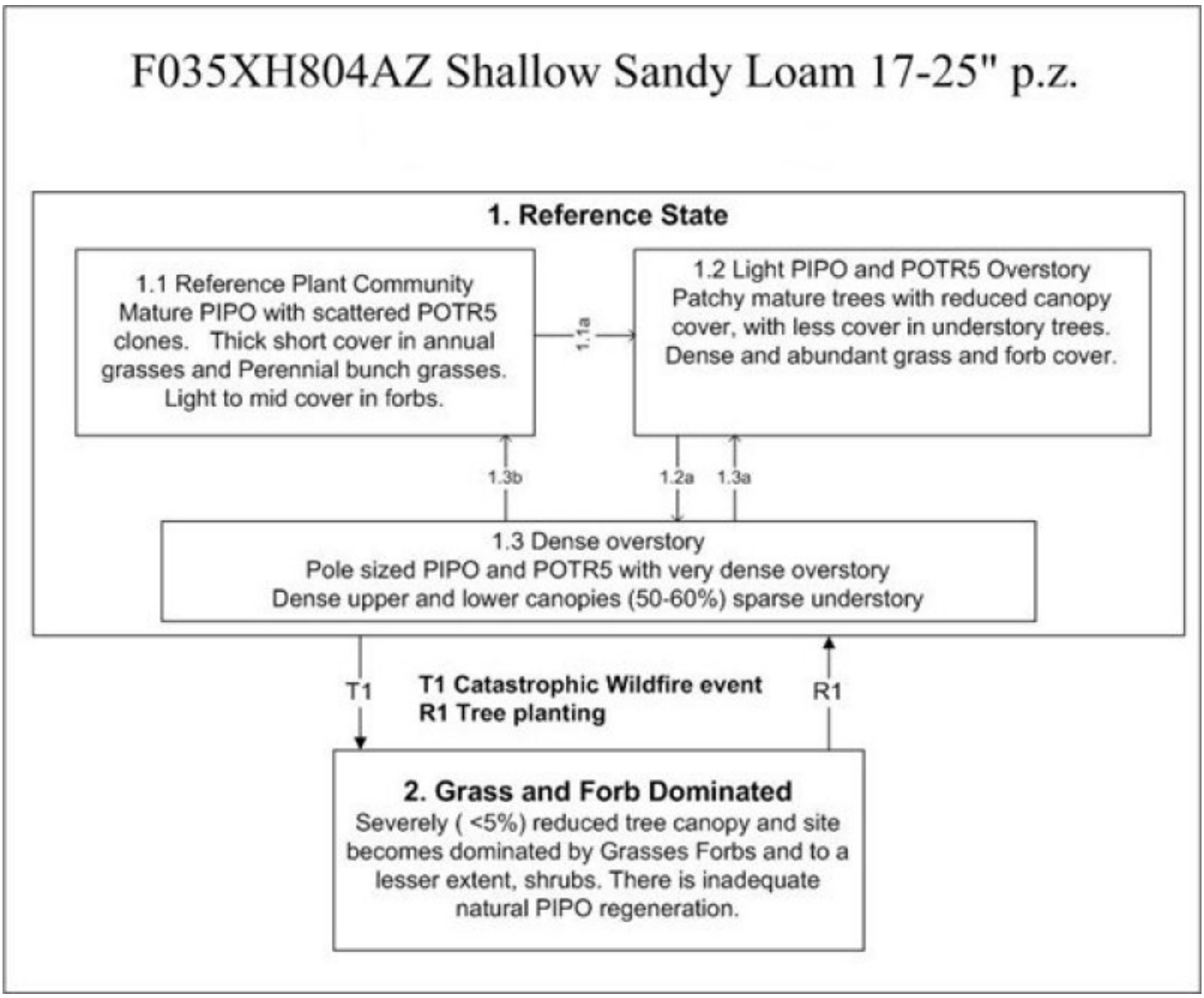

Figure 4. 358 ShallowSandyLoamS&T

State 1
Reference State

Community 1.1

Historic Cliimax Plant Community

This plant community is dominated by trees the most common being Ponderosa pine, then Douglas fir, and Quaking aspen. The understory species include: grasses and grass-like, Arizona fescue & mountain muhly. Forbs: Rosy pussytoes, fleabane & western brackenfern. Shrubs: mountain snowberry, Oregongrape & kinnikinnick. Trees (<4.5') at 5%: Ponderosa pine & Gambel oak. 1.1a Partial removal of mature PIPO canopy achieved through timber harvest, or Bark beetle infestation. The reduced canopy results in higher production on the forest floor of grass, forbs and to some extent shrubs. 1.2a Openings are filled in by natural regeneration of Ponderosa pine, forming an even aged tight canopy of sapling to pole size PIPO 1.3a Trees mature and are thinned more heavily than 1.3b, through fire or timber harvest forming a patchy and mature canopy. 1.3b Trees mature and are thinned either naturally or through Pre-commercial thinning forming a mature canopy.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	150	300	400
Forb	90	180	240
Shrub/Vine	45	90	120
Tree	15	30	40
Total	**300**	**600**	**800**

