Ecological site R237XY217AK
Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, High Elevation

Last updated: 7/23/2020
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.

MLRA notes

Major Land Resource Area (MLRA): 237X–Ahklun Mountains

The Ahklun Mountains Major Land Resource Area (MLRA 237) is in western Alaska (fig. 2). This MLRA covers approximately 14,555 square miles, and it includes the mountains, hills, and valleys of the Kilbuck Mountains in the north and the Ahklun Mountains in the south. Except for the Kilbuck Mountains and the highest ridges of the Ahklun Mountains, the MLRA was extensively glaciated during the Pleistocene (Kautz et al., 2004). Today, a few small glaciers persist in mountainous cirques (Gallant et al., 1995). The present-day landscape and landforms reflect this glacial history; glacial moraines and glacial drift cover much of the area (USDA-NRCS, 2006). The landscape of the MLRA is primarily defined by low, steep, rugged mountains cut by narrow-to-broad valleys. Flood plains and terraces of varying sizes are common at the lower elevations in the valley bottoms. Glacially carved valleys host many lakes. Togiak Lake is one of the largest lakes in the region. It is 13 miles long and about 9,500 acres in size. Major rivers include the Goodnews, Togiak, Kanektok, Osviak, Eek, and Arolik Rivers. Where the Goodnews and Togiak Rivers reach the coast, the nearly level to rolling deltas support numerous small lakes.

This MLRA has two distinct climatic zones: subarctic continental and maritime continental (fig. 3). The high-elevation areas are in the subarctic continental zone. The mean annual precipitation is more than 75 inches, and the mean annual air temperature is below about 27 degrees F (-3 degrees C) in extreme locations. The warmer, drier areas at the lower elevations are in the maritime continental zone. The mean annual precipitation is 20 to 50 inches, and the mean annual air temperature is about 30 to 32 degrees F (-0.2 to 1.2 degrees C) (PRISM). This climatic zone is influenced by both maritime and continental factors. The temperatures in summer are moderated by the open waters of the Bering Sea, and the temperatures in winter are more continental due to the presence of ice in the sea (Western Regional Climate Center, 2017). The seasonal ice reaches its southernmost extent off the coast of Alaska in Bristol Bay (Alaska Climate Research Center, 2017). The western coast of Alaska is also influenced by high winds from strong storms and airmasses in the Interior Region of Alaska (Hartmann, 2002).

The Ahklun Mountains MLRA is principally undeveloped wilderness. Federally managed lands include the Togiak and Alaska Maritime National Wildlife Refuges. The MLRA is sparsely populated, but it has several communities, including Togiak, Manokotak, Twin Hills, and Goodnews Bay. Togiak is the largest village. It has a population of approximately 855, most of which are Yup’ik Alaska Natives (U.S. Census Bureau, 2016). Major land uses include subsistence activities (fishing, hunting, and gathering) and wildlife recreation (USDA-NRCS, 2006; Kautz et al., 2004).

Ecological site concept

Ecological site R237XY217AK is associated with lithic soils on summits and shoulders of alpine mountains and hills. Climate, landform, elevation, and soil characteristics create a unique ecological site. No disturbance surpasses the resilience threshold required to create an early community sere. No alternate states are associated with this ecological site.

The reference plant community is an ericaceous dwarf scrubland tundra (Viereck et al., 1992) that consists

dominantly of alpine shrub species. Species include eightpetal mountain-avens (*Dryas octopetala*), pincushion plant (Diapensia lapponica), black crowberry (*Empetrum nigrum*), marsh Labrador tea (Ledum palustre ssp. decumbens), and arctic willow (Salix arctica). Lichens are prevalent, including reindeer lichens (Cladina spp.), cup lichens (Cladonia spp.), snow lichens (Stereocaulon spp.), and cetraria lichens (Cetraria spp.).

Associated sites

R237XY204AK	**Western Alaska Maritime Scrubland Loamy Slopes**
R237XY205AK	**Western Alaska Maritime Scrubland Loamy Swales**
R237XY206AK	**Western Alaska Maritime Dwarf Scrubland Loamy Drainage, High Elevation**
R237XY202AK	**Western Alaska Maritime Mosaic Gravelly Slopes** Ecological site R237XY217AK is on summits and shoulders of upland mountains and hills. Several ecological sites are directly adjacent to or in close proximity of this site. These sites typically are differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants. The most common associated ecological sites are on mid to upper mountain slopes. These include sites R237XY202AK, R237XY204AK, R237XY205AK, and R237XY206AK. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut.

