

# SC Envirothon 2026 Coaches Manual



## Current Environmental Topic

*Non-Point Source Pollution: It begins  
at home!*



CONSERVATION DISTRICTS



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# 1 INTRODUCTION AND GOALS

Welcome to the 2026 South Carolina Envirothon! This manual contains information you need to know to participate in the program. Your participation will prove to be a valuable learning experience for both you as a coach and your students!

The National Conservation Foundation (NCF) Envirothon is North America's largest environmental competition for high school students. The program began in Pennsylvania in 1979 in a single county. It had such appeal that by 1988, it expanded into three states and took on a national scope. Since that time, the program has grown to include most states, Canadian provinces, Chinese delegations, and Singapore.

The first South Carolina Envirothon Competition was held in 1997. The program includes an annual Coaches Training, Competition, and participation in the international NCF-Envirothon Competition. On the day of the SC Envirothon Competition, **Friday, April 17, 2026**, each team will complete five written exams and perform their Oral Presentation for a panel of judges. This is a rigorous academic competition, not a field trip! The team scoring the highest overall score will be sponsored to represent South Carolina at the international NCF-Envirothon Competition scheduled for **July 19-25, 2026**, hosted by Mississippi Soil and Water Conservation Commission in Starkville, Mississippi.

The Envirothon is an educational experience – over the course of several months of study, participants prepare themselves for testing at the six stations. The current topic is ***Non-Point Source Pollution: It begins at home***. This year's Envirothon is a tremendous opportunity to learn more about the issues surrounding this topic, while promoting teamwork and critical thinking skills in your students.

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

The overall goal of Envirothon is to promote environmental education so that succeeding generations will be more environmentally literate and possess the skills and knowledge to make informed decisions regarding the environment.

## The Ecosystems Approach

The Envirothon promotes the desire of students to learn more about the environment and to apply principles of resource management and ecology. Any ecological system (ecosystem) consists of a community of living organisms and their local physical environment. The living and non-living elements of an ecosystem are connected through flows of energy and the cycling of chemical elements. No single organism, population or species can produce all of its own food and to recycle all of its metabolic products. This ecosystem concept is important because it conveys one of the key insights that we have learned from the science of ecology, everything is related to everything else.

The Envirothon also develops students' critical thinking and problem-solving skills. Environmental problems are effectively addressed by considering the interacting elements of a system, not each sector in isolation. Ecosystem management is currently the standard approach for many government, industry and community based initiatives. South Carolina Envirothon has adopted the ecosystems approach. Written tests will occur at testing stations. Each station will focus on one of the five core subject areas. However, each station will incorporate elements of the other subjects. Questions at the stations, as well as the oral presentation scenario, will be multifaceted to ensure that students will be challenged to think critically and consider "the big picture".

## 2 RESOURCES AVAILABLE TO COACHES

Coaches Training is held annually to assist coaches in understanding the program and best practices for preparing teams. Coaches have the opportunity to interact with station managers to gain pertinent in-depth information, learn about the current topic of the year, and competition/program logistics.

- Attendance at the training is not mandatory to bring a team to the competition, however it is highly recommended. A coach may still register a team without attending the training.
- Attending this FREE training **does not** obligate an attendee to bring a team to the competition.

SC Envirothon Training Trunks are available for coaches to borrow from local Soil and Water Conservation Districts. Trunks are filled with professional environmental tools and activities to prepare students for practical portions of the competition.

SC Envirothon Website is available with up-to-date information about program events and training resources. Resources include training videos and PDFs, registration materials, and event information. <https://www.dnr.sc.gov/education/Envirothon/>

SC Envirothon Station Managers are available to answer station specific questions. See contact information on page 2 – “2026 South Carolina Envirothon Steering Committee Members”.

NCF-Envirothon Website is available with countless resources including competition training information, event information, and access to activities such as the NCF-Envirothon iNaturalist Project. <https://envirothon.org/>

Local Soil and Water Conservation Districts are bound by county boundaries. Reach out to your local district to build a relationship, network with topic professionals, and request team sponsorship. <https://www.dnr.sc.gov/conservation/index.html>

Complimentary one year membership to the Environmental Education Association of SC (EEASC) provides environmental education resources, trainings, grants, and information on local projects and happenings. For more information, visit the website at <http://eeasc.org/>

### **3 PARTNERS AND SPONSORS**

**SC Envirothon is coordinated by SCDNR-Conservation Districts in partnership with:**

|  |                                      |
|--|--------------------------------------|
| Harry Hampton Memorial Wildlife Fund     | USDA - NRCS                          |
| SC Soil and Water Conservation Districts | Clemson Sandhill REC                 |
| SC Association of Conservation Districts | SC Soil & Water Conservation Society |
| SC Conservation Districts Foundation     | Central Carolina Technical College   |
| SC Forestry Commission                   | Francis Marion University            |
| SC Department of Environmental Services  |                                      |

**2025 Friends of SC Envirothon:**

Chester Soil and Water Conservation District  
Colleton Soil and Water Conservation District  
Darlington Soil and Water Conservation District  
Environmental Education Association of South Carolina  
Greenville Soil and Water Conservation District  
Harry Hampton Memorial Wildlife Fund  
Horry Soil and Water Conservation District  
Lancaster Soil and Water Conservation District  
Laurens Soil and Water Conservation District  
Lexington Soil and Water Conservation District  
NCF-Envirothon  
Central Carolina Technical College  
Francis Marion University  
Richland Soil and Water Conservation District  
South Carolina Forestry Commission  
South Carolina Association of Conservation Districts  
South Carolina Conservation Districts Foundation  
South Carolina Department of Natural Resources-Conservation Districts  
South Carolina Soil and Water Conservation Districts Society  
Spartanburg Soil and Water Conservation District  
Union Soil and Water Conservation District  
USDA-Natural Resources Conservation Service  
York Soil and Water Conservation District

SC Envirothon is made possible only by the generous contributions from “Friends of the SC Envirothon”. Sponsor benefits can be found at the following website:

<https://www.dnr.sc.gov/education/Envirothon/sponsorsbenefits.html>.

For more information, or if you desire to financially support the program, please reach out to Jessica Egan ([eganj@dnr.sc.gov](mailto:eganj@dnr.sc.gov)).

## 4 SC ENVIROTHON COMPETITION SCHEDULE

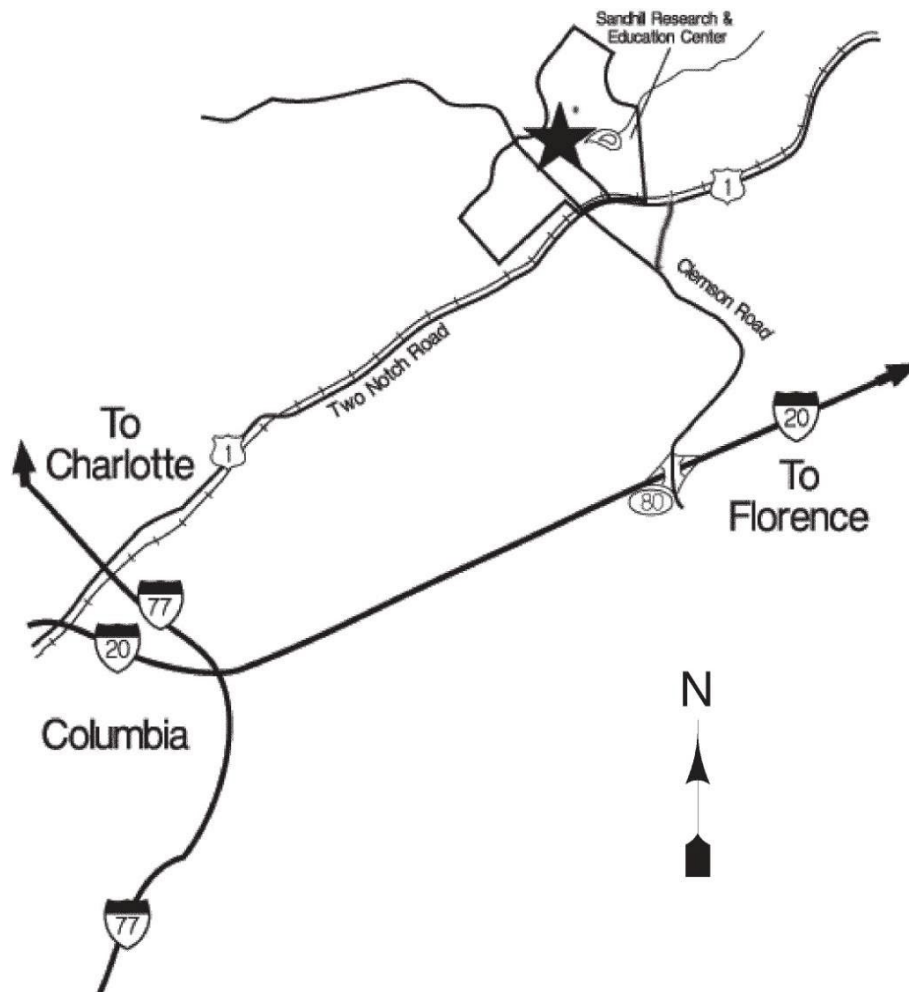
The 29<sup>th</sup> annual statewide SC Envirothon Competition will be held around the Lake House at the Clemson Sandhill Research and Education Center on **Friday, April 17, 2026**.

A schedule will be provided to registered coaches prior to the event.

### SC Envirothon Competition Sample Schedule

|                   |   |
|-------------------|---|
| 8:00 a.m.         | Volunteer Registration                  |
| 8:30 a.m.         | Team Registration begins, Team photos   |
| <b>9:30 a.m.</b>  | <b>Opening Ceremony at Awards Stage</b> |
| 9:45 a.m.         | Guides escort teams to first station    |
| <b>10:00 a.m.</b> | <b>Competition begins</b>               |
| 10:30 a.m.        | Horn ends Test Session #1, Teams rotate |
| 10:35 a.m.        | Test Session #2 begins                  |
| 11:05 a.m.        | Horn ends Test Session #2, Teams rotate |
| 11:10 a.m.        | Test Session #3 begins                  |
| 11:40 a.m.        | Horn ends Test Session #3, Teams rotate |
| 11:45 a.m.        | Test Session #4 begins                  |
| 12:15 a.m.        | Horn ends Test Session #4, Teams rotate |
| 12:20 p.m.        | Test Session #5 begins                  |
| 12:50 p.m.        | Horn ends Test Session #5, Teams rotate |
| 12:55 p.m.        | Test Session #6 begins                  |
| 1:25 p.m.         | <b>Horn ends Test Session #6</b>        |
| 1:30 p.m.         | Lunch near Awards Stage                 |
| <b>2:00 p.m.</b>  | <b>Awards Ceremony</b>                  |

## 5 HOW TO GET THERE



Take I-20 to Exit 80 (Clemson Road). Take Clemson Road North past McDonald's and cross bridge over Two Notch Road. At the light take a right into the Clemson Sandhill REC complex (this is opposite the Village at Sandhill shopping mall). Gate codes will be sent to registered attendees ahead of the competition.

