Activity 1.5

Seasons of Change

- Grade Level
  6-8
- Subject Areas
  Science, Mathematics
- Duration
  1-2 class periods
- Setting
  Classroom
- Skills
  Graphing, interpreting describing
- Vocabulary
  Salinity, Gradient, Euryhaline, parts-per-thousand (ppt)
- Correlation with Next Generation Science Standards
  3-LS4-3, 3-LS4-4, 3-ESS2-1, MS-LS1-5, MS-LS2-4

Materials:

- ☐ Map of the Delaware Estuary with sample sites marked (Student Handout-Activity 1.4/5)
- ☐ Monthly salinity data set
- ☐ Graph paper, or computer software for creating graphs
- ☐ Student Worksheet-Activity 1.5

Charting the Course

In this exercise students will construct and interpret graphs comparing monthly salinity measurements for a 1-year period for three oyster bars located along a salinity gradient, demonstrating how one environmental variable changes seasonally. This activity follows the same concepts as Activity 1.3 and can be conducted as an extension, or instead of Activity 1.3.

Background

Activity 1.3 Taking it with a Grain of Salt presents relevant background information about salinity and its importance in defining the estuary and the distribution or organisms in the Bay. Salinity, the dissolved salt content in the water is the single most important factor effecting the distribution of organisms in the estuary. Unlike the ocean, where salt content varies little over large areas the salt content of the estuary varies greatly, changing from nearly full strength salt water at the mouth of the bay to fresh water at its uppermost point. This activity expands on the concept and focuses on spatial and temporal changes in salinity throughout the estuary.

The salinity at a particular place in the estuary can fluctuate greatly with in a year through the seasons as well as from year to year. Typically the spring yields high fresh water inputs as melting snow and springtime rainfall increase fresh water flow into major rivers. This results in decreases in salinity in upper estuary locations. The salinity gradually increases through the summer and fall, as rainfalls typically are lower than in spring. On an annual basis a dry or drought year will result in relatively high salinities through out the bay where as wet years will cause a reduction in bay-wide salinities. For oysters this can greatly impact survival, as disease and predation tend to be higher at higher salinities.

Objectives / Students will be able to:

1. Define salinity.
2. Describe how salinity varies through space and time in the estuary.
3. Show how salinity affects the distribution of animals in the estuary.

Procedure / Warm Up

Open a class discussion about the definition of an estuary and the importance of the salinity gradient in the distribution of organisms living in the Bay. Or follow up with the **Taking it with a Grain of Salt Activity.** Explain that salinity in the bay can change depending on how much river flow enters. In dry years flow is low and salinity increases; in wet years flow is high and salinity decreases. Within the year salinity tends to be lowest in the spring as a result of melting snow and rain.

The Activity

1. Distribute salinity data set and materials for constructing graphs.
   Instruct students to plot the salinity data presented. The x-axis should be time (month) and the y-axis should be salinity in parts-per-thousand (ppt). Students should draw two lines, one for each site.
2. Have students interpret the graph, answering the following questions.
   Does the salinity at each site remain constant or change through time?
   Does the salinity differ between sites?
   Overall which site has the higher salinity?
   What is the highest and lowest salinity for each site?
   What is the range of salinity for each site?
   When did the highest and lowest salinity occur for each site?
   How would salinity change if a drought occurred and river flow was below average for the next 12 months?

Wrap Up / Students should discuss their interpretations of the salinity graph. Be sure to emphasize that there is great variability in the environment. Factors such as salinity in the estuarine environment are constantly changing. What trends do they observe? What other factors might similarly change? Also, have students speculate on how this information would be used in real life.

Extensions / Visit Maryland Department of Natural Resources website Eyes on the Bay (http:/www.eyesonthebay.net) for excellent activities relating to salinity.

Table 1:

Monthly salinity data at three sample locations, Arnolds, Cohansey, and New Beds. The data is for the year 2005 and all three sites are oyster bars–shown in Student Handout-Activity 1.4/5

TABLE 1

Salinity parts per thousand (ppt)

	Arnolds	Cohansey	New Beds
March	10.8	13.6	18.0
April	5.9	6.1	9.2
May	11.8	15.0	17.1
June	14.1	15.7	19.2
July	11.0	13.4	17.0
August	13.0	16.4	19.8
September	14.8	17.9	20.7
October	8.5	13.7	17.7
November	10.0	12.9	15.4

Student Worksheet Activity 1.5—Seasons of Change

Name_____**Date** _____

A. Using the charts on the following page and the data in Table 1. draw a graph to compare the salinity at the oyster bars known as Arnolds, Cohansey, and New Beds. Be sure to put a title and labels on your graph.

