

Arctic Animals X-rays and Picture Cards

Teacher's Guide

The Arctic is one of the coldest places on Earth, located around the North Pole at the top of the world. Much of the region is covered by sea ice, frozen ocean water that expands in winter and shrinks in summer. The land is called tundra, a treeless landscape where only low-growing plants like mosses, lichens, and shrubs can survive.

Although it may look empty at first, the Arctic is home to a wide variety of animals specially adapted to extreme cold, long winters, and scarce food.

One of the most important features of the Arctic is its light cycle. Because of Earth's tilt, the Arctic experiences long periods of continuous daylight in summer (called the Midnight Sun) and long periods of darkness in winter (known as Polar Night). This unusual cycle shapes every part of the food web. Many animals must eat as much as possible during the bright summer months, then conserve energy, migrate, or rely on stored fat during winter darkness.

Life in the Arctic depends on timing. During bright summer weeks, sunlight returns and causes a burst of growth in plankton, plants, and algae under the sea ice. This sudden food supply supports fish, which then feed larger predators like seals, whales, and seabirds. On land, migrating animals such as caribou arrive to feed on fresh plants, while animals like Arctic foxes raise their young when

prey is most available. Because so much life depends on a short growing season, the timing of food availability is critical for survival.

Arctic animals have remarkable adaptations that allow them to live in this challenging environment.

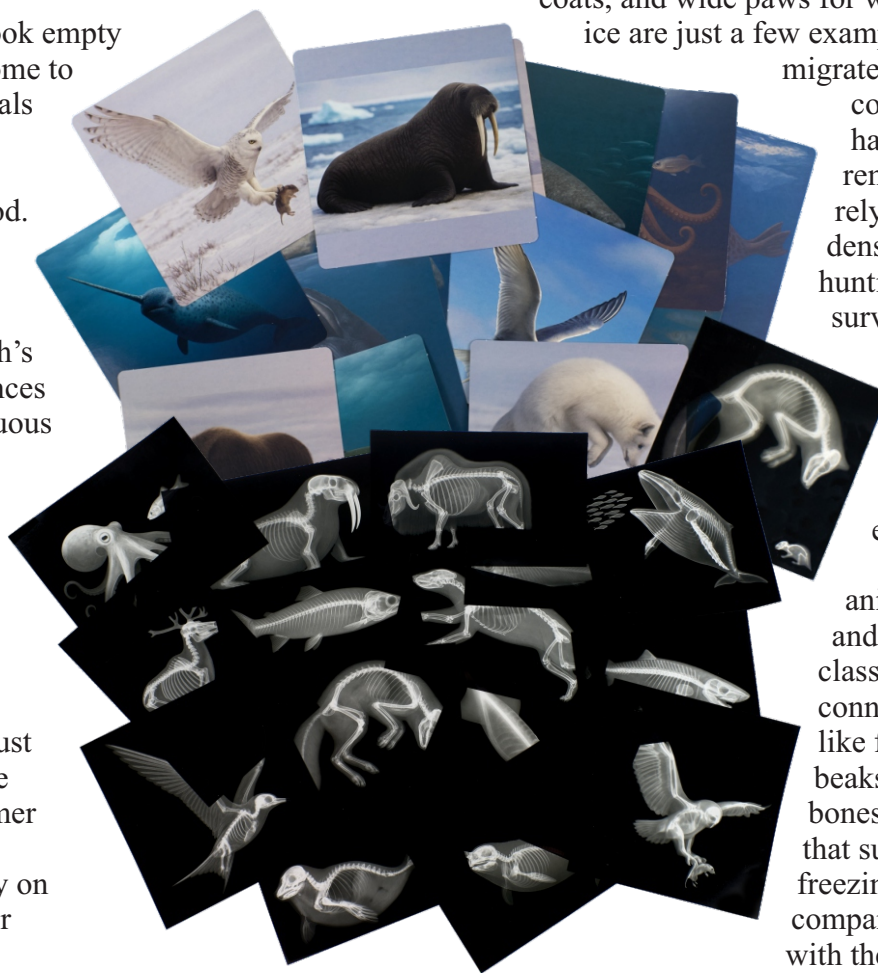
Thick fur, blubber, compact body shapes, camouflage coats, and wide paws for walking on snow and ice are just a few examples. Some animals

migrate south when conditions become too harsh, while others remain year-round and rely on stored body fat, dens, or specialized hunting skills. These survival strategies make the Arctic an ideal place to study how animals are shaped by their environment.

Using the Arctic animal picture cards and x-rays in the classroom helps students connect external features, like fur, flippers, and beaks, with the internal bones and body structures that support survival in a freezing climate. By comparing the illustration

with the x-ray overlay,

students can see how adaptations such as thick skulls, powerful jaws, wide paws, or dense bone structures are linked to movement, diet, and habitat. This hands-on matching activity makes learning visual and interactive, helping students understand how animals are built for Arctic life while also reinforcing food chains, predator-prey relationships, and seasonal environmental challenges.



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Arctic Fox (*Vulpes lagopus*)

The Arctic fox is a small carnivore adapted to extreme cold. Its thick fur changes color with the seasons: white in winter to blend with snow and

brown or gray in summer to match rocks and plants. Arctic foxes hunt lemmings, birds, eggs, and sometimes fish, and they also follow polar bears to scavenge leftover food. Because they eat so many rodents, they help control prey populations and keep the tundra ecosystem in balance. Their survival is closely tied to lemming numbers, so when lemming populations drop, Arctic foxes often have fewer pups and move longer distances to find food.

Lemming (*Dicrostonyx/Lemmus* spp.)

Lemmings are small Arctic rodents that live beneath the snow in winter, where they stay warm and safe from many predators. They eat mosses, grasses, and plant shoots, acting as important primary consumers that turn plant energy into food for larger animals. Even though they are tiny, they are one of the most important animals in the Arctic food web. When lemming populations rise, predators such as Arctic foxes and snowy owls also have more babies. Their natural population cycles help drive the rise and fall of many other Arctic animal populations, making them a key species in the ecosystem.



Caribou/Reindeer (*Rangifer tarandus*)

Caribou, also known as reindeer, are large migratory herbivores that travel long distances in huge herds across the Arctic tundra. They eat

grasses, lichens, and small shrubs, using their wide hooves to dig through snow to reach food. Their hooves also help them walk on soft ground and swim across rivers during migration. As grazers, caribou help shape the plant communities of the tundra and support predators such as wolves and bears. Their seasonal movements allow nutrients to be spread across long areas of land, making them important for the overall health and energy flow of the Arctic ecosystem.



Muskox (*Ovibos moschatus*)

The muskox is a heavy, woolly animal well adapted to freezing Arctic conditions. Its thick underwool, called qiviut, is one of the warmest natural fibers in

the world. Muskoxen live in herds and form a protective circle around their young when threatened. They graze on mosses, lichens, and low-growing Arctic plants. As herbivores, they play a key role in maintaining tundra vegetation by controlling growth and cycling nutrients back into the soil. They are prey for Arctic wolves, and their survival helps support predator populations. Their grazing patterns also help shape the habitats that many smaller animals depend on.



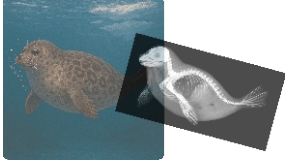
Polar Bear (*Ursus maritimus*)

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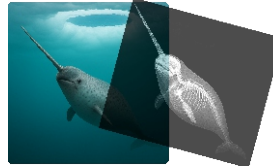
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Ringed Seal (*Pusa hispida*)

Ringed seals are small, ice-dependent seals that live in coastal Arctic waters. They get their name from the pale rings

on their dark fur. They use their strong claws to keep breathing holes open in thick sea ice, which also protects them from predators. Ringed seals eat fish and small invertebrates, acting as important mid-level consumers in the Arctic food chain. They are the primary food source for polar bears and also feed Arctic foxes and some whales. Because they connect lower-level marine life to top predators, ringed seals are essential to keeping the Arctic marine ecosystem stable and healthy.



Narwhal (*Monodon monoceros*)

The narwhal is a toothed whale famous for its long spiral tusk, which is actually an extended tooth. Scientists believe the tusk

may help with sensing changes in the environment and may also play a role in mating displays. Narwhals dive deep to hunt fish, squid, and shrimp. They are important mid-level predators that help control populations of Arctic marine animals. Narwhals also serve as prey for orcas and occasionally polar bears. Because they spend so much time in ice-covered waters, their health can show how climate change affects the Arctic. They are considered an indicator species for sea-ice conditions.



Walrus (*Odobenus rosmarus*)

Walruses are large marine mammals known for their long tusks, which are actually extended canine teeth. They use these tusks to pull themselves

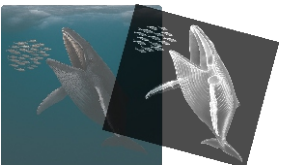
onto ice, break breathing holes, and show dominance. Walruses feed mainly on clams and other shellfish from the seafloor, which they find using sensitive whiskers. By disturbing the sediment while feeding, they help mix nutrients in the ocean floor. They are prey for polar bears and killer whales, and their presence helps support predator populations. As bottom-feeders, walruses play an important role in recycling nutrients and keeping benthic (seafloor) communities healthy.



Greenland Shark (*Somniosus microcephalus*)

The Greenland shark is one of the slowest-moving sharks in the world and can live for more than 400 years, making it one of the

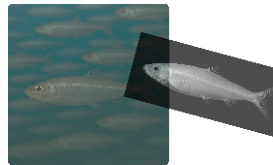
longest-living vertebrates. It hunts fish and marine mammals but also scavenges carcasses, helping clean the seafloor. Because it grows slowly and reproduces late in life, it is very sensitive to environmental change. Greenland sharks are top predators in deep Arctic waters and help control populations of fish and other marine animals. Their scavenging behavior recycles important nutrients back into the ecosystem, supporting the health of deep-sea food webs.



Humpback Whale (*Megaptera novaeangliae*)

Humpback whales are large baleen whales that migrate long distances between Arctic feeding grounds and warmer breeding

waters. They use baleen plates to filter tiny fish and krill from the water. Their spectacular feeding behavior, called bubble-net feeding, allows groups of whales to trap prey near the surface. Humpbacks help move nutrients through the water column when they dive and surface, fertilizing plankton that support the marine food web. They also help keep fish and zooplankton populations balanced. Because plankton are the base of the ocean food chain, the feeding behavior of humpback whales indirectly supports many other Arctic animals.



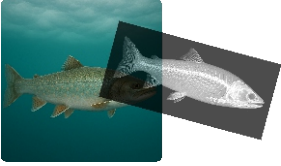
Capelin (*Mallotus villosus*)

Capelin are small schooling fish that play a major role in the Arctic marine food web. They feed on zooplankton and small crustaceans, turning tiny

organisms into energy that larger predators can use. Many animals—including seabirds, seals, whales, and cod—depend on capelin as a primary food source. During spawning season, capelin gather in huge numbers near shorelines, bringing nutrients into shallow waters. Their movements influence where predators travel and hunt. Because so many species rely on them, capelin are considered a “forage fish,” meaning they help support the entire food chain from the bottom upward.

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Arctic Char (*Salvelinus alpinus*)

Arctic char is a cold-water fish that lives in lakes, rivers, and coastal waters of the Arctic. It is closely related to salmon and

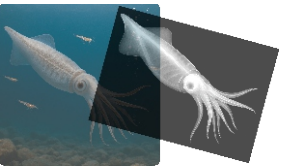
trout and can migrate between the ocean and freshwater to feed and spawn. Char eat insects, smaller fish, and crustaceans, acting as both predator and prey in the food web. They help transfer nutrients between freshwater and marine ecosystems. Many Arctic animals and people rely on char as a major food source. Because char populations reflect changes in water temperature and habitat quality, scientists study them to understand the health of Arctic freshwater environments.



White-tailed Eagle (*Haliaeetus albicilla*)

The white-tailed eagle is a large bird of prey that lives along Arctic coastlines, cliffs, and wetlands. It hunts fish, waterbirds, and small mammals,

and sometimes scavenges on carrion like washed-up whale or seal remains. As a top predator, it helps keep prey populations balanced and cleans up dead animals that might spread disease. These eagles also influence the behavior of other birds, which must stay alert to avoid being hunted. Their presence indicates a healthy coastal ecosystem with enough food to support large raptors.



Squid (*Gonatidae*, Arctic species)

Arctic squid are fast-swimming invertebrates that live in cold, deep waters. They use jet propulsion to move and change

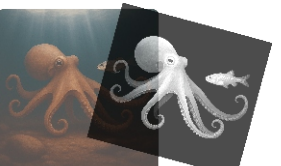
color to blend into their surroundings. Squid hunt small fish and shrimp and are an important prey item for narwhals, seals, whales, and seabirds. Their high growth rate and large populations make them a major source of energy in the marine food web. Because they feed on a variety of smaller species and are eaten by many larger predators, squid act as a key “middle link” between lower and higher levels of the Arctic ecosystem.



Arctic Tern (*Sterna paradisaea*)

The Arctic tern makes the longest migration of any animal on Earth, traveling from the Arctic to Antarctica and back each year. It spends most of its

life at sea, catching fish and small invertebrates near the surface. Terns help move nutrients between ocean regions during their long migrations. In the Arctic, they act as both predator and prey—eating small fish while being hunted by foxes, gulls, and larger birds. Their nesting behavior also affects coastal habitats, since they aggressively defend their colonies and help keep other animals from disturbing fragile breeding areas.



Octopus (*Enteroctopus dofleini*)

The giant Pacific octopus, which can be found in sub-Arctic waters, is known for its intelligence and ability to

camouflage. It uses soft arms lined with powerful suckers to catch crabs, fish, and shellfish. Octopuses are predators that help control populations of marine invertebrates. When they leave behind old shells and feeding remains, they also create shelter for smaller animals. Although they are not as common in far northern waters as squid, they still play a role in Arctic food webs by transferring energy from seafloor prey to larger predators that feed on them.

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Follow Up Activities:

Try these activities with your students:

1. Lay out all of the cards and x-rays. Ask students to match them up.
2. Create Arctic Art: Place x-rays on a light table or in a window. Lay a sheet of paper over top and trace the animals. Use the cards as reference when adding detail. Write the name of the animal on the back of the sheet and add some interesting details.
3. Separate the animals into different categories: Mammals, birds, fish; herbivores and carnivores; land dwelling or sea dwelling.

Comparative Ecosystem Activities:

Our world is not neatly compartmentalized. Take a look at how ecosystems relate to each other. For instance, compare and contrast Arctic animals with Great Barrier Reef animals.

Create a chart showing how animals from the Arctic and Great Barrier Reef solve similar survival problems in different ways. For example, students can match pairs like polar bear to a shark (top predators). How are they similar? How are they different? Look at the Arctic fox and compare it to the reef octopus (adaptable hunters). Focus on the caribou and dugong (large herbivores).

Students can examine body coverings, movement, diet, and environmental challenges such as cold water versus tropical water.

After pairing species, students can identify which adaptations are unique and which are shared. This activity encourages pattern recognition, systems thinking, and a deeper understanding of how climate and habitat shape evolution.

Expand your exploration further by looking at other ecosystems around the world. Another powerful comparison for students is between the Sahara Desert and the Brazilian Rainforest. These ecosystems represent opposite ends of Earth's moisture cycle: the Sahara is shaped by extreme dryness and limited resources, while the rainforest holds enormous biodiversity supported by constant rainfall and rich plant life. In the desert, animals survive by saving energy and conserving water, often becoming active at night, storing moisture, or reducing body heat gain. In the rainforest, survival depends on competition,

camouflage, and specialization, because so many species share the same space. By comparing these systems, students can see how climate, rainfall, and vegetation shape not only animal adaptations, but also behavior, food webs, and reproductive strategies.



