

Black-Footed Penguin

Objectives:

1. Students will describe the characteristics of the black-footed penguin and its natural habitat.
2. Students will explain how the species has adapted (behaviorally and biologically) to the environment.
3. Students will hypothesize the growth or decline of the penguin population in the next five years.

Performance Objectives:

Grade 6: Strand 1: Concept 1-3; Concept 3 & 4

Strand 4: Concept 2-4 (inclusive)

Grade 7: Strand 1: Concept 1-3

Strand 4: Concept 3-4

Grade 8: Strand 1: Concept 1-4

Strand 4: Concept 4: Concept 2-4

NGSS MS-LS4 – 1-6

Background Information:

The black-footed penguin is also known by the names, ‘Cape Penguin’ and Jackass Penguin. They are bird because they have similar adaptations to other birds such as feathers, laying eggs, and having a beak. These birds stand 27 inches tall, between 5-8 pounds. They have firm wings that are adapted to be used as flippers to help the penguins swim. They seem somewhat “wobbly” on land. Their side-to-side pace appears awkward as they maneuver on dry ground. The term, “jackass” has been associated with this penguin due to the “braying” sound it makes, which is similar to the sound a donkey makes. The unique vocal sound is modified in three ways to deliver specific messages to one another.

Grades 6 – 8

Key Vocabulary:

- Pneumatic Bone
- Carnivorous
- Monogamous
- Endangered

Relation Literature:

Ocean and Sea

Steve Parker

The Discovery

Gordon Korman

My Season with Penguins

Sophie Webb

Growing Up Wild:

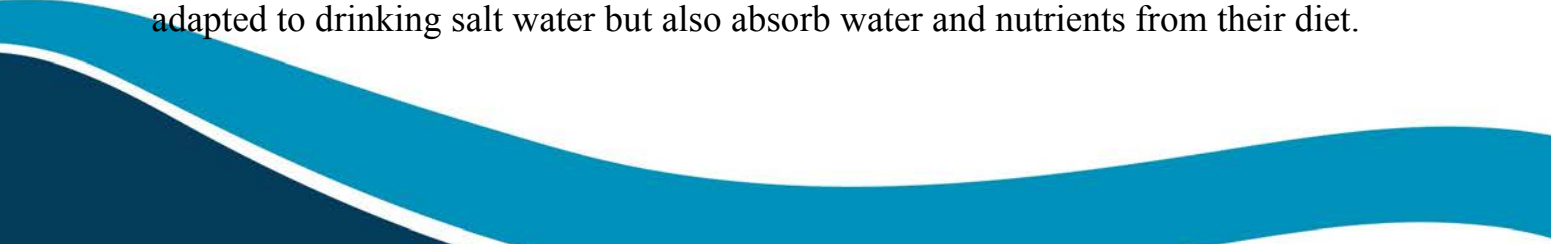
Penguins

Sandra Markle

Distinctive to penguins is the color of the body and the horseshoe mark on their chest. The front area of the black-footed penguin has speckles of black on the white areas; each penguin's pattern of speckles is unique, which allows each individual to be easily identified by each family members. The black-footed penguin also has a small area of pink skin above the eyes and the beak. This area is used to cool the blood down in the warm environment. Black-footed Penguins have a sturdy, black beak with a band of lighter color near the tip. The bill is used to catch fish and carry it back to the family. In addition to their flashy dressing, these penguins have hazel colored eyes, and of course, the feet are black. During nesting time, the female penguin digs a burrow under rocks or at the base of bushes and prepares it for eggs. Black-footed penguins generally lay 2 eggs in a nest that will be watched by both parents who remain **monogamous** for life. It takes 40 days for the eggs to hatch, and both parents care for the babies while they grow. Young penguins stay with their parents for about 4 months before starting out on their own. Baby penguins are hatched with a fluffy layer of gray feathers. The feathers help keep the baby protected and warm. As the baby matures, the feathers fall off the body and are replaced with new through a process called molting. Penguins experience their first molt around 22 months, then subsequently molt every 10 to 12 months after that. It takes almost 2 to 3 years for them to fully mature into adults.

The Black-footed penguin's natural habitat is in the ocean around rocky and sandy areas off the coast of South Africa. There are 24 coastal islands between Port Elizabeth and Nambia that the black-footed penguins call home. This species of penguin is the only one found around the southern coast of Africa, and they are not found anywhere else on Earth. While the land temperatures around the area are warm, the water currents are much colder. Black-footed penguins have a triple layer of feathers that overlap to maintain their internal temperature and keep them waterproof. Their natural oil secretion aids in the waterproofing the feathers so they can effectively swim and feed in the cold ocean waters. The penguin has a torpedo shaped body, which is critical to survival as it helps them swim at speeds of up to 12 mph and dive as deep as 30 feet. Unlike birds of flight that have **pneumatic bone** (hollow bones), penguins have solid bones which help them to dive.

Living in small colonies, the black-footed penguins make their way up and down the coastal area of southern Africa looking for food. Individuals have been known to travel 25 or more miles in search of food. Penguins are **carnivorous** and feed on squid, anchovies, sardines, and other small fish. A daily fish diet, eating about a pound of fish each day or 20% of their body weight to survive. Penguins have adapted to drinking salt water but also absorb water and nutrients from their diet.



Black-footed penguins can live up to 24 years in captivity and approximately 11 years in the wild. While appearing to have been on earth for thousands of years, these birds have faced survival challenges in the past century. The population has declined in significant numbers leaving the black-footed penguin in danger. Loss of food sources, water pollution, predators, and avian disease contributed to the black-footed penguin being placed on the ‘**endangered**’ list by the IUCN (2015). Penguin World reports that as many as 19,000 of these penguins were killed as a result of an oil spill that took place in their area in the year 2000.

To assist in protecting the black-footed penguin, conservation organizations have monitored the colonies, placed them on the endangered list, and participated in international breeding programs to ensure their survival. In addition, rescue efforts continue when these penguins are affected by oil spills or other disasters in and around their natural habitat.

Black-Footed Penguin
Classification: Aves
Order: Sphenisciformes
Family: Spheniscidae
Genus: *Spheniscus*
Species: *demersus*

Additional Resources

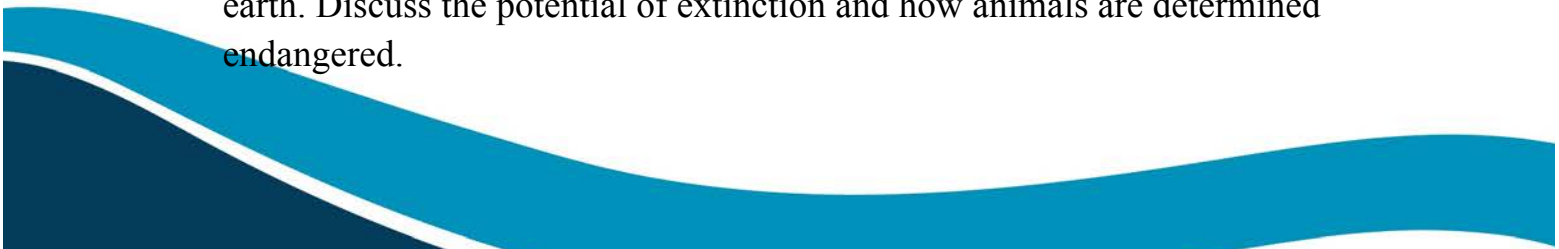
Penguins Braying: <https://www.youtube.com/watch?v=CFjFqIjWHM>

Penguins Swimming: <https://www.youtube.com/watch?v=hkAmMR-HE2Y>

Sources: Wayne/Encyclopedia of Life; Denver Zoo; IUCN Red List 2015; Encyclopedia of Earth; Penguin World; Maryland Zoo. Photos: OdySea Aquarium.

Procedures and Activities:

1. State the learning objectives.
2. Review vocabulary as words relate to the topic.
3. Read related literature. Follow up with open-ended questions about the penguin and its habitat.
4. Discuss fossil remains to emphasize the lengthy existence of penguins on earth. Discuss the potential of extinction and how animals are determined endangered.



5. Show pictures and discuss the physical appearance of the black-footed penguin. Discuss the anatomy, color traits, use of (wings) flippers, feet and bill. (See attached photo.)
6. Discuss the adaptations as they relate to environment and the difference between birds of flight and penguins.



Indicates ‘take along’ activity.

Activity: Students complete the Conservation Status Chart. Students may need to research the IUCN Red List (2015).

Optional Activity: Students identify and research another ocean animal to locate its status on the IUCN list.

Activity: Students research the decline of the black-footed penguin in its natural habitat. From the data, students create a population chart or graph on the computer. The chart or graph demonstrates the decline of the population from 1910 to today. Using the data collected, including the information regarding the impact of oil spills, human contact, loss of food and disease, students hypothesize the condition of the black-footed penguin population in five to ten years. Students write their predictions in essay form. Additionally, students may want to include conservation efforts in their writing. (Pre or Post field trip.)

STEM Activity: Students utilize data and information about the black-footed penguin to problem-solve the decline of the population. As the teacher guides students, they discuss the optimum environment for the penguin and develop solutions to the problem. Consider the efforts of aquariums and the impact on conserving the species. (Pre or Post field trip.)

Activity: Students create posters regarding the conservation of the Black-Footed Penguin.

Activity: Students create a tri-fold brochure for tourists to safely visit the black-footed penguin in its natural habitat.

Activity: Students write an expository essay about the black-footed penguin.



Activity: ‘My Special Home’ is a take-along activity that students complete during their visit to the aquarium.



Activity: “OdySea Aquarium Ethogram” is a tool to use at OdySea Aquarium while observing the African Penguins. Students choose a penguin to observe for 2 minutes and then make inferences about how it spends its day.

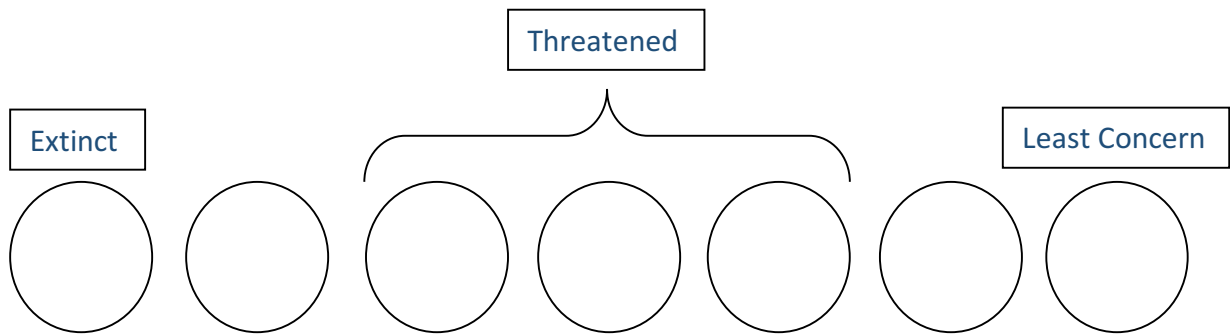
STEM Resources: www.livescience.com www.gk12.org/resources/stem
STEM Education Resource Center; STEM Educator Materials

Reflections and Assessments:

Students can be evaluated on the basis of participation. The use of technology is an expectation in the activities. Teachers may elect to use certain activities prior to the field trip, while other activities can be part of the culminating experience and take place following the field trip.



African Penguin Conservation Status



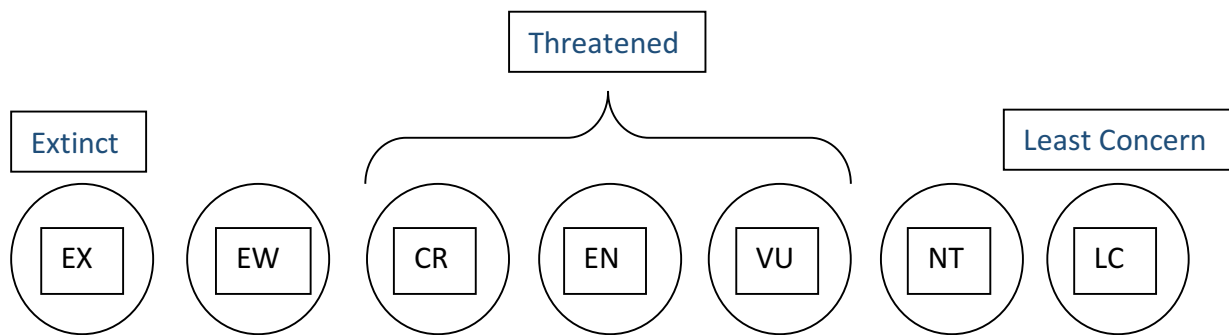
Fill out the conservation status chart above with the following abbreviations in order:

- Critically Endangered (CR)
- Vulnerable (VU)
- Extinct in the Wild (EW)
- Not Threatened (NT)
- Extinct (EX)
- Least Concern (LC)
- Endangered (EN)

Why are African Black Footed Penguins Endangered and what conservation efforts are being done to help?



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The population has declined in significant numbers leaving the black-footed penguin in danger. Loss of food sources, water pollution, predators, and avian disease contributed to the black-footed penguin being placed on the 'endangered' list by the IUCN (2015). Penguin World reports that as many as 19,000 of these penguins were killed as a result of an oil spill that took place in their area in the year 2000.

To assist in protecting the black-footed penguin, conservation organizations have monitored the colonies, placed them on the endangered list, and participated in international breeding programs to ensure their survival. In addition, rescue efforts continue when these penguins are affected by oil spills or other disasters in and around their natural habitat.

Tips for writing essays:

Thesis – The theme of your essay put into one sentence.

Consider a point of view (your argument)

Your thesis should do the following:

- respond directly to the prompt
- contain a definite statement
- is your thesis an arguable claim
- show you have knowledge of the topic
- illustrate a passionate perspective
- not too specific or too broad
- list key points to be discussed in the essay
- can you provide evidence to back up the thesis
- Typically, the thesis is located at the end of the opening paragraph. Make it clear, strong, and easy to find.

Example:

The life of a typical high school student is characterized by time spent studying, attending class, and socializing with friends.

Practice: Write a thesis statement about the following topics.

1. My favorite car

2. Attendance in school



Writing an Expository Essay

Paragraph #1 – Introduction

Topic Sentence:

Major Idea #1: _____

Major Idea #2: _____

Major Idea #3: _____

Closing Sentence:

Paragraph #2 – Major Idea #1 is discussed completely and with evidence

Topic Sentence:

Major Idea #1: _____

Major Idea #2: _____

Major Idea #3: _____

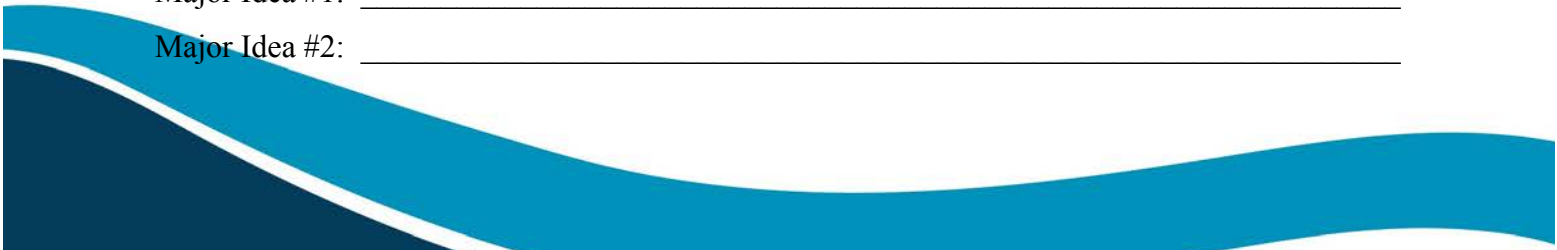
Closing Sentence:

Paragraph #3 – Major Idea #2 is discussed completely and with evidence

Topic Sentence:

Major Idea #1: _____

Major Idea #2: _____



Major Idea #3: _____

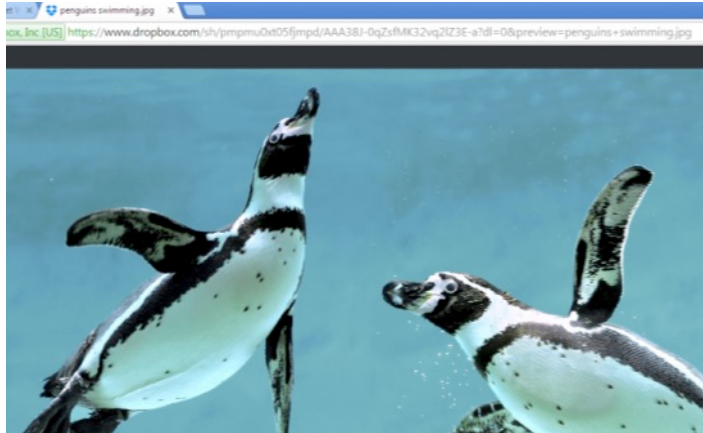
Closing Sentence:

Consider this activity your first draft. Using the outline, write your final essay.



My Special Home

I would like to spend some time with you and show you how I live.



Do you know what kind of bird I am?

What is my name?

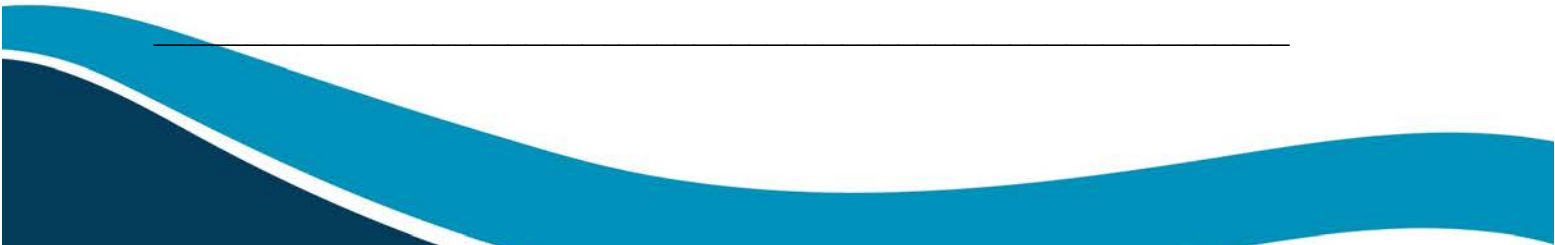
Look closely at my feet!
What do you see?

How have I adapted to ocean life? _____

What do penguins eat? _____
How fast can penguins swim? _____
What helps penguins swim so fast? _____
Explain the term, 'flightless bird.' _____

How can penguins be protected from loss of habitat? _____

While watching penguins, what did you observe? _____





OdySea Aquarium Ethogram

Practice what it is like to be a behavioral biologist and study one animal at OdySea Aquarium for two minutes.

An Ethogram is a way we can record the behavior of an animal over time in order to make inferences, or assumptions, about how an animal generally spends its time.

Every 15 seconds, mark what behavior the animal is exhibiting.

Species: _____

OdySea Aquarium Ethogram					
	Resting	Moving	Hiding	Eating	Other
0:15					
0:30					
0:45					
1:00					
1:15					
1:30					
1:45					
2:00					

Inference about animal's behavior:

