

NH ENVIROTHON 2010

Forestry Section Study Information

The forestry section of the ENVIROTHON will deal with the basic knowledge of forest types and facts that influence their diversity and use. Generally, your study should concentrate on the basics of how trees function and their importance to the forest ecosystem. You should focus on forest types, composition, identification and characteristics, important insects and diseases of New Hampshire forests, and the benefits of forest land and forest management practices. The forestry test will also include a few questions on the positive and negative impacts of recreation in our forests.

The forestry section of the ENVIROTHON test will consist of a two part challenge. One part will be a written section consisting of short answer, multiple choice, and true and false questions on any tree or forest related topic. The second part of the challenge will be a hands-on field exercise, which will include tree identification, forest measurements and forestry management methods. Things to study include:

Forestry Concepts

- forest types (in NH)
- forest succession
- forest stands (know what a stand is)
- vertical structure
- canopy closure
- long versus short rotation
- shade tolerance in tree species (some trees grow best in full sunlight, some in partial sunlight, and some are shade tolerant and can endure forest shade)
- tree biology (how trees grow; know the function of phloem, cambium, xylem, and pith, and where they are located in a tree)
- know the three major macronutrients important to trees (N, P, K)
- know the differences between dominant trees and suppressed trees
- know that trees vary in growth rate by species (e.g., Shagbark Hickory grows slowly while White Ash grows rapidly)
- tree and shrub identification
- deciduous
- coniferous
- uneven-aged management – what is it?
- even-aged management – what is it?
- Site quality (some sites are better for growing forest trees due to such factors as soil fertility and soil moisture; in NH, site quality is generally better in valleys and lower slopes (or benches on hillsides), average on hillsides, and poorer on ridgetops, swamps, and sandy soil)

- know that trees vary in site requirements by tree species (e.g., white ash grows best on the best soils and thus has high site requirements; in contrast, aspen grows well on poorer soils and thus has low site requirements)
- silviculture (e.g., know and understand the four recognized silvicultural systems including clearcut, seed-tree, selection, and shelterwood); know the difference between single tree selection and group selection; what is crop tree management and how does it differ from the four recognized systems; importance of light and space to tree growth; know why thinning is conducted; know what high-grading means; know what is the best way to regenerate Northern hardwoods in NH; name some of the NH tree species favored by the recognized systems (e.g., aspen and birch favor openings created by clearcutting; sugar maple prefers the shade retained by selection cutting); name some tree species that grow in different soil habitats (e.g., poorly drained habitats, rocky habitat, sand or gravel, habitats enriched by high organic matter); what does “stocking” mean
- “Best Management Practices” to maintain water quality during timber harvest practices – what are they (e.g., constructing water bars on forest roads to prevent soil erosion)
- know some soil characteristics (e.g., high moisture, hard pans) that limit tree growth
- stand age and size class
- know the following forest diseases and their effects on trees: Dutch elm disease, black knot disease, white pine blister rust, beech bark disease, butternut canker
- know the following forest insect pests and their effects on trees: Emerald Ash Borer, Gypsy Moth, Hemlock Woolly Adelgid, Asian Longhorned Beetle, Balsam Woolly Adelgid, Sirex Woodwasp, Winter Moth
- know what Integrated Pest Management means and what is a quarantine
- know the best way to prune (importance of leaving branch collar, what about retaining branch stubs)
- know how to plant a tree

tree measurements

- basal area
- board feet
- merchantable height
- DBH – what are the instruments used to measure it
- Cord (dimensions of cord)
- Instruments to measure trees

Know how to use the Biltmore stick to determine diameter at breast height to the nearest 2-inches; the number of 16-ft logs to the nearest half log (don’t round up) and to a predetermined height (done by your instructor); and total merchantable volume to identified branch or fork

Tree species that the students will be asked to identify are trees that are native to New Hampshire (no Latin names required).

Study information (in pdf format) for the Forestry test is provided on the NH Envirothon website (see Internet Resources below). These are downloadable. Be sure to read: 1) the Northeastern Forest Regeneration Handbook (pp. 29-42) to understand silvicultural systems used in NH; and 2) "Riparian Forest Buffers" to understand the importance of buffers in protecting and enhancing water resources.

Protection of Groundwater Through Urban, Agricultural and Environmental Planning

The 2010 topic is *Protection of Groundwater Through Urban, Agricultural and Environmental Planning*. Ground water is the Nation's principal reserve of fresh water and represents much of its potential future water supply (US Forest Service, Technical Guide to Managing Ground Water Resources, FS-881, May 2007). Ground water is a major contributor to flow in many streams and rivers and has a strong influence on the health and diversity of plant and animal species in forests, grasslands, riparian areas, lakes, wetlands, and cave systems. Ground water and surface water are interconnected and interdependent in almost all ecosystems. Ground water plays significant roles in sustaining the flow, chemistry, and temperature of streams, lakes, springs, wetlands, and cave systems, while surface waters provide recharge to ground water in other settings. Many of the concerns about ground water resources involve questions about depletion of ground water storage, reductions in streamflow, potential loss of ground water-dependent ecosystems, land subsidence, saltwater intrusion, and changes in ground water quality. The effects of many human activities on ground water resources and on the broader environment need to be clearly understood in order to properly manage these systems.

Increasingly, attention is being placed on how to manage ground water (and surface- water) resources in a sustainable manner. The potential for ground water resources to become contaminated from anthropogenic as well as natural sources is being scientifically assessed. Each ground water system and development situation is unique and requires a specific analysis to draw appropriate conclusions.

Students should be prepared to:

1. Discuss the crucial role of streamside forests in the protection and enhancement of the water resources of the Eastern United States. Know that streamside forests can be effective in removing excess nutrients and sediment from surface runoff and shallow groundwater; and in shading streams to optimize light and temperature conditions for aquatic plants and animals. These forests also ameliorate the effects of some pesticides; and directly provide dissolved and particulate organic food needed to maintain high biological productivity and diversity in the adjacent stream.

2. Discuss negative impacts of overuse of ground water. Overuse may impact streams, wetlands, riparian areas, forest stands, meadows, grasslands, seeps, springs, cave systems, and livestock and wildlife watering holes. It may lower lake and reservoir levels, and promote land subsidence, sinkhole formation, and cave collapse. Reduced water-table levels can impact biota that depend on ground water, particularly in riparian and wetland ecosystems. When water is removed from saturated soils and deeper sediments, the soil, sediment, or rock structure that remains may partially collapse and result in visible slumping of soils, widespread subsidence of the land surface, or the formation of sinkholes. The list of elements and chemical compounds that may be accidentally or purposely released in the environment, and transported by ground water is seemingly endless.
3. Know what an aquifer is. Discuss the importance of headwater streams that flow from forestlands and help recharge aquifers from which water is drawn for human use.

Internet Resources for 2010 Envirothon – Forestry

Forestry study materials are posted at: <http://www.nhacd.org/envirothon.htm>