Ecological site F123XY004TN
Deep Loamy Terraces And Depressions

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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): 123X–Nashville Basin

123—Nashville Basin
This area is entirely in Tennessee (fig. 123-1). It makes up about 5,625 square miles (14,580 square kilometers). The cities of Nashville, Franklin, Hendersonville, Columbia, Murfreesboro, and Shelbyville are in this area.

Physiography
Most of this area is in the Nashville Basin Section of the Interior Low Plateaus Province of the Interior Plains. A small part of the northeast corner and the western and southern fourth of the area are in the Highland Rim Section of the same province and division. Most of the outer part of the Nashville Basin is deeply dissected and consists of steep slopes between narrow, rolling ridgetops and narrow valleys. The inner part of the basin is dominantly undulating and rolling. In many areas the land surface is deeply pitted by limestone sinks, and outcrops of limestone are almost everywhere. Elevation generally is about 650 feet (200 meters), but it is 1,000 to 1,325 feet (305 to 405 meters) on isolated hills and is as low as 450 feet (135 meters) in some of the more deeply cut stream channels.

Geology
The bedrock geology in this area consists of Ordovician limestone exposed by geologic erosion of the top of the Nashville Dome (a high part of the Cincinnati Arch) throughout this area. Sinkholes are common in the limestone and are either open to the subsurface or are covered by soils and colluvium that have collected in the depressions formed on the land surface above the sinkhole. Younger rocks occur as a rim just outside this area. Surficial deposits include loess on the less eroded landforms and alluvium along the rivers

and streams.

Source: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the
Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Classification relationships

South-Central Interior Large Floodplain
(CES202.705)

South-Central Interior Small Stream and Riparian (CES 202.706)

Ecological site concept

This PES describes a mixed oak forest community on well-drained and moderately well-drained soils the Nashville Basin area of Tennessee. Multiple tree species may be dominant on these sites. ESD development will refine this PES group.

Associated sites

| F123XY005TN | **Floodplains** |
| | Floodplains |

Table 1. Dominant plant species

Tree	(1) *Quercus*
	(2) *Liriodendron tulipifera*
Shrub	(1) *Asimina triloba*
	(2) *Frangula caroliniana*
Herbaceous	(1) *Parthenocissus quinquefolia*
	(2) *Podophyllum peltatum*

Physiographic features

This ecosite is found on hills, basins, and plateaus in MLRA 123. NASIS lists the unique landforms for these mapunits stream terraces, flats, and hills.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace
	(2) Flat
	(3) Hill

Runoff class	Low to medium
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	107–396 m
Slope	1–60%
Water table depth	41–107 cm
Aspect	Aspect is not a significant factor

Climatic features

Climate:

The average annual precipitation in this area is 48 to 57 inches (1,220 to 1,450 millimeters). The maximum precipitation occurs in midwinter and early in spring, and the minimum occurs in autumn. Rainfall primarily occurs during high-intensity, convective thunderstorms. Some snow occurs in winter, but it does not remain on the ground for long periods.

The average annual temperature is 56 to 60 degrees F (14 to 16 degrees C). The freeze-free period averages 210 days and ranges from 195 to 230 days. The longer freeze-free periods occur in the southern part of the area.

Source: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Table 3. Representative climatic features

