



## In This Guide

This guide contains language arts and science or social studies lessons for articles in this issue of EXPLORER TRAILBLAZER.

## Explorer Magazine

EXPLORER classroom magazines are written for each grade, 2-5. Through great storytelling and stunning photographs, the magazines develop literacy skills and teach standards-based content aligned with the Common Core State Standards (CCSS), Next Generation Science Standards (NGSS), or National Council for the Social Studies (NCSS). The activity on the magazine's back cover is tailored to the NG Learning Framework. (see page 2)

EXPLORER magazines offer engaging reading opportunities for students with different ability levels in the same class. All articles have been measured using the Lexile® Framework for Reading. Articles in EXPLORER TRAILBLAZER will be within the 350-750L range.

For additional resources to extend your students' learning, visit EXPLORER's website, [NatGeo.org/ExplorerMagazine](http://NatGeo.org/ExplorerMagazine).

## Your Subscription Includes:

- Magazines • Classroom Posters • Projectables
- Teacher's Guides • Digital Magazines (additional subscription required)

## INTRODUCTION

### BACKGROUND

Since 1888, the National Geographic Society has funded scientists and explorers and shared their findings with the world. To support educators who use our resources, we have created a Learning Framework, which lays out what we believe students should learn from their experiences with the Society.

### PURPOSE

The Learning Framework was designed to convey the Society's core beliefs and values. It is built around a set of attitudes, skills, and knowledge that embody the explorer mindset.

To determine the learning outcomes within the Learning Framework, we dug deep into national standards in key subject areas. We also sought advice from subject matter and child development experts, along with the combined expertise of NG instructional designers, researchers, and content developers. To learn more, go to: <https://www.nationalgeographic.org/education/learningframework/>.

### IMPLEMENTATION

Each article in this magazine has a knowledge-based link to the Learning Framework. Students will use the skills and attitudes as they do the activity on the back cover. The activity relates to the article "River of Elk."

## MINDSET OF AN EXPLORER

### KEY FOCUS AREAS



#### Attitudes

*National Geographic kids are:*

**CURIIOUS** about how the world works, seeking out new and challenging experiences throughout their lives.

**RESPONSIBLE**, with concern for the welfare of other people, cultural resources, and the natural world. NG kids are respectful, considering multiple perspectives, and honoring others regardless of differences.

**EMPOWERED** to make a difference. NG kids act on curiosity, respect, and responsibility. They are adventurous and persist in the face of challenges.



#### Skills

*National Geographic kids can:*

**OBSERVE** and document the world around them and make sense of those observations.

**COMMUNICATE** experiences and ideas effectively through language and media. They are storytellers!

**COLLABORATE** with others to achieve goals.

**SOLVE PROBLEMS** by generating, evaluating, and implementing solutions after identifying alternatives, weighing trade-offs, and making well-reasoned decisions.



#### Knowledge

*National Geographic kids understand:*

**THE HUMAN JOURNEY** is all about where we have been, where we live now (and why), and where we are going.

**OUR CHANGING PLANET** encompasses all that coexists on our planet—interconnected through systems that generate and nurture each other.

**WILDLIFE AND WILD PLACES** inhabit our planet—from the butterflies in our backyards to the lions in Africa.

### Standard Supported

- Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (CCSS.RI.3.3)

### Resources

- Vocabulary Assessment Master (page 7)
- Language Arts Assessment Master (page 8)

### Summary

- The article "Lord of the Wings" reveals how an albatross can travel up to 966 kilometers (600 miles) a day without flapping its wings.

## BUILD VOCABULARY AND CONCEPTS

- **drag**
- **force**
- **gravity**
- **lift**
- **thrust**
- **trait**

Display the vocabulary words on page 9 of the projectable magazine. Invite volunteers to read aloud the words and their definitions. Encourage students to share what they know about each word.

Give each student a copy of the **Vocabulary Assessment Master**. Instruct students to record each word and its definition. As a class, brainstorm ideas about how the words might be related. For example, gravity causes objects to fall down but lift pushes them up. Instruct students to write three sentences telling how the words are connected, using different vocabulary words in each sentence.

After reading the article, divide the class into small groups. Have students share the connections they predicted before reading the article. Instruct them to reevaluate each connection based upon what they have learned. If necessary, have students rewrite their ideas to more accurately reflect connections between different vocabulary words.

## READ

Inform students that the purpose of this article is to introduce them to the wandering albatross, a type of seabird that can fly for months without touching land. As they read, they'll learn about how the bird is able to do this.

Explain to students that when people write, they often include examples of cause-and-effect to help readers understand the text. Good readers always search for these connections when they read.

Display pages 2-3 of the projectable magazine. Read aloud the headline and deck. Then model how to identify a cause-and-effect relationship. **Say:** *Sometimes when you read, the writer tells you what happened and why. The "what" is the effect, or result. The "why" is the cause, or the reason. The deck here contains some interesting information. It says that the wandering albatross can fly for months without touching land. That's pretty amazing. It's also an effect. What I want to know is the cause, or why this possible.* Draw students' attention to the headline and the birds spreading their wings in the photo. **Say:** *I'm not positive, but my guess is that the cause has something to do with the bird's wings. I'll have to read the article to know for sure.*

Point out to the class that sometimes there is just one cause and one effect in a cause-and-effect relationship. But often it's more complicated than that. Several things may cause one thing to happen. Likewise, one cause can have many different effects.

Give each student a copy of the **Language Arts Assessment Master**. Have students read the article on their own. As they read, instruct students to record one example of a cause-and-effect relationship in each section of the article. Challenge them to find examples that have more than one cause or effect.

