



United States
Environmental Protection
Agency



ADVISOR HANDBOOK 2020-21

Welcome to the

Mississippi Envirothon

- **Aquatic Ecology**
- **Forestry**
- **Soils/Land Use**
- **Wildlife**
- **Current Issue: *Water Resources Management: Local Control and Local Solutions***

Sponsored by:

**Mississippi Association of Conservation Districts, Inc.
Mississippi Soil & Water Conservation Commission
Mississippi Department of Environmental Quality
Environmental Protection Agency
Mississippi Forestry Association
Chevron Pascagoula Refinery
Georgia Pacific- Monticello**

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1. ABOUT THE COMPETITION

Introduction & History

Welcome to the Mississippi Envirothon. By participating in the annual Mississippi Envirothon, you become part of the environmental education history of this state. This handbook contains information you need to participate in this event.

*The Envirothon is the ultimate environmental education experience. Participants must, over the course of several months of study, prepare themselves for testing in these **five** areas:*

- **Soils/Land Use • Aquatic Ecology • Wildlife • Forestry**
- **A Current Environmental Issue (*changes annually*)**

Designed to foster cooperation and teamwork, **5-member teams** are tested not only on their knowledge in the topic areas, but also on their ability to apply that knowledge to solve real-life problems. Problem solving and teamwork are skills that enhance participants' ability to take leadership roles after high school or college, no matter their chosen field or career.

History

The Envirothon started in 1979 in Pennsylvania. Mississippi first joined the national competition in 1998, placing second in the NCF-Envirothon in 2001. In 2019, Mississippi's team from Oxford High School placed fifth in the NCF-Envirothon, and placed first in the Current Issues category at NCF-Envirothon. In its 40th year, the national event has grown to more than one million participants from all 50 states and a dozen provinces.

Mission

The mission of the Envirothon is to develop knowledgeable, skilled and dedicated citizens who have an understanding of natural resources and are willing and prepared to work towards achieving and maintaining a balance between the quality of life and the quality of the environment. The mission is accomplished by developing an understanding of the principles and practices of natural resource management and ecology training in young people through the practice of dealing with complex resource management decisions.

Overview of the Mississippi Envirothon Program

- **Identify an advisor who is interested in starting an Envirothon Program.**
- **Form a Mississippi Envirothon Team (five students and one alternate).**
(Can have maximum of four teams representing a School/Organization)
- **Have Team/Teams train in the five areas:**
(Learning Objectives for each area are provided in this handbook)
 1. Forestry
 2. Wildlife
 3. Aquatic Ecology
 4. Soils/Land Use
 5. Current Issue (changes from year to year)
- **Register for the Mississippi Envirothon Area Competition.**
Five top teams at the Area Competition – plus the top FFA team – will proceed to the Mississippi Envirothon State Competition.
- **Register for the Mississippi Envirothon State Competition.**
The top teams at the Mississippi Envirothon State Competition will receive scholarships. Their advisor will receive a cash award.

The Mississippi Envirothon State Winner will receive assistance toward a trip to the National Conservation Foundation, NCF-Envirothon Competition to be held at the University of Nebraska the week of July 25-July 31, 2021.

2. Mississippi Envirothon

Goals & Objectives

Goal 1

To promote a desire to learn more about the natural environment and equip students with the knowledge and skills needed to apply basic principles and practices of resource management and ecology to complex environmental issues.

Objectives:

- a. Students should be able to demonstrate a basic knowledge of concepts in natural resource management and ecology, particularly in the areas of soil/land use, aquatic ecology, forestry, wildlife and current environmental issues.
- b. Students should be able to analyze soil, aquatic, forestry, wildlife and current environmental issues by engaging in problem-solving activities involving natural resource issues.

Goal 2

To promote stewardship of natural resources and to encourage development of critical thinking, cooperative problem-solving and decision-making skills required to achieve and maintain a natural balance between the quality of life and the quality of the environment.

Objectives:

- a. Students should be able to identify environmental issues in a given situation and the various interests involved, while taking into consideration ecological, social and economic factors.
- b. Students should be able to investigate issues using both primary and secondary sources of information and synthesize the data gathered. Additionally, students should demonstrate the ability to:
 - Listen with comprehension
 - Collect, organize and analyze information
 - Frame appropriate questions to guide their investigation
 - Use a range of resources and technologies
 - Critically examine information

(Goal 2 Objectives continued)

- c. Assess the nature of information and materials
- d. Identify alternative solutions for various issues, and be able to evaluate alternative solutions with respect to ecological and cultural implications.
- e. Identify and evaluate position on environmental issues and the associated solution.
- f. Evaluate the interaction of the proposed solution with other factors and have the ability to plan ahead when evaluating long- and short-term solutions for environmental problems.

Goal 3

To provide students with experience in environmentally oriented activities, enabling them to become environmentally aware, action-oriented citizens.

Objectives:

- a. Students should have knowledge of a wide range of action strategies involved in seeking solutions to environmental problems.
- b. Students should have a knowledge of agencies and organizations that can be used as resources to seek solutions to environmental and natural resource problems.
- c. Students should be able to evaluate the impact of how their own actions affect a particular environmental problem, and devise alternative actions to work towards improving the environmental condition.
- d. Students should be able to work independently and/or collaboratively to solve environmental problems.

3. Advisor Responsibilities

The *Advisor* or *Coach* is the backbone of the Envirothon team, organizing, motivating and helping the Envirothon team study and train in the five areas (forestry, wildlife, aquatic ecology, soil/land use, and current issue) for the Area Envirothon Competition.

Throughout the year, the advisor/coach guides the team's preparation for the competition. It is very important that advisors teach team skills and instill a strong environmental ethic in the team members. An advisor has an important part in the team's success and is to be congratulated for making such an important investment in the growth of the team by utilizing knowledge and hands-on experiences.

Advisors are welcome to contact Mississippi Envirothon Coordinator Chelsey Gazaway at chelsey.gazaway@ms.nacdn.net or call (662) 647-8857 Ext. 103

Training Your Envirothon Team

Distance Learning Training in each topic area is offered for teams in the four areas of the state.

Learning Bins can be checked out for a week at a time from the Mississippi Envirothon Coordinators.

Training CDs and PowerPoint presentations are available from Mississippi Envirothon Coordinator Chelsey Gazaway by calling (662) 647-8857, ext. 103.

Local Soil and Water Conservation Districts (SWCDs) can assist in setting up local training.

Use the five area (forestry, wildlife, aquatic ecology, soil/land use, and current issue) Learning Objectives to help train teams.

Review the sample tests in this handbook.

