

Ecological site F111XB101IN Lacustrine Flatwood

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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): 111X–Indiana and Ohio Till Plain

111B – Indiana and Ohio Till Plain, Northeastern Part. This area is in the Eastern Lake and Till Plains Sections of the Central Lowland Province of the Interior Plains. The entire MLRA is glaciated, and most areas are dominated by ground moraines that are broken in places by lake plains, outwash plains, flood plains, and many recessional moraines. The ground moraines and lake plains in front of the recessional moraines are flat to undulating. In many places stream valleys occur at the leading edge of the recessional moraines. Narrow, shallow valleys commonly are along the major rivers and streams in this MLRA, and some areas along the major rivers and streams have deposits of sand. Elevation ranges from 630 to 1,550 feet (190 to 470 meters), increasing gradually from west to east. Relief is mainly a few meters, but in some areas hills rise as much as 100 feet (30 meters) above the adjoining plains.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Western Lake Erie (0410), 41 percent; Wabash (0512), 28 percent; Scioto (0, 28 percent; Scioto (0506), 10 percent; St. Clair-Detroit (0409), 9 percent; Great Miami (0508), 6 percent; Southeastern Lake Michigan (0405), 5 percent; and Southwestern Lake Huron (0408), 1 percent. The Huron River in Michigan, Cedar Creek in Indiana, and the Sandusky River in Ohio have been designated as National Wild and Scenic Rivers in this MLRA.

The surficial materials in this area include glacial deposits of till, outwash, and lacustrine sediments from Wisconsin and older glacial periods. A thin mantle of loess occurs in some areas. Most of the MLRA is underlain by Silurian and Devonian limestone and dolostone. Middle Devonian to Early Mississippian black shale and Early to Middle Mississippian siltstone and shale are in some areas of the northern part of the MLRA.

Classification relationships

Hierarchical Classification Relationships

Major Land Resource Area (USDA-Natural Resources Conservation Service, 2006)

USFS Ecological Regions (USDA, 2007):

Sections –Central Till Plains, Beech Maple (222H), South Central Great Lakes (222J)

Subsections – Bluffton Till Plains (222Ha), Bluffton-Ann Arbor Till Plains (222Je), Jackson Interlobate Moraine (222Jg), Steuben Interlobate Moraines (222Ji)

NatureServe Systems anticipated (NatureServe, 2011): Agriculture - Cultivated Crops and Irrigated Agriculture, Agriculture – Pasture/Hay, North-Central Interior Beech-Maple Forest, North-Central Interior Wet Flatwoods, Ruderal Forest, Ruderal Upland - Old Field

LANDFIRE Biophysical Settings anticipated (USGS, 2010): North-Central Interior Beech-Maple Forest

Ecological site concept

This site is a wetland site formed on lacustrine parent materials. It is located on lake plains, glacial lake relicts, and flats. The soils have very dark surfaces with a subsurface that is in the loamy textural group, and are very poorly or poorly drained. These soils generally occur on nearly level to depressional areas of stream terraces, till plains, and glacial lake plains. The site is occasionally flooded for a brief duration, but ponding occurs frequently to a depth of 30 inches for up to a month.

The characteristic vegetation of the site is that of a flatwoods type dominated by pin oak and swamp white oak. Black and green ash are also common in the canopy, with silver maple also being present in lower amounts. The large, seasonal fluctuation of water on the site allows for the co-existence of upland and lowland trees. Inundation of the site generally occurs in the spring which leads to a sparse and patchy understory. Fire did occur on the site, but high intensity fires were rare. Low intensity surface fires were more common on sites that are adjacent to more fire prone sites such as prairies and savannas. Ponding in the spring followed by summer drought along with windthrow were the most dominant disturbance factors. The High Graded state occurs after a selective timber harvest that removes the more desirable species, specifically oak species. That results in a site where the canopy is dominated by ash species, silver maple, and black gum. The understory stays relatively unchanged except for the younger age classes of oaks that are either reduced greatly in number or missing completely. A large portion of this site has been drained and is in agricultural production. The majority of the converted acres is used for small grain rotations, specifically corn and soybeans. A much smaller amount of the site is also used for growing forage that is used for pasture or hay production. These sites are predominately cool season grass species and legumes such as tall fescue and clover species.

Associated sites

F111XB102IN	Lacustrine Forest Soils are somewhat poorly or moderately well drained.
F111XB501IN	Till Depression Located on till parent materials

Similar sites

F111XB102IN	Lacustrine Forest Lacustrine Forest
F111XB501IN	Till Depression Till Depression
F111XB201IN	Wet Alluvium Floodplain Wet Alluvium Floodplain.

Table 1. Dominant plant species

Tree	(1) <i>Quercus palustris</i> (2) <i>Quercus bicolor</i>
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This ecological site is found in till plain landscapes in MLRA 111B: Indiana and Ohio Till Plain, Northeastern Part. It developed on lake plains, depressions, outwash plains, till plains, and relict glacial lakes on lacustrine parent material. Slopes range from 0 to 2 percent located on toeslopes.

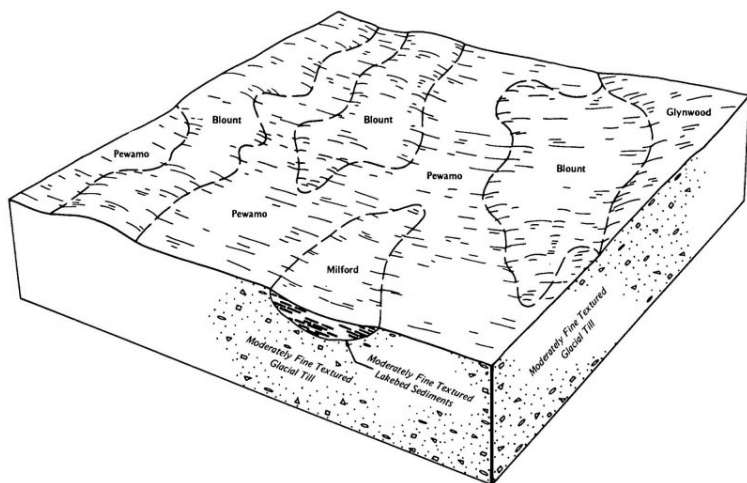


Figure 1. Block diagram showing soil series locations on the landscape.

Table 2. Representative physiographic features

Landforms	(1) Outwash plain (2) Till plain (3) Lake plain
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	162–366 m
Slope	0–2%
Water table depth	0–137 cm
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation in this area is 30 to 39 inches (760 to 990 millimeters). Most of the rainfall occurs as convective thunderstorms during the growing season. About half or more of the annual precipitation occurs during the freeze-free period. Snowfall is common in winter. The average annual temperature is 47 to 52 degrees F (8 to 11 degrees C). The freeze-free period averages about 180 days and ranges from 165 to 195 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	123-144 days
Freeze-free period (characteristic range)	154-178 days
Precipitation total (characteristic range)	889-991 mm
Frost-free period (actual range)	118-146 days
Freeze-free period (actual range)	146-180 days
Precipitation total (actual range)	838-1,016 mm
Frost-free period (average)	134 days
Freeze-free period (average)	166 days
Precipitation total (average)	940 mm

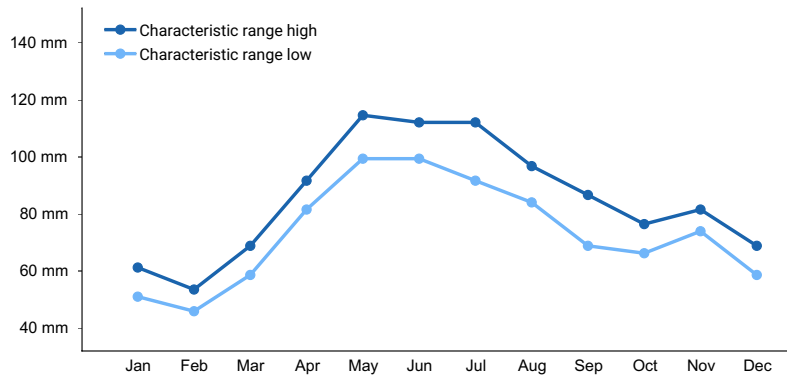


Figure 2. Monthly precipitation range

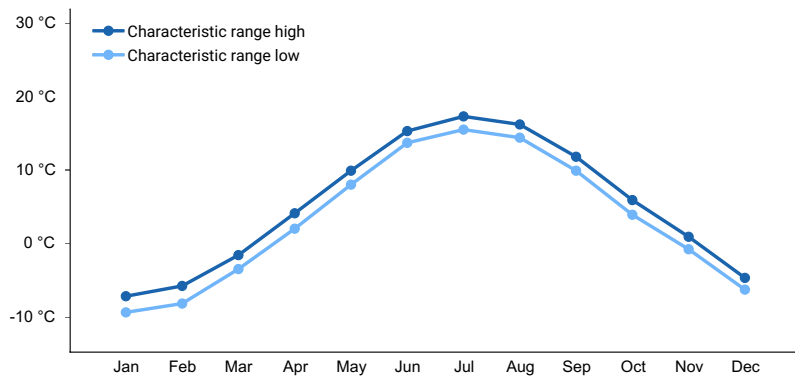


Figure 3. Monthly minimum temperature range

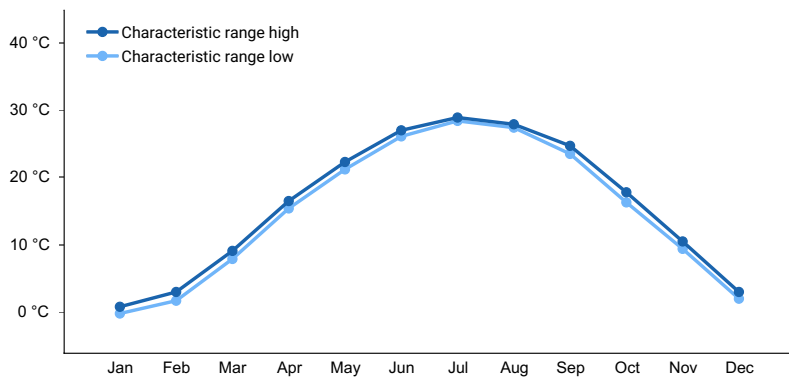


Figure 4. Monthly maximum temperature range

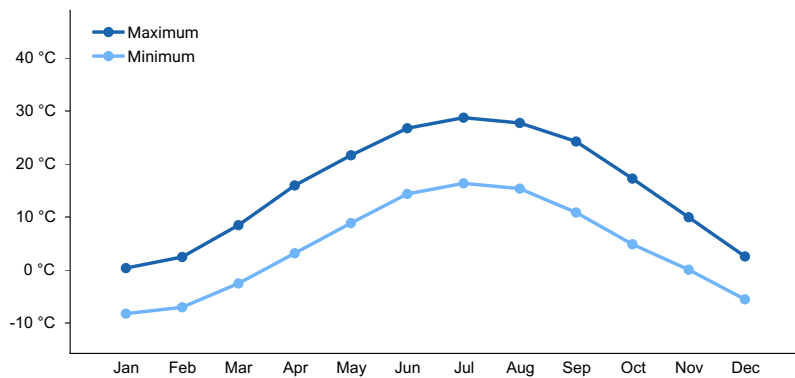


Figure 5. Monthly average minimum and maximum temperature

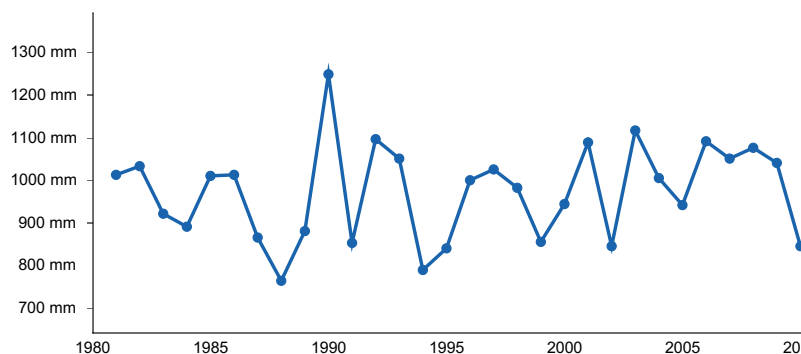


Figure 6. Annual precipitation pattern

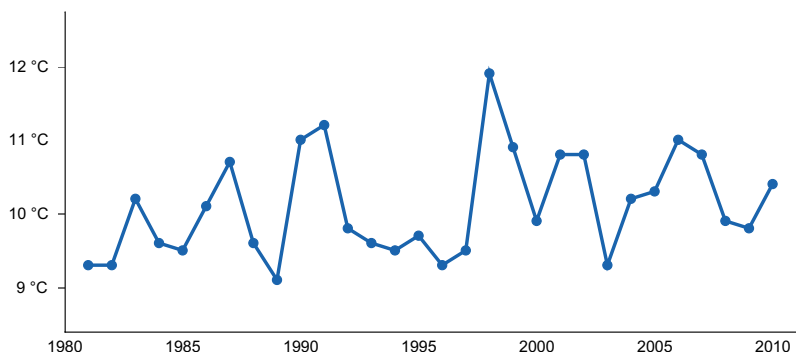


Figure 7. Annual average temperature pattern

Climate stations used

- (1) CELINA 3 NE [USC00331390], Celina, OH
- (2) HUNTINGTON [USC00124181], Huntington, IN
- (3) MARION 2 N [USC00334942], Marion, OH
- (4) FINDLAY AP [USW00014825], Findlay, OH
- (5) COLUMBIA CITY [USC00121739], Columbia City, IN
- (6) HILLSDALE [USC00203823], Hillsdale, MI
- (7) ANN ARBOR MUNI AP [USW00094889], Ann Arbor, MI

Influencing water features

This site is a lake plain wetland that receives water mostly from precipitation, though some water is contributed to the site from adjacent, higher elevation sites. This is a recharge depression as the water, largely, drains from the site to the groundwater system. Flooding can be occasional with a brief (2-7 days) duration. Ponding is often frequent with a duration of brief (2 to 7 days) to long (7 to 30 days). Ponding depth has an average maximum of 30 inches.

Wetland description

The hydrogeographic model classification of this site is MINERAL SOIL FLATS: Lake Plain, Ponded, Flat; forested. This site has a Cowardin Classification of PFO6An; it is a deciduous forested palustrine system that is temporarily ponded on mineral soil.

Soil features

The soil series associated with this site are: Toledo, Sebring, Patton, Minster, Milford, Luray, Lenawee, Latty, Hoytville, Bono. They are very deep, very poorly drained to poorly drained, and very slow to moderate permeable soils, with slightly acidic to neutral soil reaction, that formed in glaciolacustrine deposits and lacustrine deposits.

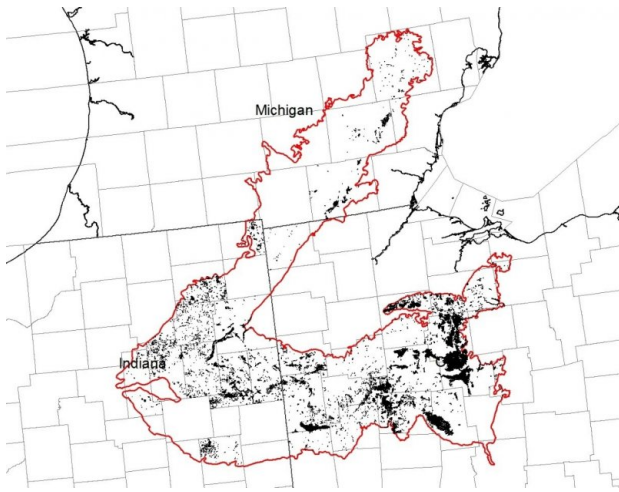


Figure 8. Mapunit locations within the MLRA.

Table 4. Representative soil features

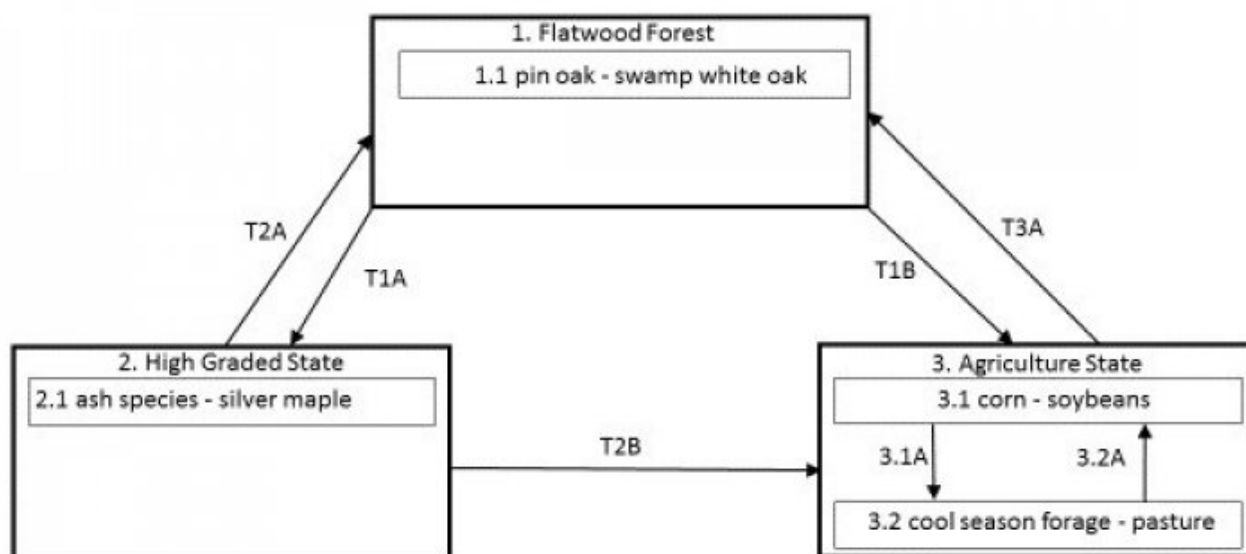
Parent material	(1) Lacustrine deposits
Surface texture	(1) Clay loam (2) Silt loam (3) Mucky silty clay (4) Silty clay loam
Drainage class	Very poorly drained to poorly drained
Permeability class	Very slow to rapid
Depth to restrictive layer	203 cm
Soil depth	203 cm
Surface fragment cover <=3"	0–3%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	11.43–20.57 cm
Calcium carbonate equivalent (Depth not specified)	0–18%
Electrical conductivity (Depth not specified)	0 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0
Soil reaction (1:1 water) (Depth not specified)	6.3–7.9
Subsurface fragment volume <=3" (Depth not specified)	0–4%
Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

The historic plant community of this ecological site is a flatwood forest. The dominant species in the canopy are pin oak and swamp white oak with black ash and green ash being common as well. The soils of this site are very poorly or poorly drained and characterized by seasonal ponding and/or flooding in the spring and much drier in the summer. This seasonal change in water presence limits seed germination and diversity of shrubs and ground layer species. Low intensity, ground fires did occur, especially on sites that bordered more fire prone sites. High intensity, stand replacing fires occurred very rarely. Windthrow is the most common type of canopy level disturbance.

State and transition model

Lacustrine Flatwood, F111BY101IN



Lacustrine Flatwood, F111BY101IN

Diagram Legend

T1A	Selective tree harvest
T1B	Remove woody species, drainage, site preparation, planting, management
T2A	Timber stand improvement and tree planting
T2B	Remove woody species, drainage, site preparation, planting, management
T3A	Drainage removal, planting, TSI management
3.1A	Pasture/forage planting and maintenance
3.2A	Tillage/no-till planting and management of row crops.

State 1 Flatwood Forest

This is the diagnostic plant community of the site. The dominant species in the canopy are pin oak and swamp white oak with black ash and green ash being common, with silver maple in lower numbers. The seasonal change in water presence limited seed germination and diversity of shrubs and ground layer species.

Dominant plant species

- pin oak (*Quercus palustris*), tree
- swamp white oak (*Quercus bicolor*), tree

Community 1.1

Pin Oak - Swamp White Oak

This phase is characterized by a closed to partially open canopy dominated by pin oak and swamp white oak.

Dominant plant species

- pin oak (*Quercus palustris*), tree
- swamp white oak (*Quercus bicolor*), tree

State 2

High Graded State

This phase is characterized by the removal of the more marketable tree species, primarily oak species. The resulting tree species; black/green ash, silver maple, black gum, become the dominant species in the canopy.

Dominant plant species

- pin oak (*Quercus palustris*), tree
- swamp white oak (*Quercus bicolor*), tree

Community 2.1

Ash -Silver Maple Forest

This phase is characterized by the removal of the oaks and the ash/silver maple/black gum dominate the canopy.

State 3

Agriculture State

This state is characterized by the conversion of the site to agricultural use. Most common practice is a corn and soybean rotation of various types. A small portion of the historic acres are used for forage and pasture.

Community 3.1

Corn - Soybean Cropland

This phase is characterized by row crop agriculture, primarily corn and soybeans.

Community 3.2

Cool Season Forage- Pasture

This phase is characterized by forage or grazing agriculture. Different mixes of, generally, cool season grasses and forbs, largely clovers, are grown.

Pathway P3.1A

Community 3.1 to 3.2

Planting of cool season pasture/forage species and management to maintain them.

Pathway P3.2A

Community 3.2 to 3.1

Planting, either by conventional or no-till methods, of row crop. Management that keeps the site in row crop production

Transition T1A

State 1 to 2

Selective tree harvest of the more marketable species, primarily oaks.

Transition T1B

State 1 to 3

Removal of trees and other woody species. Install drainage system, prepare the site for planting the agricultural crop, and regular agricultural practices.

Transition T2A

State 2 to 1

Timber stand improvement practices and planting (if warranted) of desired species.

Transition T2B

State 2 to 3

Removal of trees and other woody species. Install drainage system, prepare the site for planting the agricultural crop, and regular agricultural practices.

Transition T3A

State 3 to 1

Removal of drainage system (if warranted), site preparation, and tree planting.

Additional community tables

Inventory data references

Inventory Data References

Site concept developed through expert opinion, review of the literature, and field work.

Other references

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Approval

Chris Tecklenburg, 5/28/2020

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)	Tyler Staggs
Contact for lead author	
Date	05/19/2024
Approved by	Chris Tecklenburg
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:
