

Lesson Plan – Humpback Whales

Summary:

In this episode of Sketch and Coffee Live at 5:30am Texas time, Blade sketched a humpback whale figurine from SeaWorld San Antonio and explored its real-life biology, history, and quirks. The stream covered their evolution from land-dwelling ancestors 50 million years ago, the split of baleen whales from toothed whales 35 million years ago, and the emergence of humpbacks about 5 million years ago. Viewers learned about their distinctive long pectoral fins, sensory tubercles, and cooperative bubble-net feeding. Blade also tied in pop culture — from the whale song albums of the '80s and '90s to Star Trek IV: The Voyage Home — and broke down their migrations, conservation comeback, and even their habit of interfering with orca hunts to save other animals. Humor ran throughout, with comparisons of humpbacks to “35,000 prairie dogs in volume or 55 size-11 sneakers in length,” plus a reminder that stacking prairie dogs is both impractical and unpopular with prairie dogs.

Watch the episode here: <https://www.youtube.com/live/mvdunYAOI2w?si=SmUNQIPLmbwdphar>

Lesson Plan:

Objective

Students will explore the biology, ecology, and conservation of humpback whales, understanding their evolutionary history, physical adaptations, feeding behavior, migration, and role in marine ecosystems.

Standards

NGSS 3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived.

NGSS MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

NGSS HS-LS4-5: Evaluate evidence supporting claims that changes in environmental conditions may result in increases in some species, the emergence of new species, and the extinction of others.

Materials

- Images or models of humpback whales
- Map of migration routes (Alaska to Hawaii example)
- Audio clips of humpback whale songs
- Access to 9 Fun Facts sheet (below)

Procedure

1. Introduction (10 min)

- Show an image/model of a humpback whale. Play a short whale song clip.
- Ask students: "What makes this whale unique among other marine mammals?"

2. Direct Instruction (20 min)

- Review the 9 Fun Facts About Humpback Whales.
- Highlight evolutionary history, anatomy, feeding methods, and migrations.
- Discuss conservation history and current protections.

3. Guided Practice (15 min)

- In small groups, students match each fun fact to an illustration or diagram.
- Use a map to trace humpback migrations.

4. Independent Practice (15 min)

- Students write a short paragraph describing one adaptation (e.g., tubercles, baleen plates) and how it helps the humpback survive.

5. Conclusion (5 min)

- Recap key facts.
- Play another whale song clip and ask students to imagine what message is being "sung."

Assessment

- Participation in discussions and activities.
- Accuracy of fun fact matching activity.
- Quality of adaptation paragraph.

Extension

- Research another baleen whale species and compare its adaptations and migrations to the humpback.
- Create an infographic showing the humpback's conservation journey from near extinction to population recovery.

Rubric

Criteria	4 – Exceeds Expectations	3 – Meets Expectations	2 – Approaching Expectations	1 – Needs Improvement
Understanding of Facts	Accurately explains all 9 fun facts in detail	Explains most facts with accuracy	Explains some facts, minor errors	Major inaccuracies or missing facts
Engagement in Activities	Actively participates and contributes	Participates when prompted	Rarely participates	Does not participate
Adaptation Paragraph	Detailed, clear, connects fact to survival	Clear, mostly accurate	Somewhat clear, missing connection	Inaccurate or incomplete
Map/Migration Work	Accurate and detailed	Mostly accurate	Some inaccuracies	Inaccurate or incomplete

9 Fun Facts About Humpback Whales

1. Ancient Cetacean Lineage Humpbacks are part of the cetacean order (whales, dolphins, and porpoises), which began over 50 million years ago when hoofed, land-dwelling ancestors returned to the sea. They belong to the baleen whale group (*Mysticeti* — whales that filter food through comb-like plates instead of teeth), which split from toothed whales about 34–38 million years ago. Early baleen whales still had teeth, but true keratin baleen plates (flexible, hair-like strips used to strain food from water) evolved around 25–30 million years ago.

<https://evolution.berkeley.edu/what-are-evograms/the-evolution-of-whales/>

<https://naturalhistory.si.edu/education/teaching-resources/paleontology/whale-evolution>

2. A Species Millions of Years in the Making Modern humpback whales (*Megaptera novaeangliae* — meaning “big-winged New Englander”) have been around for over 5 million years. Their closest living relatives are other rorquals (fast-swimming baleen whales, including the blue whale, fin whale, and minke whale). <https://www.marinemammalcenter.org/animal-care/learn-about-marine-mammals/cetaceans/humpback-whale>

3. Distinctive Bodies and Behaviors Humpbacks have the longest pectoral fins (front flippers) relative to body size of any whale—up to one-third their length. Males sing complex songs (long sequences of repeated sound patterns) that can last for hours and evolve over time. The bumps on their heads, called tubercles (fleshy knobs, each with a single hair), help them sense changes in the water.

<https://nammco.no/humpback-whale/> <https://sanctuaries.noaa.gov/news/sep22/mysteries-of-humpback-whale-song.html> <https://www.whalefacts.org/humpback-whale-facts/>

4. Bubble Net and Krill Specialists Humpbacks work together to create spiral “bubble nets” (walls of bubbles blown underwater to herd prey) that trap krill (tiny shrimp-like crustaceans one to two inches long) and small schooling fish (species that swim in coordinated groups) like herring and sardines. Once the prey is concentrated, the whales lunge upward to scoop them in.

<https://sanctuaries.noaa.gov/news/press/2013/pr092613.html>

<https://www.fisheries.noaa.gov/species/humpback-whale>

5. Global Travelers Some humpbacks migrate (travel seasonally) over 5,000 miles each year between feeding and breeding grounds, one of the longest migrations of any mammal. <https://www.fisheries.noaa.gov/resource/peer-reviewed-research/trans-pacific-movement-reveals-regular-migrations-humpback-whales>

6. Nearly Hunted to Extinction By the mid-20th century, commercial whaling (large-scale hunting for whale oil, meat, and other products) had reduced humpback numbers to fewer than 10,000 worldwide. International demand for oil, baleen, and meat drove the slaughter. Today, bans on commercial whaling, strict international laws, and changing public opinion have made large-scale hunting illegal in most of the world. <https://iwc.int/management-and-conservation>

7. Cultural Exceptions to Hunting Bans While most hunting has stopped, a few indigenous communities (native groups with deep cultural ties to whale hunting) are allowed small-scale subsistence whaling (taking only what is needed for food and tradition) under strict regulations. <https://iwc.int/management-and-conservation/whaling/aboriginal/usa>

8. From 10,000 to 80,000 Strong Global protections have helped humpback populations rebound from about 10,000 at their lowest point to around 80,000 today—a major conservation success story. <https://wdfw.wa.gov/sites/default/files/publications/02169/wdfw02169.pdf>

9. Ocean Superheroes Humpbacks have been observed interfering with orca (killer whale) hunts, sometimes protecting seals or other whale species from attacks. <https://onlinelibrary.wiley.com/doi/full/10.1111/mms.12343>

Worksheet – Humpback Whales

Name: _____

Date: _____

Review:

1. How long have humpback whales existed as a species?
2. What is the main purpose of tubercles on a humpback's head?
3. How far can humpbacks migrate each year?

Discussion:

1. Why do you think humpbacks might interfere with orca hunts?
2. How does bubble-net feeding show cooperation among humpbacks?

Data Analysis: If a humpback whale is 45 feet long and weighs 40 tons, and it takes around 34 Kg of krill per ton for a healthy whale, estimate how many krill it will need to eat in one day if each krill weighs 2 grams. Show your math.

Reflection: What was the most surprising fact you learned about humpbacks? Why?