USDA Natural Resources
Conservation Service

Ecological site F122XY004KY
Loess Veneered Uplands

Last updated: 5/14/2025
Accessed: 02/11/2026

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): 122X–Highland Rim and Pennyroyal

122—Highland Rim and Pennyroyal
This area is in Tennessee (47 percent), Kentucky (43 percent), Indiana (7 percent), and Alabama (3 percent). It makes up about 21,530 square miles (55,790 square kilometers). Bloomington, Indiana, is in the small part of this area that juts into southern Indiana. The towns of Bowling Green, Fort Knox, and Hopkinsville, Kentucky, Clarksville, Tennessee, and Athens, Alabama, are in this MLRA. Interstates 24, 40, and 65 cross this area. The historic Natchez Trace (Natchez Trace Parkway) crosses the southeast part of the area. Fort Knox and Fort Campbell Military Reservations are in this MLRA. The Arnold Engineering Development Center, which is a National Natural Landmark, and the Land Between the Lakes, which is a Biosphere Reserve, are in the part of this area in Kentucky. The Biosphere Reserve lies between Kentucky Lake and Lake Barkley, formed on the Tennessee and Cumberland Rivers by dams in Kentucky.

Physiography
This area is in the Highland Rim Section of the Interior Low Plateaus Province of the Interior Plains. It is a plateau consisting of low, rolling hills, upland flats, and narrow valleys. Steep slopes occur where the encircled Nashville Basin cuts into the area and along the western edge bordering the Coastal Plain. Elsewhere, except for steep walls and hillsides along deeply cut stream channels, the topography generally is gently rolling to strongly rolling and is interrupted in a few areas by broad upland flats and shallow basins. In many areas the land surface is pitted by limestone sinks. Elevation generally is 660 to 980 feet (200 to 300 meters). It ranges from about 330 feet (100 meters) along the deepest valley floors to about 1,310 feet (400 meters) on the crest of isolated hills.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Cumberland (0513), 39 percent; Green (0511), 22 percent; Lower Tennessee (0604), 16 percent; Middle Tennessee-Elk (0603), 11 percent; Lower Ohio (0514), 9 percent; and Wabash (0512), 3 percent.

The headwaters of the Kentucky, Green, and Cumberland Rivers occur in the part of this area in Kentucky. The Ohio River forms the boundary between Indiana and Kentucky in this MLRA. The Tennessee River follows the western edge of the part of this area in Tennessee. The Cumberland River also is in this area. The Buffalo River, in Tennessee, has been designated a National Wild and Scenic River.

Geology
Most of this area is underlain by Ordovician- to Mississippian-age limestone and dolomite that has been exposed through erosion of the Cincinnati Arch. Parts of these rocks are covered by a layer of clay as much as 80 feet thick. Karst areas are common where the layer of clay does not occur. In the northernmost part of the MLRA, in Indiana, a sizable area is underlain by shale, sandstone, and limestone. Much of the bedrock on uplands and ridges is covered by a loess cap. Significant sand and gravel deposits occur on the valley floor and on terraces along the major rivers.

Soils
The dominant soil orders in this MLRA are Alfisols, Inceptisols, and Ultisols. The soils in the area dominantly have a mesic soil temperature regime, an udic soil moisture regime, and mixed or siliceous mineralogy. They are moderately deep to very deep, generally moderately well drained or well drained, and loamy or clayey.

Paleudalfs formed in residuum (Baxter and Vertrees series) and loess over residuum or old alluvium (Crider, Hammack, and Pembroke series) on hills and ridges.

Hapludalfs (Caneyville series) and Hapludults (Frankstown series) formed in residuum on hills and ridges.

Fragiudalfs (Bedford and Nicholson series) and Fragiudults (Dickson series) formed in loess over residuum on hills and ridges.

Eutrudepts formed in residuum on hills (Garmon series) and in alluvium on flood plains (Nolin series).

Paleudults formed in residuum on uplands (Frederick series) and in loess over residuum on ridges and plateaus (Mountview series).

Fluvaquents (Newark series) formed in alluvium on floodplains.

Excerpt from 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

Scientific Name: Southern Interior Low Plateau Dry-Mesic Oak Forest
Unique Identifier: CES202.898 (NatureServe)

Possible NatureServe Association(s):

Quercus alba - *Quercus rubra* - Quercus muehlenbergii / *Cercis canadensis* Forest
Translated Name: White Oak - No
Common Name: White Oak - Mixed Oak Dry-Mesic Alkaline Forest
Unique Identifier: CEGL002070
Classification Approach: International Vegetation Classification (IVC)

Ecological site concept

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This PES describes hypotheses based on available data of many different scales and sources and has not been developed utilizing site-specific ecological field monitoring. This PES also does not encompass the entire complexity or diversity of these sites. Additional field studies would be required for detailed conservation planning or to develop a comprehensive and science-based native plant restoration plan for these sites.

