

# Ecological site F142XA003NY

## Acidic Peaty Depression

Last updated: 5/22/2020  
Accessed: 06/01/2023

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### 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): 142X–St. Lawrence-Champlain Plain

This MLRA is a glaciated area of low relief dominated by broad expanses of nearly level, sandy deltas and shallow lacustrine basins or plains punctuated by low hills of glacial till. Rivers and streams have cut relatively deep but narrow valleys across the plain. Elevation ranges from 80 to 1,000 feet, increasing gradually from the St. Lawrence River southward and from Lake Champlain to the east and west. Local relief generally is less than 30 feet, but glacial till ridges, till plains, and some outwash terraces rise 15 to 80 feet above the adjacent plains.

This area has been glaciated, and a thin mantle of till covers most of the bedrock. Extensive areas of sandy glacial outwash and eolian deposits also occur. Some glacial lake sediments have been deposited above glacial moraines. These deposits are thickest in the valleys and thinnest on the ridges and highlands. During the later stages of the Wisconsin glacial period, seawater entered the Champlain Valley and deposited marine sediments that were later covered by freshwater sediments. The marine deposits are unique to the area.

This area supports hardwoods. The beech-birch-sugar maple forest type is the dominant climax forest type on uplands. Associated with this type are basswood, American elm, maple species, white ash, black cherry, and white pine. The aspen-birch type, earlier in succession, is economically important. Such species as eastern hemlock, red maple, American elm, and spruce are on wet soils.

Some of the major wildlife species in this area are white-tailed deer, red fox, raccoon, beaver, woodchuck, muskrat, cottontail, ruffed grouse, and woodcock.

Land Resource Unit (LRU): Frigid Soil Temperature Regime

The upper St. Lawrence and Champlain Valleys are characterized with soils in the frigid soil temperature regime (mean annual soil temperature greater than 32°F but less than 46°F and with a difference between mean summer and mean winter soil temperatures greater than 41°F at 20 inches below the surface or at a densic, lithic, or paralithic contact, whichever is shallower).

The Frigid Soil Temperature Regime (STR) will have shorter growing season than the lower St. Lawrence and Champlain Valleys which are characterized with soils in the mesic STR. Species more tolerant of colder year round temperatures would also be evident in the Frigid LRU.

### Classification relationships

NRCS:

Land Resource Region: R - Northeastern Forage and Forest Region

MLRA: 142 - St. Lawrence-Champlain Plain  
LRU: A/02 - Frigid Mean Annual Soil Temperature

**USFS:**

Domain: 200 - Humid Temperate  
Division: 210 - Warm Continental  
Province: 211 - Northeastern Mixed Forest  
Section: 211E - St. Lawrence and Champlain Valley  
Subsections: 211Ea - St. Lawrence Glacial Marine Plain

**EPA:**

Level I: 8 - Eastern Temperate Forests  
Level II: 8.1 - Mixed Wood Plains  
Level III: 83 - Eastern Great Lakes Lowlands  
Level IV: 83d - St. Lawrence Lowlands  
83e - Upper St. Lawrence Valley

**Ecological site concept**

**Climate:**

Mean annual precipitation is 38 inches and evenly distributed throughout the year. Most of the rainfall occurs as high intensity, convective thunderstorms during the summer. Snowfall is heavy from late in autumn to early spring. The average temperature in winter is 18°F and in summer it is 66°F. Average frost-free and freeze-free days are 124 and 147, respectively.

**Geology:**

The soils formed in organic material underlain by sandstone bedrock.

**Landform/Landscape Position:**

The site occurs in nearly level depressions on till plains. Slope ranges from 0 to 2 percent.

**Edaphic:**

The site consists of very poorly drained mucky organic soils. Depth to sandstone bedrock ranges from 16 to 50 inches. Soil pH ranges from extremely acid to ultra-acid throughout. Permeability above the bedrock is moderate or moderately rapid. Representative soil is Churubusco.

**Vegetation Dynamics:**

The reference plant community is a black spruce-tamarack bog woodland or forest which is common on acidic peatlands in cool environments (Edinger et al 2014). A black spruce-tamarack bog may grade into and form a mosaic with dwarf shrub bog, inland poor fen, and spruce-fir swamp (Edinger et al 2014) depending on local hydrology, minerology, and geomorphic conditions.

Characteristic trees include black spruce and tamarack. Canopy cover is quite variable, ranging from open canopy woodlands with as little as 20% cover of evenly spaced canopy trees to closed canopy forests with 80 to 90% cover (Edinger et al 2014). Characteristic shrubs include leatherleaf, sheep laurel, and highbush blueberry (Edinger et al 2014). Characteristic herbaceous plants are three-sided sedge, pitcher plant, and cinnamon fern. Various species of peat mosses are dominant as groundcover.

