USDA Natural Resources Conservation Service

Ecological site F129XY004WV
Mine Spoil

Last updated: 9/10/2019
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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): 129X–Sand Mountain

Major Land Resource Area (MLRA) 129 is in Alabama (96 percent), Georgia (3 percent), and Tennessee (1 percent). It makes up about 8,030 square miles (20,805 square kilometers). The towns of Jasper, Cullman, and Fort Payne, Alabama, are in this MLRA. Interstate 65 crosses this area from north to south, and Interstates 24 and 59 join in the area just west of Chattanooga, Tennessee, which is just outside the northeast tip of the MLRA. Areas of the Redstone Arsenal Military Reservation are in the northern part of the MLRA. The William B. Bankhead National Forest and the Sipsey National Forest Wilderness are in the western part.

Most of this area is in the Cumberland Plateau Section of the Appalachian Plateaus Province of the Appalachian Highlands. This MLRA is deeply dissected and consists mainly of a series of rather narrow valleys, steep escarpments, and broad plateaus that are underlain by consolidated bedrock. Elevation ranges from 165 to 2020 feet (50 to 615 meters). Valley floors are commonly about 100 to 400 feet (30 to 120 meters) below the adjacent plateau summits, but local relief may be as much as 1,200 feet (365 meters). The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Mobile-Tombigbee (0316), 50 percent; Middle Tennessee-Elk (0603), 25 percent; Alabama (0315), 21 percent; and Middle Tennessee-Hiwassee (0602), 4 percent. The Sipsey Fork, Locust Fork, and Mulberry Fork Rivers, headwaters of the Black Warrior River, are in this area. The Tennessee River forms part of the northern boundary of the area.

Classification relationships

The United States Forest Service has determined that this PES falls within the 231-Southeastern Mixed Forest Province Ecological Subregion (McNab et al. 2014). This ecoregion has generally uniform maritime climate with mild winters and hot, humid summers. Annual precipitation is evenly distributed, but a brief period of mid to late summer drought occurs in most years. Landscape is hilly with increasing relief farther inland. Forest vegetation is a mixture of deciduous hardwoods and conifers. Because their classification system does not specifically address Sand Mountain, parts of 231C-Southern Cumberland Plateau Section and/or 231D-Southern Ridge and Valley Section could be included.

Ecological site concept

This site occurs on mine spoil sites where coal mining operations have taken place. These areas are in the process of reclamation to either forests or pasture. The site occurs on nearly level to very steep slopes, depending on whether the spoils have been smoothed or how they were stocked. Where smoothed, slopes are gentle and fairly uniform over large tracts. Two soil series dominate this site and differ primarily in acidity, which most likely affects the productivity of vegetation although this has not been confirmed in the field. Loblolly pine plantations dominate forested sites, where other sites have either been converted to pasture or are in varying stages of succession. No reference community can be determined for this site so this description will focus on what is currently there. This site is of large extent.

Associated sites

F129XY005WV	**Shale Ridge** These are shale ridges that occur in proximity with some mine spoil.

Table 1. Dominant plant species

Tree	(1) *Pinus taeda* (2) *Pinus*
Shrub	Not specified
Herbaceous	(1) *Festuca*

Physiographic features

This site represents areas where coal mining operations have taken place. As a result, the topography largely depends on past human activity. Part of this site occurs on the Pottsville Formation of Pennsylvanian age.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Ridge
Elevation	165–2,020 ft
Slope	2–60%

Climatic features

Table 3. Representative climatic features

Frost-free period (characteristic range)	176 days
Freeze-free period (characteristic range)	204 days
Precipitation total (characteristic range)	58-59 in
Frost-free period (actual range)	176 days
Freeze-free period (actual range)	204 days
Precipitation total (actual range)	58-60 in
Frost-free period (average)	176 days
Freeze-free period (average)	204 days
Precipitation total (average)	59 in