## 6 COMPETITION RULES AND OVERVIEW

*While it is the intent of the SC Envirothon Steering Committee to provide a consistent experience for all teams, the SC Envirothon Competition is an outdoor, rain-or-shine event and is subject to all manner of inconsistencies, including sudden rain, background noise, visual distractions, wildlife sightings on the competition field, and technological failures involving the laptop, TV, or clicker at the oral presentation station. In the event of a technological failure at the oral presentation station, students should be prepared to present to the judges using a printed copy of their slideshow for reference.*

1. Students in grades 9-12 or their equivalent as of January 1, 2026 are eligible to participate.
2. Teams must have at least three and not more than five members. Each team must be accompanied to the competition by a coach. Transportation arrangement to and from the competition is the responsibility of the team and their coach.
3. A program may send up to two teams to the state competition. Each team will consist of members from the same school, organization and/or association. Two schools may join together to form one program and send a joint team, but then forfeit their rights to send individual teams (an organization may not contribute members to more than one team).
4. **Only ONE alternate will be allowed per team.** Additional students will not be allowed to participate in the competition. Alternates must register at the registration table the morning of the competition to participate. Alternates **may not** wander into the competition area outside of being assigned to an alternate team if available.
5. Thirty (30) minutes will be allotted for each of the six stations during the competition.
6. There will be written questions at each of the five testing stations. Question format may be true/false, multiple choice, matching, short answer, essay, fill in the blank, or practical exercises. Teams will give a prepared oral presentation at the orals station.
7. Test questions will be taken from the SC Envirothon coach resources found on the SC Envirothon website and during the SC Envirothon Coaches Training.
8. During the competition, team members will work together to answer test questions, completing one test and submitting it to the station manager in charge of the station before moving on to the next station. Once the competition has begun, the team will rotate through all six stations **AS A TEAM.**
9. **If an accommodation is needed by a team member, such as a medical condition or a need based on an Individual Education Plan (IEP), 504 Accommodation Plan, or any other law-abiding accommodation allowed by the school, the SC Envirothon Steering Committee will consider the accommodation. Accommodation requests must be received no later than the competition registration deadline so that committee has adequate time for consideration. If an unexpected accommodation arises, notify the committee as soon as possible for consideration.**
10. ALL team members must remain with team guides and **only** leave testing station when escorted by assigned guide. Snack stations are not provided during testing, only water and sports drink.

11. The station manager in charge of the testing station has final authority with respect to the test questions and answers.
12. In the event of a tied score for first, second, or third place – the team with the highest score on the Oral Presentation will be considered the winner.
13. Oral presentations will be evaluated by a panel of five judges. The high and low score from each panel will be discarded and a team's oral presentation score will be the average of the remaining three scores.
14. In the event of a procedural dispute or question arises that is not covered in this manual or its addenda, the issue will be decided by the SC Envirothon Steering Committee.
15. Team members, coaches, and volunteers with allergies or medications must bring own supplies.
16. **Cameras, video recorders, laptops, cell phones, smart watches, tape recorders and all other electronic devices are prohibited in the vicinity of the testing stations.** Students found in the testing areas with electronic devices will have the device confiscated and team will face disqualification. Allowances are made in advance for the press and/or staff.
17. The competition will be held outside regardless of weather conditions. Team members should wear appropriate clothing (sneakers, jeans/shorts, tee shirts). If it is warm and sunny, please consider sunscreen. **(Do not wear any item of clothing that may identify your team by city, county or school.)** Competition t-shirts will be provided and must be worn during the competition.
18. **The top scoring team will be eligible to attend the NCF-Envirothon Competition.** If the first-place team is unable to attend, the second place team will be asked and so forth. As a winning team, you represent the state of South Carolina and the team is expected to prepare to attend the NCF-Envirothon Competition. Post state competition, travel plans and registration for the international event will begin. Note the dates in advance and plan to leave these dates available. **Being on a winning team of the state competition obligates the coach(es) and all original competing students of the team to this commitment.**

*Any infraction of the rules will be reviewed by the Steering Committee and may become grounds for disqualification. The rules of SC Envirothon are subject to change on a majority vote of the Steering Committee. Any changes will be published and distributed prior to the SC Envirothon Competition.*

## 7 PRE-COMPETITION CHECKLIST

The Coach is the backbone of the SC Envirothon team. This person serves to organize the team, motivate the members, and teach materials pertinent to the SC Envirothon program. Throughout the year, the coach guides the team's preparation for the competition. There are two major components of the coach's job-- teaching team skills and transferring to the members a strong environmental ethic. A coach has a tremendous responsibility and is to be congratulated for making such an important contribution to the growth of the team members' knowledge and experience.

Ensure the following check-list is completed:

- Close contact is maintained with the local Soil and Water Conservation District Office (contact information can be found here: <https://www.dnr.sc.gov/conservation>).
- Team Registration Packets are sent in by **March 23, 2026**. Packets include a Team Registration Form, Student Participant Waivers (1 per student), and Coach Volunteer Agreements (1 per coach). Registration materials can be found here: <https://www.dnr.sc.gov/education/Envirothon/competition.html>
- \$175.00 Registration Fee** is paid for each registered team by registration deadline of **March 23, 2026**. Local Soil and Water Conservation Districts often sponsor local SC Envirothon teams. Ensure payment is coordinated by the registration deadline. All registration fees are non-refundable after this date.
- Transportation has been arranged to the state competition.
- All team members are familiar with rules of the competition and agree to attend the NCF-Envirothon Competition if on a winning team (summer dates must be left open).
- Team is trained in each of the five test areas: Soils, Aquatics, Forestry, Wildlife, and the Current Topic.
- Team has prepared their oral presentation and visual aids in accordance with the rules.
- Oral presentation slideshow (pdf) has been submitted to Jessica Egan ([eganj@dnr.sc.gov](mailto:eganj@dnr.sc.gov)) by the deadline of **midnight on Sunday, April 12, 2026**.

## 8 DAY OF THE EVENT REMINDERS

1. **BE ON TIME!** Allow ample travel time. Arrive 30 minutes prior to registration time.
2. Report to the registration tent to receive instructions and supplies. (Coach only)
3. Coach will receive supplies for both themselves and all team members (t-shirts, nametags, promotional items etc....).
4. Coach must check-in oral presentation notecards by securing them into the plastic bag provided in supply bag then checking them in at the oral presentation materials table (near registration). The notecards will be given back to the members of the team just prior to their presentation. Students should **NOT** practice their presentations or carry **ANY** presentation materials with them during the competition. *Please emphasize this with students!*
5. After registering and turning in presentation notecards, move to the Awards Stage to have team photos taken. Teams will be assigned a team number at registration and a poster with that number will be in supply bag. Advise the team to take a photo with a student holding the team number below their waist so the number can be cropped out later.
6. After completing the team photo, teams are welcome to help themselves to refreshments. Please encourage students to fill their provided water bottle and take a snack. **Lunch will not be until later in the afternoon and no snack stations will be provided during testing.** Students will need their bottle for refills during the competition. Watering holes will be set-up throughout the competition area, but no cups will be provided. This limits the amount of waste we produce during the day!
7. Everyone **MUST** wear their name tags (provided at Registration). Students not wearing name tags at the testing stations will potentially cause their team to be disqualified. Advisors must wear their name tags while on the grounds.
8. **COACHES MAY NOT CONSULT WITH OR ACCOMPANY THEIR TEAM ONCE THE COMPETITION HAS BEGUN!** Teams are assigned a guide to escort them between stations. Failure to follow this rule may result in disqualification.
9. Coaches are allowed to leave the grounds but must leave a phone number in case of emergency and must return prior to the end of testing rotations. If you do not have a cell phone, you are asked to remain on site.
10. No pets of any type are allowed on the competition site. No alcohol, drugs or tobacco will be allowed. No smoking is allowed on the competition site.
11. Winning teams must complete necessary paperwork before leaving the competition (see Awards and Recognition).
12. **Familiarity with the rules and regulations of the competition is expected of all coaches and team members.** Ignorance of a rule is not an acceptable excuse for failure to comply.

## **9 AWARDS AND RECOGNITION**

Awards will be presented to 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> place teams, station winners, and the Marc Cribb Exceptional Leader Award recipient. All participants will receive an SC Envirothon t-shirt, water bottle, and promotional items.

**1st Place - \$1,000 scholar award and gold medal per student, \$1,000 cash to head coach, team trophy**

**2nd Place - \$500 scholar award and silver medal per student, \$500 cash to head coach, team trophy**

**3rd Place - \$250 scholar award and bronze medal per student, \$250 cash to head coach, team trophy**

**Station Winners – team certificate**

### **CLAIMING PRIZE MONEY**

After the competition ends and winners are announced, paperwork will be provided to the top three teams explaining how to claim prize money. The paperwork must be completed and returned to SC Envirothon Coordinator in order for prize money to be distributed. SC Envirothon must keep a record of winners. A check will be mailed to the winners approximately (4) weeks following the completion of paperwork.

# 10 SOILS

Station Manager: Kristine Ryan, USDA-NRCS

## Learning Objectives:

1. Define soil, know the importance of soil, and describe basic soil properties. (ref. 3, 6, 10)
2. Explain the diagnostic significance of soil color. Be able to describe how soil color is measured and what processes produce different colors. (ref. 6, 10)
3. Be familiar with the 12 soil orders of soil taxonomy. (ref. 6, 9, 10)
4. Describe the factors which influence soil texture and structure and be able to explain how these properties influence a soil's ability to retain water and nutrients and its tendency to erode. Explain how this further influences the hydrologic and nutrient cycles in an ecosystem. (ref. 3, 6, 10)
5. Derive information from a hard copy of a soil survey book, as well as web soil survey, and explain the interaction between soil type and plant communities as well as suitability for various land use practices. Also be knowledgeable of the information and data that can be obtained from using web soil survey. (ref. 4, 6, 10)
6. Explain and/or describe the features of a soil profile, the five factors of soil formation, and the origin of soil parent materials. (ref. 1, 3, 4, 6, 10)
7. Describe various soil constituents (sand, silt, clay, organic matter) and their properties. (1, 3, 6, 10)
8. Be familiar with the Major Land Resource Areas in South Carolina. (ref. 10)
9. List the benefits of a healthy soil and the four basic soil health principles to improve soil health and sustainability. (ref. 7, 8)
10. Understand the basics of the Land Capability Classification System. (ref. 3, 4, 6)
11. Identify the various types of soil erosion, factors affecting the rate of soil erosion, and best management practices and/or conservation systems used to control soil erosion. (ref. 6, 7, 8)
12. Explain how composting improves soil health and provide evidence for how composting supports water conservation efforts. (ref. 11)
13. Understand the important role soils play in home sewage treatment systems. (ref. 12)

