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IN REPLY REFER TO:

United States Department of the Interior

NATIONAL PARK SERVICE

Morristown National Historical Park

P.O. Box 1136R

Morristown, New Jersey 07960

A Report on Water Quality and Biota of Cat Swamp Pond,

Morristown National Historical Park,

Morris County, New Jersey

Prepared for

United States Department of the Interior

National Park Service

Morristown National Historical Park

by

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Youth Conservation Corp, 1980

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Year of
the
Visitor



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INTRODUCTION

During the summer of 1980, Morristown National Historical Park (MNHP) hosted a Youth Conservation Corp Camp. In order to fulfill a segment of the "Environmental Awareness" program of the Youth Conservation Corp (YCC) the camp director, group leaders, and enrollees initiated a study of the Cat Swamp Pond (Figure 1). The objectives of the field study were to ascertain the quality of the water in the pond and identify some of the flora and fauna in the immediate vicinity. It is hoped that these data will provide a baseline from which to draw on to determine any changes in water quality and/or species diversity of the pond and swamp ecosystem.

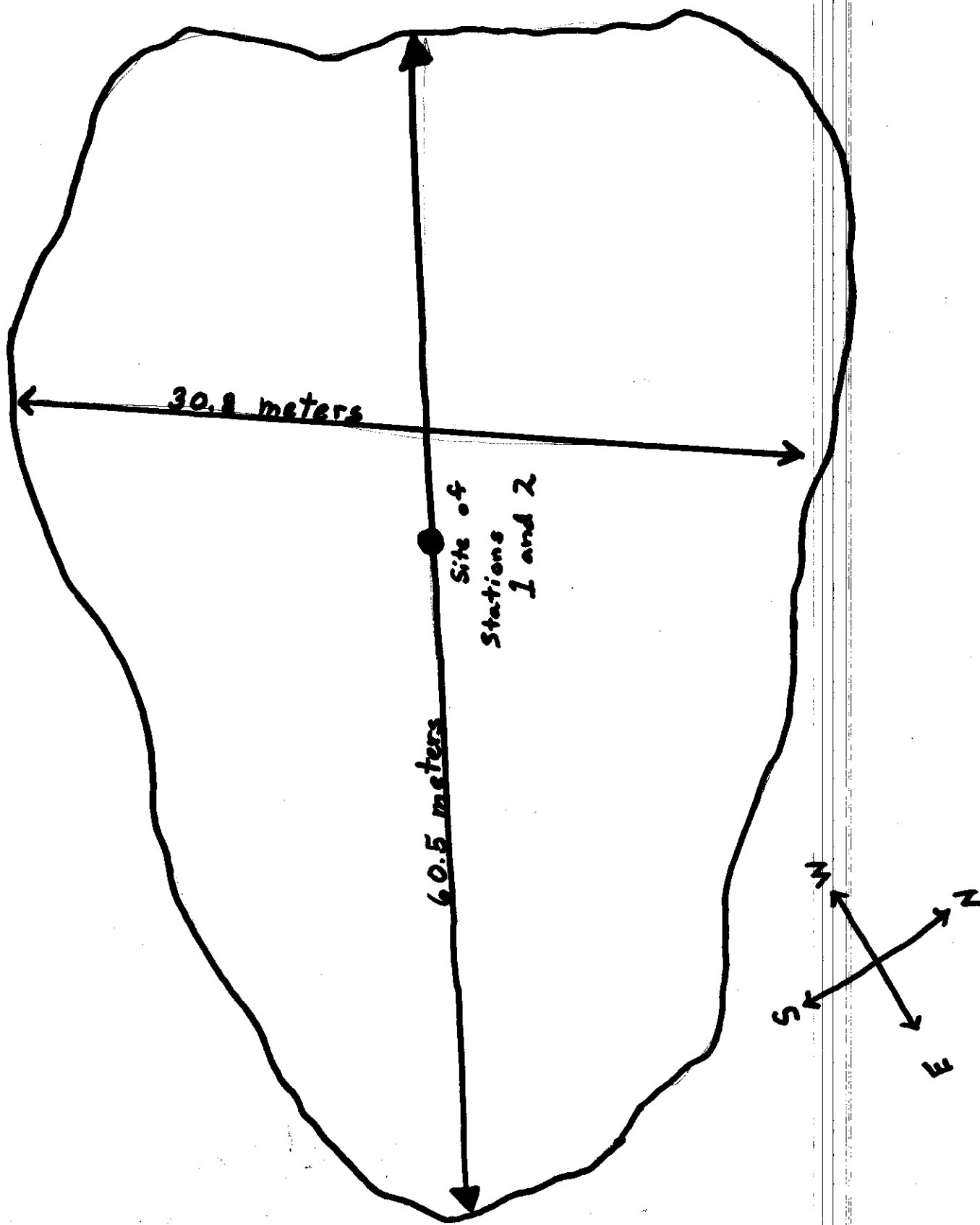


FIGURE 1



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MATERIALS AND METHODS

A field investigation of water quality and aquatic macro-invertebrates of Cat Swamp Pond, Morristown National Historical Park, Morris County, New Jersey was conducted by the Youth Conservation Corp Personnel during July, 1980. During this study, two sampling stations were established to measure physical and chemical characteristics of the water. Station 1 was located in the center of the pond at a depth of just below the surface of the water and Station 2 was at the same location but at a depth of 2 meters. Additionally, vegetation, vertebrate and invertebrate organisms in and around the pond were identified and recorded. At both sampling stations the following physical and chemical parameters were measured:

1. Dissolved Oxygen - A dissolved oxygen meter (Yellow Springs Instrument Company) and field probe were used to determine levels of dissolved oxygen in the water.
2. Ambient and Water Temperature - All temperatures were measured using the dissolved oxygen meter previously described.



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3. Secchi Disc - Used to determine depth of light penetration as an indicator of turbidity.

4. Chemical Test Kits obtained from LaMotte Chemical Company, Chestertown, Maryland were used to determine chemical water quality. The following tests were performed:

- A. Phosphate (Orthophosphate)
- B. Nitrate
- C. Alkalinity
- D. Sulfate
- E. pH

5. Biological Sampling Methods - A Bottom-sampling Dredge (LaMotte Chemical Company # 1061) and Sieve Set (Carolina Biological GEO 9300A) were used to obtain samples of the sediment for the purpose of collecting and identifying macroinvertebrates.

6 Topographical Features - A calibrated line was used to measure the maximum length, width and depth of the pond.

7. General Observations - The immediate area surrounding the pond was examined and any organisms found were listed.



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RESULTS AND DISCUSSION

1. Water Quality and Dissolved Oxygen -

Observed dissolved oxygen concentration ranged from 8ppm at the surface to 10.5 ppm at the 2 meter depth. All recorded concentrations of dissolved oxygen were greater than the state standard (4.0 ppm; NJ-DEP 1975). Because of the shallow nature of the pond no stratification of oxygen was detected. This was also true of temperature.

2. Ambient and Water Temperature - Measured water and air temperatures were normal for Northern New Jersey during July. Temperatures ranged from 22° C T_a to 20° C T_w at Station 1 and 19° C T_w at Station 2. The presence of a high concentration of dissolved oxygen all the way to the bottom of the pond indicated a very healthy situation and suggests that there is little decaying organic matter on the bottom.

3. Secchi disc depth averaged .5 meters (5 measurements were recorded and averaged). The relatively shallow secchi disc depth was the result of increased siltation from a storm which occurred a few days prior to our investigation rather than from a dense population of algae which was not observed.



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4 A. and B. Concentrations of orthophosphate were less than 1ppm at Stations 1 and 2. Values for nitrate were also less than 1 ppm at both stations. All values for phosphate and nitrate appear to be less than the proposed federal standard which is intended to prevent the growth of nuisance plants. Further chemical testing using more sophisticated methods could ascertain whether total phosphorous levels are within federal standards of .1 ppm (US - EPA 1973). The same could be said for levels of nitrogen.

C Alkalinity - Concentrations of alkalinity were 100 ppm at both stations. These levels of alkalinity are normal for fresh water. They indicate that there is a moderate buffering of the water.

D Levels of Sulfate ranged from 5ppm at the surface to 10ppm at the bottom. The higher levels of sulfate at station 2 indicate higher levels of bacterial decomposition of organic matter on the pond bottom.

E. pH values ranged from 7.0 at station 1 to 6.0 at station 2. The neutral to slightly acidic values are due to the normal levels of buffering activity present in the pond. Large shifts in pH are therefore, unlikely in this system.



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5 A summary of organisms found in and around the pond is presented in Table 1.

TABLE 1

Red Maple - Acer Rubrum
Americam Beech - Fagus Grandifolia
Sassafras - Sassafras Albidum
Tulip - Liriodendron Tulipifera
White Oak - Quercus Alba
Pin Oak - Quercus ~~Al~~ustris
Black Locust - Robinia Pseudoacacia
Witch Hazel - Hamamelis Virginiana
Dogwood - Cornus Florida

TREES

Ferns
Fungii (including mushrooms)
Skunk cabbage
Lichens
Indian Cucumder
Poison Ivy
Water Hypnum
Various mosses including Fountain Moss

OTHER
VEGETATION

Leopard Frog - Rana pipiens
Bullfrog - Rana catesbiana
Green Frog - Rana clamitans
tadpoles
Snapping turtle - Chelydra serpentina
carp eggs
Red-backed Salamander - Plethodon cinereus

VERTEBRATES

Crayfish - Crustacea
pond snails - Gastropoda
earthworm - Oligochaetae
leech - Hirudinea
water strider - Insecta - Hemiptera
water & diving beetles - Insecta - Coleoptera
Dragon & damsel flies - Insecta - Odonata
Flies - Insecta - Diptera
Various Butterflies & Moths - Insecta - Lepidoptera

INVERTEBRATES



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6 Measurements of maximum length and width of Cat Swamp Pond were 60.5 and 30.8 meters respectively. The depth at the center of the pond was 2.5 meters.

General Conclusions

The levels of chemical and physical parameters measured in water samples showed that the water quality in Cat Swamp Pond, generally was outstanding. This pond is certainly one of the least polluted ponds in Northern New Jersey. No problems appear to be evident at this point with respect to water quality. Field collections of vertebrates and macroinvertebrates from Cat Swamp indicate a balanced and diverse community. In addition, the rooted aquatic vegetation provides refuge for fish in the pond. If the pond has suffered environmental insult in the past it apparently has recovered. In summary, chemical and biological characteristics in July, 1980 indicated a high quality of water and a healthy aquatic system, Cat Swamp Pond has the potential of being an outstanding laboratory for outdoor environmental education since this ecosystem supports a variety of aquatic life and is surrounded by a diversity of terrestrial plant species. Studies such as the present one should be continued to determine the extent of environmentally sensitive areas within the National Park so that they may be protected for future generations.