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

State 2
Grass and Forb Dominated

Community 2.1
Grass and Forb Dominated

Severely (<5%) reduced tree canopy and site becomes dominated by Grasses Forbs and to a lesser extent, shrubs. There is inadequate natural PIPO regeneration.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Grasses**			150–400	
	Arizona fescue	FEAR2	*Festuca arizonica*	20–100	–
	Kentucky bluegrass	POPR	*Poa pratensis*	20–100	–
	mountain muhly	MUMO	*Muhlenbergia montana*	8–40	–
	White Mountain sedge	CAGE	*Carex geophila*	15–40	–
	Ross' sedge	CARO5	*Carex rossii*	15–40	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	7–20	–
	Grass, perennial	2GP	*Grass, perennial*	7–20	–
	nodding brome	BRAN	*Bromus anomalus*	7–20	–
Forb					
2	**Forbs**			90–240	
	rosy pussytoes	ANRO2	*Antennaria rosea*	10–60	–
	hairy brackenfern	PTAQP2	*Pteridium aquilinum var. pubescens*	10–60	–
	fleabane	ERIGE2	*Erigeron*	8–25	–
	Forb, perennial	2FP	*Forb, perennial*	5–15	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	5–12	–
	ragwort	SENEC	*Senecio*	5–12	–
	woodland strawberry	FRVE	*Fragaria vesca*	5–12	–
	pingue rubberweed	HYRI	*Hymenoxys richardsonii*	5–12	–
	cinquefoil	POTEN	*Potentilla*	5–12	–
Shrub/Vine					
3	**Shrubs**			45–120	
	kinnikinnick	ARUV	*Arctostaphylos uva-ursi*	10–30	–
	creeping barberry	MARE11	*Mahonia repens*	10–30	–
	Gambel oak	QUGA	*Quercus gambelii*	15–30	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	10–30	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	5–10	–
Tree					
4	**Trees**			15–40	
	ponderosa pine	PIPO	*Pinus ponderosa*	5–15	–
	quaking aspen	POTR5	*Populus tremuloides*	5–15	–
	Rocky Mountain Douglas-fir	PSMEG	*Pseudotsuga menziesii var. glauca*	5–10	–

Table 7. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
ponderosa pine	PIPO	*Pinus ponderosa*	Native	10–80	40–50	10–18	–
quaking aspen	POTR5	*Populus tremuloides*	Native	15–75	10–20	5–10	–
Rocky Mountain Douglas-fir	PSMEG	*Pseudotsuga menziesii var. glauca*	Native	4–70	10–15	8–15	–

Table 8. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
Arizona fescue	FEAR2	*Festuca arizonica*	Native	–	20–30
Kentucky bluegrass	POPR	*Poa pratensis*	Native	–	10–20
Forb/Herb					
rosy pussytoes	ANRO2	*Antennaria rosea*	Native	–	5–15
Fern/fern ally					
hairy brackenfern	PTAQP2	*Pteridium aquilinum var. pubescens*	Native	–	5–15

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 eaarly 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 ppotential 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, Ponderosa pine, Douglas fir and Quaking aspen provide opportunities for firewood collection when dead and down.

Other products

Woodland Overstory Production:
PIPO PSMEG POTRT
Site Index: 80 71 79
Fuelwood (Cords/Ac):
Fence posts (7ft)/Ac:
Christmas Trees/Ac:
CMAI* per year:(bd ft/ac) 414 280 280
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: all kinds - no limitations
Site Preparation: all kinds
Tree Planting: all kinds - shallow soils limits certain equipment
Precommercial thinning: all kinds

Equipment Limitations:
Slope: none
Unsurfaced roads: when wet could get stuck
Stoniness/Rock Outcrop: Slight (some rock outcrop present)

Water Table/Flooding: None

Erosion potentials:
Cutover areas/bare ground: Water - moderate
Wind - high to moderate
Roads/Trails/Landings: Water - moderate
Wind - high to moderate

Soil Management:
Compaction potential: Fair
Rutting potential: Some rutting may occur when wet
Revegetation potential: Fair - shallow soils

Silviculture potentials & limitations:
Harvest Cutting: harvest mature trees on a sustained yield basis.
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.
Mechanical Tree Removal: Shallow soils would prohibit getting tree root.
Pest Control: Control pests to prevent tree damage & loss
Fire Hazard: Fire hazard may become extreme if understory fuel load builds up on this shallow soil.

Suitability for replanting: Fair (soils are shallow)
Seedling Mortality: Moderate limitation due to shallow soil.
Natural Regeneration: Slow (because of shallow soil)
Seedling Protection: Seedlings should be protected from grazing and trampling
Plant competition: Dense grass and forb cover may impede regeneration.
Windthrow Hazard: Severe (shallow soils - rooting depth limited)

Other information

Table 9. 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	*PIPO*	75	80	400	414	–	–	100BH	Edminster, Carleton B. and Lewis H. Jump. 1976. Site index curves for Douglas-fir in New Mexico. USDA, Forest Service. Rocky Mountain Forest and Range Experiment Station Research Note RM-326.
ponderosa pine	*PIPO*	75	80	400	414	75	601	–	
quaking aspen	*POTR5*	75	79	250	280	–	–	100BH	Edminster, Carleton B. and Lewis H. Jump. 1976. Site index curves for Douglas-fir in New Mexico. USDA, Forest Service. Rocky Mountain Forest and Range Experiment Station Research Note RM-326.
Rocky Mountain Douglas-fir	*PSMEG*	65	71	250	280	–	–	100BH	Edminster, Carleton B. and Lewis H. Jump. 1976. Site index curves for Douglas-fir in New Mexico. USDA, Forest Service. Rocky Mountain Forest and Range Experiment Station Research Note RM-326.
Rocky Mountain Douglas-fir	*PSMEG*	70	71	200	280	70	775	–	
quaking aspen	*POTR5*	75	79	200	280	75	735	–	

Type locality

Location 1: San Juan County, NM	
Township/Range/Section	T22N R20W S23
General legal description	Toadlena Quad - Chuska Mountains - Navajo Reservation Section 23, T22N, R20W, New Mexico.

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:**

   _____

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

   _____

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

   _____

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

   _____

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

   _____

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

   _____

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

   _____

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

   _____

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

   _____

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

    _____

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

    _____

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

Other:

Additional:

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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):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**
