Watersheds & Wetlands

Integrated Inland Bays curriculum for Delaware's 7th graders

James Farm Ecological Preserve

Name _____

Date_____

Teacher_____

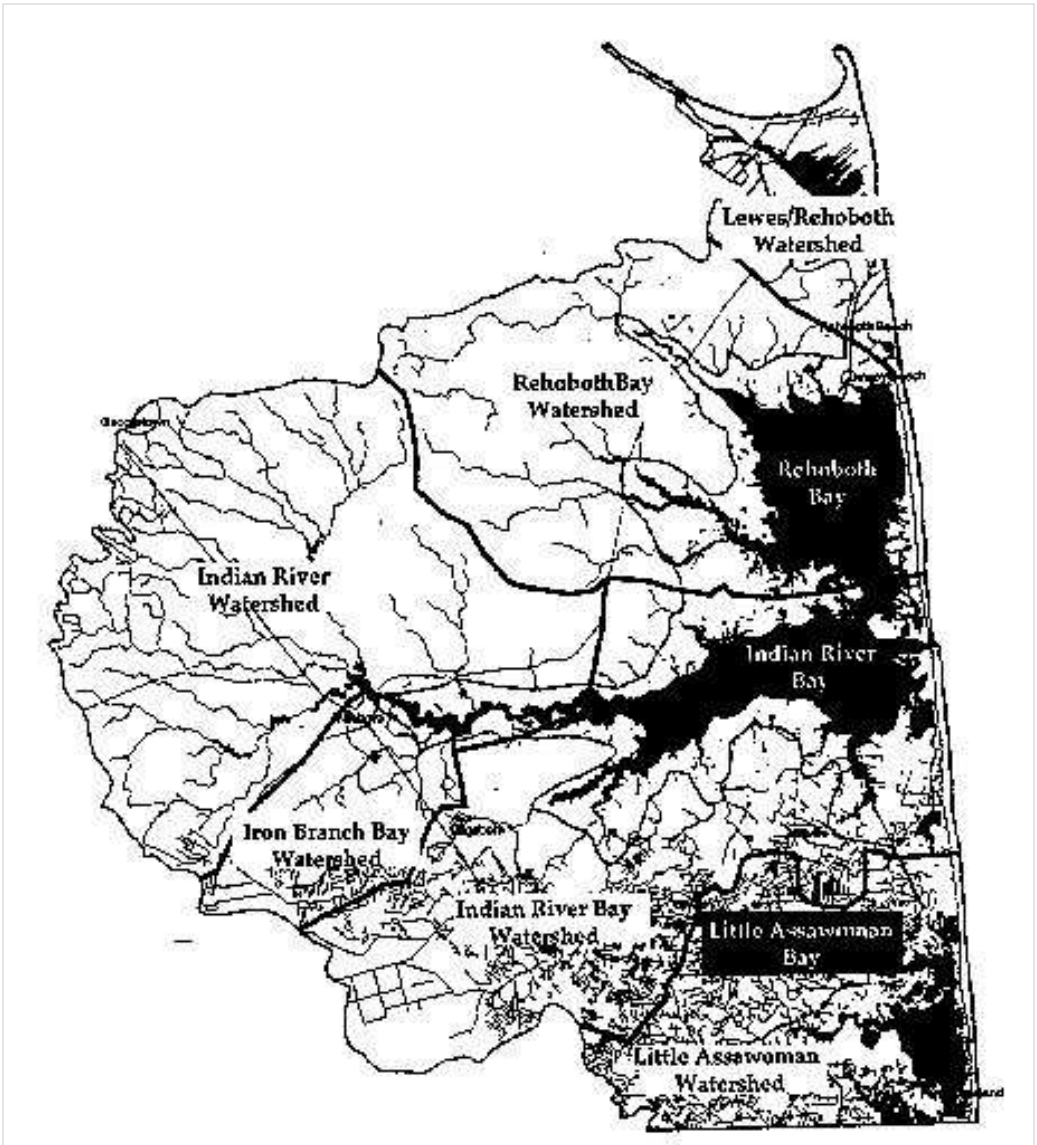
Outdoor Learning Activities-Fall 2008

Delaware's Inland Bays consist of three interconnected bodies of water in southeastern Sussex County: Indian River Bay, Little Assawoman Bay, and Rehoboth Bay.

The bays and their tributaries cover about 32 square miles and drain a land mass -called the "watershed"- of about 320 square miles. The Inland Bays are shallow, with an average depth ranging from 3 to 8 feet.

Because the bays are so shallow, and because they are poorly flushed by tidal movement, they are especially sensitive to environmental changes. Increases in pollutants, changes in salinity and fluctuations in water temperature, for example, can have dramatic effects on water quality and on the plants, fish, shellfish, and microscopic creatures that live in the bays.

The Delaware Center for the Inland Bays works to protect and preserve this valuable natural resource through efforts in restoration, research, education, and the development of sound public policy.



What is a Watershed?

The land area that drains into a particular lake, bay, river, or ocean.

DELAWARE
Limulus polyphemus
CENTER FOR THE INLAND BAYS
Rehoboth Indian River Little Assawoman

Key Terms

pH—measure of acidity on a scale from 0— 14 (a reading of 7 is neutral).

Dissolved oxygen— (D.O.) the oxygen in the water available for aquatic organisms to breathe; measured in parts per million (ppm) or mg/l.

Salinity—total amount of dissolved salt in a volume of water; measured in parts per thousand (ppt); average salinity of sea water is 35 ppt.

Turbidity— the measure of the ability of light to transmit down through the water column; as suspended particles (algae, sediments, detritus, etc) increase in the water, the amount of light penetrating through the water column is reduced.

Goals and Objectives

- *Measure abiotic factors in estuarine waters*
- *Seine estuarine waters and identify fish, crustaceans, and other organisms collected*

Seining Survey

Biotic factors (living influences) such as number and species of organisms, habitat, predation, or food sources are measured to evaluate the ecological health of an aquatic system.

For example, seine nets are used to capture and count the number of juvenile fish of a certain species so that scientists can make predictions about future abundance of that species.

Water Chemistry Analysis

Scientists measure ***abiotic*** factors (non-living influences) such as temperature, pH, dissolved oxygen, and salinity to analyze water quality conditions.

For example, dissolved oxygen (D.O)measurements are used to determine whether or not fish are capable of surviving in a body of water. If the D.O. level is below 4 mg/l, many fish become stressed and survival is limited.

Abiotic Factor	Data	Ranking
Air Temperature (ºF/°C)		
Water Temperature (ºC)		
pH		
Salinity (ppt)		
Dissolved Oxygen (D.O.)		
Turbidity		

Organism	# Found
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	

Goals and Objectives

- *Conduct a benthic survey to identify and count organisms*
- *Evaluate the impact of the abiotic factors we tested on biotic factors discovered by beach combing and seining.*

Thinking like a scientist...

This activity could lead a scientist to ask the following questions:

1. What are the effects of water quality on the diversity and numbers of living organisms in Indian River Bay at Pasture Point?

2. What additional information would we need to form a valid conclusion?

Observations

Use your eyes and ears to search for organisms or evidence of organisms along the shoreline and above the bay. We will be looking and listening for evidence of living organisms such as shells, animal parts, bird calls, scat, tracks.

Organism	# Found
1.	
2.	
3.	
4.	
5.	
6.	

Benthic (bottom) Survey

Bottom-living (benthic) organisms are important indicators of water quality. We will be looking for organisms such as worms, snails, and clams.

Organism	# Found
1.	
2.	
3.	
4.	

The Big Picture...

Problem	Contributing Factor(s)	What could be done?
1. Algae blooms	Excess nutrients flowing into the bays	
2. Population decline of shellfish	Loss of submerged aquatic Vegetation	
3. Restrictions on eating fish	Pollution from multiple sources	
4. Loss of wetlands	Development or draining	

What Are Some Solutions?

Goals for the Wetland Activity

- *Engage in a wetland survey; identify wetland soils and plants*
- *Learn to differentiate soil types based on texture, color, and structure*
- *Conduct percolation studies at various sites and relate percolation rates to soil porosity and permeability*

Identifying a Wetland

- *We will examine two sites (A and B) to determine the presence/absence of wetlands.*
- *We will evaluate potential water sources (hydrology), vegetation, and soil types.*
- *We will measure percolation rates at each site.*

1. Why do we need wetlands?
   A. _____
   B. _____
   C. _____

2. How is a sponge like a wetland? _____
   _____

Wetland Data Table

DATA	SITE A	SITE B
Site Description		
Hydrology (source of Water)		
Vegetation Identified		
Soil Color		
Soil Texture Structure	**gritty soft smooth moist clump semi clump no clump**	**gritty soft smooth moist clump semi clump no clump**

Percolation Test

 # inches or cm drained = $\frac{H_1 - H_2}{T}$
Time elapsed for infiltration

Site	Height/H2O at start (H1)	Height/H2O at finish (H2)	Time elapsed for infiltration (T)	Perc Rate (=)
A				
B				

Key Terms

Wetlands
Hydrologically important resources within watersheds functioning like a sponge to regulate the amount of water moving through a watershed by retaining water during wet periods and sometimes, slowly releasing it during dry periods

Hydrology
A science dealing with the properties, distribution, and circulation of water on and below the earth's surface and in the atmosphere

Hydric soils (wetland soils)
Soils saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper profile

Hydrophytic vegetation (wetland plants)
Plants that require flooded or saturated conditions for survival

Anaerobic
Deficient of or lacking oxygen

Mineral soil
Soil characterized by predominately inorganic material.

Organic soil
Soil derived from living organisms (humus)

Percolation
The downward movement of water through soil and rock

Permeability
The ability of water to pass through the pores or interstices of soil

Porosity
The volume of all open spaces (pores) between the solid grains of soil.