# Ecological site R237XY223AK
# Western Alaska Maritime Graminoid Gravelly Plains, Berms

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 R237XY223AK is on beach berms of shore complexes proximal to the bay. Landform, location, and soil characteristics combine to create this ecological site. The reference state supports a single community. One alternate state results from the anthropogenic reconstruction of berms or buildup of existing berms.

The reference plant community is dry graminoid herbaceous grassland (Viereck et al., 1992) consisting of tall graminoids and forbs. American dunegrass (*Leymus mollis*) is the most prevalent species. Other species commonly

include bluejoint (*Calamagrostis canadensis*), beach pea (*Lathyrus japonicus* var. maritimus), fireweed (*Chamerion angustifolium*), and common yarrow (common yarrow).

## Associated sites

| | |
|---|---|
| R237XY208AK | **Western Alaska Maritime Scrubland Peat Depressions**<br>Several ecological sites are associated with ecological site R237XY223AK. 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 site is R237XY224AK. This site is adjacent to site R237XY223AK on the leeward side of beach berms. Other associated ecological sites include R237XY208AK and R237XY236AK. Nonvegetated areas such as beaches commonly are on the coastal side of rises. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut. |
| R237XY236AK | **Western Alaska Maritime Graminoid Peat Plains**<br>Several ecological sites are associated with ecological site R237XY223AK. 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 site is R237XY224AK. This site is adjacent to site R237XY223AK on the leeward side of beach berms. Other associated ecological sites include R237XY208AK and R237XY236AK. Nonvegetated areas such as beaches commonly are on the coastal side of rises. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut. |
| R237XY224AK | **Western Alaska Maritime Scrubland Gravelly Plains, Berms**<br>Several ecological sites are associated with ecological site R237XY223AK. 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 site is R237XY224AK. This site is adjacent to site R237XY223AK on the leeward side of beach berms. Other associated ecological sites include R237XY208AK and R237XY236AK. Nonvegetated areas such as beaches commonly are on the coastal side of rises. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut. |

## Similar sites

| | |
|---|---|
| R237XY224AK | **Western Alaska Maritime Scrubland Gravelly Plains, Berms**<br>Ecological site R237XY224AK is on sloping berms of inland coastal plains, and it supports a reference plant community of low and dwarf shrubs. Site R237XY236AK supports a grassland reference plant community; however, it is on organic soils of coastal plains and is very different than the grassland reference plant community of site R237XY223AK. |

**Figure 1. Some coastal communities are built on berms.**

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | Not specified |

| | |
|---|---|
| Herbaceous | (1) *Leymus mollis*<br>(2) *Lathyrus japonicus var. maritimus* |

