Ecological site F144BY507ME
Semi-rich Till Toeslope

Last updated: 9/27/2024
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): 144B–New England and Eastern New York Upland, Northern Part

This major land resource area (MLRA) is in Maine (56 percent), New Hampshire (22 percent), Vermont (14 percent), Massachusetts (6 percent), Connecticut (1 percent), and New York (1 percent). It makes up about 22,728 square miles (58,864 square kilometers). The MLRA consists of a relatively young landscape shaped by the Laurentide Ice Sheet, which covered the region from 35,000 to 10,000 years ago. Rolling hills of dense basal till converge on ridges of shallow bedrock that were scoured by glacial ice. River valleys that were flooded by melting glacial water or seawater house large expanses of glacial outwash and stratified drift in inland areas and, to a lesser extent, glaciomarine and glaciolacustrine sediment deposits in coastal areas. Organic bogs, ablation till, and alluvial flood plains make up the remaining portions of the MLRA.

The soils in this region are dominantly Entisols, Spodosols, and Inceptisols. They commonly have a fragipan. The dominant suborders are Ochrepts, Orthods, Aquepts, Fluvents, and Saprists. The soils in the region dominantly have a frigid soil temperature regime with some cryic areas at higher elevation, a udic soil moisture regime, and mixed mineralogy. Most of the land is forested, and 98 percent is privately owned. Significant amounts of forest products are produced including lumber, pulpwood, Christmas trees, and maple syrup. Principal agricultural crops include forage and grains for dairy cattle, potatoes, apples, and blueberries. Wildlife habitat and recreation are important land uses. Stoniness, steep slopes, and poor drainage limit the use of many of the soils.

Classification relationships

NRCS:
Land Resource Region: R—Northeastern Forage and Forest Region
MLRA: 144B—New England and Eastern New York Upland, Northern Part

Ecological site concept

This site occurs on deep, poorly- to somewhat poorly-drained loam soils derived from calcareous bedrock. Bedrock is greater than 20 inches below the mineral soil surface. This site is found on footslope and toeslope positions that receive additional water and nutrients from higher areas of the watershed. The vegetation is characterized by northern hardwoods, particularly sugar maple, basswood, ash, and northern white cedar. These are productive soils with some rich site indicators in the understory, including blue cohosh, Christmas fern, and royal fern. These soils are often farmed.

Associated sites

F144BY230ME	**Acidic Peat Wetland Complex** The Loamy Till Swamp site occurs lower in the watershed than the Semi-rich Till Toeslope site. The two sites occur together along a soil drainage gradient from somewhat poorly to poorly- and very poorly-drained.

F144BY507ME	**Semi-rich Till Toeslope**
	The Semi-rich Till Toeslope site usually occurs downslope, on wetter, richer soils than the Semi-rich Till Slope.

Similar sites

F144BY502ME	**Loamy Till Toeslope**
	The Semi-rich Till Toeslope site has similar soil texture and wetness, but is distinguished by higher soil nutrients derived from calcareous parent material (such as limestone), as evidenced by high soil pH and rich site indicator species (particularly basswood).
F144BY506ME	**Semi-rich Till Slope**
	The Semi-rich Till Toeslope site usually occurs downslope, on wetter, richer soils than the Semi-rich Till Slope.
F144BY504ME	**Enriched Loamy Cove**
	While both sites have rich site indicators, the Enriched Loamy Cove site occurs along drainageways, is well-drained, lacks calcareous parent material, and has a thick dark soil surface horizon. By contrast, the Semi-rich Till Toeslope occurs at the base of calcareous slopes and is poorly- to somewhat poorly-drained. These two sites produce very similar communities.

Table 1. Dominant plant species

Tree	(1) *Acer saccharum* (2) *Fraxinus americana*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs mostly on gentle slopes near the base of till landforms. Slopes are typically 0-8%, sometimes up to 15%. This site has a seasonally-high water table.

Table 2. Representative physiographic features

Landforms	(1) Till plain > Ground moraine
Flooding frequency	None
Ponding frequency	None
Elevation	50–230 m
Slope	0–8%
Water table depth	15–30 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is humid and temperate and is characterized by warm summers and cold winters. Precipitation generally is evenly distributed throughout the year. Near the coast, it is slightly lower in summer. In inland areas, it is slightly higher in spring and fall. Rainfall occurs during high-intensity, convective thunderstorms in summer. In winter, most of the precipitation occurs as moderate-intensity storms (northeasters) that produce large amounts of rain or snow. Heavy snowfalls commonly occur late in winter. Temperatures and the length of the freeze-free period increase from north to south and closer to the coast.

