3-6. Prospect Hill Forest is the site of a long-term study of forest growth, structure, and succession. Three 25x25m tree plots have been studied since 1991 in courses and research. This forest shows secondary succession following disturbances caused by fire, wind storms, and human activities

North Plot: The northeastern hardwood forest supports 22 species of trees, the most common of which are white pine, white birch, red oak, and sugar maple.

Middle Plot: The forest in this area displays a normal distribution of tree species and age classes.

South Plot: Here forest composition is affected by strong winds that blew down several trees. Such opened areas often initially have an increased density of younger trees. Increased competition for resources usually leads to natural die-off, allowing only a few of these young trees to reach maturity.

15-16. Land Use History Prospect Hill was probably cleared by European settlers in 1725 and used as a pasture. The few remaining trees on the hill were birch, juniper, and oak. These trees developed large, broad crowns as they grew in an open area with no competition for sunlight. At least a few of these large trees can be found in the forest today. Known as "wolf" trees, they are one of the lingering clues that Prospect Hill was once farmland. Replanting of the hill started in the 1880s. After the 1890s, no further planting on the hill was done for the next 40 years, and the forest was left to regenerate. The environmental history of the campus landscape is a particular interest of Prof. Robert Schwartz and his students.

(*The 19th century and contemporary photos courtesy Mount Holyoke College Archives*)

18. Vernal Pools form in the spring when rain or melted snow collect in pools with no outlet to a stream or river. These shallow pools usually evaporate during the summer or fall months, making it impossible for fish to survive; but they are essential to the survival of several plant and animal species, including American toads, spring peepers, spotted salamanders, and fairy shrimp. Vernal pools are very sensitive to environmental changes. For example, drought can cause pools to remain dry for several years, and human activities such as construction or water drainage can destroy vernal pools and alter upland habitats.

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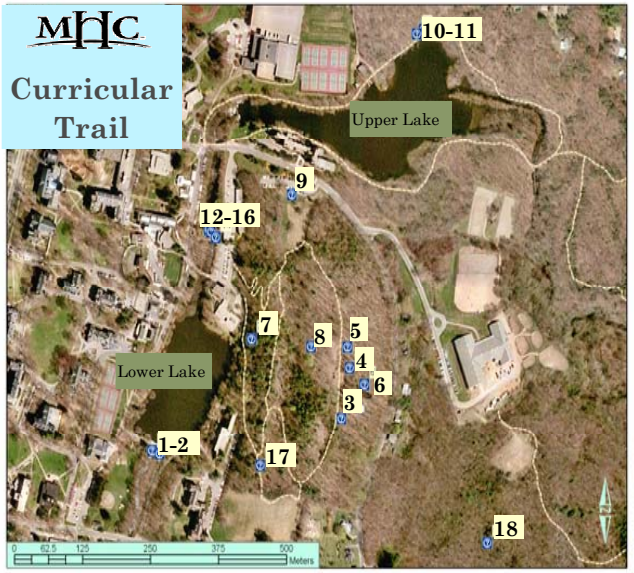
MOUNT HOLYOKE

Center for the Environment

Curricular Trail Guide



The above image shows locations of trail sites described in more detail in this brochure. Please refer to site numbers.

More than 300 acres of Mount Holyoke's 800-acre campus are a rural, undeveloped landscape — of lakes, streams, forests, marsh, shrub wetlands, forested wetlands, and vernal pools — that is home to hundreds of animal species, including beavers, otters, American eel, birds and coyotes. These diverse environments and life forms exist near areas of rapid development, providing students with opportunities to study ecological processes and their responses to human activities. The **curricular trail** was developed by our students and the Center for the Environment to collect data on the rich array of environmental phenomena on campus. Sensors monitor weather, water flow and water quality in Stony Brook, and Upper and Lower lakes. We also survey native and invasive plant, fish and invertebrate species and characterize forest composition.

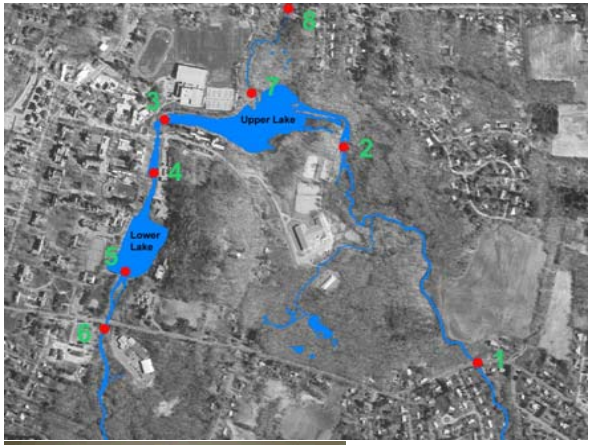
The purpose of the curricular trail is to use the campus as a natural "laboratory" for teaching. Dr. Leszek Bledzki oversees data collection and the training of students to do this field work. Courses in biology, ecology, environmental studies, physical geography, geology, and history have used the data to study subjects ranging from changes in weather patterns and water quality to biodiversity and community structure. Students can also use the data, which are available online at the Center's website, for original research.

1-2 Eel Way The American eel (*Anguilla rostrata)* is a catadromous fish, meaning it spawns in the sea and returns to fresh water where it spends 5 to 20 years maturing. American and European eels spawn in the Sargasso Sea, north of the Bahamas. Eels feed in rivers at night, on fish, mollusks, crustaceans, and worms.

Dams built along rivers have led to a decline in the range of eels, which are key predators and food for otters, kingfishers and herons. While small eels may be able to get beyond small dams, larger eels cannot. In order to help restore the range of the American eel, Mount Holyoke College constructed an eel ladder at Lower Lake dam. This ladder, one of few in the Connecticut River watershed, works during the eels' freshwater migration that occurs mostly in July.

Eels gather at the bottom of the dam, unable to climb this structure. Attracted to the opening of the eel ladder by a current of flowing water (generated by a pump) inside a covered ramp with small pegs, the eels make their way up the ladder and into the storage container with water. The trap is checked on a regular basis and eels are counted and released upstream in Stony Brook.

12-14 Water Quality has been monitored since 1996 biweekly, with measurements of chlorophyll, pH, temperature, turbidity, conductivity, dissolved oxygen, NO_3, NH_4, and PO_4, and continuous recording of water flow. Sampling sites are shown below.

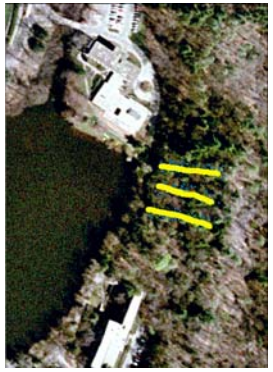


The YSI portable water quality sampling probe is used to make measurements on site. All data are stored and organized in Excel files available online through the Center's website.

10-11 Invasive Species pose a growing environmental problem in aquatic and forest habitats. In Upper and Lower lakes several invasive plant species have been found (*Trapa natans, Myriophyllum heterophyllum, Myriophyllum spicatum, Potamogeton crispus,* and *Cyanobacteria*). Milfoil and algae are invasive species replacing water chestnut, another invasive species. Lower Lake has a higher risk of aquatic plant invasions due to its high nutrient load (N, P) and shallowness. Removing invasive species in an aquatic habitat is difficult and costly; and it must preserve native species' diversity. Students (shown: Courtney Moore, Emily Wheeler, Helen Fallat, and Tracy Zhu) recently evaluated invasive aquatic species in an environmental studies course in 2005. The spread of invasive species is a specific interest of Prof. Martha Hoopes and her students.

17. Woolly Adelgid (*Adelges tsugae*) has recently infested eastern hemlock (*Tsuga canadensis*) woods on Prospect Hill and northeastern America. The hemlock woolly adelgid was observed on the West Coast in 1924, then found in New England in 1985. It spreads at a rate of 15-30 km/year, and causes widespread tree mortality through sap feeding and injection of toxic saliva. Hemlocks die within 4 to 10 years of infection, and non-chemical control methods have not been effective.

The year-to-year increase in woolly adelgid infestation has been monitored at four transects on Prospect Hill by students in Prof. Jill Bubier's environmental science class. This aerial photograph of Lower Lake and Prospect Hill shows transects of hemlocks mapped since 2003. Larger trees tend to have higher levels of infestation. The rapid spread of this parasite has aleady caused massive changes to stands and forests in the northeast. Cold winter temperatures can work as a temporary check on the spread of the pest and tree deterioration. To evaluate the changes of infestation, students have used GIS and remote-sensing resources of the GeoProcessing Lab, directed by Prof. Thomas Millette.



7-9 Weather Stations are installed at three locations on Prospect Hill to examine the effects of vegetation (deciduous or evergreen canopy and open field) on microclimate, and Prof. Al Werner (Geology) runs another station located on the roof of Clapp Laboratory. Data from all stations are recorded every 30 minutes, then downloaded and added biweekly to Excel files, which are available online through the Center's website.

Just a few of the courses that use the curricular trail:

- Bio 223 (Ecology)
- Bio 331 (Conservation Biology)
- Bio 145 and Bio 150 (Intro Biology)
- ChemBio 160 (Integrated Intro to Biol and Chem)
- ES 100 (Introduction to Environmental Studies)
- ES 200 (Environmental Science)
- Geol 101 (Environmental Geology)
- Geol 203 (Surface Processes)
- Hist 283 (Environmental History of the Mount Holyoke Campus)