# Lord of the Wings

## LANGUAGE ARTS

### TURN AND TALK

Have students turn and talk to discuss what they learned about the wandering albatross. **Ask:** *What is a wandering albatross?* (a type of seabird) *Where does the wandering albatross live?* (in Earth's southern oceans) *What is perhaps the most interesting thing about a wandering albatross?* (how far it can fly) Invite students to share what else they learned about the albatross.

- **Finding Connections** Explain to students that a word's definition tells you what the word means. But readers can get a more thorough understanding if they recognize how important words are connected. Point out that this is exactly what they did when they wrote sentences connecting the article's vocabulary words. Instruct students to turn and share the sentences they wrote on their **Vocabulary Assessment Masters** in small groups. Encourage students to identify and discuss similarities and differences in their sentences to get an even deeper understanding of the vocabulary words.

- **Identify Cause-and-Effect Relationships** After reading the article, remind students that making connections can help them understand what they've just read. One type of connection is the relationship between a cause and an effect. Invite students to turn and talk to share their **Language Arts Assessment Masters** in small groups. Instruct students to compare their results. Did they each identify the same cause-and-effect relationships? If not, do all of their examples make sense? Encourage students to review the article to see where any missed connections went astray. Rejoin as a class. Invite students to share examples of one-on-one relationships as well as connections with more than one cause or effect.

### WRITE AND ASSESS

You may want students to write about what they learned to assess understanding. Encourage students to reflect upon what they read and how it affected their ideas about the topic.

- *How does a wandering albatross fly?*
- *How often does a wandering albatross go to land? What is island life like for this seabird?*
- *What surprised you about what you read?*

### Standard Supported

- The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (NGSS.3-PS2-2)

### Resources

- Content Assessment Master (page 9)
- Comprehension Check (page 10)

### Science Background

The wandering albatross is a feathered giant. Adults can weigh up to 10 kilograms (22 pounds) and have a wingspan that stretches up to 3.5 meters (11.5 feet). That's the longest wingspan of any living bird.

These seabirds spend most of their lives in flight. Unlike most birds, they don't flap their wings to stay aloft. Instead, they stretch out their wings and lock them into place. Then they can glide for hours without rest. This flying technique is known as dynamic soaring.

Dynamic soaring is possible because wind speeds vary with altitude. The albatross flies a constant looping pattern. It gains altitude as it glides up on fast-moving updrafts. It gains speed as it dives back down toward slower moving air at the surface. This allows the bird to take advantage of differences in wind speed and capture energy from wind.

Throughout most of its 60-year lifetime, the wandering albatross flies above or rests on the sea. But adults do return to land to breed. Pairs, which mate for life, build nests on islands just north of the Antarctic Circle.

The female lays a single egg in their mud and grass nest. Both parents care for the egg, and they take turns caring for their offspring after it hatches. After about eight months, the young albatross is ready to fly off. Over the next five to seven years it grows and matures until it, too, is ready to return to land to mate.

### ENGAGE

#### Tap Prior Knowledge

Make a paper airplane. Fly it across the room. Ask students why they think the airplane flew. What kept it in the air? What made it eventually move to the ground? Do students think the airplane would have flown differently if it had larger wings? Encourage them to share their opinions.

### EXPLORE

#### Preview the Lesson

Display pages 2-3 of the projectable magazine. Instruct students to examine the photo. Then read aloud the deck. Point out to students that most birds cannot fly this long without touching land. As a class, brainstorm ideas about how the albatross is able to do this.

#### Set a Purpose and Read

Have students read the article in order to analyze how the albatross's body is built for flight, recognize the forces of flight, and understand how this seabird uses wind energy to fly.

### EXPLAIN

#### Analyzing the Albatross's Body

Display pages 6-7 of the projectable magazine. Zoom in on the sidebar "Built For Life at Sea." Review the diagram as a class. **Say:** *An albatross can fly for months at a time.* **Ask:** *Why doesn't it get tired?* (The albatross's wing bones lock in place so it doesn't have to flap its wings. This keeps the bird's muscles from getting tired.) Challenge students to identify other traits of an albatross that help it fly and live at sea.

#### Recognizing the Forces and Flight

Display page 5 of the projectable magazine. Review the section "Forces of Flight" as a class. **Say:** *Gravity is a force that pulls objects toward Earth's center.* Have students identify the other forces of flight (lift, drag, thrust). Discuss how each force affects a bird in flight. (Gravity pulls the bird down, lift pushes it up, drag slows it down, and thrust propels it forward.)

### EXPLAIN

(continued)

#### Understanding How an Albatross Flies

Inform students that most birds can fly because the shape of their wings splits air into two directions. Faster-moving air travels over the wings. Slower-moving air goes under. This gives birds the lift they need to overcome gravity. Flapping their wings creates thrust. As long as their thrust is more than the drag of the winds they are flying into, they can move forward. **Say:** *The albatross is different. It doesn't flap its wings. It locks them in place and angles them. Then it turns directly into the wind. Instead of slowing the bird down, the energy of the wind helps the albatross glide.* Assign each student a partner. Have pairs examine the information about how albatross fly on page 6 of their student magazines. Then give each student a copy of the **Content Assessment Master**. Instruct students to show and tell how an albatross flies and predict what will happen next.

### ELABORATE

#### Find Out More

Remind students that the wandering albatross is just one of the 22 different albatross species. Divide the class into small groups. Instruct groups to select one albatross species and conduct research to learn more about it. Invite groups to share and compare what they learned with the class.

#### Extend Your Thinking About the Albatross

Remind the class that wandering albatross are endangered. Point out to students that there are natural threats like sharks. But the biggest danger for the albatross is long line fishing. As a class, identify possible solutions fishing companies have tried. Discuss reasons why the ideas could work. Brainstorm other solutions the companies could try.

### EVALUATE

Have students record their answers to the assessment questions in their science notebooks or on a separate sheet of paper.

- *What is a force?* (a push or a pull)
- *What is a trait?* (a distinguishing feature or quality)
- *How does gravity affect an albatross when it flies?* (Gravity pulls the bird toward the center of Earth.)  
*How does the albatross overcome gravity when it flies?* (It uses the energy of the wind to create lift and soar upward.)

If you wish, have students complete the **Comprehension Check** to assess their knowledge of concepts mentioned in the article.

**VOCABULARY ASSESSMENT: Lord of the Wings**

Record each vocabulary word and its definition.

Word	Definition

Write three sentences showing how the vocabulary words above are connected.  
Use two different vocabulary words in each sentence.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

3. \_\_\_\_\_

\_\_\_\_\_

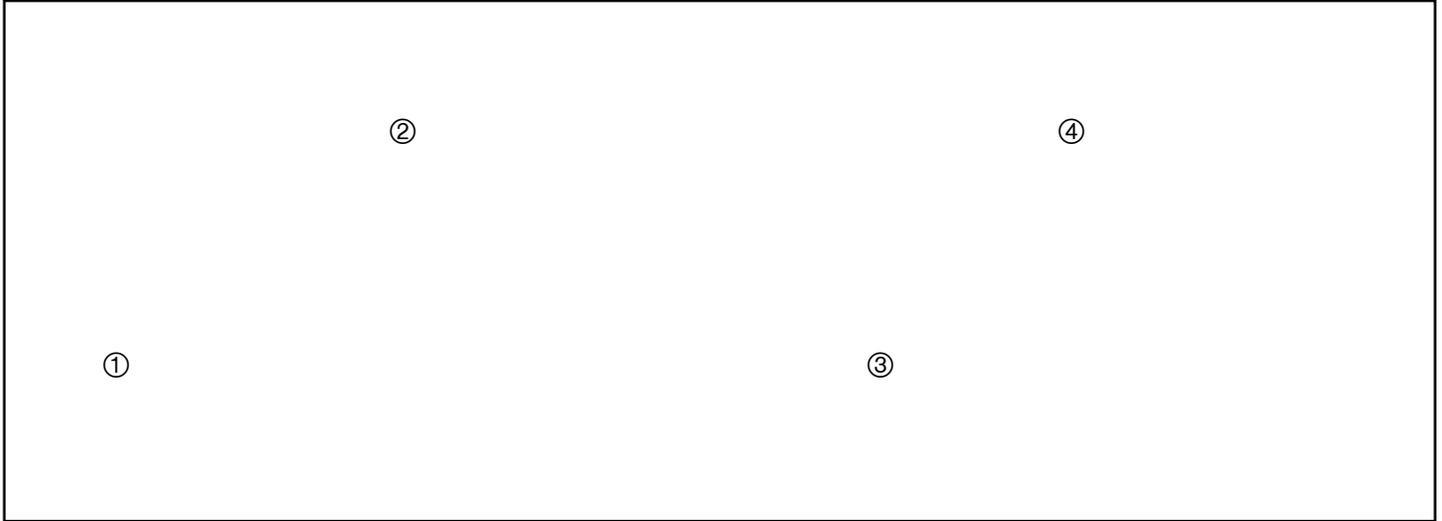
**LANGUAGE ARTS ASSESSMENT: Lord of the Wings**

Record a cause-and-effect relationship for each section of the article.

	Cause	Effect
Introduction		
Birds of a Feather		
Forces of Flight		
Fantastic Flying		
Island Life		
Dangers to Albatross		

**CONTENT ASSESSMENT: Lord of the Wings**

Draw a picture to show how an albatross flies.



Put these sentences in the correct order to tell how an albatross flies

- \_\_\_\_\_ The albatross glides back down to the sea to gain speed.
- \_\_\_\_\_ The cycle repeats.
- \_\_\_\_\_ The wind lifts the bird.
- \_\_\_\_\_ An albatross flies low over the waves. Then the bird turns into the direction of the wind.

Look at the picture you drew. What will the albatross do after step 4?  
What will it do after that?

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**COMPREHENSION CHECK: Lord of the Wings**

Read each question. Fill in the circle next to the correct answer or write your response on the lines.

1. What are the four forces of flight?  
Ⓐ drag, friction, gravity, and energy  
Ⓑ lift, thrust, drag, and gravity  
Ⓒ thrust, drag, lift, and wind
  
2. What creates lift for an albatross as it flies?  
Ⓐ wind  
Ⓑ water  
Ⓒ gravity
  
3. Which direction does an albatross fly to gain speed?  
Ⓐ up  
Ⓑ down  
Ⓒ east
  
4. Why would a wandering albatross go to land?  
Ⓐ to rest  
Ⓑ to find food  
Ⓒ to mate

5. What traits of an albatross's body help it fly?

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### Standard Supported

- 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). (CCSS.RI.3.7)

### Resources

- Vocabulary Assessment Master (page 15)
- Language Arts Assessment Master (page 16)

### Summary

- The article "Orchids: Flowers of the Forest" introduces readers to the unique world of orchids, the world's largest family of flowering plants.

## BUILD VOCABULARY AND CONCEPTS

- **column**
- **lip**
- **nutrient**
- **petal**
- **sepal**
- **species**

Display the Wordwise feature on page 17 of the projectable magazine. Invite volunteers to read aloud the words and their definitions. Encourage students to share what they know about each word.

