USDA Natural Resources Conservation Service

Ecological site F143XY302ME
Mucky Swamp

Last updated: 10/07/2024
Accessed: 05/13/2025

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): 143X–Northeastern Mountains

MLRA 143 is in Maine (51 percent), New York (27 percent), Vermont (13 percent), New Hampshire (7 percent), and Massachusetts (2 percent). It makes up about 34,409 square miles (89,118 square kilometers). The MLRA consists of rolling hills and mountains covered by Wisconsin till. It is in three parts separated by other MLRAs. The western part is in New York (primarily the Adirondack Mountains). The central part is mainly in the Green Mountains in Vermont and the Berkshires in Massachusetts. The eastern part is in New Hampshire and most of northern Maine. The MLRA is used mainly for forestry and recreational purposes. The western part of MLRA 143 in the Adirondack Mountains has a distinct boundary with the physiographical dissimilar Saint Lawrence-Champlain Plain. The middle part that encompasses the Green Mountains has a diffuse boundary as it blends into the northern part of the New England and Eastern New York Uplands on the foothills of the Green Mountains. The southern boundary of the easternmost part of MLRA 143 has the same diffuse boundary. The northern boundary of the MLRA is the Canadian border.

The westernmost part of this MLRA is primarily in the Adirondack province of the Appalachian Highlands. A small area in the southern end of the western part is in the Mohawk section of the Appalachian Plateaus province of the same division. The easternmost part, primarily in northern Maine, is in the New England Upland section of the New England province of the Appalachian Highlands. The southwestern half of this part is in the White Mountain section of the same province and division, and the middle part of the MLRA is in the Green Mountain section. The mountains and foothills in this MLRA are commonly rounded. They are underlain by bedrock and typically covered with thin deposits of till. The more rugged mountain areas are separated by high-gradient streams coursing through steep areas of colluvium or talus-laden valleys. Many glacially broadened valleys are filled with glacial outwash and have numerous swamps and lakes. The mountains and foothills are moderately steep to very steep, and the valleys are nearly level to sloping.

As the northernmost MLRA in the region with the coldest temperatures and shortest growing season, the Northeastern Mountains have less overall tree diversity, fewer pine and oak trees, and more abundant spruce and fir trees than neighboring MLRAs. The variability in microtopography on this site results in a patchy mosaic of plant communities. Silver maple is the most common overstory species, with diverse grasses and herbs indicating differences in soil wetness throughout the site due to slight variability in elevation above the water table. This site is subject to ice scour and flooding, but the most extensive disturbance is cultivation. These broad, flat landforms are nutrient rich with high water-holding capacity. These factors along with their adjacency to rivers made them ideal farming locations for early settlers, much of which continues today. The effects of altered flow regimes from modern dams may also be significant but require further study.

Classification relationships

This site occurs in Ecological Site Group 3 (Wooded Wetlands) of MLRA 143 (The Northeastern Mountains), in the Northeastern Forage and Forest Region (Land Resource Region R).

The Northeastern Forage and Forest LRR includes all of Maine, New Hampshire, Vermont, Rhode Island, and Connecticut, as well as large portions of Massachusetts, New York, New Jersey, Pennsylvania, and Ohio. Its southern boundary marks the extent of the Wisconsin ice sheet, which engulfed the entire LRR as recently as 10,000 to 15,000 years ago. Erosional and depositional processes associated with glaciation created many of the topographic patterns that distinguish MLRAs within the Northeastern region. Harder granitic and metamorphic bedrock to the north were more resistant to glacial erosion, resulting in the relatively nutrient poor mountains of MLRA 143; whereas nutrient-rich sedimentary bedrock of MLRAs 139, 140, and 146 resulted in relatively flat, fertile landscapes ideal for cultivation. Other areas were depressed below sea-level by the sheer mass of the glacier, resulting in pockets of marine sediments which distinguish MLRAs 142, 144A, 144B, and 145.

Precipitation is sufficient to support productive forestland throughout the Northeastern region. Still, a latitudinal temperature gradient from mesic to frigid soil temperatures results in a general transition from central hardwoods and pine in the southern MLRAs to northern hardwoods and spruce-fir forests farther north (no true boreal forests exist in the region). Elevations are generally low throughout the Northeastern region, with the exception of MLRA 143 which has many high mountain ecosystems with cryic temperature regimes and alpine vegetation above the tree line.