## Resources/References:

### **NRCS Web Soil Survey/Published Soil Surveys:**

<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

**NRCS Wetlands:** <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/wetlands/>

**Soil Health:** <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/soils/health/>

### **Soil PowerPoint Presentation:**

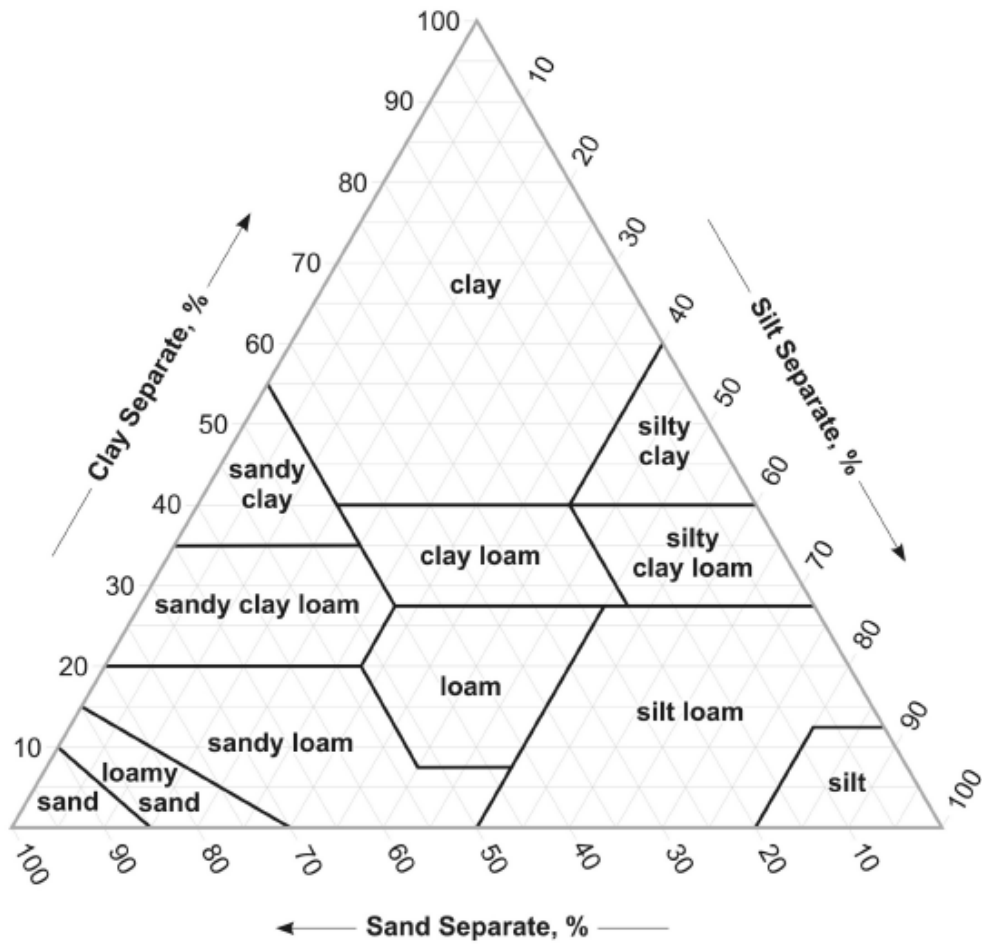
<http://www.dnr.sc.gov/education/Envirothon/pdf/SoilsStudyMaterial2019.pdf>

**Composting:** <https://www.nrdc.org/stories/composting-101#tips>;

<https://nrccspad.sc.egov.usda.gov/distributioncenter/pdf.aspx?productID=46>

**Historical Soil Surveys:** <https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soil/soil-surveys-by-state>

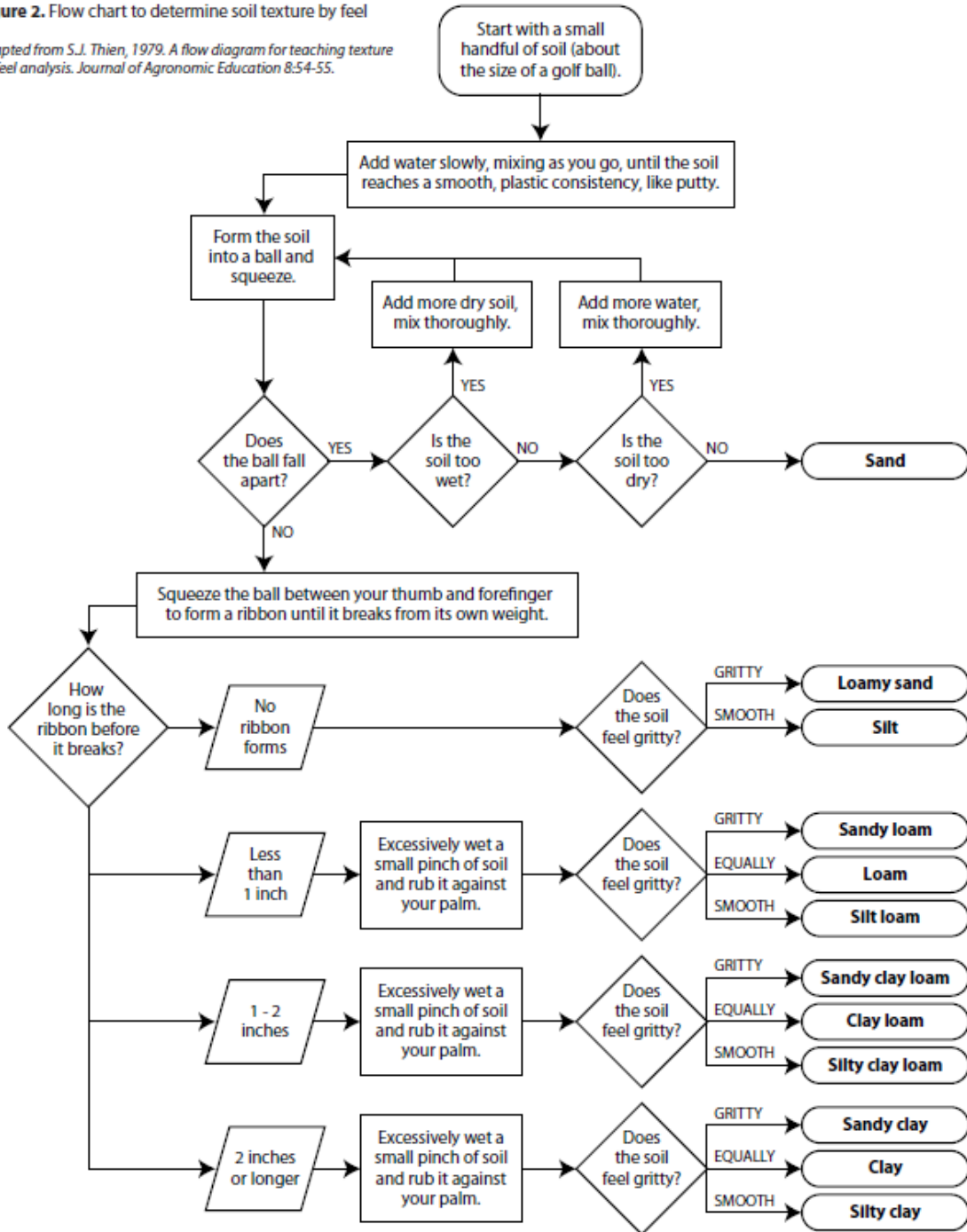
## Soil Textural Triangle



[https://www.nrcs.usda.gov/Internet/FSE\\_MEDIA/nrcs142o2\\_050242.jpg](https://www.nrcs.usda.gov/Internet/FSE_MEDIA/nrcs142o2_050242.jpg)

**Figure 2.** Flow chart to determine soil texture by feel

Adapted from S.J. Thien, 1979. A flow diagram for teaching texture by feel analysis. *Journal of Agronomic Education* 8:54-55.



# 11 AQUATIC ECOLOGY

**Station Manager: Jeff Steinmetz, Francis Marion University**

Adapted by Jeff Steinmetz from the North American Envirothon Guidelines

## Learning Objectives

Most of these objectives come directly from the main NCF Envirothon webpage; however, I've added a few tweaks / additional references. Be aware that the national competition guideline has 62 distinct learning objectives! I have shortened that down to 27, but if you're curious, or if your team wins and goes to the national competition, you'll want to check out the full list of all 62 learning objectives. The official Envirothon curriculum guide for the Aquatic Ecology section can be found here:

<https://envirothon.org/the-competition/areas-of-study/aquatic-ecology/>.

Below is the shortened list of objectives for the SC competition and some useful links for learning about those objectives.

## Study Area 1: Hydrosphere

1. Identify different types of water bodies, how they are formed, and where they are found.
  - a. "Types of water bodies" could be a very large list, depending on how you break it down. For the SC Envirothon, focus on the main ones: oceans, lakes, rivers, wetlands.
    - i. Oceans: <https://www.noaa.gov/education/resource-collections/ocean-coasts>
    - ii. Lakes: <https://www.nalms.org/home/basics-of-lake-management/>
    - iii. Rivers: <https://www.usgs.gov/special-topics/water-science-school/science/rivers-streams-and-creeks>
    - iv. Wetlands: <https://www.nps.gov/subjects/wetlands/how.htm> and <https://www.epa.gov/wetlands/what-wetland>
2. Differentiate the types of wetlands, describe their characteristics, and identify which are common in SC
  - a. <https://www.epa.gov/wetlands/classification-and-types-wetlands>

## Study Area 2: Aquatic Ecosystems

3. Describe the structure of an aquatic ecosystem, including:
  - a. Carrying capacities
    - i. [http://en.wikipedia.org/wiki/Carrying\\_capacity](http://en.wikipedia.org/wiki/Carrying_capacity)
  - b. Productivity
    - i. <https://www.britannica.com/science/primary-productivity>
4. Define an aquifer and elaborate on how aquifers relate to the local and global water supply.
  - c. <https://www.usgs.gov/special-topics/water-science-school/science/aquifers-and-groundwater>
5. Diagram an aquatic food web and describe the flow of energy within it.
  - d. <https://www.noaa.gov/education/resource-collections/marine-life/aquatic-food-webs>
  - e. <https://www.nalms.org/wp-content/uploads/2018/09/31-2-5.pdf>
6. Determine the order of a stream and describe what the order indicates.
  - f. [https://en.wikipedia.org/wiki/Strahler\\_number](https://en.wikipedia.org/wiki/Strahler_number)
7. Describe the basics of hydrology, including:
  - g. Stratification in freshwater and saltwater systems

- i. <https://www.iisd.org/ela/blog/commentary/lakes-stratify-turn-explain-science-behind-phenomena/>
- h. Discharge and recharge for aquatic systems
  - i. <https://www.usgs.gov/special-topics/water-science-school/science/how-streamflow-measured>
- i. Runoff
  - i. <https://www.usgs.gov/special-topics/water-science-school/science/runoff-surface-and-overland-water-runoff>

### Study Area 3: Organisms

8. Describe the roles of producers, consumers, and decomposers in various aquatic ecosystems and identify their trophic levels.
  - a. <https://flexbooks.ck12.org/cbook/cbse-biology-class-10/section/4.3/primary/lesson/producers-consumers-and-decomposers/>
  - b. <https://www.epa.gov/sites/default/files/documents/foodchainsandfoodwebs.pdf>
9. Describe the role of cyanobacteria in aquatic ecosystems and their role in harmful algal blooms.
  - c. <https://www.epa.gov/cyanohabs>
10. Explain the distinctions between species designations (such as common, rare, endangered, threatened, endemic, extirpated, and extinct) and provide examples of each type
  - d. [https://www.galapagos.org/about\\_galapagos/conservation-glossary/](https://www.galapagos.org/about_galapagos/conservation-glossary/)

### Study Area 4: Aquatics and Society

11. Explain the history of human impact on water quality and water resources.
  - a. Know what fish consumption advisories are and what the common advisories are in SC <https://des.sc.gov/programs/bureau-water/aquatic-science/fish-consumption-advisories>
12. Identify how major legislation protects water resources.
  - a. Clean Water Act: <https://www.epa.gov/laws-regulations/summary-clean-water-act>
13. Identify key stakeholders, agencies, and organizations that oversee water resource protection and management (such as local conservation districts or water boards, state/provincial agencies, and national environmental and conservation agencies).
  - b. For 3-4:
    - i. E.g. SCDES, SCDNR, U.S. EPA, USGS, etc.
      1. <https://des.sc.gov/programs/bureau-water>
      2. <http://www.dnr.sc.gov/water.html>
      3. <https://des.sc.gov/programs/bureau-water/aquatic-science/how-scdes-measures-surface-water-quality>
14. Explain why it is important to take the entire watershed/catchment area into account when planning for water quality.
  - c. <https://www.epa.gov/hwp>
15. Identify state/provincial river basins.
  - d. [https://www.dnr.sc.gov/water/waterplan/pdf/Major\\_Basins\\_of\\_South\\_Carolina.pdf](https://www.dnr.sc.gov/water/waterplan/pdf/Major_Basins_of_South_Carolina.pdf)
16. Describe water conservation practices and in which situations they are most effectively used.
  - e. Homes: <https://www.epa.gov/watersense>
  - f. Agriculture: <https://cuesa.org/article/10-ways-farmers-are-saving-water>
17. Describe cultural eutrophication and how it affects lakes and ponds.