Similar sites

R237XY219AK	**Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, Very Steep** Several ecological sites in the Ahklun Mountains area support a reference plant community that consists of dwarf shrubs and is similar to that of site R237XY217AK. However, site R237XY217AK supports many alpine shrubs and forbs that are not in any other ecological site in the area. Site R237XY219AK is on steep backslopes that support different reference community plants and are subject to erosion.

Figure 1. These landforms support a dwarf scrub community that consists dominantly of alpine species. Lichens are interspersed throughout.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Empetrum nigrum* (2) *Dryas octopetala*
Herbaceous	(1) *Cladina rangiferina* (2) *Cladina stellaris*

Physiographic features

Site characteristics specifically relate to the reference plant community phase. Each ecological site has a specific set of site characteristics and disturbance dynamics that results in a unique plant community composition, structure, and function. Site characteristics (climate, geology, topography, and soil characteristics) are dynamic across a

landscape. Subtle changes in site characteristics can result in a different plant community phase or ecological site. Definitions of site characteristics are provided in the United States Department of Agriculture Handbook 296 (USDA-NRCS, 2006), Geomorphic Description System (Schoeneberger and Wysocki, 2012), Field Book for Describing and Sampling Soils (Schoeneberger et al., 2012), and Soil Survey Manual (Soil Science Division Staff, 2017).

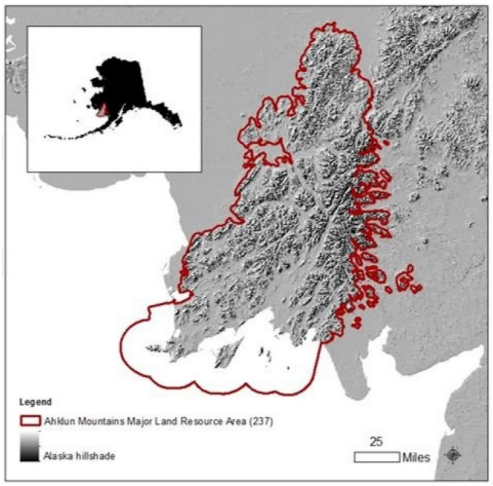

Figure 2. The Ahklun Mountains area (MLRA 237) is in western Alaska.

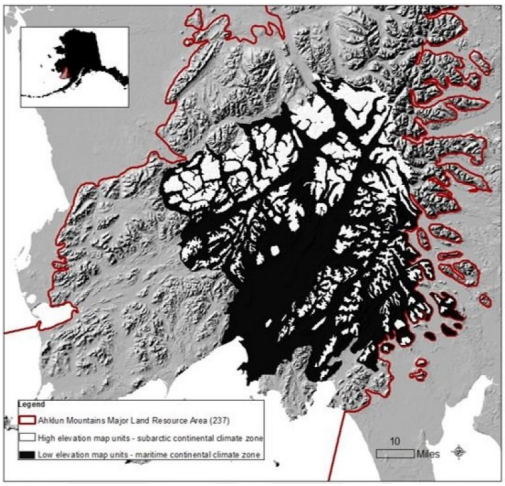

Figure 3. High-elevation and low-elevation map units in the area, which illustrate the primary climatic influence.

Table 2. Representative physiographic features

Hillslope profile	(1) Summit (2) Shoulder
Slope shape across	(1) Convex
Slope shape up-down	(1) Convex (2) Linear
Landforms	(1) Mountains > Mountain slope (2) Hills > Hillslope
Flooding frequency	None
Ponding frequency	None
Elevation	65–4,100 ft
Slope	0–40%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Climate of land resource region (LLR): Maritime continental (Western Regional Climate Center, 2017); short, warm summers and long, cold winters (USDA-NRCS, 2006)

Climate of major land resource area (MLRA): Maritime continental in the lowlands and subarctic continental at higher elevations. The mean annual precipitation is 20 to 30 inches in the lowlands, and it increases to more than 45 inches at the higher elevations. The mean annual air temperature along the coast is about 34 degrees F (1 degree C) (PRISM, 2014). Strong winds are common throughout the year.

Table 3. Representative climatic features

Frost-free period (characteristic range)	70-140 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	

Influencing water features

Soil features

The Goodnews soils, alpine, and the Nagyagat soils are correlated to this ecological site. Both soils are well drained and have saturated hydraulic conductivity of moderately high to very high. The Nagyagat soils do not have an organic layer at the surface, but the Goodnews soils, alpine, have a thin organic layer. Both soils have a restrictive layer of lithic bedrock at a depth of 10 to 40 inches.

