Ecological site F220XY205AK
Subalpine Woodlands Gravelly Moist Slopes

Last updated: 6/05/2025
Accessed: 09/24/2026

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): 220X–Alexander Archipelago-Gulf of Alaska Coast

The Alexander Archipelago-Gulf of Alaska Coast area consists of a narrow arc of islands and lower elevation coastal mountains in the Southern Alaska Region. This area spans from the Alexander Archipelago in southeastern Alaska, north and west along the coast of the Gulf of Alaska and Prince William Sound, and further west to the southern tip of the Kenai Peninsula and the northeastern islands of the Kodiak Archipelago. The area makes up about 27,435 square miles (USDA 2006). The terrain primarily consists of low to moderate relief mountains that are deeply incised. Throughout the area glaciers, rivers, and streams have cut deep, narrow to broad valleys. The broader valleys have nearly level to strongly sloping flood plains and stream terraces. Alluvial and colluvial fans and short footslopes are common in the valleys along the base of the mountains. Rocky headlands, sea cliffs, estuaries, and beaches are common along the coast. During the late Pleistocene epoch, the entire area was covered with glacial ice. The numerous fjords of the Alexander Archipelago and Prince William Sound were formed chiefly as a result of glacial scouring and deepening of preglacial river valleys. Most glacial deposits have been eroded away or buried by mountain colluvium and alluvium, which cover about 90 percent of the present landscape. The remaining glacial and glaciofluvial deposits are generally restricted to coastal areas. During the Holocene epoch, volcanic activity within and adjacent to this area deposited a layer of volcanic ash of varying thickness on much of the landscape in the southeastern and northwestern parts of the area. Paleozoic, Mesozoic, and Lower Tertiary stratified sedimentary rocks and Cretaceous and Tertiary intrusive rocks underlie much of the area and are exposed on steep mountain slopes and ridges (USDA 2006). ? The dominant soil orders in this MLRA are Spodosols, Histosols, and Entisols. Soils in the area typically have a cryic soil temperature regime, an udic moisture regime, and have mixed minerology. Spodosols are common on mountains and hills having been formed in gravelly or cobbly colluvium, glacial till, and varying amounts of silty volcanic ash. These Spodosols commonly range from shallow to deep, are well to somewhat poorly drained, and typically classify as Humicryods or Haplocryods. Histosols that are poorly to very poorly drained occur on footslopes, discharge slopes, and valley floors. These wet histosols commonly classify as Cryosaprists, Cryohemists, and Cryofibrists. Histosols that are well drained occur on steep mountainsides. These dry Histosols commonly classify as Cryofolists. Entisols are common on flood plains, stream terraces, and outwash plains having been formed in silty, sandy, and gravelly to cobbly alluvium. These Entisols are generally deep, range from well to somewhat poorly drained, and commonly classify as Cryaquents and Cryofluvents. Miscellaneous (nonsoil) areas make up about 23 percent of this MLRA. The most common miscellaneous areas are chutes, rock outcrop, rubble land, beaches, riverwash, and water. ? This area represents the Northern extent of the Pacific temperate rainforest and is characterized by productive stands of conifers. Western hemlock and Sitka spruce are the dominant trees on mountains and hills at lower elevations. Due to warmer temperatures, western red cedar and Alaska cedar are more prevalent in the southern portion of this area. Black cottonwood and mixed forest types occur on flood plains. Areas of peat and other sites that are too wet for forest growth support sedge-grass meadows and low scrub. As elevation increases, mountain hemlock becomes the dominant tree in forested stands, which marks the transition to subalpine vegetation. The subalpine life zone typically occurs at elevations between 1500 to 3000 feet (Boggs et al. 2010, Carstensen 2007, Martin et al. 1995). Other common subalpine plant communities include tall alder scrub and bluejoint-forb meadows. Alpine vegetation occurs at even higher elevations, which marks the transition to the Southern Alaska Coastal Mountains Area (MLRA 222). This area includes the Municipality of Juneau, Alaska's capital, and a number of smaller coastal towns and villages. Federally administered lands within this MLRA include Admiralty Island National Monument and part of Misty Fjords National Monument, Tongass National Forest, Chugach National Forest, and Glacier Bay, Wrangell-St. Elias, and Kenai Fjords National Parks and Preserves. The southern terminus of the Trans-Alaska Pipeline is in Valdez. For many decades, logging, commercial fishing, and mining have been the primary industrial land uses throughout much of the area. In recent years, changes in public interests, land use policies, and timber economics have contributed to a significant decline in the timber industry. Commercial fishing continues to be an important industry and most communities support a fleet of boats and fishing related facilities. A number of mines operate in the area and others have been prospected and proposed. Tourism and wildland recreation are becoming increasingly important within the area. Subsistence hunting, fishing, and gathering provide food and a variety of other resources to local residents and remain the principal economy for residents of remote villages.