- g. <https://www.nature.com/scitable/knowledge/library/eutrophication-causes-consequences-and-controls-in-aquatic-102364466/>
- 18. Recommend best management practices for improving water quality and enhancing aquatic habitat, such as riparian buffers.
  - a. <https://www.nrcs.usda.gov/plantmaterials/idpmstn7248.pdf>
- 19. Distinguish between point and non-point source pollution and give examples and management strategies for each.
  - h. <https://www.epa.gov/nps/basic-information-about-nonpoint-source-nps-pollution>
  - i. <http://www.waterencyclopedia.com/Po-Re/Pollution-Sources-Point-and-Nonpoint.html>
  - j. <http://water.epa.gov/polwaste/nps/whatis.cfm>
- 20. Explain the economic, societal, and cultural impacts of water quality and quantity resource issues (such as water scarcity, damming projects, pollution disasters, et cetera).
  - k. Understand the fight between North and South Carolina over water on Catawba River
    - i. <https://www.circleofblue.org/2011/world/north-vs-south%E2%80%94carolina-states-settle-water-dispute-without-supreme-court/>
    - ii. I've written a case study on this that you can find here:
      - 1. <https://www.nsta.org/ncss-case-study/one-glass-two-people>

### Study Area 5: Field Skills

- 21. Identify common fish in SC <https://www.dnr.sc.gov/fish/pdf/FreshwaterFishPocketGuide.pdf>
- 22. Identify common aquatic macroinvertebrates and their pollution tolerances.
  - a. [https://seetolearn.weebly.com/uploads/4/6/7/4/46744079/key-lettersize\\_compressed.pdf](https://seetolearn.weebly.com/uploads/4/6/7/4/46744079/key-lettersize_compressed.pdf)
  - b. You can also find links to the great “Pocket Macros” app at <https://seetolearn.weebly.com/resources.html>. This is a great resource for learning, but they will not be able to use it at the competition as it is phone based. Use it for learning, but know how to use the key listed in 22a for the competition.
- 23. Calculate a biotic index and determine water quality for freshwater systems.
  - a. For 22-23:
    - i. <http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/biocriteria/index.cfm>
    - ii. [https://dnr.maryland.gov/streams/Documents/dnr\\_bugsheet.pdf](https://dnr.maryland.gov/streams/Documents/dnr_bugsheet.pdf)
    - iii. <http://www.epa.gov/wetlands/wetlands-monitoring-and-assessment> .
- 24. Identify common invasive aquatic species in SC.
  - a. <https://des.sc.gov/sites/des/files/DNR/SCAISplan.pdf>
- 25. Interpret results of water quality monitoring measures (such as dissolved oxygen, turbidity, E. coli counts, pH, nutrient levels, et cetera) and provide recommendations for best management practices.
  - b. [http://water.epa.gov/scitech/swguidance/standards/wqslibrary/sc\\_index.cfm](http://water.epa.gov/scitech/swguidance/standards/wqslibrary/sc_index.cfm) (click on SC, then on the water classification & standards regulation to open a .pdf file)
- 26. Delineate a watershed using a topographic map.
  - c. [http://www.wvca.us/envirothon/pdf/Watershed\\_Delineation\\_2.pdf](http://www.wvca.us/envirothon/pdf/Watershed_Delineation_2.pdf)
- 27. Interpret a hydrograph
  - d. <https://www.bbc.co.uk/bitesize/guides/zv4r7nb/revision/1>
  - e. [https://www.weather.gov/lot/hydrology\\_education\\_hydrographs](https://www.weather.gov/lot/hydrology_education_hydrographs)

## **AQUATICS – List of General Resources.**

**See Learning Objectives for specific references/links for particular topics.**

- EPA’s Office of Water Homepage: [www.epa.gov/ow](http://www.epa.gov/ow)
- USGS Water Science for Schools: <http://water.usgs.gov/edu/>
- USDA National Water Management Center:  
<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/nwmc/>
- NRCS National Water and Climate Center: <https://www.nrcs.usda.gov/wps/portal/wcc/home/>
- SCDESs Bureau of Water: <https://des.sc.gov/programs/bureau-water>
- SCDNR Water: <http://www.dnr.sc.gov/water.html>
- SC Office of Resilience: <https://scor.sc.gov/>
- Center for Watershed Protection: [www.cwp.org](http://www.cwp.org)
- EPA’s How’s My Waterway: <https://www.epa.gov/waterdata/how-my-waterway>
- American Rivers. <https://www.americanrivers.org/>

## 12 FORESTRY

Station Manager: James Miller, SC Forestry Commission

### Learning Objectives:

1. Identify common South Carolina trees without a key.
2. Identify specific or unusual species through use of a dichotomous key.
3. Understand how wildlife diversity relates to: forest communities, forest species, forest age structure, snags and den trees, availability of food and cover, and riparian zones.
4. Understand basic forest management concepts such as: harvesting techniques, regeneration methods, and insect and disease control.
5. Be familiar with the use of a Biltmore stick, compass and other forestry tools.
6. Understand how following Best Management Practices will help protect soil and water quality.

### Additional Resources:

**South Carolina Forestry Commission Foresters** available for assistance (project, stewardship, and urban). They can be sources of information and advice for local teams. To find your local foresters follow this link and choose your county: <https://www.scfc.gov/about-us/contacts/>.

**Forest Trees of SC:** <http://www.state.sc.us/forest/pubs/foresttreesofsc.pdf>

### **Estimating the volume of a standing tree using a scale stick**

<https://content.ces.ncsu.edu/estimating-the-volume-of-a-standing-tree-using-a-scale-biltmore-stick>

<https://forestry.ces.ncsu.edu/wp-content/uploads/2019/07/scale-stick-template.pdf? fwd=no>

### **Using a basal area angle gauge:**

<https://extension.msstate.edu/publications/using-the-msu-basal-area-angle-gauge#:~:text=This%20is%20the%20correct%20procedure%20for%20using%20the,10%20%28the%20B AF%20of%20the%20angle%20gauge%29.%20>

<https://blogs.clemson.edu/fnr/2021/08/20/homemade-devices-to-determine-basal-area/>

**Managing the Family Forest in SC:** <https://www.fs.usda.gov/research/treearch/49889>

# 13 WILDLIFE

## Station Manager: Zadok Moss, SC Department of Natural Resources

Wildlife Station objectives come directly from the NCF-Envirothon webpage. The official NCF-Envirothon curriculum guide for the Wildlife section can be found here: <https://envirothon.org/the-competition/areas-of-study/wildlife/>.

### Wildlife Biology

1. Identify the different stages in a species' life cycle and describe how each stage relates to the species' biology, behavior, adaptations, habitat requirements, and ecological niche.
2. Provide examples of physical and behavioral adaptations (such as mimicry, camouflage, freeze response, hibernation, special organs, et cetera) and how these adaptations benefit wildlife.
3. Explain how the needs of a species might change throughout its life cycle, and how these changing needs are addressed in management strategies.
4. Differentiate between a territory and a home range and discuss how each is important for wildlife species.
5. Explain the difference between generalist and specialist species and provide examples of each.

### Wildlife Ecology

6. Identify the essential components of a habitat.
7. Name and describe the different types of symbiotic relationships.
8. Identify common wildlife diseases, their causes, and their effects.
9. Describe the different levels of ecosystem organization, including individuals, populations, communities, and ecosystems.
10. Define an ecological niche and describe how species fulfill these different roles in an ecosystem.
11. Describe different habitat characteristics that are important to wildlife (such as ecotones, edges, snags, downed logs, riparian areas, early successional stages, et cetera).
12. Define succession and describe how each successional stage is important for different species of wildlife.
13. Describe wildlife adaptations to unique ecosystems (such as high elevations, deserts, fire-dependent ecosystems, et cetera).
14. Identify sources of disturbance in an ecosystem and predict how different types of disturbance may impact wildlife species.
15. Explain the importance of pollinators in natural and agricultural ecosystems.

## **Wildlife, Conservation, and Society**

16. Identify major legislation (local and national) and international agreements pertaining to wildlife and describe how they provide protection for natural resources.
17. Explain the distinctions between species designations (such as common, rare, endangered, threatened, endemic, extirpated, and extinct) and provide examples of each type.
18. Recognize important issues facing wildlife on a local, state/provincial, national and international scale.
19. Define keystone, umbrella, game, non-game, and indicator species.
20. Explain the differences between conservation and preservation.
21. Define invasive and exotic species, describe their characteristics, name examples, describe how they are spread, and explain their impact on local ecosystems.
22. Identify the roles of key leaders in the conservation movement, both historical and present (such as Rachel Carson, Aldo Leopold, John Muir, Teddy Roosevelt, etc).

## **Field Skills**

23. Identify common local wildlife species from preserved specimens, pelts, or pictures without the use of a key.
24. Explain an animal's habitat, dietary requirements, and life cycle based on animal signs.
25. Identify wildlife based on communication methods (bird calls, etc)

# **14 CURRENT TOPIC: NON-POINT SOURCE POLLUTION: IT BEGINS AT HOME!**

**Station Manager: Joshua Castleberry, Central Carolina Technical College**

Learning Objectives adopted from NCF-Envirothon Current Issue Study Resources:  
<https://envirothon.org/2026-mississippi/study-resources/>

## **Key Topic #1: Non-Point Source Pollution Status**

Learning Objectives

1. Define non-point source (NPS) pollution and differentiate it from point source pollution using real-world examples from urban and rural settings.
2. Explain changes in watershed ecology that influence NPS pollution (Water cycle, nutrient cycles, carbon cycles, river continuum concept).
3. Identify major types, sources and pathways of NPS pollution in surface water systems, including stormwater runoff, agricultural fields, and impervious surfaces.
4. Describe the impacts of NPS pollution on water quality and designated water uses (e.g., recreation, fisheries, drinking water).

## **Key Topic #2: NPS in a Growing World and Your Role in It**

Learning Objectives

1. Explain how population growth, urban expansion, and agricultural intensification contribute to increased non-point source pollution globally and locally.
2. Compare the effects of land use types (e.g., urban, suburban, agricultural) on runoff volume and pollutant loading.
3. Identify common products or practices in daily life that contribute to non-point source pollution through indirect pathways (e.g., fertilizers, car washing, pet waste).
4. Illustrate the concept of a personal environmental footprint as it relates to NPS pollution, using tools such as footprint calculators.

## **Key Topic #3: The role of the Individual/Community in NPS issues and solutions**

Learning Objectives

1. Describe the role that individuals, families, and local communities can play in reducing NPS pollution through behavior change and local initiatives.
2. Identify examples of community-based solutions to NPS pollution (e.g., storm drain marking campaigns, rain garden installations, stream cleanups).
3. Compare the effectiveness of individual vs. collective actions in mitigating NPS pollution at the watershed scale.
4. Demonstrate how to design or participate in a local outreach or monitoring project that addresses NPS pollution, such as conducting a stormwater audit or organizing a pollution prevention campaign.
5. Interpret the benefits and limitations of volunteerism, citizen science, and public- private partnerships in addressing NPS issues.

## **Key Topic #4: Strategies to Evaluate NPS Sources, Issues, and Solutions**

Learning Objectives

1. Identify tools and techniques used to assess non-point source pollution, including watershed mapping, stormwater flow tracing, and visual assessment methods.
2. Explain how monitoring data (e.g., water quality indicators such as turbidity, E. coli, nutrients) can

be used to evaluate the presence and severity of NPS pollution.

