

Reading Comp Lesson Plan

Whales: victims or Superheroes of Climate Change?

Materials needed: class sets (I'd suggest one per pair of students) of <http://www.worldwildlife.org/press-releases/whales-in-hot-water-global-warming-s-effect-on-world-s-largest-creatures> (possibly omitting the last two paragraphs to save space) and of two paragraphs from <http://www.sciencedaily.com/releases/2014/07/140703102957.htm> (Paragraph 3 under "Whale benefits", starting "As humpbacks... recover...", and paragraph 1 of "Watch whales:" starting "In death...")

Optional but useful for the vocabulary: an enlarged color copy of the top photo in the Science Daily news release above.

Warm-up (approx. 5 minutes): Ask students what they know about whales. Summarize their answers on the board. (If necessary, correct any obvious misinformation IF other students do not correct it.)

Introduction: Point out it's possible to think of whales as victims of human hunting, marine pollution (and even noise pollution), and climate change. It's also possible to think of them as superheroes that may help to reduce climate change.

As students read the articles you give them, ask them to take brief notes about facts that show whales either as victims or heroes.

Presentation (5+ min.): Pass out "Whales in hot water?" (This 2007 report is now several years old, but it is still referred to as authoritative among the resources I found. It's also the best summary I could find, though still not 'easy'.)

Have students look at the two introductory paragraphs and bullet point list. Ask them if they see anything that explains what 'cetaceans' means. (It's defined in context in the introduction.)

The bullet points talk about increasing threats and increased rainfall, a rise in sea level, declining salinity and a decline of krill populations. Ask volunteers for the meanings of increase, rise, decline, and decrease, as well as 'reduction' (twice in later text.) Write them on the board with up or down arrows. You might mention that 'salinity' means how salty something is.

After looking at the bullet list of impacts, can they figure out from context what 'impacts' means? (I would accept 'changes,' but it's an important academic word, so you might want to add that it's how changes affect someone or something—in this case the differences they make in the life of whales and other cetaceans.)

Practice (10-15 min.): Ask students to read the rest of the article, possibly with a partner. Then discuss as a class any words or phrases partners cannot figure out from context.

Go over ways to figure out words from context and word parts rather than have students use dictionaries. (Students need to practice skills they can use when dictionaries are not available.) Examples of word parts decoding: Acid-ification: the process of making something acid. Facilitate: to make something easier (if you have Spanish-speakers to recognize ‘facil’ = easy.)

Presentation/Practice 2 (about 10 min.): Show picture of whale ‘plumes’ and explain how they fertilize areas near the surface of the ocean with nutrients from deeper waters. This is called a “whale pump”, since they “pump” needed minerals up to the ocean surface. They also fertilize the warmer areas where they have their calves (babies) with nutrients they got from the richer areas of the Arctic or Antarctic where they spend more time eating.

So whales bring nutrients both to the less fertile surface and to warmer areas of the ocean, giving needed minerals to the plankton—tiny plants on the surface that remove carbon dioxide from the air and feed most ocean animals. As more plankton grow, the whole ocean becomes more “productive”—able to produce more of the fish and other creatures that eat plankton.

(Basically, you’re scaffolding students who may not know some of this vocabulary by summarizing what students will be reading in simpler language, with explanations. When they read it, the main ideas will already be familiar.)

Pass out copies of the excerpts from the Daily Science article. Check if your students know these words, and teach any they don’t.

- nutrients—substances with food value to help plants and animals grow
- enhance—make something better
- calving areas- places in warmer areas where whales give birth.
- carcass- a dead body

Have students read the two paragraphs, and discuss any questions they have.

Evaluation (10-15 min.): Ask them to answer the questions on the worksheet below, using the handouts and their notes. (If you want individual answers, you may need a few extra copies of the articles so they can pick one up without discussion if their partner is using ‘their’ copy.)

When all have finished (or at the start of the next class), discuss the answers and explain any words or ideas that have caused student confusion.