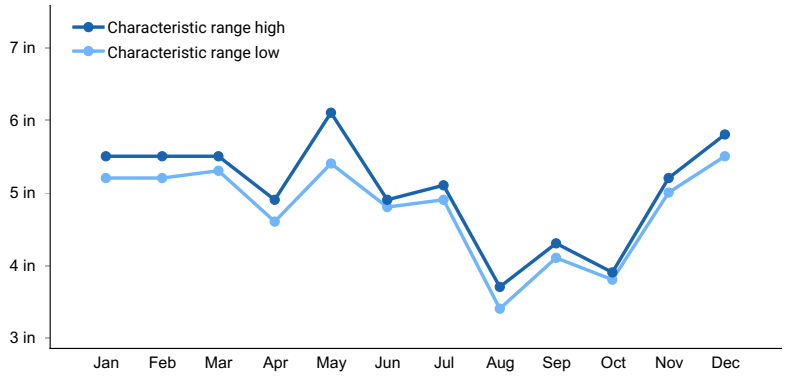

Figure 1. Monthly precipitation range

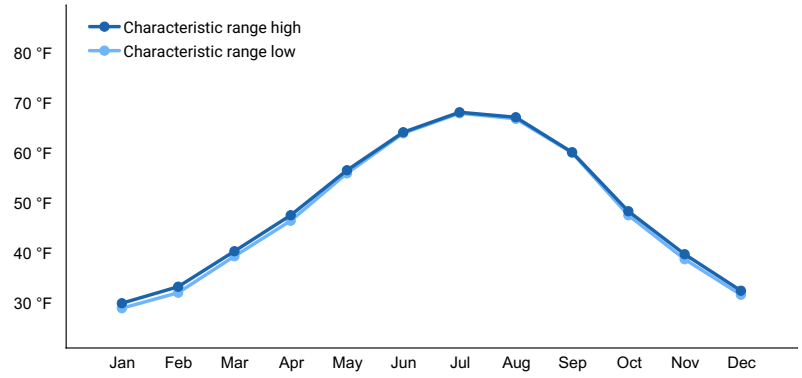

Figure 2. Monthly minimum temperature range

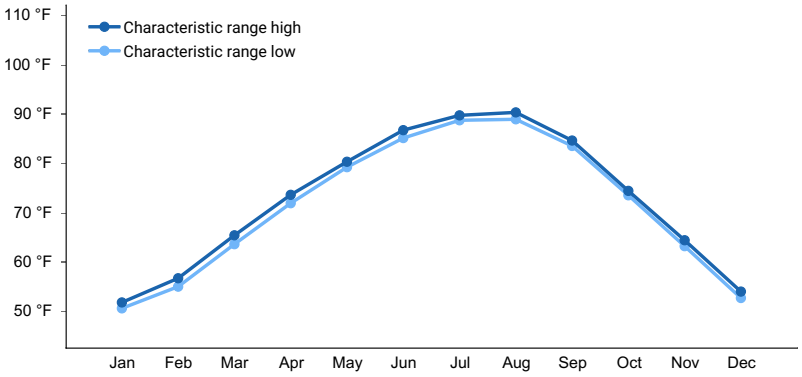

Figure 3. Monthly maximum temperature range

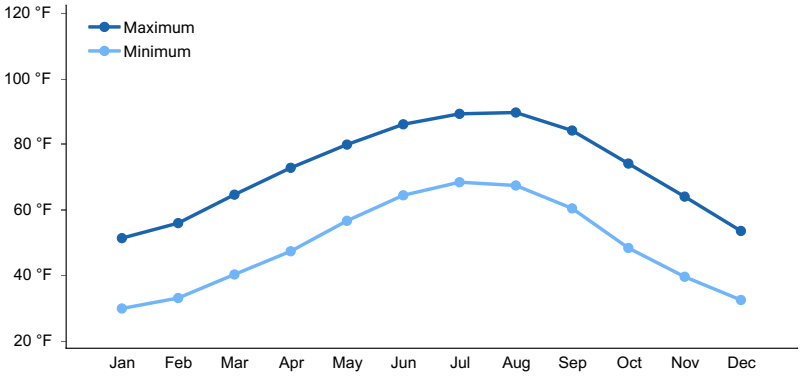

Figure 4. Monthly average minimum and maximum temperature

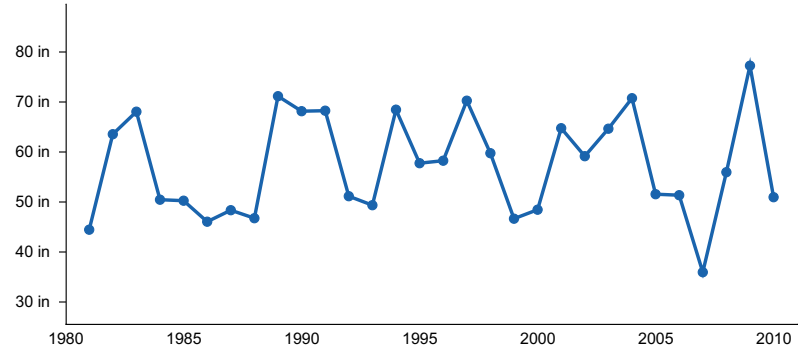

Figure 5. Annual precipitation pattern

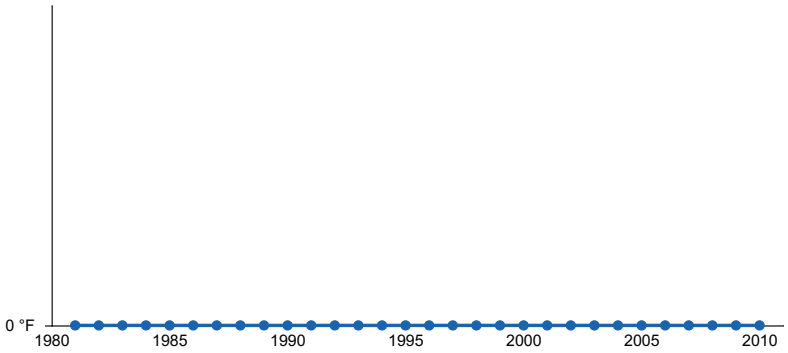

Figure 6. Annual average temperature pattern

Climate stations used

- (1) ADDISON [USC00010063], Addison, AL
- (2) WEST POINT [USC00018812], Cullman, AL
- (3) JASPER [USC00014226], Jasper, AL

Influencing water features

This ecological site is not influenced by wetland or riparian water features.

Soil features

The soil series associated with this site are Palmerdale and Brilliant. They are very deep, well drained to excessively drained and moderate to moderately rapid permeable soils that formed in coal extraction mine spoil. Palmerdale soils are strongly acid to extremely acid throughout the profile, while Brilliant soils is nonacid.

Figure 7.

Table 4. Representative soil features

Parent material	(1) Mine spoil or earthy fill–acid shale (2) Coal extraction mine spoil–sandstone and shale
Surface texture	(1) Fine sandy loam (2) Loam (3) Sandy loam
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	80 in

Ecological dynamics

This site was addressed because it is of large extent and therefore is an important part of the MLRA. The reference conditions on this site are unknown. It has been extremely altered by coal extraction. Large areas have been converted to pine plantations with loblolly pine being the primary species. Other areas are in pasture and were largely planted to fescue and other grass species and/or lespedeza. Other areas are in various stages of succession. The state and transition diagram recognizes that further investigation of this site is required before an adequate description of the ecological dynamics can be developed.

Of note is the loblolly pine plantations that were planted on really old mine spoil are stunted, whereas the plantations established on newer spoil show better growth. Most recent spoil has been planted to grasses, some of which is used for pasture. Forested plantations are often used for timber or as hunting clubs or both.