3. Describe the challenges in monitoring, quantifying, and managing NPS pollution compared to point source pollution.
4. Apply simple field protocols to evaluate land use and physical features (e.g., slope, impervious cover, vegetative buffers) that influence runoff and pollutant transport.
5. Interpret basic maps, aerial imagery, or field data to locate potential sources of NPS pollution in a given watershed.
6. Recommend appropriate solutions based on identified issues in a mock or real- world NPS pollution scenario, drawing on field evidence or data interpretation.

### **Key Topic #5: Legislation, Regulations, and Voluntary Measures**

#### Learning Objectives

1. Summarize major U.S. policies and programs that address non-point source pollution, including the Clean Water Act (especially Sections 303 and 319) and Total Maximum Daily Loads (TMDLs).
2. Differentiate between regulatory and voluntary approaches to controlling NPS pollution and identify examples of each.
3. Describe how federal and state agencies support local communities in managing NPS pollution through funding, education, and technical assistance.
4. Simulate a decision-making process where students must select appropriate policy or program tools to manage a fictional watershed's NPS challenges.

### **Key Topic #6: Your Best Management Practices for NPS**

#### Learning Objectives

1. Identify common BMPs used to reduce NPS pollution in urban, suburban, and agricultural environments (e.g., rain gardens, cover crops, buffer strips, pervious pavement).
2. Explain how selected BMPs reduce pollutant loads or improve stormwater infiltration, using diagrams or real-world examples.
3. Compare the costs, benefits, and feasibility of different BMPs in various land use contexts (e.g., a schoolyard vs. a farm vs. a residential street).
4. Demonstrate how to plan or assess a BMP using a field checklist, photo documentation, or a site sketch (e.g., rain garden layout or runoff path).
5. Recommend appropriate BMPs for a hypothetical site based on land use, soil conditions, and observed pollution risks.

Students will also be asked to identify logical fallacies as they apply to the current topic. The students should be able to identify which of the following fallacies are being presented and why they are a logical fallacy. All fallacies presented will fit into one of the following categories:

- Ad hominem Attack
- Appeal to Tradition
- Appeal to (the Wrong) Authority
- Appeal to Emotion
- Appeal to ignorance
- Argumentum ad Populum
- Argument from Personal Incredulity
- Association Fallacy
- Cherry Picking
- Fallacy Fallacy
- False Cause
- Hasty Generalization
- Red Herring
- Single Cause
- Slippery Slope
- Straw Man
- Hasty Generalization
- Loaded Questions

## 15 ORAL PRESENTATION SCENARIO

### Station Manager: Chanda Cooper, SC Department of Environmental Services

#### General Learning Objectives:

1. Research the scientific, political, historical and social issues surrounding the current topic. Evaluate the evidence and construct a solution for this issue.
2. Using materials and information gathered in your research construct and present your solution to a diverse judging panel of resource and communication professionals. You may use a slideshow in .pdf format as a visual aid (no audio/video or animations allowed). Each student is allowed five (5) 3.5 x 5 inch index cards to assist them during the presentation. No materials other than the aids mentioned above are allowed. **Email the finalized PDF file of your slideshow to Jessica Egan (eganj@dnr.sc.gov) by midnight, Sunday, April 12, 2026.** Submission of the presentation prior to the competition allows for printed copies of the presentation to be given to judges. Index cards must be turned in at registration on competition day and will be returned to students just prior to presenting.
3. Respond to questions from the judging panel at the conclusion of your presentation. Questions may be direct (on the material you presented) or indirect (interpretive, based on assumed background knowledge).

#### Oral Presentation Scenario

Team members are asked to research issues and information surrounding the scenario below. Any source of information is allowed although teams should carefully screen their facts for accuracy and objectivity. Teams will be allowed ten (10) minutes to present, with two (2) minutes of question-and-answer period following the presentation. All team members must speak and participate in the presentation. A slideshow in .pdf format is allowed as a visual aid (see materials list on page 28).

#### Scenario Written and Developed by:

**Joshua (Central Carolina Technical College) and Cassie (Clemson Extension) Castleberry**

Manckeville is a growing municipality with a current population density nearing the threshold that would classify it as a **Municipal Separate Storm Sewer System (MS4)** under EPA guidelines (See census data below). Manckeville utilizes a Mayor-Council system of governance. The Mayor and the four member City Council have heard loud concerns from constituents that once Manckeville becomes an MS4, it will be required to comply with federal and state stormwater regulations. These regulations mandate the development and implementation of a **Stormwater Management Program (SWMP)** designed to reduce polluted runoff and protect water quality. Many constituents are concerned about how the town would fund these new requirements, and many more are worried about what the mandates would look like in practical terms.

The board has hired your consulting group, Fluid Solutions, to investigate the situation and present recommendations. Your task is to analyze what becoming an MS4 means for Manckeville and propose a strategic plan for compliance. This plan should be thorough and touch on each of the six required mandates, the additional requirements, as well as an appropriate funding structure. In your initial interviews with the mayor and the council you picked up on concerns that they had about green vs. grey

infrastructure, how this might affect the rural areas surrounding Manckeville, and how any new ordinances may need to be enforced.

MS4 requirements mandate that municipalities develop a Stormwater Management Program (SWMP) to reduce polluted runoff. This program must include six minimum control measures: Public Education & Outreach, Public Participation & Involvement, Illicit Discharge Detection & Elimination (IDDE), Construction Site Runoff Controls, Post-Construction Runoff Controls, and Pollution Prevention/Good Housekeeping. Municipalities also need to submit permit applications and annual reports to the relevant environmental agency (SCDES).

### **Stormwater Management Program (SWMP)**

1. **Public Education & Outreach:** Informing the public about the impacts of stormwater pollution and how they can help.
2. **Public Participation & Involvement:** Providing opportunities for the public to participate in the decision-making process for the stormwater program.
3. **Illicit Discharge Detection & Elimination (IDDE):** Developing and implementing a program to find and eliminate illegal connections and discharges into the storm sewer system.
4. **Construction Site Runoff Controls:** Implementing and enforcing a program to reduce pollutants from construction activities, including requirements for erosion and sediment control.
5. **Post-Construction Runoff Controls:** Managing stormwater runoff from new developments and redevelopments to minimize the impact on water quality.
6. **Pollution Prevention/Good Housekeeping:** Implementing practices to prevent or reduce pollutant runoff from municipal operations.

### **Other requirements**

- **Permit Application:** Submitting a permit application to the state's environmental agency.
- **Annual Report:** Submitting a report to the regulatory authority detailing the activities and effectiveness of the program.
- **Implementation Schedule:** Creating a schedule for implementing the program measures over the 5-year permit cycle.
- **Additional Requirements:** Meeting extra requirements if the MS4 discharges to impaired water bodies.

### **Description of Manckeville:**

The town Manckeville sits in the Coastal Plain of the state and it has several blackwater rivers running through and around it. The ones that run through town have been engineered to manage flows with hard channels, culverts, and other grey infrastructure. The creeks and rivers that are outside of the town limits are still mostly natural seasonally flooded hardwoods and cypress/tupelo swamps. The town is medium sized, but is close enough to major interstate that it partially serves as a bedroom community for at least one larger city, about an hour away. About 15% of the town lives in the Historic Downtown, while the remaining 85% live in medium density housing surrounding the town. Most of the growth for the town is on the West side, toward the larger city. Manckeville is a mix of owner-occupied (around 64%) and rental units, with a significant portion being single-family homes (2% mobile home, 28% Multi-unit, 70% single unit). The older, more affordable options are in areas like South Manckeville with mid-century styles. The newer developments, with higher price points, are in newer annexed areas. All of this contributes to an overall affordable market compared to national averages, though there are major disparities between neighborhoods.

**Census Data:**

Population: 38,103 (2-5% growth expected annually)

Area: 34.6 mi<sup>2</sup>

Median Age: 35.7 (53% M, 47% F)

Income: \$56,433 (\$33,725 per capita) which leaves 18.1% of the population below the poverty line

Median home cost: \$188,400

Education: 89.4% High School or higher (26% High School, 33% Some College, 17% Bachelors, 13% post-grad)

For questions or additional information, please contact Josh Castleberry, Dean Professional Studies at Central Carolina Technical College. 803-778-6663

## **16 ORAL PRESENTATION RULES**

### **Materials allowed for Oral Presentations:**

Teams may use a slideshow in .pdf format as a visual aid (no audio/video or animations allowed). Each student is also allowed up to five (5) 3.5 x 5 inch index cards to assist them during the presentation. No materials other than the aids mentioned above are allowed. Email the finalized PDF file of your slideshow to Jessica Egan ([eganj@dnr.sc.gov](mailto:eganj@dnr.sc.gov)) by **midnight on Sunday, April 12, 2026**. Submission of the presentation prior to the competition allows for printed copies of the presentation to be given to judges. Index cards must be turned in at registration on competition day and will be returned to students just prior to presenting.

### **Scoring Procedures:**

A panel of judges with expertise in the current topic, natural resource management and public communication will score the presentation of each team using the score sheet found at the end of this section of the manual. Also included is a detailed explanation of the scoring procedure. In accordance with National Conservation Foundation Envirothon procedure, the highest and lowest scores will be dropped and the remaining three scores averaged. This average will be the team's score for Oral Presentation.

Teams are allowed 10 minutes to present but are stopped at 12.5 minutes to allow for questions and answers. The following outlines the scores allocated based on length of presentation:

2.5 – 5.5 minutes 2 points

5.5 – 7.5 minutes 3 points

7.5 – 9.5 minutes 4 points

9.5-10.5 minutes 5 points

10.5-12.5 minutes 4 points

Teams will be notified when there are 5 minutes remaining, 1 minute remaining, and 30 seconds remaining in their presentation time.

| Scoring Scale  |          |                  |
|----------------|----------|------------------|
| 0 – not at all | 4 – fair | 8 – excellent    |
| 2 – poor       | 6 – good | 10 – outstanding |

