



CURRICULUM CONNECTIONS

Humpback Whales

(<http://www.humpbackwhalesfilm.com/>)

IMAX film, with Educator Guide (see below).

FILM - After viewing *Humpback Whales* and with some guidance from teachers, students should be able to:

Next Generation Science Standards

Grade 3

3-LS2-1. Construct an argument that some animals form groups that help members survive.

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

Grade 4

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

Grade 5

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Middle School

MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

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

Common Core State Standards in English Language Arts

Grade 3

SL.3.2 Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

Grade 4

SL.4.2 Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

Grade 5

SL.5.2 Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

Grade 6

SL.6.2 Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

Grade 7

SL.7.2 Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

EDUCATOR GUIDE - (See Educator Guide p. 29 for Next Generation Science Standards, National Geography Standards, Common Core State Standards)

Michigan Science Grade Level Content Expectations**Grade 3**

S.IP.03.11 Make purposeful observation of the natural world using the appropriate senses.

S.IP.03.13 Plan and conduct simple and fair investigations.

S.IP.03.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer).

S.IA.03.12 Share ideas about science through purposeful conversation in collaborative groups.

S.RS.03.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.

S.RS.03.17 Identify current problems that may be solved through the use of technology.

S.RS.03.18 Describe the effect humans and other organisms have on the balance of the natural world.

P.EN.03.31 Relate sounds to their sources of vibrations (for example: a musical note produced by a vibrating guitar string, the sounds of a drum made by the vibrating drum head).

P.EN.03.32 Distinguish the effect of fast or slow vibrations as pitch.

L.EV.03.12 Relate characteristics and functions of observable body parts to the ability of animals to live in their environment (sharp teeth, claws, color, body coverings).

L.EC.04.11 Identify organisms as part of a food chain or food web.

L.EC.04.21 Explain how environmental changes can produce a change in the food web.

E.ES.03.52 Describe helpful or harmful effects of humans on the environment (garbage, habitat destruction, land management, renewable, and non-renewable resources).

Grade 4

S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.

S.IP.04.13 Plan and conduct simple and fair investigations.

S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).

- S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.
- S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.
- S.RS.04.17 Identify current problems that may be solved through the use of technology.
- S.RS.04.18 Describe the effect humans and other organisms have on the balance of the natural world.

Grade 5

- S.IP.05.12 Design and conduct scientific investigations.
- S.IP.05.13 Use tools and equipment (spring scales, stop watches, meter sticks and tapes, models, hand lens) appropriate to scientific investigations.
- S.IA.05.12 Evaluate data, claims, and personal knowledge through collaborative science discourse.
- S.RS.05.15 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.
- S.RS.05.16 Design solutions to problems using technology.
- S.RS.05.17 Describe the effect humans and other organisms have on the balance in the natural world.
- L.EV.05.11 Explain how behavioral characteristics (adaptation, instinct, learning, habit) of animals help them to survive in their environment.
- L.EV.05.12 Describe the physical characteristics (traits) of organisms that help them survive in their environment.
- L.EV.05.21 Relate degree of similarity in anatomical features to the classification of contemporary organisms.

Grade 6

- S.IP.06.12 Design and conduct scientific investigations.
- S.IP.06.13 Use tools and equipment (spring scales, stop watches, meter sticks and tapes, models, hand lens, thermometer, models, sieves, microscopes) appropriate to scientific investigations.
- S.IA.06.12 Evaluate data, claims, and personal knowledge through collaborative science discourse.
- S.RS.06.15 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.
- S.RS.06.16 Design solutions to problems using technology.
- S.RS.06.17 Describe the effect humans and other organisms have on the balance of the natural world.
- L.OL.06.51 Classify producers, consumers, and decomposers based on their source of food (the source of energy and building materials).
- L.OL.06.52 Distinguish between the ways in which consumers and decomposers obtain energy.
- L.EC.06.11 Identify and describe examples of populations, communities, and ecosystems including the Great Lakes region.
- L.EC.06.21 Describe common patterns of relationships between and among populations (competition, parasitism, symbiosis, predator/prey).
- L.EC.06.23 Predict how changes in one population might affect other populations based upon their relationships in the food web.
- L.EC.06.41 Describe how human beings are part of the ecosystem of the Earth and that human activity can purposefully, or accidentally, alter the balance in ecosystems.

Grade 7

- S.IP.07.12 Design and conduct scientific investigations.

- S.IP.07.13 Use tools and equipment (spring scales, stop watches, meter sticks and tapes, models, hand lens, thermometer, models, sieves, microscopes, hot plates, pH meters) appropriate to scientific investigations.
- S.IA.07.12 Evaluate data, claims, and personal knowledge through collaborative science discourse.
- S.RS.07.15 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.
- S.RS.07.16 Design solutions to problems using technology.
- S.RS.07.17 Describe the effect humans and other organisms have on the balance of the natural world.
- P.EN.07.31 Identify examples of waves, including sound waves, seismic waves, and waves on water.
- P.EN.07.32 Describe how waves are produced by vibrations in matter.
- P.EN.07.33 Demonstrate how waves transfer energy when they interact with matter (for example: tuning fork in water, waves hitting a beach, earthquake knocking over buildings).
- E.ES.07.42 Describe the origins of pollution in the atmosphere, geosphere, and hydrosphere, (car exhaust, industrial emissions, acid rain, and natural sources), and how pollution impacts habitats, climatic change, threatens or endangers species.

Michigan Social Studies Grade Level Content Expectations

Grade 6

- G5.1.1 Describe the environmental effects of human action on the atmosphere (air), biosphere (people, animals, and plants), lithosphere (soil), and hydrosphere (water) (e.g., changes in the tropical forest environments in Brazil, Peru, and Costa Rica).

Grade 7

- G5.1.1 Describe the environmental effects of human action on the atmosphere (air), biosphere (people, animals, and plants), lithosphere (soil), and hydrosphere (water) (e.g., desertification in the Sahel Region of North Africa, deforestation in the Congo Basin, air pollution in urban center, and chemical spills in European Rivers).