4. Competition Rules

1. Only students enrolled in grades 9-12 during the current competition school year are eligible to participate and compete in the Mississippi Envirothon Competition. Each team is allowed one alternate. Alternates can be interchangeable for any teams advancing. Alternates must be present at the Area Envirothon competition to advance to the State Envirothon competition.
2. Each team will consist of five members from the same school/organization. Students from the same school district's junior high may be included if eligible by grade.
3. Each school/organization may send a maximum of four teams to the area competition. Each team must consist of members from the same school, organization or association. There may be only one FFA Envirothon team per school. Each advisor may have only two teams registered at the area level.
4. Once the competition has begun, advisors, sponsors, teachers, alternates or parents must stay in the designated area. No communication is allowed between team members and advisors, sponsors, teachers, alternates or parents. Violation of this rule will result in disqualification of the team.
5. At the registration table at the Area Competition, you will be asked to finalize your team's/teams' list of members' names and alternate's/alternates' name(s). Changes to your team can be made up to this point.
6. All teams advancing to the state competition will be required to use team members and alternate member(s) that competed in the Area Competition.
7. Substitution of an alternate(s) for the state competition must be approved by the Mississippi Envirothon Steering Committee. A written request or email must be received prior to the state competition. Mississippi Envirothon Steering Committee will be contacted to approve the alternate substitution. In the event of an emergency or unresolvable time conflict that would prevent all five members from competing at the State competition, a form will be available the day of the State competition for approval of alternate member. Mail written request to: Mississippi Envirothon, P.O. Box 23005, Jackson, MS, 39225-3005, Attn: Chelsey Gazaway or email Chelsey.Gazaway@ms.nacdn.net
8. The Mississippi Envirothon State winning team will attend flexible training opportunities provided by the State Coordinator for the National Conservation Foundation (NCF) Envirothon. The Mississippi Envirothon Coordinator will work with the team's schedule.

5. Before the Competition

Maintain close contact with the local Soil & Water Conservation District Office. A directory of SWCD offices is on page 43.

Be sure the following checklist is completed:

- A Registration Form has been mailed or emailed to the MSWCC Office by the due date (**January 29, 2021**). The Registration Form is on page 39.
- Registration Fees (if any) have been paid.
- Transportation has been arranged to the competition location.
- Team members are familiar with rules of the competition.

6. How the Mississippi Envirothon Competition Works

An Envirothon team consisting of five members will rotate through a series of five stations: Soils/Land Use, Aquatic Ecology, Wildlife, Forestry and Current Issue.

A natural resource specialist will manage each station. For example, a forester may conduct the Forestry Station, and a soil scientist can be expected to coordinate the activities at the Soils Station.

At each of the five stations, the Envirothon team will be given a written test to complete. The test will consist of 50 percent written questions and 50 percent hands-on questions. Each test is to be taken as a team, with each member participating hands-on. Test questions may be asked in a variety of ways: Multiple choice, true/false, essay, or fill-in-the-blank. (See sample test questions.)

At the conclusion of the Envirothon competition, the scores will be tabulated and the top five teams from each area competition will advance to the state competition.

At the State competition, teams will take a written and hands-on test, and will be expected to give an oral presentation based on the topic provided prior to the state event. The presentation topics will be based on a hypothetical current environmental problem or issue.

Teams should use visual aids during the oral presentation to demonstrate how they recognized and solved the environmental problem. (See rules and sample score sheet)

After combining scores from the written tests and the oral presentation, the top five teams will be announced and will receive awards.

The team with the highest score at the state competition will represent Mississippi at the National Conservation Foundation (NCF) Envirothon Competition.

7. Aquatic Ecology

Learning Objectives

- A. Identify the processes and phases for each part of the water cycle.
- B. Describe the chemical and physical properties of water and explain the importance for freshwater and saltwater ecosystems.
- C. Discuss methods of conserving water and reducing point and non-point source pollution.
- D. Analyze the interaction of competing uses of water supply, hydropower, navigation, wildlife, recreation, waste assimilation, industry and others.
- E. Identify common aquatic organisms through the use of a key.
- F. Delineate the watershed boundary for a small water body.
- G. Explain the different types of aquifers and how each type relates to water quality and quantity.
- H. Briefly describe the benefits of wetlands, both function and value.
- I. Describe the changes to the aquatic ecosystem based on alteration to the aquatic habitat.
- J. Know methods used to assess and manage aquatic environments and utilize water quality information to assess general water quality of a given body of water (includes sampling techniques and water quality parameters used to monitor point and non-point source pollution).
- K. Be familiar with major methods and laws used to protect water in a given situation.

Aquatic Ecology–Onsite Learning Objectives

Envirothon testing consists of two parts: a written test, which accounts for 80 percent of the score, and onsite questions, which accounts for 20 percent of the score. Onsite questions are usually “hands-on” questions. Listed below are specific aquatic species, important aquatic ecology factors and common tools used when working with watersheds, water quality and aquatic ecology. Although the majority of onsite questions for the Area and State Envirothon aquatic test will be from the learning objectives below, there could be an onsite question from other Envirothon aquatic learning objectives as listed on the MSWCC website, www.mswcc.ms.gov. Click left-navigation Envirothon tab.

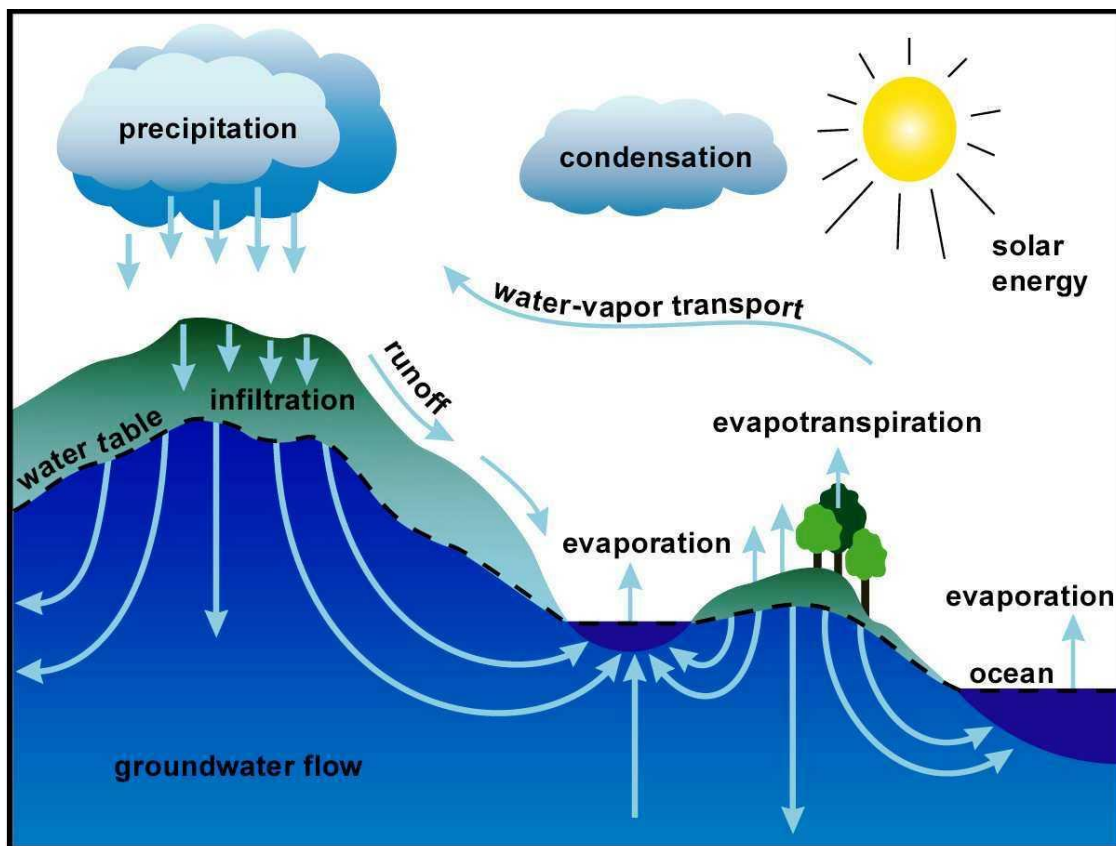
1. Identify major Families and common names of native Mississippi fish by mount, picture or dichotomous key.
 - blue gill (Centrarchidae)
 - largemouth bass (Centrarchidae)
 - spotted bass (Centrarchidae)
 - white or black crappie (Centrarchidae)
 - catfish (Ictaluridae)
 - sturgeon (Acipenseridae)
2. Identify common names of aquatic plants by specimen, picture or dichotomous key. Scientific names are provided to ensure proper species identification.
 - filamentous algae
 - lizard tail (*Saururus cernuus*)
 - cattail (*Typha* spp.)
 - American lotus (*Nelumbo lutea*)
 - water hyacinth (*Eichhornia crassipes*)
 - water shield (*Brasenia schreberi*)
 - duckweed (*Lemna* sp.)
 - white water lily (*Nymphaea* spp.)
 - yellow water lily / spatterdock (*Nuphar* spp.)
 - salvinia (*Salvinia* sp.)
 - alligator weed (*Alternanthera philoxeroides*)
 - water primrose (*Ludwigia* sp.)
 - smartweed (*Polygonum* spp.)
 - golden club (*Orontium aquaticum*)
 - rush (*Juncus* spp.)
 - spikerush (*Eleocharis* spp.)

Aquatic Ecology – Onsite Learning Objectives (continued)

- sedge (*Carex* spp.)
 - flat sedge (*Cyperus* spp.)
 - bulrush (*Scirpus* spp.)
 - arrowhead / duck potato (*Sagittaria* spp.)
3. A) Identify common names of aquatic macroinvertebrates (adults or immature) by specimen or picture (without a key), and list their water quality indicator status (good, fair, or poor).
- B) Use an Adopt-A-Stream Mississippi Quarterly Macroinvertebrate Count Form to calculate the Total Index Value (TIV) based on an aquatic macroinvertebrate sample.
- mayflies
 - stoneflies
 - hellgrammite
 - caddisflies
 - riffle beetle
 - water penny
 - right-opening snail
 - dragonflies
 - damselflies
 - beetle larvae
 - scud
 - crane fly
 - sowbug
 - crayfish
 - freshwater snail
 - midge
 - aquatic worms
 - leech
 - left-opening snail
4. Identify the following aquatic tools and be able to identify the purpose of each tool.
- D net
 - secchi disk
 - plankton net
 - otolith
 - seine net
 - fishing rod

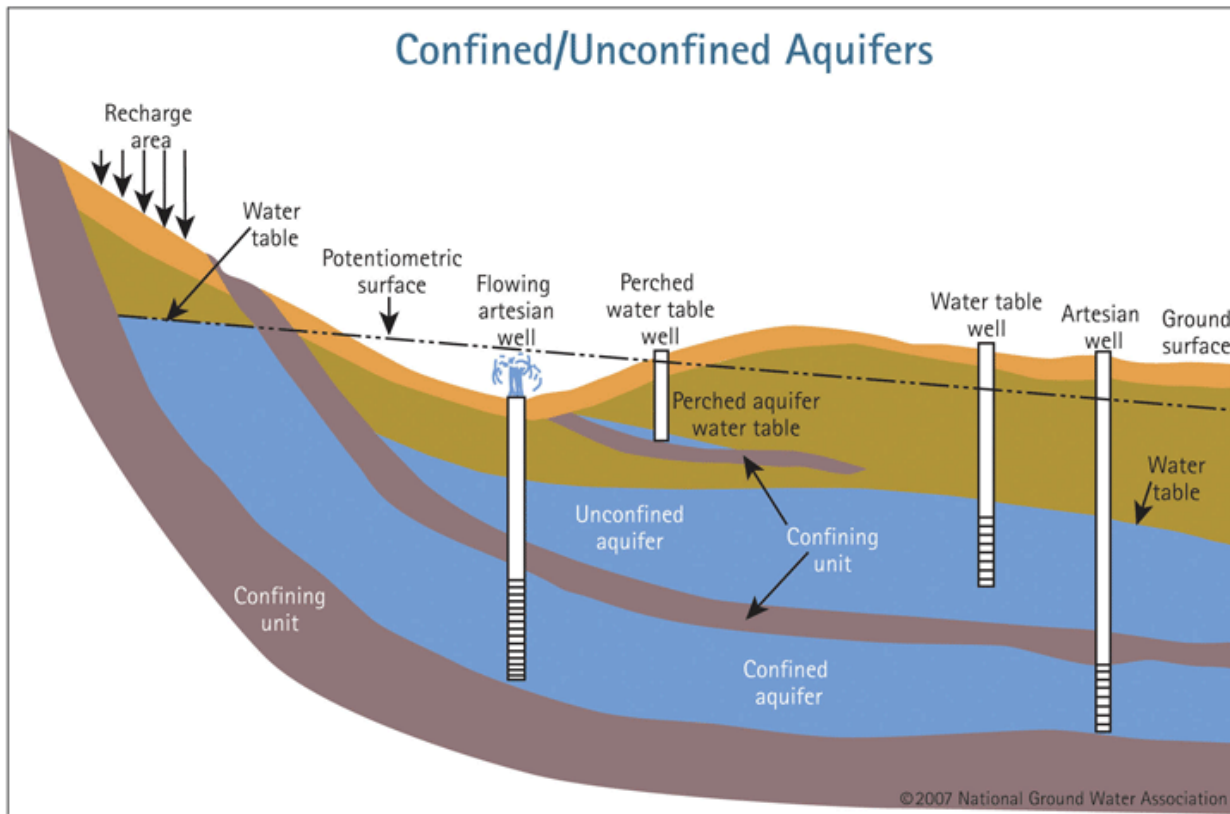
Aquatic Ecology–Onsite Learning Objectives (continued)

5. Identify the 3 indicators used for identifying and delineating wetlands.
 - Hydrology
 - Hydric soils
 - Hydrophytic vegetation
6. Conduct a pH test on a water sample (amount of indicator solution to use will be provided).
7. Know how to use a dichotomous key to identify various specimens (plants and/or animals).
8. Know how to delineate a watershed using a topographic map.
9. Know the parts of the water cycle.



