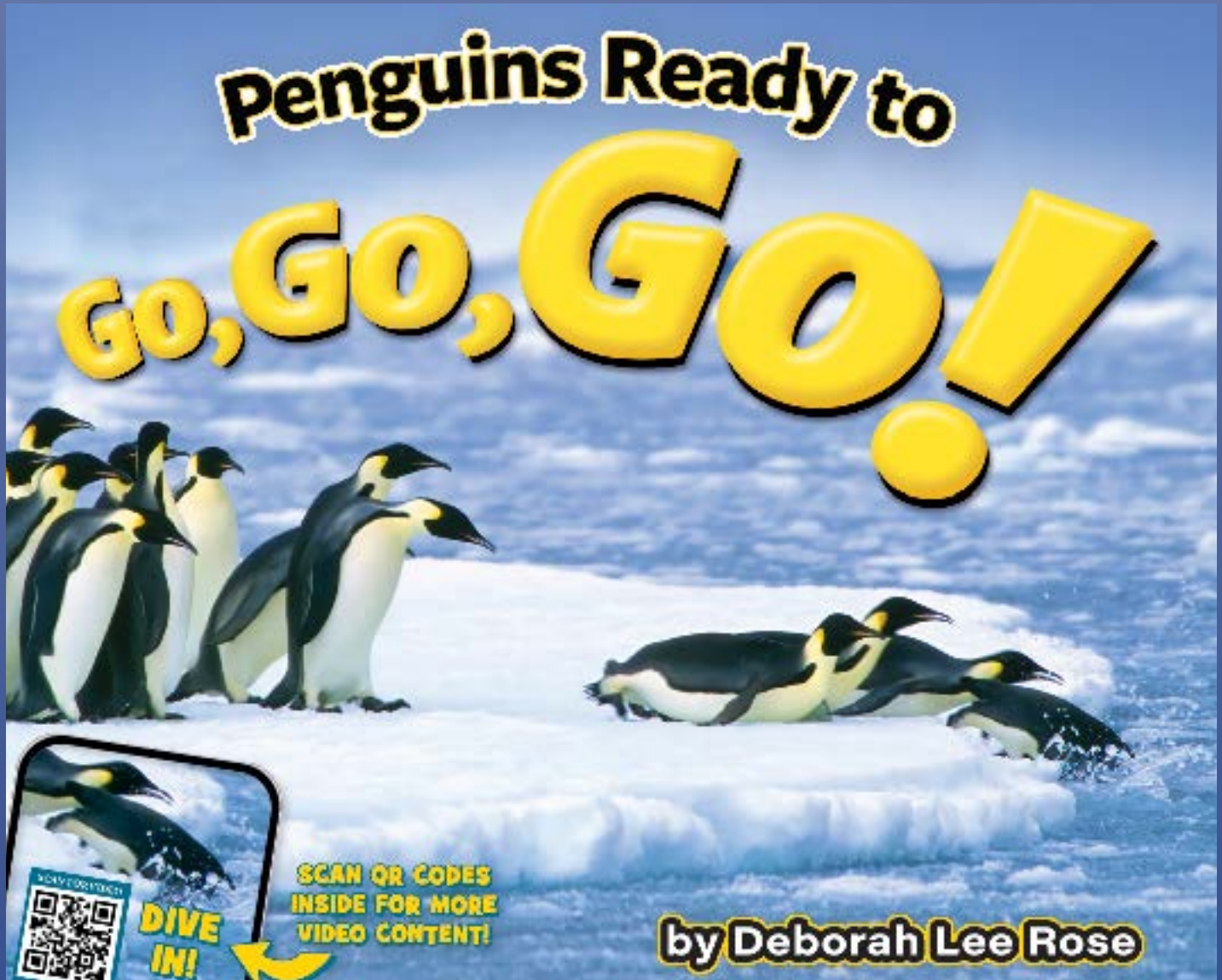


EDUCATIONAL GUIDE

Emperor penguins are full of surprises! How do they waddle, sled, leap, huddle, dive deep, make bubble streams, snuggle their chicks, and use teamwork to survive in frozen Antarctica? Fun language, amazing photos, and lots of STEM!