## 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).

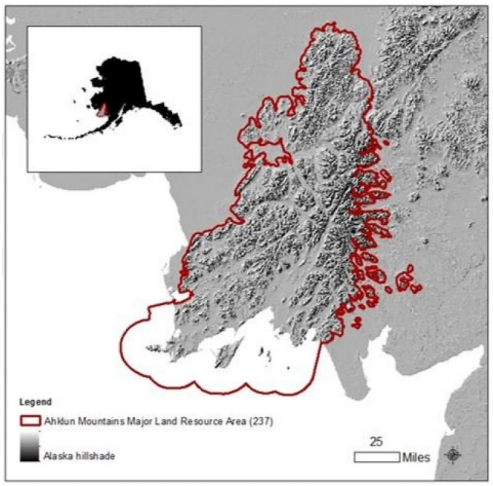


**Figure 2. The Ahklun Mountains area (MLRA 237) is in western Alaska.**

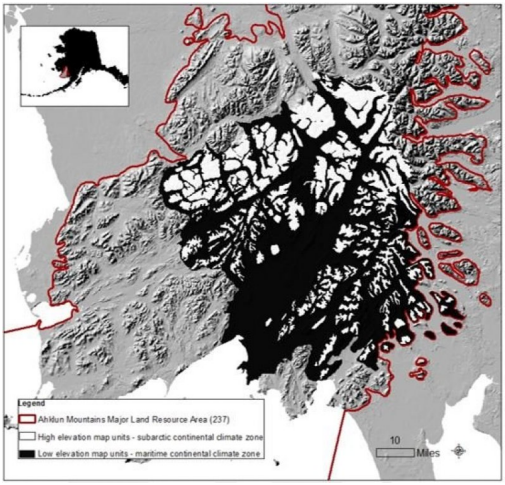


**Figure 3. High-elevation and low-elevation map units in the area, which illustrate the primary climatic influence.**

**Table 2. Representative physiographic features**

| | |
|---|---|
| Slope shape across | (1) Linear |
| Slope shape up-down | (1) Convex |
| Landforms | (1) Shore complex > Berm |
| Flooding duration | Very brief (4 to 48 hours) |
| Flooding frequency | Occasional |
| Ponding frequency | None |
| Elevation | 0–15 ft |

| | |
|---|---|
| Slope | 3–20% |
| 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) | 85-140 days |
| Freeze-free period (characteristic range) | |
| Precipitation total (characteristic range) | |

## Influencing water features

## Soil features

The Togiak soil is correlated to this ecological site. This soil is somewhat excessively drained and neutral. The saturated hydraulic conductivity of the soil is very high throughout.

**Table 4. Representative soil features**

| | |
|---|---|
| Drainage class | Somewhat excessively drained |

## Ecological dynamics

Shore complexes consist of depressions, talfs, and rises. The depressions and talfs support two ecological sites based on whether the soils are proximal to a tidal channel (site R237XY236AK) or distal (site R237XY208AK). Rises are differentiated by slope length and gradient. Site R237XY223AK is on windward rises that have short vertical slopes and long horizontal slopes. Site R237XY224AK commonly is on gentle slopes of wide leeward rises but is on short, steep slopes in some areas. Site R237XY224AK supports vegetation that cannot survive or reproduce in the windier, saltier conditions of site R237XY223AK.

Site R237XY223AK is on windward beach berms that have short vertical slopes and long horizontal slopes (fig. 5). The berms were formed by wind and wave action. The soil is sandy-skeletal and somewhat excessively drained. The saturated hydraulic conductivity of the soil is very high. These conditions are ideal for coastal graminoids and forbs that thrive under the coastal winds and salt spray.

Disturbance Dynamics

No known disturbance regime in this ecological site results in an early community phase. Although the berms are exposed to coastal winds and salt spray and are subject to flooding, no evidence exists that these result in the site surpassing the resilience threshold required to create an early sere. Natural variation in plant richness and cover may be evident on the berms.

Flooding
The coastal berms are subject to occasional, very brief periods of flooding that do not result in an early community sere. Depositional processes such as overwash or overtopping may occur, depending on the energy of the waves. Overwash transports sediment across a berm, which adds sediment to the back (leeward) side and results in a

depositional landform that has a flat, plateau-like surface. Overtopping deposits sediment on the top of berms, which builds them vertically (Goudie, 2004; Stockdon, 2016).

Fire
Fire was not recorded in situ for this ecological site nor is there any known record of fire occurring in areas of the site. Fires have occurred in similar coastal grassland communities in other parts of Alaska (AICC, 2017). These dry grassland areas are at particular risk in spring before greenup (Innes, 2014; Matheson, 2013). Fires may aid in maintaining grassland communities, and historically they have been used to preserve or expand dry grassland throughout Alaska (Innes, 2014).

Other Observations
No evidence of grazing or browsing was observed in this ecological site. This likely is because of the proximity to coastal villages rather than a lack of edible plants.

One alternate state is in this ecological site. Berms constructed near towns to protect property from storm surges have resulted in a change in the overall vegetative community.