Aquatic Ecology–Onsite Learning Objectives (continued)

10. Identify and label aquifers, wells and other terms associated with aquifers



Aquatic Ecology Sample Test Questions

1. Sewage treatment plants are designed to remove materials that damage water quality and threaten public health. Most facilities employ a combination of what to remove harmful substances? (two points each)
 - A. _____
 - B. _____
2. What is the most prevalent source of agricultural water pollution?
 - A. Sedimentation
 - B. Nutrients
 - C. Animal feeding operations
 - D. Livestock grazing
 - E. Irrigation
3. Forested wetlands' functions and values include:
 - A. Water purification
 - B. Storm water retention
 - C. Reduction in downstream sedimentation
 - D. All of the above
 - E. A and B only

Aquatic Ecology Sample Test Questions (continued)

4. Diurnal fluctuations in dissolved oxygen are primarily due to:
 - A. Reduced photosynthesis at night in comparison to daylight conditions
 - B. Higher abundances of aquatic insects at night
 - C. Increased input of clay particles at night
 - D. Increased respiration of aquatic organisms during the day
 - E. Decomposition due to the death of aquatic organisms
5. Gulf Coast waters often experience a “dead zone” characterized by massive phytoplankton blooms which have died and depleted dissolved oxygen. Which is an example of an agricultural activity in the Midwest that would likely result in heavy phytoplankton blooms in the Gulf of Mexico?
 - A. Excessive use of pesticides
 - B. Nutrient runoff from excess fertilizer
 - C. Oil spills from farming equipment
 - D. All of the above
6. The Asian carp is an invasive species which was stocked in Mississippi to control algae in catfish ponds. It has escaped to the Mississippi River and is now threatening our rivers and streams. How does this fish cause adverse effects to native species?
 - A. Out-competes native species
 - B. Displaces native species
 - C. Shifts population dynamics of fisheries
 - D. None of the above
 - E. All of the above
7. A pH between _____ is favorable for supporting life in natural waters.
 - A. 4.5 – 7.0
 - B. 8.0 – 10.0
 - C. 6.5 – 8.2
 - D. 5.0 – 9.5
 - E. 4.5 – 10.0
8. Which of the following types of wastewater is considered gray water?
 - A. Washing machines, dish water, showers, baths and sinks
 - B. Potable water
 - C. Effluent
 - D. Thermally polluted water
 - E. All of the above

Aquatic Ecology Sample Questions Key

- | | | |
|----|-----------------------|----------------------------|
| 1. | A. Mechanical Removal | B. Bacterial Decomposition |
| 2. | A | |
| 3. | D | |
| 4. | A | |
| 5. | B | |
| 6. | B | |
| 7. | C | |
| 8. | A | |

8. Forestry

Learning Objectives

- L. Identify common trees without a key and identify specific or unusual species of trees or shrubs through the use of a key.
- M. Understand forest ecology concepts and factors affecting them, including the relationship between soil and forest types, tree communities, regeneration, competition and succession.
- N. Understand the cause/effect relationship of factors affecting tree growth and forest development (climate, insects, microorganisms, etc.).
- O. Understand how wildlife habitat relates to forest communities, forest species, forest age structure, snags, and den trees, availability of food and riparian zones.
- P. Understand the value of trees in urban and suburban settings and factors affecting their health and survival.
- Q. Understand how the following issues are affected by forest health and management: biological diversity, forest fragmentation, air quality, fire and recreation.
- R. Understand basic forest management concepts and tools such as how various silvicultural practices are utilized, the use of tree-measuring devices and best management practices.
- S. Identify complex factors which influence forest management decisions (economic, social and ecological).
- T. Apply silviculture concepts and methods to develop general management recommendations for a particular situation and management goals.

Forestry–Onsite Learning Objectives

Envirothon testing consists of two parts: A written test, which accounts for 80 percent of the score, and onsite questions, which account for 20 percent of the score. Onsite questions are the “hands-on” questions that you can see and touch. Listed below are specific trees, invasive species, and common tools, instruments and techniques used in forestry. The majority of onsite points on the Mississippi Envirothon Area and State forestry tests will be from the learning objectives listed below:

IMPORTANT: When identifying trees or invasive species, credit will only be given for the common name listed below. Be sure to learn the exact names shown below!

1. Identify the following trees by common name. For example, *American Hornbeam* but NOT *Musclewood*. Scientific names are provided to ensure proper species identification

- American Beech (*Fagus grandifolia*)
- American Holly (*Ilex opaca*)
- American Hornbeam (*Carpinus caroliniana*)
- Bald Cypress (*Taxodium distichum*)
- Black Cherry (*Prunus serotina*)
- Black Gum (*Nyssa sylvatica*)
- Black Walnut (*Juglans nigra*)
- Black Willow (*Salix nigra*)
- Blackjack Oak (*Quercus marilandica*)
- Boxelder (*Acer negundo*)
- Cherrybark Oak (*Quercus pagoda*)
- Devil’s Walkingstick (*Arilia spinosa*)
- Eastern Cottonwood (*Populus deltoides*)
- Eastern Hophornbeam (*Ostrya virginiana*)
- Eastern Red Cedar (*Juniperus virginiana*)
- Eastern Redbud (*Cercis canadensis*)
- Flowering Dogwood (*Cornus florida*)
- Green Ash (*Fraxinus pennsylvanica*)
- Honey Locust (*Gleditsia triacanthos*)
- Live Oak (*Quercus virginiana*)
- Longleaf Pine (*Pinus palustris*)
- Loblolly Pine (*Pinus taeda*)
- Mockernut Hickory (*Carya tomentosa*)
- Nuttall Oak (*Quercus nuttallii*)
- Osage Orange (*Malicuza pomifera*)

Forestry—Onsite Learning Objectives (continued)