State 1. Forestland

Only two tree species can be selected for entry into the database as dominants; however, multiple tree species may be dominant on these sites and it will vary depending on aspect, soil depth, seed sources, management, and disturbance history.

Phase 1.1: Plant species dominants:
White oak – northern red oak / redbud / Virginia creeper – Jack-in-the-pulpit
(*Quercus alba* - *Quercus rubra* / *Cercis canadensis* /*Parthenocissus quinquefolia* -*Arisaema triphyllum*)

Forests on these sites are generally mixed oak or oak-hickory. In areas with more topography, the north and east slopes may show an increase in shade tolerant hardwood species such as maples, ashes, or poplar. Understory communities are usually well-developed and contain herbs and forbs. The shrub layer is usually sparse in older, reference type communities but may be dense in successional stages.

Depending upon external influences such as fire and site management history, tree species may include various oaks, hickories, maples, dogwoods, ashes, and elms.

The absence of a natural fire regime and a history of disturbances (logging, grazing, etc.) are influences that will move this community from an old growth mixed-oak or oak-hickory community to a more mesic hardwood community.

This state may in impacted by the invasion of non-native honeysuckle within the understory.

Additional States and Phases are described in the Community Phase Data Section.

Similar sites

F122XY005KY	**Moderately Deep Well Drained Uplands** Moderately Deep Well Drained Uplands

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus rubra*
Shrub	(1) *Cercis canadensis*
Herbaceous	(1) *Parthenocissus quinquefolia* (2) *Arisaema triphyllum*

Physiographic features

These sites have a silty loess mantle and are on uplands.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Flat
Runoff class	Very low to high
Flooding frequency	None
Ponding frequency	None
Elevation	370–1,350 ft
Slope	0–20%
Water table depth	60 in
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Climate
The average annual precipitation in this area is 43 to 63 inches (1,090 to 1,600 millimeters), increasing to the south. The maximum precipitation occurs in winter and early in spring, and the minimum occurs in fall. Most of the rainfall occurs as high-intensity, convective thunderstorms. Snowfall may occur in winter. The average annual temperature is 52 to 60 degrees F (11 to 16 degrees C), increasing to the south. The freeze-free period averages 210 days and ranges from 185 to 235 days. The longer freeze-free periods occur in the more southerly parts of the area.

(Excerpt from 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)	156-163 days
Freeze-free period (characteristic range)	183-193 days
Precipitation total (characteristic range)	49-57 in
Frost-free period (actual range)	153-164 days
Freeze-free period (actual range)	179-194 days
Precipitation total (actual range)	47-59 in
Frost-free period (average)	159 days
Freeze-free period (average)	188 days
Precipitation total (average)	53 in

