

NURDLES: A DISRUPTION IN THE FOOD CHAIN

Audience: | **Grades 3–5**

Lesson Overview

In this interactive game, students will model how energy flows through a food chain while exploring the impacts of nurdle pollution on aquatic ecosystems. Through role-play and movement, they will experience the feeding relationships of different organisms and see how something as small as a nurdle can ripple through the entire food web.

Student Outcomes

- Demonstrate the flow of energy through a food chain and food web.
- Identify the impacts nurdles can have on aquatic ecosystems.
- Classify organisms by their trophic level and feeding roles.

Materials

- Paper cups or paper bags (one per student)
- Tokens or manipulatives (to represent phytoplankton)
- Paper and pencils
- Colored pencils
- Large open area (indoors or outdoors, free of hazards)

Teacher Preparation

- Write a hidden number (0–30) on the bottom of each cup/bag. This number represents “nurdles” consumed.
- Do not tell students about the numbers until the end of the game.

Introduction (10 minutes)

1. Have students brainstorm for 5 minutes: “What organisms live in an aquatic ecosystem?”
 - Encourage local ecosystems (freshwater or saltwater).
 - Record answers on a class chart.
2. Build a class food web by drawing connections between the organisms listed.
3. Ask: “If you could be any one of these animals, which would you choose and why?”

Procedure – Food Chain Game

1. Explain that students will model a food chain from the intertidal zone.
2. Hand out Life Cards (each tells a student their role—zooplankton, small fish, bird, or coyote).
3. Designate an open area as the ecosystem “home.” Scatter tokens on the ground to represent phytoplankton (producers).
 - Ask: “What trophic level do phytoplankton represent?”

Round 1:

- Zooplankton enter the ecosystem.
- With their cups/bags, they have 10–15 seconds to collect phytoplankton.
- Rule: Only one token at a time may be picked up.

Round 2:

- Small fish join.
- While zooplankton continue collecting phytoplankton, small fish “eat” them by gently tagging their elbow.
- If tagged, zooplankton must hand over their bag to the fish and sit down.

Round 3:

- Birds join.
- Birds tag small fish on the elbow to “eat” them and collect their cups/bags.

Round 4:

- Coyotes (apex predators) join.
- They tag birds to take their bags.

Conclusion & Reveal

1. Everyone returns to their seats.
2. Students look at the bottom of their cups/bags to reveal the hidden number of nurdles consumed.
3. Pass around a vial of real nurdles for students to examine.

Discussion Questions:

- At what trophic level were nurdles first introduced?
- What might animals mistake nurdles for? (Seeds, fish eggs, sargassum bulbs, etc.)
- How could nurdles affect animals, food chains, and the environment?
- What can humans do to reduce nurdle pollution?

Extensions

Math Connection:

- Compile class data into a table.
- Create a bar graph showing nurdle consumption at each trophic level.
- Discuss trends and draw conclusions.

Literature Connection:

- Who Eats What? by Patricia Lauber
- This is the Sea that Feeds Us by Robert F. Baldwin

<p>Zooplankton (Primary Consumers) Role: Start the food chain by eating phytoplankton (tokens on the ground). Collect phytoplankton using your cup/bag. You can only pick up one token at a time. Special Rule: Watch out for small fish! If they tag your elbow, give them your bag and sit down.</p>	<p>Zooplankton (Primary Consumers) Role: Start the food chain by eating phytoplankton (tokens on the ground). Collect phytoplankton using your cup/bag. You can only pick up one token at a time. Special Rule: Watch out for small fish! If they tag your elbow, give them your bag and sit down.</p>
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<p>Zooplankton Role: Collect phytoplankton (tokens). Special Rule: Some of the phytoplankton tokens are actually tiny nurdles (different color). If you collect one, keep it — you’ve eaten plastic.</p>	<p>Zooplankton Role: Collect phytoplankton (tokens). Special Rule: Some of the phytoplankton tokens are actually tiny nurdles (different color). If you collect one, keep it — you’ve eaten plastic.</p>
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<p>Small Fish (Secondary Consumers) Role: Eat zooplankton by gently tagging them on the elbow. When you tag a zooplankton, they must give you their bag. Keep collecting until the round ends. Special Rule: Avoid being eaten by birds!</p>	<p>Small Fish (Secondary Consumers) Role: Eat zooplankton by gently tagging them on the elbow. When you tag a zooplankton, they must give you their bag. Keep collecting until the round ends. Special Rule: Avoid being eaten by birds!</p>
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<p>Birds (Tertiary Consumers) Role: Eat small fish by tagging them on the elbow. Take their bag if you tag them. Keep your bag safe! Special Rule: Be careful—coyotes are hunting you next!</p>	<p>Birds (Tertiary Consumers) Role: Eat small fish by tagging them on the elbow. Take their bag if you tag them. Keep your bag safe! Special Rule: Be careful—coyotes are hunting you next!</p>
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<p>Coyote (Apex Predator)</p> <p>Role:</p> <ul style="list-style-type: none"> • Eat birds by tagging their elbow. • Collect their bags. • You are the top of the food chain—no one eats you! 	<p>Coyote (Apex Predator)</p> <p>Role:</p> <ul style="list-style-type: none"> • Eat birds by tagging their elbow. • Collect their bags. • You are the top of the food chain—no one eats you!
<p>Coyote / Apex Predator</p> <p>Role: Eat birds by tagging them and taking their cup/bag.</p> <p>Special Rule: If the bird you ate had nurdles, you now have plastic in your stomach. Even top predators aren't safe!</p>	<p>Coyote / Apex Predator</p> <p>Role: Eat birds by tagging them and taking their cup/bag.</p> <p>Special Rule: If the bird you ate had nurdles, you now have plastic in your stomach. Even top predators aren't safe!</p>

Extensions

Marine Debris Tokens

- Use two types of tokens:
 - Regular food = phytoplankton (beans, paper circles, or green chips)
 - Marine debris = nurdles/plastic (different colored tokens)
- Students won't know which tokens are plastic until the reveal at the end.

✨ This way, the plastic moves up the food chain naturally as students play the game. At the end, you can reveal: "All of you who have purple tokens in your bags have eaten marine debris. How do you think this affects the food chain?"

Optional Life Card: Phytoplankton (Producers)

If you have a very large group, you can assign a few students to sit on the ground as phytoplankton.

- They don't move.
- Zooplankton can only collect from them (handing over tokens one at a time).