Classification relationships

National Vegetation Classification – Ecological Systems: Alaskan Pacific Maritime Subalpine Mountain Hemlock Woodland (CES204.143) (NatureServe 2015) Alaskan Vegetation Classification: Mountain Hemlock Dwarf Tree Scrub (Viereck et al. 1992)

Ecological site concept

This subalpine site occurs on mountain slopes at the highest subalpine bands of elevation before the true alpine life zone. This site has a harsh climate where trees are often stunted and grow in patches. This site occurs on concave slopes that are thought to collect snowdrifts and result in deep snow beds that persist into the growing season. In addition, these concave slopes result in wet soil. The soils have a water table for much of the growing season and are somewhat poorly to poorly drained. These wet soils are typically gravelly Spodosols formed in colluvium and/or weathered residuum. Some soils are shallow with bedrock occurring at a depth of 20 inches, while other soils are deep lacking any bedrock in the soil profile. The reference plant community is a krummholz woodland dominated by coniferous trees, ericaceous shrubs, and wetland indicator plant species. Mountain hemlock is the dominant tree on the site (Martin et al. 1995). The understory vegetation is a mixture of species common in subalpine and alpine plant communities. Common understory plants include copperbush, yellow mountainheath, blueberry, and dear cabbage (Martin et al. 1995, Landfire 2009). The primary disturbance processes that maintain this plant community are exposure to cold temperatures, wind, snowpack creep, and avalanches (Carstensen 2007, NatureServe 2018).

Associated sites

R220XY358AK	**Subalpine Scrub Gravelly Dry Slopes** R220XY358AK occurs on similar bands of elevation on soils that slip or creep downslope.
F220XY350AK	**Subalpine Woodland Gravelly Dry Slopes** F220XY350AK occurs on similar bands of elevation on drier soils.

Similar sites

F220XY350AK	**Subalpine Woodland Gravelly Dry Slopes** Both sites occur in a similar band of elevation and have similar overstory species. However, copperbush and wetland indicator species are less common on F220XY350AK because it has drier soils.
R220XY358AK	**Subalpine Scrub Gravelly Dry Slopes** While considered subalpine and below tree-line, this site is a mosaic of tall shrubs and meadow vegetation. The process of soil creeping downslope and thick snowpack crushing woody plants maintains the site vegetation.

Table 1. Dominant plant species

Tree	(1) *Tsuga mertensiana*
Shrub	(1) *Elliottia pyroliflora* (2) *Phyllodoce glanduliflora*
Herbaceous	(1) *Nephrophyllidium crista-galli*

Physiographic features

Subalpine Low Scrub Gravelly Slopes ecological sites occur on subalpine mountain slopes in snow accumulation areas. They are in a slightly more exposed landscape position than the closely associated Subalpine Dwarf Tree Scrub Gravelly Slopes ecological sites. They are reported from approximately 1200 to 2000 feet ASL (DeVelice et al. 1999; Boggs et al. 2008). The site does not experience flooding, but rather generates runoff to adjacent, downslope ecological sites.

Figure 1. Representative block diagram of Subalpine Low Scrub Gravelly Slopes and associated ecological sites.

