

PENGUIN POO? FROM SPACE!?

GRADE LEVEL K-1





Photo: Fredi Devas ©BBC NHU

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- (1) 60 minute Lesson or
- (2) 30 minute Lessons

Standards (NGSS):

K-ESS3-1 Earth and Human Activity

Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.

From the Film:

In the film, *Antarctica*, we learn that scientists and researchers are using satellite imagery of penguin poo to monitor penguin populations. The color of penguin poo varies based on their diet. As an example, Adelie penguin guano varies from reddish brown if they eat a lot of krill to blue if their diet is primarily fish. This means that we can not only use this data to understand penguin counts, but also understand more about their diet and relationship with the environment.

Lesson Overview:

Penguins are flightless birds found on the continent of Antarctica. Students will learn about four different species of penguins that live in Antarctica. Then students will create their own satellite imagery of penguin poo, which scientists and researchers use to gain a better understanding of penguin population and behavior. Through this activity, students will understand that the presence of other animals, such as krill, fish, and squid, make this an ideal habitat for penguins.

Materials:

- The book:
One Day on our Blue Planet: In the Antarctic
by Ella Bailey
<https://www.amazon.com/One-Day-Blue-Planet-Antarctic/dp/1909263672>
- Model Globe
- Technology to show the following video:
www.youtube.com/watch?v=dCQVci2IXag
- Penguin identification cards - handout, pp. 10-13 (one set per group)
- Crayons or colored pencils, tempera paint in red and blue, water
- Satellite image - handout, p. 14 (one per group)
- Outline of Antarctica - p. 15
- Sheets of butcher paper, cut into 5-foot lengths (per group)
- 2 Pipettes (per group)
- 2 paper cups: small 4 oz. cups work great (per group)

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EDUCATOR PREP:

Prepare the video clip to be shown to the class. Print out one penguin ID sheet for each student. Prepare the guano solution using the recipe to the right. Using the map on p. 15 draw a large outline of Antarctica on each sheet of butcher paper, filling the sheet.

GUANO RECIPE:

Mix equal parts tap water and tempera paint in small cups. Provide at least 2 different colors. (*red and blue preferred*)

EDUCATOR GUIDE:

1. Inform students that today we are going to go on an adventure to Antarctica to learn about penguins. Tell them first, we need to start with what Antarctica is and where it is located.
2. Using the globe, show students first their current location, and then move towards Antarctica and the South Pole. Ask students what they think life would be like on the southern side of our planet.
3. Read aloud the book, *One Day On Our Blue Planet: In The Antarctic*, by Ella Bailey. Comprehension Check: Students should recognize that Antarctica is extremely cold and does not have a lot of plant life. It is surrounded by water and although it is a harsh environment, a lot of animals live here. Finish the book and ask the following questions:

What do you know about this place called Antarctica?

Students will describe the Antarctic in a lot of different ways with some focusing on the shape, others on the color, and still others on what lives on the continent.

What details do you notice about Antarctica?

Help students use descriptive words to share their observations of the continent from the clip.

What kinds of plants and animals live in Antarctica?

Student answers will reflect their recollection from the film or the clip, so they may mention penguins, seals, whales, sea stars and more.

4. Explain that as a class we are going to learn more about penguins that live in Antarctica. Pass out the penguin ID cards to each group.
5. Share with students that Antarctica is really cold and far away, which means scientists and researchers have to be creative and use interesting tools to study these animals. Today we are going to be scientists studying penguin populations.



Adult king penguins must head out to sea to collect food for their chicks. Director Fredi Devas watched this group walk to these rocks, and then hesitate getting into the cold water for ten minutes.

Eventually one was pushed in.

Photo: Fredi Devas © BBC NHU

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6. Students will learn more about the types of penguins found in Antarctica. Show the students each of the penguin ID cards and introduce them to the types of penguins living in Antarctica. Make note that each penguin species looks a little different and may have unique food and habitat preferences.

Note: Stop here if doing this in two lessons. If doing this in one lesson, this is a good place for a brain break – allow students to act like penguins for a few minutes – flap their wings, pretend to swim, waddle on the ice, “talk” to a friend penguin, ...etc.