- Overcup Oak (*Quercus lyrata*)
 - Persimmon (*Diospyros virginiana*)
 - Pignut Hickory (*Carya glabra*)
 - Post Oak (*Quercus stellata*)
 - Red Maple (*Acer rubrum*)
 - River Birch (*Betula nigra*)
 - Sassafras (*Sassafras albidum*)
 - Shagbark Hickory (*Carya ovata*)
 - Shortleaf Pine (*Pinus echinata*)
 - Silver Maple (*Acer saccharinum*)
 - Slash Pine (*Pinus elliotti*)
 - Slippery Elm (*Ulmus rubra*)
 - Sourwood (*Oxydendrum arboretum*)
 - Southern Catalpa (*Catalpa bignonioides*)
 - Southern Magnolia (*Magnolia grandiflora*)
 - Southern Red Oak (*Quercus falcata*)
 - Sugarberry (*Celtis laevigata*)
 - (Sweet) Pecan (*Carya illinoensis*)
 - Sweetgum (*Liquidambar styraciflua*)
 - Sycamore (*Platanus occidentalis*)
 - Water Oak (*Quercus nigra*)
 - White Oak (*Quercus alba*)
 - Winged Elm (*Ulmus alata*)
 - Willow Oak (*Quercus phellos*)
 - Yellow-poplar (*Liriodendron tulipifera*)
2. Identify the following invasive species by common name. Scientific names are provided to ensure proper species identification.
- Kudzu (*Pueraria lobata*)
 - Chinese or Japanese Privet (*Ligustrum sinense*) (*Ligustrum lucidum*)
 - Cogongrass (*Imperata cylindrica*)
 - Chinese Tallowtree (*Triadica sebifera*)
 - Japanese Honeysuckle (*Lonicera japonica*)
 - Japanese Climbing Fern (*Lygodium japonicum*)
 - Chinaberry (*Melia azedarach*)
 - Mimosa (*Albizia julibrissin*)
 - Shrub Lespedeza (*Lespedeza bicolor*)
 - English Ivy (*Hedera helix*)
 - Golden Bamboo (*Phyllostachys aurea*)
 - Japanese Stiltgrass (*Microstegium vimineum*)

Forestry—Onsite Learning Objectives (continued)

3. Determine the age of a tree by counting tree rings, and/or a sample obtained from an increment borer.
4. Identify the following forestry management tools. Teams must be able to identify the forestry management use and/or purpose of each tool as well as the tool itself.
 - Drip torch
 - Fire swatter/flapper
 - Nomex
 - Chainsaw, ax, hand saw
 - Pole saw
 - Dibble bar
 - Increment borer
 - Herbicide and/or sprayer
 - Herbicide injector tools
 - Biltmore stick
 - Compass
 - Clinometer
 - DBH Tape
 - Calipers
 - Bark gauge
 - Flagging tape
 - Hand held prisms
 - Topo maps
 - Aerial photography
5. Conduct the following tree measurements using a Biltmore stick.
 - Tree diameter
 - Merchantable height in terms of 16-foot logs
 - Board foot volume of the tree
6. Understand the three basic types of timber inventory methods. Understand when to use each method, and the reasons for choosing each method. Decide which inventory method to use within a given a timber stand in the field.
 - 100 percent tree tally
 - Fixed-radius plot sampling (circular plots)
 - Variable-radius plot sampling (prism sampling)

Forestry—Onsite Learning Objectives (continued)

7. Establish a fixed-radius sampling plot and record basic measurements: tree density and volume on a per acre basis.
8. Identify in the field, the following timber product tree classifications.
 - Premerchantable
 - Pulpwood
 - Chip-n-Saw
 - Sawtimber
9. Be able to operate a compass and *pace*.

Note: Pacing is a method used to measure a distance. To estimate your own pace, a measure of known distance should be marked in a straight line on level ground. One pace is defined as two footsteps. Pace the distance several times and record the number of paces it takes to walk the distance each time. To determine the average distance of one pace, divide the total distance walked by the number of paces it takes to pace that distance.

 - Take a compass bearing
 - Use a compass bearing and pace to a designated point.
10. Identify the following common symbols on a given topo map or place the appropriate symbol on an aerial photograph or sketched map.
 - Section, Township and Range
 - Perennial stream
 - Intermittent stream
 - Perennial lake or pond
 - Marsh or swamp
 - Contour line and contour lines interval
 - Roads
 - Railroads
 - Pipelines

Forestry Sample Test Questions

1. Which of the following requires extremely high temperatures, or fire, in order for the seeds to be released?
 - A. Walnut
 - B. Serotinous cone
 - C. Samara
 - D. Cypress cone
 - E. All of the above
2. Which cropland conservation practice involves the re-establishment of streamside forests by including trees, shrubs, and grass plantings to slow down non-point water pollution?
 - A. Perennial Stream Cover
 - B. Contour Buffers
 - C. Riparian Forest Buffers
 - D. Rip-Rap Structure Enhancement
3. What are the three stages of forest succession?
 - A. Herbaceous vegetation, Shrubs and Trees
 - B. Primary Succession, Secondary Succession and Climax Forest
 - C. Pine Plantation, Pulpwood Stand and Old-Growth Forest
 - D. Pioneer, Flora and Fauna
 - E. Pine, Oak and Hickory
4. During a harvesting operation, logging roads should be maintained to prevent soil erosion from reaching the stream. This can be accomplished by installing "water bars and water turnouts." At what spacing should the water bars be installed?
 - A. Every 100 feet
 - B. Every 250 feet
 - C. Water bars are installed based on the "grade of road" (percent of slope)
 - D. Water bars are installed based on the width of the logging road
5. Tree growth and accumulated biomass are greatest and energy flow is lowest during which stage of natural succession?
 - A. Pioneer
 - B. Primary
 - C. Secondary
 - D. Sub-Climax
 - E. Climax

Forestry Sample Test Questions (continued)

6. What are natural resources that cannot be replaced?
- A. Renewable
 - B. Non-renewable
 - C. Limiting
 - D. Fossil Fuels
 - E. Bio Fuels
7. What has the greatest potential negative effect associated with the use of prescribed fire?
- A. Smoke
 - B. Escaped fire (outside of fire lines)
 - C. Heat
 - D. Ash
 - E. Detrimental to wildlife
8. Use the data provided to determine the stand basal area: The number of trees tallied using a 10-factor prism was: Plot 1 = 10; Plot 2 = 12; Plot 3 = 15; Plot 4 = 12; and Plot 5 = 16. THIS IS AN EXAMPLE OF AN ON-SITE QUESTION WHERE ONE WOULD USE PROVIDED INFORMATION.
- A. 65
 - B. 1300
 - C. 650
 - D. 130
 - E. 13

Sample Questions Key

- | | | | |
|----|---|----|-----------------------------|
| 1. | B | 6. | B |
| 2. | C | 7. | A |
| 3. | B | 8. | EXAMPLE of On-Site Question |
| 4. | C | | |
| 5. | E | | |

9. Soils/Land Use

Learning Objectives

- U. Recognize soil as an important resource.
- V. Describe basic soil properties and formation factors.
- W. Understand soil drainage classes and know how wetlands are defined.
- X. Determine basic soil properties and limitations, such as mottling and permeability, by observing a soil pit or soil profile.
- Y. Identify types of soil erosion and discuss methods for reducing erosion.
- Z. Utilize soil information, including soil surveys, in land use planning.
- AA. Discuss how soil is a factor in, or impacted by, non-point source pollution.

