

Examining A Fish Kill

Overview:

Fish kills unfortunately happen in North Carolina's waters for various reasons; algal blooms, pollution, hypoxia and others. This activity is designed to show students how scientists look at water quality data to try and assess what happens in the water when there has been a localized die-off of fish or a fish kill.

Grade Level

4th-8th

Objectives

* To gain experience reviewing scientific data.

* To become familiar with the causes of fish-kills.

*To learn the importance of monitoring the health of coastal waters.

N.C. Standard Course of Study

Grade 4
(4.L.1.1, 4.L.1.4)

Grade 5
(5.L.2.3)

Grade 8
(8.E.1.2, 8.E.1.3, 8.E.1.4, 8.L.3.1)

Materials:

- copies of blank fish kill graph (provided below)
- copies of water quality data table (provided below)
- activity questions (provided below)
- colored pencils, markers or crayons



Background:

Part of the mission of The North Carolina National Estuarine Research Reserve is to monitor the waters surrounding Masonboro Island 24 hours 7 days a week. This program is called SWMP or System-Wide Monitoring Program and is conducted at 28 NERR (National Estuarine Research Reserve) sites around the country. Water quality instruments called sondes are put in the water where they measure turbidity, temperature, pH, dissolved oxygen and salinity. Scientists rely on this information to gauge the health of our coastal waters.

In the early morning hours of January 8, 2013, something mysterious happened in the water of Loosin Creek near the Masonboro Island National Estuarine Research Reserve. Thousands of fish washed up dead all along the banks of the creek. Scientists in the area were immediately contacted by concerned citizens who wanted to know why this had happened. Reserve research scientists immediately turned to SWMP data for answers.

Activity:

1. Explain dissolved oxygen and pH and the significant role they play in estuarine waters.
2. Have students divide into groups of three or four.

3. After reading the background information (dissolved oxygen & pH) with the class, have the groups brainstorm possible causes for the fish kill. Possible causes include:

Harmful Algal Blooms (HAB) happens when there is a rapid increase of microscopic algae growing in the water, which can block sunlight that organisms need to survive and can deplete oxygen levels.

Pollution/Poison is when a chemical or non-natural substance is released into the water and has harmful and poisonous effects.

Hypoxia is a deficiency in the amount of oxygen reaching the tissue in aquatic animals.

4. Give each group a copy of the blank fish kill graph (below) and a copy of the table showing data received from the water quality measuring sonde located near Loosin Creek the day before, the day of, and the day after the fish kill.

5. Go over the following instructions for graphing the data-

-Look at the fish kill information on the table provided. You will find dissolved oxygen and pH data for the day before, day of, and day after the fish kill.

-Choose 6 different colors to use for graphing dissolved oxygen and pH level on the graph. Label the colors using the key provided on the graph.

-On the x-axis (horizontal axis) of the graph, label with "time of day".

-Starting with Day 1, graph the information for "dissolved oxygen concentration" and "pH level" by plotting dots on the graph. Use the appropriate colors you put in the key.

-Connect the dots for each of the colors.

-After graphing the Day 1 information, repeat the same process for information on Day 2 and Day 3 using the appropriate colors.

-Once all of the data has been graphed, check your work to make sure all data has been graphed correctly.

6. After groups have graphed the data, have them complete activity questions (below).

7. Discuss questions as a class.

Extension:

- Have students learn more about SWMP at <http://www.nccoastalreserve.net/web/crp/system-wide-monitoring-program>
- Have students research other fish kills in your area and the causes.

Vocabulary:

- dissolved oxygen
- pH
- fish kill
- harmful algal bloom
- hypoxia

National Science Standards:

Content Standards *Science as inquiry. [K-4]*

Life science. [K-4]

Ocean Literacy Principles:

Essential Principle #5 *The ocean supports a great diversity of life and ecosystems.
(Fundamental concepts-a, d,)*

The North Carolina National Estuarine Research Reserve is a cooperative program between the North Carolina Department of Environment and Natural Resources, Division of Coastal Management and the National Oceanic and Atmospheric Administration.



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www.nccoastalreserve.net



Fish-Kill Activity Questions

1. What does pH measure?
2. What does dissolved oxygen measure?
3. After looking at the graph, at what point did the levels begin to rise?
4. Looking at the graph, what is an unsafe dissolved oxygen concentration?
5. Looking at the graph, what is considered to be a dangerous pH level?
6. Was the graph produced what you expected?
7. What could be done to help prevent a fish-kill such as the one in Loosin Creek?
8. In your opinion, what was the cause of the fish kill?
9. Why is water quality research important to coastal ecosystems?

Water Quality Data Table

Day and Time	Dissolved Oxygen Conc. (mg/L)	pH Level
Day 1		
Day 1-2:30	8.35	8.19
Day 1-2:45	8.35	8.24
Day 1-3:00	8.31	8.15
Day 1-3:15	8.3	8.19
Day 1-3:30	8.23	8.19
Day1-3:45	8.26	8.19
Day 1-4:00	8.24	8.19
Day 1-4:15	8.22	8.19
Day 1-4:30	8.21	8.19
Day 1-4:45	8.18	8.19
Day 1-5:00	8.17	8.19
Day 1-5:15	8.19	8.18
Day 1-5:30	8.2	8.18
Day 1-5:45	8.23	8.18
Day 1-6:00	8.21	8.17
Day 1-6:15	8.22	8.17
Day 1-6:30	8.23	8.17
Day 1-6:45	8.25	8.18
Day 1-7:00	8.29	8.17

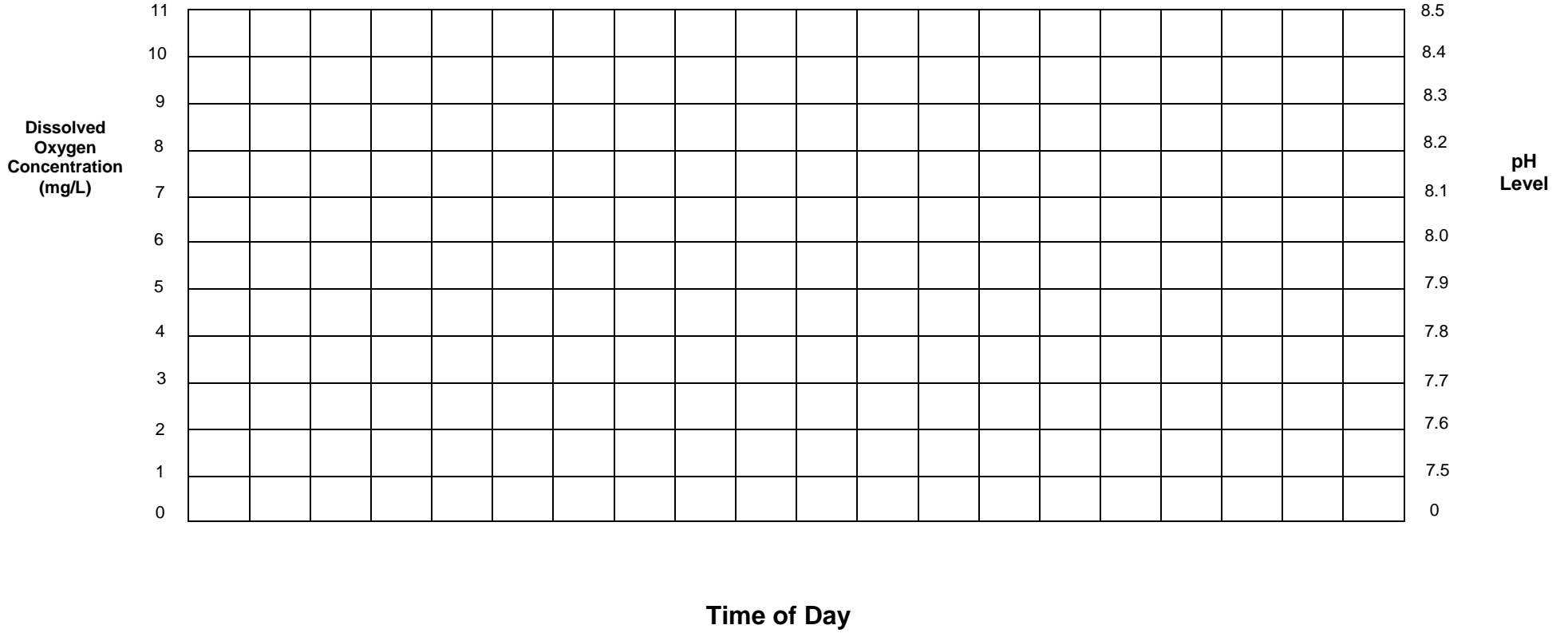
Day and Time	Dissolved Oxygen Conc. (mg/L)	pH Level
Day 2		
Day 2-2:30	5.87	8.05
Day 2-2:45	2.65	7.8
Day 2-3:00	1.29	7.69
Day 2-3:15	0.77	7.61
Day 2-3:30	0.78	7.63
Day 2-3:45	0.73	7.64
Day 2-4:00	0.68	7.63
Day 2-4:15	1.07	7.68
Day 2-4:30	1.3	7.69
Day-2-4:45	0.96	7.63
Day 2-5:00	1.08	7.65
Day 2-5:15	1.94	7.75
Day 2-5:30	2.63	7.81
Day 2-5:45	3.58	7.88

Day and Time	Dissolved Oxygen Conc. (mg/L)	pH Level
Day 2		
Day 2-6:00	3.77	7.88
Day 2-6:15	4.23	7.92
Day 2-6:30	4.94	7.97
Day 2-6:45	5.41	8
Day 2-7:00	5.79	8.02

Day and Time	Dissolved Oxygen Conc. (mg/L)	pH Level
Day 3		
Day 3-2:30	8.7	8.19
Day 3-2:45	8.76	8.19
Day 3-3:00	8.75	8.18
Day 3-3:15	8.76	8.18
Day 3-3:30	8.76	8.17
Day 3-3:45	8.78	8.17
Day 3-4:00	8.6	8.18
Day 3-4:15	8.67	8.17
Day 3-4:30	8.65	8.18
Day 3-4:45	8.64	8.17
Day 3-5:00	8.62	8.17
Day 3-5:15	8.58	8.17
Day 3-5:30	7.65	8.17
Day 3-5:45	7.63	8.17
Day 3-6:00	7.60	8.17
Day 3-6:15	7.60	8.16
Day 3-6:30	7.57	8.16
Day 3-6:45	7.93	8.16
Day 3-7:00	7.91	8.15

General observations of fish that had washed up:
-no sores or physical damage

Fish Kill Graph



Key

Day 1

Dissolved Oxygen Concentration-
pH Level-

Day 2

Dissolved Oxygen Concentration-
pH Level-

Day 3

Dissolved Oxygen Concentration-
pH Level-