Publication April 2024—with many photos published for the first time in a children's book, and QR codes linked to penguin videos

Book by Deborah Lee Rose (www.deborahleerose.com), winner of 5 national STEM children's book awards, author of *Astronauts Zoom!* launched to the International Space Station for Story Time From Space, *Scientists Get Dressed*, *Ocean Babies*, *Into the A, B, Sea*, *One Nighttime Sea*; coauthor of *Beauty and the Beak* and *Swoop and Soar*

Guide design by Caitlin Sockin, WunderMill Books

PENGUIN AWARENESS DAY JANUARY 20 **WORLD PENGUIN DAY APRIL 25**

ABOUT THE BOOK

Children (and adults) love Emperor penguins, they're so waddly and their chicks are so fluffy. In *PENGUINS READY TO GO, GO, GO!* discover how these birds do way more than waddle, with amazing adaptations to live and raise their young in frozen Antarctica. Find **rhyming verses full of fun penguin surprises, photos by world experts and explorers—many being published for the first time in a children's book, highlighted WOW! facts, STEM-rich backmatter, and QR codes linked to Emperor penguin videos.** *PENGUINS READY TO GO, GO, GO!* delights, teaches, and inspires children to dive into reading, STEM, and environmental learning. Young readers learn about **Emperor penguins' extraordinary secrets of survival**, from bubbles to teamwork; the **newest technology scientists use**, like robotic rovers, to study and conserve these marine birds; how **climate change and human activity impact this threatened species**; and how **we can help protect them.**



A NOTE FROM DEBORAH LEE ROSE

"Children always ask me where I get my ideas. This book began when a katydid landed on my car windshield! That 'hitchhiking' insect got me thinking about animals that find help to get from here to there, then wondering about animals that don't move much at all. I had thought Emperor penguins fit into the 'don't move much' group. In fact, scientists are discovering more and more about these flightless birds' amazing ways of moving to survive, on the sea ice and in the polar ocean. I love the ocean and its animals—plus when I learned this species is threatened, I knew I had to write this book."

Special thanks to **Paul Ponganis**, Scripps Institution of Oceanography, UC San Diego, for scientific review, and his Antarctic photos and videos linked to QR codes in the book; **Woods Hole Oceanographic Institution; NSF; Katsufumi Sato**, Atmosphere and Ocean Research Institute, University of Tokyo, for his videos linked to QR codes in the book; **Cherrie MacInnes**, Maine, for all her educational insights; and **Fabienne Durand**, France, for her special spread in the book about conserving these penguins and their ecosystem. Find full credits in the book.



READ *PENGUINS READY TO GO, GO, GO!* AND FIND ANSWERS

NGSS: HIGHLIGHTS FROM NEXT GENERATION SCIENCE STANDARDS

1. Where do Emperor penguins spend different parts of their life cycle? What is their polar ecosystem like?

- NGSS—Biodiversity and Humans: There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1)
- OCEAN LITERACY PRINCIPLES—#5: The ocean supports a great diversity of life and ecosystems. Ocean life ranges in size from the smallest living things—microbes—to the largest animal that has lived on Earth—the blue whale...

2. When Emperor penguins aren't waddling on the sea ice, how do they move and why?

- NGSS—Structure and Function: All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. (1-LS1-1)
- OCEAN LITERACY PRINCIPLES—#4: The ocean makes Earth habitable.



3. How do Emperor penguins protect their eggs and chicks from Antarctica's extreme weather?

- NGSS—Growth and Development of Organisms: Plants and animals have unique and diverse life cycles. (3-LS1-1)
- OCEAN LITERACY PRINCIPLES—#3: The ocean is a major influence on weather and climate.

4. How do Emperors penguins find food, and feed their young?

- NGSS—Organization for Matter and Energy Flow in Organisms: All animals need food in order to live and grow. They obtain their food from plants or from other animals. (K-LS1- 1)
- NGSS—Growth and Development of Organisms: In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2)

5. What different ways do Emperor penguins use their beaks?

- NGSS—Information Processing: Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive.

6. How do Emperor colonies use teamwork to survive the Antarctic winter?

- NGSS—Social Interactions and Group Behavior: Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size. (3-LS2-1)
- NGSS—Natural Hazards: Some kinds of severe weather are more likely than others in a given region. (K-ESS3-2)

7. Why do Emperor penguin adults and chicks need the sea ice?

- NGSS—Natural Resources: Living things need water, air, and resources from the land, and they live in places that have the things they need. (K-ESS3-1)
- NGSS—The Roles of Water in Earth's Surface Processes: Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3)
- OCEAN LITERACY PRINCIPLES—#1: Earth has one big ocean with many features.

8. How do scientists study these birds on the sea ice, including using robots, and in the ocean?

- NGSS—Scientific Knowledge is Based on Empirical Evidence: Scientists look for patterns and order when making observations about the world. (1-LS1-2)
- NGSS—Influence of Science, Engineering and Technology on Society and the Natural World: Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (1-LS1-1)

9. How do human activities and climate change threaten these marine birds?

- NGSS—Patterns: Patterns of change can be used to make predictions. (3-LS1-1)
- NGSS—Cause and Effect: Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1)
- NGSS—Human Impacts on Earth Systems: Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (K-ESS3-3)
- OCEAN LITERACY PRINCIPLES—#6: The ocean and humans are inextricably interconnected.

10. What can we do to protect Emperor penguins and their polar ecosystem?

- NGSS—Adaptation: For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)
- OCEAN LITERACY PRINCIPLES—#7: The ocean is largely unexplored... With a rapidly warming climate and increasingly dominant human footprint, it is critical to explore and understand this driving force for life on Earth.





LANGUAGE ARTS

ACTION WORDS—How many action words can students find in the book? When you read it aloud, try having children respond with a penguin-y movement (like waddling or "flapping their wings") when they recognize a verb.

ALLITERATION and **ONOMATOPOEIA**—Find fun alliteration, words that start with the same sound, and onomatopoeia, words that sound like what they describe like *WHOOSH* and *PLOP!* Ask students what sound words they could use for other animals in a story.

PHOTO PROMPTS—Choose one or several photos and ask:

- Why do you think the penguins are moving this way?
- What happened just before or after this picture was taken?

- NGSS—Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
- Common Core Standards: ELA/Literacy—Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

READING IS FUNDAMENTAL— LITERACY CENTRAL

Find special RIF reading activities and resources for the book at <https://www.rif.org/literacy-central/book/penguins-ready-go-go-go>.



EMPEROR EGG ROLL—STEM ACTIVITY

by Deborah Lee Rose

An Emperor penguin mother incubates a single egg on her feet. When the mother leaves to hunt in the ocean, the mother and father use their beaks to move their egg onto the father's feet. The father incubates the egg on his feet until it hatches, then keeps the new chick safe and warm on top of his feet.

What You'll Need (no real ice or snow required):

short plastic shoehorn "beak" for each child to hold with both hands; model "egg" or roundish soft toy or ball about 5 inches high; optional—fabric or paper for "ice" and "snow"/cardboard and strong tape/rubber bands for penguin "feet"

What to Do: Each "mother" starts with an "egg" on top of the feet. Both "parents" use their feet and "beaks" to move the "egg" to the "father's" feet, without the "egg" touching the "ice."



PENGUIN SHUFFLE—MODELING TEAMWORK ACTIVITY

by Deborah Lee Rose

Emperor penguins use teamwork to survive. In huge huddles, they keep moving step by step so all the birds get a turn in the middle, where the temperature can be as warm as a human body.

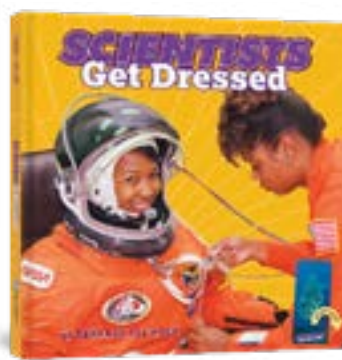
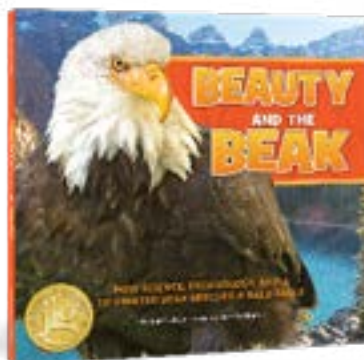
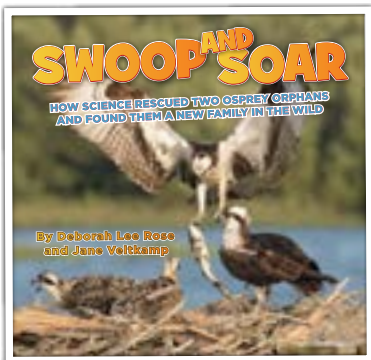
Have students try making a moving model of penguin teamwork. They can be penguins and move through a huddle, or move pieces on a tabletop to show a penguin huddle's shuffle pattern. Ask: How do you think penguins could move through their huddle to give each one a turn in the middle?

Discuss and maybe chart how humans use teamwork too. Ask: Are you part of a group project or activity? Does it help your family, school, community, or the environment? How do you think people can work together to protect penguins, the ocean, and Earth's environment?

WATCHING EMPEROR PENGUINS AND OTHER BIRDS

PENGUINS READY TO GO, GO, GO! has QR code links to watch wild Emperor penguin videos. SeaWorld® in California and major aquariums in other countries have live Emperor penguins on exhibit. Many zoos and aquariums have other live penguin species.

Encourage students to watch other birds near school or home, or online or on video. Ask: How do the birds move? How do they catch and eat their food? How do they take care of their young? Are they like Emperor penguins?



Deborah's STEM books published by Persnickety Press/WunderMill Books