Give each student a copy of the **Vocabulary Assessment Master**. Instruct students to record each word and its definition. As a class, discuss how the vocabulary words are related. Then divide the class into pairs. Challenge partners to create a diagram that illustrates how the words are connected. Have students label each term in their drawings. Then invite pairs to share their ideas with the class.

## READ

Display pages 2-3 of the projectable magazine. **Say:** *When people read, they usually focus on the words. But photos can tell you a lot, too. For example, when I look at this photo, I see flowers. The flowers are all different.* Read aloud the headline and deck. **Say:** *These flowers may look different, but they're also the same. They're all orchids.* **Ask:** *How can that be?* Encourage students to share their ideas.

Inform students that the purpose of this article is to teach them about orchids. They will learn what orchids are, how they grow, where they grow, and why they are such special flowers. **Say:** *As you read, you will learn much about orchids from the text. But you'll also get information from photos, captions, diagrams, and other elements in the article, as well. Those text elements can quickly answer some of the questions you have about orchids.*

Give each student a copy of the **Language Arts Assessment Master**. Have students read the article on their own. As they do, instruct them to write four questions they have about key concepts in the text. Tell them to record each answer and tell where they found it in the article.

## LANGUAGE ARTS

### TURN AND TALK

Have students turn and talk to discuss what they learned about orchids. **Ask:** *What is an orchid?* (a type of flower) *Why was it so dangerous to search for orchids in the past?* (Orchids grow in rain forests and on mountaintops. There are many ways to die in these environments.) *Why are they easier to find now?* (People grow them in greenhouses.) Have students share other facts they learned about orchids.

- **Interpreting Information** After reading the article, have students share their **Language Arts Assessment Masters** in small groups. Instruct students to compare the questions they came up with and the answers they recorded for each. Have students discuss how using text, photos, and the diagrams helped them answer their questions more quickly than if they had searched through the text. As a class, identify other types of resources that could help them quickly learn even more about orchids.

### WRITE AND ASSESS

You may want students to write about what they learned to assess understanding. Encourage students to reflect upon what they read and how it affected their ideas about the topic.

- *Do you think orchids are special? Why or why not?*
- *How are most orchids alike? What are some of the biggest differences between orchid species?*
- *What surprised you about what you read?*

### Standard Supported

- Different organisms vary in how they look and function because they have different inherited information.(NGSS.3-LS3-1)

### Resources

- Content Assessment Master (page 17)
- Comprehension Check (page 18)

### Science Background

Recognized for their variety and beauty, orchids are one of the most ancient flowering plants found on Earth. They are also the largest family of plants, with more than 25,000 species. They mostly grow in moist tropical areas.

There are two main types of orchids. Terrestrial orchids grow in loose soils on the forest floor. They get nutrients from decomposing leaves and twigs. Epiphytic orchids grow on trees. They have a spongy covering around their roots. It absorbs the nutrients, moisture, and air they need to survive.

Orchids are nothing if not diverse. Blooms can be as big as your hand or small enough to fit on a pinhead. Flowers may look like a running man or a flying duck. Orchids blossoms often mimic the shape of pollinators they want to attract. And the blooms come in every color except for blue and black.

Despite this variety, most orchid flowers have the same basic parts. The three outermost flower parts are sepals. Inside the sepals lie two petals and a lip. The lip is a specialized petal designed to attract specific pollinators. The column, which combines the flower's male and female parts, is in the middle.

### ENGAGE

#### Tap Prior Knowledge

Give each student a piece of plain white paper and access to crayons or colored pencils. Then ask each student to draw a picture of a flower. Compare and contrast the results. Point out the variety of colors, sizes, and shapes. Then point out that, more likely than not, students' drawings represent different species of flowers. **Ask:** *Do you think it's possible for one species of flower to have this much variety?* Encourage students to share their opinions.

### EXPLORE

#### Preview the Lesson

Display pages 10-11 of the projectable magazine. Read aloud the headline and deck. **Say:** *Each flower you see here is an orchid. According to the deck, orchids come in nearly every shape, size, and color.* **Ask:** *How would you describe the orchids you see in these photos?* Invite students to share their descriptions.

#### Set a Purpose and Read

Have students read the article in order to identify the common parts of most orchids, compare and contrast different orchid traits, and understand how orchids get what they need to survive.

### EXPLAIN

#### Identifying the Anatomy of an Orchid

Inform students that most orchids have common characteristics. One example is the flowers' parts. Display page 13 of the projectable magazine. Review the diagram to identify those parts (sepal, petal, column, lip). Then have students examine the section "Anatomy of an Orchid" on page 12 of their student magazines for more information about each flower part. Divide the class small groups. Instruct groups to review the article's photos. Challenge them to identify the sepal, petal, column, and lip on as many orchids as they can. Rejoin as a class to compare results. Give each student a copy of the **Content Assessment Master**. Instruct students to draw a picture of an orchid and label its parts.

### EXPLAIN

(continued)

#### Compare and Contrast Orchid Traits

Point out to the class that while most orchids have common characteristics, orchid species vary in many ways. **Say:** *Orchids come in nearly every shape, size, and color. That's what makes these flowers so special.* Display pages 16-17 of the projectable magazine. As a class, compare and contrast the shapes, sizes, and colors of the orchids shown here. Then have students take out their **Content Assessment Masters**. Have students describe the shape, size and color of the orchid they drew on their worksheets.

#### Understand How Orchids Survive

Remind students that a nutrient is a substance that is needed for healthy growth, development, and functioning. **Say:** *You get the nutrients you need from the food you eat. Most plants grow in soil. They absorb nutrients from the soil through their roots. Some orchids grow this way. Others don't.* Display page 14 of the projectable magazine. Inform students that this orchid grows on a tree. **Say:** *Growing on a tree lets this orchid reach more sunlight.* **Ask:** *But how can the flower's roots, which are nowhere near the ground, help the orchid get what it needs to survive?* (The roots are surrounded by a spongy covering that takes in nutrients and stops the true roots inside from drying out.) As a class, discuss how other orchids have adapted to live in places where they can get what they need to survive. (Orchids that need constant water grow in wet bogs. Those that need constant shade grow near tall trees.)

### ELABORATE

#### Find Out More

Inform students that orchids are the largest family of flowering plants. There are more than 25,000 different species, and each one is unique. Divide the class into small groups. Instruct groups to conduct research to identify several orchid species that share a common trait, such as those featured in the "Look-Alikes" diagram on pages 16-17 of the article. Encourage each group to create a poster with pictures and captions comparing the different orchids in this way. Have groups share their posters with the class.

#### Extend Your Thinking About Orchids

Remind students that people grow millions of orchids in greenhouses each year. But orchids are still rare and hard to find in the wild. As a class, discuss reasons why it is important to protect wild orchids. Challenge students to identify ways this could be done.

### EVALUATE

Have students record their answers to the assessment questions in their science notebooks or on a separate sheet of paper.

- *How is an orchid's lip different from its other petals?* (The lip is designed to attract pollinators.)
- *What is a sepal?* (a part of the flower that forms outside the bud before the flower blooms)
- *How did the Aztecs use orchids to make glue?* (They would dry the roots, mash them, and then add water.)

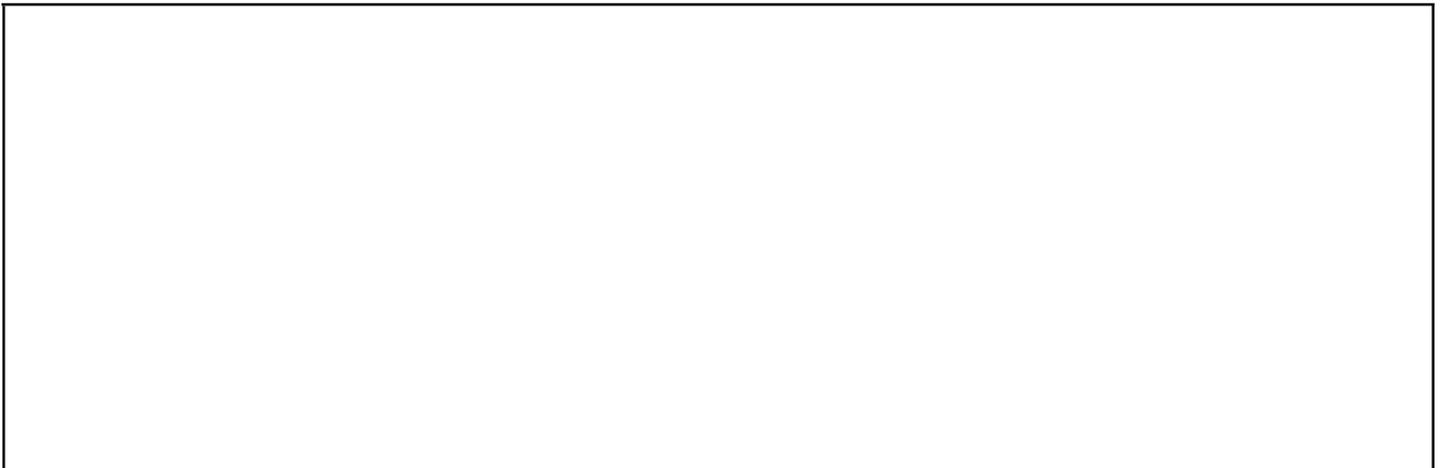
If you wish, have students complete the **Comprehension Check** to assess their knowledge of concepts mentioned in the article.

**VOCABULARY ASSESSMENT: Orchids**

Record each vocabulary word and its definition.

Word	Definition

Create a diagram that shows how each vocabulary word is connected to an orchid.  
Label each part of your drawing.



Name \_\_\_\_\_

Date \_\_\_\_\_

**LANGUAGE ARTS ASSESSMENT: Orchids**

Write four questions you have about the article. Record the answer. Tell where you found each answer in the article.

Question	Answer	Source

Name \_\_\_\_\_

Date \_\_\_\_\_

**CONTENT ASSESSMENT: Orchids**

Draw an orchid and label its parts. Describe the shape, size, and color of the orchid you drew.

Draw and Label	Describe		
	Shape		
	Size		
	Color		

**COMPREHENSION CHECK: Orchids**

Read each question. Fill in the circle next to the correct answer or write your response on the lines.

1. Which part of an orchid forms outside the bud before the flower opens?

Ⓐ sepal

Ⓑ petal

Ⓒ lip

2. How does the lip help orchids survive?

Ⓐ It takes in nutrients.

Ⓑ It attracts pollinators.

Ⓒ It grows roots.

3. Which part combines the male and female parts of an orchid?

Ⓐ leaves

Ⓑ column

Ⓒ sepal

4. Which of these statements is true?

Ⓐ Orchids grow in deserts and on beaches.

Ⓑ Orchids are easy to find in the wild.

Ⓒ Some orchids are used to make medicines.

5. How does an orchid that grows on a tree get the nutrients it needs to survive?

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### Standard Supported

- Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. [CCSS.RI.3.1]

### Resources

- Vocabulary Assessment Master (page 23)
- Language Arts Assessment Master (page 24)

### Summary

- The article "River of Elk," introduces readers to a researcher and a photographer and explains how and why they are tracking the mass migration of elk in Yellowstone National Park.