## State and transition model

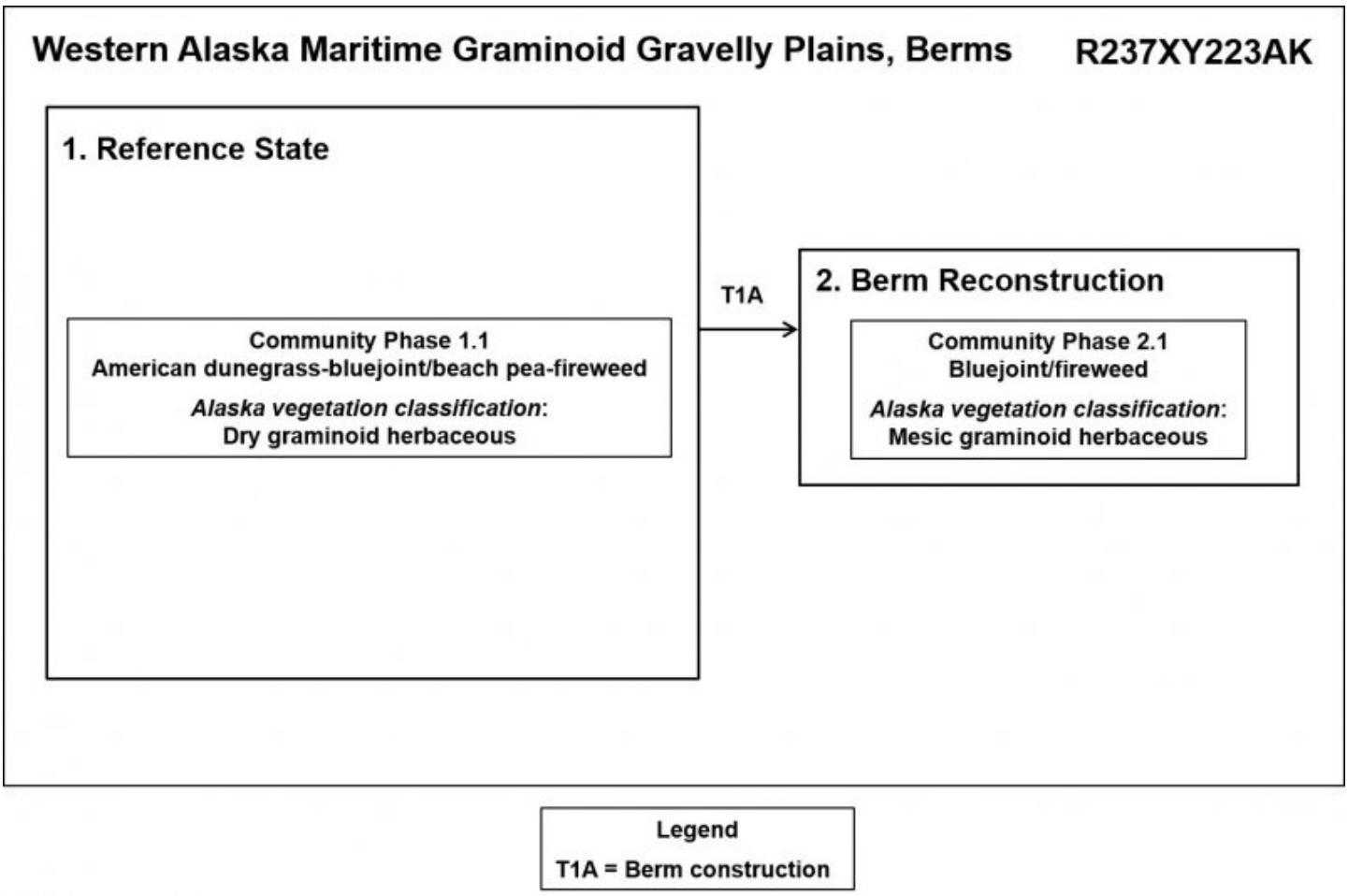


**Figure 4. State-and-transition model.**

## 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 plant community is grassland consisting of graminoids and forbs. 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
## American dunegrass-bluejoint/beach pea-fireweed (Leymus mollis-Calamagrostis canadensis/Lathyrus japonicus var. maritimus-Chamerion angustifolium)