As with any ecological site in the southeastern U.S., invasive, non-native plants can become problematic and any management plan should recognize this. Non-native wisteria was notable on this site and could merit it's own state. Further investigation is needed.

State and transition model

Ecosystem states

1. Pine Plantation State

2. Grassland State

State 1 submodel, plant communities

1.1. Loblolly Pine Plantation (planted)

State 1
Pine Plantation State

These areas occur on coal mine spoil that have been planted primarily to loblolly pine. Stands on older mine spoil will be stunted in comparison to stands established on newer material.

Community 1.1
Loblolly Pine Plantation (planted)

Figure 8. Stunted loblolly pine trees established on older mine spoil material.

Figure 9. Young plantation of loblolly pine on newer mine spoil material

These areas occur on mine spoil that has been planted to pine for reclamation purposes. The structure of these stands depends on their age and local conditions that occur at too fine a scale to capture in this product. These areas could be important to forestry as well as wildlife in some cases.

State 2
Grassland State

Figure 10. Pasture established on mine spoil.

These sites occur on coal mining spoil that have been planted with grasses. These occur primarily as pasture and are largely planted to fescue.

Additional community tables

Other references

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, M. Russo, K. Schulz, K. Snow, J. Teague, and R. White. 2003-present. Ecological systems of the United States: A working classification of U.S. terrestrial systems. NatureServe, Arlington, VA.

Eyre, F. H., editor. 1980. Forest cover types of the United States and Canada. Society of American Foresters, Washington, DC. 148 pp.

McNab, W.H.; Cleland, D.T.; Freeouf, J.A.; Keys, J.E.; Nowacki, G.J.; Carpenter, C.A., comps. 2005. Description of ecological subregions: sections of the conterminous United States [CD-ROM]. Washington, DC: U.S. Department of Agriculture, Forest Service. 80 p.

NatureServe. 2018. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: February 5, 2019).

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.

Contributors

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Approval

Nels Barrett, 9/10/2019

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	
Approved by	
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:**

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):**

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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:**