Soils/Land Use – Onsite Learning Objectives

Envirothon testing consists of two parts: A written test, which accounts for 52 percent of the score, and onsite questions, which account for 48 percent of the score. Onsite questions are usually “hands-on” questions. Listed below are specific Soil textures, soil horizons, specific soil diagnostic features, specific landscape positions, and certain soil land use interpretations. Although the majority of onsite questions for the Area and State Envirothon Soils test will be from the learning objectives below, there could be an onsite question from other Envirothon Soils learning objectives as listed on the Envirothon web site.

1. Identify Soil textural classes

- Sand
- Loamy sand
- Sandy loam
- Silt loam
- Silt
- Loam
- Clay loam
- Sandy clay loam
- Silty clay loam
- Sandy clay
- Silty clay
- Clay

2. Identify Soil Horizons

- O
- A
- E
- B
- C
- R

3. Identify Soil Diagnostic features

- Concretions or nodules
- Gleying
- Illuviation
- Eluviation

Soils/Land Use – Onsite Learning Objectives (continued)

- Fragipan
 - Redoximorphic features
 - Lithological discontinuity
 - Slickensides
 - Plintite
 - Cambic horizons
 - Argillic horizons
4. Identify the following soil structures
- Granular
 - Platy
 - Blocky
 - Prismatic
 - wedge
 - massive
5. Identify and describe soil matrix colors and redoximorphic features using the Munsell color chart.
6. Be able to identify rooting depth and soil restriction features.
7. Be able to estimate soil drainage classes based on soil color and texture.
8. Identify the following landscapes
- Ridgetops
 - Sideslopes
 - Terraces
 - Floodplains
9. Identify the land capability
- a. Class I
 - b. Class II
 - c. Class III
 - d. Class IV
 - e. Class V
 - f. Class VI
 - g. Class VII
 - h. Class VIII

Soils/Land Use – Onsite Learning Objectives (continued)

10. On a given site, use the Soil survey to find:

- i. A Soil Chemical Property
- j. A soil Physical Property
- k. Interpretive Groups Woodland, Wildlife, Recreation, Septic System

Soils/Land Use Sample Test Questions

1. Alfalfa and some clovers prefer neutral pH soils. Would a soil at pH 7.2 require an application of lime in order make it suitable for alfalfa production? **YES** or **NO**
(Circle your answer).
2. Which of the following is a true statement about conventional till farming?
 - A. Increases soil organic matter
 - B. Decreases sedimentation
 - C. Increases sedimentation
 - D. Good for soil structure
3. Which of the following is not considered a soil-forming factor?
 - A. Time
 - B. Chemistry
 - C. Parent Material
 - D. Relief
 - E. Plant and Animal Life
4. Name two state or federal agencies within Mississippi that provide free on-site technical assistance with natural resource management for private landowners?
 - A. _____ (2 points)
 - B. _____ (2 points)
5. A sandy texture indicates a soil with a high percentage of sand, and a clayey soil indicates high clay content. A soil with a loamy texture is indicative of what?
 - A. A soil with approximately equal amounts of sand, silt and clay
 - B. A soil with high silt content.
 - C. A soil that cracks when it is dry
 - D. A soil that frequently floods
 - E. A soil with greater than 45% clay

Soils/Land Use Sample Test Questions (continued)

6. Match the appropriate answer from the right-hand column with the items in the left-hand column (one point each):

- | | |
|--|--|
| _____ Color of the surface soil | A. Good aeration, little water logging |
| _____ Reddish and brownish subsoil | B. Long periods of severe O ₂ depletion |
| _____ Gray subsoil | C. Organic matter content |
| _____ Mottled subsoil; splotchy pattern of brownish and grayish colors | D. Fluctuating water table |

7. Which of the following would have the most erosion due to surface water runoff?

- A. Overgrazed pasture
- B. Cutover forestland
- C. No-till cropland
- D. Conventional tilled cropland
- E. Forested hillside with an 18 percent slope

8. Which of the following is NOT true about earthworms in relation to soils?

- A. They increase soil productivity
- B. They increase soil bulk density
- C. They increase soil permeability
- D. They increase soil aeration
- E. Their casts increase OM, nitrogen, and cation exchange capacity of soils

Sample Questions Key

- 1. NO
- 2. C
- 3. B
- 4. A. Mississippi Cooperative Extension Service; Mississippi Department of Wildlife, Fisheries and Parks
B. Mississippi Forestry Commission; Natural Resource Conservation Service; U.S. Fish and Wildlife Service
- 5. A
- 6. C...A...B...D
- 7. D
- 8. B

10. Wildlife

Learning Objectives

- BB. Identify common wildlife species and wildlife signs (keys will be used for more extensive identification).
- CC. Identify basic wildlife survival needs.
- DD. Describe specific adaptations of wildlife to their environment and their role in the ecosystem.
- EE. Describe predator/prey relationships and examples.
- FF. Describe the potential impact of the introduction of non-native species.
- GG. Describe the major factors affecting threatened and endangered species and methods used to improve the populations of these species.
- HH. Describe ways habitat can be improved for specific species by knowing their requirements.
- II. Discuss the concepts of carrying capacity and limiting factors.
- JJ. Discuss various ways the public and wildlife managers can help in the protection, conservation, management and enhancement of wildlife populations.
- KK. Describe food chains/webs and cite examples.
- LL. Describe factors that limit or enhance population growth.
- MM. Evaluate a given habitat for its suitability for designed species, giving a description of their habitat needs.

Wildlife – Onsite Learning Objectives

Envirothon testing consists of two parts: a written test which accounts for 80 percent of the score and onsite questions which account for 20 percent of the score. Onsite questions are the “hands-on” questions that you can see and touch. Listed below are specific wildlife species, wildlife signs, and common tools and instruments used in wildlife management. The majority of onsite points on the MS Envirothon Area and State wildlife tests will be from the learning objectives shown below. A small portion of the onsite wildlife test may include the identification of other wildlife species, feral species, signs, calls, and/or wildlife management tools not specifically identified below. Note: When identifying wildlife species and or signs, credit will only be given for the full name (*Virginia Opossum* but NOT *Opossum*). Learn the exact names listed below!

1. Identify the following animals by pelts, mounts, skins, skulls, tracks and/or pictures.
 - Virginia Opossum
 - Nine-banded Armadillo
 - Mole (species not required)
 - Rabbit (species not required)
 - Eastern Gray Squirrel
 - Eastern Fox Squirrel
 - Beaver
 - Muskrat
 - Nutria
 - Coyote
 - Red Fox
 - Gray Fox
 - Black Bear (subspecies not required, i.e., Louisiana Black Bear, American Black Bear)
 - Northern Raccoon
 - Mink
 - Eastern Spotted Skunk
 - Striped Skunk
 - River Otter
 - Bobcat
 - Wild Hog
 - White-tailed Deer
2. Identify whether an animal is a Carnivore, Omnivore or Herbivore by examining ANY mammal skull.

