USDA Natural Resources
Conservation Service

Ecological site R010XB022OR
JD Clayey 9-12 PZ

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General information

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

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.

Associated sites

R010XB041OR	**JD Clayey South 9-12 PZ** South aspect
R010XB065OR	**JD Droughty Clayey North 9-12 PZ** North aspect

Similar sites

R010XB019OR	**JD Gumbo 9-12 PZ** deep vertisol soils

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. tridentata*
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Achnatherum thurberianum*

Physiographic features

This site occurs on low elevation terraces and tablelands with slopes ranging from 0 to 12%. Elevations range from 1,300 to 3,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge
Flooding frequency	None
Elevation	396–914 m
Slope	0–12%
Ponding depth	0 cm
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Climatic features

The annual precipitation ranges from 9 to 12 inches, most of which occurs in the form of rain during the months of November through May. Localized, occasionally severe, convectional storms occur during the summer. The a mean annual air temperature of about 54 degrees F. Temperature extremes range from 105 to +10 degrees F. The frost-free period ranges from 113 to 132 days. The optimum period for plant growth is from April through June.

Table 3. Representative climatic features

Frost-free period (average)	132 days
Freeze-free period (average)	162 days
Precipitation total (average)	305 mm

Influencing water features

Soil features

The soils of this site are typically moderately deep to deep and well drained. Typically the surface layer is clay or a stony loam about 5 inches thick. There can be an abruptic textural change at 4 to 12 inches but roots are able to penetrate the textural change. The subsoil is a cobbly clay loam about 20 inches thick. Depth to bedrock or sediment pan is usually 30 to 60 inches. Permeability is very slow to moderately slow. The available water holding capacity is about 4 to 7 inches for the profile. The potential for erosion is moderate to severe. The soils have a mesic temperature regime and a xeric to aridic moisture regime.

Table 4. Representative soil features

Surface texture	(1) Stony clay loam (2) Loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow to moderately slow
Soil depth	76–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–25%
Available water capacity (0-101.6cm)	10.16–17.78 cm

Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Subsurface fragment volume <=3" (Depth not specified)	0–11%
Subsurface fragment volume >3" (Depth not specified)	0–6%

Ecological dynamics

Range in Characteristics:

Coarse fragments in the surface layer or a decrease in clay in the subsoil will favor the presence of Thurber's needlegrass in the stand. Similarly, big sagebrush increases with a decrease in clay in the surface layer. Western juniper will increase in the absence of fire, particularly at the upper end of the precipitation range. As this site deteriorates the soils with higher clay content in the surface will favor the invasion of medusahead and those with more loam in the surface will be more favorable to cheatgrass invasion.

Response to Disturbance:

If the condition of the site deteriorates as a result of overgrazing, bluebunch wheatgrass, and Thurber's needlegrass decrease while broom snakeweed increases and annuals invade. In the absence of periodic fire, western juniper will increase. Under deteriorated conditions bare soil interspaces increase and excessive erosion reduces the site productivity.

Multiple pathways of change exist from the Juniper Sagebrush Steppe phase of State 1. If fire is suppressed juniper will continue to expand and out-compete both the bunchgrass and sagebrush understory. When fine fuels are reduced to the point where fire no longer will carry, the site will cross a threshold and transition to Juniper Sagebrush Steppe. With a canopy fire the Juniper Sagebrush Steppe has the potential to transition to annual grasses. Maturation of the juniper community leads to a juniper woodland with no more than a trace amount of sagebrush and deep-rooted perennial bunchgrasses. The potential for soil erosion increases as the juniper woodland matures and the understory plant community cover declines. The risk of a transition over an abiotic threshold to the Juniper Woodland erosional phase increases with increasing slope and increasing bare ground.

With no fire, improper grazing and/or severe drought within the Juniper Sagebrush Steppe phase of State 1, the perennial bunchgrasses will continue to decline while cheatgrass and/or medusahead abundance increases and sagebrush matures further facilitating the decline in bunchgrass. This feedback continues until sagebrush and annual grasses control ecological processes. Frequent fire transitions this community to an annual grass dominated state. The risk of a transition over an abiotic threshold to the erosional state increases with increasing slope and increasing bare ground.