Ecological site concept

This site occurs in relatively flat areas (0-2% slopes) near the bottom of watersheds where water saturates deep organic muck deposits for most of the growing season. These organic soils are very poorly-drained and often underlain by mineral deposits at depths greater than 16 inches. The water table is within a few inches of the surface. This site often has pit and mound topography, with ponding typical in the pits, and slightly drier soil conditions on the mounds where most trees are rooted.

Northern white cedar is abundant, with balsam fir, black spruce, larch, black ash, and grey birch as common associates. Diverse herbs, shrubs, and bryophytes dominate the understory. Treethrow and altered hydrology are common disturbances on this site. Small openings created by treethrow, which is very common on these unstable soils, are typically colonized by species already present in the community and may persist as canopy openings dominated by herbaceous species for a long time.

Persistent ponding caused by beavers, man-made structures (such as roads, dams, etc.), or increased runoff in the watershed above can cause water levels to rise and kill cedar trees, resulting in an open ponded or marsh condition. If hydrology is restored to reference conditions, the site is likely to transition through a marsh and/or early seral forest phase before eventually returning to cedar dominance.

Logging is limited on this site and requires winter harvest methods when the ground is frozen. Cedar removal may result in an early seral phase dominated by balsam fir, grey birch, red maple, and other colonizers before eventually reverting to cedar dominance. This may take a very long time to occur.

The wetter version of these soils supports the Marsh Wetlands site, and the more acidic version of these soils support the Semi-rich Peatlands.

Associated sites

F143XY210ME	**Marsh Wetland Complex** The Marsh Wetland Complex site often grades upslope into the Mucky Swamp as the depth to mineral soil contact decreases, likely due to increased soil oxygen levels which support cedar growth.
F143XY301ME	**Loamy Till Swamp (Northern White Cedar)** The Loamy Till Swamp often grades into the Mucky Swamp site downslope as the site gets wetter and organic matter accumulates.

Similar sites

F143XY301ME	**Loamy Till Swamp (Northern White Cedar)** The Loamy Till Swamp is similar in species composition to the Mucky Swamp, but mineral soils rather than organic soils support greater productivity and cover of cedar trees, often with overall understory production and sphagnum moss.

Table 1. Dominant plant species

Tree	(1) *Quercus rubra* (2) *Picea rubens*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs in flat, low-lying areas between mineral soils (upslope) and open wetlands (downslope). This site often exhibits pit and mound topography, with most trees rooted on the mounds and water ponding in the pits.

Table 2. Representative physiographic features

Landforms	(1) Till plain > Bog (2) Mountain range > Hillside or mountainside
Runoff class	High to very high
Flooding frequency	None
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Frequent
Elevation	0–610 m
Slope	0–2%
Ponding depth	8–15 cm
Water table depth	0–15 cm
Aspect	Aspect is not a significant factor

Climatic features

As the northernmost MLRA in the region, this site experiences frigid and snowy winters, warm rainy summers, and a relatively short five to six month growing season. Precipitation is considerably constant from month to month; however, areas of higher elevations may receive up to double the annual precipitation of the lower elevations and have a three to four month growing season with extremely cold winters.

Table 3. Representative climatic features

Frost-free period (characteristic range)	87-113 days
Freeze-free period (characteristic range)	127-133 days
Precipitation total (characteristic range)	1,067-1,168 mm
Frost-free period (actual range)	85-114 days
Freeze-free period (actual range)	126-135 days
Precipitation total (actual range)	1,041-1,168 mm
Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	1,118 mm