## Oral Presentation Score Sheet

Team Number: \_\_\_\_\_ Judge's Initials: \_\_\_\_\_

Total Score: \_\_\_\_\_

| Part I Preparation & Presentation of Plan (60 points maximum)  | Circle Score |   |   |   |    |    |
|--|--------------|---|---|---|----|----|
| <b>A. How well did the presentation address or identify:</b>   |              |   |   |   |    |    |
| • The current issue?   | 0            | 2 | 4 | 6 | 8  | 10 |
| • The interrelationship between natural resources, management strategies, and human health and well-being?   | 0            | 2 | 4 | 6 | 8  | 10 |
| • How the current issue affects, or is affected by, each of the major natural resource areas (soil, water, forestry, wildlife)?  | 0            | 2 | 4 | 6 | 8  | 10 |
| • All the different players/interest groups affected by the problem?   | 0            | 2 | 4 | 6 | 8  | 10 |
| • Knowledge of new research or technologies that address the issue?  | 0            | 2 | 4 | 6 | 8  | 10 |
| <b>B. Were references and resources cited in the team's presentation?</b>  | 0            | 2 | 4 | 6 | 8  | 10 |
| <b>Part I Subtotal</b>   |              |   |   |   |    |    |
| Part II Comprehensive Consideration of Relevant Issues (80 points maximum)   | Circle Score |   |   |   |    |    |
| <b>A. Team demonstrated a solid understanding of political issue(s) related to the problem, including regulations, mandates, and impacts on the political system and the community.</b>                  |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>B. Team demonstrated a solid understanding of ecological/environmental issue(s) related to the problem.</b>   |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>C. Team demonstrated a solid understanding of economic issue(s) related to the problem, including the cost and benefit of the proposed plan.</b>  |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>D. Team demonstrated a solid understanding of social and cultural issue(s) related to the problem, including private property rights, traditions, right to farm, urban issues, etc.</b>               |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>E. Team presented ONE viable opinion/solution to the problem, addressing the resource issue.</b>  |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>F. The solution(s) presented address(es) the long-term sustainability of natural resources.</b>   |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>G. The solution(s) presented reflect(s) or addresses(es) the concerns of all affected stakeholders.</b>   |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>H. The main points of the presentation were clearly stated and supported.</b>   |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>Part II Subtotal</b>  |              |   |   |   |    |    |
| Part III Quality of Presentation (40 points maximum)   | Circle Score |   |   |   |    |    |
| <b>A. The presentation was well organized with a clear introduction and strong conclusion.</b>   |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>B. Participants enhanced the presentation with eye contact, gestures, voice inflection, originality, etc.</b>   |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>C. Visual aids were used to make major points and show conclusions. (Visual aids should be correct, eye appealing, readable, neat, etc.)</b>  |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>D. Questions were answered logically and concisely with all team members participating.</b>   |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>Part III Subtotal</b>   |              |   |   |   |    |    |
| Part IV Required Elements (20 points maximum)  | Circle Score |   |   |   |    |    |
| <b>A. Add up to ten points for all team members participating in presentation. (Each team member gets two points for equal oral participation in presentation.)</b>                                      |              |   |   |   |    |    |
| 0  | 2            | 4 | 6 | 8 | 10 |    |
| <b>B. Add up to five points if a viable plan (solution) was presented.</b>   |              |   |   |   |    |    |
| 0  | 1            | 2 | 3 | 4 | 5  |    |
| <b>C. Add up to five points if the presentation was completed within the allotted time. (2.5-5.5 min = 2 pts; 5.5-7.5 min = 3 pts; 7.5-9.5 min = 4 pts; 9.5-10.5 min = 5 pts; 10.5-12.5 min = 4 pts)</b> |              |   |   |   |    |    |
| 0  | 1            | 2 | 3 | 4 | 5  |    |
| <b>Part IV Subtotal</b>  |              |   |   |   |    |    |
| <b>Final Score (out of 200 points)</b>   |              |   |   |   |    |    |

# 17 ORAL PRESENTATION SCORE SHEET GUIDELINES

## Part I – Preparation and Presentation of Plan (60 points)

- A. How well did the presentation address or identify:
- The current issue? (0 to 10 points)
    - Not addressed: 0 points
    - Poorly addressed: 2 points
    - Some misconceptions and flaws: 4 points
    - Complete, accurate, appropriate: 6 points
    - Very detailed, well supported, and highly effective: 8 points
    - Profound, insightful, extremely organized, and highly effective: 10 points
  
  - The interrelationship between natural resources, management strategies, and human health and well-being? (0 to 10 points)
    - Not addressed: 0 points
    - Poorly addressed: 2 points
    - Some misconceptions and flaws: 4 points
    - Complete, accurate, appropriate: 6 points
    - Very detailed, well supported, and highly effective: 8 points
    - Profound, insightful, extremely organized, and highly effective: 10 points
  
  - How the current issue affects, or is affected by, each of the major natural resource areas (soil, water, forestry, wildlife)? (0 to 10 points)
    - No major natural resource areas addressed: 0 points
    - One subject addressed: 2 points
    - Two subjects addressed: 4 points
    - Three subjects addressed: 6 points
    - All four subjects addressed: 8 points
    - All four subjects addressed in a highly effective manner: 10 points
  
  - All the different players/interest groups affected by the problem? (0 to 10 points)
    - Not addressed: 0 points
    - Many players/interest groups not addressed: 2 points
    - Some players/interest groups not addressed: 4 points
    - Comprehensive, well addressed: 6 points
    - Very comprehensive, very well addressed: 8 points
    - Profound, insightful, extremely comprehensive: 10 points
  
  - Knowledge of new research or technologies that address the issue? (0 to 10 points)
    - Not addressed: 0 points
    - Poorly addressed: 2 points
    - Some misconceptions and flaws: 4 points
    - Complete, accurate, appropriate: 6 points
    - Very detailed, well supported, and highly effective: 8 points
    - Profound, insightful, extremely organized, and highly effective: 10 points

- B. Were references and resources cited in the team presentation? (0 to 10 points)
- 2 points for each reference used that is relevant to the problem and that supports the science behind the problem solution. Award the full 10 points for 5 or more references. No points are awarded for references that are not relevant to the problem.

**Part II – Comprehensive Consideration of Relevant Issues (80 points)**

- A. Team demonstrated a solid understanding of political issue(s) related to the problem, including regulations, mandates, and impacts on the political system and the community. (0 to 10 points).
- Demonstrated no understanding: 0 points
  - Demonstrated poor understanding: 2 points
  - Demonstrated some understanding but with flaws: 4 points
  - Demonstrated good understanding: 6 points
  - Demonstrated very good understanding: 8 points
  - Demonstrated highly insightful, superior understanding: 10 points
- B. Team demonstrated a solid understanding of ecological/environmental issue(s) related to the problem. (0 to 10 points)
- Demonstrated no understanding: 0 points
  - Demonstrated poor understanding: 2 points
  - Demonstrated some understanding but with flaws: 4 points
  - Demonstrated good understanding: 6 points
  - Demonstrated very good understanding: 8 points
  - Demonstrated highly insightful, superior understanding: 10 points
- C. Team demonstrated a solid understanding of economic issue(s) related to the problem, including the cost and benefit of the proposed plan. (0 to 10 points)
- Demonstrated no understanding: 0 points
  - Demonstrated poor understanding: 2 points
  - Demonstrated some understanding but with flaws: 4 points
  - Demonstrated good understanding: 6 points
  - Demonstrated very good understanding: 8 points
  - Demonstrated highly insightful, superior understanding: 10 points
- D. Team demonstrated a solid understanding of social and cultural issue(s) related to the problem, including private property rights, traditions, right to farm, urban issues, etc. (0 to 10 points)
- Demonstrated no understanding: 0 points
  - Demonstrated poor understanding: 2 points
  - Demonstrated some understanding but with flaws: 4 points
  - Demonstrated good understanding: 6 points
  - Demonstrated very good understanding: 8 points
  - Demonstrated highly insightful, superior understanding: 10 points
- E. Team presented ONE viable opinion/solution to the problem, addressing the resource issue. (0 to 10 points)
- Solution was not viable and was highly flawed: 0 points
  - Solution was only somewhat viable and contained significant flaws: 2 points

- Solution was mostly viable with some minor flaws: 4 points
  - Solution was viable and would be effective: 6 points
  - Solution was very viable and would be highly effective: 8 points
  - Solution was highly insightful, extremely viable, and would be profoundly effective: 10 points
- F. The solution(s) presented address(es) the long-term sustainability of natural resources. (0 to 10 points)
- Solution was not sustainable and had major flaws: 0 points
  - Solution was questionably sustainable and contained significant flaws: 2 points
  - Solution was somewhat sustainable with some minor flaws: 4 points
  - Solution was sustainable and would be effective: 6 points
  - Solution was very sustainable and would be highly effective: 8 points
  - Solution was highly insightful, extremely sustainable, and would be profoundly effective: 10 points
- G. The solution(s) presented reflect(s) or address(es) the concerns of all affected stakeholders. (0 to 10 points)
- Solution did not address any concerns: 0 points
  - Solution poorly addressed most concerns: 2 points
  - Solution inadequately addressed concerns: 6 points
  - Solution effectively addressed concerns: 8 points
  - Solution profoundly addressed all concerns in a highly insightful manner: 10 points
- H. The main points of the presentation were clearly stated and supported. (0 to 10 points)
- Main points were very poorly stated and not supported: 0 points
  - Main points were poorly stated and poorly supported: 2 points
  - Main points were inadequately stated and ineffectively supported: 4 points
  - Main points were adequately stated and supported: 6 points
  - Main points were well stated and well supported: 8 points
  - Main points were very well stated and very well supported: 10 points

### **Part III – Quality of Presentation (40 points)**

- A. The presentation was well-organized with a clear introduction and strong conclusion. (0 to 10 points).
- Presentation organization (0-6 points)
    - The whole presentation was poorly organized: 0 points
    - A portion of the presentation was inadequately organized: 2 points
    - Presentation was well organized: 4 points
    - Presentation was very well organized: 6 points
  - Introduction (0-2 points)
    - Presentation had missing or inadequate introduction: 0 points
    - Presentation had strong introduction: 2 points
  - Conclusion (0-2 points)
    - Presentation had missing or inadequate introduction: 0 points
    - Presentation had strong introduction: 2 points

- B. Participants enhanced the presentation with eye contact, gestures, voice inflection, originality, etc. (0 to 10 points)
- Majority of participants had poor presentation skills: 0 points
  - Majority of participants had limited presentation skills: 2 points
  - Several participants had limited presentation skills: 4 points
  - All participants had adequate presentation skills: 6 points
  - All participants had effective presentation skills: 8 points
  - All participants had extremely effective presentation skills: 10 points
- C. Visual aids were used to make major points and show conclusions. (Visual aids should be correct, eye appealing, readable, neat, etc.) (0 to 10 points)
- Visual aids enhanced the presentation: (0-6 points)
    - Visual aids had no impact or distracted from the presentation: 0 points
    - Visual aids had little impact on the presentation: 2 points
    - Visual aids had a positive impact on the presentation: 4 points
    - Visual aids had a very strong positive impact on the presentation: 6 points
  - Visual aids were visually appealing: (0-4 points)
    - Visual aids had flaws that made them unappealing: 0 points
    - Visual aids were appealing: 2 points
    - Visual aids were very appealing: 4 points
- D. Questions were answered logically and concisely with all team members participating. (0 to 10 points)
- Award points for demonstrating subject knowledge. (0-6 points)
    - Team members demonstrated poor subject knowledge in answering all of the questions: 0 points
    - Team members demonstrated inadequate subject knowledge in answering some of the questions: 2 points
    - Team members demonstrated adequate subject knowledge in answering all of the questions: 4 points
    - Team members demonstrated superior subject knowledge in answering all of the questions: 6 points
  - Award points for equal participation answering questions. (0-4 points)
    - Participation by team members was very unequal: 0 points
    - Participation by team members was somewhat unequal: 2 points
    - Participation by team members was approximately equal: 4 points

#### **Part IV – Required Elements (20 points)**

- A. Add up to ten points for all team members participating in the presentation. (0 to 10 points)
- Award 2 points for each team member that participated approximately equally. Do not award points for team members who spoke a disproportionately long or short amount of time.
- B. Add up to five points if a viable plan (solution) was presented. (0 to 5 points)
- Did not present a plan: 0 points

- Presented an ill-defined plan with major flaws: 1 point
- Presented an inadequate plan that had numerous flaws: 2 points
- Presented an adequate plan that had very minor flaws: 3 points
- Presented a well-defined plan with no flaws: 4 points
- Presented a very well-defined plan that was exceptional: 5 points

C. Add up to five points if the presentation was completed within the allotted time.

- <2.5 minutes: 0 points
- 2.5-5.5 minutes: 2 points
- 5.5-7.5 minutes = 3 points
- 7.5-9.5 minutes = 4 points
- 9.5-10.5 minutes = 5 points
- 10.5-12.5 minutes = 4 points

## 18 GLOSSARY OF ENVIRONMENTAL TERMS:

**Acclimatization:** A process of adaption of an introduced species and their offspring in a new environment.

**Adaptation:** Changes in an organism's physiological structure or function or habits that allow it to survive in new surroundings.