Research is needed to fill information gaps about black spruce-tamarack bogs, especially to advance the understanding of their classification, ecological processes (e.g., fire), hydrology, floristic variation, characteristic fauna, and bog development and succession (Damman 1987, Edinger 2014).

**Associated sites**

|             |  |
|-------------|--|
| F142XA015NY | <b>Shallow Acidic Till Upland Frigid</b><br>Shallow Till site on hills and ridges. |
|-------------|--|

|             |   |
|-------------|---|
| F142XA019NY | <b>Acidic Moist Till Frigid</b><br>Somewhat poorly drained acidic till depressions. |
|-------------|---|

## Similar sites

|             |   |
|-------------|---|
| F142XA002NY | <b>Mucky Depression Frigid LRU</b><br>Nutrient rich organic soils |
|-------------|---|

**Table 1. Dominant plant species**

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

## Physiographic features

The site occurs in nearly level depressions on till plains. Slope ranges from 0 to 2 percent. Ponding occurs frequently.

**Table 2. Representative physiographic features**

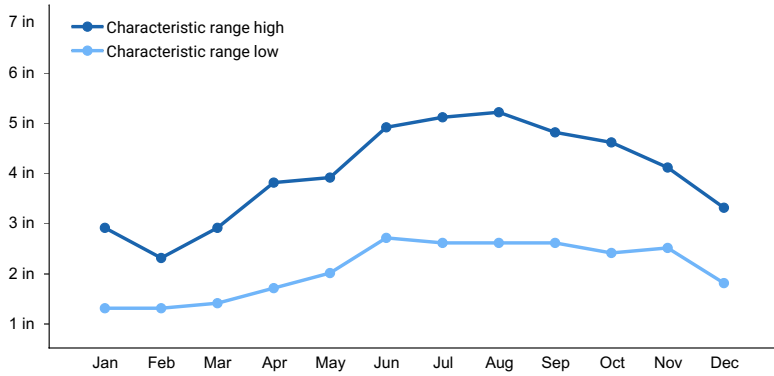
|                    |                                    |
|--------------------|------------------------------------|
| Landforms          | (1) Depression<br>(2) Bog          |
| Flooding frequency | None                               |
| Ponding frequency  | Frequent                           |
| Elevation          | 700–1,200 ft                       |
| Slope              | 0–2%                               |
| Water table depth  | 0 in                               |
| Aspect             | Aspect is not a significant factor |

## Climatic features

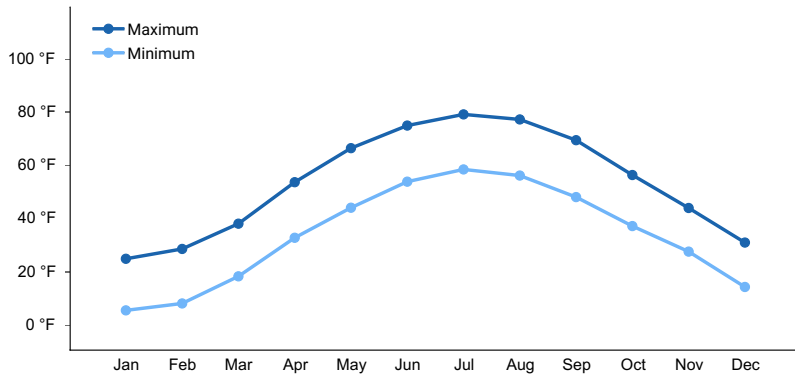
Mean annual precipitation is 38 inches and evenly distributed throughout the year. Most of the rainfall occurs as high intensity, convective thunderstorms during the summer. Snowfall is heavy from late in autumn to early spring. The average temperature in winter is 18°F and in summer it is 66°F. Average frost-free and freeze-free days are 121 and 145, respectively.