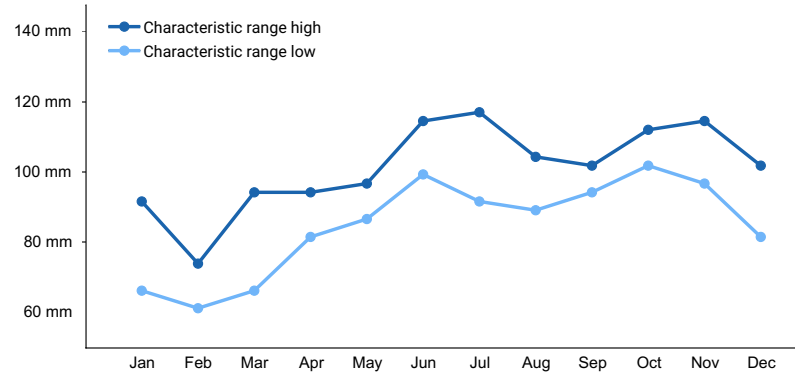

Figure 1. Monthly precipitation range

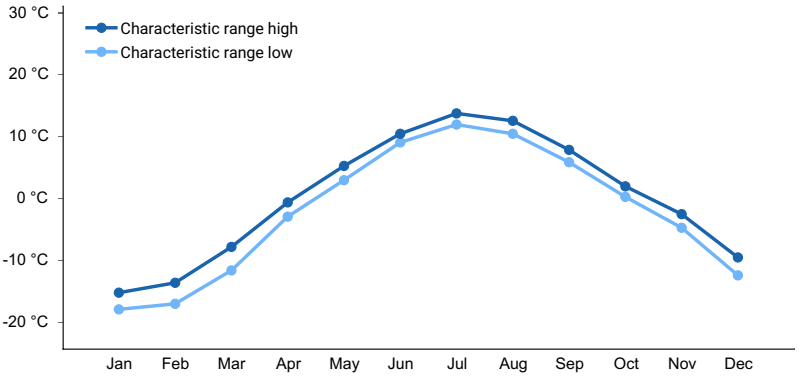

Figure 2. Monthly minimum temperature range

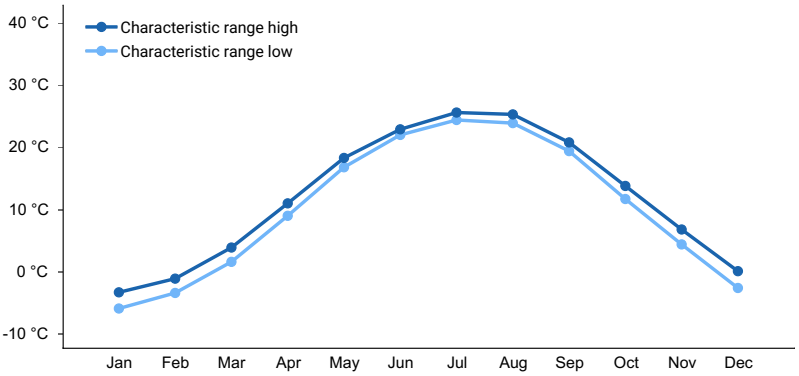

Figure 3. Monthly maximum temperature range

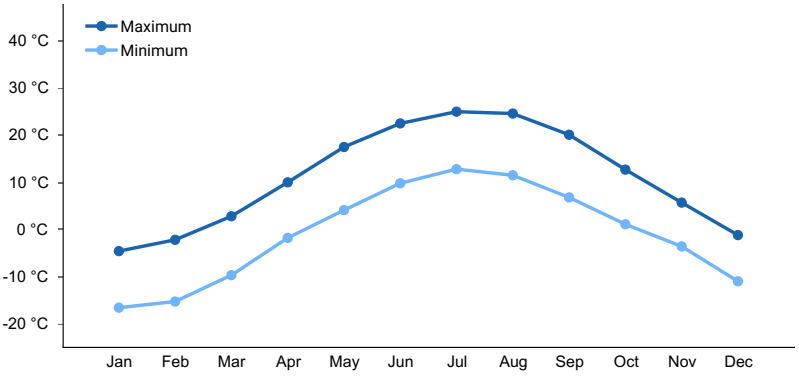

Figure 4. Monthly average minimum and maximum temperature

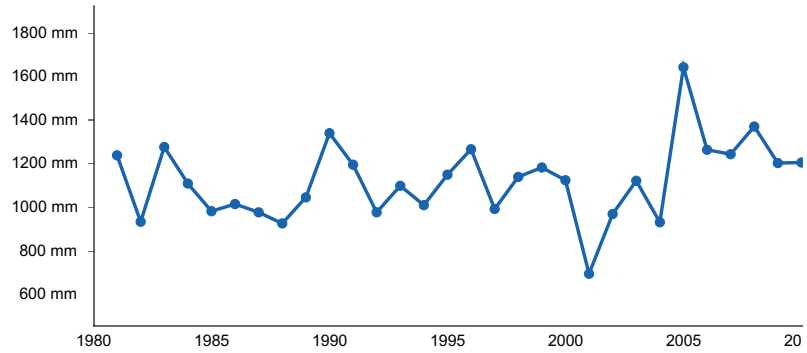

Figure 5. Annual precipitation pattern

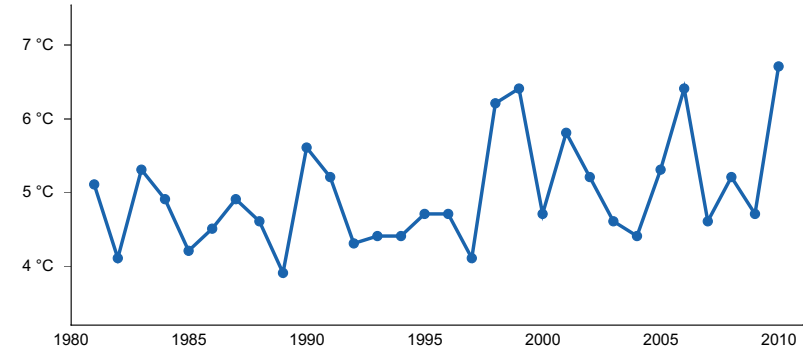

Figure 6. Annual average temperature pattern

Climate stations used

- (1) BARNARD [USC00170398], Brownville, ME
- (2) PITTSTON FARM [USC00176721], North Somerset County, ME
- (3) GRAND LAKE STREAM [USC00173261], Northern Washington Co, ME
- (4) JACKMAN [USC00174086], Jackman, ME

Influencing water features

Large amounts of water saturate the soils of this site throughout the year, resulting in fairly open cedar canopies and a lush herbaceous/sphagnum understory.

Soil features

The soils of this site are very poorly-drained muck or mucky peat, often underlain by a loamy mineral substrate (at least 16 inches below the surface). Soil pH typically ranges between 5.0-6.5 on this site, but may be somewhat more acidic in places.

Table 4. Representative soil features

Parent material	(1) Organic material (2) Till–gneiss
Surface texture	(1) Muck (2) Loam
Family particle size	(1) Loamy
Drainage class	Very poorly drained to well drained
Permeability class	Very slow to slow
Soil depth	152 cm
Surface fragment cover <=3"	0%

Surface fragment cover >3"	2%
Available water capacity (7.6-38.1cm)	Not specified
Soil reaction (1:1 water) (8.9-16.5cm)	Not specified
Subsurface fragment volume <=3" (0-25.4cm)	Not specified
Subsurface fragment volume >3" (0-12.7cm)	Not specified

Ecological dynamics