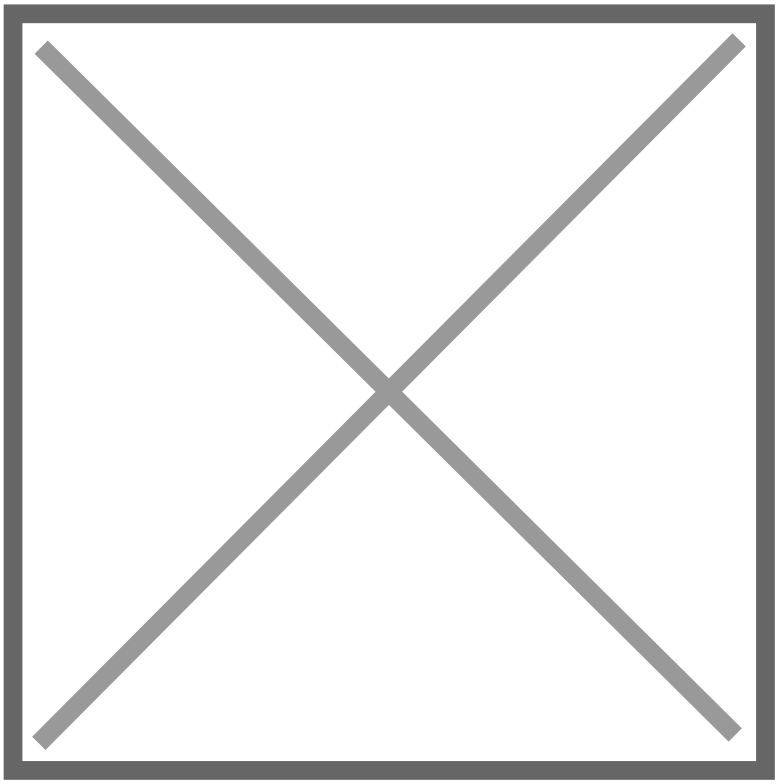

Figure 2.

Table 2. Representative physiographic features

Ponding depth	0 cm
Water table depth	0 cm

Climatic features

Cloudy skies, moderate temperatures, and abundant rainfall characterize the temperate maritime climate of this area. Winter storms, accompanied by heavy rainfall at lower elevations and snow at higher elevations, are frequent. Moderate to strong, south and southeast winds are common before and during storms. The average annual precipitation is approximately 60 to 140 inches. The average annual snowfall ranges from about 30 to 70 inches along the coast, to as much as 200 inches at higher elevations (USDA 2006). Average annual temperatures are considerably warmer in the Southern portion of this area. The average annual temperature at lower elevations ranges from about 37 degrees F (2.7 degrees C) in the northwest, to 46 degrees F (7.7 degrees C) in the southeast (USDA 2006). The average annual temperatures associated with lower elevation maritime vegetation is considerably warmer compared to higher elevation subalpine vegetation. The average frost-free period is about 105 to 140 days.

Table 3 Representative climatic features

Frost-free period (characteristic range)	100-120 days
Freeze-free period (characteristic range)	170-190 days
Precipitation total (characteristic range)	1,830-3,100 mm
Frost-free period (actual range)	100-130 days

Freeze-free period (actual range)	160-190 days
Precipitation total (actual range)	1,730-3,630 mm
Frost-free period (average)	110 days
Freeze-free period (average)	180 days
Precipitation total (average)	2,520 mm

- (1) PELICAN [USC00507141], Hoonah, AK
- (2) HOONAH [USC00503695], Hoonah, AK
- (3) GLACIER BAY [USC00503294], Gustavus, AK

Influencing water features

During the growing season, these poorly to somewhat poorly drained soils tend to have a water table near the soil surface (0 to 20 inches). Depth to the water table may decrease following summer storm events or spring snowmelt and increase during extended dry periods.

Due to the perceived depth and persistence of a water table, wetland indicator plants are thought to be common in the reference state.