**Agronomic:** relating to the scientific study of soil management, land cultivation, and crop production.

**Algal bloom:** A condition which occurs when excessive nutrient levels and other physical and chemical conditions facilitate rapid growth of (usually) phytoplankton algae in aquatic or marine systems. Factors that foster algal bloom formation and growth include: temperature, light, pH, the availability of nutrients, lack of competition from other micro-organisms, and the absence of predators. Typically, only one or a few species are involved and the bloom is recognized by discoloration of the water resulting from the high density of pigmented cells. Algae that die and sink to the bottom stimulate growth of decomposers, especially bacteria. Decomposition can result in the depletion of oxygen in the deeper water layers, and these conditions may result in fish kills or replacement with less valuable species more tolerant of higher phosphorus and lower oxygen levels. Algal blooms may also be of concern as some species of algae produce neurotoxins. At the high concentrations reached during blooms, these may cause death if affected water is ingested.

**Anadromous fish:** born in fresh water, spends most of its life in the sea and returns to fresh water rivers, streams, and/or lakes to spawn. [Salmon](#), smelt, shad, striped bass, and [sturgeon](#) are common examples.

**Anaerobe:** An organism that can only exist in the absence or near-absence of gaseous or dissolved oxygen.

**Aquatic:** Animals that live predominantly or entirely in water.

**Aquifer:** any permeable geological formation, be it a layer of soil, sand, gravel, or rock, containing and/or conducting ground water that will yield usable quantities of water for wells, springs, streams, impoundments etc. Some productive aquifers are in fractured rock (carbonate rock, basalt, or sandstone). The study of water flow in aquifers and the characterization of aquifers is hydrogeology.

**Arboreal:** describes a species that lives in trees.

**Archaeology:** study of past human cultures by examining the materials remains and other deposits left at archaeological sites such as shell rings and mounds. Trained professionals only conduct archaeology, but opportunities to visit with archaeologists often arise.

**Artifact:** An object that has been manipulated by human hands into a tool or implement.

**Assimilative capacity of water:** the natural ability of a body of water to use and decompose potential [pollutants](#) without harmful effects to the [environment](#) and without damage to aquatic life or humans who consume the water. In environmental permitting, the assimilative capacity of a water body is defined as the maximum amount of pollutant load that can be discharged without impairing water quality for its designated best usage.

**Basal Area:** A measurement of the cross-sectional area of a stand of trees at 4.5 feet aboveground expressed in square feet per acre (ft<sup>2</sup>/ac).

**Benthic Organism:** Any organism that lives in or near the bottom of a water body.

**Biltmore Stick:** This scaling tool is a straight wooden stick graduated for direct readings of tree diameters and heights. The stick allows you to measure the diameter at a point 4.5 feet above stump height and also the merchantable height in terms of 16 foot logs. With these two measurements, the board foot volume of the tree may be determined. The actual volume table is printed on the stick.

**Bioaccumulation/Biomagnification:** The accumulation of a harmful substance such as a radioactive element, a heavy metal, or an organochlorine in an organism, especially an organism that forms part of the food chain. The process by which a concentration of a substance increases as it moves up the food

chain.

**Biodiversity I:** Refers to the variety and variability among living organisms and the ecological complexes in which they occur. Diversity can be defined as the number of different items and their relative frequencies. For biological diversity, these items are organized at many levels, ranging from complete ecosystems to the biochemical structures that are the molecular basis of heredity. Thus, the term encompasses different ecosystems, species, and genes

**Biodiversity II:** The variation of life forms within a given ecosystem, biome, or for the entire Earth. Biodiversity is often used as a measure of the health of biological systems. The biodiversity found on Earth today consists of many millions of distinct biological species, which is the product of nearly 3.5 billion years of evolution.

**Bioenergy:** Energy derived from biofuel.

**Biofuel:** Any fuel derived from biomass. Agricultural products specifically grown for conversion to biofuels include corn and soybeans. Research and development is currently being conducted to improve the conversion of non-grain crops, such as switchgrass and a variety of woody crops, to biofuels.

**Biological Carrying Capacity:** The equilibrium between the availability of habitat and the number of animals of a given species the habitat can support over time.

**Biological control:** Control method involving a biological control agent that is a natural enemy of a target pest.

**Biological integrity:** is "the ability to support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity and functional organization comparable to those of natural habitats within a region" ([Karr, J. R. and D. R. Dudley. 1981](#)). Biological integrity is equated with pristine conditions, or those conditions with no or minimal disturbance. The reference condition is commonly associated with biological integrity, and the threshold is some proportion of the reference condition.

**Biological Oxygen Demand (BOD):** An indirect measure of the concentration of biologically degradable material present in organic wastes. It usually reflects the amount of oxygen consumed in five days by biological processes breaking down organic waste.

**Biomass:** Organic material made from plants and animals, containing stored energy from the sun. Biomass is a renewable energy source because we can always grow more trees and crops, and waste will always exist. Some examples of biomass fuels are wood, crops, manure, and some garbage.

**Biophilic Design:** Biophilia is a term popularized by E.O. Wilson to describe the extent to which humans are hard-wired to need connection with nature and other forms of life. More specifically, Wilson describes it this way: "Biophilia...is the innately emotional affiliation of human beings to other living organisms. Innate means hereditary and hence part of ultimate human nature." (Wilson, 1993, p.31). *Biophilic design* then, recognizes the need for healing gardens and spaces in hospitals and workspaces, and for homes and apartments that provide abundant daylight, natural ventilation, plants and greenery.

**Browse:** Leaves, buds, twigs, etc. of shrubs or trees that are eaten by wildlife.

**Buffer Strip:** A relatively undisturbed section of forest adjacent to an area requiring special attention or protection such as a stream or lake.

**Carnivore:** An animal anatomically and physically adapted to eating animal material for its main diet component.

**Carrying Capacity:** 1. In recreation management, the amount of use a recreation area can sustain without loss of quality. 2. In wildlife management, the maximum number of animals or plants an area can support during a given period.

**Catadromous fish:** fish that live in fresh water, and breed in the ocean. The most remarkable catadromous

fishes are freshwater eels of genus *Anguilla*, whose larvae drift from spawning grounds in the Sargasso Sea, sometimes for months or years, before entering freshwater rivers and streams as juveniles referred to as glass eels or elvers.

**Cave:** Any natural cavity or series of cavities beneath the surface of the earth. Such cavities are usually classed as caves only if they are large enough to permit entrance by humans. The term is generally synonymous with cavern and is commonly applied also to wind- or water-eroded rock cavities.

**Chiefdom:** Highest level of social organization reached by prehistoric Native Americans. Chiefdom usually has status differences, depends on an agricultural economy, build monumental architecture such as mounds.

**Community:** All of the populations of different species that live in the same area and interact with one another.

**Competition:** The struggle for survival that occurs when organisms, trees, vegetation or wildlife all make similar demands on environmental resources such as food or sunlight.

**Coral Bleaching:** A process in which corals expel the algal cells (zooxanthellae) that normally live within their tissue. These algae give corals their characteristic brownish color, and once they have been expelled, the white skeleton shows through a coral's transparent tissue, giving it a bleached white appearance.

**Corridor:** A pathway which serves as a conduit for wildlife to move from one patch of land to another, which can also be as small as a brushy fencerow or as large as a streamside management zone. Areas of continuous habitat that permit animals to travel securely from one habitat to another.

**Cover:** A description of the protection and seclusion afforded by a combination of vegetation and topography. Some types of cover are: brood, escape, nesting, roosting and winter cover.

**Cryptogenic species:** Species that are neither clearly native nor exotic.

**Cultural Carrying Capacity:** The number and type of a given species that people will tolerate over time.

**Diadromous Fish:** Fish that travel between salt and fresh water.

**Dichotomous Key:** A two branched key that can help you quickly identify trees in the field. Leaves are used for the identifying characteristics. Each line in the key has two choices. Read the descriptions on these two lines and decide which fits your tree best. The choosing between two characteristics continues through the key until identification is complete.

**Dissolved Oxygen (DO):** The oxygen freely available in water, vital to fish and other aquatic life and for the prevention of odors. DO levels are considered a most important indicator of a water body's ability to support desirable aquatic life. Secondary and advanced waste treatment are generally designed to ensure adequate DO in waste-receiving waters.

**Diurnal:** Animal behavior characterized by activity during the daytime with a period of sleeping or inactivity during the night.

**Ecofact:** A non-artifact such as pollen, animal bones, and shellfish remains, antler tine or carving, carbonized materials such as wood, nuts, corn or other plant remains.

**Ecological Site:** A distinctive kind of land with specific soil and physical characteristics that differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its ability to respond similarly to management actions and natural disturbances.

**Ecosystem:** The interacting system of a biological community and its non-living environmental surroundings.

**Ecotone:** A habitat created by the juxtaposition of distinctly different ecological zones containing different habitats such as an edge habitat or a zone of transition between habitat types. For example, the intertidal zone is an ecotone occurring at the intersection between the subtidal zone and dry land. An ecotone often contains species characteristic of both overlapping habitat types as well as other species occurring only within the zone itself.

**Electricity:** The flow of electrical power or charge and is a secondary energy source. The energy sources we use to make electricity can be renewable or non-renewable, but electricity itself is neither renewable nor non-renewable.

**Endemic:** Plant or animal species that is native to a particular area; sometimes they can only be found in that one particular geographic area. **Endemic:** A species or taxonomic group that is restricted to a particular geographic region because of such factors as isolation or response to soil or climatic conditions.

**Energy Conservation:** The practice of decreasing the quantity of energy used while achieving a similar outcome of end use.

**Endangered Species:** A species of native fish, wildlife, or plants found by the Secretary of the Interior to be threatened with extinction because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of over exploitation, disease, predation, or other factors its survival requires assistance.

**Environmental Justice:** The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

**Eutrophication:** The process by which lakes, ponds, and streams become enriched with inorganic plant nutrients, especially phosphorus and nitrogen. This process happens naturally over a long period of time as dead organic matter accumulates, and is one step in the normal succession of the freshwater ecosystem. Cultural or artificial eutrophication occurs when human activity such as sewage effluent or leachate from fertilized fields causes a lake, pond, or fen to become over-rich in organic and mineral nutrients, which speed up plant and algal growth and eventually increases the plant and algal death rates. The bacterial decomposition of the dead plants and algae consumes the oxygen dissolved in water, sometimes suffocating fish and other aquatic plant and animal life.

**Extirpated species:** A species that has been destroyed or removed completely and no longer exists in a particular area, region, or habitat. The species, however, may exist elsewhere.

**Feature:** Features are of great interest to archaeologists. Features can be large like mounds or shell rings, or small like a posthole for a prehistoric house or a deposit of periwinkle shells within a shell ring. A hearth used 800 years ago to heat a clay walled hut is yet another type of feature.

**Fecal Coliform Bacteria:** Bacteria found in the intestinal tracts of mammals. Their presence in water or sludge is an indicator of pollution and possible contamination by pathogens.

**Fecundity:** The quality or power of producing offspring. The inherent reproductive potential of a species.

**Feedstock:** A substance used as a raw material in an industrial process. Biomass feedstocks include herbaceous and woody energy crops, agricultural food and feed crops, agricultural crop wastes and residues, wood wastes and residues, aquatic plants, and other waste materials including some municipal wastes.

**Fossil Fuel:** A general term for buried combustible geologic deposits of organic materials, formed from decayed plants and animals that have been converted to crude oil, coal, natural gas, or heavy oils by exposure to heat and pressure in the earth's crust over hundreds of millions of years.

**Fossorial:** Animals that live predominantly or entirely underground.

**Genetic Diversity:** A level of biodiversity that refers to the total number of genetic characteristics in the genetic makeup if a species.

**Geomorphology:** the branch of geology that examines the earth's topographic features including their classification, description, nature, origin, development, and relationships to underlying structures, as well as the history of geologic changes as recorded by these surface features. Geomorphology can be used to provide predictive power for activities such as stream restoration.