Nature's Neighbours

A Teacher's Guide to Ecosystems

At Roylco, we want teaching science to younger children to be fun and fascinating. Because younger students are fascinated to learn and understand their own bodies, we want to use their natural curiosity to introduce them to science and help them gain an appreciation of nature.

We are developing a series of x-ray and picture cards that focus on ecosystems from around the world. No ecosystem survives in isolation, so use a combination of these sets to explore the entire world.

Let's start by understanding what an ecosystem is:

An ecosystem is a place where living things, like plants and animals, and nonliving things, like water, air, and soil, all work together. Every part of an ecosystem is connected—if one thing changes, it can affect everything else.

More specifically, a living thing can be as small as a single cell bacteria, or as big as a gray whale. In between we have bugs, fungi, plants and animals like mammals, amphibians, reptiles, invertebrates, fish and birds.

Non-living parts of an ecosystem includes sunlight, water, air, rocks, and soil. And don't forget the weather! Temperatures and space contribute to every ecosystem. When it comes to something like weather, think about how rainfall/snowfall affects your environment. Seeds, pollen and some animals, like birds and insects, travel on the wind. Storms and fire can quickly change an ecosystem. Likewise, the normal flow of seasons require ecosystems to adapt to the changing climate.

There are wonderful benefits to learning about ecosystems:

Cognitive and Academic Benefits

- **Build Science Foundations:** By understanding how living and nonliving things interact, we are introduced to the concept of cycles, like water cycles, food chains, and the four season.
- **System Thinking:** Instead of focusing on isolated facts, students will start to think about how things come together: Plants need sunshine and water; animals need plants; people need both. Together these elements make up systems and by learning about the systems, we start to become aware of the importance of each part and the role it plays.
- **Supports Curiosity:** When we start to ask "what if" questions, we develop critical thinking and problem solving skills.

Environmental Awareness

- **Fosters Stewardship:** Appreciating ecosystems helps nurture respect for nature and a sense of responsibility.
- **Highlight Human Impact:** Students learn that their actions matter. They can help by recycling their waste, reducing the amount of water they consume, and protecting habitat.
- **Connect Local to the Global:** Your environment is part of an ecosystem. By protecting your home ecosystem, you are contributing to the whole planet.

Social and Emotional Benefits:

- **Encourage Empathy:** By learning about how living things depend on each other, children develop empathy for animals, plants, and people.
- **Nurtured by Nature:** Exposure to nature increases attention, lowers stress, and improves mood.
- **Build Wonder and Joy:** Learning about the elements of an ecosystem sparks imagination, creativity and the excitement of exploration.

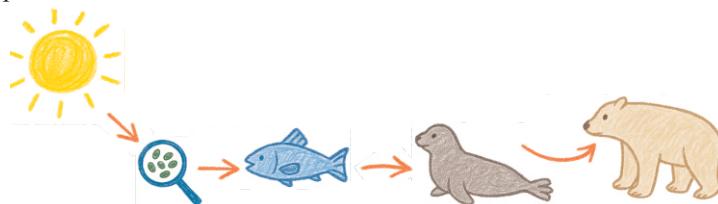
Cross-Curricular Benefits:

- **Literacy:** Reading and writing about ecosystems builds scientific and relationship vocabulary.
- **Math:** Looking at groups and individuals helps children develop a strong number sense.
- **Creativity:** Drawing pictures of animals or creating diagrams of food chains promotes visual literacy.

Activity Suggestions

Explore ecosystems with children through science, art and language.

- **Create a diagram of a food chain.** Up in the Arctic, sunlight shines down on the ocean and nourishes plankton. Fish eat the plankton. Seals eat the fish. Polar bears eat the seals.



There are other ways to understand this information.

- **Show how the world is interconnected.** Look at the migratory patterns of birds, whales and Monarch butterflies.



- **Use Roylco's X-ray and Picture cards sets to explore the animals from the inside out.** The cards are printed with detailed images of animals in their natural habitat. Match the cards to their x-rays. Group animals by characteristics. Use the x-rays on a light table and trace the details.



- **Write stories about the animals.** Be sure to include information about where they live, what they eat, and the threats they face.