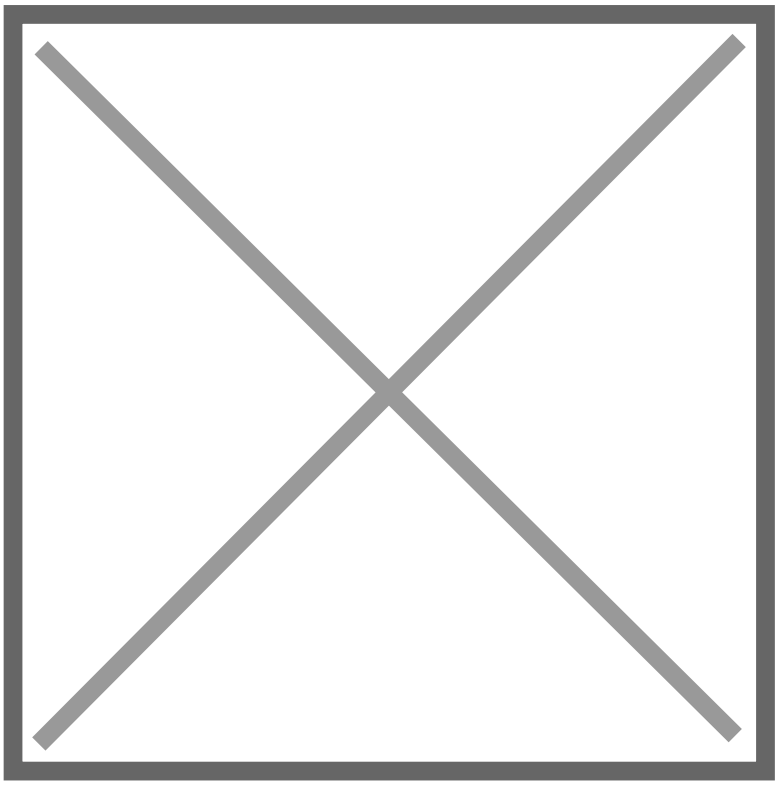

Figure 9. Hydrologic cycling in Subalpine Low Scrub Gravelly Slopes ecological site.

Soil features

This site occurs on shallow bedrock-controlled soils and deeper soils. Bedrock controlled soils formed in gravelly colluvium and/or weathered residuum. Bedrock typically occurs at 10 and 25 inches. The deeper soils formed in colluvium and/or glaciofluvial deposits that

are occasionally ash influenced. Rock fragments do not typically occur on the soil surface. Rock fragments in the soil subsurface are abundant and range between 10 and 45 percent of the soil profile by volume.

Soils are classified as somewhat poorly to poorly drained. The soil moisture regime for somewhat poorly drained soils is udic, while the soil moisture regime for poorly drained soils is aquic. The temperature regime for this site is classified as cryic, where the mean annual soil temperature is between 32°F and 46°F (USDA-NRCS 2006). Soils of this ecological site are in the Spodosols order and typically classified as Lithic Humicryods, Lithic Cryaquods, or Typic Humicryods.

Table 4. Representative soil features

Parent material	(1) Colluvium (2) Residuum (3) Glaciofluvial deposits (4) Volcanic ash
Surface texture	(1) Gravelly silt loam (2) Silt loam (3) Loam
Family particle size	(1) Loamy-skeletal (2) Medial
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Moderately rapid to rapid
Depth to restrictive layer	30 – 150 cm
Soil depth	30 – 150 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	3.3 – 10.16 cm
Soil reaction (1:1 water) (0-25.4cm)	3.6 – 5.5

Subsurface fragment volume <=3" (0-152.4cm)	10 – 40 %
Subsurface fragment volume >3" (0-152.4cm)	0 – 20 %

Table 5. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified
Depth to restrictive layer	10 – 150 cm
Soil depth	Not specified
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-25.4cm)	Not specified
Subsurface fragment volume <=3" (0-152.4cm)	Not specified
Subsurface fragment volume >3" (0-152.4cm)	Not specified

Ecological dynamics

The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on historical data, current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant species, disturbances, and ecological processes are described to inform land management decisions.

This ecological site occurs on mountain slopes on wet soils at the highest bands of subalpine vegetation. While the subalpine life zone typically occurs between 1500 and 3000 feet of elevation, subalpine vegetation in this area can be split into various subzones. Located in the subalpine parkland subzone (Carstensen 2007) just below treeline and the true alpine life zone, this site is exposed to a variety of harsh environmental conditions that drive and maintain the reference state plant communities.

Species characteristic of this ecological site consist of stunted coniferous trees, ericaceous shrubs, and wetland indicator species. Cold temperatures and high winds prevent the trees from growing tall. Avalanches, creeping snowpack that crushes woody vegetation, fungal pathogens, and blowdown are small-patch disturbances that typically result in mortality of individual or small groups of trees (Viereck et al. 1992; Carstensen 2007; Zouhar 2017; NatureServe 2018).

This site occurs on protected positions on the mountainside that accumulate snow over the long winter. Protected positions tend to be concave slopes such as depressions at the base of steep banks. Places where snow accumulates tend to take longer to melt in the spring and result in a shorter growing season compared to the less protected and adjacent associated sites. These concave slopes also tend to accumulate water during the growing season and have wetter soils compared to the less protected and adjacent associated sites. The previously mentioned small-patch disturbances, combined with important site factors like elevation and drainage class, maintain vegetation within this site and the larger subalpine parkland subzone.

