



HOW DOES CHLORINE AFFECT THE BIOTIC INDEX OF MACRO-INVERTEBRATES LIVING IN PROSPECT PARK'S WATER SYSTEM?

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Hypothesis

If there is chlorine present in the water, then there will be a lower biotic index

INTRODUCTION

During the period of September – December of 2007, the Freshman of BASE High School tested water quality in Prospect Park. Every week in Field Studies class, we tested the water at the specific site to measure water characteristics. We tested for temperature (°C), dissolved oxygen (DO), chlorine (Cl), pH, Nitrate (?), and phosphate (PO4). We cooperates as a team to get the data necessary to check the water. The sites visited to measure water characteristics were: Fallkill Falls, Dog Beach, Binnen Water, Lily Pond.

From April – May of 2008, the Freshman of BASE High School searched leaf packs placed at different sites in the Prospect Park water system in March for macro-invertebrates. The sites gave us different amounts and types of invertebrates. The sites were visited to assess the biotic index were: Fallkill Falls, Peninsula, Esdale Bridge, Binnen Water.

The different types of macro-invertebrates found in the sites were leeches, snails, red worms, dragon fly larvae, midges and other worms. For our research project we will examine what the relationship is between water quality and the amount of macro-invertebrates at each site.

GENERAL METHODS

Materials

Materials for Water Monitoring:

- Test tubes, tablets and kits for the following water quality indicators:
 - pH
 - phosphate (PO4)
 - dissolved oxygen (DO)
 - chlorine (Cl)
 - nitrate (N)
- A color chart to measure the results for each test
- Water samples from different sites at Prospect Park

Materials for finding Macro-invertebrates:

- Leaf packs left in the water at different sites in Prospect Park
- Forceps
- Containers
- Magnifying glass
- Chart for identifying macro-invertebrates

Procedure:

Testing Water Quality:

- *Water was monitored and tested for different chemicals at Prospect Park.
- *The four water sites that were tested were: Fallkill Falls, Dog Beach, Binnen Water, and Lily Pond.
- *The five compounds tested were: pH, nitrate, phosphate, dissolved oxygen and chlorine.

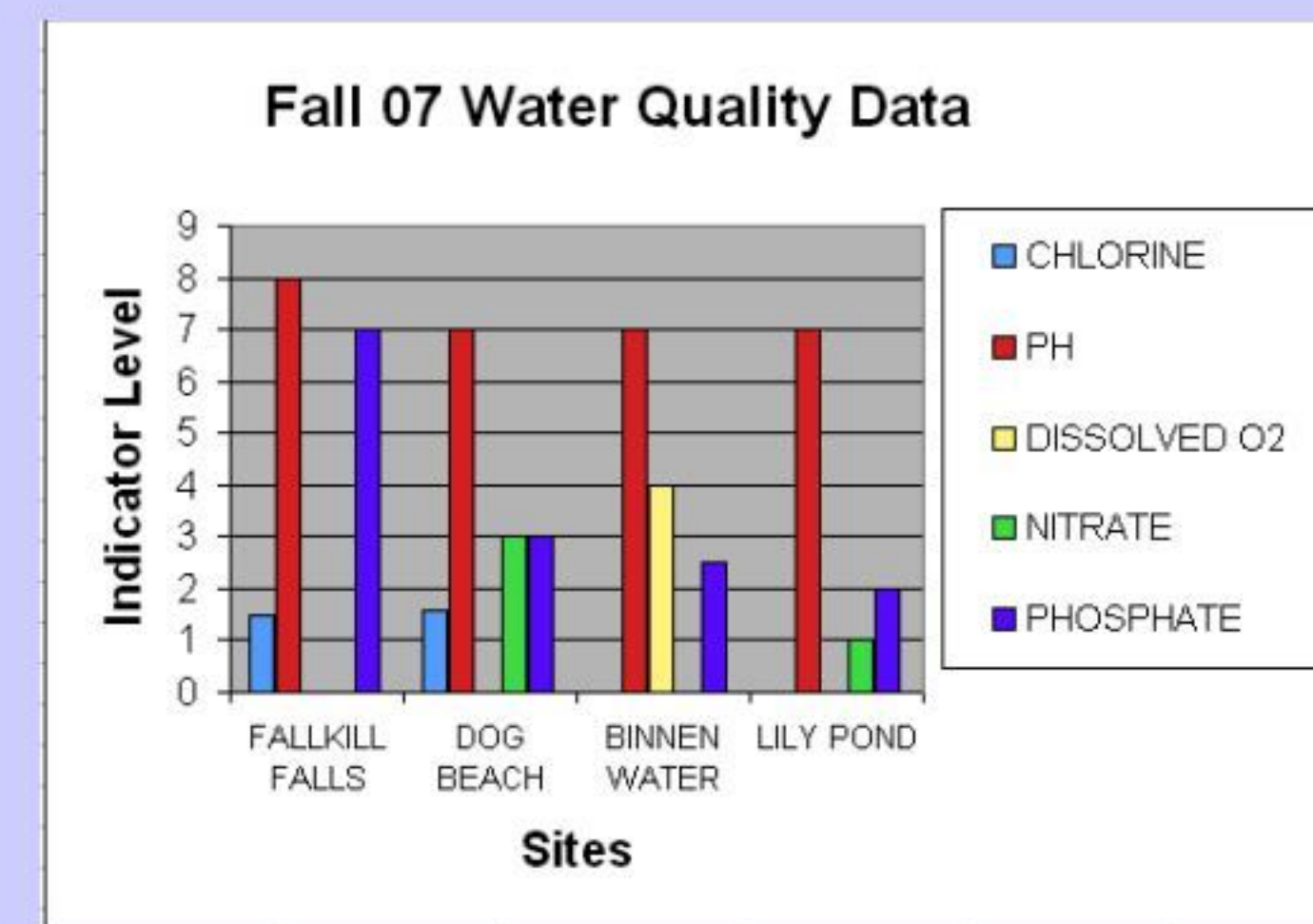
Finding Macro-invertebrates:

- *Leaf packs were left at a few of the same water sites in Prospect Park.
- *These leaf packs were left at these sites for a few weeks.
- *That gave enough time for macro-invertebrates to be attracted to the leaves.
- *The leaves were taken out from each site, the observed thoroughly.

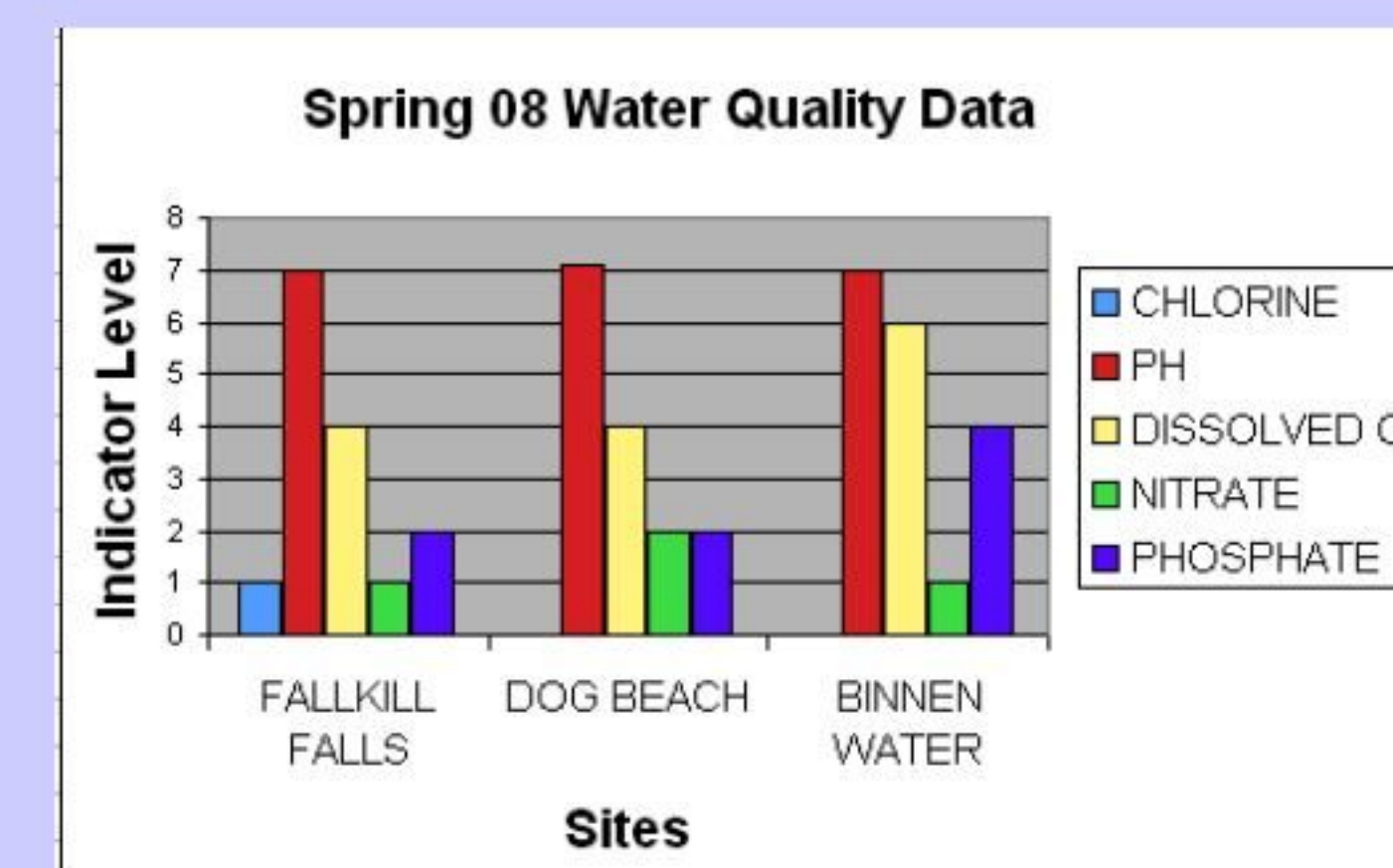
Water Quality:

Data Tables & Graphs:

PROSPECT PARK WATER QUALITY FALL RESULTS					
SITE	FALLKILL FALLS	DOG BEACH	BINNEN WATER	LILY POND	
AIR TEMP	73	73	66	66	
WATER TEMP	21	23	24	18	
CHLORINE	1.5	1.6	0	0	
PH	8	7	7	7	
DISSOLVED O ²	0	0	4	0	
NITRATE	0	3	0	1	
PHOSPHATE	7	3	2.5	2	



PROSPECT PARK WATER QUALITY SPRING RESULTS				
SITE	FALLKILL FALLS	DOG BEACH	BINNEN WATER	
AIR TEMP	11	11	11	
WATER TEMP	18.3	19.5	18.3	
CHLORINE	1	0	0	
PH	7	7.1	7	
DISSOLVED O ²	4	4	6	
NITRATE	1	2	1	
PHOSPHATE	2	2	4	



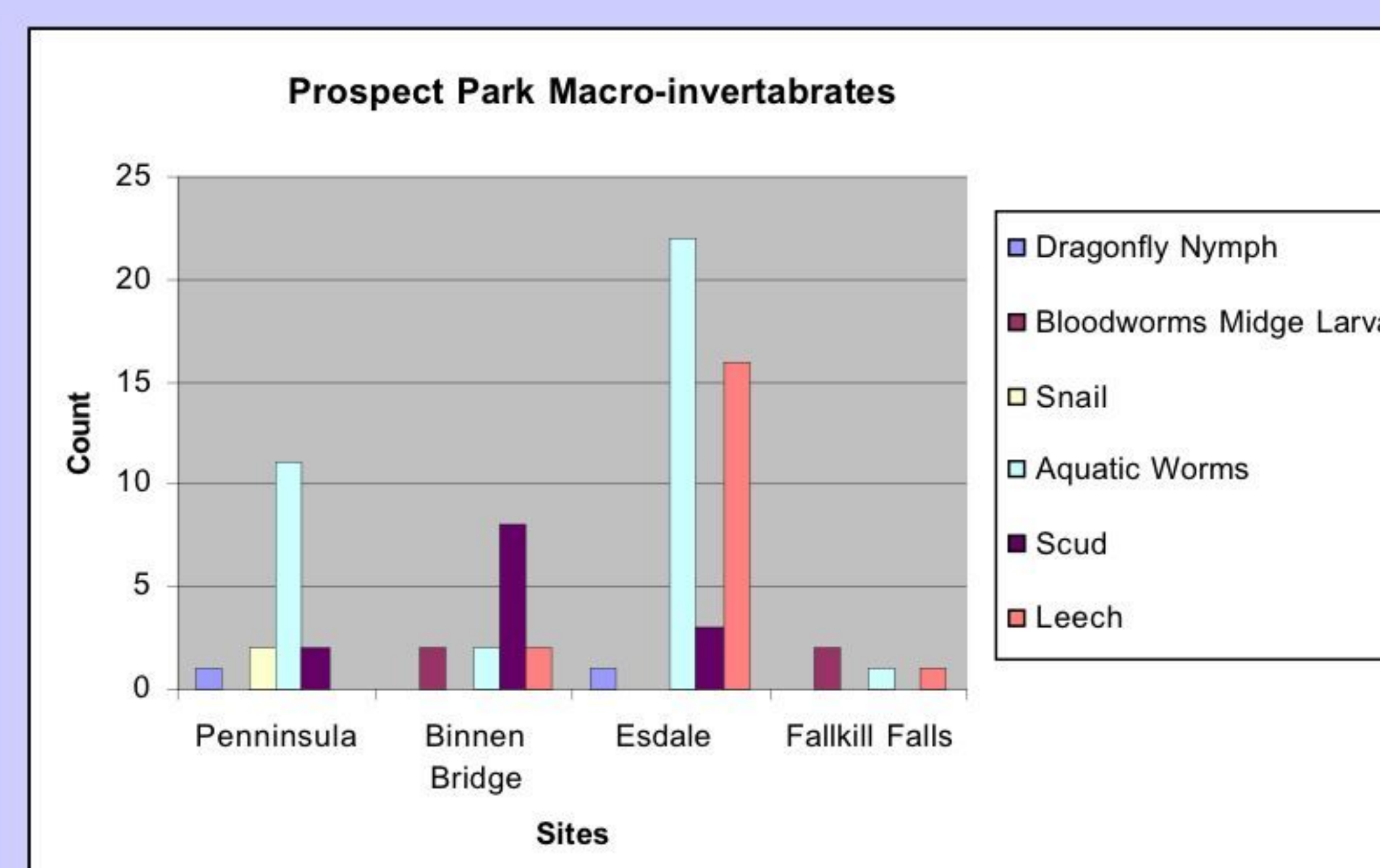
Macro-invertebrates:

Conditions in which macro-invertebrates are found:

Different macro-invertebrates live under a variety of conditions. Some are so sensitive to pollution, they could hardly be found. Some are found more often than wanted. These creatures vary from habitat and food source. We've gone to four locations to find what type of organisms we find and calculate the biotic index of the water.

Data Tables & Graphs:

	Peninsula	Binnen Bridge	Esdale Bridge	Fallkill Falls
Dragonfly Nymph	1	0	1	0
Bloodworms Midge Larva	0	2	0	2
Snail	2	0	0	0
Aquatic Worms	11	2	22	1
Scud	2	8	3	0
Leech	0	2	16	1
	Peninsula	Binnen Bridge	Esdale Bridge	Fallkill Falls
BIOTIC INDEX	1.2	1.6	1.1	1



Results:

- After our experiment, our research showed that most of the macro-invertebrates we found were pollution tolerant.
- The biotic indexes were calculated and showed poor water quality of different degrees at all of the sites tested.
- The site with the highest biotic index was the water from Binnen Bridge.
- The site with the lowest biotic index was Fallkill falls.
- The site with the highest chlorine level was Fallkill falls.

Discussion:

- We found a lot of aquatic worms at the sites and they are pollution tolerant. We also found a lot of leeches which are also pollution tolerant. We found a lot of these pollution tolerant macro-invertebrates (22 aquatic worms and 16 leeches) at Esdale Bridge; therefore, it tells us that the water quality at Esdale Bridge has very poor water quality. The chlorine levels at Esdale Bridge were not collected. Chlorine can make the water bad for pollution sensitive macro-invertebrates, but good for pollution tolerant macro-invertebrates.
- We found the next highest amount of pollution tolerant macro-invertebrates (11 aquatic worms) at the Peninsula site. The chlorine levels were not tested at Peninsula.
- We found 2 aquatic worms and 2 leeches at Binnen Falls. The biotic index there was 1.6 which is poor. The chlorine level was 0ppm.
- The least amount of pollution tolerant macro-invertebrates (1 aquatic worm 1 leech) was at Fallkill Falls. The biotic index at Fallkill Falls was 1.0 which is also poor. The chlorine level was 1 ppm. This shows that the water at Fallkill Falls had more chlorine than other sites tested. We suspect that the higher chlorine levels have prevented macro-invertebrates from successfully living at this site.

CONCLUSIONS

- After this experiment the results and data lead us to the following conclusion.
 - * The chemical water quality had an effect on the number and type of macro-invertebrates, which indicated the biotic index.
 - * For example, in the spring at Fallkill Falls, the chlorine level was tested at 1 ppm and the biotic index was 1.0, indication poor water quality. However, at a different site, Binnen Water, the chlorine level was 0ppm. The biotic index at Binnen Water was 1.6, which is still poor. The difference in the biotic index shows that possibly the higher chlorine level at Fallkill Falls prevented macro-invertebrates from living successfully in that part of the Prospect Park water system. The site Fallkill Falls contained the highest amount of this chemical and the macro-invertebrates may not like chlorine that much.
- The chlorine of the water changes as it moves along the water course. As the chlorine levels decreased, the biotic index increased.

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