Regional Class Research Vessel

Oregon State University

In the Belly of the Whale

Timeframe

1-2 Fifty minute class periods

Target Audience

Grades 4th- 6th

Suggested Materials

- Comb
- Small sieve
- Straws
- Small plastic beads, rice, black pepper
- Container for water (3 stations for each group)
- Station cards

Contact:
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Description

Students work in cooperative groups and participate in a hands-on activity that simulates the feeding methods of the humpback, right, and gray whales. Students collect data and construct a bar graph to compare the feeding styles of these three baleen whales, and share findings with the class.

Objectives

Students will:

- Understand the different feeding strategies used by whales
- Describe the feeding behavior of three species of baleen whales
- Develop a prediction
- Collect and graph mock data

Essential Questions

How are the feeding methods of baleen whales similar and different?

Why do baleen whales use different feeding strategies?

Background Information

Whales are very large mammals that consume large amounts of food each day.

The more aggressive predators are the Toothed Whales (Odontoceti) and they eat larger fish and other aquatic life such as squid and seals. Even though these larger whales do have teeth, most of them don't use them to tear apart their food. They use the teeth for the killing process only. Then they end up swallowing their prey whole.

Baleen whales have a type of filtering system in their jaw. This allows them to catch a great deal that is in the water, keep what is food, and then to filter out the rest. Generally, they will eat smaller sized prey, such as zooplankton, krill, amphipods and smaller fish. On average, a whale will eat 4% of its body weight as long as there is enough food readily available. Baleen whales can be gulpers, skimmers, and suckers.

Gulpers are whales that have throat grooves that expand when they are feeding and their mouths are filled with water. Their feeding behavior is also sometimes referred to as lunging, as they propel through the water to gather food. The water is gulped then forced through the baleen, filtering out krill and small fish. This baleen will be tougher than skimmers but not as thick and tough as sucking baleen. Gulpers include whales such as the Humpback Whale and the Blue Whale.

Skimmers include the Right Whale. These whales often feed near the surface, with their mouths open to filter out small organisms called copepods and krill for food. Blue whale baleen will be feathery, as these whales are only filtering krill or copepods from the water.

Suckers include the Gray Whale family. When feeding, gray whales roll on their sides with their mouths parallel to the ocean floor. They pull their huge tongues into the back of their mouths, sucking huge amounts of mud, and everything in the mud, into their mouths. The mouthful of mud and water is pushed through the baleen to filter out the amphipods. Baleen for this method of feeding will be tough, thick, and durable, as these whales must filter mud and sand.

Preparation

Fill the three containers with water. Use the permanent marker to label three paper towels with the name of each whale group: gulper (bubble-netters), lunge feeder, and sucker. Sprinkle small beads and pepper in the bowls of water and add rice grains to sink to the bottom. These items will represent whale food items such as zooplankton and small fish. Put out station signs at each bowl.

Activity Introduction

Show students the following video clips of the different types of feeding strategies of Gray, Humpback, and Right whales. Discuss: what did you see? What did you wonder about it? What do you wonder?

Discuss the different feeding strategies and which whales use them.

- **Right whales** feed by skimming the ocean surface with their mouths open. They use the filter-like **baleen** structures in their mouths to catch food items such as small crustaceans or fish. Right whale feeding video: https://youtu.be/scoJ6IsU7B0
- **Gray whales** are a "sucker" species. They have expandable throat pouches that can hold larger volumes of seawater and prey. Gray whale feeding video: https://www.mnn.com/earth-matters/animals/blogs/grey-whales-peculiar-way-of-feeding-video
- **Humpback whales** are a gulper species. Many humpbacks feed cooperativelyin groups by using a strategy called bubble-netting. Humpback whale feeding video: https://youtu.be/

Next Generation Science Standards

PERFORMANCE EXPECTATIONS:

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

DISCIPLINARY CORE IDEAS:

LS2.A.: Interdependent Relationships in Ecosystems
LS2.C.: Ecosystem Dynamics, Functioning and Resiliance

SCIENCE AND ENGINEERING PRACTICES:

Developing and Using Models
Analyzing and Interpreting Data

CROSSCUTTING CONCEPTS:

Structure and Function
Systems and Systems Models
Energy and Matter

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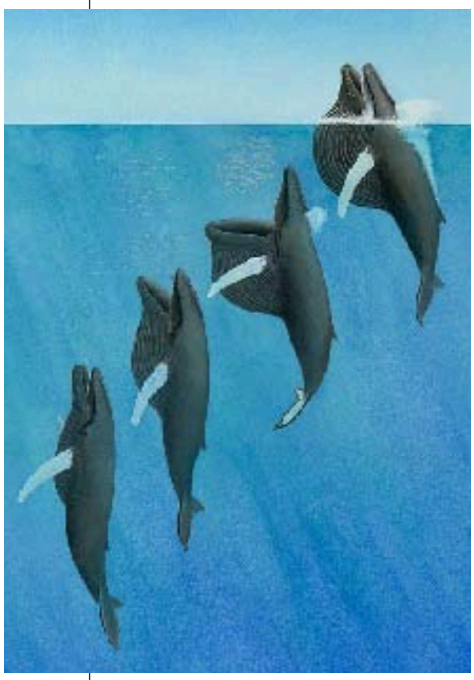
Activity:

1. Divide students into groups of three. Tell them that they will test out the different feeding strategies of the three whales in each of the containers. Have them read the station cards and review the equipment available. Ask them to make predictions: which feeding strategies will be the most efficient at collecting the beads or the rice, pepper (plankton and fish)?



2. Direct students to collect the beads, pepper and rice using the different utensils. Give them 15 seconds per utensil. Have students discuss which utensil worked the best on which food type and identify which whale would use this method of feeding. Have them save paper towels with "food" until the end of the activity.

3. Once students have tested all feeding strategies, have them place all three labeled paper towels next to each other and examine them closely. What general observations can they make from this rough comparison?

4. Count the simulated prey items on each paper towel. Record the data in the table.

5. Have students create a graphical representation of their findings.

6. Have each group report (either in writing or orally) on their most successful method of feeding and which whale it represents. Have students include their predication, how accurate were they?

7. Have students compare their findings with those of their fellow student-scientists. Did others have similar or dissimilar results?

Wrap Up

- Which feeding style captured the most prey? Can you explain why?
- Which feeding style captured the least prey? Can you explain why?
- What was realistic and not realistic about this simulation?
- Why might whales have different feeding strategies? Is one strategy "better" than another?

Extension

Have students research and report on one of the whales that they learned about (or another species of whale).

This project is supported by the Regional Class Research Vessel Program in the College of Earth, Ocean, and Atmospheric Sciences at Oregon State University.

Resources

Marine Mammal Institute: https://mmi.oregonstate.edu/sites/mmi7/files/great_whales_6-30-08_3.pdf

Whale Feast Feeding Discovery Lab: https://coast.noaa.gov/data/SEAMedia/Lessons/G3U5L2%20Whale%20Feast%20Feeding%20Discovery%20Lab.pdf

Station 1 Discovery Card

Humpback Whales

Humpbacks feed on herring and on swarms of small shrimp-like animals, called krill, by lunging. They have an interesting manner of feeding called bubble-net feeding. They blow curtains of bubbles, to trap their food. An individual whale can make a bubble-net, or a team of up to 20 hump- backs working together can make huge nets to encircle the fish. The humpbacks are believed to use their long, white flippers to herd fish. They then open their mouths and swim up through the bubble net to gulp up the fish.

Simulate the feeding of the humpback whale by using the plastic pocket combs to represent their baleen and drinking straws to represent their blowholes. Use the drinking straws to gently blow bubbles into the water near the outer edges of the container.

Station 2 Discovery Card

Gray Whales

Gray whales are filter feeders, sifting their food through baleen plates. But unlike any other species of whale, grey whales strain the sediment of the sea floor for food. Individuals roll onto their sides after diving to the bottom and take large amounts of sediment into their mouth. As the whale rises to the surface, it strains the contents of the mouth through the baleen, leaving a trail of mud and sand behind it. Gray whales eat tiny amphipods, shrimp-like animals that live inside that sediment among other tiny animals scraped up from the floor.

Simulate Gray whale feeding by using a comb to represent baleen that scrapes food up from the bottom and lets the water run it through leaving prey items.

Station 3 Discovery Card

Right Whales

The Right whale diet consists almost exclusively of krill, a type of plankton. When these whales hunt for food they swim towards large schools of krill with their mouth open and engulf both their prey along with the surrounding water. They then push the water out of their mouth with their tongue while keeping the krill trapped inside their baleen bristles.

Simulate Right whale feeding by running a small sieve across the top of the water to represent the open mouth of the whale capturing its prey.

Student Activity Handout

Prediction:				
	Trial 1	Trial 2	Trail 3	Notes
Feeding Strategy 1				
Feeding Strategy 2				
Feeding Strategy 3