



Marine Mammals of the Arctic: Plunge into the icy Arctic with whales, seals, and polar bears.

Students immerse themselves in the extreme environment of the Arctic as they explore the biology and ecology of key Arctic animals such as beluga whales, ice seals, narwhals, and polar bears. Students engage in hands-on activities that raise discussion and awareness around current threats and conservation efforts. STEM topics include Arctic geography, climate change, adaptations, predator-prey relationships, marine mammal husbandry, research methods, conservation, and careers. Featured STEM Professionals include:

BJ Kirschhoffer - Polar Bear International; Director of Field Operations

Janelle Schuh - Mystic Aquarium; Manager: Animal Rescue Program

Dr. Brendan Kelly - SEARCH; Executive Director of the Study of Environmental Arctic Change and Professor of Marine Biology at the International Arctic Research Center

Greg Marshall - National Geographic Fellow; inventor of Crittercam

- **Activity 1: Polar Puzzler** - Identify similarities and differences between the Arctic and the Antarctic.
- **Activity 2: Life in the Arctic** - Carve an Arctic marine mammal out of soap.
- **Activity 3: Marine Mammals of the Arctic** - Investigate three adaptations of Arctic marine mammals.
- **Activity 4: Narwhals on the Move** - Explore what it is like to be a narwhal and to be a scientist studying satellite-tagged narwhals.
- **Activity 5: Beluga Basic Training** - Study and practice training techniques trainers use to teach behaviors to beluga whales.
- **Activity 6: Polar Bear Den Discovery** - Simulate how scientists research polar bear dens on the North Slope of Alaska.
- **Activity 7: Ice Seal Survivor** - Explore the interactions between polar bears and molting ringed seals.
- **Activity 8: Arctic Challenge** - Take action to reduce your carbon footprint.

Cross-Curricular Connections

Reading & Writing for Technical Subjects:

LST.1: Read and comprehend science and technical texts independently and proficiently and write effectively for a variety of discipline-specific tasks, purposes, and audiences

LST.2: Extract and construct meaning from science and technical texts using a variety of comprehension skills

LST.2.2: Determine the central ideas or conclusions of a text; provide an accurate, objective summary of the text.

LST.2.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

LST.3.1: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to texts and topics.

LST.4.1: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

LST.7.1: Conduct short research assignments and tasks to answer a question (including a self-generated question), or test a hypothesis, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

Book Selections: *Arctic Memories; The Inuit; Arctic Animals and Their adaptations to Life on the Edge; Narwhals: Unicorn of the Sea; Beluga Days: Tracking the Endangered White Whale; The Last Polar Bear: Facing the Truth of a Warming World; A Hot Planet Needs Cool Kids: Understanding Climate Change and What You Can Do About It*

Math: Algebraic Problem Solving, Using Ratios, Creating and Analyzing Graphs (Bar, Pie, Best-Fit Line)

Social Studies: Arctic Cultures; Inuits, Arctic Tundra

Art: Soap Carving

Grades K-3 Science Content Standards

- K.LS.2** Describe and compare the physical features of common living plants and animals. (Activities 2,3,4,5,6,7)
- K.LS.3** Use observations to describe patterns of what plants and animals (including humans) need to survive. (Activities 2,3,4,5,6,7)
- K-2.E.1** Pose questions, make observations, and obtain information about a situation people want to change. Use this data to define a simple problem that can be solved through the construction of a new or improved object or tool. (Activities 1,2,3,4,5,6,7,8)
- 1.ESS.1** Use observations of the sun, moon, and stars to describe patterns that can be predicted. (Activities 1,8)
- 1.LS.2** Develop a model mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. Explore how those external parts could solve a human problem. (Activities 2,3,4,5,6,7)
- 1.LS.3** Make observations of plants and animals to compare the diversity of life in different habitats. (Activities 2,3,4,5,6,7)
- 1.LS.4** Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. (Activities 2,3,4,5,6,7,8)
- K-2.E.2** Develop a simple sketch, drawing, or physical model to illustrate and investigate how the shape of an object helps it function as needed to solve an identified problem. (Activities 3,4,5,6,7)
- 2.LS.1** Determine patterns and behavior (adaptations) of parents and offspring which help offspring to survive. (Activities 2,3,4,5,6,7,8)
- 2.LS.2** Compare and contrast details of body plans and structures within the life cycles of plants and animals. (Activities 3,4,5,6,7)
- 2.LS.3** Classify living organisms according to variations in specific physical features (i.e. body coverings, appendages) and describe how those features may provide an advantage for survival in different environments. (Activities 2,3,4,5,6,7)
- 3.LS.3** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (Activities 2,3,4,5,6,7)
- 3.LS.4** Construct an argument that some animals form groups that help members survive. (Activities 3,4,5,6,7)

Grades 4-5 Science Content Standards

- 4.LS.2** Use evidence to support the explanation that a change in the environment may result in a plant or animal surviving and reproducing, moving to a new location, or dying. (Activities 1,2,3,4,5,6,7,8)
- 4.LS.3** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction in different ecosystems. (Activities 2,3,4,5,6,7)
- 5.ESS.3** Investigate ways individual communities within the United States protect the Earth's resources and environment. (Activities 2,,8)
- 5.LS.1** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. (Activities 2,3,4,5,6,7)
- 5.LS.3** Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. (Activities 2,3,4,5,6,7)

Grades 6-8 Science Content Standards

- 6.ESS.2** Design models to describe how Earth's rotation, revolution, tilt, and interaction with the sun and moon cause seasons, tides, changes in daylight hours, eclipses, and phases of the moon. (Activities 1,8)
- 6.LS.1** Investigate and describe how homeostasis is maintained as living things seek out their basic needs of food, water, shelter, space, and air. (Activities 2,3,4,5,6,7)
- 6.LS.3** Describe specific relationships (predator/prey, consumer/producer, parasite/host) and symbiotic relationships between organisms. Construct an explanation that predicts why patterns of interactions develop between organisms in an ecosystem. (Activities 3,4,5,6,7)
- 6.LS.4** Investigate and use data to explain how changes in biotic and abiotic components in a given habitat can be beneficial or detrimental to native plants and animals. (Activities 3,4,5,6,7,8)
- 8.ESS.1** Research global temperatures over the past century. Compare and contrast data in relation to the theory of climate change. (Activities 1,8)
- 8.ESS.3** Research how human consumption of finite natural resources (i.e. coal, oil, natural gas, and clean water) and human activities have had an impact on the environment (i.e. causes of air, water, soil, light, and noise pollution). (Activity 8)
- 8.LS.9** Examine traits of individuals within a species that may give them an advantage or disadvantage to survive and reproduce in a stable or changing environment. (Activities 2,3,4,5,6,7)