[Caveat: The vegetation information contained in this section and is only provisional, based on concepts, and future projects support validation through field work. *] The vegetation groupings described in this section are based on the terrestrial ecological system classification and vegetation associations developed by NatureServe (Comer et al., 2003) and localized associations provided by the New York Natural Heritage Program (Edinger et al., 2014), Maine Natural Areas Program (Gawler and Cutko, 2010), New Hampshire Natural Heritage Program (Sperduto and Nichols, 2011), and Massachusetts Division of Fisheries and Wildlife (Swain, 2020).

This site is dominated by northern white cedar, often with black spruce, balsam fir, red maple, yellow birch, white pine, and/or brown ash present in small amounts. Most trees are rooted in the poorly-drained soil mounds rather than the very poorly-drained soil depressions. The understory is diverse with sphagnum moss, creeping snowberry, and three-seed sedge common.

Treethrow and altered hydrology are common disturbances on this site. Small openings created by treethrow, which is very common on these unstable soils, are typically colonized by species already present in the community and may persist as canopy openings dominated by herbaceous species for a long time.

Persistent ponding caused by beavers, man-made structures (such as roads, dams, etc.), or increased runoff in the watershed above can cause water levels to rise and kill cedar trees, resulting in an open ponded or marsh condition. If hydrology is restored to reference conditions, the site is likely to transition through a marsh and/or early seral forest phase before eventually returning to cedar dominance.

Logging is limited on this site and requires winter harvest methods when the ground is frozen. Cedar removal may result in an early seral phase dominated by balsam fir, grey birch, red maple, and other colonizers before eventually reverting to cedar dominance. This may take a very long time to occur.