Abusive improper grazing can cause seeded phases to transition either to a decadent sagebrush cover type or a juniper dominated system. With improper grazing and fire the seeded rangeland has the potential to convert to annual grasses or an eroded state.

Treatment Response:

This site has low resilience to disturbance due to the low annual precipitation of less than 12 inches. One repair pathway indicates potential exists for rehabilitation of the juniper controlled plant community. Potential for success is dependent upon climatic factors and the existence of annual grasses. If annual grasses are present it will require long term treatment. Mechanical treatment of junipers will incorporate methods to provide soil cover to provide microsites for seedling establishment along with seeding of adapted native and/or introduced species.

Fire is not a recommended tool of rehabilitation when significant amounts of annual grasses are present due to the increased risk of rapid increase in the annual grasses that can control the ecological processes on the site.

The repair pathway of the sagebrush annual grass phase requires chemical or mechanical control of the sagebrush and annual grasses along with seeding. The potential for failure of rehabilitation projects increases with the presence of annual grasses. Every effort should be made to prevent the establishment of annual grasses.

State 1 – Reference State

Three plant community phases occur in the Reference State. They are phase 1.1, the Reference Plant Community Phase (RPCP) which is the perennial grass and forb phase, phase 1.2, the sagebrush phase and phase 1.3, sagebrush dominate or the juniper-sagebrush steppe phase.

Phase 1.1. Reference Plant Community Phase (RPCP) is the perennial grass phase. This plant community is strongly dominated by bluebunch wheatgrass and Thurber's needlegrass with basin wildrye and Sandberg bluegrass being common and lesser amounts of other perennial grasses and a small amount of forbs. Basin big sagebrush is common. Grasses compose 90 % of the community, forbs and shrubs 5% each. Energy capture, nutrient cycling and water use are controlled by the perennial grasses.

Phase 1.2. Sagebrush phase. The sagebrush phase results with prescribed grazing and normal fire frequency of 40-60 years (1.1A). This transition would be accelerated with improper grazing. The composition of sagebrush within the plant community will increase as the length of time between fires gets longer. A period of improper grazing can accelerate the increase in sagebrush even if the bunchgrass plant community is maintained. Under prescribed grazing and fire the plant community pathway (1.2A) moves back toward Phase 1.1, the perennial grass and forb plant community. With the continued absence of fire and improper grazing management or drought (1.2B), the plant community will move towards phase 1.3, sagebrush dominate or the juniper-sagebrush dominant plant communities.

Phase 1.3. Sagebrush or juniper-sagebrush is dominated by either juniper or basin big sagebrush, bluebunch wheatgrass, Thurber's needlegrass and Sandberg bluegrass. This plant community is a result of the absence of fire with improper grazing or drought and can occur through community pathways 1.1B or 1.2B. This phase is the "at risk" plant community within State 1. As the site deteriorates the potential for cheatgrass and/or medusahead invasion increases. With prescribed grazing and fire this phase can be returned to Phase 1.1 by community pathway 1.3A. Since this phase is "at risk" it can transition to State 2 (IRT1A) or State 3 (IRT1B) with the continued lack of fire and improper grazing or drought. With frequent fire this plant community can transition to State 4 (IRT1C).

State 2. This State is dominated by juniper which controls all of the ecological processes. Initially, Phase 2.1, the Juniper-sagebrush phase is occupied by juniper, basin big sagebrush, with minor amounts of bluebunch wheatgrass, Thurber's needlegrass and Sandberg bluegrass with a trace of cheatgrass. If fire continues to be suppressed and severe improper grazing continues, juniper will continue to increase and out compete both the sagebrush and bunchgrass understory. When fine fuels are reduced and fire will no longer carry (fire proof), the site transitions to a juniper woodland community (Phase 2.2). The potential for soil erosion increases as the juniper woodland matures and the understory plant community declines. If a crown fire occurs, State 2 will transition (IRT 2A) to State 4. The risk of an irreversible transition (IRT2B) over an abiotic threshold to the juniper woodland erosional state, State 5, increases with increasing slope and increasing bare ground. The repair pathway (RP2) from State 2 back to State 1 is generally not economically feasible and would require mechanical treatment of the junipers and seeding of adapted native grasses, forbs and shrubs. Seeding with introduce species will move the site to State 6.