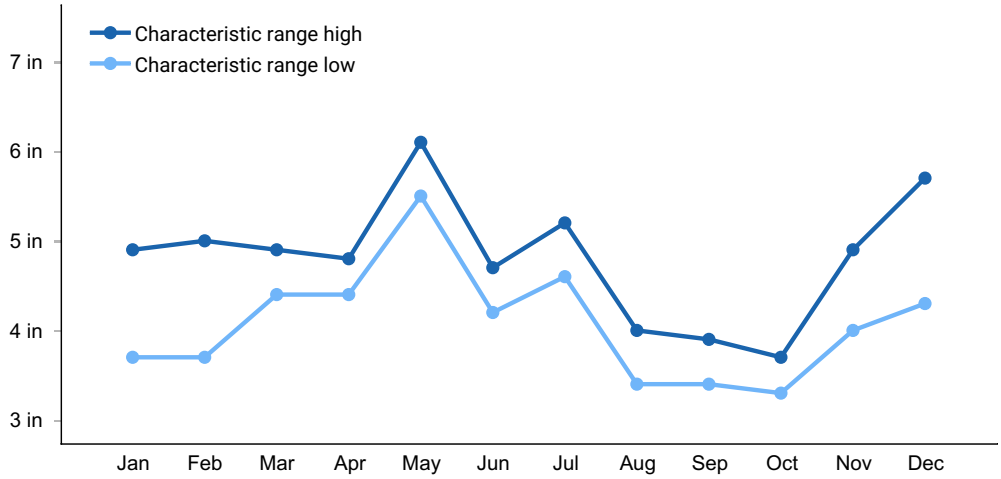

Figure 1. Monthly precipitation range

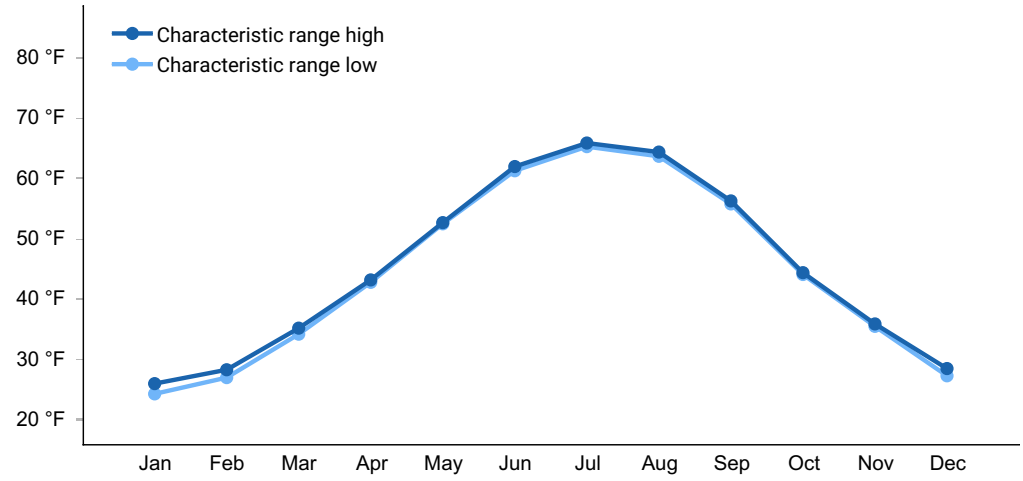

Figure 2. Monthly minimum temperature range

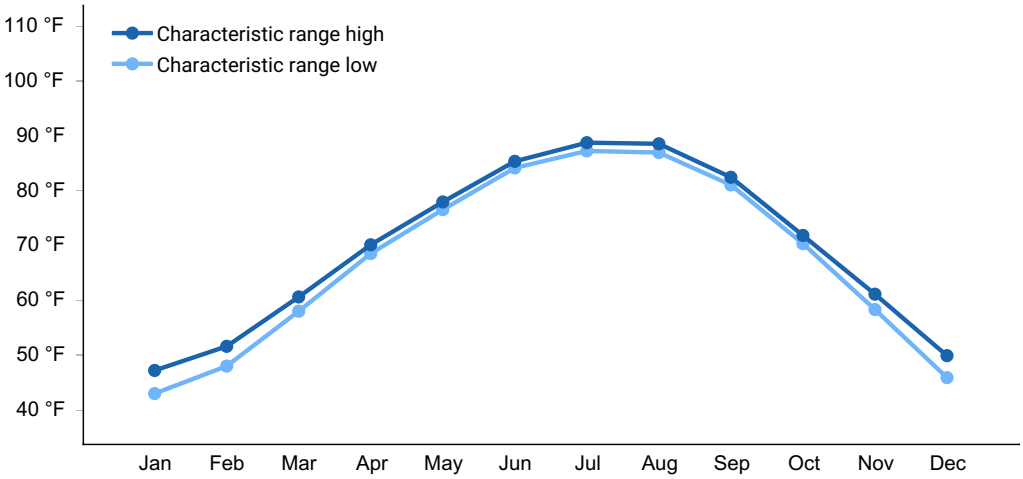

Figure 3. Monthly maximum temperature range

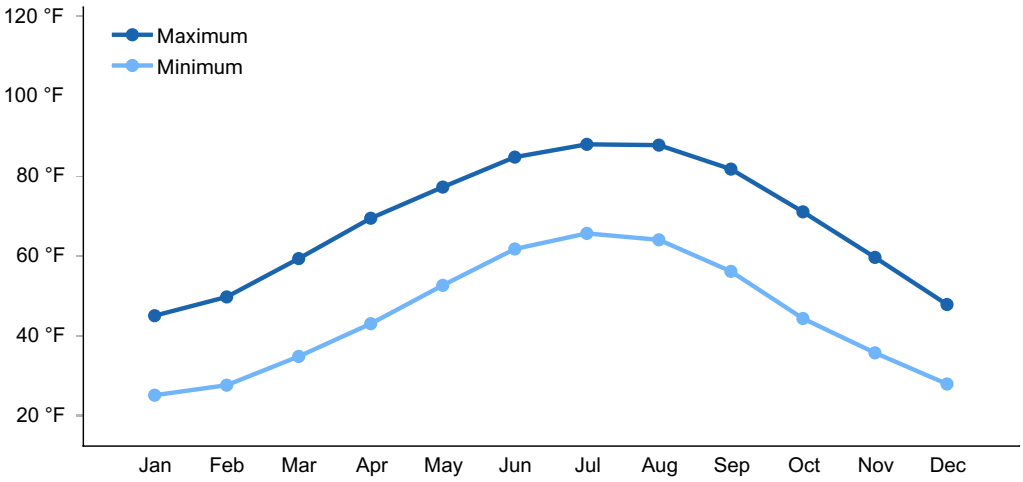

Figure 4. Monthly average minimum and maximum temperature

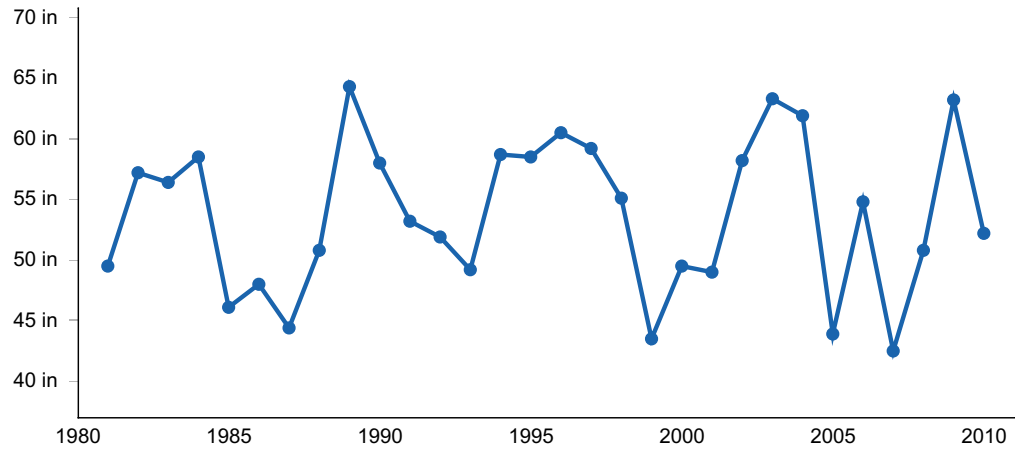

Figure 5. Annual precipitation pattern

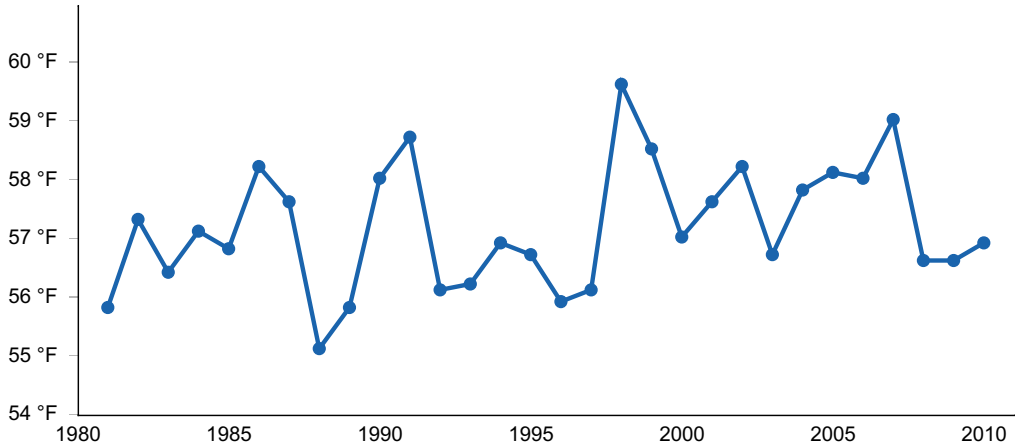

Figure 6. Annual average temperature pattern

Climate stations used

- (1) GREENSBURG [USC00153430], Greensburg, KY
- (2) COOKEVILLE [USC00402009], Cookeville, TN
- (3) WAYNESBORO [USC00409502], Waynesboro, TN
- (4) SALEM [USC00127755], Salem, IN

Influencing water features

there are no influencing water features on these sites.

Soil features

Soils on these sites are deep to very deep and covered with a loess mantle. Sites are on uplands.

