WATER QUALITY OF MT. SINAI HARBOR

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Introduction

Mt. Sinai Harbor is a small harbor situated just a few miles east of Port Jefferson harbor on the north shore of Long Island. The water quality of the harbor was tested as a part of a study conducted by the marine science class in Commack High School over the past two years. Water samples were taken to determine dissolved oxygen concentration, salinity level, dissolved metals level, and the presence of E. coli bacteria. The samples that were taken in the second year showed a significant improvement in the water quality when compared to the first year.

Mt. Sinai Harbor is a popular harbor due to two manmade jetties that keep the harbor from filling up with sand. It is connected to the Long Island Sound by an inlet bordered by the jetties, providing both a safe inlet and a protected harbor.

Methods and Materials

Samples were taken at incoming tide on July 7,1994, and high tide on July 7, 1995. There were four sites from which water was tested: the marsh area adjacent to Crystal Brook Hollow Road; harbor (deep); harbor (shallow); and the shallow sound area adjacent to the west jetty (see map). The harbor samples were taken by a team on a raft in the middle of the harbor. All samples were taken by hand, except for the deep harbor samples, which were collected using a Van Dorn bottle.

All samples were collected and stored in a pair of clean Biological Oxygen Demand (B.O.D) bottles. One of each pair was immediately treated with manganous sulfate and alkaline iodide solutions to fix the dissolved oxygen . All B.O.D. bottles were brought back to the lab for further analysis. With the exception of dissolved oxygen, all chemical parameters were determined using a colorimeter. Specific methods for each test are described below.

Dissolved Oxygen Test

A standard Winkler titration was used at the lab after chemical fixation in the field.

Salinity

Salinity was determined using a standard titration with Silver Nitrate solution, using a potassium chromate end point indicator.

Nitrate Analysis

Powdered cadmium was used to reduce nitrate to nitrite. The nitrite that was originally present plus reduced nitrate was determined by diazotizing sulfanilamide and coupling with N-(1 naphthyl)-ethylenedihydrochloride to form a highly colored azo dye which was measured colorimetrically with a 535 nm filter.

Phosphate Analysis

Ammonium molybdate and antimony potassium tartrate were reacted in a filtered acid medium with a dilute solution of PO4 to form an antimony-phosphomolybdate complex. This complex was then reduced to an intense blue colored complex by ascorbic acid and assayed with a 640 nm filter.

Copper Analysis

Copper analysis was performed using a diethyldithiocarbamate chelation under alkaline conditions (pH 9-10) and subsequent colorimetric measurement using a 415 nm filter.

Iron Analysis

The iron analysis was performed by using a ferric to ferrous reduction coupled with a bipyridyl complexing method. Colormetic analysis was done using a 535 nm filter.

pH

Cholrphenol red, phenol red, and thymol blue were used as pH indicators. The pH was measured in 1995 only.

Coliform Bacterial Analysis

In addition to the chemical analysis, the presence of E. Coli was tested qualitatively using a lactose-eosin-methylene blue broth.

Water Tests Mt. Sinai Harbor

Test	1994				1995			
	Marsh	Harbor (deep)	Harbor (shallow)	Sound	Marsh	Harbor (deep)	Harbor (shallow)	Sound
Oxygen (ppm)	3.8	4.5	4.3	3.8	4.2	5.6	10	7.0
Salinity (ppt)	25.3	27.5	30.5	26.6	25	25.7	25	26.2
Nitrates (ppm)	0.53	0.35	1.06	1.06	N.D.	0.04	0.18	0.59
Phosphate(ppm)	0.44	0.36	0.23	0.44	0.01	0.01	0.07	0.27
Copper (ppm)	0.1	1.91	0.42	0.56	0.03	0.03	0.16	0.10
Iron (ppm)	0.03	0.77	0.09	0.03	0.14	0.09	0.14	0.14
E. Coli	Yes	No	No	No	Yes	Yes	Yes	No
pH					8	8.1	8.3	8.1

Discussion

The results of the experiments were compared to water quality standards set by the E.P.A. and Board of Health. The prescence of E. coli in the water violates these standards, as does the high concentration of phosphates and nitrates in 1994. All three of these were probably the result of raw sewage dumped in the harbor. The levels of phosphates and nitrates dropped in 1995, however. The iron concentration increased, but still fell below the minimum set by the E.P.A. While the oxygen concentration was dangerously low in almost all areas in 1994, it had increased and even doubled in the shallow harbor sample. However, the marsh area was slightly low in oxygen, a condition which could lead to hypoxia. The copper concentrations in 1995 decreased with respect to 1994 results.

Conclusions

When comparing the results of the two years, it appears that the water quality of Mt. Sinai Harbor has improved. While the level of many nutrients are below standard, and many of the metals are well above set limits in 1994, the concentration of all findings in 1995 meets the set limits. Because these are one time results, and were not studies done on a day to day basis, meaningful conclusions are impossible. However, it is possible to infer from the data that the water quality may have significantly improved over the course of a year. This is encouraging in spite of the heavy recreational pressure from fishermen, boaters and homes in the area. It is important to monitor the water on an ongoing basis in order to ensure that the marine environment remains still healthy. State and local officials should develop a regular monitoring system, and keep residents and boaters in the area informed of the results. Only then will the future vitality of the water and its suitability for marine life be ensured.

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