State 3. This state is dominated in the overstory by decadent basin big sagebrush (Phase 3.1) with cheatgrass and/or medusahead in the understory. Ecological processes in this state are controlled by the sagebrush. This state has developed as a result of continued improper grazing or drought in the absence of fire (IRT1B). If fire occurs, the plant community transitions to State 4 (IRT3A) a cheatgrass and/or medusahead dominated plant community. The risk of an irreversible transition (IRT3B) to the eroded conditions of State 5 occurs with severe improper grazing in combination with fire. The repair pathway (RP3) from State 3 back to State 1 is generally not economically feasible and requires mechanical and/or chemical treatment of the basin big sagebrush, rabbitbrush, and annual grasses and reseeding of adapted native grasses, forbs, and shrubs. Seeding with introduce species will move the site to

State 6.

State 4. This state is dominated by cheatgrass and/or medusahead with few other shallow-rooted grasses in the understory but may have some broom snakeweed and/or rabbitbrush (4.1) in the overstory. This state is recognized as the annual grass phase and is a result of fire and improper grazing. Continued improper grazing and fire will transition this state to the eroded state 5. The ecological processes in this state are controlled by cheatgrass and/or medusahead.

State 5. This is the eroded state and is recognized by the soil erosion that is occurring or has occurred on site. Since this state occurs through widespread erosion as a result of severe improper grazing in combination with or without fire all of the other states can transition to this State. The increase in bare ground facilitates the increase in wind and/or water erosion. Abiotic factors control site resources and ecological functions. Rehabilitation of this state may not be practical or possible due to extreme soil loss.

State 6. As in State 1, three plant community phases occur in the seeded state. They are 6.1, seeded grass phase; 6.2 Sagebrush seeded grass phase; and 6.3 Sagebrush and/or Juniper seeded grass phase. These three plant communities respond to improper grazing, fire or no fire the same as the plant community phases in State 1. As in 1.3, phase 6.3 is the “at risk” plant community in this State. The seeded state with introduced species is a common occurrence on this ecological site. Improper grazing of the seeded rangeland can cause a reduction in deep rooted perennial grasses in favor of Sandberg’s bluegrass, annual grasses, sagebrush and/or juniper. State 6 can transition to any of the other states, except State 1, with improper grazing and/or fire.