Table 4. Representative soil features

Drainage class	Well drained
Depth to restrictive layer	10–40 in

Ecological dynamics

Ecological site R237XY217AK is on summits and shoulders of alpine mountains and hills throughout the Ahklun Mountains area. Various ecological sites are on mountains and hills in MLRA 237. Sites R237XY204AK, R237XY202AK, and R237XY205AK are on backslopes and footslopes. Sites R237XY217AK, R237XY219AK, and R237XY206AK are in high-elevation alpine areas. Site R237XY219AK is on very steep slopes and commonly is associated with talus slopes, and site R237XY206AK is in drainageways of alpine mountains.

Site R237XY217AK is on alpine summits and shoulders (fig. 1). The plant community is influenced dominantly by slope shape, climate, and soil characteristics. The southern aspects may be more productive than the northern aspects (personal observation). The soils associated with this site are well drained, are subject to cool temperatures in winter, and have a restrictive layer of lithic bedrock at a depth of 10 to 40 inches, which affects the richness and density of species and growth of plants. A thin organic layer is in some areas. Lack of a thick organic layer and extreme climate create a vegetative community that is very different from communities on soils at lower elevations (e.g., R237XY201AK).

Plants in exposed areas of mountains typically are dwarfed, hardy shrubs and lichens. Lichens thrive in areas where adequate drainage results in low moisture content in the soils, low-growing plants are not affected by wind, and a foggy maritime climate supplies water vapor that lichens absorb through a cortex (Holt et al., 2009; Lichen habitat). Dense, mixed lichens propagate in these areas.

Disturbance Dynamics

Disturbances resulting in community phase or state transitions were not observed.

Exposure
These high-elevation, convex summits and shoulders are exposed to extreme climatic conditions, including wind,

low temperatures, and a short growing season. These disturbances do not meet the resilience threshold required to create an early community sere. Anthropogenic disturbances that remove vegetation, such as construction of trails, may promote further disturbances such wind erosion. These disturbances could alter the reference plant community and result in a different plant community; however, they were not recorded in situ. Although no major disturbances are known to occur, a natural variation in plant richness and cover is evident among some areas of this site.

Fire
No incidence or evidence of fire was recorded in situ for this ecological site; however, previous wildfires have been mapped in areas of the site. Historically, the main causes of wildfires in the Ahklun Mountains area are lightning strikes and human activity (AICC, 2017).

Other Observations
Caribou grazing of lichen has been recorded in this ecological site. Incidental browsing of some shrubs may occur. Grazing and browsing do not result in a phase or state transition.

No alternate states have been observed for this ecological site.

State and transition model

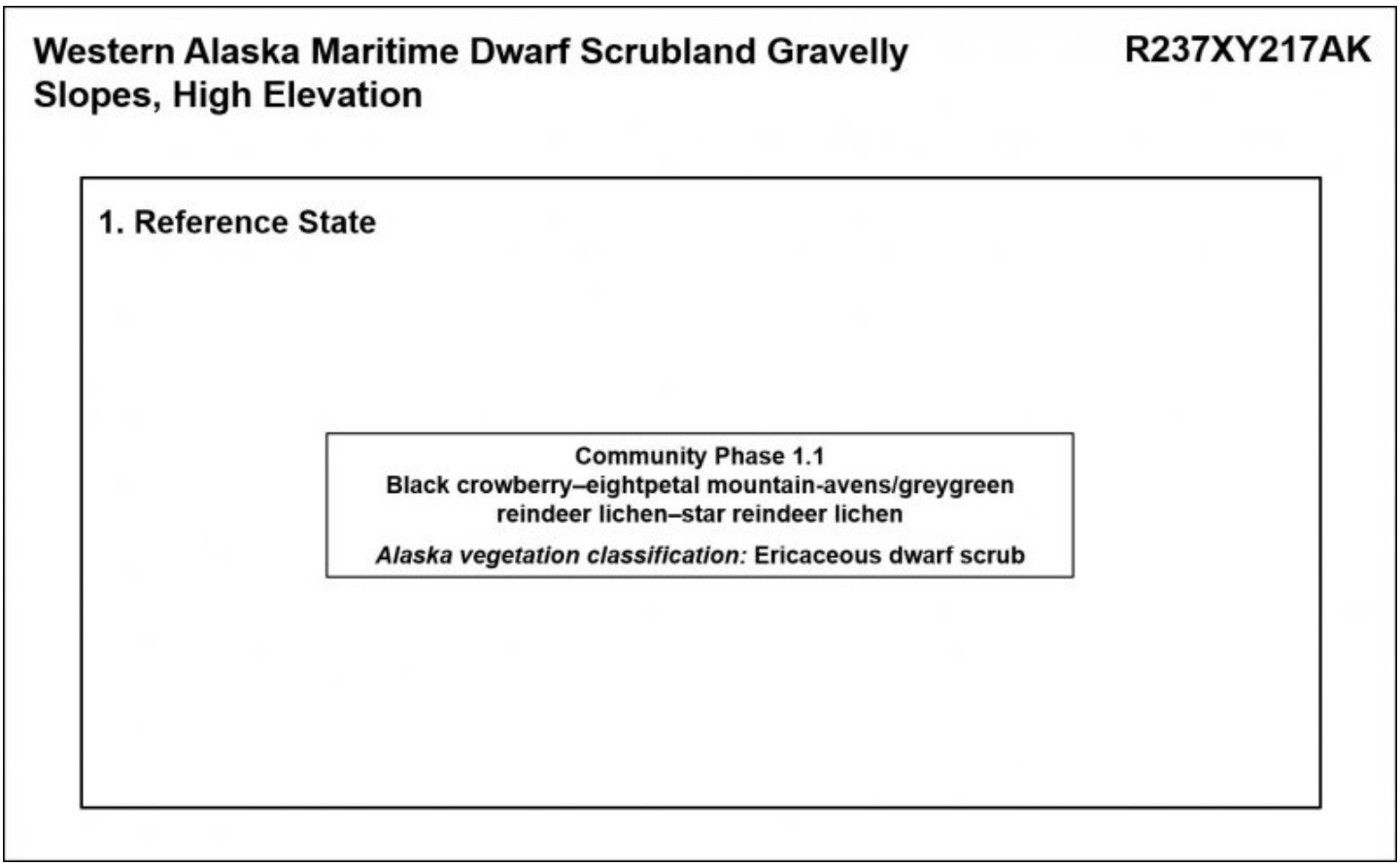

Figure 4. State-and-transition model.

State 1
Reference State

The reference state supports one community phase that is distinguished by the developed structure and dominance of the vegetation and the ecological function and stability of the community (fig. 4). The reference community phase is scrubland consisting of dwarf alpine shrubs and various lichens throughout. This report provides baseline vegetation inventory data. Future data collection is needed to provide further information about existing plant communities. Common and scientific names are from the USDA PLANTS database. All community phases are characterized by the Alaska Vegetation Classification System (Viereck et al., 1992).

Community 1.1

Black crowberry—eightpetal mountain-avens/greygreen reindeer lichen—star reindeer lichen (Empetrum nigrum—Dryas octopetala/Cladina rangiferina—Cladina stellaris)

Figure 5. Typical area of the reference plant community on alpine summits and shoulders.

Community Phase 1.1 Canopy Cover Table

Vegetation data are aggregated across modal sample plots for this community phase and are provided as a frequency (percent) and mean canopy cover (percent) of the dominant and most ecologically relevant species. Canopy cover is represented as a mean with the range in parentheses.

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
S	Black crowberry	*Empetrum nigrum*	EMNI	100	15 (1-60)
S	Marsh Labrador tea	*Ledum palustre* ssp. *decumbens*	LEPAD	91	4 (0-10)
S	Arctic willow	*Salix arctica*	SAAR27	82	4 (0-20)
S	Eightpetal mountain-avens	*Dryas octopetala*	DROC	55	6 (0-30)
S	Pincushion plant	*Diapensia lapponica*	DILA	55	3 (0-20)
L	Reindeer lichen^	*Cladina* spp.	CLADI3	100	25 (0.1-65)
L	Cup lichen	*Cladonia* spp.	CLADO3	82	8 (0-50)
L	Snow lichen	*Stereocaulon* spp.	STERE2	73	3 (0-10)
L	Greygreen reindeer lichen	*Cladina rangiferina*	CLRA60	55	10 (0-40)
L	Star reindeer lichen	*Cladina stellaris*	CLST60	36	10 (0-40)

^Reindeer lichen (*Cladina spp.*) includes all *Cladina* species, including greygreen reindeer lichen and star reindeer lichen.