Table 4. Representative soil features

Parent material	(1) Residuum–limestone

Surface texture	(1) Loam (2) Silt loam (3) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	45–100 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	7–11 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	4.5–6
Subsurface fragment volume <=3" (Depth not specified)	0–16%
Subsurface fragment volume >3" (Depth not specified)	0–6%

Ecological dynamics

4-Loess Veneered Uplands

Individual sites deserve a detailed understanding before conservation and restoration practices are implemented; therefore, it should be noted that the communities described in this provisional document reflect plant communities that are likely to be found on these soils and have not been field verified. Therefore, this PES describes hypotheses based on available data of many different scales and sources and has not been developed utilizing site-specific ecological field monitoring. This PES also does not encompass the entire complexity or diversity of these sites. Field studies would be required to develop a comprehensive and science-based native plant restoration plan for these sites.

State 1. (Reference)
Phase 1.1: Plant species dominants:
White oak – northern red oak / redbud / Virginia creeper – Jack-in-the-pulpit

(*Quercus alba - Quercus rubra / Cercis canadensis /Parthenocissus quinquefolia -Arisaema triphyllum*)

Narrative: Forests on these well drained, loamy, sites are generally mixed oak or oak-hickory with successional communities of oak-cedar. In areas with more topography, the north and east slopes may show an increase in shade tolerant hardwood species such as maples. Understory communities are usually well-developed and contain herbs and forbs that thrive on limestone soils. The shrub layer is usually sparse in older, reference type communities but may be dense in successional stages.

Depending upon external influences such as fire and site management history, tree species may include white oak, northern red oak, black oak, black walnut, shagbark hickory, eastern redbud, dogwood, and white ash. (*Quercus alba*, *Quercus rubra*, *Quercus velutina*, *Juglans nigra*, *Carya ovata*, *Cercis canadensis*, *Cornus florida*, and *Fraxinus americana*.).

Field work and site inspections are needed to determine the typical composition and dominance of understory species.

Shrubs and vines on these sites may include coralberry, spicebush, Virginia creeper, and poison ivy. (*Symphoricarpos orbiculatus*, *Lindera benzoin*, *Parthenocissus quinquefolia*, and *Toxicodendron radicans*).

The absence of a natural fire regime and a history of disturbances (logging, grazing, etc.) are influences that will move this community from an old growth mixed-oak or oak-hickory community to a more mesic hardwood community. Long-term lack of a natural fire regime or human disturbances can create a more mesic, shady environment which enhances the reproduction of quick growing, fire intolerant, shade-tolerant species such as maples and reduces the successful regeneration of oaks and hickories.

This state may in impacted by the invasion of non-native honeysuckle within the understory. Lonicera spp. (usually L. maackii in central Kentucky) alters the native plant communities due to shade and competition. Long-term, multi-year control efforts are required to control this aggressive non-native plant and restore native woodlands.

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

Narrative: Plant species within all of these pasture phases is dependent on seeding, weed control, concurrent land uses, on-going levels of disturbance, and landowner goals. Individual site and soil characteristics, along with management activities, will influence production levels.
Many other species of grass, both warm and cool season, are available and suitable for these sites.

State: 3 – Transitional (Abandoned Field)
Phases 3.1: Plant species dominants: *Juniperus virginiana*/ Rubus spp. - *Rosa multiflora*/ *Vernonia gigantea* -*Schedonorus arundinaceus*
Eastern red cedar /blackberry – multiflora rose/ ironweed- tall fescue

Narrative: Tree species regeneration on these sites will depend on the severity and duration of disturbance, soil characteristics, adjacent plant communities and seed sources, post-disturbance management inputs, presence or absence of continued site disturbances (grazing), slope, and aspect.

Transitioning this state to a reference condition will likely require timber stand improvement practices to control non-native vegetation and manage for desired hardwood species.
It would require years of management, plantings, and weed control to establish successional communities that could transition to a reference community.

State 4: Phase 4.1. Abandoned Croplands
Plant species dominant:
henbit deadnettle (*Lamium amplexicaule*) – mouse-eared chickweed (Cerastium L.)

Abandonment of cropland would result in many weed species taking over the site. Initially, annual weeds would be predominate followed by grasses, shrubs and finally, pioneers trees.

It would require years of management, plantings, and weed control to establish successional communities that could transition to a reference community.

State 5: Phase 5.1. Cropland
Dependent upon seeding and management. Most common crops are corn and soybeans.

It would require years of management, plantings, and weed control to establish successional communities that could transition to a reference community.

