2024 NH Envirothon Forestry Learning Objectives

These Learning Objectives serve as an overview of the types of knowledge and skills expected of students at the state level of competition. Numbers are from National Learning Objectives.

Forestry Introduction

Forests comprise 30.8 percent of global land area *(Food and Agriculture Organization of the United Nations, 2020)*[1]. Forestland covers about 82% – or 4.7 million acres – of New Hampshire. As the second most forested state in the nation, our forest products industry supports over 12,800 jobs and $2.5 billion in sales or output (total value of all goods and services) annually (https://extension.unh.edu/blog/2022/02/value-new-hampshires-urban-trees). Humans rely on the biodiversity of forests for many services, including timber for homes, wood pulp for paper, biochemical models for future medications, recreation, aesthetic beauty, and countless others. A good understanding of plant biology, forest ecology, and human impacts to these ecosystems will help to inform good management practices to conserve these areas for future generations.

Students should be able to:
- Provide an informed opinion about current issues in forestry and plant communities.
- Think critically about solutions to current issues regarding forestry and plant communities.
- Work collaboratively in a team to synthesize and apply knowledge.
- Make connections between concepts in Forestry and the subjects of Soils and Land Use, Aquatic Ecology, Wildlife, and the Current Issue.

Plant Biology

1. Explain the fundamentals of plant biology as they apply to trees and other common plants, including:
   a. Anatomy
   e. Transpiration

3. Explain the formation and function of different types of tissues found in trees and other plants (including xylem, phloem, cambium.

5. Explain the chemical processes that take place within plants (including their fundamental importance, basic chemical reaction equations, and impact on plant survival) such as:
   a. Photosynthesis
   b. Transpiration

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   a. Photosynthesis
   c. Transpiration

Forest Ecology

10. List the biotic and abiotic components of a forest ecosystem.
12. Differentiate between hardwood, softwood, and mixed stands.
14. Describe the typical structure of a forest soil and identify unique characteristics of forested soils.
16. Diagram the energy flow in a forest ecosystem and describe the relationships between trophic levels.
17. Explain how forested ecosystems benefit water quality.
Added: Explain how forest management affects forest structure and wildlife diversity?
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Plant Communities

24. Describe successional change in an ecosystem over time, including changes in species composition, shade tolerance, and interactions with disturbances.
25. Differentiate between primary and secondary succession.
27. Identify the causes of erosion in plant-dominated ecosystems and recommend practices for prevention and mitigation. (natural and recreation, forestry practices)

29. Describe the role that plant communities play in the water cycle, including major events such as flooding, droughts, and storms.
30. Explain how different plant communities provide different types of habitat and describe the importance of this habitat variety to wildlife.
31. List the benefits of snags and downed logs to wildlife species.

Forests and Society

The following Learning Objectives should be applied on a local and state level.

34. Describe the ecosystem services provided by forests, grasslands, and other plant communities.
35. List the economic benefits provided by forests, grasslands, and other plant communities.
42. List human uses for forest and plant products and describe how these products are obtained from natural resources.
43. Describe common forestry practices, including thinning, harvesting, and regeneration methods.
44. Explain the concept of Best Management Practices (BMPs) in forestry and list examples.
45. Describe the different types of forest management and explain how they are sustainable.
46. Explain how management strategies differ between even and uneven aged stands.
47. Apply silvicultural practices to make recommendations based on management goals.
48. Added: Define Biofuels. Explain the pros and cons of using biofuels for energy.

Field Skills

53. Identify common local trees and plants by leaves, bark, branching patterns, buds, fruit, and other characteristics without the use of a key.
54. Identify uncommon local trees and plants with the use of a key.
55. Use common forestry tools, such as:
    a. Biltmore stick/Merritt hypsometer
    b. D-tape
    e. Clinometer
57. Make management recommendations based on ecological conditions of the forest and management goals (such as wildlife habitat, timber production, recreation, et cetera).
58. Identify common plant pests and diseases without use of a key, describe how they are spread, and list methods of control.
59. Utilize and make common forestry measurements, such as diameter at breast height (DBH), chain, cord, total tree height, merchantable height, board feet, log, and basal area.