

# 2011 New Hampshire Envirothon Aquatics Cover Letter



## Dear Participants:

This letter will help prepare you for the aquatics section of this year's New Hampshire Envirothon competition. Previous aquatics tests have included the following concepts:

- ✓ Assessing water quality and stream flow data using tables and graphs;
- ✓ Map interpretation, especially topographic maps (be able to figure out which way the water flows and the basic map symbols and characteristics);
- ✓ Macroinvertebrate identification – this is a basic ID, we don't ask for the names but you should have a general knowledge and understanding of the organisms and biodiversity; and
- ✓ Sources of nutrients and other pollutants, pressures of development, and how to remediate pollution problems (a.k.a. Best Management Practices).

Questions often refer to on-site visual aids (such as trays of insects), topographic maps, tabular and graphical data, etc. Be sure to answer each question thoroughly and provide an explanation for your answer when applicable. It is to your advantage to answer each question to the best of your ability, as we give partial credit for acceptable answers. Our test is designed to see how well you apply your knowledge to support your conclusions. We recommend that teams involve all team members to complete the entire exam in the time given.

## Estuaries – Background Information

Estuaries are an important aquatic ecosystem. They are a transitional zone between freshwater and salt water environments. Great Bay is the largest estuary in New Hampshire. It intercepts water flowing from five rivers before it reaches the Atlantic Ocean. And salt water moves from the ocean up the Piscataqua River into the bay. There are frequent changes to the water; organisms living there must be able to adapt.

There is a diverse population of organisms found in estuaries. Great Bay is home, for at least a portion of the year, to various birds, shellfish, invertebrates, mammals, and plant species. These organisms are found in several habitat types within the estuary.

Estuaries have unique physical and chemical properties. Be sure to review the material under the "Websites Specific to Estuaries" in the Aquatics Team Resources, but also review the traditional aquatics materials.

We will tell you more about the test structure at the training day. We hope to see you all there!

Good luck to you all,

*The New Hampshire Envirothon Aquatics Team*

## Websites Specific to Estuaries

- <http://www.armofthesea.info/index.html> - Great Bay Estuary information
- [http://www.estuaries.gov/Doc/PDF/LS3\\_BiodiversityEstuary.pdf](http://www.estuaries.gov/Doc/PDF/LS3_BiodiversityEstuary.pdf) - pages 8-11, Student Reading: “Biodiversity in an Estuary”
- [http://www.estuaries.gov/Doc/PDF/ES3\\_EstWatershed.pdf](http://www.estuaries.gov/Doc/PDF/ES3_EstWatershed.pdf) - pages 8-9, Student Reading: “Estuary and Watershed”
- <http://www.estuaries.gov/Teachers/Default.aspx?ID=180> - Estuarine Principles and Concepts
- [http://wildlife.state.nh.us/marine/saltwater\\_fish.html](http://wildlife.state.nh.us/marine/saltwater_fish.html) - NH saltwater fish information
- <http://news.discovery.com/tech/estuary-energy-alternative.html> - Creating power from estuaries
- <http://www.darvill.clara.net/altenerg/tidal.htm> - Tidal power background information

## General Aquatics Information Websites

### Surface Water and Groundwater

1. [waterontheweb.org/under/lakeecology/index.html](http://waterontheweb.org/under/lakeecology/index.html) - Understanding Lake Ecology from Water on the Web. Basics of lake ecology. Review the following pages: Density Stratification, Watersheds, General Lake Chemistry, Dissolved Oxygen, Nutrients, Chlorophyll.
2. [www.assabriver.org/river/watercycle/groundwater](http://www.assabriver.org/river/watercycle/groundwater) - What is Groundwater? (Assabet River StreamWatch - MA)
3. [www.epa.gov/region01/students/teacher/world.html](http://www.epa.gov/region01/students/teacher/world.html) - “World in Our Backyard” (EPA New England). Wetland science and function. Chapters 1 through 4.
4. [www.wildlife.state.nh.us/Wildlife/Wildlife\\_profiles/profile\\_vernal\\_pools.pdf](http://www.wildlife.state.nh.us/Wildlife/Wildlife_profiles/profile_vernal_pools.pdf) - From the NH Fish and Game Department. Information on vernal pools.

### Water Quality and Pollution Prevention

5. [www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/vrap\\_parameters.pdf](http://www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/vrap_parameters.pdf) - “Interpreting VRAP Water Quality Parameters”, from the NHDES Volunteer River Assessment Program (VRAP). Basic water quality parameter descriptions.
6. [www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-03-42.pdf](http://www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-03-42.pdf) - Best Management Practices to Control Non-point Source Pollution: A Guide for Citizens and Town Officials (NHDES). Guide to BMPs and Non Point Source pollution. Read Section 3.
7. [www.crjc.org/buffers/Introduction.pdf](http://www.crjc.org/buffers/Introduction.pdf) - Fact sheet about riparian buffers from the Connecticut River Joint Commissions.

### Plants and Animals

8. [www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-05-30.pdf](http://www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-05-30.pdf) - From the Department of Environmental Services Exotic Species Program. Aquatic Plants and Algae of New Hampshire’s Lakes and Ponds.
9. [www.dec.ny.gov/animals/35772.html](http://www.dec.ny.gov/animals/35772.html) - From the NY Department of Conservation. Pictorial guide to macroinvertebrates. Students should understand the difference between the major Orders of insects. Do not be concerned about knowing the different Families within each Order, but at least understand that similar insects within an order can have a variety of characteristics.
10. [www.cdm.org/biosite/BioSITE-Curriculum/Curriculum-by-Activity/Unit-8-Read1-Intro-Macroinvertebrates.pdf](http://www.cdm.org/biosite/BioSITE-Curriculum/Curriculum-by-Activity/Unit-8-Read1-Intro-Macroinvertebrates.pdf) - From the Children’s Discovery Museum “BioSITE” curriculum. Introduction to Macroinvertebrates.

## Things to think about as you read through the aquatics materials

1. **Water quality parameters** – What do they measure? What do they indicate?
  - Focus on nitrogen enrichment, dissolved oxygen, chlorophyll *a*, phosphorus, temperature, chloride, conductivity, turbidity, and macroinvertebrate pollution tolerance, salinity, brackish water, etc.
2. **Hydrologic cycle components** – connections between groundwater, rivers, estuaries, lakes, wetlands, etc.
3. **Watershed changes** – How does water quality change from upstream of an urbanized area to downstream? How will the aquatic organisms be impacted by changes? Which types of organisms prefer brackish water? Economic impacts from coastal pollution (i.e., vertebrate and invertebrate larvae species nurseries, etc.)
4. **Best management practices** – How can pollutants from non-point source pollution be kept from entering water bodies in urban or rural settings?
5. **Non-native, invasive species** – How do they impact a water body? How can they be reduced, controlled or eliminated?
6. **Topographic maps** – How are watershed boundaries found by looking at a topographic map? Which way does the water flow on the map?
7. **Shoreline buffers** – How can plants prevent pollutants from entering a water body? What barriers to pollution exist along the shorelines of estuaries?
8. **Wetlands** – What are the characteristics of a wetland? What are the characteristics of a vernal pool? A saltmarsh? A marine beach? What are the functions and values of wetlands?
9. **Groundwater** – What is an aquifer? How does groundwater “recharge”? What is saltwater intrusion?

### The Aquatics Committee

Should you have any questions, please feel free to contact one of us. We will respond to you in as timely a manner as we can.

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