Questions about Whales and Climate Change



1. Less sea ice near the poles may affect whales in several ways. Which of these may be problems for whales according to the article "Whales in Hot Water?"
 - A. Increased movement of ships in the Arctic
 - B. Increased human settlement
 - C. Increased noise
 - D. Decreased chemical and oil spills
2. The article mentioned the "decline of krill in key areas." Why is the krill population declining?
 - A. Too many other animals are eating the krill.
 - B. Oil and chemical spills kill them.
 - C. They prefer warmer water.
 - D. They need sea ice and there is less of it as waters warm.
3. According to the article, whales will be more likely to get sick as climate change increases.
 - A. True
 - B. False
 - C. The article does not discuss this.
4. The article says the survival of North Atlantic right whale calves "has been directly related to the effects of climate variability on prey abundance." Some of these statements are correct according to that quote and some mean something different. Which are correct?
 - A. Their calves eat species that may be less abundant due to changing climate.
 - B. The survival of their calves is directly related to how variable there the climate is.
 - C. Climate changes may lead directly to a reduction in whale calf abundance (less whale calves being born.)
 - D. The survival of their calves is at risk because climate change may reduce the population of animals they eat.

5. The population of many whale species has increased since whale hunting was prohibited in the late 20th century. What is the *major* impact of larger whale populations on plankton?

- A. They have decreased because some whales eat them.
- B. They have remained stable (stayed about the same.)
- C. They have increased, since whales bring nutrients they need to the surface of the ocean.
- D. They have increased because whales stir up the surface water.

6. What is a whale pump?

- A. A huge industrial pump that looks like a whale
- B. The way whales bring nutrients to the ocean surface when they defecate (“poop.”)
- C. The way whales pump their baby calves up and down
- D. The way whales stir up the ocean surface when they breathe

7. Scientists say whales may help reduce global warming by fertilizing the ocean surface. Put the steps of this process in order.

- A. Marine animals eat the plankton.
- B. Those plankton take carbon dioxide out of the air and use it for photosynthesis.
- C. More plankton grow because they have more nutrients available.
- D. Whales bring nutrients from deep in the ocean to the surface.
- E. When whales and other marine animals die, their bodies fall to the ocean floor, where the carbon is kept out of the atmosphere for a long time.

8. Name at least two ways whales might be called victims of climate change and at least one way they are its heroes.

Answers

1. Less sea ice near the poles may affect whales in several ways. Which of these may be problems for whales according to the article “Whales in Hot Water?”
 - A. Increased movement of ships in the Arctic
 - C. Increased noise
2. The article mentioned the “decline of krill in key areas.” Why is the krill population declining?
 - D. They need sea ice and there is less of it as waters warm.
3. According to the article, whales will be more likely to get sick as climate change increases.
 - A. True
4. The article says the survival of North Atlantic right whale calves “has been directly related to the effects of climate variability on prey abundance.” Some of these statements are correct according to that quote and some mean something different. Which are correct?
 - A. Their calves eat species that may be less abundant due to changing climate.
 - D. The survival of their calves is at risk because climate change may reduce the population of animals they eat.
5. The population of many whale species has increased since whale hunting was prohibited in the late 20th century. What is the *major* impact of larger whale populations on plankton?
 - C. They have increased, since whales bring nutrients they need to the surface of the ocean.
6. What is a whale pump?
 - B. The way whales bring nutrients to the ocean surface when they defecate (“poop.”)
7. Scientists say whales may help reduce global warming by fertilizing the ocean surface. Put the steps of this process in order.
 - D. Whales bring nutrients from deep in the ocean to the surface.
 - C. More plankton grow because they have more nutrients available. (or B, then C)
 - B. Those plankton take carbon dioxide out of the air and use it for photosynthesis.
 - A. Marine animals eat the plankton.
 - E. When whales and other marine animals die, their bodies fall to the ocean floor, where the carbon is kept out of the atmosphere for a long time.
8. Name at least two ways whales might be called victims of climate change and at least one way they are its heroes.

Answers may vary. Reasons they are victims might include habitat loss, risks due to increasing human traffic (collisions, chemical or noise pollution, etc.), decrease in food sources (krill in particular), increased disease susceptibility, etc. They’re heroes for increasing sea fertility & plankton growth (= reduced atmospheric CO₂) & in death feeding marine life & carrying huge amounts of carbon in their bodies to the ocean floor, keeping more out of the atmosphere.