TO VALIDATE THE INFORMATION IN THIS PROVISIONAL ECOLOGICAL SITE DESCRIPTION FUTURE FIELD WORK IS NEEDED. This will include field inspection and data collection including medium to high intensity sampling, soil correlations, and analysis of that data.

A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce a document to be utilized for on-site conservation planning.

State and transition model

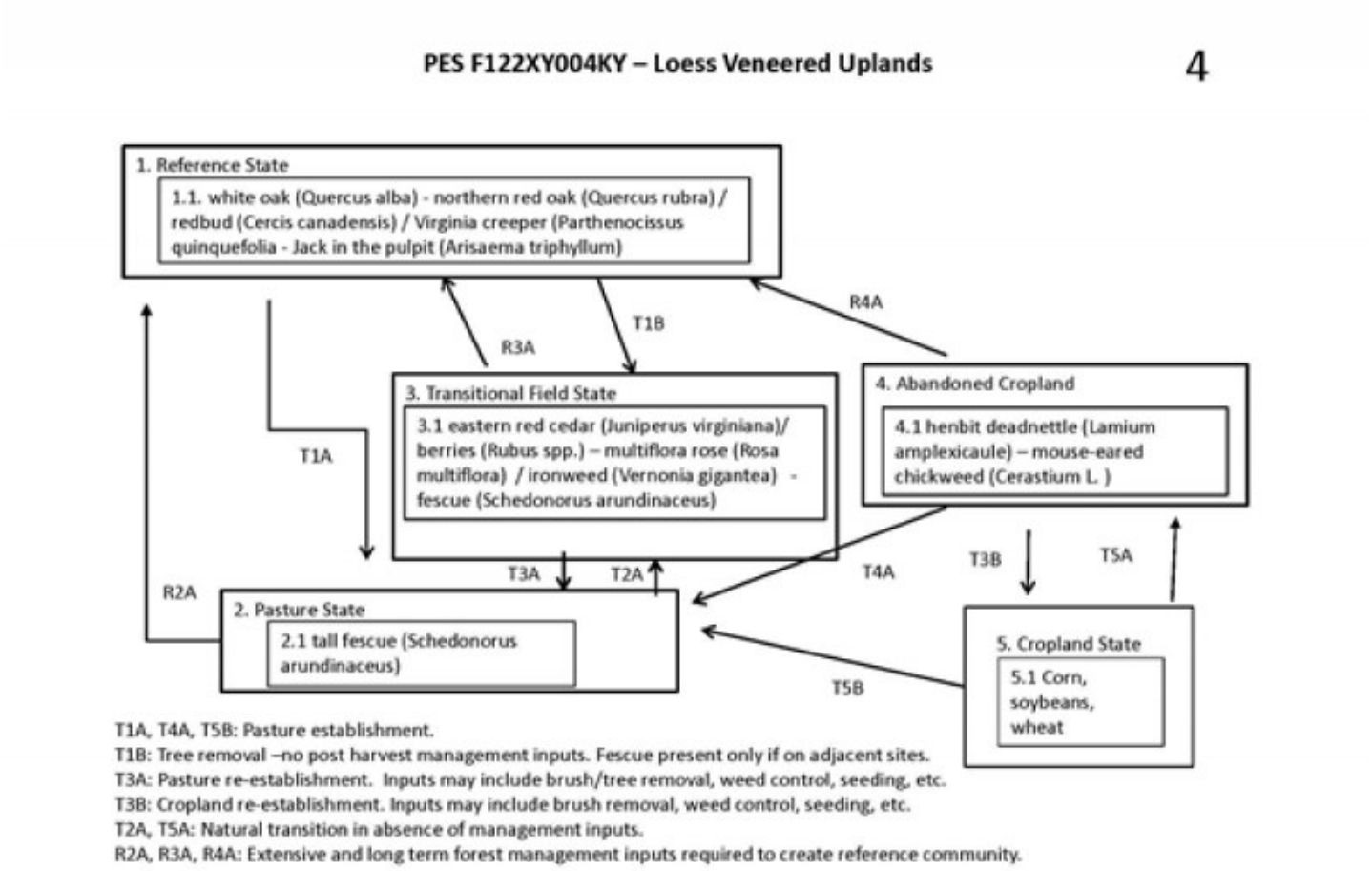

Figure 7. Group 4

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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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	02/11/2026
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:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:

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13. **Amount of plant mortality and decadence (include which functional groups are**

expected to show mortality or decadence):

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**