This major land resource area (MLRA) covers four states and may have substantial climate variability among locations: Maine (56 percent), New Hampshire (22 percent), Vermont (14 percent), Massachusetts (6 percent), Connecticut (1 percent), and New York (1 percent).

Table 3. Representative climatic features

|	
Frost-free period (characteristic range)	117-140 days
Freeze-free period (characteristic range)	144-170 days
Precipitation total (characteristic range)	1,067-1,219 mm
Frost-free period (actual range)	98-146 days
Freeze-free period (actual range)	133-180 days
Precipitation total (actual range)	1,016-1,372 mm
Frost-free period (average)	126 days
Freeze-free period (average)	159 days
Precipitation total (average)	1,168 mm
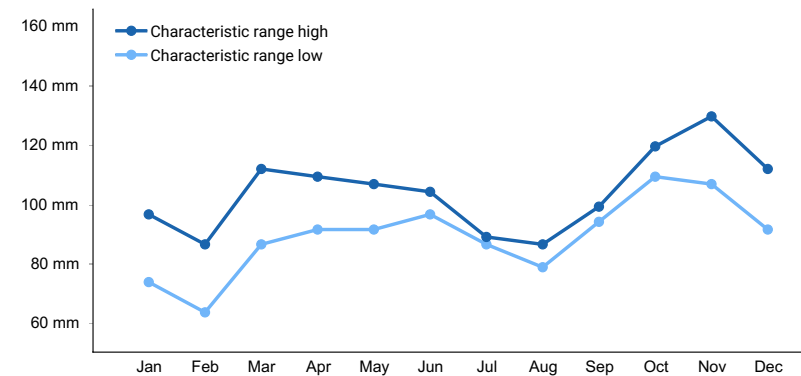
Figure 1. Monthly precipitation range
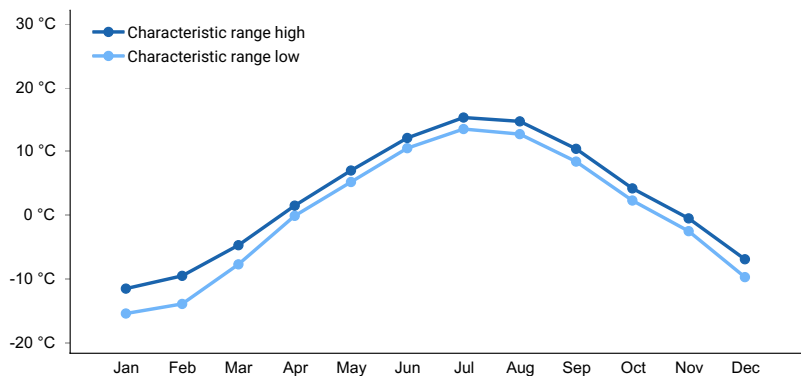
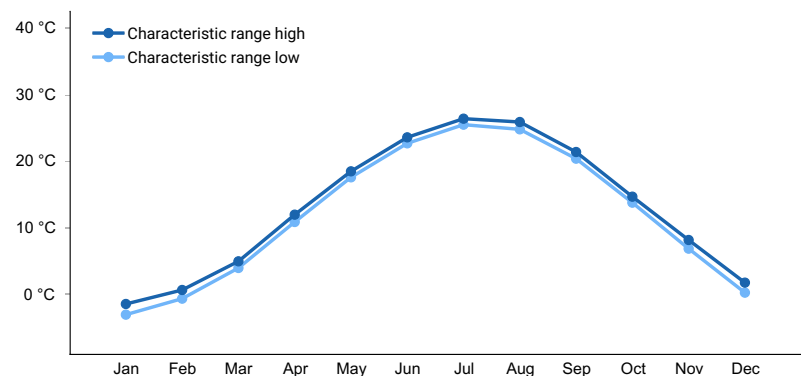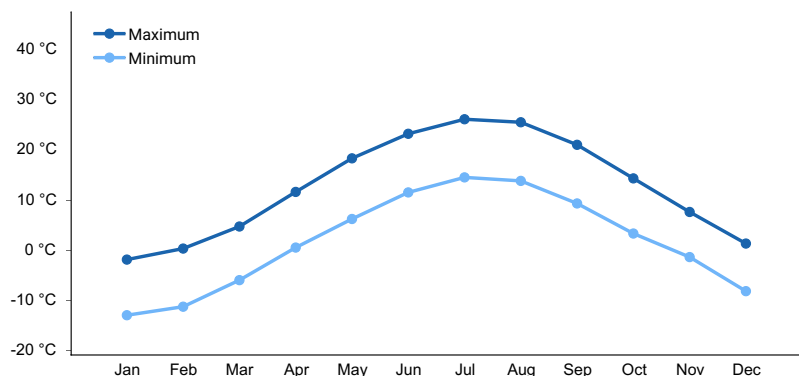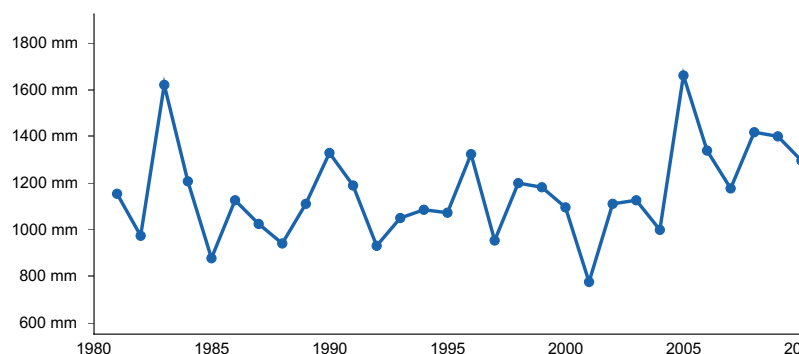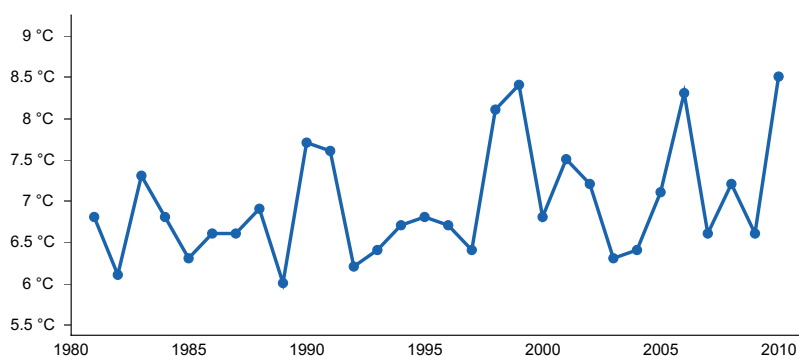**Figure 2. Monthly minimum temperature range**

