

2017 TN Envirothon Comprehensive Question Presentation

Agricultural Soil and Water Conservation Stewardship

Introduction:

Part of your team's overall score for the TN Envirothon competition is based on an oral presentation concerning this year's current environmental issue: Agricultural Soil and Water Conservation Stewardship (emphasis on Soil Health). This presentation will consist of the review and study of a specific scenario with environmentally related aspects and features. Your team will review the scenario, determine appropriate solutions and/or actions, organize and compile the information for a team presentation, and give the presentation to a panel of 3 judges for an average weighted score. This score counts as 200 points towards a total maximum of 700 points in the TN Envirothon State Competition. The scenario and related components are presented below:

Soil Health:

Soil Health is one of the hottest environmental topics in the field of Natural Resources today. Kevin Brown, State Conservationist with USDA-NRCS in Tennessee, recently stated that if farmers would address soil health in their farming operations, they would address other concerns such as water quality, air quality, animal health, and human considerations. Soil health is the "gold standard" to total conservation stewardship. Consider what soil health means: The continued capacity of soil to function as a vital living ecosystem that sustains and improves the living condition of plants, animals, and humans.

Background:

Your team has been tasked with addressing the natural resource concerns on a newly acquired farm parcel containing cropland and pastureland fields. You must create a conservation plan that addresses the current soil health condition and how to improve soil health on these two fields.

A local conservation farmer named Mike Hubbs has been operating a family farm in Cumberland County for over 25 years. Most recently, his family has purchased a 194-acre tract in the Pomona Community consisting of a large homestead of several outbuildings, sheds, and barns along with pastureland, and cropland areas.

Natural Resources Present on the New Farm:

One major stream and two smaller drainage features are within the property. Four ponds, one of 1 acre, one of 2 acres, one of 3 acres, and one of 5 acres in size, are present on the property. This area resides in what is generally known as limestone with a sandstone cap and karst topography.

The drainage features present on the property are first order, headwater tributaries that flow into a larger stream that ultimately drains into the Obed River and eventually into the Tennessee River basin. It has been noted in previous stream surveys that a healthy population of various benthic organisms are present in the streams. Fish populations within the ponds are unknown in number and variety at this time.

Wetlands have not been determined or documented for this parcel. There are no hydric soils shown on the Soil Map Descriptions. That does not preclude the presence of wetlands on the property. The presence of a threatened and endangered species has not been documented at the farm.

Soil map units indicate that the slope varies from 2-20%. On-site soils are loamy, well-drained, and do not flood or pond. See Map Unit Description for additional information on each Soil Map Unit present on farm.

2017 TN Envirothon Comprehensive Question Presentation

There is no data on the Sewage Disposal Plant located on the Topographical Map.

Crop Scenario:

Two cropland fields are located on the north side of the farm. One field contains 13 acres and the other field contains 33 acres, minus the water and forested areas. The soils are rolling with slopes ranging from 2-5% with some areas in drains containing up to 20% slopes. They are well drained. Productivity is good, but yields have stayed the same for the last several years. Mike follows his soil test result recommendations and has found that his pH is approximately 6.0. He has used no-till planting methods in the past but complains that the soil is hard. He is convinced that he must use deeper tillage methods to loosen the soil in order to allow water to infiltrate further into the soil. He notices water running off soon after the first rain and there are some erosion problems beginning on the steeper areas of the fields.

Mike uses a corn-soybean rotation in his cropping sequence. While this remains better than continuous corn as far as diversity, his lack of variety is still a problem. The local USDA-NRCS staff has calculated soil erosion at seven tons per acre per year – over 3 times the ‘T’ tolerance of 2 for Lily soil. His soil organic matter levels are 1%. The field contains areas of goosegrass and dog fennel. Mike wants to reduce his herbicide use since those costs are affecting his income; however, he must control weeds. He currently is applying several fungicide sprayings on his soybeans. How can he add diversity to a corn-soybean rotation? Mike does not plan to reduce fertilizers, but he has heard if soils are more productive, he may be able to reduce his fertilizer costs. He plans to continue to follow soil test result recommendations for his fertilizer applications. In the summer, the current crop often suffers from short-term drought even though annual rainfall is 52 inches per year. Soil temperature readings between the crop rows have been measured at well over 100 degrees at a 2” depth in the soil.

Pasture Scenario:

Mike’s pastureland field totals 103 acres and is located on the southern side of the farm with different species of clovers, grasses, annual and perennial weeds, and grazed forested acreage. Currently, Mike lets the livestock pick and choose within the total open acreage. Certain areas are overgrazed with bare hard-packed soil while other areas remain untouched with overgrown brush and tall weeds. Horsenettle, broomsedge, and oxeye daisy are beginning to intrude into more areas of the field. Watering areas where livestock gather are concentrated with manure, annual weeds, and eroded, hard-packed soil. Since water sources are plentiful, the fields can be split into smaller fields (paddocks) using water tanks, poly wire (electric fence) and an available power source. Use your general knowledge in soil health to improve Mike’s pastureland; thereby, combating the problems associated with over grazing such as erosion, weeds, poor water infiltration, etc.

Items to consider

Apply the four principles of soil health with conservation practices that will address plant diversity, soil erosion, water infiltration, and soil organic matter. What can aid in water loss due to poor water infiltration, soil compaction, and high soil temperatures in during the summer? How can Mike increase his soil organic matter? Will the conservation practices help economically? How will improving soil health address water quality (sediment and nutrients running off into streams)? Will keeping the soil covered and addressing soil health affect any air quality issues?

2017 TN Envirothon Comprehensive Question Presentation

Hint: Some soil functions are soil productivity and bio-diversity, water infiltration vs. run off, nutrient storage and cycling, along with filtering and buffering. USDA-NRCS has calculated that using no-till alone would reduce the soil erosion rate to three tons per acre per year.

Assignment:

Your team represents members of the ***USDA-NRCS Resource Conservationist Team*** in this scenario. Some members of your team may characterize Soil Conservationists, Soil Scientists, Soil Health experts, Biologists, Engineers, and/or others in the technical resource field.

You will proceed to:

1. Inventory the resources on the farm – using your knowledge of Soils, Aquatics, Forestry, Wildlife, and the resource information provided.
2. Assess alternative methods to be stewards of those resources based on ***the Landowner's*** objectives below:

Landowners Objectives:

1. Find ways to be more efficient and effective at managing the new farm property while improving the agricultural soil and water conservation stewardship of the property.

Present:

2. Present a convincing plan to the panel consisting of the owner (and farm operators/managers) on how improving the Soil Health of the cropland and pastureland fields will assist in meeting (*or not?*) the landowner's objectives.
3. State which *crop(s)* Mike should integrate into his cropland sequence along with the *cropland conservation practices* that would achieve the optimum of efficient, effective soil health stewardship.
4. Present a plan proposing which *pasture/grazing conservation practices* offer the best alternative for productive soil health improvement toward a successful, sustainable, farming operation.
5. Defend your selected alternative *based on the Landowner's objective* to the panel of judges.

Present the BEST alternative and explain your reason for its selection to the judges using the visual aids in your kit and following guidelines provided for the presentation.

IMPORTANT NOTE:

The site pages attached should be considered as the project area for the scenario. Additional map details of various environmental features are included for analysis and interpretation of map features. It is suggested that any site sketch presented by your team be simple, easy to understand, and serve to show the various environmental land use features. Additional copies may be obtained of these maps, as needed.