

Total Station  
Score

## 2008 Missouri Envirothon Soils Eco-station

Team #

1. What are the four major processes that change parent material into life-sustaining soil and provide an example for each one: (8 points)
- a. *Additions – O.M. added, Nitrogen thru rainfall, Acid from rainfall, sediment accumulations (flooding), etc.?*
  - b. *Losses (or Subtractions) – Leaching of Carbonates by rainfall or irrigation water, Oxygen losses from decomposition of OM, N gas release, Erosion losses, etc.?*
  - c. *Translocations – clay particles moving, carbonates moving down, etc.?*
  - d. *Transformations – O.M. to humus, Fe<sup>3+</sup> to Fe<sup>2+</sup>, chemical weathering of minerals, structure development, etc.?*
2. Which answer best describes soil texture? (2 points)
- a. The percentage by volume of sand, silt, and clay in a soil.
  - b. The percentage by volume of sand and loam in a soil.
  - c. **The percentage by weight of sand, silt, and clay in a soil.**
  - d. The percentage by weight of sand and loam in a soil.
  - e. None of the above
3. In order to determine what the soil texture class is for a soil from the textural triangle, what is the least amount of information required? (2 points)
- a. One particle size.
  - b. **Two particle sizes.**
  - c. Three particle sizes.
  - d. Both a & b.
  - e. None of the above.
4. The soil survey report lists the soils present as being well drained. What does this mean? (2 points)
- a. Water runs off quickly.
  - b. Soils have a low clay content.
  - c. **Little to no saturation occurs in the soil.**
  - d. Soils have a high rock content.
  - e. None of the above.
5. Surface soil color dominantly reflects what? (2 points)
- a. Drainage Class
  - b. **Organic Carbon Content**
  - c. Texture
  - d. All the above.
  - e. None of the above.
- Page  
Total

6. Subsoil colors of brown or red indicate what? (2 points)

- a. Organic Carbon Content
- b. Texture
- c. **Iron Oxidation**
- d. Iron Reduction
- e. None of the above

7. What is the estimated rock content of the E horizon? (2 points)

- a. <15%
- b. 15-34%
- c. **35-59%**
- d. ≥60%

8. What is the estimated rock content in the upper clay subsoil? (2 points)

- a. <15%
- b. 15-34%
- c. 35-59%
- d. ≥60%

9. Calculate the available water capacity (AWC for the upper 40 inches of soil) using representative values supplied for the Poyner and Bardley Series (AWC values provided account for rock content). What are the five soil properties that impact AWC calculations the most? Which soil property is primarily responsible for the difference in AWC of these two soils? (11 points)

$$\begin{aligned} \text{Poyner} - 10 \text{ in} \times 0.12 \text{ in/in} &= 1.20 \text{ in} && (2 \text{ points}) \\ 30 \text{ in} \times 0.09 \text{ in/in} &= \underline{2.70 \text{ in}} \\ &= \underline{\underline{3.90 \text{ in}}} \end{aligned}$$

$$\begin{aligned} \text{Bardley} - 04 \text{ in} \times 0.15 \text{ in/in} &= 0.60 \text{ in} && (2 \text{ points}) \\ 04 \text{ in} \times 0.07 \text{ in/in} &= 0.28 \text{ in} \\ 19 \text{ in} \times 0.10 \text{ in/in} &= \underline{1.90 \text{ in}} \\ &= \underline{\underline{2.78 \text{ in}}} \end{aligned}$$

10. The notations listed on the Munsell Color Chart include which three variables? (2 points)

- a. Purity, Strength, Clarity
- b. **Hue, Value, Chroma**
- c. Hue, Brightness, Contrast
- d. Texture, Contrast, Chroma
- e. None of the above

Page  
Total

11. What is the dominant parent material present at this site? (2 points)

- a. Alluvium
- b. Loess
- c. Glacial Till
- d. Residuum**
- e. Eolian sand

12. What are the three major types of soil water? (3 points)

***Gravitational, Capillary, Hygroscopic***

Page  
Total

Soils  
Total

1. The soil survey report lists the soils occurring on the side slopes in this area as being the Niangua and Bardley series. Niangua soils list a forest productivity value of 43 ft<sup>3</sup> / acre-yr for white oak. Bardley soils list 29 ft<sup>3</sup> / acre-yr for white oak. What is the most likely reason for the lower productivity of the Bardley Series? (3 points)

*Shallower Effective Rooting Depth (Soil Depth) OR lower Available Water Capacity*

2. Surface water flow is an important variable in supplying water for tree growth. Which order of landform shapes best depicts the greatest amount of surface water runoff to the least amount? (3 points)

- a. Concave, Linear, Convex
- b. Convex, Linear, Concave**
- c. Linear, Concave, Convex
- d. Convex, Concave, Linear
- e. Concave, Convex, Linear

3. The clay content in the subsoil of the Niangua and Bardley soils is: (3 points)

- a. 60-85%**
- b. 35-60%
- c. 18-35%
- d. 0-18%
- e. >85%

4. The subsoil representative pH values are 6.0 in the Bardley soils and 5.4 in the Niangua soils. Which soil is more acidic? How many times more acidic is it? (6 points)

*Niangua soils are more acid.*

A pH of 5.0 is ten times more acidic than a pH of 6.0 therefore the *Niangua soil is 6 times more acidic (6.0 - 5.4 = 0.6).*

1. What are two common causes of soil erosion along undeveloped and wooded portions of the lakefront? (4 points)

*Wave action and Lake level fluctuations*

2. Given the following soil profile, is this soil suited to wetland plants? Why or why not? (4 points)

A 0 – 3 inches 10YR(3/3) gravelly silt loam  
E 3 - 10 inches 10YR(6/3) extremely cobbly silt loam  
Bt1 10-24 inches 2.5YR(4/6) cobbly clay  
Bt2 24-36 inches 5YR(5/3) gravelly sandy clay loam  
R 36 inches Dolostone

*No. There is no evidence of saturation in this soil. (No gray colors.)*

3. Soil development is caused by what two weathering processes? (4 points)

*Physical and chemical.*

4. Microorganisms cause organic matter in the soil to decompose. This provides and/or assists with: (3 points)

- a. Humus development
- b. Soil structure development
- c. Increasing CEC
- d. a & b
- e. *All the above.*

1. Name the five factors of soil formation. Of the five factors, which are considered active factors and which are considered passive factors? (10 points)

*Climate, Organisms, Parent Material, Topography, Time (5 points)*

*Active Factors (Climate, Organisms) (2 points)*

*Passive Factors (Parent Material, Topography, Time) (3 points)*

2. The soil survey report lists the Forage Suitability Group for the Niangua soil as Group GNS. What does GNS stand for? What does the report state are the two limitations for using this soil for forage species and equipment use? (4 points)

*Generally Not Suited. (2 points)*

*Slope and high rock fragment content. (2 points)*

3. List an environmental planting for the Niangua soil that has a representative height in 20 years of 20 feet tall. (1 point)

*Black Cherry OR*

*Arborvitae OR*

*Blackgum*

Page  
Total

1. There are several buildings at Camp Cloverpoint that generate wastewater. The wastewater drains into a wastewater stabilization pond (or sewage lagoon) on the west facing hillside. Discuss the soil and site properties/features that should be considered when constructing a lagoon at this recreational facility? (15 points)



***Soil Texture, Rock Content, Soil Depth, Slope, Seasonal Water Tables, Bedrock Type and Degree of Weathering, Distance from Surface Waters, Distance from Buildings, Proximity to Public Use Areas, Location to Drinking Water supplies.***

***Five correct responses needed for 15 points.***



Page  
Total