**Table 3. Representative climatic features**

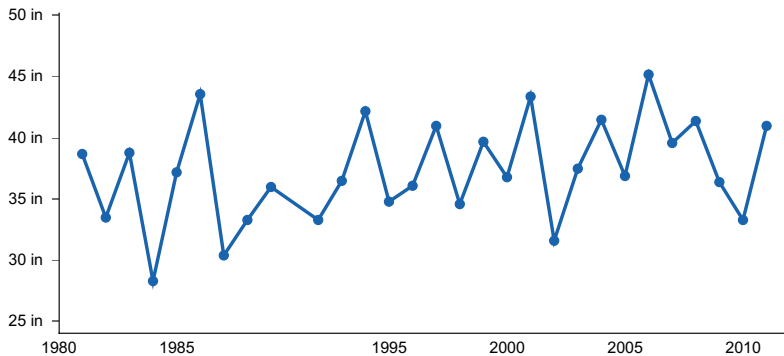
|                               |          |
|-------------------------------|----------|
| Frost-free period (average)   | 121 days |
| Freeze-free period (average)  | 145 days |
| Precipitation total (average) | 39 in    |



**Figure 1. Monthly precipitation range**



**Figure 2. Monthly average minimum and maximum temperature**



**Figure 3. Annual precipitation pattern**

### Climate stations used

- (1) LAWRENCEVILLE 3 SW [USC00304647], Nicholville, NY
- (2) MALONE [USC00304996], Malone, NY
- (3) MASSENA INTL AP [USW00094725], Massena, NY

### Influencing water features

Very poorly drained.

Water is removed from the soil so slowly that free water remains at or very near the ground surface during much of the growing season. The occurrence of internal free water is very shallow and persistent or permanent. Unless the soil is artificially drained, most mesophytic crops cannot be grown. The soils are commonly level or depressed and frequently ponded. If rainfall is high or nearly continuous, slope gradients may be greater.

### Soil features

The site consists of very poorly drained mucky organic soils. Depth to sandstone bedrock ranges from 16 to 50

inches. Soil pH ranges from extremely acid to ultra-acid throughout. Permeability above the bedrock is moderate or moderately rapid. Representative soil is Churubusco.

**Table 4. Representative soil features**

|   |                                |
|---|--------------------------------|
| Parent material                                       | (1) Organic material–sandstone |
| Surface texture                                       | (1) Muck                       |
| Drainage class  | Very poorly drained            |
| Permeability class                                    | Moderate to moderately rapid   |
| Soil depth  | 16–50 in                       |
| Surface fragment cover <=3"                           | 0%                             |
| Surface fragment cover >3"                            | 0%                             |
| Available water capacity (0-40in)                     | 13 in                          |
| Calcium carbonate equivalent (0-40in)                 | 0%                             |
| Soil reaction (1:1 water) (0-40in)                    | 3.5–4.4                        |
| Subsurface fragment volume <=3" (Depth not specified) | 0%                             |
| Subsurface fragment volume >3" (Depth not specified)  | 0%                             |

## Ecological dynamics

The information in this provisional ecological site description, including the state-and-transition model (STM), was developed using historical information, available data, professional experience, and scientific studies. The information is representative of a complex set of plant communities. Not all scenarios or plants are included. Key indicator plants, animals, and ecological processes are described to inform land management decisions.

**Cultural Ecology:** Humans have occupied the St. Lawrence River and Champlain Valley for at least ten thousand years, adapting their ways of life in a variety of changing environments. Initially people lived in small, nomadic groups and later in larger settlements. Historically, the area was within the Iroquois Tribal Territory. European exploration of the area began in the 17th century. Fur trade and settlement of the area followed during the 18th century. Industrialization, riverine-related activities, agriculture, concentrated human settlement in metropolitan areas, and recreation are currently the major human activities affecting the ecosystem (USDA USFS)

The reference plant community is a black spruce-tamarack bog woodland or forest which is common on acidic peatlands in cool environments (Edinger et al 2014). A black spruce-tamarack bog may grade into and form a mosaic with dwarf shrub bog, inland poor fen, and spruce-fir swamp (Edinger et al 2014) depending on local hydrology, minerology, and geomorphic conditions.

Characteristic trees include black spruce and tamarack. Canopy cover is quite variable, ranging from open canopy woodlands with as little as 20% cover of evenly spaced canopy trees to closed canopy forests with 80 to 90% cover (Edinger et al 2014). Characteristic shrubs include leatherleaf, sheep laurel, and highbush blueberry (Edinger et al 2014). Characteristic herbaceous plants are cotton grass, pitcher plant, and cinnamon fern. Various species of peat mosses are dominant as groundcover.

Invasive species such as reed canary grass is known to occur on the site. Hydrology and nutrient input changes caused by dams, drainage ways, diversions, roads, and structures for example will impact species composition and organic material.

Research is needed to fill information gaps about black spruce-tamarack bogs, especially to advance the

understanding of their classification, ecological processes (e.g., fire), hydrology, floristic variation, characteristic fauna, and bog development and succession.