## BUILD VOCABULARY AND CONCEPTS

- camera trap
- data
- ecosystem
- migration

Display the vocabulary words on a word wall or on a whiteboard. Inform students that when they read they will encounter words they don't know. Remind them that using context clues such as the sentences before or after an unknown word and visuals such as photographs or illustrations can help them figure out what an unfamiliar word means.

Give each student a copy of the **Vocabulary Assessment Master**. Instruct students to record each vocabulary word from the article. Have them scan the article to locate each bold word in the text.

In small groups, have students find and record text and visual clues in the article related to each vocabulary word. Then have each student record his or her own idea about what each word means. Invite volunteers to read aloud the definitions from the Wordwise feature on page 23 of their student magazines. Have students record the definitions on their worksheets. As a class, compare the definitions students wrote with the definitions from the text.

## READ

Explain to students that good readers ask questions before, during, and after they read. They ask questions, in particular, when they encounter something they don't understand or something they want to learn more about. Usually, they can find the answer in the text.

Display pages 18-19 of the projectable magazine. Model how to ask and answer questions. **Say:** *When I look at these pages, the first thing I notice is the photographs. There are three of them. One shows some animals close up. The other shows the same animals from far away. The third photo shows two men. What kind of animal is this? To me, it looks kind of like a deer. And where are they going? Who are the men and how are they connected to the animals?* Read aloud the headline and deck. **Say:** *This information answered a few of my questions. The animals aren't deer. They're elk. And the men are explorers who are following the elk. According to the caption under the photo, their names are Joe Riis and Arthur Middleton. But I still have questions. Where are the elk going? And what do the men hope to learn by following them? To find the answers to those questions, I'll have to read the article.*

Give each student a copy of the **Language Arts Assessment Master**. Explain to students how they can use the worksheet to record questions and answers they have before, during, and after they read the article.

As a class, brainstorm a list of questions about the article. Instruct students to record the questions in the appropriate section of their worksheets. Then have students read the article on their own. As they do, instruct them to record additional questions and any answers they find in the text. If students still have questions after reading the article, instruct them to record those questions, too.

# River of Elk

## LANGUAGE ARTS

### TURN AND TALK

Have students turn and talk to discuss what they learned about elk. **Ask:** *Where are the elk featured in the article going? (Yellowstone National Park) Why? (They are migrating.) Why are they migrating to Yellowstone? (They are going to get fresh, green grass.)* Encourage students to share other interesting facts they learned about elk.

- **Strengthen Understanding** Inform students that combining what you already know with what you learn can help readers understand new words. **Say:** *Once you understand what a word means, it's easier to use it correctly in a sentence.* Challenge students to make accurate statements using each of the vocabulary words. Encourage them to use their **Vocabulary Assessment Masters** as a resource. Remind students to be original. They shouldn't restate sentences from the article. They should create new sentences of their own.

- **Ask and Answer Questions** Remind students that asking and answering questions is a strategy that can help them understand what they read. **Say:** *Even the best readers come across words or ideas they don't understand. Asking questions is the first step toward figuring those things out. If you ask questions, you know which answers to search for as you read and re-read the text.* Have students share and compare their **Language Arts Assessment Masters** in small groups. Did they have the same questions? Did they find the same answers? If not, encourage them to identify where in the text they found the answer and make any corrections necessary.

### WRITE AND ASSESS

You may want students to write about what they learned to assess understanding. Encourage students to reflect upon what they read and how it affected their ideas about the topic.

- *What is migration? Describe the elk's migration to Yellowstone.*
- *Why do the explorers want to learn about the elk's migration to Yellowstone?*
- *What surprised you about what you read?*

# River of Elk

## SCIENCE

### Standard Supported

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (NGSS.3-LS4-3)

### Resources

- Content Assessment Master (page 25)
- Comprehension Check (page 26)

### Science Background

At one time, elk were found across much of North America. But over the years, they were killed off and driven to live in more remote areas. Today, most elk live in western North America, including the mountainous regions of Yellowstone National Park.

Each year, tens of thousands of elk migrate between Yellowstone and the lower altitude areas that surround it. Their route follows the path of freshly sprouted grass. It also takes them across private lands where fences block their way and roads present crossing hazards.

To protect the elk and hopefully prevent more obstructions from being built, wildlife biologist Arthur Middleton and photographer Joe Riis set out to track the elk's annual migration route.

To do this, the researchers had to capture elk and put GPS collars around their necks so they could track the elk's movement. That was the easy part. Then they had to follow the elk along a route that went up and down mountains, through deep snow, and across raging rivers. At times, it was impossible to keep up.

That's where the locals came in. Area residents told the researchers where the elk were going. Middleton and Riis got ahead of the herd and set up camera traps in their path. The data and images they collected, helped them track the elk's route and showed them how elk get what they need to survive along the way.

### ENGAGE

#### Tap Prior Knowledge

Instruct students to think about a wild animal they commonly see, such as a squirrel. Tell students to imagine that they must follow that animal and document its actions for one day. Challenge students to identify problems they might have as they tried to keep up. For example, how would they keep track of the animal when it went places they couldn't go? Brainstorm potential solutions for each problem students mention.

### EXPLORE

#### Preview the Lesson

Display pages 18-19 of the projectable magazine. Invite a volunteer to read aloud the headline and deck. As a class, discuss reasons why people might want to follow elk as they move from place to place. Brainstorm ideas about what they could learn from the experience.

#### Set a Purpose and Read

Have students read the article in order to understand how migration helps elk survive and how technology helps people track and record animal movements.

### EXPLAIN

#### Understanding Elk Migration

Display page 23 of the projectable magazine. Zoom in on the Wordwise feature and review the definition of migration. **Say:** *Many different animals migrate. And they always do it for a reason. Animals migrate to get the resources they need to survive.* **Ask:** *What resource are the Yellowstone elk trying to find?* (fresh, green grass) Zoom in on the map showing the elk's migration route. Use the map key to help students interpret the information. If necessary, point out that the elk travel to Yellowstone in the summer but away from the park during winter. **Ask:** *Why don't the elk stay in Yellowstone all year long?* (In winter there is too much snow here. The elk move back to lower lands where they can find shelter.)

#### Using Technology to Learn About Migration

Instruct students to examine the article's photos in their student magazines. Invite volunteers to describe what they see. **Say:** *These photos show elk running across highlands, going up and down mountains, and even crossing raging rivers. And the researchers were right there with them.* **Ask:** *How was this possible?* (The men put collars on the elk. The collars helped them find the elk's locations.) **Say:** *According to the article, the photographer set up camera traps.* **Ask:** *What are camera traps and why were they necessary?* (Camera traps are remotely activated cameras. The photographer needed them to get pictures of the animals without disturbing them.) **Ask:** *Why didn't the photographer want to disturb the elk?* (Possible response: Disturbing the elk would have changed where the elk went and how they behaved. It would have changed what the men learned about the elk.) Give each student a copy of the **Content Assessment Master**. Instruct students to draw a picture of elk from a distance and a picture close up, like it was taken from a camera trap. Instruct students to write two things people could learn about elk from each picture.

### ELABORATE

#### Find Out More

Inform students that photos provide valuable information about elk migration to and from Yellowstone. They show researchers when, where, and why the elk move and what they do along the way. They also help researchers understand how elk migration affects the overall ecosystem. Inform students that elk are just one of many animals that migrate. Divide the class into small groups. Instruct each group to select an animal that migrates. Have them conduct research to track the animal's migration route. Challenge them to explain how the animal's movement affects the overall ecosystem.

#### Extend Your Thinking About Communication

Display the National Geographic Learning Framework feature on the back cover of the magazine. Discuss what communication is and how the researchers in the article "River of Elk" used pictures and words to communicate their findings with others. Then have students go outside. Tell them to take or draw pictures of something they find interesting. Give students time to write about what they saw. Encourage students to share their picture stories with others.

### EVALUATE

Have students record their answers to the assessment questions in their science notebooks or on a separate sheet of paper.

- *Why do elk migrate to Yellowstone National Park?* (to get fresh, green grass)
- *What did the researchers want to learn from following the elk as they migrated?* (how elk migration affected the ecosystem)
- *What did the explorers learn?* (The elk migration helps keep the ecosystem in balance.)

If you wish, have students complete the **Comprehension Check** to assess their knowledge of concepts mentioned in the article.

Name \_\_\_\_\_

Date \_\_\_\_\_

**VOCABULARY ASSESSMENT: River of Elk**

Record information from the article about each vocabulary word.

Word				
Text Clues				
Visual Clues				
What I Think the Word Means				
Definition				

Name \_\_\_\_\_

Date \_\_\_\_\_

**LANGUAGE ARTS ASSESSMENT: River of Elk**

Record questions you have about Yellowstone's elk before, during, and after reading the article. Search for the answers in the text.

	Questions	Answers
<b>Before</b>		
<b>During</b>		
<b>After</b>		

Name \_\_\_\_\_

Date \_\_\_\_\_

**CONTENT ASSESSMENT: River of Elk**

Draw a picture of elk from a distance. Draw a picture of elk up close, like a photo taken with a camera trap.

Distance	Camera Trap
	

Write two things people could learn from each picture.

- 1. \_\_\_\_\_  
\_\_\_\_\_
- 2. \_\_\_\_\_  
\_\_\_\_\_

- 1. \_\_\_\_\_  
\_\_\_\_\_
- 2. \_\_\_\_\_  
\_\_\_\_\_

**COMPREHENSION CHECK: River of Elk**

Read each question. Fill in the circle next to the correct answer or write your response on the lines.

1. How often do elk migrate to Yellowstone?  
Ⓐ once a week  
Ⓑ once a month  
Ⓒ once a year
  
2. How many elk make the trip?  
Ⓐ hundreds  
Ⓑ thousands  
Ⓒ tens of thousands
  
3. Why do the elk migrate to Yellowstone?  
Ⓐ to find snow  
Ⓑ to find grass  
Ⓒ to find water
  
4. What causes a camera trap to take a photo?  
Ⓐ light  
Ⓑ motion  
Ⓒ sound

5. How does migration help elk survive?

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# Understanding Maps

## EUROPE

### Standard Supported

- Use maps of different scales to describe the locations of cultural and environmental characteristics. (NCSS.D2.Geo.3.3-5)

### Resources

- Content Assessment Master (page 28)
- Comprehension Check (page 29)
- Europe Physical Map poster (teacher's edition)
- Europe Political Map poster (teacher's edition)

### Social Studies Background

Spatial thinking is an essential skill for students to develop as they learn about geography and Earth and environmental sciences. Developing spatial concepts takes time and practice. Recognizing that, each month Explorer magazine will introduce students to a new set of physical and political maps. Use the accompanying lessons to guide students as they learn to recognize spaces and places in the natural world.

## ENGAGE

### Tap Prior Knowledge

Give students three minutes to list facts about Europe. Review the lists. Which items were recorded most often? Which countries could students name? Note questionable items that show students could benefit by learning more about Europe.

## EXPLORE

### Preview the Lesson

Display the **Europe Physical Map poster** and the **Europe Political Map poster**. Cover the captions. Have students examine the photos. As a class, discuss what each photo tells about Europe.

