**PEC Outline for Lessons Water Quality in Jamaica Bay**

**Teacher:** Deborah Sarria

**Grade Level:** 8th

**Aim:** What factors affect the water quality in Jamaica Bay?

**Student Performance Objectives:**

* Students will compare current and historical maps of Jamaica Bay and identify the changes in topography.
* Students will demonstrate proper use of water testing equipment.
* Students will compare water-testing data from three sites around Jamaica Bay.
* Students will construct conclusions about the factors that affect the water quality in Jamaica bay.

**Advanced Preparation:**

* Site visit to water testing location
* Gather historical maps and information about Jamaica Bay
* Rewrite the historical focus and natural resource information in the Dead Horse Bay Teacher Packet to make in site specific.
* Divided students into groups of four, assigning each group a water quality test.

**Materials:**

* Historical maps
* Current Maps
* Data collection sheets
* Water testing equipment (enough for classroom practice and three field tests)
* Water sample for classroom
* Student research material:
  + Water quality test directions
  + Water quality test information
  + History of site
  + Natural resource information
* Cameras (still and video)
* Waders

**Agenda:**

Pre-Trip:

* Do Now/Motivation/Engagement: List as many bodies of water as you can.
  + Working as a class, list the different types of bodies of water with simple definitions.
  + Focus on the types of water students will be visiting (estuary, salt marsh, beach)
* Working in a group of four, give students current map of NY Harbor/Jamaica Bay.
  + Students will identify the different water types
  + Students will locate various points of interest on the map, including the location they will be collecting data
* Introduce the parts of an ecosystem
  + Biotic and abiotic
  + Focus on the importance of water in the ecosystem
* Students compare historical maps of location to current map.
  + Identify the changes and the implications to the eco-system
* Water quality testing
  + pH, dissolve oxygen, oxygen % saturation, nitrate, turbidity, temperature, phosphate, salinity
  + Divide students into testing groups
    - pH
    - Dissolved oxygen & oxygen % saturation
    - Nitrate
    - Phosphate
    - Salinity
    - Turbidity
    - Temperature
  + Each group will get reading about their test
  + On chart paper answer three questions

1. What is being tested?
2. Why is it important?
3. What are the implications if amount are higher or lower than optimal amounts?
   * Students will share out findings to class.
   * Groups will practice using testing equipment

Trip:

* Students explore location, recording observations:
  + Using field guides, students identify different plants and animals
  + Written notes, drawings, still pictures, video
* Teacher enters water for collection
* Students, in assigned groups, conduct water testing (Three trials)
  + Each group will record data on data collection sheet
  + Results will be shared

Post-Trip

* Students compare results of water testing
  + From same location or different locations taken at the same time
  + Create graph of results (Bar if one day comparison, line if over time)
* Students will discuss what factors (based on observations at site and previous work with maps) affects the water quality in Jamaica Bay
* Research the changes that have occurred in Jamaica Bay and the NY/NJ Estuary
* Students will create a conclusion based on the data
  + Claim
  + Evidence
  + Scientific reasoning
* Include next steps. Possible follow up experiments or data collection.

**Key questions:**

* What is the importance of water in an ecosystem?
* How has urbanization of Brooklyn affected the ecosystem in Jamaica Bay?
* Why is it important to preserve Jamaica Bay?
* What could you do to help conservation efforts?

**Wrapping Up:**

* Students will use the information to complete a lab report.
  + Question will be determined by the data used.
    - Does the location in Jamaica Bay affect the amount of \_\_\_\_\_\_\_\_\_?
    - Does the time of year affect the water quality in Jamaica Bay?

**Follow up activities**

* Contact environmental groups currently involved in conservation efforts
* Contact scientist about on going research being conducted in Jamaica bay
* Write a article for the school website or newsletter
* Create a visual log about what is happening in Jamaica Bay
  + Video
  + Still pictures
  + Drawings

**Science Concepts** (Taken from NYS Science Standards)

* The community and the physical factors with which it interacts compose and ecosystem.
* Lack of resources, habitat destruction, and other factors such as predation and climate limit the growth of certain populations in the ecosystem.
* I all environments, organisms interact with one another in many ways. Relationships among organisms may be competitive, harmful, or beneficial.
* In ecosystems, balance is the result of interactions between community members and their environment.
* Overpopulation by any species impacts the environment due to the increased use of resources. Human activities can bring about environmental degradation through resource acquisition, urban growth, land-use decisions, waste disposal, etc.
* Since the industrial Revolution, human activities have resulted in major pollution of air, water, and soil. The survival of living things on our planet depends on the conservation and protection of Earth’s resources.

**Intermediate-Level Science Core Curriculum**

* AID M1.1 – Identify independent and dependent variables. Identify relationships among variables including: direct, indirect, cyclic, constant.
* AID S1.1 – Formulate questions in dependently with the aid of references appropriate for guiding the search for explanations of everyday observations.
* AID S1.2 – Construct explanations independently for natural phenomena, especially proposing preliminary visual models of phenomena.
* AID S1.3 – Represent, present, and defend their proposed explanations of everyday observations so that they can be understood and assessed by others.
* AID S2.1 – Use conventional techniques and those of their own design to make further observations and refine their explanations, guided by a need for more information.
* AID S3.1 – Design charts, tables, graphs, and other representations of observations in conventional and creative ways to help them address their research question or hypothesis.
* AID S3.2 – Interpret the organized data to answer the research question or hypothesis and to gain insight into the problem.
* LE 6.1a – Energy flows through ecosystems in one direction, usually from the Sun, through producers to consumers and then to decomposers. This process may be visualized with food chains or energy pyramids.
* LE 7.1 Describe how living things, including humans, depend upon the living and nonliving environment for their survival.
* LE 7.2 – Describe the effects of environmental changes on humans and other populations.
* PE 2.1j – Water circulates through the atmosphere, lithosphere, and hydrosphere in what is known as the water cycle.

**References:**

Black, Frederick. *Jamaica Bay: A History, Gateway National Recreation Area New York, New Jersey.* Division of Cultural Resources North Atlantic Regional Office National Park Service U.S. Department of Interior. Washington, D.C., 1981

Kurlansky, Mark. *The Big Oyster History*. Random House Trade Paperbacks. New York, NY. 2007

**Jamaica Bay Water Quality Data Sheet**

Location: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Current Weather Conditions: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Current Air Temperature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_oC

Weather Conditions Last Two Days: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Turbidity: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_NTU

Observations:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| **Test** | **Trial 1** | **Trial 2** | **Trial 3** |
| Water Temperature |  |  |  |
| Dissolve Oxygen |  |  |  |
| Oxygen % Saturation |  |  |  |
| pH |  |  |  |
| Nitrate |  |  |  |
| Phosphate |  |  |  |
| Salinity |  |  |  |