## State and transition model

### Acidic Peaty Depression— Frigid LRU; RX142X02X003

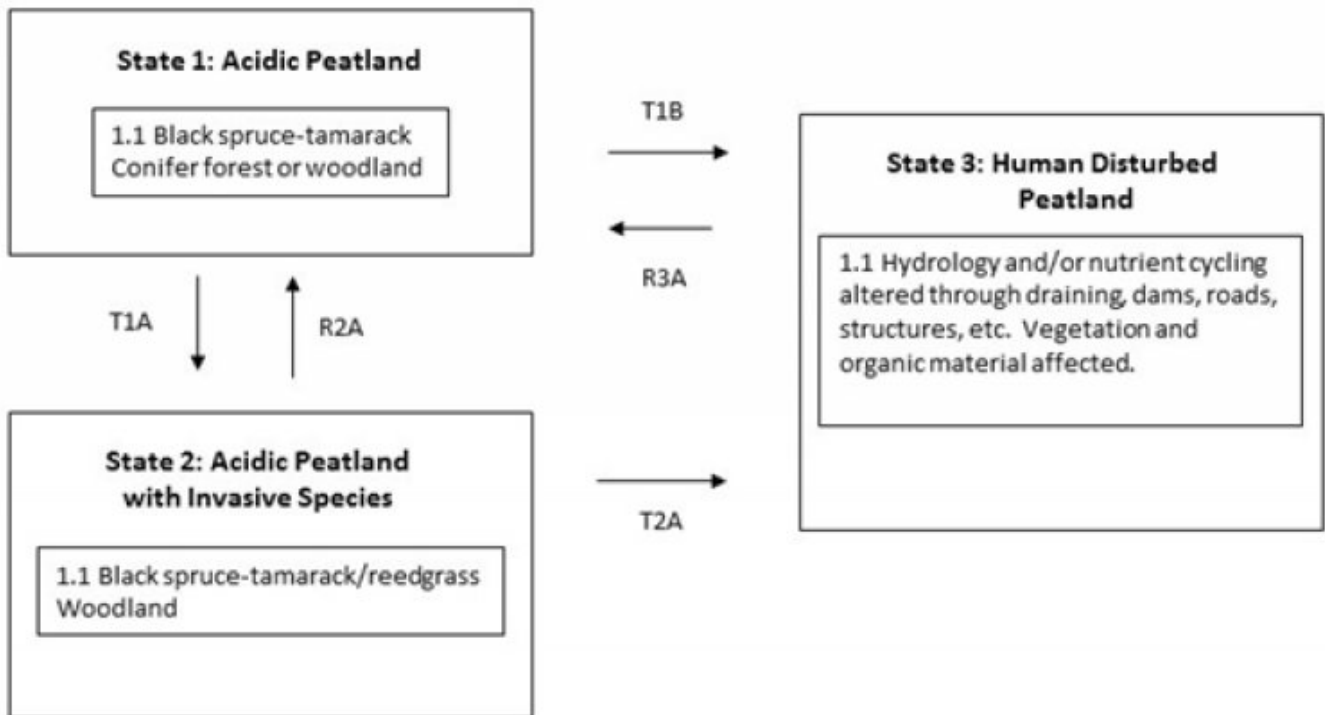


Figure 5. Acidic Peaty Depression

| Transition | Primary Triggers  | Secondary Trigger | Indicator   |
|------------|---|-------------------|---|
| T1A        | Introduction of non-native invasive species                                     |                   | Presence of non-native invasive species   |
| T1B, T2B   | Human development: draining, roads, dams, structures, etc.                      |                   | Loss of organic material, species shifting to accommodate drier conditions and/or mesotrophic/eutrophic conditions. |
| R2A        | Invasive Plant Species Control  |                   |   |
| R3A        | Restoration and Management of Rare and Declining Habitats; Wetland Restoration; |                   | Restoration of ecosystem function.  |

Figure 6. Acidic Peaty Depression

## State 1

### Acidic Peatland

Plant species dominants: Black spruce-tamarick/leatherleaf-sheep laurel/three seeded sedge-pitcherplant/Magellan's peat moss. Tree canopy cover can vary from 20-90% (Edinger 2014) depending on habitat conditions. Shrubs in the heath family (Ericaceous) which are adapted to soils with low fertility or acidic conditions are common in areas with decreased tree canopy. Ponding, beaver activity insect damage, or tree fall are some natural disturbances within the state.

## Community 1.1

### Black spruce-tamarack

Conifer forest or woodland with shrubs. Below is a list of some characteristic plants.