### Set a Purpose and Read

Have students examine the posters in order to understand that physical and political maps can be used to describe the cultural and environmental characteristics of a location.

## EXPLAIN

### Explore the Physical Map

Display the **Europe Physical Map poster**. Read aloud the text in the "Landforms" box. As a class, find the Alps and Balkans on the map. Challenge students to identify and locate other mountain ranges in Europe. Review the other boxes in this same way. Then read aloud the caption for each photo. Invite students to share what the map taught them about the physical characteristics of Europe.

### Explore the Political Map

Display the **Europe Political Map poster**. Invite volunteers to read aloud the captions and text. As a class, find each location mentioned on the map. Challenge students to add another fact they know about each place. As a class, make a list of fun facts students know about European locations.

## ELABORATE

### Find Out More

Ask students to examine the **Europe Physical** and **Political Map** posters. **Ask:** *Why does Europe look larger on the political map?* (More area is colored (non-gray).) *Why is this accurate?* (The entire political area of each country is colored on the political map. But physically, only parts of some countries are in Europe. Only those parts are colored on the physical map.) Point out the white line on the political map that divides Europe and Asia.

### Extend Your Thinking About Europe

Give each student a copy of the **Europe Map Content Assessment Master**. Have students create a physical or political map of Europe. Then have them conduct research to find and record three more physical or political facts about Europe.

## EVALUATE

Have students ask and answer questions about the physical and political maps. If you wish, have them complete the **Comprehension Check** to assess their knowledge of European geography.

Name \_\_\_\_\_

Date \_\_\_\_\_

**CONTENT ASSESSMENT: Europe Maps**

Create a physical or political map of Europe. Record three new facts about Europe.



1.
2.
3.

**COMPREHENSION CHECK: Europe Maps**

Read each question. Fill in the circle next to the correct answer or write your response on the lines.

1. What is the largest country in Europe?  
 A France  
 B Russia  
 C Turkey
2. Which European country is famous for making chocolate?  
 A England  
 B Spain  
 C Switzerland
3. What is a U-shaped inlet connected to the sea called?  
 A a river  
 B a lake  
 C a fjord
4. What is Mount Etna?  
 A a volcano  
 B a cliff  
 C a mountain

5. Write three facts about Europe.

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### Lord of the Wings

#### Assess Vocabulary, page 7

Students should record the words and definitions from the Wordwise feature on page 9.

**drag:** the force that slows down an object's movement

**force:** a push or a pull

**gravity:** the force that causes objects to fall toward the center of Earth

**lift:** the force that pushes something upward

**thrust:** the force that propels something forward

**trait:** a distinguishing feature or quality

Sentences will vary depending on the connections students identify.

#### Assess Language Arts, page 8

Answers will vary, but each cause and effect should come from the article and each identified relationship should make sense.

#### Assess Content, page 9

**Draw:** Students should create a diagram like the one on page 6 of the article.

**Sequence:** The order of events is: 3, 4, 2, 1.

**Explain:** After step 4, the albatross will glide back down to the sea to gain speed. Then it will fly low over the waves and turn into the direction of the wind so the wind can lift the bird again.

#### Comprehension Check, page 10

1. B; 2. A; 3. B; 4. C; 5: Answers may vary, but students will most likely note that the albatross's wing bones lock together so the bird doesn't have to flap its wings as much. This keeps its muscles from being tired so it can fly for long periods of time without rest.

### Orchids

#### Assess Vocabulary, page 15

Students should record the words and definitions from the Wordwise feature on page 17.

**column:** the fused male and female parts of an orchid

**lip:** a type of petal designed to attract pollinators

**nutrient:** a substance that is needed for healthy growth, development, and functioning

**petal:** one of the brightly colored leaf-like parts of a flower

**sepal:** one of the parts forming the outer covering of a flower

**species:** a type of plant or animal

Diagrams should show an accurate connection between the words. All terms should be labeled in the diagram.

#### Assess Language Arts, page 16

Questions will vary. Students should cite specific sources in the text as the basis for each answer.

#### Assess Content, page 17

Students should draw an image of an orchid like the one on page 13 of the article and label the sepal, petal, column, and lip. Students should accurately describe the shape, size, and color of the orchid they drew.

#### Comprehension Check, page 18

1. A; 2. B; 3. B; 4: C; 5: Tree-dwelling orchids that grow roots that are surrounded by a spongy covering that takes in nutrients and stops the true roots inside from dying out.

### River of Elk

#### Assess Vocabulary, page 23

Students should record the words and definitions from the Wordwise feature on page 23.

**camera trap:** a remotely activated camera

**data:** facts about something that can be used in calculating, reasoning, or planning

**ecosystem:** includes all of the living things in a given area, interacting with each other and also with the non-living parts of that environment

**migration:** the regular movement of groups of animals from one region to another for feeding or breeding

Text clues, visual clues, and what students think each word means may vary. Evaluate answers for accuracy.

(continued)

### River of Elk

#### Assess Language Arts, page 24

Students' questions will vary, but all questions should relate to the article. All answers should come directly from the text.

#### Assess Content, page 25

Students should draw the same scene of elk along the migration route close up and from a distance. Ideas about what people can learn will vary depending on what students choose to draw.

#### Comprehension Check, page 26

1. C; 2. C; 3. B; 4. B; 5: Migration allows elk to find plenty of food in the summer and shelter from snow in the winter.

### Europe Maps

#### Assess Content, page 28

Students should create an accurate physical or political map of Europe. Facts will vary, but they should relate to the type of map (physical or political) that the student chose to create.

#### Comprehension Check, page 29

1. B; 2. C; 3. C; 4. A; 5: Facts will vary but should come from the Europe Physical or Political Map posters.