Brookhaven National Laboratory (BNL) is located in the center of the Long Island Pine Barrens. Within BNL’s 5240-acre site there are 20 wetlands. Included are coastal plain ponds, vernal ponds, exchange basins, and streams, making it an ideal ecological site to study water chemistry. We took water samples from seven coastal plain ponds on BNL: four natural (BP1, BP2, BP6, BP9), one man-modified (BP5), and two manmade (BP13a, Meadow Marsh). Five water samples were collected from each pond. An Axiom Via XG coaxial positioning system (GPS) was used to mark each water sample point. A YSI 650 MDS meter fitted with a multiprobe was utilized to determine temperature, pH, dissolved oxygen, conductivity, and turbidity at each sample point. Water samples were analyzed for selenium, nitrite, iron, phosphorus, chlorite, calcium, magnesium, copper, cadmium, tin, aluminum, chromate, and suspended solids using Hach DREL2000 and CEL380 water test kits. Water samples were also analyzed for eleven different elements using an ICP-AES. The pH in the anthropogenic ponds was found to be more basic than that of natural ponds. Phosphorous, tannin-lignin, and hardness were elevated in the natural ponds when compared to manmade and modified ponds, but only the difference in tannin-lignin content proved statistically significant. The natural ponds were shaded by the canopy of the surrounding forest while the manmade and modified ponds where located directly in the sun. This had a slight effect on water temperature. The results of this study will give environmental scientists an insight into water chemistry and interrelationships between abiotic and biotic factors and will enable BNL to optimize the management of amphibian and reptile habitats.

Methods and Materials

A track of each pond was collected using an i-urn Vida Cx Global Positioning System (GPS). The information from the GPS unit was then downloaded into a Geographic Information System (GIS) program, which determined the midpoint of each pond (Figure 1).

Stakes were used to mark sampling points on the north, south, east, and west sides of the pond three meters in from the shore. GPS was used to record the location of each sampling point. An additional stake was placed at the middle of each pond. The ponds were left to settle for twenty-four hours before sampling was carried out (Figure 2).

From each point a water sample was collected and placed on ice to minimize any chemical reaction while in the field. Each sample was analyzed for nitrate, iron, copper, chloride, aluminum, sulfite, total chromium, molybdate, phosphorus, tannin-lignin, suspended solids, and total hardness using Ylach DREL2000 and CEL380 water test kits (Figure 4). A subsample was preserved with nitric acid and analyzed on an ICP-AES for eleven different elements.

Introduction

Long Island, New York embodies the essence of the Pine Barrens region, from its sandy, well drained, nutrient poor soils to its abundance of pines. The Long Island Pine Barrens support a number of distinct natural communities including dwarf pine plains, oak-pitch pine forest, and pitch pine-scrub forest. Pitch pine (Pinus rigida) is the dominant tree species in the Pine Barrens; the shrub layer is dominated by scrub oak, black huckleberry (Gaylussacia Cinerea), and hibiscus blueberry (Vaccinium philadelphicum). Coastal plain ponds and vernal ponds are two types of wetland structures that are found throughout the Pine Barrens region. Vernal ponds, unlike coastal plain ponds, dry out completely in the summer. These ponds are basin depressions lacking outlets, filling with water during periods of precipitation, and offering permanent or temporary habitat to a variety of species [2]. Over recent decades an increase in population and pollution has resulted in habitat loss for species such as the tiger salamander (Ambystoma tigrinum) and mud turtle (Kinosternon subrubrum) causing them to be placed on New York state’s endangered species list [4]. BNL contains approximately 22 of the 91 known active breeding sites for eleven different amphibian species [2]. Over recent decades an increase in population and pollution has resulted in habitat loss for species such as the tiger salamander (Ambystoma tigrinum) and mud turtle (Kinosternon subrubrum) causing them to be placed on New York state’s endangered species list [4].

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References