## State 2

### Acidic Peatland with Invasive species

Black spruce-tamarick/leatherleaf-sheep laurel/reed grass Non-native and invasive reed grass (*Phragmites australis*) is present.

## State 3

### Human Disturbed Peatland

Hydrology and/or nutrient cycling altered through draining, dams, roads, structures, etc. Vegetation and organic material affected.

## Restoration pathway R2A

## State 2 to 1

### Conservation practices

|                                |
|--------------------------------|
| Invasive Plant Species Control |
|--------------------------------|

## Restoration pathway R3A

### State 3 to 1

### Conservation practices

|   |
|---|
| Restoration and Management of Rare and Declining Habitats |
|---|

|                     |
|---------------------|
| Wetland Restoration |
|---------------------|

## Additional community tables

Table 5. Community 1.1 forest overstory composition

| Common Name  | Symbol | Scientific Name       | Nativity | Height (Ft) | Canopy Cover (%) | Diameter (In) | Basal Area (Square Ft/Acre) |
|--------------|--------|-----------------------|----------|-------------|------------------|---------------|-----------------------------|
| <b>Tree</b>  |        |                       |          |             |                  |               |                             |
| black spruce | PIMA   | <i>Picea mariana</i>  | Native   | –           | –                | –             | –                           |
| tamarack     | LALA   | <i>Larix laricina</i> | Native   | –           | –                | –             | –                           |

Table 6. Community 1.1 forest understory composition

| Common Name                          | Symbol | Scientific Name                 | Nativity | Height (Ft) | Canopy Cover (%) |
|--------------------------------------|--------|---------------------------------|----------|-------------|------------------|
| <b>Grass/grass-like (Graminoids)</b> |        |                                 |          |             |                  |
| tall cottongrass                     | ERAN6  | <i>Eriophorum angustifolium</i> | Native   | –           | –                |
| threeseeded sedge                    | CATR10 | <i>Carex trisperma</i>          | Native   | –           | –                |
| <b>Forb/Herb</b>                     |        |                                 |          |             |                  |
| purple pitcherplant                  | SAPU4  | <i>Sarracenia purpurea</i>      | Native   | –           | –                |
| threeleaf goldthread                 | COTR2  | <i>Coptis trifolia</i>          | Native   | –           | –                |
| <b>Fern/fern ally</b>                |        |                                 |          |             |                  |
| cinnamon fern                        | OSCI   | <i>Osmunda cinnamomea</i>       | Native   | –           | –                |
| <b>Shrub/Subshrub</b>                |        |                                 |          |             |                  |
| leatherleaf                          | CHCA2  | <i>Chamaedaphne calyculata</i>  | Native   | –           | –                |
| sheep laurel                         | KAAN   | <i>Kalmia angustifolia</i>      | Native   | –           | –                |
| highbush blueberry                   | VACO   | <i>Vaccinium corymbosum</i>     | Native   | –           | –                |
| bog Labrador tea                     | LEGR   | <i>Ledum groenlandicum</i>      | Native   | –           | –                |
| <b>Nonvascular</b>                   |        |                                 |          |             |                  |
| Magellan's sphagnum                  | SPMA70 | <i>Sphagnum magellanicum</i>    | Native   | –           | –                |

## Inventory data references

### Site Development and Testing Plan

Future work, as described in a project plan, to validate the information in this provisional ecological site description is needed. This will include field activities to collect low and medium intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document. Annual reviews of the project plan are to be conducted by the Ecological Site Technical Team.

## Other references



Damman, A . W . H . , and T.W. French. 1987. The ecology of peat bogs of the glaciated Northeastern United States: a community profile. U. S. Fish Wildl. Serv. Biol. Rep. 85(7.16). 100 pp.

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.

USDA-NASS. 2012 Census of Agriculture. St. Lawrence County New York. Accessed on 11/17/17: [https://www.agcensus.usda.gov/Publications/2012/Online\\_Resources/County\\_Profiles/New\\_York/cp36089.pdf](https://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/New_York/cp36089.pdf)

USDA-USFS. Ecological Subregions of the United States. 212E--St. Lawrence and Champlain Valley. Northeastern Forest Experiment Station, Northeastern Area State and Private Forestry, and the Eastern Region. Accessed on 11/17/17: <https://www.fs.fed.us/land/pubs/ecoregions/ch14.html#212E>

## Approval

Nels Barrett, 5/22/2020

## 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  | 06/01/2023        |
| Approved by                                 | Nels Barrett      |
| Approval date                               |                   |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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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:**

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**17. Perennial plant reproductive capability:**

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