



VERMONT ENVIROTHON KEY POINTS 11.13

Each of the Envirothon's five topic areas contains a variety of activities and content that can be identified as being addressed in the *Vermont Framework of Standards and Learning Opportunities*. For each of the Key Points, the applicable Vermont standard is identified by the standard number.

In the Vermont Envirothon competition, each of the topic areas is weighted equally, except for the Current Issue – which is scored as double that of the other topics.

About Overarching Concepts

Each topic area features *Overarching Concepts*. These broad concepts are indicative of the depth of investigation that could take place under each topic area, and are designed to help teachers apply a broad, but deep, approach to each topic. The concepts are designed to indicate interconnections between standards and the depth of understanding needed for full achievement of the standard, and to stimulate discussion during the teaching/learning process.

TOPIC AREA: AQUATICS

Overarching Concepts

- Understanding the water cycle and its many ramifications is essential to understanding the role of water in the natural world.
- Water can be affected by many factors including temperature, dissolved organic and inorganic matter, suspended materials, and the presence of various living organisms.
- Aquatic ecosystems can be impacted by human activities such as agriculture, industry, introduction of invasive species, and others.
- Damage to wetlands and riparian areas can create profound effects on ecosystems.

1. Define and illustrate the water cycle. 7.15
 2. Describe the process of eutrophication, including what time of day oxygen and carbon dioxide levels would be the highest in a pond and why. 7.13
 3. Identify the life cycles and habitats of common fish, amphibians, aquatic macroinvertebrates, and aquatic plants found in Vermont, native and exotic. 7.13
 4. Explain the functions and values of wetlands and riparian areas. 3.9
 5. List the sources of point and non-point source pollution and detail their prevalence in Vermont. 3.9, 7.16
 6. Determine which federal and state regulations assist citizens in managing aquatic resources. 3.9
 7. Depict the aquatic food web and its interconnections with the terrestrial food web. 7.12, 7.13
 8. Distinguish between a cold-water and warm-water fishery and give an example of a fish species that commonly inhabits each. 3.9, 7.13, 7.16
 9. Delineate the watershed boundary of a small water body. 7.15, 7.16
 10. Use a dichotomous key for identifying plants and animals. 2.2, 7.13, 7.16
 11. Understand what parameters to sample based on the purpose of the monitoring. 7.1, 7.2
 12. Identify aquatic macroinvertebrates common to Vermont to the level of order and correlate their presence to the water quality condition. 7.13, 3.9
 13. Identify common fish species in Vermont (e.g., trout, salmon, bass, and walleye). 7.13
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TOPIC AREA: FORESTRY

1. Be able to use a 10-factor glass prism to determine the basal area of a given plot and discuss the various other measurements that could be accrued with this tool. 7.18
2. Be able to use a scale stick for determining tree height and diameter, standing board foot volume, and log volume on the ground. 7.18
3. Be able to identify from a tree section all of the component parts and their functions. Be able to explain how these functions work collectively to keep the tree alive and allow the tree to interact with the rest of the forest. 7.13, 7.11
4. Be able to identify by common name 30 of our most common forest trees. 7.13
5. Be able to identify the various Vermont forest types (northern hardwood, oak-hickory, etc.) and their Vermont locations. 7.13
6. Be able to explain how soils and nutrient cycling affect trees and forests. 7.13, 7.15
7. Be able to explain how and why forests change over time. 7.13
8. Be able to explain how stress, both natural and human induced, influences trees and forests over the short and long term. 3.9, 7.15
9. Have a basic understanding of the relationship between stocking and density and how they affect tree growth. Be able to explain a stocking chart. 7.15
10. Be able to describe the purpose of silviculture and the reasons for implementing it. 7.15
11. Be able to describe, compare and contrast the various silvicultural systems used in forest management. 7.15
12. Have an understanding of the difference between a forest management objective and a silvicultural prescription. 7.15
13. Be familiar with some of the similarities and differences between the rural and urban forest. 7.15

Overarching Concepts

- Forests are important ecosystems affected by climate, elevation, soils, precipitation, air quality and human activities – both past and present.
 - Forests function as communities over time and change constantly as these communities grow. The longer the time, the greater the collective change.
 - The tree is the basic forest building block and is a complex structure with multiple functions. How it grows and its relationship within the forest environment determines the condition of the forest.
 - Forests are an important natural resource in Vermont, providing a variety of forest products, clean air and water, soil stability and habitat for wildlife.
 - Forest management requires measurement, data collection, and forest evaluation before changes can be made.
 - Forest management is built on understanding of how forests respond to change, both natural and human directed.
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TOPIC AREA: WILDLIFE

Overarching Concepts

- Wildlife is only a part of ecosystems – complex interactive systems of living and non-living things.
- Changes to ecosystems, whether natural or human-made, cause changes in wildlife populations.
- Wildlife populations are dynamic; they can be growing, static, or shrinking depending on the ecosystem.
- Some wildlife populations are regulated when they exist side-by-side with humans.
- Positive changes in ecosystems can help restore endangered or threatened species.
- Some wildlife species are managed as a renewable natural resource.

1. Identify wildlife species from silhouettes, mounted specimens, or pictures (part of an animal may be shown instead of the whole animal). Keys will be used for more extensive identification. 7.13
2. Identify wildlife species based on wildlife sound or sign. Sign can include animal fur, hair, feathers, gnawings, rubbings, pellets, and scat. 7.13
3. Answer questions concerning the natural history and management of wildlife species occurring in Vermont. 7.13
4. Identify basic survival needs of wildlife. 7.13

5. Describe specific wildlife adaptations and their role in the ecosystem. 7.13
 6. Describe predator/prey relationships and be able to identify examples. 3.9
 7. Describe food chains and food webs and be able to identify examples. 3.0, 7.13
 8. Describe factors that limit or enhance population growth. 3.9
 9. Understand the historical and present connection of people and wildlife, including hunting, trapping and wildlife watching. 3.9
 10. Identify habitat requirements for specific species. 3.9
 11. Evaluate a given habitat and select or list species most likely to live there. 3.9
 12. Describe ways habitat can be improved for special species by knowing their requirements. 3.9
 13. Discuss concepts of carrying capacity and limiting factors. 3.9
 14. Discuss how forestry practices can enhance wildlife habitat. 3.9
 15. Answer questions concerning hunting regulations and how they pertain to wildlife management. 3.9
 16. Describe various ways each person can help in the protection, conservation, management and enhancement of wildlife populations. 3.9 & 7.19
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17. Identify agencies responsible for providing the protection and management of wildlife resources. 3.9
 18. Identify wildlife species that are listed as endangered or threatened and describe the main causes that led to the depleted populations. 3.9 & 7.13
 19. Describe major consequences of wetland destruction on wildlife. 3.9
 20. Identify non-native species that have been introduced into Vermont. 7.13
 21. Identify the most common carriers of rabies and Lyme disease. 7.13
 22. Describe the cause, transmission and symptoms of rabies and Lyme disease in people and wildlife. 7.13
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TOPIC AREA: SOILS

1. Understand the five factors of soil formation. 7.15
2. Identify and be familiar with basic soil properties, including physical, chemical and biological properties, and be able to identify basic soil horizons and soil textures and other characteristics from an actual soil pit. 7.15
3. Understand the relationship of soils to each year's Special Topic, which focuses on pressing environmental issues, including soil erosion, non-point source pollution, and broader issues such as biodiversity and climate change. 3.9
4. Understand the role of soils in land use issues such as building site development, prime farmland and wetland preservation, septic system siting, and recreation development. 3.9
5. Recognize the importance of soils for agricultural production and forestry and the importance of managing soils sustainably on a global level in the face of mounting population pressure and urban sprawl. 3.9
6. Use the Natural Resources Conservation Service (NRCS) Web Soil Survey website (<http://websoilsurvey.nrcs.usda.gov/app/>) to learn about soil types and other information about the soils in Vermont and understand how this information can be used. 1.8, 1.10, 7.1

Overarching Concepts

- Soil has physical, chemical and biological properties and can be studied, classified and mapped based on these properties.
 - Soils are a functionally important part of the environment and interact with other major factors in the environment, including the atmosphere and the hydrosphere.
 - Environmental relationships between the soil and other factors can be interrupted and influenced by human activities, such as development, agriculture, waste disposal, resource extraction and pollution.
 - Global sustainability for humans is highly dependent on managing and conserving soils for multiple uses including crop production, forestry, and habitat diversity.
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TOPIC AREA: CURRENT ENVIRONMENTAL ISSUE AND ORAL PRESENTATION

Overarching Concepts

- Developing an in-depth understanding of specific natural resource issues is the foundation of informed natural resource management and decision making.
- Developing oral presentation skills strengthens the ability to communicate with others.
- Working as a team yields the best results.

1. Gain an in-depth understanding of a specified natural resource issue.
2. Understand the ecological, social, and economic implications of the specific issue.
3. Use references and resource personnel to get information appropriately.
4. Develop and interpret data.

5. Use reasoning and problem-solving skills to define the problem, develop alternative solutions, determine which solution is most feasible, and develop a plan for that solution.
 6. Read and interpret various types of maps such as topographic maps, soils maps, and land-use maps.
 7. Adapt what is learned about this issue to the format of an oral presentation.
 8. Create a map of the area and information studied.
 9. Apply the information on the natural resource issue to create and deliver a well-organized oral presentation with a clear introduction and strong conclusion that lasts a specific amount of time.
 10. Speak in front of an audience.
 11. Answer questions logically and concisely.
 12. Clearly state and support a plan for the specific issue.
 13. Enhance the presentation with good eye contact, gestures, inflections, skits, originality etc.
 14. Use appropriate visual aids to make major points and show conclusions.
 15. When working as part of a team each student should demonstrate that they contribute to the planning process, have a strong role during the oral presentation, and are able to answer questions.
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