The state-and-transition model that follows provides a detailed description of each known state, community phase, pathway, and transition. This model is based on available experimental research, field observations, literature reviews, professional consensus, and interpretations.

State and transition model

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

The subalpine parkland zone of MLRA 222 provides desirable habitat opportunities for many wildlife species. The matrix of herbaceous meadows, low and tall shrubs, and small stands of stunted trees offer foraging opportunities and thermal and protective cover. Herbivores – such as Sitka deer (Odocoileus hemionus sitkensis), mountain goats (Oreamnos americanus), and hoary marmot (Marmota calligata) – readily graze the herbaceous meadows. Grouse (Dendragapus spp.) and ptarmigan (Lagopus spp.) utilize these meadows and low shrub communities for hunting insects. A small portion of bears (Ursus sp.), mostly sows with cubs, forage in this zone throughout the summer. Lastly, various songbirds will utilize the tall shrubs and stunted trees for nesting cover (Carsten 2007).

Inventory data references

No field plots were available for this site. A review of the scientific literature and professional experience were used to approximate the plant communities for this provisional ecological site. Information for the state-and-transition model was obtained from the same sources. All community phases are considered provisional based on these plots and the sources identified in ecological site description.

Other references

Boggs, K.W., S.C. Klein, J.E. Grunblatt, G.P. Streveler, and B. Koltun. 2008. Landcover Classes and Plant Associations of Glacier Bay National Park and Preserve. Natural Resource Technical Report NPR/GLBA/NRTR-2008/093. National Park Service, Fort Collins, CO. 254 pps.

Boggs, K., S.C. Klein, J. Grunblatt, T. Boucher, B. Koltun, M. Sturdy, and G.P. Streveler. 2010. Alpine and subalpine vegetation chronosequences following deglaciation in coastal Alaska. Arctic, Antarctic, and Alpine Research 42: 385-395.

Carstensen, R. 2007. Chapter 5.2 Terrestrial habitats of Southeast Alaska. In: Schoen, J.W. and E. Dovichin (eds). The Coastal Forests and Mountains Ecoregion of Southeastern Alaska and the Tongass National Forest: A Conservation Assessment and Resource

Synthesis. Audubon Alaska and The Nature Conservancy, Anchorage, AK.

Jaques, D. 1973. Reconnaisance botany of alpine ecosystems on Prince of Wales Island, Southeast Alaska. Master of Science. Oregon State University, Corvallis, Oregon.

Martin, J., S. Trull, W. Brady, R. West, and J. Downs. 1995. Forest plant associations management guide: Chatham Area, Tongass National Forest. General Technical Report R10-TP-57. U.S. Department of Agriculture, Forest Service, Alaska Region. 328 pps.

NatureServe. 2018. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1 NatureServe, Arlington, VA. Available at http://explorer.natureserve.org. (Accessed 10 September 2018).

PRISM Climate Group. 2018. Alaska – average monthly and annual precipitation and minimum, maximum, and mean temperature for the period 1981-2010. Oregon State University, Corvallis, Oregon. https://prism.oregonstate.edu/projects/alaska.php. (Accessed 4 September 2019).

Scenarios network for Alaska and arctic planning (SNAP). Historical Monthly Temperature – 1km, 1901-2009. http://ckan.snap.uaf.edu/dataset/. (Accessed 5 May 2021).

SNAP. Historical monthly and derived precipitation products downscaled from CRU TS data via the delta methods – 2km, 1901-2009. http://ckan.snap.uaf.edu/dataset/. (Accessed 5 May 2021).

United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS). 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. 682 pps.

United States Department of Agriculture-Natural Resources Conservation Service. 2016. U.S. General Soil Map (STATSGO2). Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov. Accessed (Accessed 3 March 2021).

Viereck, L.A., C.T. Dyrness, A.R. Batten, and K.J. Wenzlick. 1992. The Alaska Vegetation Classification. General Technical Report PNW-GTR-286. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 278 pps.

Zouhar, K. 2017. Fire regimes in Alaskan mountain hemlock ecosystems. In: Fire Effects Information System (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory (Producer). Available: https://www.fs.fed.us/database/feis/ fire_regimes/AK_mountain_hemlock/all.html. (Accessed 23 October 2018).

Contributors

Lisa Kluesner
Blaine Spellman
Jamin Johanson
Nathan Parry

Approval

Blaine Spellman, 6/05/2025

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	06/04/2025
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:

---

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:**