PART II

7. Due to Antarctica’s harsh environment, scientists have discovered new ways to study penguins. Penguin poo, known as guano, can actually be seen from space! Show students the vocabulary card with guano on it and have them say “Guano” after you say “Poo.” Scientists are using satellite images or pictures to see where penguins are living and count the size of their groups called colonies. Show students the satellite images of penguin colonies from space. Penguins eat a diet of fish, squid, and krill. Scientist can also tell what kind of food the penguins are eating based on the color of their poo or guano. Penguins who eat a diet primarily of krill have a reddish brown guano, while penguins who eat a diet primarily of fish have a blueish guano.

What did you notice or what did you see in the satellite pictures taken from space?

Student answers should begin to draw connections between the patterns or “splatters” on the picture and penguins. Help the students use descriptive language to describe what they see.

8. Place the butcher paper maps of Antarctica on the floor. Tell the class that we are going to be making our own model of a penguin poo satellite image from space. Use the following prompts and questions:

So, we know the color of penguin poo is based on what?

Penguin poo is based on their diet. Guano that is primarily made up of krill are reddish brown, while penguins who eat mostly fish make guano that is mostly blueish.

What do you know about where penguins like to live?

Penguins like to live near water so that they can get to the water around the continent to get food.

Knowing all of that, where would we find blue guano?

We should see a lot of blue guano near the coast.

Educator Notes:

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9. Stand close to the map of Antarctica. Using a pipette, carefully drop guano or penguin poo onto the map. Each drop represents a colony of penguins. Start by adding 1 drop at a time to the map. Students should take turns one at a time.

10. Once each student has had an opportunity to add penguin poo to their group map, bring up the satellite images from the British Antarctic Survey and have the children look at the satellite image compared to their own model.

Ask the following discussion questions:

What is one thing you see that is similar about your model and the satellite photo? How is your model like the map?

Student answers will include something about the shape and the color of the patterns, and maybe even some thinking about where guano is and where it's not.

What is one thing that is different?

Student answers should reflect thinking about how the colors may be different, or the shape of their pattern may be different.

11. To close the lesson, ask students to take a few minutes and to write or draw in their notebooks what they have learned about penguins, their guano or the animals that live on/near Antarctica.

Use the sentence beginning:

“Today, I learned _____.”

After a few minutes of writing, ask them to share something that they wrote or drew. Represent the class' learning on chart paper or make a bubble map to collect student answers.



In spring, king penguin chicks wait for days for their parents to return with food.

Photo: Fredi Devas © BBC NHU

Adelie Penguin

Size:

- 27 inches tall
- *Smallest penguin in Antarctica*

Physical Features:

- Black and white
- White ring around eye
- Peach feet

Habitat:

- Ice-free areas like rocky coasts

Diet:

- Mainly krill
- Small fish
- Squid



Photo: Shutterstock/ Simo Graells

Chinstrap Penguin

Size:

- 28 inches tall

Physical Features:

- Black band under chin
- Black beak
- Peach feet

Habitat:

- Ice-free areas like rocky coasts

Diet:

- Fish
- Squid
- Krill



Photo: Shutterstock/ Hullis

Gentoo Penguin

Size:

- 30 inches tall

Physical Features:

- Bright orange beak
- White caps over eyes
- Peach feet

Habitat:

- Ice-free areas like rocky cliffs
- Valleys
- Plains

Diet:

- Fish
- Squid
- krill

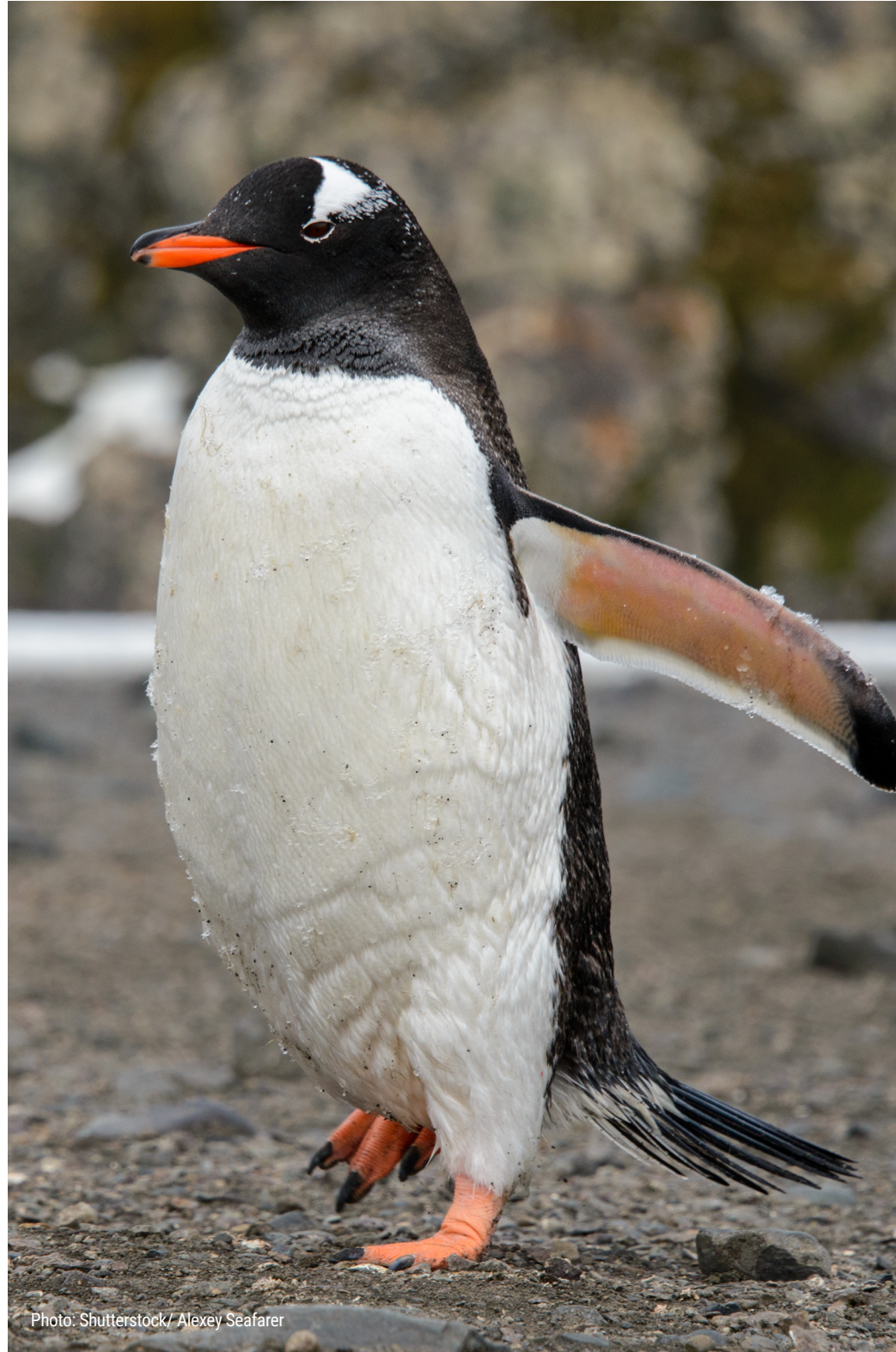


Photo: Shutterstock/ Alexey Seafarer

King Penguin

Size:

- 36 inches tall
- *Largest penguin species in the world*

Physical Features:

- Long beak with orange on lower bill
- Orange ear patches and throat
- Black feet

Habitat:

- Flat coastlines
- Valleys

Diet:

- Mainly fish
- May eat squid
- Krill and other crustaceans

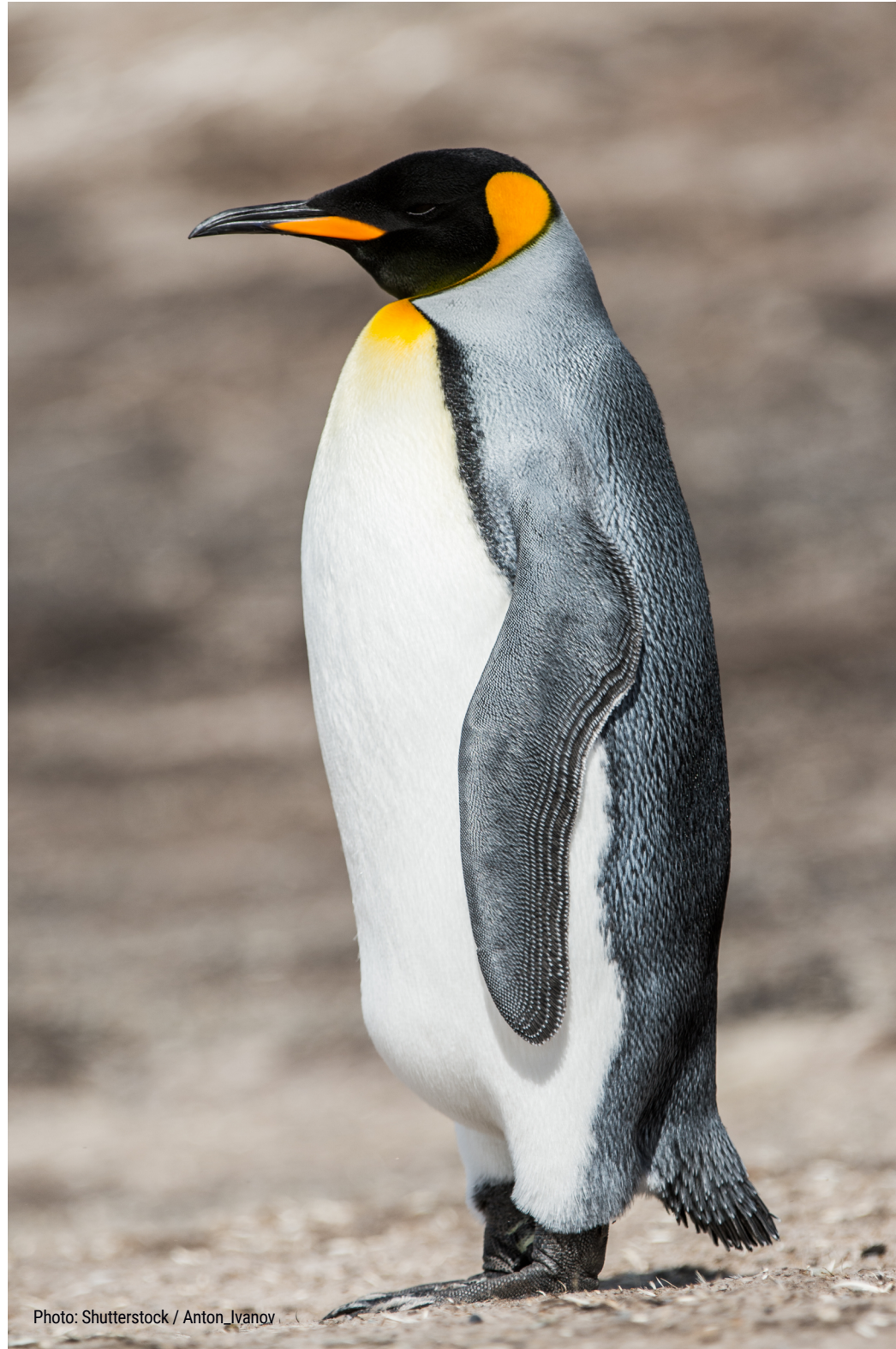


Photo: Shutterstock / Anton_Ivanov

Satellite Image

Guano Tells the Story

Scientists are using satellite images to see where penguins are living and count the size of their groups called colonies.

Scientists can also tell what kind of food the penguins are eating based on the color of their poo, or guano.

Penguins who eat primarily krill have a reddish brown guano, while penguins who eat primarily fish have a blueish guano.



Photo: DigitalGlobe / British Antarctic Survey

Outline of Antarctica

Directions: Use this outline of Antarctica on each sheet of butcher paper.

Do your best to fill the sheet.



ANTARCTICA