| Frost-free period (characteristic range)	165-173 days
Freeze-free period (characteristic range)	188-202 days
Precipitation total (characteristic range)	1,321-1,422 mm
Frost-free period (actual range)	162-174 days
Freeze-free period (actual range)	181-208 days
Precipitation total (actual range)	1,245-1,422 mm
Frost-free period (average)	169 days
Freeze-free period (average)	195 days
Precipitation total (average)	1,372 mm
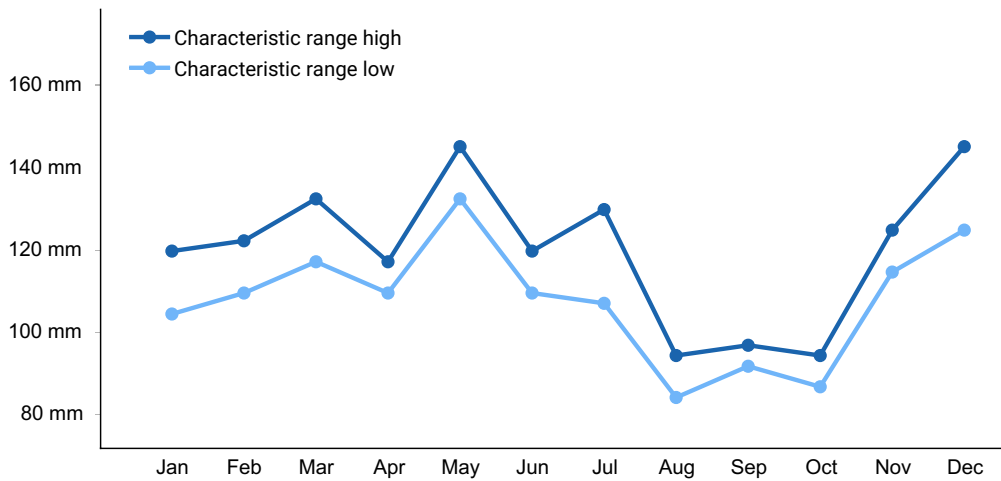
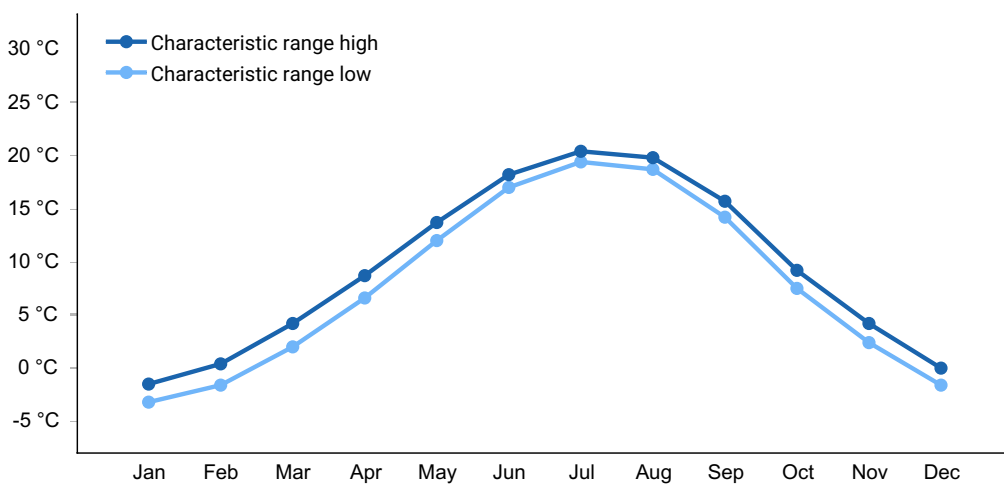**Figure 1. Monthly precipitation range**

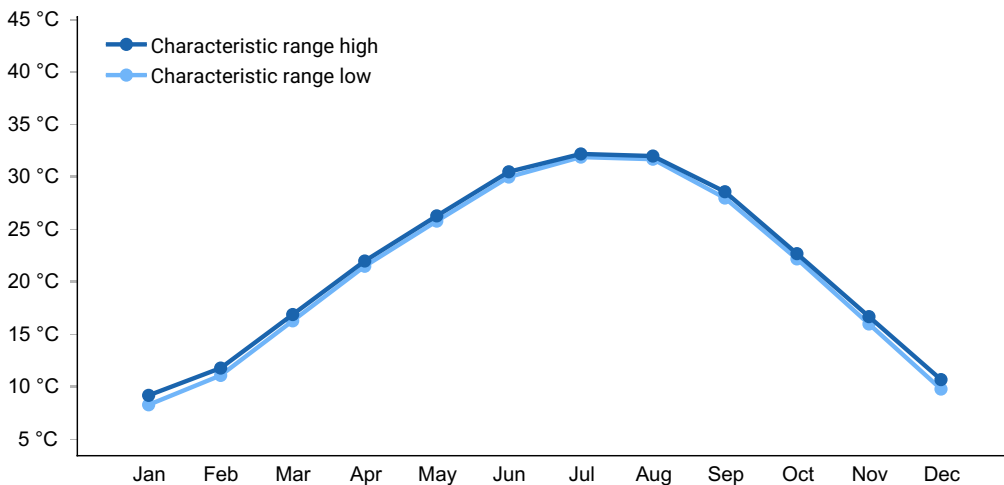**Figure 2. Monthly minimum temperature range**