State and transition model

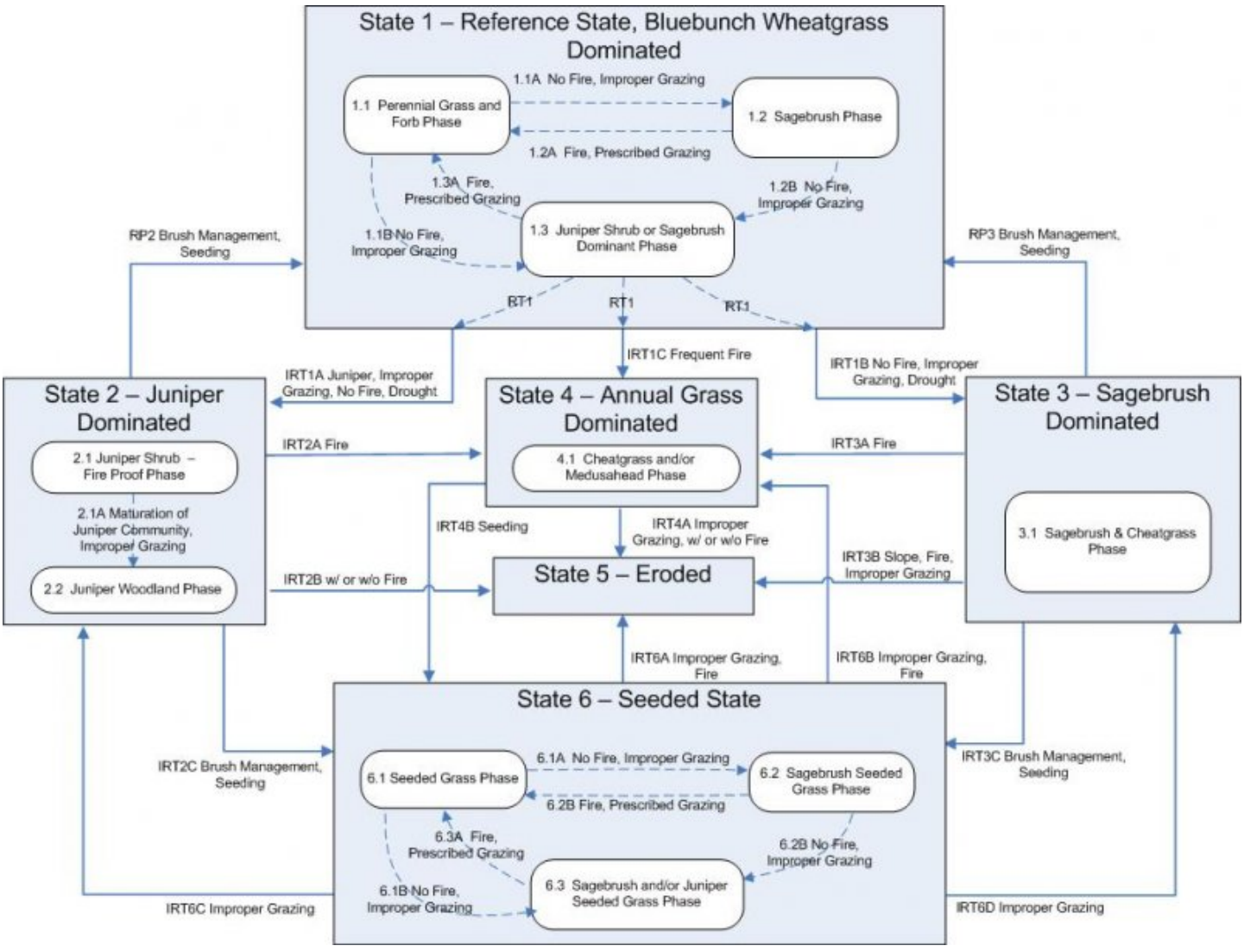

Figure 4. JD CLAYEY 9-12 PZ - R010XB022OR

State 1
Reference Plant Community

Community 1.1
Reference Plant Community

The reference plant community is dominated by bluebunch wheatgrass with Thurber's needlegrass very common in the stand. Vegetative composition of the community is approximately 90 percent grasses, 5 percent forbs and 5 percent shrubs. Approximate ground cover is 50-60 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	605	1009	1412
Shrub/Vine	34	50	67
Forb	34	50	67
Tree	–	6	11
Total	**673**	**1115**	**1557**

Figure 6. Plant community growth curve (percent production by month). OR4171, B10 JD Loamy & North RPC. JD Loamy & North RPC (Basin Big Sagebrush, Bluebunch wheatgrass, Sandberg bluegrass).

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	20	30	20	0	5	5	0	0

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial, deep-rooted, dominant**			560–785	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	560–785	–
2	**Perennial deep-rooted bunchgrass**			224–448	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	224–448	–
3	**Perennial, deep-rooted, sub-dominant**			45–101	
	basin wildrye	LECI4	*Leymus cinereus*	22–56	–
	squirreltail	ELEL5	*Elymus elymoides*	11–22	–
	Idaho fescue	FEID	*Festuca idahoensis*	11–22	–
4	**Perennial, shallow-rooted, sub-dominant**			22–45	
	prairie Junegrass	KOMA	*Koeleria macrantha*	11–22	–
	Sandberg bluegrass	POSE	*Poa secunda*	11–22	–
Forb					
7	**Perennial, all, dominant**			34–67	
	common yarrow	ACMI2	*Achillea millefolium*	11–22	–
	milkvetch	ASTRA	*Astragalus*	11–22	–
	buckwheat	ERIOG	*Eriogonum*	11–22	–
9	**Other perennial forbs, all**			11–50	
	onion	ALLIU	*Allium*	0–6	–
	pussytoes	ANTEN	*Antennaria*	0–6	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	0–6	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	0–6	–
	oldstem idahoa	IDSC	*Idahoa scapigera*	0–6	–
	desertparsley	LOMAT	*Lomatium*	0–6	–
	silky lupine	LUSE4	*Lupinus sericeus*	0–6	–
	phlox	PHLOX	*Phlox*	0–6	–
	yellow salsify	TRDU	*Tragopogon dubius*	0–6	–
10	**Annual forbs**			0–6	
	oldstem idahoa	IDSC	*Idahoa scapigera*	0–6	–
Shrub/Vine					
11	**Perennial, evergreen, dominant**			22–56	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	22–56	–
15	**Other perennial shrubs, all**			11–22	
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–11	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–11	–
Tree					
16	**Perennial, evergreen, dominant**			0–11	
	western juniper	JUOC	*Juniperus occidentalis*	0–11	–

Animal community

Livestock Grazing:

This site is suited to use by cattle, sheep, and horses in all seasons under a planned grazing system. Use should

be postponed until the soils are firm enough to avoid trampling damage and soil compaction.

Native Wildlife Associated With The Potential Climax Community:

Mule deer
Hawks
Rodents
Songbirds

This site offers food and cover for mule deer, rodents, and a variety of birds. It is an important wintering habitat for mule deer.

Hydrological functions

The soils are in hydrologic groups C and D. The soils of this site have moderately high to high runoff potential.

Wood products

This site is susceptible to increase in western juniper. Where this site has occured, the site will yield fence posts, firewood, and specialty products.

Other information

Increase in western juniper and the subsequent competition for moisture will lead to a reduction of available forage. Overgrazing can easily reduce ground cover and accelerate soil loss. Improving infiltration and permeability, and reducing runoff should be the immediate goal of juniper and brush control.

Type locality

Location 1: Grant County, OR	
Township/Range/Section	T12S R26E S25
General legal description	Caprock-Ferris Creek Road

Other references

Stringham, Tamzen, 2007. Final Report for USDA Ecological Site Description. Oregon State University, Corvallis, Oregon.

USDI Bureau of Land Management, US Geological Survey; USDA Natural Resources Conservation Service, Agricultural Research Service; Interpreting Indicators of Rangeland Health. Technical Reference 1734-6; Version 4-2005.

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.

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Contact for lead author	State Rangeland Management Specialist for NRCS - Oregon
Date	09/01/2009
Approved by	Bob Gillaspy
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None. Moderate sheet and rill erosion hazard.

2. **Presence of water flow patterns:** None.

3. **Number and height of erosional pedestals or terracettes:** None.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 25-35%

5. **Number of gullies and erosion associated with gullies:** None.

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

7. **Amount of litter movement (describe size and distance expected to travel):** Fine. Limited movement, typically < two feet.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Moderately resistant to erosion. Aggregate stability = 3-5.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The soil surface structure is strong fine and moderately fine granular. Surface soil organic matter ranges from 1 to 3 percent. The A horizon is 12 to 31 inches thick.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Moderate to significant ground cover (50-60% basal and crown) and gentle slopes (0-12%) limit rainfall impact and overland flow.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. An abruptic textural change may occur at 4 to 12 inches.

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: Deep-rooted, perennial, cool-season bunchgrasses >>

    Sub-dominant: Shallow-rooted, perennial, cool-season bunchgrasses >

    Other: Tall shrubs > Forbs

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Big sagebrush will become decadent in the absence of normal fire frequency and ungulate grazing. Grass and forb mortality will occur as tall shrubs and/or junipers increase. Normal decadence would be expected in the bluebunch wheatgrass. This would be evidenced by the dead centers in the plants.

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):** Favorable: 1400; Normal: 1000; Unfavorable: 600 lbs/ac/yr

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:** cheatgrass, medusahead, dalmation toadflax, russian, diffuse and spotted knapweed.

17. **Perennial plant reproductive capability:** all species should be capable of reproducing annually.