Wildlife – Onsite Learning Objectives (continued)

3. Identify the following additional animal tracks.

- Wild Turkey
- American Alligator
- Great Blue Heron
- Goose (species not required)
- Duck (species not required)

4. Identify the following game birds by their wings.

- Wild Turkey
- Northern Bobwhite
- American Woodcock
- Mourning Dove

5. Identify the following animals by pictures, mounts, and/or live specimens.

- American Toad
- Bullfrog
- Green Tree Frog
- Eastern Diamondback Rattlesnake
- Copperhead
- Canebrake or Timber Rattlesnake
- Cottonmouth or Water Moccasin
- Pigmy Rattlesnake
- Coral Snake
- King Snake
- Gray Rat Snake
- Corn Snake
- Speckled King Snake
- American Alligator
- Alligator Snapping Turtle
- Eastern Box Turtle
- Red-eared Slider
- Great Horned Owl
- Barn Owl
- Eastern Screech-Owl
- Barred Owl
- Red-tailed Hawk
- Osprey
- Northern Bobwhite

Wildlife – Onsite Learning Objectives (continued)

6. Identify the following ducks by mounts, wings, and/or pictures.

- Wood Duck (male versus female)
- Mallard (male versus female)
- American Black Duck
- Northern Pintail
- Gadwall
- American Widgeon
- Northern Shoveler
- Blue-winged Teal
- Green-winged Teal

7. Identify the following animals by their calls.

- American Toad
- Bullfrog
- Green Tree Frog
- Great Horned Owl
- Barn Owl
- Eastern Screech-Owl
- Barred Owl
- Red-tailed Hawk
- Osprey
- Northern Bobwhite
- Wild Turkey
- Whip-poor-will
- Chuck-will's-widow
- American Woodcock
- Mourning Dove
- Canada Goose
- Wood Duck
- American Crow
- Blue Jay
- Northern Cardinal

8. Identify the following animals by their scats or droppings.

- Black Bear (subspecies not required, i.e., Louisiana Black Bear, American Black Bear)
- Coyote
- Bobcat

Wildlife – Onsite Learning Objectives (continued)

- River Otter
 - Nutria
 - White-tailed Deer
 - Rabbit (species not required)
 - Wild Turkey (male versus female)
 - Goose
 - Owl
9. Identify the following wildlife signs.
- Crawfish mounds
 - Mole runways and burrows
 - Tree cavities versus feeding excavations
 - Beaver dam, lodge, and sticks
 - Antler scrapes / rubs
 - Wild Hog damage
 - Rodents gnawing on antlers
 - Rabbit-browsed twig versus a deer-browsed twig
10. Use a key to age white-tailed deer by examining a deer jaw bone for tooth replacement and wear. Distinguish between a fawn, a yearling – 1-½ years old, or adult – 2-½ years or older.
11. Identify the following wildlife management tools. Teams must be able to identify the wildlife management function / purpose of each tool as well as the tool itself.
- Drip torch
 - Matches
 - Fire swatter / flapper
 - Chainsaw, ax, hand saw
 - Dibble bar
 - Seeds and/or seed spreader
 - Herbicide and/or sprayer
 - Bullet and/or shells
 - Foothold / Leg hold traps
 - Conibear trap
 - Sherman live trap
 - Deer jaw bone extractor
 - Radio collar
 - Wildlife bands and/or tags

Wildlife Sample Test Questions

1. Food webs help illustrate the complex ways that _____ and _____ are transferred among living organisms and their environments.
A. _____ and _____
2. Which of the following would be the best reason for a wildlife manager to maintain a balance of red and white oak species in a stand?
 - A. To create species diversity
 - B. To reduce the impact of disease
 - C. To provide hard mast (acorns) which will help game animals survive the winter
 - D. To ensure that there will not be a complete mass failure during a particular year
 - E. Because red oaks drop acorns in early spring while white oak acorns drop in the fall
3. Which of the following species is an example of an r-strategist which is typically short-lived and has high reproductive rates?
 - A. Black Bear
 - B. Gopher Tortoise
 - C. West Indian Manatee
 - D. Northern Bobwhite Quail
 - E. Bald Eagle
4. Funding for both game and nongame wildlife conservation in Mississippi has come primarily from:
 - A. Environmental organizations such as Ducks Unlimited, National Turkey Federation, etc.
 - B. Private contributions from individuals
 - C. Sale of specialty wildlife license plates
 - D. Sale of hunting licenses and taxes placed on hunting-related sporting goods
 - E. State taxes
5. Name one wild animal that would make an acceptable household pet.
Answer: _____
6. Which of the following species is slowly increasing from near extinction in the state?
 - A. Florida Panther
 - B. Red Wolf
 - C. Ivory-billed Woodpecker
 - D. American Burying Beetle
 - E. Black Bear

Wildlife Sample Test Questions (continued)

7. Prescribed burning is one of the most cost-effective practices for improving wildlife habitat in pine stands because:
 - A. Burning sets back the successional stage of an area, controls woody vegetation, and increases herbaceous plant diversity
 - B. Burning is easy and safe to perform
 - C. Tree species will usually grow larger after a burn
 - D. Burning heats the soil, making it more productive
 - E. All of the above
8. When stocking a farm pond, the ratio of bream to bass should be 10:1. Which of the following is the correct stocking rate for Mississippi farm ponds?
 - A. 350 bream and 75 bass per acre
 - B. 500 bream and 50 bass per acre
 - C. 1000 bream and 100 bass per acre
 - D. 2000 bream and 200 bass per acre
 - E. All of the above would be acceptable stocking rates

Sample Questions Key

1. Energy and Nutrients
2. D
3. D
4. D
5. None! Wild Animals do not make good pets.
6. E
7. A
8. B

11. Current Issue 2020-21

Water Resources Management:

Local Control and Local Solutions

Mississippi is fortunate to have abundant water resources, both surface and groundwater. The Mississippi Delta sits atop the MS River Alluvial Aquifer, an abundant water resource for agriculture. The Ross Barnett Reservoir serves as the drinking water supply for the Jackson metropolitan area and the Pearl River is a significant water resource in Southwest MS. The Pascagoula River is one of the most pristine watersheds in the country and it and many south MS rivers and streams are used for wildlife and recreation. There are four large flood control reservoirs in North Mississippi. The Tennessee-Tombigbee Waterway is a commerce, recreation, and water supply resource along the eastern boundary of MS. Numerous lakes of various size cover Mississippi, Managing and protecting these resources is the responsibility of various state and federal agencies including Mississippi's Soil and Water Conservation Districts (SWCDs).