**Figure 5. A typical berm along the beachfront.**

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) |
|---|---|---|---|---|---|
| G | American dunegrass | *Leymus mollis* | LEMO8 | 100 | 75 (60-90) |
| G | Bluejoint | *Calamagrostis canadensis* | CACA4 | 50 | 8 (0-15) |
| F | Beach pea | *Lathyrus japonicus* var. *maritimus* | LAJAM | 100 | 10 (4-20) |
| F | Fireweed | *Chamerion angustifolium* | CHAN9 | 50 | 5 (0-10) |
| F | Common yarrow | *Achillea millefolium* | ACMI2 | 50 | 3 (0-5) |
| F | Pacific hemlockparsley | *Conioselinum gmelinii* | COGM | 50 | 2 (0-4) |

This dataset includes data from two sample plots. The sample plots are distributed across the Ahklun Mountains 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 as dry graminoid herbaceous (fig. 5) (Viereck et al., 1992). The major functional groups include tall graminoids (more than 2 feet in height), tall forbs (more than 2 feet), and medium forbs (4 to 24 inches) (fig. 6). American dunegrass is the dominant species. Forb species commonly include beach pea, fireweed, and seacoast angelica (*Angelica lucida*). Other species may include bluejoint, Pacific hemlockparsley (*Conioselinum gmelinii*), common yarrow, and seaside ragwort (*Senecio pseudoarnica*). The ground cover typically includes herbaceous litter and woody litter (driftwood). Some areas are bare soil.

## State 2
## Berm Reconstruction

This alternate state results from anthropogenic construction of coastal berms. Naturally shifting berms can create pathways for flooding during coastal storms. To prevent this, bulldozers have been used to reconstruct damaged berms and shore up existing berms (figs. 1 and 8). A new plant community consisting dominantly of bluejoint and coastal forbs typically colonizes these berms. This community commonly is on the gentle slopes of the leeward side of constructed berms. The steeper, exposed, coastal-facing side supports salt-resistant graminoids and forbs such as those in the reference state. No browsing is associated with this alternate state.

## Community 2.1
## Bluejoint/fireweed (Calamagrostis canadensis/Chamerion angustifolium)

**Figure 7. The alternate state is on built-up berms near villages.**

Community 2.1 Canopy Cover Table

Vegetation data is aggregated across modal sample plots for this community phase and is provided as frequency (percent) and mean canopy cover (percent) of the most dominant and 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) |
|---|---|---|---|---|---|
| G | Bluejoint | *Calamagrostis canadensis* | CACA4 | 100 | 95 |
| F | Fireweed | *Chamerion angustifolium* | CHAN9 | 100 | 1 |
| F | Seacoast angelica | *Angelica lucida* | ANLU | 100 | 0.1 |

This dataset includes data from one sample plots. Due to the limited data available for this community phase, personal field observations were used to aid in describing this plant community.

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

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

**Figure 8. Canopy cover and frequency of species in community 2.1.**

This community is characterized as mesic graminoid herbaceous (Viereck et al., 1992). The major functional groups are tall graminoids (more than 2 feet in height) and medium forbs (4 to 24 inches). Bluejoint is most prominent. Forbs include fireweed, seacoast angelica, and arctic starflower (*Trientalis europaea*). The ground cover typically includes herbaceous litter and woody litter (driftwood). Some areas are bare soil or sand.

## Transition T1A
## State 1 to 2

This transition is a result of the anthropogenic movement or buildup of berms. The plant community on the leeward side of the berms shifts from salt-resistant coastal vegetation to fast-growing, less salt-tolerant graminoids and forbs.

## Additional community tables

## Other references

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## 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:**