**Geothermal Energy:** Taps into heat underneath the Earth's crust to boil water that is then used to drive electric

turbines to heat buildings, homes, or in other non-electrical purposes.

**Grazing Management:** The manipulation of grazing and browsing animals to accomplish a desired result.

**Ground Water:** The supply of fresh water found beneath the Earth's surface usually in aquifers, which supply wells and springs. Because ground water is a major source of drinking water, there is growing concern over contamination from leaching agricultural or industrial pollutants or leaking underground storage tanks.

**Habitat:** The physical area where an organism lives. A place where a plant or animal naturally lives and grows. **Hectare:** A metric measurement for land area. 1 hectare = 10,000 square meters, or about 2.5 acres. (abbreviation: ha). **Herbivore:** An animal anatomically and physically adapted to eating plant material for its main diet component.

**Home Range:** The geographic area to which an animal generally restricts its activities.

**Homestead Act of 1862:** An act passed by Congress in 1862 promising ownership of a 160-acre tract of public land to a citizen or head of a family who had resided on and cultivated the land for five years after the initial claim.

**Human-wildlife conflict:** any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, on the conservation of wildlife populations, or on the environment.

**Hybrid:** Offspring resulting from a cross between two different species (or genetically distinct individuals within the same species) that may be naturally occurring or the result of controlled crosses, or being genetically modified.

**Hydrogen:** The most abundant element in the universe, and an important factor in our energy future. Hydrogen fuel cells can produce power without emitting any pollutants; their only byproducts are water and heat. Hydrogen can both carry and store energy and can be used in a wide variety of applications, including portable devices that use batteries, transportation vehicles, and a number of stationary power sources.

**Hydropower:** The capture of the energy of moving water for some useful purpose. Hydropower plants capture the energy of falling water to generate electricity. A turbine converts the kinetic energy of falling water into mechanical energy. Then a generator converts the mechanical energy from the turbine into electrical energy.

**Impaired Streams:** Streams that do not meet the water quality standards set by the state based on classified uses (ie. fishing, swimming, shellfish).

**Indicator Species:** Plants or animals whose abundance and health are a reflection of environmental quality and conditions.

**Indigenous:** originating, growing, occurring in and characteristic of a particular region or environment.

**Infrastructure:** The basic network or foundation of capital facilities or community investments which are necessary to support economic and community activities.

**Injurious species:** An introduced species that causes economic or environmental harm to humans.

**Instream flow:** the amount of water needed to adequately provide for downstream uses occurring within a stream channel. These users cover some or all of the following uses: human drinking water, aquatic habitat, recreation, wetlands, navigation, hydropower, riparian vegetation, and water quality, including waste assimilation. Flow is measured in volume of water per unit of time, usually cubic feet per second (cfs). This gauges the amount of water flowing past a point in the river at a given time.

**Integrated pest management (IPM):** pest management approach that considers the life cycle of a targeted species and intervenes in reproduction, growth, or development to reduce pest populations to a level not harmful to crops. IPM also works to maintain populations of beneficial insects.

**Invasive species:** an invasive species is a species that does not naturally occur in a specific area and whose

introduction does or is likely to cause economic or environmental harm, or harm to human health. Invasive species become a nuisance through rapid spread and increase in numbers, often to the detriment of native species.

**Karst:** The typical surface terrain of a limestone region, characterized by an abundance of sinkholes, disappearing streams, exposed rock outcrops or ledges, and underground caverns.

**Keystone Species:** A keystone is the stone at the top of an arch that supports the other stones and keeps the whole arch from falling. A keystone species is a species on which the persistence of a large number of other species in the ecosystem depends; a species that plays a critical role in maintaining the structure of an ecological community and whose impact on the community is greater than would be expected based on its relative abundance or total biomass.

**Late Archaic Period:** a period from roughly 5000-3000 years ago. During this time complex hunter-gatherer tribal societies began to construct shell rings, fashion pottery vessels and live a semi sedentary lifeway.

**Limiting Factor:** A condition whose absence or excessive concentration is incompatible with the needs or tolerance of a species or population, and which may have a negative influence on their ability to thrive. Any ingredient of habitat that is deficient and prevents a species from increasing.

**Mast:** fruits or nuts used as a food source by wildlife. Hard mast is the fruit or nuts of trees such as oaks, beech, walnut, chinquapin, and hickories. Soft mast includes the fruits and berries of dogwood, viburnums, elderberry, huckleberry, spice bush, grape, raspberry, and blackberry.

**Microclimate:** A small area (such as a cove) that has different physical characteristic (such as soils, soil moisture, soil fertility, exposure to sunlight) than its surrounding landscape. Because of these differences, microclimates create unique habitats that support plants and animal species that are uncommon in the surrounding landscape.

**Mississippian period:** a period from 1000 to four hundred years ago. During this time earthen mound building, corn agriculture, and complex societies living in permanent villages were ruled by hereditary chiefs.

**Mound:** Artificially constructed village feature constructed of baskets loads or dirt, shaped like a truncated cone and used as a platform for chief's houses temples or both.

**Naturalized:** To establish a self-sustaining population of exotic species in the wild outside of its natural range.

**Nocturnal:** Animal behavior characterized by activity during the night with a period of sleeping or inactivity during the daytime.

**Non-Point Source of Pollution:** Diffuse pollution sources (i.e. without a single point of origin or not introduced into a receiving stream from a specific outlet). The pollutants are generally carried off the land by storm water. Common non-point sources are agriculture, forestry, urban, mining, construction, dams, channels, land disposal, saltwater intrusion, and city streets.

**Non-renewable:** Energy resources, such as coal, oil and natural gas that cannot be replenished by nature as fast as they have been used. It took hundreds of millions of years to form many of these resources and they are in limited supply.

**Nuclear Energy:** Energy in the nucleus (core) of an atom. There is enormous energy in the bonds that hold atoms together. Nuclear energy can be used to make electricity, but first the energy must be released. It can be released from atoms in two ways: nuclear fusion (when atoms combine) and nuclear fission (when atoms split).

**Omnivore:** An animal with the ability to eat and survive on both plant and animal matter.

**Osmosis:** The movement of water molecules across a selectively permeable membrane from an area of low

solute concentration (high water potential) to an area of high solute concentration (low water potential). Osmosis will occur whenever the water concentrations are different on either side of a differentially permeable membrane.

**Organic Production Systems:** An ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activity.

**Pastureland:** Grazing lands comprised of introduced or domesticated native forage species that are used primarily for the production of livestock. They receive periodic renovation and/or cultural treatments such as tillage, fertilization, mowing, weed control and may be irrigated. They are not in rotation with crops.

**Pathway:** Mode by which a species establishes and continues to exist in a new environment.

**Photosynthesis:** a biochemical process in which plants, algae, and some bacteria use chlorophyll to harness the energy of light to synthesize life sustaining organic compounds such as carbohydrates. Ultimately, nearly all living things depend on energy produced from photosynthesis for their nourishment, making it vital to life on Earth. It is also responsible for producing the oxygen that makes up a large portion of the Earth's atmosphere. Plants use carbon dioxide gas and water to produce glucose and oxygen gas in accordance with the following formula:  $12\text{H}_2\text{O} + 6\text{CO}_2 + \text{light} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6$  (glucose) +  $6\text{O}_2 + 6\text{H}_2\text{O}$ .

**Pollination:** The act of transferring pollen grains from the male anther of a flower to the female stigma.

**Population:** A group of organisms belonging to the same species that live in the same area and interact with one another.

**Precocial:** Newly hatched birds that are covered with down and are capable of moving around when first hatched, as opposed to altricial which are born naked and helpless.

**Rangeland:** Land on which the plant community is comprised of predominately native or indigenous grasses, grass-likes (e.g. sedges), forbs and/or shrubs. Rangeland includes natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes and wet meadows.

**Renewable Energy:** Any sustainable energy source that comes from the natural environment. The most common forms of renewable energy are solar, wind, water or hydro, biomass and geothermal energy. Renewable energy sources are maintained or replaced by nature, relatively quickly, after use.

**Riparian Buffer:** Planting of trees, shrubs, grasses that catch pollutants in both surface and groundwater before those pollutants reach a water body, such as a stream or lake. Riparian buffers also improve fish and wildlife habitats.

**Riparian Corridor:** Part of a floodplain situated closest to the channel, or taking place along the bank of a river.

**Salt-water wedge:** A wedge-shaped intrusion of ocean saltwater into a fresh-water estuary or tidal river; it slopes downward in the upstream direction, and salinity increases with depth because of higher density. During a rising tide, the sea water forces its way upstream beneath the seaward flow of freshwater.

**Sedimentation:** The removal of large volumes of soil from the land, and their deposition in waterways.

**Shell Ring:** Artificial deposit of shell occurring as a ring, crescent, horseshoe shape or mound of shell and other artifacts and ecofacts.

**Solar Power:** The technology of obtaining usable energy from the light of the sun. Solar energy is the solar radiation that reaches the earth and can be converted directly or indirectly into other forms of energy, such as heat and electricity.

- **Active Solar Systems:** Use solar collectors and additional electricity to power pumps or fans to distribute the sun's energy. The heart of a solar collector is a black absorber which converts the sun's energy into heat. The heat is then transferred to another location for immediate heating or for storage for use later.

- **Passive Solar Systems:** Do not use any mechanical equipment to move the sun's energy. This technique uses building elements such as walls, windows, floors and roofs, in addition to exterior building elements and landscaping, to control heat generated by solar radiation.
- **Photovoltaic Solar Systems:** Photovoltaic (PV) cells convert sunlight to electricity. PV cells are semiconductor devices, usually made of silicon, which contain no liquids, corrosive chemicals or moving parts. They produce electricity as long as light shines on them, require little maintenance, do not pollute and operate silently.

**Stocking Rate:** The amount of land area allocated to each animal unit for the entire grazing period in one year.

**Sustainability and Sustainable Living:** The ability to achieve continuing economic prosperity while protecting the natural systems of the planet and providing a high quality of life for its people.

**Synanthropization:** refers to the adaptation of animal populations to human-created conditions.

**Synurbization:** denotes an adjustment within animal populations to specific conditions of the urban environment, in connection with regular existence (often breeding) in the wild state.

**Terrestrial:** Animals that live predominantly or entirely on land.

**Tidal freshwater marsh:** freshwater marshes close enough to coasts to experience significant tides but far enough upriver or in the estuary to be beyond the reach of oceanic salt water. This set of circumstances usually occurs where fresh river water runs to the coast and where the morphology of the coast amplifies the tide as it moves inland.

**Tidal Power:** Achieved by capturing the energy contained in moving water mass due to tides. Two types of tidal energy can be extracted: kinetic energy of currents between ebbing and surging tides and potential energy from the difference in height between high and low tides.

**Traditional Energy:** The sources and methods we currently use to generate stable, inexpensive, and readily available supplies of energy.

**Unintentional introduction:** An unintended introduction made as a result of a species utilizing humans or human delivery systems as vectors for dispersal outside its natural range.

**Urban Forests:** ecosystems composed of trees and other vegetation that provide cities and municipalities with environmental, economic and social benefits. They include street and yard trees, vegetation within parks and along public right of ways, water systems, fish and wildlife.

**Urbanization:** refers to changes in landscape (environment) caused by urban development

**Whole-farm Planning:** A holistic approach to farm management used to identify and prioritize environmental issues on a farm without compromising the farm business.

**Wildlife Openings:** Openings maintained to meet food or cover needs for wildlife. They may contain native vegetation or planted crops and can be maintained by burning, disking, mowing, planting, or fertilizing.

**Wind Power:** The conversion of wind energy into more useful forms, usually electricity using wind turbines (machines for converting the kinetic energy in wind into mechanical energy).

## **NOTES:**