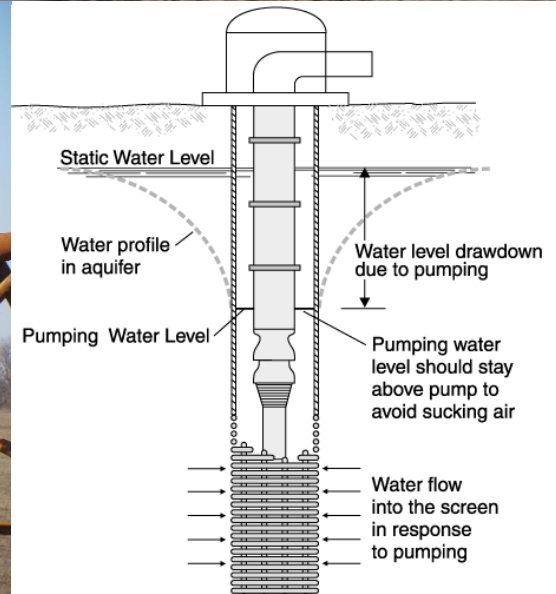
Students will learn the concepts of how water is managed in Mississippi, and how the local SWCD system works to address integrated water management challenges in cooperation with other local, state, and federal agencies.

Envirothon teams will pick a Mississippi watershed/aquifer of concern and specifically address that resource identifying history, present conditions, future planning and actions focusing on SWCD activities.

Key topics will include:

- Understand the ability of SWCDs to implement local policy and local management to protect water users;
- Understand administrative structures and processes for managing water uses and supplies;
- Understand ground and surface water hydrology and connectivity;
- Understand the economic, social and environmental impacts of projects and policy decisions.

Water is the driving force of all nature. - Leonardo da Vinci



Current Issue

Key Topics & Learning Objectives

Key Topics:

1. Understanding how groundwater and surface water systems function.
2. Understanding the importance of water quality and quantity as a foundation in a healthy ecosystem
3. Understanding a variety of water quality indicators in different landscapes.
4. Understanding a variety of water quantity indicators in different landscapes
5. Understanding how sustainable and best management practices enhance and protect water quality and quantity for humans and wildlife.
6. Understanding the differences of local, regional, and national systems that manage natural resources and the importance of each in water resources.
7. Understanding the social, economic, political impacts of natural resources management and decision making

Key Topic #1: Understanding how groundwater and surface water systems function.

Objective 1. Knowledge of hydrologic cycle **Objective 2.** Knowledge of groundwater and surface water interactions **Objective 3.** How human activities effect groundwater and surface water

Key Topic #2: Understanding the importance of water quality and quantity as a foundation in a healthy ecosystem.

Objective 1. Understanding the connection between groundwater and surface water and how they affect each other.

Key Topic #3: Understanding a variety of water quality indicators in different landscapes.

Objective 1. Knowledge of water quality impacts such as agriculture practices, urban development, nitrates, toxic algae, etc. **Objective 2.** Understand the indicators of water health, including physical, chemical and biological properties and its role in the hydrological system.

Key Topic #4: Understanding a variety of water quantity indicators in different landscapes

Key Topics & Learning Objectives continued)

Objective 1. Knowledge of water quantity impacts such as agriculture practices, urban development, groundwater levels

Objective 2. Understanding of stream gauges and groundwater maps

Key Topic #5: Understanding how sustainable and best management practices enhance and protect water quality and quantity for humans and wildlife

Objective 1. Understand the importance of moving toward sustainable practices to protect water quality and quantity.

Objective 2. Understand best management practices that improve water quality and quantity such as improved agriculture practices, urban planning and water efficiency.

Objective 3. Understand the role of technology: flow meters, observation wells, Airborne Electromagnetic (AEM) surveys, Unmanned Aerial Vehicles (UAV) (drones, GIS, etc.), precision agriculture, etc.

Key Topic #6: Understanding the differences of local, regional, and national systems that manage natural resources and the importance of each in water resources

Objective 1. Knowledge of various conservation agencies including Mississippi's SWCDs, and how partners work together for conservation success.

Objective 2. Understanding Mississippi's SWCD structure and what makes it unique from other Conservation districts in the U.S.

Key Topic #7: Understanding the social, economic, political impacts of natural resources management and decision making.

Objective 1. Describe the social, economic and political impacts of regulating water quality and quantity.

Objective 2. Understand the delicate balance behind decision making - funding projects, social responsibility, regulatory authority.

12. Mississippi Envirothon State Competition Oral Presentation Rules

1. Five minutes
2. Each team member must have an equal part in the presentation.
3. Team may use a maximum of two visual aids. Example: posters
4. **No electronic media of any kind. No computer-generated media.**
5. Be prepared for a question-and-answer period by the judges.
6. Only 3" x 5" note cards may be used during the presentation.
7. All presentation materials will be collected at registration and taken to the Oral Presentation Station by a contest official.

13. Mississippi Envirothon Area Competitions

March 25, 2021

LOCATIONS ARE TENTATIVE; PLEASE CHECK BACK FOR UPDATES

North Area - University of Mississippi Field Station, Oxford

Central Area - Chautauqua Park, Crystal Springs

South Area – Vancleave City Park, Vancleave

Delta Area – Delta Conservation Demonstration Center, Metcalfe

***This page will be updated on the MSWCC
website as additional information becomes
available:***

www.mswcc.ms.gov



2021 Mississippi Envirothon

Registration Form Area Competition

Must have registration form in office by
DEADLINE- January 29, 2021

Check One: ☐ Scholastic Team

☐ FFA Team

High School or Organization: _____

Address: _____

City: _____ State: _____ Zip: _____

Email: _____

Phone: () _____ - _____ Fax () _____ - _____

Advisors: (1) _____ T- Shirt Size _____

(2) _____ T-Shirt Size _____

If you have more than one team, specify with an A, B, C or D below.
Team: _____

Print Names Legibly	M/F	Grade	T-Shirt Size
1.			
2.			
3.			
4.			
5.			
Alternate: (Optional)			

PLEASE MAIL OR EMAIL TO:

MS ENVIROTHON, P.O. Box 23005, Jackson, MS 39226-3005

Email: Chelsey.Gazaway@ms.nacdn.net



DUE: April 5, 2021

14. Mississippi Envirothon State Competition

State Competition: APRIL 23, 2021

**FFA Center,
Raymond, Mississippi**

***This page will be updated on the website as
additional information becomes available.***

State competition awards and recognition

The Mississippi Envirothon Program is currently reviewing scholarship amounts and securing funds for 2021 scholarships. This information will be made available at a later date.

15. National Conservation Foundation (NCF) Envirothon Competition

2021 North American Envirothon

University of Nebraska, Lincoln, NE

July 25-July 31, 2021

MS SWCD Offices

Adams County SWCD (Natchez)
601-442-1790, Theresa.McGaughey@ms.nacdnet.net
Seth.Bragg@usda.gov
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