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) BELFAST [USC00170480], Belfast, ME
- (2) ACADIA NP [USC00170100], Bar Harbor, ME
- (3) CORINNA [USC00171628], Corinna, ME
- (4) DOVER-FOXCROFT WWTP [USC00171975], Dover Foxcroft, ME
- (5) FARMINGTON [USC00172765], Farmington, ME
- (6) GARDINER [USC00173046], Gardiner, ME
- (7) JONESBORO [USC00174183], Addison, ME
- (8) LEWISTON [USC00174566], Auburn, ME
- (9) MADISON [USC00174927], Anson, ME
- (10) NEWCASTLE [USC00175675], Newcastle, ME
- (11) ORONO [USC00176430], Old Town, ME
- (12) WATERVILLE TRTMT PLT [USC00179151], Waterville, ME
- (13) WEST ROCKPORT 1 NNW [USC00179593], Rockport, ME
- (14) AUGUSTA STATE AP [USW00014605], Augusta, ME
- (15) BANGOR INTL AP [USW00014606], Bangor, ME
- (16) PORTLAND INTL JETPORT [USW00014764], Portland, ME

Influencing water features

This site is not typically influenced by streams or wetlands

Soil features

The soils of this site are deep, poorly- and somewhat poorly-drained. They formed in semi-rich till characterized by circumneutral pH, the lack of a densely compacted subsurface horizon, and few rocks. When present, rock fragments are usually soft, and easy to break with your fingers.

Soil textures are silt loams to sandy loams throughout the profile. Soil pH increases with depth and ranges from 4.5 to 7.3. Depressions may pond water for brief periods and accumulate organic matter, but often the soil surface is bare of leaf litter.

Representative soils are Nicholville, Roundabout, Raynham, Kenduskeag, and Monarda.

Table 4. Representative soil features

Parent material	(1) Subglacial till (2) Lodgment till
Surface texture	(1) Coarse sandy loam (2) Loam
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Very slow to slow
Soil depth	48–183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–2%
Available water capacity (10.2-20.3cm)	Not specified
Soil reaction (1:1 water) (10.7-19.1cm)	Not specified
Subsurface fragment volume <=3" (12.7-25.4cm)	Not specified
Subsurface fragment volume >3" (25.4-33cm)	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).

The vegetation is characterized by northern hardwoods, particularly sugar maple, yellow birch, basswood, ash, and northern white cedar. Christmas fern, blue cohosh, and royal fern are often present in the understory as rich site indicators. Historically, American chestnut would also be present on this site, but currently it has been all but eliminated from the region by chestnut blight.

When forested, treethrow and logging are the most common disturbances on this site. The site is resilient following these disturbances and succeeds through an herbaceous and shrubby phase prior to tree establishment and eventual return to the reference community.
On gentler slopes, this site is often cultivated for crop or pasture given the richness of the soil. When cropland or pastureland management ceases, as occurred across most of the area in the late 19th century, the site either

returns to hardwoods or may transition to a white pine forest. Once white pine is established, it tends to form a single age stand with low diversity and little understory.

Relationship to Other Classification Systems
This site includes the following state natural heritage program types:
• Rich mesic forests (Sperduto and Nichols 2004)
• Enriched Northern Hardwoods Forest (Gawler and Cutko 2010)
• Sugar Maple Forest (Gawler and Cutko 2010)
• Rich mesic forests (Thompson and Sorenson 2000)

State and transition model

F144BY507ME – Semi-rich Till Toeslope
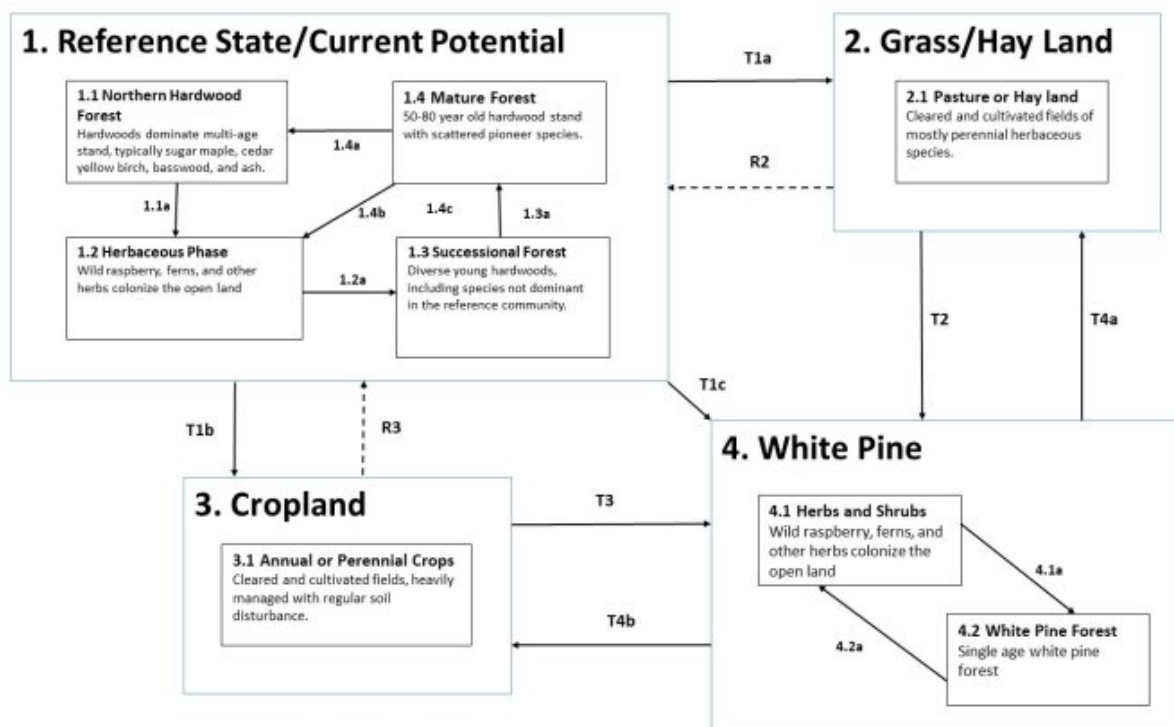
State 1
Reference State / Current Potential

Community 1.1
Northern Hardwood Forest

Hardwoods dominate multi-age stand, typically sugar maple, cedar yellow birch, basswood, and ash.

Community 1.2
Herbaceous Phase

Wild raspberry, ferns, and other herbs colonize the open land

Community 1.3
Successional Forest

Diverse young hardwoods, including species not dominant in the reference community

Community 1.4
Mature Forest 50-80 yr

50-80 year old hardwood stand with scattered pioneer species

Pathway P1.1-1.2
Community 1.1 to 1.2

windthrow, blowdown, fire

Pathway P1.2-1.3
Community 1.2 to 1.3

vegetation development (succession)

Pathway P1.3-1.4
Community 1.3 to 1.4

vegetation development (succession)

Pathway P1.4-1.1
Community 1.4 to 1.1

windthrow, blowdown, fire

Pathway P1.4-1.2
Community 1.4 to 1.2

windtrhrow, blowdown, fire

State 2
Grassland / Hay land

Community 2.1
Pasture or Hay Land

Cleared and planted fields of mostly perennial herbaceous species.

State 3
Crop Land

Community 3.1
Annual or Perennial Crops

Cleared and cultivated fields, heavily managed with regular soil disturbance.

State 4
White Pine

Community 4.1
Herbs and Shrubs

Wild raspberry, ferns, and other herbs colonize the open land

Community 4.2

White Pine Forest

Single age white pine forest.

Pathway P4.1-4.2
Community 4.1 to 4.2

Vegetation development (succession)

Pathway P4.2-4.1
Community 4.2 to 4.1

harvest, logging

Conservation practices

Forest Stand Improvement
Forest Land Management

Transition T1-2
State 1 to 2

tree removal, pasture or hayfield establishment

Conservation practices

Clearing and Snagging
Land Clearing
Invasive Plant Species Control
Managed Haying/Grazing

Transition T1-3
State 1 to 3

Tree clearing, crop establishment

Conservation practices

Clearing and Snagging
Cover Crop
Land Clearing

Transition T1-4
State 1 to 4

selective harvest

Conservation practices

Forest Stand Improvement
Forest Land Management

Transition R2-1
State 2 to 1

abandonment, vegetation development (succession), planting

Conservation practices

Tree/Shrub Site Preparation
Tree/Shrub Establishment
Upland Wildlife Habitat Management
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Invasive Plant Species Control
Managed Haying/Grazing

Transition T2-4
State 2 to 4

tree establishment

Conservation practices

Tree/Shrub Site Preparation
Tree/Shrub Establishment
Invasive Plant Species Control

Restoration pathway R3-1
State 3 to 1

abandonment, vegetation development (succession), tree planting

Conservation practices

Tree/Shrub Establishment
Upland Wildlife Habitat Management
Tree/Shrub Pruning
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Invasive Plant Species Control

Transition T3-4
State 3 to 4

tree planting

Conservation practices

Tree/Shrub Site Preparation
Tree/Shrub Establishment
Invasive Plant Species Control

Restoration pathway R4-1
State 4 to 1

abandonment, vegetation development (succession), plantings

Conservation practices

Tree/Shrub Site Preparation
Tree/Shrub Establishment
Upland Wildlife Habitat Management
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Invasive Plant Species Control

Restoration pathway T4-2
State 4 to 2

Tree removal, pasture or hay land establishment

Conservation practices

Clearing and Snagging
Land Clearing

Transition T4-3
State 4 to 3

tree removal, cropland establishment

Conservation practices

Clearing and Snagging
Cover Crop
Land Clearing

Additional community tables

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 vegetation 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

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Contributors

Christopher Mann

Approval

Nels Barrett, 9/27/2024

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Nels Barrett and Nick Butler 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	06/29/2020
Approved by	Nels Barrett
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:**