Lesson Title: Five Borough Water Comparison – water contamination testing (day 2)

Objectives/ SWBAT:
List contaminants of concern to water quality. Utilize test kits to quantify water contaminant levels. Understand the significance of test results with respect to habitability for aquatic organisms, and drinking water consumption safety for humans.

Lesson duration: 50 mins (day 2 of 8)

Aim: How can water quality parameters be tested?

Do Now:
Based on yesterday's lesson, list as many contaminants found in water as you can think of.

Materials:
Hanna or LaMotte water quality testing kits
Stopwatches
Water supply (perhaps saline)
Chart listing normal range for the various contaminants

Procedure:
1. Review definition of "parameter"

2. Review the parameters covered yesterday that affect water quality. Also review the sources and why the contaminants are harmful to organisms dependent on the water source.

3. Learn the vocabulary words: reagent, titration

4. Discuss techniques necessary to conduct the lesson: using a pipet, reading a meniscus. This includes a review of volumetric measures in the metric system, if necessary. The specific techniques to be discussed include:

-carrying out a titration
- using/reading a color comparator cube
- using/reading a secchi disk
- using/reading a refractometer

5. Divide the class into the following groups: (groupings created to insure equal working times)

Group 1: methyl orange acid test, nitrate, pH (shake method)

Group 2: alkalinity, nitrite, salinity (with refactometer)

Group 3: carbon dioxide, specific gravity (with hydrometer), ammonia, dissolved solids

Group 4: dissolved oxygen, phosphate, secchi disk, temperature

*note: the groups were established such that the time investment for each group would be equal. It is obvious that some techniques (such as a secchi disk) can not have classroom trials conducted, and must await the field.

6. Each group will run trials using tap water and/or a saline solution prepared for them.

7. The groups will enter their data onto a chart on the board. Each group will tell their classmates whether their findings indicate that their water sample is within the “safe” range. For any findings outside the normal range, potential explanations for the sources should be provided. Discuss anticipated contamination levels at the field study site.

8. Clean up and store all materials.

Homework:

No written homework is due.

Lesson Title: Five Borough Water Comparison – water contamination testing (days 3-7)

Objectives/ SWBAT:
Understand which contaminants may be affecting humans and wildlife in the parks of NYC.
Gain experience conducting water chemistry in the field.

Lesson duration: 1 hour + transport (days 3-7)

Aim: How can water quality parameters be tested?

Do Now:
Prepare materials for going to the field

Materials:
LaMotte water quality testing kits, thermometers
Bucket, discard jar
Stopwatches
Data collection sheet

Procedure:
Each week, for 5 weeks, students will go to one of the following locations:
-Brooklyn Bridge Park, Brooklyn
-Hudson River Pier 40, Manhattan
-Flushing Meadows Park, Queens
-Van Cortlandt Park, Bronx
-Greenbelt, Staten Island

Students will collect data on water chemistry, as specified in the data collection sheet.

Homework:
After the final visit students should compile data into a spreadsheet in order to generate graphs and do a comparative analysis.

Name: _____ Date: _____

Site: _____

Parameter	Normal Range	Detected Range
Acidity	0.2-0.7ppm	
Alkalinity	50-300pm	
Ammonia	0-60ppm	
Carbon Dioxide	90ppm	
Copper	0.005 – 0.01ppm	
Specific Gravity	1.020-1.029	
Dissolved Oxygen	4-20ppm	
Nitrate	0-40ppm	
Nitrite	0.0- 0.1ppm	
pH	Salt: 7.5-8.5 Fresh: 6.5-8	
Phosphate	0.01-0.2ppm	
Salinity	Salt: 30-37ppm Fresh: 10-30ppm	
Temperature	2 – 30°C	
Turbidity	varied	

Notes: