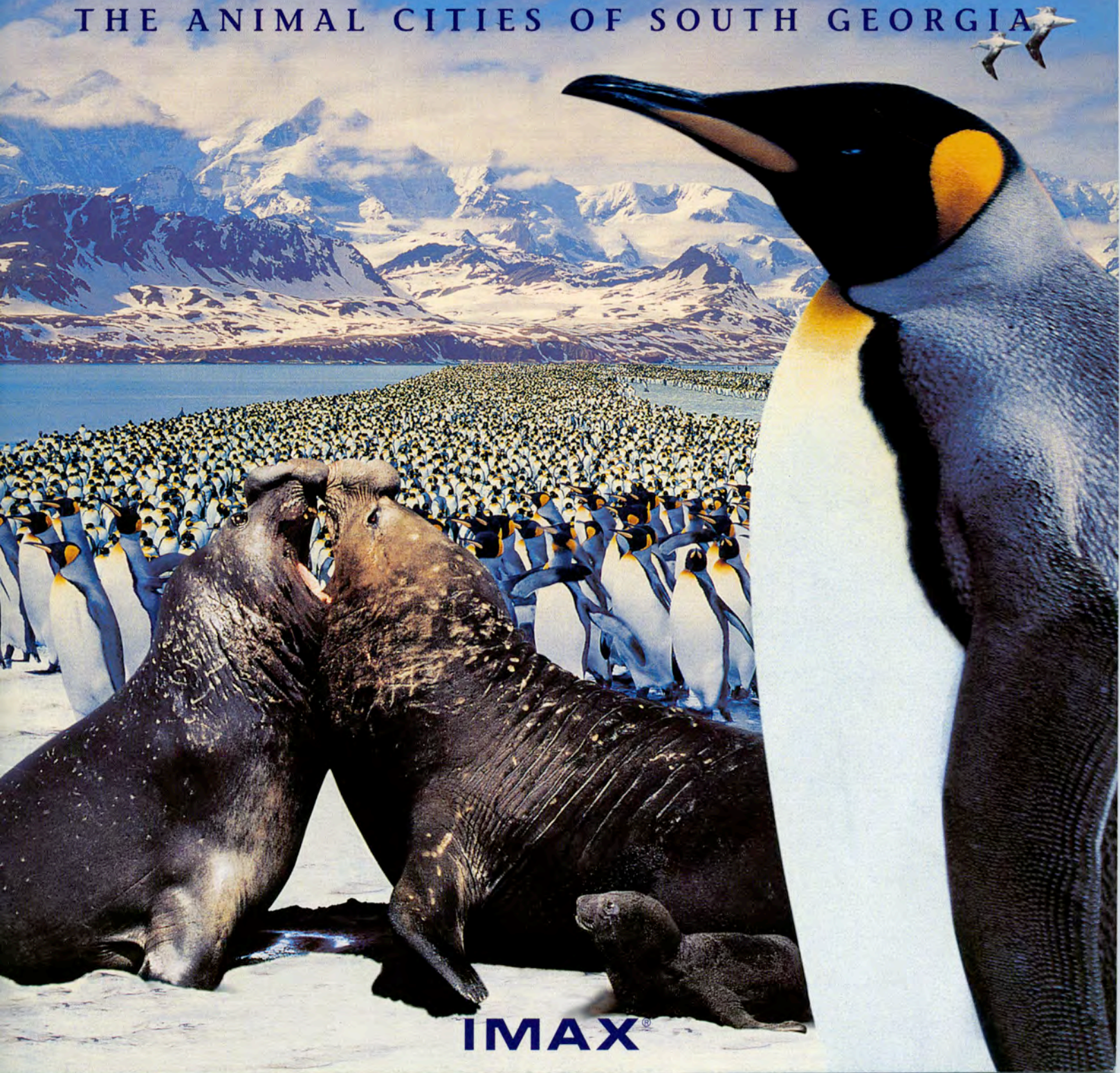


A TEACHER'S RESOURCE GUIDE TO

SURVIVAL ISLAND


THE ANIMAL CITIES OF SOUTH GEORGIA



IMAX®

Introduction for Teachers

Survival Island tells the story of the summer breeding season for the animals of South Georgia Island, one of the most isolated places in the world. On behalf of the film sponsor, Hakuhodo Incorporated, Imax Corporation is proud to present this resource guide for use in conjunction with this unique natural history film. Because many teachers enjoy taking their classes to giant screen IMAX® films, this guide will help them prepare students to view the film and to follow up with discussions and activities. The guide is intended as a classroom supplement for elementary and middle school grades, and is consistent with U.S. National Science Standards published by the National Research Council and the National Geography Standards published by the Geography Education Project.

The material is flexibly designed, and teachers may modify and duplicate the copyrighted materials to suit their students' needs. (Pages marked with this icon  are especially recommended for reproduction.) Activities have been set up as double-page spreads. Lefthand pages contain materials and suggestions for the teachers; righthand pages have been designed as reproducible student worksheets. Teachers will find responses to questions in all four activities within the Facts In Brief section. Also included in that section are definitions of key terms, in bold-face type.

We hope this information will enhance your viewing experience of *Survival Island*.

Film Synopsis

The film opens with a dramatic view of South Georgia Island's snow-capped peaks rising from the distant ocean. As the camera draws closer, the viewer discovers that a seemingly barren and inhospitable shoreline is actually teeming with life and drama. South Georgia Island, over the summer, will become the breeding ground for 95 percent of the world's southern fur seals, half of the world's southern elephant seals, and millions of penguins and other bird species.

A male elephant seal lumbers ashore. It tries to establish its territory, competing with other males by intimidation or fierce fights. Females give birth on the crowded beaches. These beaches are shared with king penguins — adults, year-old chicks, and newly-hatched chicks — all huddled together for shelter from the weather. Adult king penguins go out to sea for food to feed their young.

Next to arrive for the summer are macaroni penguins, braving leopard seals hunting offshore and heavy surf to climb the hillsides and make nests out of stones. Albatross perform their courtship ritual in the air and on the ground. By mid-summer fur seals come to South Georgia Island, with females giving birth and males defending their territories, sometimes resulting in the death of a seal and food for scavenging birds. Where once people hunted these animals almost to the point of extinction, scientists now study them to help their survival.

By the time the Antarctic summer ends, several million young animals have started their lives on South Georgia Island. Now most of them must take a hazardous step: following their parents into the ocean, for that is the only place they can find food. Only the king penguin chicks huddled on the beach and the young albatross in the hills will remain behind, waiting for their parents to return with food. When the island warms again in the spring, it will once more become the Southern Ocean's nursery for a new generation of wildlife, an extraordinary testament to nature's resilience.

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Program Objectives

- To describe South Georgia Island's location, geography and climate.
- To describe the animals that breed there each summer and their physical and behavioral adaptations to the environment.
- To help students understand how humans affect the ecological balance, emphasizing the relevance to their lives of seemingly distant environmental issues.
- To help students understand the resilience of nature.
- To help students practice written and oral communication skills and strengthen listening skills.

Target Audience

This guide is designed for teachers and students in elementary and middle school who view *Survival Island* at an IMAX theater.

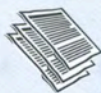
Pre-Screening Discussion

- 1 After locating South Georgia Island on a map and noting its latitude (distance from the equator), students find their hometown and compare its climate to what they expect to be the climate on South Georgia Island.
- 2 List the animals that students expect to find on a windy, mountainous, ice- and snow-covered island hundreds of miles from the closest land, Antarctica. Discuss and list the special conditions the students expect the animals would have to endure and how they would behave or adapt to survive.
- 3 One of the birds in the film is the macaroni penguin. Ask: Why do you think it has that name? Does anyone know a song with "macaroni" in it? (Hint: it also contains the word "feather.") [Note: "Yankee Doodle...stuck a feather in his cap and called it macaroni," which American colonists sang during the Revolutionary War. The macaroni penguin's golden eyebrow feathers reminded sailors of feather-plumed hats and dyed hairstyles of 18th-century English gentlemen, called "macaronis" after they returned from Italy.]
- 4 Ask students whether they think any people live on South Georgia Island. If so, what would they do there? Fish or hunt animals? For food or sport? Look for valuable rocks or oil? Do scientific research? How would people affect the island's environment?

Post-Screening Discussion

- 1 Compare the students' reaction to the film with their pre-screening expectations. What new things did students observe? What surprised them?
- 2 How did watching the IMAX film differ from television and other movie experiences? Did the IMAX film create a greater sense of "being there" through the wrap-around large screen and sound? Did the IMAX technology help students learn more?
- 3 Themes concerning the human impact on South Georgia Island's ecology can launch extended activities:
 - Ask students to research and discuss the impact of human activity on the environments of South Georgia Island and Antarctica—e.g., seal and whale hunting to near-extinction; massive krill harvesting by commercial fishing vessels; scientific research; tourism, including garbage, pollution and oil spills from boats; disturbances that affect the role of scavengers, such as the petrel; the hole in the ozone layer; and global warming and the "greenhouse effect."
 - Ask students to learn more about Antarctica. Why is it special, and how does this special quality make it vulnerable to pollution? What steps have been taken to protect the region? Who "owns" Antarctica?





South Georgia Island Facts In Brief

Where in The World Is South Georgia Island?

- Near the South Pole, in the Southern Ocean, 620 miles (1,000 km) from the continent of Antarctica and 900 miles (1,440 km) from the Falkland Islands off Argentina; between latitudes 53°56 and 54°55 south and longitudes 34°45 and 38°15 west; beyond the normal range of **pack ice** (frozen sea water driven in large masses by currents and winds) within the **Antarctic Convergence** (a circumpolar transition zone where the warmer, saltier waters of the Atlantic, Pacific and Indian Oceans from the north meet the colder, fresher water of the Southern Ocean coming from iceberg melt).
- Crescent-shaped island, about 105 miles (170 km) long and 1.25 to 18.5 miles (2 to 30 km) wide; snow and ice permanently covers over half the land.
- Mountains and **glaciers** (a sea of ice flowing slowly over land, formed from compacted snow) extend to the water's edge; peaks are 10,000 feet (3,000 m) high. Receding glaciers form beaches and coastal inlets.
- Winter temperature of minus 30° F (minus 34° C); summer temperatures rise to freezing (32° F, 0° C) and as high as 70° F (21° C).
- Frigid **katabatic winds** blow down from mountains at 100 miles (160 km) per hour.



Think about it:
How does a southern
fur seal compare in size
to a man?

The Human Element

- Amerigo Vespucci reportedly sighted the island in 1502; explorers first landed there in 1675; Captain Cook landed in 1775, claiming it for Great Britain. (Antarctica discovered in 1819.)
- People hunted seals for fur and oil 1786-1913, and fur seals disappeared by the 1920s. Commercial hunters established the first of four whaling stations and settlements in 1904; they killed more than 120,000 whales between 1904 and 1965. More than half a million penguins killed annually for their oil, skins and feathers. International treaties now protect animals (including Antarctic Treaty of 1961, Convention on the Conservation of Antarctic Marine Living Resources of 1980 and Convention on the Conservation of Antarctic Seals of 1972).
- No indigenous people. Today, tour ships stop there to and from Antarctica; a small whaling museum is open. Two small research stations of the British Antarctic Survey (one open year-round) and a base for 40 British soldiers also occupy the island (Argentina also claims it, in unresolved dispute with Great Britain).

Seals: Fascinating Facts

ELEPHANT SEAL

- Half the world's southern elephant seal population breeds on South Georgia Island, up to 6,000 on a single beach.
- Elephant seals are the largest of all seals; males can be 20 feet (6 m), twice that if they rear to full height, and weigh up to 8,000 pounds (3,700 kg). Life expectancy: 20 years.
- Named for the male's size and **proboscis** (trunk) that inflates to make noise to attract females and scare off other males.
- Up to 100 females stay together in **harem**, with one dominant male.
- Feeds on fish and squid, diving deeper than any other marine mammal (recorded depths over 5,000 feet, or 1,500 m); can spend nearly two hours underwater.
- Retains body heat with dense fur and thick layer of **blubber** (insulative fat just under the skin of most marine mammals and penguins). **Molts** (shedding fur and skin) its fur to keep cool in the summer and to allow new fur growth for the winter.



SOUTHERN FUR SEAL

- Not a true seal; part of animal group including sea lions (has visible ears; uses front flippers for water propulsion and both front and rear flippers on land; true seals' ears are not visible and use only rear flippers for propulsion).
- Two million—95 percent of all southern fur seals—breed on South Georgia Island.
- Has two layers of fur: a dense, velvety inner layer that is waterproof and an outer layer of coarse hair (300,000 hairs per square inch).
- Feeds primarily on **krill** (small shrimp-like animal, the base of the Southern Ocean food chain); seal population increased when competing whales were hunted; krill does not live outside Antarctic Convergence.

Here A Chick, There A Chick, Everywhere A Chick Chick

- Penguins are the largest family of flightless birds.
- Island is breeding ground for 10 million macaroni penguins, hundreds of thousands of king penguins and 350,000 gentoos.
- Penguins stay warm with blubber and waterproof coat of oily feathers; ruffle feathers and raise wings to circulate cooler air when overheated; molt to shed old feathers, grow new ones.
- "Flies" through water with wing movements like airborne birds.
- Live in **rookeries** (tightly packed penguin colonies on land); 35,000 in a king penguin rookery, 80,000 in a macaroni penguin rookery.
- For warmth and protection against predators or harassing adult penguins, chicks gather in **creche** (group of penguin chicks); both parents fish in turns, feeding chick every few days.
- Natural predators: Leopard seals, which feed on penguins in the ocean.

KING PENGUIN

- Territory: wherever it's standing, extends to wing length.
- No nest; female lays one egg, which male and female take turns carrying on their feet under protective skin flap until hatched. Needs flat ground for this.
- Upon returning to creche with food (primarily squid), parent and chick recognize each other with individual calls.
- Parent leaves chick on the island for the winter, returning from the ocean to feed it about once a month. Due to long nurturing period, king penguins breed only once every two to three years.

MACARONI PENGUIN

- Male and female gather pebbles for nest on hills, a wing-length apart from other nests.
- Lays two eggs, the first less than half the size of the second. Both eggs are fertile, but the smaller egg rarely hatches. (Scientists are perplexed as to why; one possibility is that the species may be evolving toward laying a single egg or it may be insurance against loss of larger egg.)
- Chick returns from the creche to its nest to be fed.
- Diet is 98 percent krill.

"Water, Water, Everywhere...."

- Ancient mariners observed great variety of shore birds (feed in shallow waters near shore and on land), land birds (feed exclusively on shore and include scavengers) and seabirds (come ashore only to breed and feed chicks).
- The skua—the primary predator of penguins—is a shorebird that feeds on penguin chicks and eggs.
- Petrels are large seabirds that **scavenge** (feed on dead or decaying animals) on land and prey on penguins.

WANDERING ALBATROSS

- Wandering albatross, with wingspan of about 10 feet (3 m), is the largest seabird. Wings too long to take off without strong wind; therefore nests on cliffs or open mountainsides.
- Life expectancy: as long as 80 to 85 years.
- Does not breed until it is 10 to 14 years old, and then only once every two years.
- Lays one egg; parents take turns hatching. Chick stays on island all winter.
- Feeds primarily in Southern Ocean, flying 1,000 miles on a single fishing trip.
- Albatross pairs engage in elaborate courtship and bonding rituals—flying, dancing and calling to each other.



*Think about it:
The wingspan of a
wandering albatross
stretches to nearly twice
a person's armspan.*



Where in the World Is South Georgia Island?

Objectives: To provide a framework for understanding the interactions of South Georgia Island's geographical location, physical environment and animal life. Focusing on map and globe skills, students plan and conduct a simple investigation with basic data-gathering equipment and tools. Use the reproducible sheet on the facing page to guide the activities. Discussion questions:

- 1) Where is South Georgia Island? Name some places in the Northern Hemisphere that are just as far from the equator.
- 2) Why is it so cold there and in Antarctica?
- 3) Why do animals come to South Georgia Island in the summer?

Part A: Location Exercise

1) Ask students to locate Antarctica, the South Pole, and South Georgia Island on a globe or the map on the facing page and describe their general location near the "bottom" of the earth. Have students locate their own community and compare its seasons and climate (e.g., temperate) with South Georgia's.

2) Ask students to use a globe or map to identify the latitude of (a) South Georgia Island, (b) their hometown, and (c) a city in the Northern Hemisphere. Discuss the tilt of earth's axis and its shape, and their effects on climate. [Note: Seasons are caused in part by the 23.5 degree tilt of the earth's axis. When the South Pole tips toward the sun it is summer in the Southern Hemisphere, with longer days and warmer temperatures, while the Northern Hemisphere is tipped away and has winter, with shorter days and colder weather. There is little seasonal difference at the equator, and seasonal effects increase as distance from the equator increases. South Georgia Island receives little solar radiation due to its distance from the equator and because the earth's axis tilts it farther from the sun in winter.]

3) The following hands-on demonstration will help students describe how the earth's roundness and tilt of its axis make a difference in the amount of the sun's energy, or radiation, the island receives.

Materials: Globe and bright flashlight.

Directions: Ask students to shine the light, representing the sun, on the globe. They will observe that the light at the equator is brighter than at the South Pole or South Georgia Island. Ask students to measure the differences in distance from the light source to various points on the globe. If the globe is tilted and rotated, students can see the difference in the amount of light during long summer days.

Part B:

Extended Activity—Solar Radiation

Survival Island shows seals and penguins basking in the sun on rocks and sand, not on ice and snow. This experiment will help students describe how ice keeps the sun from warming South Georgia Island.

Materials: Black, green and white construction paper—one sheet apiece for each group of students. Lamps with 60-watt (minimum) bulbs or bright flashlights.

Directions: Give each student group one sheet of each color paper. Have them place the papers about 6 to 12 inches underneath the light bulb or flashlight for about five minutes. Ask them to feel the papers' surfaces or use a thermometer or temperature probe to check differences.

Discussion:

1) Which color paper is warmest? Coolest? Why? [Note: Because light colors reflect most of the sun's energy, the white paper should be coolest. Dark colors reflect less and absorb more solar energy, so the black paper should be the warmest. The green paper should be in between.]

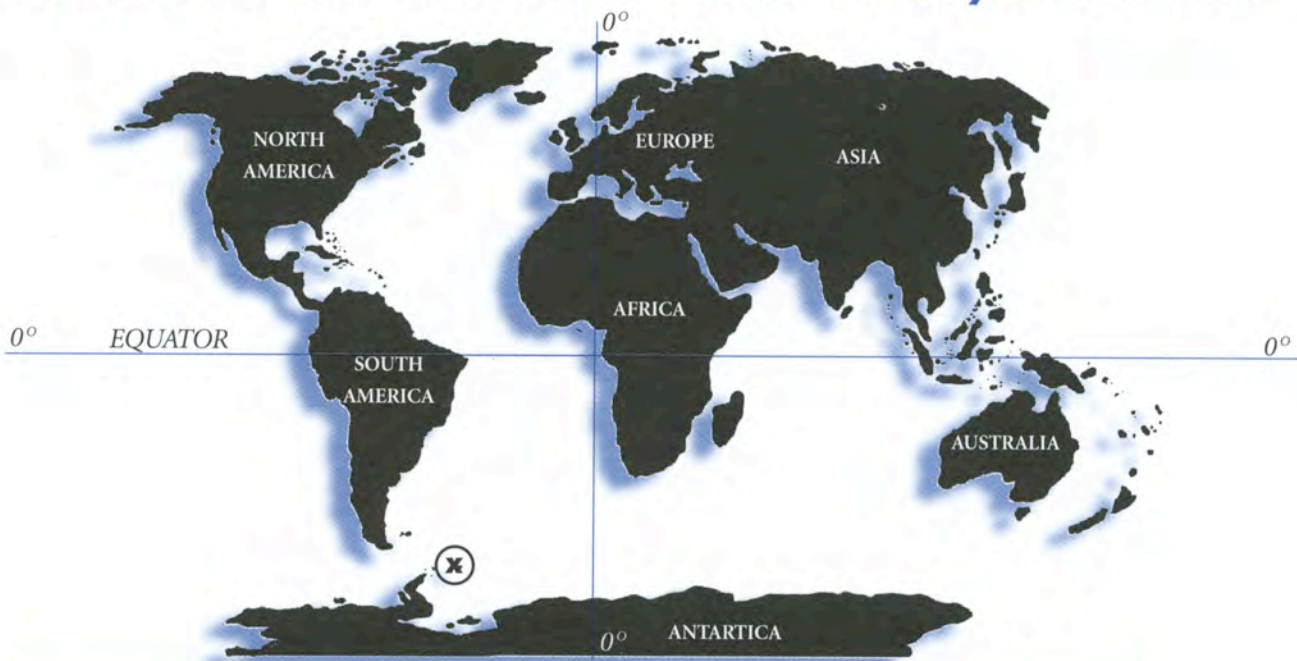
2) Which would be warmer, the rocks or the snow on South Georgia Island? [Note: Snow reflects between 40 percent and 95 percent of the sun's radiation. Because snow and ice permanently cover most of South Georgia Island, those surfaces will reflect most of the sun's energy, making them colder than the rocks and beaches, which reflect 5 percent to 10 percent of the sun's radiation. Islands warm up quickly, but also lose heat more quickly than water.]

3) Which surface would the animals prefer? [Note: The animals on South Georgia Island prefer the warmer surfaces to ice and snow because they use less energy to stay warm and chances are better for their young to survive.]



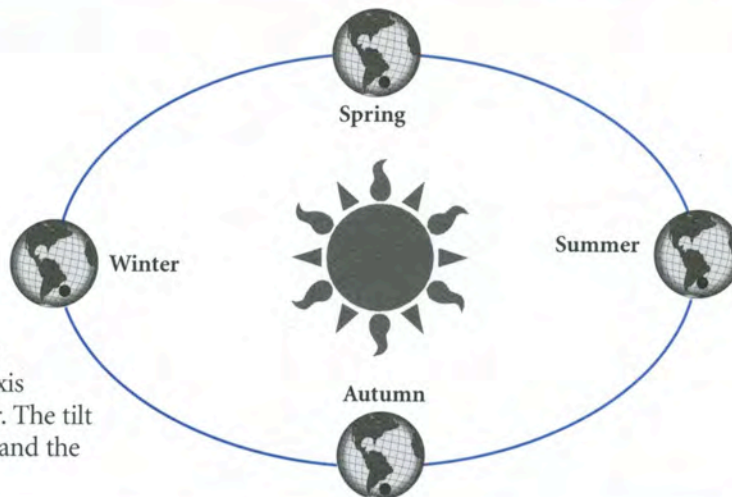


Where in the World Is South Georgia Island?



- 1) Locate South Georgia Island on the map. It is marked this way: (X)
- 2) Locate Antarctica; South America; find the Falkland Islands, just east of the southern part of South America. Where is the equator?
- 3) Locate where you live. Measure about how far you are from the equator and compare how far South Georgia is from the equator. Is South Georgia Island colder than where you live? Why?
- 4) Find a place above the equator that is the same distance as South Georgia Island is below the equator. Is South Georgia Island colder? Why?

South Georgia Island receives relatively little warmth from the sun, compared to land on the equator. It is further from the sun and the earth's axis tilts it away from the sun in the winter. The tilt also makes the winter days very short and the summer very long.



- 1) Locate South Georgia Island in each season. The solid dot should help you.
- 2) Which season will be warmest at South Georgia Island?
- 3) Which season would have the longest amount of daylight?

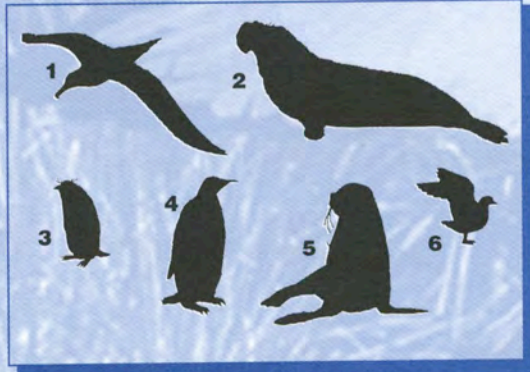
The Animals of South Georgia Island

Objectives: This section focuses on the elephant and fur seals, king and macaroni penguins, and the albatross. Students explore the concept of environmental niches and how organisms interact with and change the environment.

Part A: Animal Silhouettes

You may want to introduce the term "silhouette" to your class before having students complete this activity. Note that the silhouettes shown on the facing page are not drawn to precise scale. The reproducible activity sheet shows silhouettes of several animals in *Survival Island*. Students are asked to match the silhouettes with the animals' names. Students can write about, or discuss, how various body shapes help animals survive. They also can match descriptive sentences with the appropriate animals.

Answers



Question 1.

1. Wandering albatross 2. Elephant seal
3. Macaroni penguin 4. King penguin
5. Southern fur seal 6. Skua

Question 2.

Sample answer: The sleek shape of the seals and penguins help them move easily under water.

Question 3.

Use pebbles-macaroni penguin; has trunk-elephant seal; hunted for fur-southern fur seal; steals eggs-skua; carries egg on feet-king penguin; needs wind-wandering albatross

Part B: Environmental Niches and Competition

All animals and plants occupy their own niche, a physical space and habitat where they live and feed among a bigger community of other animals and plants. Nature provides that each type or species of animal is adapted to its particular niche. In this way, the animals that come to South Georgia Island do not compete with other kinds of animals for the same territory and food (although they do compete among themselves).

1) *Survival Island* shows king penguins fighting each other for territory. Ask: Why don't fights break out between king and macaroni penguins, or between penguins and albatross? Consider: Where do king penguins stay? Where do macaroni penguins and albatross nest? Do they compete over the same type of ground? Why couldn't king penguins live where macaroni penguins or albatross nest?

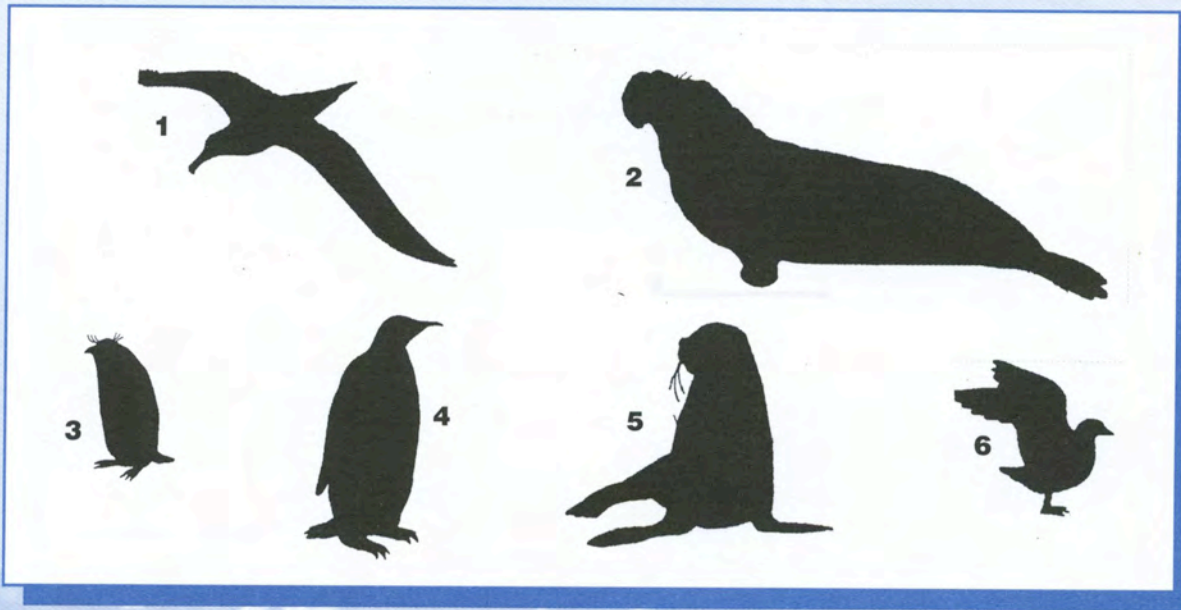
2) Seals and penguins all must find food in the ocean. Ask: Why don't they fight over food? Is there more than enough food to go around, or do they eat different things? Do they hunt for food in the same place? [Note: Animals eat different foods and dive to different depths to catch food. Even among penguins, the macaroni and king penguins eat different foods.]

3) As part of the oceanic food web, for the birds and mammals of South Georgia Island, what eats them is as important as what they eat. If there were no predators, such as the leopard seal, or scavengers, such as the giant petrel, then what might be the consequences?

4) Ask: What would happen if a change in habitat threatened an animal's niche? For example, what would happen if South Georgia Island became much hotter or even colder? What would happen if huge fishing boats caught krill, leaving little for the animals that depend on krill for food? Also ask students to consider the effects of seemingly small changes in the food chain. What would happen if, during one breeding season, an oil spill caused the death of large numbers of male animals?



The Animals of South Georgia Island



1

Match the silhouette. Write the number of the animal silhouette next to its name.

King penguin

Macaroni penguin

Elephant seal

Southern fur seal

Wandering albatross

Skua

2

Pick one animal and briefly describe how its shape helps it survive.

3

Match these descriptions of animals with their silhouettes, and write their names in the space provided:

- Uses pebbles to make its nest

- Has a trunk to scare rival males and attract females

- Hunted for its fur almost to extinction

- Steals penguin eggs

- Does not make a nest and carries its egg on its feet

- Needs strong wind to take off



Physical Adaptations to the Habitat of South Georgia Island

Objectives: Building on the previous sections, students explore the physical features that help animals survive in their habitats on South Georgia Island. These are called adaptations. In activities and discussion, students will improve thinking and questioning skills while observing, comparing, classifying and predicting.

Part A: Challenges to Survival

In class discussion, ask students to identify the challenges to survival and how the animals' bodies have adapted (evolved to improve their ability to survive) on South Georgia Island:

- Animals have (and people use) coats to keep them warm. How else do animals endure freezing temperatures?
- Describe and compare ways the different animals on South Georgia Island move on land and in the water or air. Which way seems the easiest for the animal? Is that where it spends most of its time?

- An advanced discussion could address disadvantages to some adaptations, such as overdependence on a very cold climate or a particular food, or that an albatross' long wingspan helps it fly and glide easily over long distances but also makes it unable to take off from flat ground.
- Advanced students might do research on physiological adaptations; for example, how are penguins able to swim long distances without fresh water to drink? (Special glands take out the salt.) What keeps fish from freezing? (Special enzymes in the blood.)

Part B: Animal Features

The class, groups or individual students should fill in the table (facing page) of the animals on South Georgia Island. Students should list animal features and how each feature helps the animal survive. Advanced students might also list the disadvantages of particular adaptations.





Animal Features

Survival Island shows how difficult it is for animals to live and breed on South Georgia Island. To survive, the animals have adapted—they have special features for living there.

Pick several animals from *Survival Island* and, in the space provided, write how each animal's body has adapted to its habitat—its shape, size or coat, for instance. Think about challenges to survival from the island's weather, where the animals live and how they get their food. Animals have many ways of surviving, so you can write about more than one adaptation for each animal. An example is provided.

ANIMAL	FEATURE	HOW IT HELPS THE ANIMAL
Wandering Albatross	Large wingspan	Can fly long distances, skim over ocean water to catch fish

Animal Behaviors

Objectives: In addition to physical adaptations, animals adopt behaviors that help them survive on South Georgia Island. In this activity, students draw on life-science issues (biodiversity, the interaction of organisms and environments, reproduction and heredity, and regulations and behavior) to practice writing and questioning skills.

Part A: Investigative Reporter

In pairs, one student pretends to be a reporter who asks about how animals survive on South Georgia Island, while the other is a scientist who responds. After a number of questions or at a specified time, they switch roles.

Instead of being a scientist, the other student could pretend to be an animal from *Survival Island*—"king penguin" or "wandering albatross," either adult or chick. Questions could include:

- Don't you get cold?
What do you do to stay warm?
- How do you breathe air?
- How do you know which baby is yours to feed?
- Why do you live where you do?
- Do other animals try to eat you?
How do you protect yourself?
- How do you pick a mate?

Students should prepare questions before the exercise. Afterward they might write brief newspaper articles or T.V. reports about their interviews. Students also could perform their roles in class.

Part B: Animals Do the Strangest Things

Animals on South Georgia Island show a wide range of fascinating behaviors. Class discussion might focus on describing those behaviors and, for more advanced students, the reasons for the behaviors. Students might:

- Characterize their purpose, e.g, mating, identifying baby, protecting harem.
- Describe the benefits of such behaviors.
Compile supporting evidence.
- Compare and contrast specialized behavior with that in different environments, e.g, the students' own area or a tropical rain forest.

Part C: Mix and Match Behaviors

The student worksheet on the facing page displays scenes from *Survival Island* that show animals engaged in specific behaviors—for example, defending territory, identifying young, displaying to attract females, playing, and protecting an egg or chick. Students should answer the questions next to each photograph. They might also discuss reasons for the animals' actions.

Suggested answers: 1) Wandering albatross displays it is healthy and free of parasites to attract female and pass on its genes. 2) Male elephant seals are fighting over territory and harems; the winner, the "beachmaster," breeds and passes on its genes. 3) King penguin recognizes its own chick by distinctive, individual call. 4) King penguins are staking out their territories and are spaced a wing-length apart. 5) The seals are "porpoising" to breathe; penguins also "porpoise." The animal uses less energy leaping out of the water for a quick gulp of air than by swimming on the surface to breathe.



Animal Behaviors



- 1 What is this wandering albatross doing? Why would it be important for an albatross to show its feathers?



- 2 What are these male elephant seals doing?



- 4 Why are these penguins spaced this way?



- 3 How does a king penguin know which of the identical looking little fuzz-balls is its chick to feed?



- 5 Why are these seals jumping out of the water while swimming?

Additional Resources

- * *A First Look At Seals, Sea Lions, and Walruses*. Millicent Selsam and Joyce Hunt. New York: Walker Publishing Company, 1988.
- * *Albatrosses of Midway Island*. Sylvia A. Johnson, Minneapolis: Carolrhoda Books, 1990.
- * *Antarctic Encounter: Destination South Georgia*. Sally Poncet. New York: Simon & Shuster Books For Young Readers, 1995.
- * *Antarctica: An Introductory Guide*. Diana Galimberti. Buenos Aires: Zagier and Urruty Publications, 1991.
- * *Elephant Seals*. Sylvia Johnson. Minneapolis: Lerner Publications Company, 1989.
- * *Let's Save Antarctica*. James N. Barnes. Greenhouse Publications, 1982.
- * *Life In The Freezer*. Alastair Fothergill. London: BBC Children's Books, 1994.
- * *Penguins*. Dorothy Hinshaw Patent. New York: Holiday House, 1993.
- * *Penguins*. Roger Tory Peterson. Boston: Houghton Mifflin, 1979.
- * *Penguins At Home: Gentoos of Antarctica*. Bruce McMillan. Boston: Houghton Mifflin, 1993.
- * *Penguins, Puffins, and Auks: Their Lives and Behavior*. William Ashworth and Art Wolfe. New York: Crown, 1993.
- * *Seals*. Eric Grace. Boston: Sierra Club Books/Little, Brown and Company. (U.S.). Key Porter Books Limited (Canada), 1991.
- * *Summer Ice: Life Along the Antarctic Peninsula*. Bruce McMillan. Boston: Houghton Mifflin, 1995.
- * *The Crystal Desert: Summers in Antarctica*. David Campbell. Boston: Houghton Mifflin, 1992.
- * *The Elephant Seal*. William Sanford and Carl Green. Mankato, MN: Crestwood House, 1987.
- * *The Penguins*. Lynn Stone. Mankato, MN: Crestwood House, 1987.
- * *The Seaworld Book of Penguins*. Frank Todd. Orlando: Harcourt, Brace, Jovanovich, 1981.
- * *The Total Penguin*. James Gorman. New York: Prentice-Hall, 1990.

[*are juvenile books]

Web Sites

Students who have access to the Internet may want to browse the World Wide Web for more information about the region.

<http://quest.arc.nasa.gov/livefrom/livefrom.html>

Live From Antarctica is a Passport to Knowledge project designed to allow students and teachers the opportunity to experience what life is like in the coldest place on the planet, Antarctica; includes videos aired over TV, teachers guide and classroom activities.

<http://loki.ur.utk.edu/ut2kids/penguins/penguin.html>
University of Texas

<http://icair.iac.org.nz/list.html>

Gateway to Antarctica Home Page; subjects include environment, education, and provides information on how to get involved.

<http://astro.uchicago.edu/cara/vtour/pole/>
Visual tour of the South Pole (Amundsen-Scott South Pole Research Station)

<http://orca.iasos.utas.edu.au/antcrc.html>

The Cooperative Research Centre for the Antarctic and Southern Ocean Environment is concerned with the role of Antarctic and the Southern Ocean in climate and global change.

For further information, contact The Antarctica Project, Washington, D.C., at Econet: antarctica@igc.org



Acknowledgments

Survival Island is a Hakuhodo Incorporated presentation distributed worldwide by Imax Corporation.

Filmed in IMAX®.

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