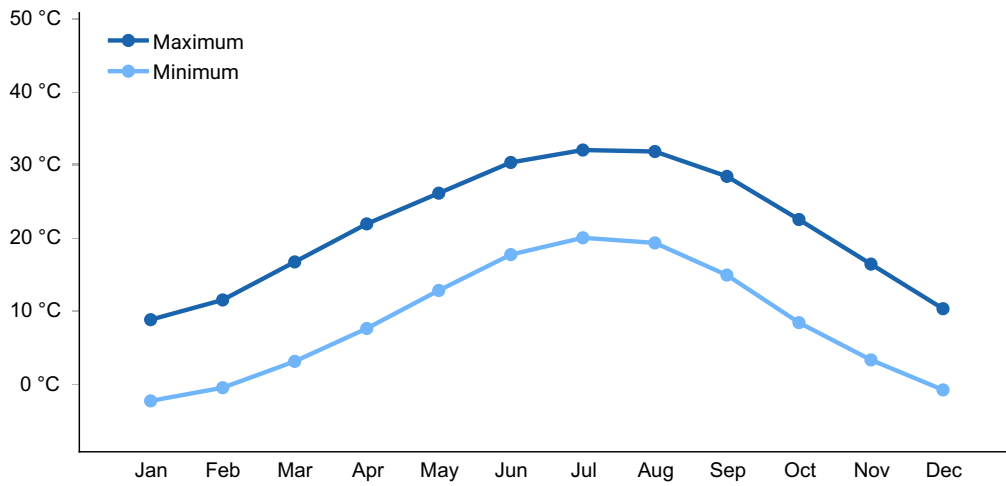**Figure 3. Monthly maximum temperature range**

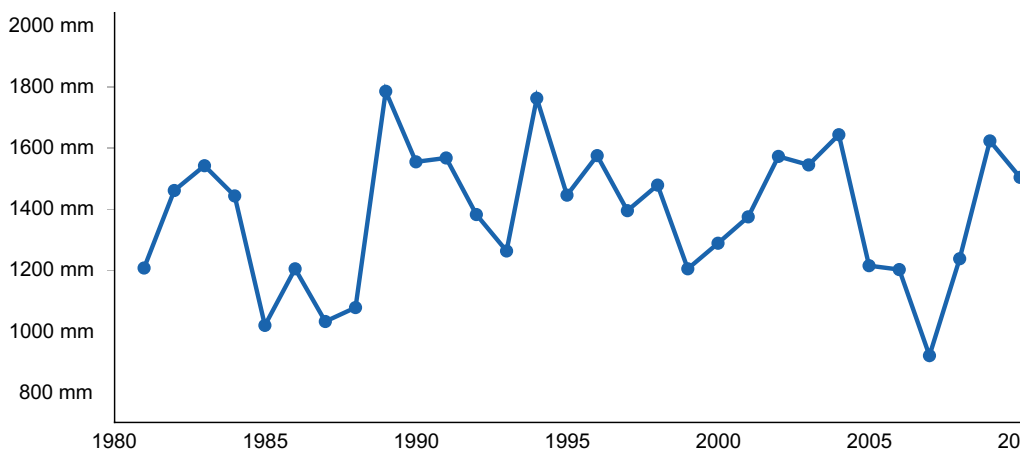**Figure 4. Monthly average minimum and maximum temperature**

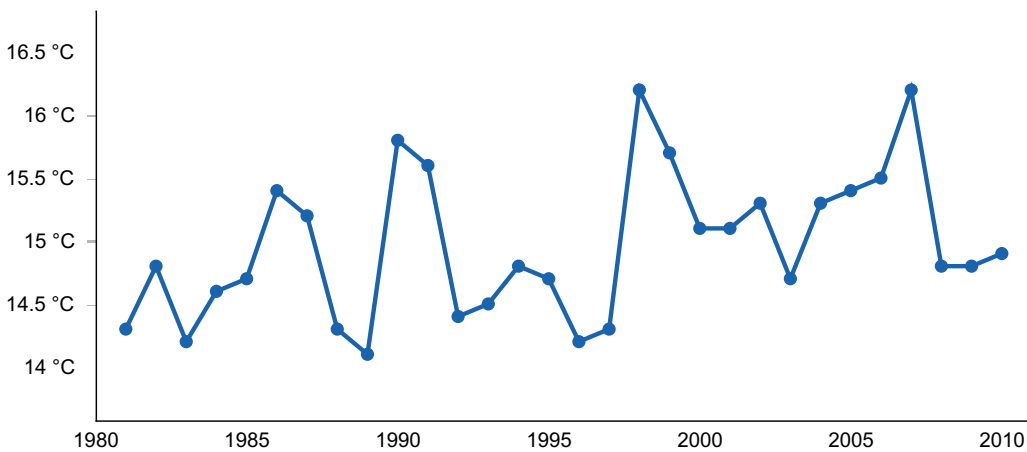**Figure 5. Annual precipitation pattern**

Figure 6. Annual average temperature pattern

Climate stations used

- (1) GAINESBORO [USC00403370], Gainesboro, TN
- (2) COLUMBIA 3 WNW [USC00401957], Columbia, TN
- (3) FAYETTEVILLE WTP [USC00403074], Fayetteville, TN
- (4) NASHVILLE INTL AP [USW00013897], Nashville, TN

Influencing water features

Some mapunits in this group may undergo occasional flooding.

Soil features

Soils in this group are shallow to deep, moderately well drained to well drained, and slow to moderately rapid permeable soils.

Soils in this group have different depths and drainage. Multiple ESDs will likely be developed from this initial PES group.

Table 4. Representative soil features

Parent material	(1) Colluvium–limestone (2) Alluvium–limestone and shale (3) Loess–limestone, sandstone, and shale
Surface texture	(1) Gravelly silt loam (2) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderately rapid
Soil depth	51–165 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.16–20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5–6
Subsurface fragment volume <=3" (Depth not specified)	0–45%
Subsurface fragment volume >3" (Depth not specified)	0–40%

Ecological dynamics

Provisional Ecological Site (PES): F123XY004TN - Deep Loamy Terraces and Depressions
Major Land Resource Area (MLRA) 123

This PES describes ecological communities likely to be found on soil in the PES soil grouping. Future field work is required to develop detailed and accurate ecological site descriptions (ESDs) that can be used by conservation planners for restoration and planning activities. This PES describes hypotheses based on available data from many different sources and scales and has not been developed using site specific ecological field monitoring. Future ESD development will result in this initial PES group being split into more refined ecological communities.

The main soil series currently included in this PES group are Armour, Byler, Dellrose, Harpeth, Hicks, Hillwood, Lomond, Nesbitt, and Sykes.

Forest Vegetation as listed in Official Series Descriptions (OSDs):

Armour: The native vegetation was mixed hardwoods including oaks, hickory, elm, hackberry, maple, beech, black walnut, ash, locust, yellow-poplar, and red cedar.

Byler: Most of the soil has been cleared and is used for growing pasture, hay, soybeans, small grain, grain sorghum, and silage crops. A small acreage is in forest dominantly hickory, oak, hackberry, red cedar, and elm.

Dellrose: The native vegetation is hardwoods, chiefly beech, hickory, oaks, yellow poplar, hackberry, black walnut, and locust.

Harpeth: Nearly all areas are cleared and used for growing row crops, pasture and hay. Crops commonly grown are corn, soybeans, tobacco, small grains and alfalfa. The native vegetation was mixed hardwoods such as oaks, hickories, beech, sweetgum and popular.

Hicks: Most of the soil is cleared and used for growing hay, pasture, small grains, tobacco, corn and vegetables. The native vegetation was mixed hardwoods.

Hillwood: Most areas of this soil have been cleared and are used as pasture. Forested areas are chiefly oak, hickory, elm, hackberry, and red cedar.

Lomond: These soils are used to grow hay, pasture, small grains, corn, tobacco, cotton, and soybeans. A small amount is in forest consisting of mixed hardwoods.

Nesbitt: Hay, pasture, corn, small grain, and tobacco. Native vegetation was mixed hardwoods.

Sykes: Most areas of this soil are used for corn, tobacco, small grain, hay and pasture. The native vegetation was mixed hardwoods including oak, hickory, elm, hackberry, locust, yellow poplar and black walnut.

Trees-on-site as listed in the USDA-NRCS Tennessee County Soil Surveys for MLRA 123 on these soils include: southern red oak, northern red oak, white oak, tulip poplar, hickories, black walnut, eastern red cedar, loblolly pine, and shortleaf pine. The most common tree species were southern red oak, northern red oak, white oak, and tulip poplar.

