



# SCIENTISTS IN THE FIELD

Where Science Meets Adventure

DISCUSSION AND ACTIVITY GUIDE

## *The Polar Bear Scientists*

By PETER LOURIE

### About the Series



*The Polar Bear Scientists* is part of the award-winning Scientists in the Field series, which began in 1999. This distinguished and innovative series examines the work of real-life scientists doing actual research. Young readers discover what it is like to be a working scientist, investigate an intriguing research project in action, and gain a wealth of knowledge about fascinating scientific topics. Outstanding writing and stellar photography are features of every book. Reading levels vary, but the books will interest a wide range of readers.



***The Polar Bear Scientists***  
by Peter Lourie

### About the Book

Peter Lourie describes the work and research of the scientists at the USGS Polar Bear Project as they study the impact of global warming, pollution and other environmental issues on polar bears.

### About the Author

The writer and photographer Peter Lourie believes that firsthand exploration is an important part of the research he does for the adventure and science books he writes for children and books. He has studied early human bones with Margaret Leakey and searched for Incan gold in Peru. He has observed Colobus monkeys in Tanzania, whales in the Arctic, and held a tranquilized polar bear on his lap in Alaska. He also teaches writing at Middlebury College and lives with his family near Middlebury, Vermont.

### Pre-Reading Activity

When we read animal studies by scientists, they always come with a whole slew of numbers. What numbers do scientists care about and why? What is a scientific study? Make a list of statistics that we would collect if we were scientists studying, say, dogs. Later in the reading of this book, compare the numbers from this list with the numbers shown in the text. Discuss.

Make a video of the class discussing something—anything—for a few minutes. Have someone from the class take notes on this discussion. Also make an audio recording. Without sharing the notes, the audio, or the video, have someone write a recap of this discussion a few days later. After this recap, share the notes, play the audio, and show the video. Discuss the differences among the various ways of recording this same information. Are there limitations for the ways we collect and use information? Are there limits to what we can learn from a webcast or video recordings? The polar bears in this book are studied by using webcams. Webcams are used, in part, because of the cost of transporting scientists to polar bear habitats. Consequently, part of

Houghton Mifflin Harcourt Books for Young Readers

Visit [www.sciencemeetsadventure.com](http://www.sciencemeetsadventure.com) for authors' Adventure Notes, teacher resources, videos, and more!

## *The Polar Bear Scientists*

BY PETER LOURIE

the conversation must deal with practical considerations such as money. What is the ideal way to study an animal, if money were not a limitation?

### Discussion Questions

What is the difference between weather and climate?

Polar bears depend on sea ice for their survival. With a population already reeling from “overharvesting,” the polar bear sea ice is melting at an alarming rate. If the polar bear habitat becomes increasingly unstable, what should the scientific response be? Should polar bears be allowed to go extinct if their habitat disappears?

The top carnivores of a food chain help to maintain balance in an ecosystem. How does this work? What will happen in this cold Arctic environment if polar bears become extinct?

What are the average temperatures in the Arctic? What are the wind conditions? What sort of gear would a scientist be required to don in order to be safe in this part of the world? Discuss the very practical human limitations and concerns for working and studying polar bears in this region.

When scientists paint numbers on the polar bears, they say they do this so they do not accidentally tranquilize the polar bear twice in one season. The paint makes it easy for scientists to avoid shooting the bear again, which benefits the bear. However, does the paint pose any unintended negative consequences for the bears?

If we decide that saving polar bears is important, does it matter if the sea ice melts? Can we save both the ice and the polar bears? What needs to happen?

Animals regularly become extinct. We need only look at the dinosaurs and animals such as mastodons and saber-tooth tigers to know this is true. These groups of animals became extinct without any help from people. Should we simply accept the fact that we may be dealing with one of those unpleasant but true facts of life?

### Applying and Extending Our Knowledge

Look back at the discussion question in which students discussed the difference between climate and weather. Dig a bit deeper into this discussion:

- Examine the various maps of the Arctic region in the book, including the den location map on page 64. Compare the size and location of this area to the area of the state in which you live.
- Transpose the Arctic area onto a map of your state. What are the sizes? How much bigger or smaller is your state?
- Research the Arctic climate and compare it to the climate in which you live.
- In the event that the sea ice fails and polar bears begin the move toward extinction, make a case both for and against the possibility of the United States creating habitats just large enough for zoolike polar bear enclosures. Make sure you take into consideration the full range of habitat requirements (diet, physical size of habitat, climate, plants, etc.).
- Research the historical range of polar bears. Has the range changed? What could humans do to make life easier for polar bears?
- Currently, there is a big difference between the scientific community’s perception of global warming and the perception of global warming among the population as a whole. Is there any sort of consensus in the scientific community concerning the cause of global warming? What do polls suggest that the average person believes the cause(s) to be?
- The previous activity suggests that scientists have not been effective in conveying their position on global warming. Is presenting the consensus of scientific research important? What should scientists do to be more effective in presenting the results of their research? Prepare an ad campaign to display in your school, either on bulletin boards or online, that shares the current position from the scientific community on global warming and the range of predictions for what this may mean to polar bears and humans.

### Common Core Connections

CCSS.ELA-Literacy.RH.6-8.7

Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

CCSS.ELA-Literacy.W.6.7

Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

CCSS.ELA-Literacy.W.6.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1-3 above.)

CCSS.ELA-Literacy.RST.6-8.1

Cite specific textual evidence to support analysis of science and technical texts.

## *The Polar Bear Scientists*

BY PETER LOURIE

Throughout the book we read about the “immense size” of the polar bear’s paws. We also read about the beauty of polar bears and how cold it is to work with them.

- Prepare an online presentation showing how polar bears fit into the world in relation to other kinds of bears.
- In the presentation, make sure to explain the difference between polar bears, bears such as grizzly bears, and even animals such as pandas.
- Make a map showing where various types of bears live.
- Make a set of cards showing the types of bears, their range, what they eat, threats to the various species, and other interesting facts.
- Prepare a poster or an online presentation distinguishing polar bears from other bears.
- Prepare a Venn diagram showing what polar bears hold in common with other bears and how they differ.

### Common Core Connections

CCSS.ELA-Literacy.RST.6-8.7

Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CCSS.ELA-Literacy.W.6.7

Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

CCSS.ELA-Literacy.WHST.6-8.6

Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

On page 53 we see a picture of a polar bear radio collar that contains the GPS and VHF radio transmitter. Much of the success of the Polar Bear Research Project depends on the ability to tag, track, and find polar bears!

- Find the longitude and latitude of your school to the nearest degree.
- Using Google Maps, zoom in to the location of your school. Print out maps for students and have them insert and label a grid showing precise locations where students found trash.
- If your classroom has a document camera, use this tool to share several of the students’ maps. Discuss the different ways students numbered or labeled their grids.
- Share the exact GPS location (which can be found online through a longitude latitude search: [www.findlatitudeandlongitude.com](http://www.findlatitudeandlongitude.com)). Discuss why it is important to have a standard reference. Discuss why a simpler numbering system might be easier for tracking trash at school.

### Common Core Connection

**RH.6-8.7.** Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

**RI.6.7.** Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

**W.6.7.** Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

On page 15 we read, “‘We became aware,’ Steve says, ‘of global warming and the threat it presents to polar bears—a far greater threat because of the extensive loss of essential habitat. You can have a population that is over-harvested, and by reducing the harvest you can allow population to rebound and grow again. But if a population of animals doesn’t have appropriate habitat, then you’re in trouble. Because the world is warming (and it’s warming because of human influences), there’s going to be less sea ice. Sea ice is the habitat of polar bears. . . . So that’s the situation we’re in now. Whereas a couple of decades ago our main concern was hunting, now our principal concerns are global warming and habitat loss.’”

- The typical response from many in the face of a quote like this is to assume that the change required applies more to other people than it does to them. Describe in a piece of writing the steps you could take to change a long-held belief or turn an enemy into a friend. Include an example of how you could apply that to a belief or situation in your own life.
- How do people change long-standing traditions and habits? How would we begin to change the behavior of a state or nation? What steps would we need to take to, say, persuade people to stop using air conditioning? How would you go about getting people to use public transportation or to stop using gas engines?
- Present an online report showing what causes global warming in simple enough terms that younger students are able to understand. Make a list of as many contributing factors to global warming that your class or group can think of. Include on this list the challenges for eliminating or greatly reducing each item’s contribution to global warming. What are the impediments for eliminating or reducing each item? Prepare a persuasive essay to deliver to Congress or to the Senate that has the best chance of gaining political momentum that creates political and social change.
- Readers in the United States are a long way from polar bears and may feel no sense of urgency in changing behaviors. It may be easy to suggest changes for other

## *The Polar Bear Scientists*

BY PETER LOURIE

states or other groups of people a long way away from us, but what changes in behavior do we need to make? What changes should our schools and communities adopt to save animals such as polar bears? List these too. For all lists, supply a brief annotation that explains each list entry.

### Common Core Connections

CCSS.ELA-Literacy.RI.6.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.  
 CSS.ELA-Literacy.RI.6.3 Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).  
 CCSS.ELA-Literacy.W.6.1 Write arguments to support claims with clear reasons and relevant evidence.  
 CCSS.ELA-Literacy.W.6.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

A graphic on page 22 shows the very best places on a polar bear's body to dart them, bad places to dart them, and even places that are good for skinny bears but not so good for bears with more fatty tissue. On page 36 we read that the female's fat has sustained both herself and her cubs. We also read that she must restore her fat to ensure their continued survival. On page 40 we read, "For polar bears, fat is where it's at. Fat polar bears are better able to survive long periods when the hunting may not be so good."

- How does fat protect polar bears? Prepare a poster or a diagram that shows where on the polar bears fat accumulates and how it works.
- Students will quickly realize that fat or blubber keeps many arctic animals from dying in the frigid arctic region. Use a website such as Steve Spangler Science to do some of the experiments showing how fat helps to insulate polar bears: [www.stevespanglerscience.com/lab/experiments/blubber-gloves](http://www.stevespanglerscience.com/lab/experiments/blubber-gloves)
- Prepare pictures or videos that show the adaptations polar bears have made to the cold. Compare the fur of polar bears to other bears. Compare the paws of polar bears to the paws of other bears. Compare the coloration of polar bears to other bears. Compare the behavior of polar bears on the ice to the behavior of black bears in Yellowstone. What do these characteristics do for the polar bear that helps it to survive in the Arctic?
- The chart on page 22 lends itself well to a political cartoon from the polar bear's perspective. Imagine how a polar bear would react to seeing this graphic, and draw or assemble a political cartoon response from the polar bear.

### Common Core Connections

CCSS.ELA-Literacy.RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).  
 CCSS.ELA-Literacy.W.6.7 Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.  
 CCSS.ELA-Literacy.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.  
 CCSS.ELA-Literacy.SL.6.5 Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

- Create a picture glossary of all the organisms found in the Arctic.
- Indicate which ones, if any, are found outside of the Arctic (and when). Indicate whether an organism is a year-round resident or a transient species. If transient, what is the range of their stays?
- Include scientific name, common name, range, animal description, habitat description, diet, and any noteworthy facts (about behavior or endangered status, etc.).
- Group animals by families and then alphabetical by scientific name.

### Common Core Connection

CSS.ELA-Literacy.RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.  
 CCSS.ELA-Literacy.RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).  
 CCSS.ELA-Literacy.W.6.7 Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

On page 65, George Durner issues an optimistic assessment of the situation in the Arctic. He says, "A lot of people may feel that we are at a tipping point, where we can't do anything about the melting ice and the downward direction that bear populations are headed. I guess my optimism comes from knowing that humans can make a difference."

- If we were making a soundtrack of the history of polar bears and projecting the future of polar bears, what ten songs tell the story and the future of the polar bears the best? Create an annotated playlist explaining the music in terms of polar bear history and future.

*The Polar Bear Scientists*

BY PETER LOURIE

- Spliced between conversations with Dr. Steven Amstrup is a book filled with information primarily concerned with tracking, darting, collecting information, and preparing equipment for studying the health of polar bears. How should we adapt this information to share with younger students? Prepare a report for first-or second-graders on how scientists collect information for the study of polar bears. Perhaps this information can be conveyed via a skit or a picture book or a non-fiction video presentation. Make a list of the essential information that young students should know. Prepare your method for delivering that information and then prepare some sort of assessment that will show you how effective you were at delivering the information.

**Common Core Connection**

CCSS.ELA-Literacy.SL.6.5

Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

CCSS.ELA-Literacy.W.6.2

Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

CCSS.ELA-Literacy.W.6.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1-3 above.)

It may not be possible for many students to really grasp the nature of the weather in the Arctic and thus to fully understand the difficulties in the study of this region and these polar bears.

- Write a reflection on what you predict the challenges may be for the scientists working in this area. Share this information with the public relations department of a scientific agency working in the Arctic. Share any responses with your class.
- Dr. Amstrup knew from the time he was a young boy that he wanted to study bears. Most of us are not that focused. What do you know about yourself in terms of career possibilities? Reflect on your own potential career possibilities. If you looked into the future and saw yourself as a scientist, whether surprised or not, what is the most likely area of scientific work that you could be doing?

**Common Core Connections**

CCSS.ELA-Literacy.W.6.1.a

Introduce claim(s) and organize the reasons and evidence clearly.

CCSS.ELA-Literacy.W.6.3

Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.

CCSS.ELA-Literacy.W.6.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1-3 above.)

CCSS.ELA-Literacy.W.6.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

**Further Reading**

Person, Stephen. *Polar Bear: Shrinking Ice*. Bearport, 2011.

**Other Websites to Explore**

Facts and photographs on polar bears from National Geographic:

[animals.nationalgeographic.com/animals/mammals/polar-bear](http://animals.nationalgeographic.com/animals/mammals/polar-bear)

Extensive information on polar bears and the impact of global warming on this endangered species from the National Wildlife Federation:

[www.nwf.org/wildlife/wildlife-library/mammals/polar-bear.aspx](http://www.nwf.org/wildlife/wildlife-library/mammals/polar-bear.aspx)

News article on a recent NASA study on the loss of glaciers in West Antarctica:

[www.nasa.gov/press/2014/may/nasa-uci-study-indicates-loss-of-west-antarctic-glaciers-appears-unstoppable/#.U3VZC17oa2w](http://www.nasa.gov/press/2014/may/nasa-uci-study-indicates-loss-of-west-antarctic-glaciers-appears-unstoppable/#.U3VZC17oa2w)

Guide created by Ed Spicer, curriculum consultant, and Lynn Rutan, retired middle school librarian, now reviewer and blogger at *Bookends: the Booklist Youth Blog*.