Activity: **Pier Data**

Grade Level: Grade 5

Major Emphasis: Salt Water Habitat

Major Curriculum Area: Science

Related Curriculum Objectives:

Refer to Outdoor Education Curriculum Matrix 3-5:
- Career Education
- Mathematics
- Language Arts
- Social Studies

Program Indicator:

The students will compare/contrast habitats and adaptations of plant and animals in salt water (brackish) habitat.

Student Outcomes:

The student will be able to:

1. Use various data gathering equipment to examine the effects of clarity, depth, and temperature on the estuary environment.
2. Provide a physical description of a marine environment from the data collected.

Readiness:

1. Complete the fifth grade Unified Science Unit - Aquatic Biomes.
2. Introduce vocabulary:

habitat	variables	estuary
depth	salinity	sediments
pH	nekton	phytoplankton
zooplankton	micro-organisms	macro-organisms
clarity	wetland	brackish

3. Discuss basic ingredients for life: food, light, air and water.
4. Discuss variables that affect the plants and animals living in various environments.
5. Introduce and explain how to use the following pieces of equipment:

secchi disk	depth line	water test kits
seine net	water sampling bottles	hydrometer
thermometer	bottom dredge	anemometer

Materials:

PFDs	buckets (3)	anemometer (3)
air thermometers (3)	bottom dredges (3)	secchi disk (3)
water thermometer (3)	pH sampling strips	trowels (3)
hydrometer (3)	compasses (3)	depth line (3)
dissolved oxygen testing supplies	student worksheets (3)	activity posters
meter sticks (3)		

Preparation:

Upon arrival, instructor should collect materials and take them down to the waterfront pier. Included in materials are PFDs, which the instructor will find in the boathouse. Instructors should take enough PFDs for all children and adults that will be near the waterfront, make sure you take a variety of appropriate sizes. There are three kinds of PFDs: 50lbs and below, 50-90lbs, and 90lbs and above. Choose sizes based upon body weight of students. Instructors will also place site A, site B, and site C signs at different locations on the pier.

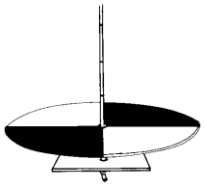
Procedure:

1. Students will meet instructor at the waterfront pier. Upon arrival students should sit at the picnic table next to the water in order to receive instruction.
2. Explain to students that they will be broken into three small groups and each group will be doing a variety of water quality testing. Use this opportunity to review outcome poster and ask students what river they will be testing (the Severn). Also review what the term "brackish" means (a mixture of salt and fresh water).
3. Before breaking students into groups, instruct the students on how to use the testing instruments using the Marine Science Equipment poster (see below and Supplement A).
   -Wind Speed/Direction: Hold anemometer in air, read and record wind speed. Use compass to determine wind direction.
   -Depth: Different plants and animals live at different depths. Plants need shallow water so that the light can reach them. Gently lower depth sounder; pull line taught and note water level on line; retrieve and measure by laying line flat on the pier and using a meter stick.
   -Clarity: Clarity is important because it affects whether or not sunlight can reach the plants and animals that need it. Also sediment amount effect the health of some animals. Too much sediment can bury plants and prevent sunlight from reaching them. Gently lower disc until it disappears. Note water level and retrieve. Measure by laying line flat on pier and using a meter stick.
   -Sediment: In the upper bay, sediment is fine-grained silt and clay. In the middle bay, the sediments are larger-grained silt and clay, mostly from shoreline erosion. Worms and clams live in the sediment. Drop bottom dredge straight down. Pull line taut. Retrieve and empty sample into sieve set. Observe and record.
   - pH: pH tells whether the water is acidic or basic. Most living things like relatively neutral pH, which is 7. Greater than 7 is basic while less than 7 is acidic. pH is affected by acid rain, which is cause by air pollution. Obtain water sample using buckets and then follow directions on pH strip bottle.
   -Salinity: Fresh water = no salt, ocean water = 30-35 ppt (parts per thousand), average bay salinity = 15 ppt but this decreases as you move north, away from the ocean and increases when you move toward the ocean. Salinity is one of the greatest factors in determining what things live in the water. Obtain water sample using bucket, then pour water into hydrometer, read and record.
   -Dissolved Oxygen: Plants and animals living in the bay need oxygen in the water. Various factors such as pollution and temperature affect the amount of oxygen in the water. Oysters require at least 1 mg/L, crabs 3mg/L, yellow perch 5mg/L. Retrieve water sample using bucket, then follow directions accompanying D.O. tablets.

Procedures Continued:

4. Break students into three small groups, each group should go to one site on the pier and conduct all tests at their location.
5. After all tests have been completed, bring groups together back at picnic tables to review their findings. Use the Water Quality Data Sheet poster to record information. Then use the poster to discuss which organisms would find the water at Arlington Echo a suitable habitat.
6. Close lesson with the Chesapeake Stewards Discussion Question found on the back of the Outcome Poster.

Using Marine Science Equipment



Test	Equipment	Procedures	Helpful Hints
Depth	Depth Line	Gently lower depth sounder; pull line taught and note water level on line; retrieve and measure.	Measure by laying line flat on pier.
Air Temperature	Thermometer	Let thermometer stand 2-3 minutes. Read and record.	
Water Temperature	Thermometer	Gently lower water thermometer; wait 2-3 minutes; retrieve and read temperature.	Measure at surface and bottom.
Clarity/ Visibility	Secchi Disc	Gently lower disc until it disappears. Note water level and retrieve.	Measure by laying line flat on pier.
pH	pH Kit Bucket or Water Sampling Device	Obtain water sample using bucket. Follow directions on pH kit.	Toxic: below 5 and above 9.5 Acid - Neutral - Base 1 7 14 acceptable range:6.5-8.5
Salinity	Salinity Kit	Obtain water sample using bucket. Pour water into hydrometer, read, and record.	Fresh: 0 Brackish: 1-29 Marine: 30-35 Unit: Parts per Thousand
Sediment	Bottom Dredge Sieve Set Trowel	Drop bottom dredge straight down. Pull line taut. Retrieve and Empty sample into sieve set. Observe and record.	Repeat as needed.

Severn River Monitoring Project
Water Quality Student Data Sheet

Section A:

Date: _____ Time: _____ Site: _____

Recorder: _____
Group:_____

Water Level at Beginning: _____ Water Level at End:_____

Section B: Weather Data

Tide Conditions: High _____ Low _____ Rising _____ Falling _____

Air Temperature: ____ degrees C Wind Speed: _____mph Wind Direction:_____

Cloud Cover: _____% Conditions:_____

Section C: Physical River Data

Depth: _____cm/in (circle one) Visibility/Clarity: _____cm/in (circle one)

Water Temperature: Surface ____degrees C/F (circle one) Bottom ____degrees C/F (circle one)

Water Surface		*Water Color*		*Water Odor*	
calm	___	light green	___	rotten egg	__
rippled	___	dark green	___	sewage	__
waves < 6"	___	brownish-green	___	fishy	__
waves < 12"	___	brown	___	other	__
whitecaps	___	reddish-brown	___	none	__

Sediment Texture		*Sediment color*		*Sediment Odor*		*Sediment Type*	
gritty	___	dark brown	___	rotten egg	___	sand	__
sandy	___	light brown	___	sewage	___	mud	__
muddy	___	black	___	fishy	___	gravel	__
slimy	___	grey	___	other			
sticky	___	green	___	none			

Shoreline Observations

bulkhead	_____	sandy beach	_____	eroded	_____
riprap	_____	field	_____	cliffs	_____
wetlands	_____	forested	_____	residential	_____

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Section D: Chemical Data

Test	Surface	Bottom
pH (acid or base)		
Salinity (salt)	ppt	ppt
Dissolved Oxygen	ppm	ppm

Section E: Living Things Sighted

Birds	
Mammals	
Reptiles	
Amphibians	
Fish	
Invertebrates	