Trees-on-site as listed in the USDA NRCS NASIS database for PES soil mapunits include: southern red oak, northern red oak, white oak, sweetgum, "hybrid hickory", shagbark hickory, black walnut, black cherry, tulip poplar, loblolly pine, shortleaf pine, eastern red cedar, cherrybark oak, American elm, and American sycamore.

Ecological Dynamics
This PES describes a mixed oak forest community on well-drained and moderately well-drained soils the Nashville Basin area of Tennessee. Multiple tree species may be dominant on these sites with variations due to aspect, drainage, seed sources, present management, disturbance history, fire regime, topography, occasional flooding and the presence or absence of a fragipan layer.

Future field work is required to develop full ecological site descriptions (ESDs), a field-based state and transition model, and accurate plant community phases to support conservation or restoration planning.

State 1. (Reference)
State 1, Phase 1.1:
Plant species dominants:
Oaks (Quercus spp.) – tulip poplar (*Liriodendron tulipifera*) / paw paw (*Asimina triloba*) – Carolina buckthorn (*Frangula caroliniana*) / Virginia creeper (*Parthenocissus quinquefolia*) - mayapple (*Podophyllum peltatum*)

Oaks on these sites may include white oak (*Q. alba*), southern red oak (*Q. falcata*), Shumard oak (*Q. shumardii*), and northern red oak (*Q. rubra*). Other hardwoods include tulip poplar (*Liriodendron tulipifera*), maples (Acer spp.), ashes (Fraxinus spp.), hickories (Carya spp.), American elm (*Ulmus americana*), black walnut (*Juglans nigra*), black cherry (Prunus serotine), sweetgum (*Liquidambar styraciflua*) and hackberry (*Celtis occidentalis*).

A robust and diverse herbaceous layer consisting of a variety of herbs, forbs and vines is found on these sites.

State 2. Pastureland
State 2, Phase 2.1: Managed Pasture.
Plant species dominants: *Schedonorus arundinaceus* (tall fescue)

Plant species within pasture phases depend on seeding, management, and concurrent land uses. As with all sites, soil characteristics and management inputs will influence production levels.

Many species of warm-season or cool-season grasses are feasible for these sites. Common forage species include tall fescue, orchard grass, Johnson grass, and timothy.

Management of pasture sites should follow conservation planning standards and protocols which will benefit water quality, forage production, and soil health.

Transitioning this state to a reference condition would likely require extensive and long-term timber stand improvement practices including control of non-native vegetation and management for desired native tree, shrub and understory species.

State 3. Transitional Field
State 3, Phase 3.1: Plant species dominants: tulip poplar (*Liriodendron tulipifera*) - Eastern red cedar (*Juniperus virginiana*) / tall ironweed (*Vernonia gigantea*n)- tall fescue (*Schedonorus arundinaceus*)

Tree species would be dependent upon several factors including severity and duration of disturbance, adjacent plant communities, available seed sources, post-disturbance management (control of invasive plants, grazing, etc.). A wide range of hardwoods is possible and may include tulip poplar, maples, ashes, locusts, black cherry, blackhaw, eastern red cedar, pines, and if seed sources are nearby, oaks and hickories. Common shrubs would be berries, roses, and sumac.

Transitioning this state to a reference condition will require timber stand improvement practices to control non-native vegetation and manage for higher quality oak or hickory species.

State 4. Croplands
Dependent upon seeding and management. Corn and soybeans are common.

Abandonment of cropland would result in weed species taking over the site. Dozens of species are possible depending on the seed sources. Initially annual weeds would predominate followed annual and perennial grasses, shrubs, and finally, pioneer tree species such as pines, eastern red cedar, locusts, maples, ashes, and tulip poplar. Restoration would be required to return this State to a reference community, including oak and hickory regeneration, control of non-native vegetation, and planting of native understory species. Protection from disturbance (grazing) would also be required.

Quercus michauxii - Quercus shumardii - Liquidambar styraciflua / Arundinaria gigantea
Swamp Forest
Translated Name: Swamp Chestnut Oak - Shumard Oak - Sweetgum / Giant Cane
Swamp Forest
Common Name: Swamp Chestnut Oak - Sweetgum Mesic Floodplain Forest
Unique Identifier: CEGL002099
Classification Approach: International Vegetation Classification (IVC)
Summary: This swamp chestnut oak - hardwood forest is a bottomland community found in the central and south-central United States along borders and first bottoms of rivers, streams, and swamps, particularly along the Mississippi River, Ohio River, Tennessee River and their tributaries. Soils which support this association are deep, moist, rich, loamy, typically somewhat acidic to circumneutral, and well-drained. Short periods of inundation in the fall and winter can occur. Canopy diversity can be high in this community. Stands are typically dominated by *Quercus michauxii*, *Quercus shumardii*, *Liquidambar styraciflua*, and *Carya laciniosa*. Other hickories which can be present include *Carya ovata* and Carya alba. Canopy closure is at or near 100%. The subcanopy is dense and dominated by *Carpinus caroliniana* and *Ulmus alata*. Dominant shrubs include *Ilex decidua*, *Cornus foemina*, and *Viburnum dentatum*. The herbaceous layer is dense and dominated by Carex spp. and a diverse and varied assemblage of grasses and forbs, including *Arundinaria gigantea* which often forms dense, almost impenetrable stands particularly where canopy openings allow sunlight to reach the forest floor. Vines are prevalent in the subcanopy and understory of this community; the most commonly encountered are *Toxicodendron radicans*, *Campsis radicans*, and *Parthenocissus quinquefolia*.
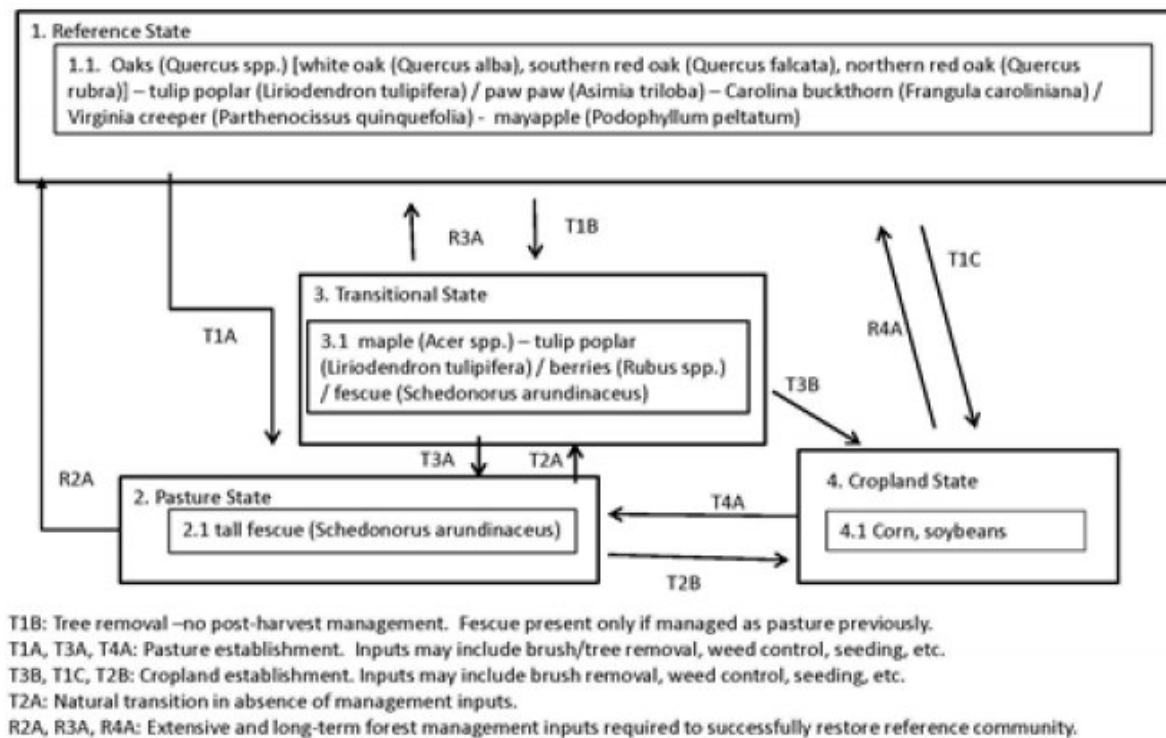
State and transition model

Figure 7. DeepLoamyTerraces&Depressions

Inventory data references

Site Development and Testing Plan
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.

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Approval

Matthew Duvall, 5/13/2025

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	05/21/2025
Approved by	Matthew Duvall
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:**

_____