

Name \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

### Worksheet 3: Oyster Catch vs Nutrient Levels in the Chesapeake Bay

Testing the hypothesis that oysters maintain healthy plankton levels in the Bay

**Plot and connect your data points on one graph:**

1. Oyster Catch in Relation to Years
2. Floating Algae to Sea Floor Algae Ratio in Relation to Years

Year	Oyster Catch (x 10 <sup>5</sup> Metric Tons)
1700	0*
1800	0*
1826	0.2
1883	5.8
1886	4.3
1891	6.2
1916	1.5
1925	1.9
1920	1.0
1935	0.7
1942	1.4
1946	0.9
1952	0.9
1957	1.2
1965	0.5
1968	1.3
1970	1.0
1972	1.2
1978	0.8
1982	1.0
1984	0.9
1985	0.4
1986	0.6

Year	Floating Algae to Sea Floor Algae Ratio
1700	0.877
1766	1.179
1834	2.943
1859	2.489
1896	3.372
1928	2.666
1957	6.016
1968	7.553
1981	7.931

\* Oyster catches in these years were so small there are no written records

**USE YOUR COMPLETED GRAPH TO ANSWER THESE QUESTIONS:****1. What was the ratio of floating algae to sea floor algae in 1700?**

*Floating algae and sea floor algae levels were about equal in the ecosystem in 1700*

**2. How does it compare to the ratio today?**

*Today there are many more floating algae than sea floor algae in the ecosystem*

**3. What does the increase in floating algae indicate about today's level of nutrient pollution as opposed to the nutrient levels 300 years ago?**

*Today's nutrient levels are much worse than 300 years ago*

**4. Why do you think the ratio of floating algae to sea floor algae levels in the Bay began to increase around 1750? (Hint: In the 1700s European settlers began to establish farms in the Chesapeake region).**

*European settlers began to clear land for farming of crops and cattle leading to greater nutrient input into the Bay from the soil, crops, and cattle on land.'*

**5. Did the increase in the ratio of floating algae to sea floor algae in 1750 have anything to do with the oyster catch? Why or why not?**

*No, people were not catching large numbers of oysters at this time.*

**6. The ratio of floating algae to sea floor algae held steady for a very long time at around three and then suddenly increased towards eight starting after 1930. Use your graph to determine what happened to the oyster catch over the same time period.**

*Oysters started to decline as more oysters were harvested from the Bay.*

**7. How might the decline of oysters lead to the sudden increase in the ratio of floating algae to sea floor algae levels? Use what you know about the role of oysters in the Bay food web to answer this question.**

*Oysters were keeping the nutrient levels relatively stable in the Bay by filtering the nutrients sewage, animal waste, and fertilizer that was running into the Bay. Once the oysters were removed from the Bay around 1930, they were no longer present to clean the nutrient overload from the Bay causing the nutrient level to drastically rise in the Bay. (It is thought that oysters used to filter the entire water column of the Bay every 3 days. Now it is thought that the water column is only filtered twice a year.)*

**8. How does this graph help us to understand how oysters affect the ratio of floating algae to sea floor algae?**

*Analysis of the data shows that the ratio of floating algae to sea floor algae dramatically increased at the same time that oysters were removed from the Bay. The data provide evidence that loss of oysters and their role as filter feeders in the Bay has contributed to the*

*high floating algae levels in the Bay. (It is also possible to infer from the graph that high floating algae levels led to the decline in oysters. However, nutrient input that causes increases in floating algae did not suddenly increase in the 1930s, but harvesting pressure remained strong.)*

**9. Why are so few oysters being caught today as compared to the end of the 1800s?**

*There are not enough oysters in the Bay to make oyster fishing worthwhile. (Paradoxically, the pollution in the Bay has made the Bay hospitable to an oyster parasite that infects and kills the American oyster, making reintroduction of the oyster difficult.)*

**10. How would you propose to solve the problem of algae overgrowth and also help the oyster industry?**

*Add oysters to the Bay in order to clean the water. If native oysters cannot withstand the pollution, introduce a non-native oyster that can withstand it (can potentially have devastating unforeseen consequences to the health and complexity of the Bay ecosystem).*