

NGSS & Common Core Standards	Lesson Title	Materials
<ul style="list-style-type: none"> <li>• <b>SL.8.4:</b> Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence and sound valid reasoning.</li> <li>• <b>MP.2:</b> Reason abstractly and quantitatively.</li> <li>• <b>SC.5.N.2.1-</b> Recognize and explain that science is grounded in empirical observations that are testable; explanations must always be linked with evidence.</li> <li>• <b>MS.PS.3.1:</b> Construct and interpret graphical displays of data to describe relationships.</li> <li>• <b>SC.5.L.17.1 -</b> Understand how low-level pollution can cause drastic health problems up the food chain, including humans.</li> </ul>	<div> <h2 style="text-align: center;">SAY BYE TO BIOACCUMULATION</h2> </div> <div> <h3 style="text-align: center; background-color: #ff69b4;">Warmup Questions</h3> </div> <ol style="list-style-type: none"> <li>1. <b>What</b> is a food chain?</li> <li>2. <b>What</b> is a food web?</li> <li>3. <b>How</b> does a food web in an ecosystem contribute to understanding the ecosystem itself?</li> <li>4. <b>Why</b> do people have the responsibility to manage their impact on the sustainability of ecosystems?</li> <li>5. <b>What</b> is a primary producer?</li> <li>6. <b>What</b> is <i>bioaccumulation</i>?</li> <li>7. <b>What</b> is <i>biomagnification</i>?</li> </ol>	<ul style="list-style-type: none"> <li>• Beads, poker chips, etc.               <ul style="list-style-type: none"> <li>• Any marker that can be handed out in relatively large quantities</li> </ul> </li> <li>• Two stopwatches or timers               <ul style="list-style-type: none"> <li>• A cell phone timer will work</li> <li>• Use timers to make sure each student uses the correct time interval.</li> </ul> </li> <li>• Index cards</li> <li>• Colored pencils to draw organisms on the index cards</li> <li>• Zoom</li> <li>• YouTube (<i>MindFuel Canada</i> video)               <ul style="list-style-type: none"> <li>• <a href="https://www.youtube.com/watch?v=dj0U9-ZvWZs&amp;feature=youtu.be">https://www.youtube.com/watch?v=dj0U9-ZvWZs&amp;feature=youtu.be</a></li> </ul> </li> </ul>
<h3 style="text-align: center; background-color: #ffff00;">Vocabulary</h3>		
<ul style="list-style-type: none"> <li>• <b>Bioaccumulation;</b></li> <li>• <b>Biosphere;</b></li> <li>• <b>Biomagnification;</b></li> <li>• <b>Equilibrium; Toxin;</b></li> <li>• <b>Ecosystem; Sustainability,</b></li> <li>• <b>Primary Producer; Food Web; Food Chain</b></li> </ul>		

Activity Instructions	
<p>1. To become familiar with <i>bioaccumulation</i>, watch the <i>MindFuel Canada</i> video and make notes to compare how different animals and plants in the food web have very unique positions:</p> <p>1. <a href="https://www.youtube.com/watch?v=dj0U9-ZvWZs&amp;feature=youtu.be">https://www.youtube.com/watch?v=dj0U9-ZvWZs&amp;feature=youtu.be</a></p> <p>2. For our modeling, we will use beads (or a similar marker). One marker = one toxin “particle.”</p> <p>3. Draw algae, seaweed, or another plant on a card. Discuss the role of a plant in an ecosystem.</p> <p>4. Use a timer to add (<i>accumulate</i>) toxins at consistent intervals by placing them on the algae card. Remove one toxin at the timed intervals (if there is at least one present) for each scenario.</p> <p>5. For this purpose, we will assume that our algae can rid themselves of one toxin every 5 seconds across all of the following absorption scenarios.</p> <p>6. Scenario one: Low pollution of the water.</p> <p>1. The algae absorb a toxin every 10 seconds.</p> <p>7. Scenario two: intermediate water pollution.</p> <p>1. The algae absorb a toxin every 5 seconds</p> <p>8. Scenario three: high water pollution.</p> <p>1. The algae absorb a toxin every 3 seconds.</p> <p>2. Play this scenario for a few turns to see how things develop.</p>	
What did we learn?	Why am I learning this?
<p><b>What is <i>Bioaccumulation</i> and <i>Biomagnification</i>?</b></p> <ul style="list-style-type: none"> <li>Gain an understanding of the complexity and interconnectedness of a food web.</li> <li>Identify various human activity factors that impact ecosystems, and explain how these factors affect the equilibrium and survival of ecosystems.</li> <li>Understand that ecosystems are dynamic and have the ability to respond to change, within limits, while maintaining their ecological balance.</li> </ul>	<ul style="list-style-type: none"> <li><b>Discover</b> how the world around you works.</li> <li>Provide <b>inspiration</b> for a career in science.</li> <li><b>Compare</b> the requirements of STEM professions.</li> <li><b>Understand</b> you could be the next scientist to solve unknowns!</li> </ul>
	<p><b>Share Your Skills</b></p> <ul style="list-style-type: none"> <li><b>Share</b> with a friend or family member what you learned about the process of bioaccumulation because the more we share, the more we care!</li> <li><b>Connect</b> with us on Flipgrid (<a href="https://flipgrid.com/seatrek">https://flipgrid.com/seatrek</a>) to share your findings or submit any questions!</li> </ul>

**Real world applications?****1. After watching the video:**

1. Name a plant or animal that other life forms depend on either directly or indirectly.
2. Is there a plant or animal that is connected to almost every other plant or animal in that ecosystem (many arrows pointing toward or away from it)?

**2. After exploring the demo:**

1. What happened to the algae as it started to accumulate toxins faster than it could filter out the toxins?
2. How would one fish, that ate the algae which absorbed toxins every 3 seconds, be affected differently than another fish that ate the algae which absorbed toxins every 10 seconds?
3. Now imagine one bird ate the fish from the last question. Which fish poses a greater toxin threat to the bird? Why? What would the outcome be if one bird ate both the fish? Why?

**Observation Notes**

**FREE ZOOM WEBINAR**

# WOMEN IN STEM

PROGRAM FOR 5TH-9TH GRADES

**26-FEB-21 ► LAURA GARCÍA BARCIA**

SAY BYE TO BIOACCUMULATION

Chicago Zoological Society  
Sarasota Dolphin Research Program

**MOTE** MARINE LABORATORY & AQUARIUM

[MOTE.ORG/EVENTS/DETAILS/WINS](https://mote.org/events/details/wins)

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