State and transition model

F143XY302ME – Mucky Swamp

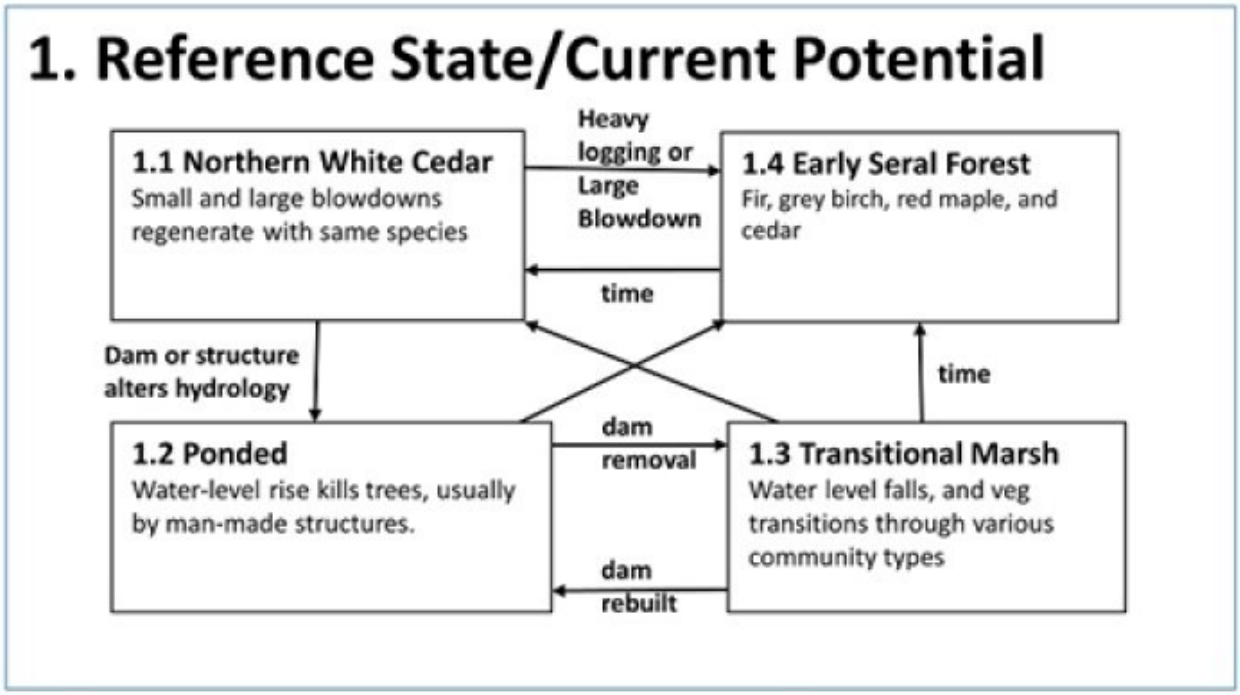

Figure 7. STM

Inventory data references

Future work is needed, as described in a future project plan, to validate the information presented in this provisional ecological site description. Future work includes field sampling, data collection and analysis by qualified ecologists and soil scientists. As warranted, annual reviews of the project plan can be conducted by the Ecological Site Technical Team. A final field review, peer review, quality control, and quality assurance reviews of the ESD are necessary to approve a final document.

Other references

Comer, P., D. Faber-Langendoen, R. Evans, S. Grawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schultz, K. Snow, and J. Teague. 2003. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems. NatureServe, Arlington, Virginia

Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

Gawler, S. and A. Cutko. 2010. Natural Landscapes of Maine: A Guide to Natural Communities and Ecosystems. Maine Natural Areas Program, Maine Department of Conservation, Augusta, Maine.

NatureServe. 2021. NatureServe Explorer: An online encyclopedia of life [web application]. NatureServe, Arlington, Virginia. https://explorer.natureserve.org/. (accessed 10 July. 2021).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. 2006. Land

Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. Agricultural Handbook 296

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions. Available online. (accessed 11 Aug. 2021).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Climate Research Station Data. Available online. (accessed 23 June. 2021).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database for [MLRA 141, Maine]. Available online. (accessed 14 Oct. 2021).

Sperduto, D.D. and William F. Nichols. 2011. Natural Communities of New Hampshire. 2nd Ed. NH Natural Heritage Bureau, Concord, NH. Pub. UNH Cooperative Extension, Durham, NH.

Swain, P. C. 2020. Classification of the Natural Communities of Massachusetts. Massachusetts Division of Fisheries and Wildlife, Westborough, MA

USNVC [United States National Vegetation Classification]. 2017. United States National Vegetation Classification Database V2.01. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. Available The U.S. National Vegetation Classification (usnvc.org) (accessed 2 July. 2021).

Contributors

Christopher Mann
Jamin Johanson

Approval

Greg Schmidt, 10/07/2024

Acknowledgments

Nels Barrett, Nick Butler, and Carl Bickford provided considerable review of this ecological site concept.

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	05/13/2025
Approved by	Greg Schmidt
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:**