



## BIOMAGNIFICATION ROLE PLAY ACTIVITY

**ALLOTTED TIME:** ½ hour - 45 minutes

**SUGGESTED GRADE LEVEL:** 4-8

**NUMBER OF STUDENTS NEEDED:** Variable (at least 20 students suggested)

### OBJECTIVES:

- To promote discussion and foster understanding of the process of biomagnification as it relates to PCB contamination of fish in the New Bedford Harbor.
- To understand that fish, including shellfish and lobster, taken from New Bedford Harbor are contaminated and therefore, are unsafe to eat.

### CONCEPTS:

- New Bedford Harbor fish, such as lobster and shellfish, are contaminated with PCBs.
- Students will learn how fish become contaminated through biomagnification.
- Fish from New Bedford Harbor, including shellfish and lobster, are unfit for human consumption due to their contamination.
- Food chains exist among animals native to New Bedford Harbor.
- PCBs bioaccumulate up the food chain.

### MATERIALS/TOOLS:

- 10 colored paper discs
- Organism Name Tags (can use same cards from Web of Life Activity):

Phytoplankton = 6

Zooplankton = 5

Oyster = 5

Blue Crab = 4

Bass = 3

Human = 3

- Create a table with each above group including PCB listed along the side. Place totals in the last column. (See **Table 1** for sample)
- Make name tags for each organism. Label discs “PCB.” Scatter them throughout the classroom.



**Table 1** **Eaten by:**

	Phytoplankton	Zooplankton	Oyster	Blue Crab	Bass	Human
<b>Human</b>						
<b>Bass</b>						<b>3</b>
<b>Blue Crab</b>					<b>4</b>	<b>4</b>
<b>Oyster</b>				<b>5</b>	<b>5</b>	<b>5</b>
<b>Zooplankton</b>			<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>
<b>Phytoplankton</b>		<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>
<b>PCBs</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>
<b>TOTAL</b>	<b>10</b>	<b>16</b>	<b>21</b>	<b>25</b>	<b>30</b>	<b>33</b>

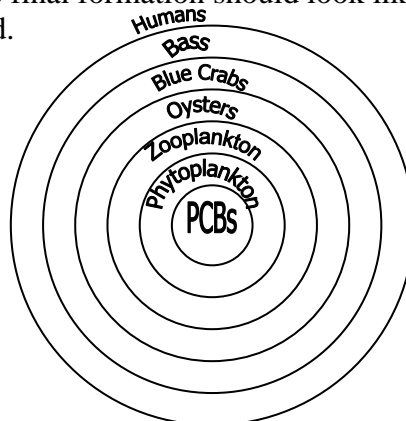
**Eaten:**

**PRE-ACTIVITY:** Before activity begins give students an overview of PCBs, PCB contaminated fish, and the PCB problem in New Bedford Harbor. An explanation should be provided on how the fish got contaminated, as well as the fact that potential health problems could occur if one eats contaminated fish. Next, ask the students what they think the word biomagnification means. Have them brainstorm briefly and then explain the concept of biomagnification.\* A sample student definition might be: *when chemicals like PCBs get into bodies of water and build up in plants that animals eat. These chemicals build up in the animals as they move through the food chain.*

\* **Refer to Biomagnification Stencil Activity- attached**

**PROCEDURE (Role Play Activity):**

- Ask the students to imagine the classroom is New Bedford harbor and the students are the animals that live in the harbor.
- Give out name tags then divide students into groups: phytoplankton, zooplankton, blue crabs, oysters, bass, and humans.
- Ask 2 students to volunteer: one to count and one to record on the chart the number of animals caught.
- Ask the phytoplankton group to “swim” around the harbor/classroom, “fish” for the PCBs, and to put the PCBs in a pile in the center of the room. Phytoplankton should then be asked to continue to swim.
- Ask zooplankton to swim, catch the phytoplankton, and bring the phytoplankton to the center of the room to stand in a circle around the pile of PCBs.
- Repeat this exercise with each consecutive group until all that is left is the humans.
- Below is a diagram of what the final formation should look like after the swimming/fishing is completed.





### **DISCUSSION QUESTIONS FOR ASSESSMENT:**

- Ask students what they observed as each group fished.
- What happens to the PCBs as they move up the food chain?
- What does “bioaccumulation” mean?
- What should one do when one catches a contaminated fish?



## CLASSROOM BIOMAGNIFICATION STENCIL ACTIVITY

**Quick introduction activity to bioaccumulation:**

**GRADE LEVEL:** 2-3

**GOALS AND OBJECTIVES:**

- Demonstrate how polluted waters affect the food chain.
- The importance of not eating fish from polluted waters.

**PRE-ACTIVITY:** Teacher reads the class a book about food chains appropriate to that age level. Teacher discusses with/asks the children if they have ever fished and if they eat the fish they catch.

**MATERIALS:** Colored transparencies (four different colors), fish patterns (four different sizes)

**ACTIVITY:** Children will work in groups of four. Give each child a different color transparency and a different size fish pattern. Each child will trace a fish pattern on their transparency and cut it out. The child with the smallest fish will use a brown marker and make dots on the fish (to represent PCBs). Starting with the child that has the smallest fish, have each child step up and place their fish one over the other. Layering the fish will visually demonstrate the bioaccumulation of toxins in the food chain as one fish eats another. Discuss with children.

**DESIRED OUTCOME:** That children will understand that it is important to avoid eating fish from polluted waters.

