

**A Comparison of Water Quality between Natural, Modified, and Manmade Ponds
within Brookhaven National Laboratory**

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Table of Content

Abstract

Introduction

Material and Methods

Result

Discussion and Conclusion

Acknowledgement

References

Tables

Figures

ABSTRACT:

Brookhaven National Laboratory (BNL) is located in the center of the pine barren region. Within BNL's 5,265-acre site there are 26 wetlands present that consist of the vernal pools, recharge basins, and streams making it an ideal site to study water quality in long island. Testing the water quality in natural, modified, and manmade ponds will give environment scientist in long island insight on what type of water characteristics are found in certain types of ponds. By define those characteristics of the ponds will allow scientist to observe certain animal such as the endanger tiger salamander and what types of water quality they thrive in. Seven ponds were selected for study, which included four natural, two modified, and one manmade. Five water samples were collected from each point. A Global Positioning System (GPS) unit was used to mark each water sample point. An YSI 659 MDS meter fitted with a multiprobe was also utilized at each water sample point to determine temperature, pH, dissolved oxygen, conductivity, and turbidity. Water samples were analyzed using Hach DREL/2000 and CEL/890 water test kits. Water samples were tested for nitrate, phosphorus, tannin-lignin, suspended solid, and hardness. The pH in the manmade ponds was found to be more basic than that of natural ponds Phosphorous, tannin-lignin and hardness were elevated in the natural when compared to manmade and modified ponds. Most of the natural pond had a lot of trees that provide drapery for them while the manmade and modified ponds where located directly in the sun which could have affected the biological breakdown of certain nutrient in the pond. This information will enable BNL to optimize the management of amphibian and reptile habitats.

INTRODUCTION

Long Island, New York embodies the essence of a Pine Barren region; from its sandy, excessively well drained, and nutrient poor soils to its variety of altitudinous pine trees, which provide shade for lower vegetation and wetland structures. Dwarf pine plains (*ilicifolia*), oak-pitch pine (*Pinus rigida*), and pitch pine heath (*Quercus*) comprise Long Island Pine Barrens, which support a vast number of species and vegetation. Pitch pine is the dominant tree species and the shrub layers are dominated by shrub oak, black huckleberry (*Gaylussacia baccata*), and hillside blueberry (*Vaccinium pallidum*)[1].

Vernal pools are one of the wetland structures that are found all throughout the Pine Barren region. They are basin depressions lacking outlets within the Pine Barrens, filling with water during winter snowfall and offering temporary habits to a variety of species during seasonal precipitation [2].

Brookhaven National Laboratory (BNL) is located in the center of the Long Island Pine Barren region. BNL encompasses a variety of wetland structures that included recharge basins, vernal pools, and modified and man-made ponds on its 5,265-acre site [3]. Over the recent years an increase in population and pollution has caused habitat loss in species such as the tiger salamander (*Ambystoma tigrinum*), northern cricket frog (*Acris crepitans*) and mud turtle (*Kinosternon subrubrum*) forcing them to be placed on New York's state endangered species list by New York State Department Environmental Conservation [4]. Out of 91, BNL contains 22+ of the active endangered tiger salamander breeding sites making it an ideal ecological site for testing water chemistry on Long Island.

By collecting and testing the water chemistry in different ponds, along with soil and vegetation data, it will help environmental scientists determine what conditions are most suitable for different species. And this information will optimally give scientists a better guideline on how to maintain different habitats to prevent extinction in species on Long Island.

METHOD AND MATERIAL

Water procedure:

A perimeter of the ponds was collected using a Global Positioning System (GPS) etrex Vista Cx. The information from the GPS was then downloaded into a GIS program, which determined the midpoint of each pond. Four stakes were used to mark each cardinal direction three meters in from the shore. Each point was marked using GPS to record the location. An additional stake was placed at the midpoint of each pond. The ponds were left to settle for twenty-four hour to allow the sediment to resettle in the pond. An YSI multiprobe meter was utilized the following day to determine the pH, temperature, turbidity, conductivity, and dissolved oxygen at each point. To make sure that the reading was accurate, a bottle of DI water was used to clean the probe between each testing point. From each point a water sample was collected and placed on ice to minimize any chemical reaction while in the field. The water was analyzed for nitrate, iron, copper, chlorine, aluminum, sulfate, total chromium, molybdenum, phosphorus, tannin-lignin, suspended solid, and hardness using Hach DREL/2000 and CEL/890 water test kits.

RESULTS:

Two tables (Tb1 and Tb2) was constructed to display the average and the standard deviation of the 12 test that was run on the five water samples that was collected from each pond. The First table showed the results from the twelve tests that was conducted which were: sulfate, nitrate, iron, phosphorus, total chlorine, hardness, copper, tannin and lignin, total chromium, molybdenum, aluminum, and suspend solids. The second table displays the YSI reading, which tested for pH, temperature, conductivity, dissolved oxygen, and turbidity of the seven ponds.

DISSCUSION AND CONCULION

A fluctuation in hardness was observed between the meadow marsh pond and nature ponds.

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