This dataset includes data from 11 sample plots. The plots are distributed across the Ahklun Mountains area and are independent of one another.

Plant functional group classifications—T = trees, S = shrubs, G = graminoids, F = forbs, B = bryophytes, L = lichens

Canopy cover data are based on ocular estimates and rounded, except trace (0.1 percent) cover. Data ranging from 1 to 9 percent cover are rounded to the nearest integer. Data ranging from 10 to 100 percent cover are rounded to the nearest factor of 5.

Figure 6. Canopy cover and frequency of species in community 1.1.

The reference plant community is characterized by ericaceous dwarf scrub (Viereck et al., 1992). The major functional plant groups are lichens, dwarf shrubs (less than 8 inches in height), mosses, and medium graminoids (4 to 24 inches). Many of the plants in this community are only in alpine areas, but some can also be at lower elevations. Common shrubs include black crowberry, marsh Labrador tea, eightpetal mountain-avens, arctic willow, pincushion plant, alpine azalea (*Loiseleuria procumbens*), and red fruit bearberry (*Arctostaphylos rubra*). Sporadic graminoids include smallawned sedge (*Carex microchaeta*) and alpine sweetgrass (*Anthoxanthum monticola* ssp. alpinum). Common alpine forbs are mountain harebell (*Campanula lasiocarpa*) and alpine pussytoes (*Antennaria alpina*). Ground cover is dominantly lichens such as cup lichens (Cladonia spp.) and reindeer lichens (Cladina spp.), but it also includes herbaceous litter, rock fragments, and moss. Some areas are bare soil.

Additional community tables

Other references

Alaska Climate Research Center. 2017. Climatological data–Bristol Bay. http://oldclimate.gi.alaska.edu. Accessed September 19, 2017.

Alaska Interagency Coordination Center (AICC). https://fire.ak.blm.gov/predsvcs/maps.php. Accessed August 16, 2017.

Gallant, A.l., E.F. Binnian, J.M. Omernik, and M.B. Shasby. 1995. Ecoregions of Alaska. U.S. Geological Survey Professional Paper 1567. Government Printing Office, Washington, D.C.

Hartmann, B. 2002. Climate regions of Alaska. The Alaska Climate Research Center. http://oldclimate.gi.alaska.edu/ClimTrends/30year/regions1.html. Modified August 28, 2002. Accessed September

19, 2017.

Holt, E.A., B. McCune, and P. Neitlich. 2009. Macrolichen communities in relation to soils and vegetation in the Noatak National Preserve, Alaska. Botany 87(3): 241-252.

Kautz, D.R., P. Taber, and S. Nield (editors). 2004. Land resource regions and major land resource areas of Alaska. U.S. Department of Agriculture, Natural Resources Conservation Service, Palmer, AK. Revised 2012.

PRISM Climate Group. 2014. PRISM climate data. Oregon State University. http://prism.oregonstate.edu. Accessed March 27, 2018.

Schoeneberger, P.J., and D.A. Wysocki. 2012. Geomorphic description system. Version 4.2. U.S. Department of Agriculture, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and Soil Survey Staff. 2012. Field book for describing and sampling soils. Version 3.0. U.S. Department of Agriculture, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

Soil Science Division Staff. 2017. Soil survey manual. Ditzler, C., K. Scheffe, and H.C Monger, editors. U.S. Department of Agriculture Handbook 18. Government Printing Office, Washington, D.C.

U.S. Census Bureau. 2016. Vintage 2016 population estimates: Population estimates. https://www.census.gov. Accessed August 14, 2017.

U.S. Department of Agriculture, Forest Service. Lichen habitat. https://www.fs.fed.us/wildflowers/beauty/lichens/habitat.shtml. Accessed August 4, 2017.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Viereck, L.A., C.T. Dyrness, A.R. Batten, and K.J. Wezlick. 1992. The Alaska vegetation classification. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station General Technical Report PNW-GTR-286. Portland, OR.

Western Regional Climate Center. 2017. Climate of Alaska. http://wrcc.dri.edu. Accessed September 19, 2017.

Contributors

Kendra Moseley
Michael Margo
Stephanie Schmit
Sue Tester
Charlotte Crowder

Approval

Michael Margo, 7/23/2020

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	05/10/2025
Approved by	Michael Margo
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:

---

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:**

---

17. **Perennial plant reproductive capability:**
