



# Chapman Mill Pond Vernal Pool Long-Term Monitoring Program

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## ABSTRACT

A vernal pool, a small pool of water with no water outlet, is an extremely important habitat for many amphibians, such as wood frogs (*Rana sylvatica*) and salamanders as a safe breeding environment. If they were to breed in a regular river or pond, they would surely be eaten by fish along with their offspring. Vernal pools provide unique habitat within a greater landscape, increasing the diversity of the overall ecosystem. Vernal pools provide opportunities for the community to learn about their natural world and understand natural processes. The three vernal pools located within the Chapman Mill Pond Open Space are owned by the Town of Westbrook and managed by the Westbrook Conservation Commission for natural resource conservation, water conservation and protection, and wildlife-dependent recreation. These Vernal Pools provide unique microhabitats that add biological diversity to the open space and the greater Menunketesuck River Watershed. In the future I will work on maintaining the project to make sure it is successful.

## INTRODUCTION

Habitats that are critical for aquatic breeding amphibians (Fig. 1) are facing a number of threats (Semlitsch 2000). These threats include habitat destruction and alteration (agricultural, timber harvest, housing development, etc.), chemical contamination (chemical application to agricultural fields, industrial forests, and residential areas), invasive species (the introduction of bull frogs, *Rana catesbeiana*), introduction of fish, as they are competitors and predators of aquatic breeding amphibians, and commercial exploitation.

Vernal pools are critical habitat for a number of amphibian species. This habitat type has been defined in different ways, but all definitions agree that the ephemeral water stays in the pools for a short amount of time (Kenney 1995). The period of time the water stays in the pool has a direct effect on amphibians, which use the pools for breeding, hatching, larval development, and metamorphosis (Kenney 1995).

One of the challenges that the Westbrook Conservation Commission has identified is the possible affect of global climate change on vernal pools. The cause of global climate change is a worldwide issue, outside the regulatory control of the Westbrook Conservation Commission.

In collaboration with the Westbrook Conservation Commission, we will monitor biological and physical changes of vernal pools to enable us to manage the habitats for future generations. I have developed a manual intended to be used with other web-based resources by citizen scientists, which can be accessed on the Westbrook Conservation Commission website. I also worked with Westbrook High School to teach the environmental club the monitoring protocol, which will be carried out this spring.



Figure 2. Satellite image of the landscape of Chapman Mill Pond and locations of the three vernal pool sites.

## MATERIAL AND METHODS

### Study Area, Ecosystem and Organisms

- This long-term monitoring program was established in Chapman Mill Pond Open Space Westbrook, CT (Fig. 2).
- I set up three vernal pool sites (Fig. 2) within the study area.
- At each vernal pool, all amphibians, freshwater shell fish and crustaceans will be monitored (Fig. 1), in addition to physical characteristics.

### Development of Monitoring Protocol

- Delineated vernal pool sites using a GPS unit and marked each pool with stakes (Fig. 3).
- Developed survey protocol document that explains all aspects of survey procedure to citizen scientists. Document located at (<http://www.westbrookct.us>) and includes:
  - Identification protocol of study organisms (amphibians, freshwater shell fish and crustaceans).
  - Identification protocol of vegetation.
- Developed vernal pool surveying form through iNaturalist to be used by citizen scientists for gathering data in the field.
- Developed identification protocols for flora and fauna.
- Developed electronic storage system for field data.

### Westbrook Conservation Commission and Citizen Scientists

- I presented the monitoring protocol to the conservation commission to further refine the protocol (Fig. 3).
- I worked with the environmental club at Westbrook High School to train students to carry out the protocol with me in spring 2016.



Figure 3. Taking a GPS waypoint at one of the survey sites.



Figure 4. Meeting with the Westbrook Conservation Commission.

## MONITORING PROTOCOL OUTLINE

I developed a long-term monitoring program that will help identify biological and physical changes to the Chapman Mill Pond vernal pools. Through the monitoring of water depth, obligate species, facultative species, flora species, and canopy cover twice a year, information can be stored to monitor change. As we monitor the changes, the Westbrook Conservation Commission will be better able to manage the open space and the animals that rely on the habitat.

### Chapman Mill Pond Vernal Pool Monitoring Manual

- To become familiar with the project
- To identify changes in physical characteristics such as depth of water, pH, and dissolved oxygen.
- To identify the flora and fauna in the surrounding pools by using the following internet resources.

### iNaturalist

- Used to identify animal and plant species that cannot be found in the manual
- Place observations or comments found at certain stakes.

### iTree

- Monitoring canopy cover and possible changes to global climate change.



## IMPLICATIONS OR OUTLOOK

In order for land use managers to make decisions concerning management they need to gather information concerning how natural resources are affected by changing environmental conditions. The commission has identified vernal pools as a system that can be threatened by climate change. In order to understand the possible effect on this resource, the commission has determined that there is a need to establish a long-term monitoring program. The commission then will be able to identify the trends within the pond's ecosystems and take action to protect vernal pool resources.

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## REFERENCES

Kenney, L. P. (1995). Wicked big puddles: a guide to the study and certification of vernal pools. Reading MA: Vernal Pool Association.  
Semlitsch, R. (2000) Principles for Management of Aquatic-Breeding Amphibians. The Journal of Wildlife Management 64: 615-631.



Figure 1. Wood frog (*Rana sylvatica*), an obligate species of vernal pools.