TABLE 1

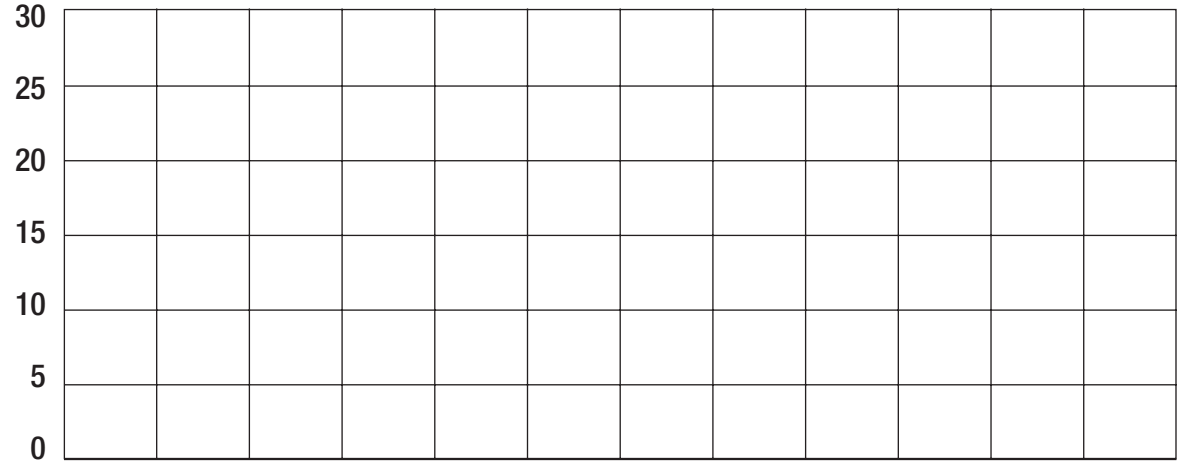
Salinity parts per thousand (ppt) in Oyster Bars and New Beds

Month	Arnolds	Cohansey	New Beds
March	10.8	13.6	18.0
April	5.9	6.1	9.2
May	11.8	15.0	17.1
June	14.1	15.7	19.2
July	11.0	13.4	17.0
August	13.0	16.4	19.8
September	14.8	17.9	20.7
October	8.5	13.7	17.7
November	10.0	12.9	15.4

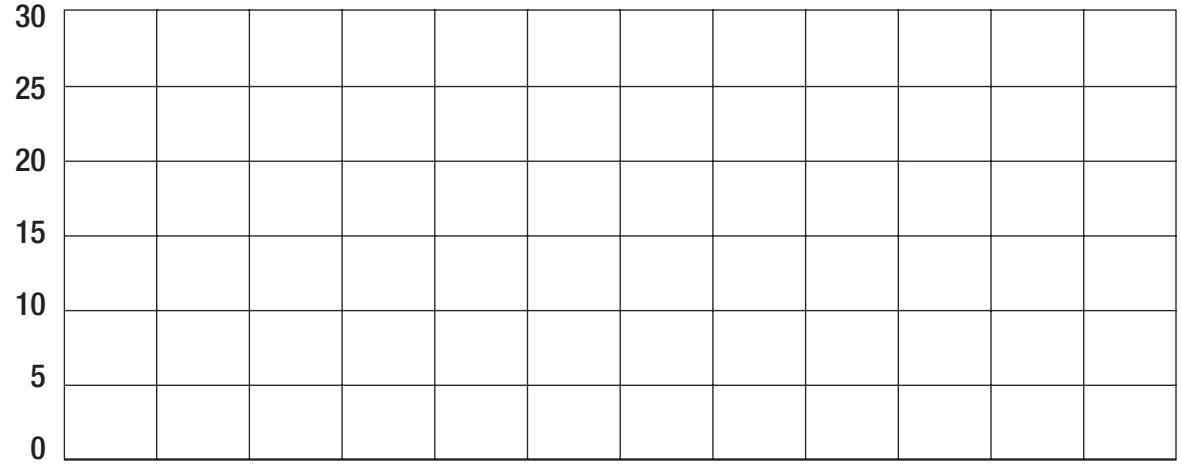
Student Worksheet Activity 1.5—Seasons of Change

Name_____Date _____

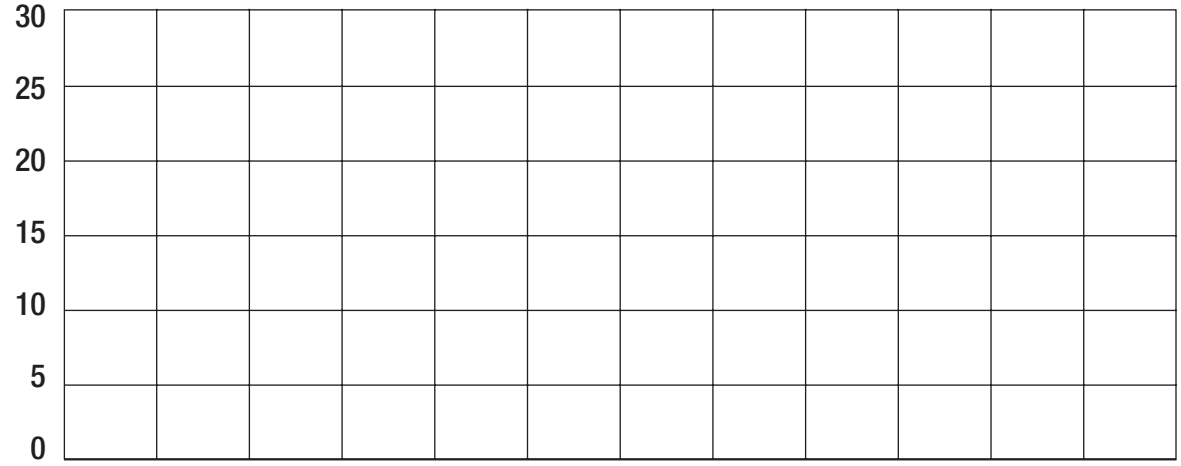
Arnolds



Cohansey



New Beds



B. After completing your graph answer the following questions.

1. Does the salinity at each site remain constant or change through time?

2. Does the salinity differ between sites?

3. Overall which site has the highest salinity?

4. Overall which site has the lowest salinity?

5. What is the highest and lowest salinity for each site?

6. What is the range of salinity for each site?

7. When did the highest and lowest salinity occur for each site?

8. How would you expect the graph to look the next year if there is above average rainfall all year long?

9. How would this information be used in real life?