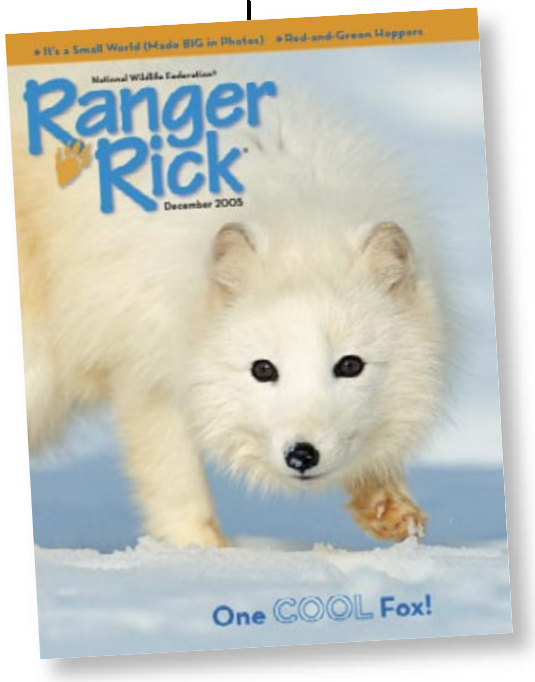
DECEMBER 2005

National Wildlife Federation®
Ranger Rick®

EDUCATOR'S GUIDE



This guide is designed to complement the December 2005 issue of National Wildlife Federation's *Ranger Rick*® magazine.

NATIONAL WILDLIFE FEDERATION®
www.nwf.org®

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Introduction

Welcome to the *Ranger Rick Educator's Guide!*

This guide provides you with educational activities to bring **National Wildlife Federation's** *Ranger Rick*® magazine alive in the classroom and beyond. Using *Ranger Rick* feature articles as an entry point, this guide engages students ages 7-12 in exploring the natural world to build literacy, critical and creative thinking skills, and understanding across the disciplines. Activities are correlated with the National Science Education Standards and are designed to assist you in meeting required curriculum objectives.

Can we have class outside today?

Find out how you can say "Yes!" at **www.nwf.org/backyardwildlifehabitat**. The outdoor environment offers excellent opportunities for active, hands-on, interdisciplinary learning. You can enhance the learning experience by creating your own habitat site. Revitalize an entire schoolyard, a garden, or even a rooftop, windowsill, or balcony by creating an outdoor classroom and sanctuary for birds, butterflies, and other wildlife.

How To Use This Guide

Each section of the guide is matched with a specific *Ranger Rick* feature. After you read through the magazine, choose the stories and activities that complement your curriculum and that will interest your students. Sections include:

- ***Learning Links.*** A summary of concepts presented in the article.
- ***Discussion Questions and Writing Prompts.*** Entry points to engage students in discussion or writing to develop literacy and thinking skills.
- ***Resources.*** Web sites and books where you can find further information.
- ***Activity Ideas.*** Quick investigations and extended projects to complement article topics.
- ***Student Pages.*** Ready-to-copy activity sheets for students.

We have also provided a ***Family Fun*** activities page for you to copy and send home with students.

1 Welcome To My Small World

pages 4-9

Learning Links:

Students consider the importance of insects and other small creatures as they explore the world from a close-up, zoomed-in perspective.

DISCUSSION QUESTIONS & WRITING PROMPTS

Pre-Reading Questions:

- When do you feel small? When do you feel like a giant? What do you like and dislike about each feeling?
- Have you ever discovered something in nature that you had never seen before? What was it? How did you feel when you found it?

Comprehension Check:

- Why does Piotr Naskrecki call the creatures he studies "the smaller majority"?
- What are three reasons Piotr gives for his interest in and respect for insects and other small creatures?
- After Piotr decided to study insects, how did he prepare for his career?
- Name a fact about insects from the story that surprised you.

Critical and Creative Thinking Connections:

- Which photograph in this story is your favorite? What do you like about it? What do the photos add to the story?
- Piotr Naskrecki says there are some things you will never learn in school. Do you agree? What are some things you've learned by doing new things or visiting new places?
- If you had Naskrecki's job, what would be the best parts for you? The worst?
- Why do you think so many kinds of insects are still being discovered today?
- Why does Naskrecki say that we need to save rainforests and other wild places "just as they are"? Why does he feel it is so important to learn about all the creatures living there?

RESOURCES

www.hup.harvard.edu/features/smaller_majority.html Get a preview of Naskrecki's book and a glimpse of more of his amazing photos at this Web site.

The Smaller Majority by Piotr Naskrecki (Harvard University Press, 2005). Here's the place to see many more of Naskrecki's stunning photos. Take a visual journey into the world of the often-overlooked but oh-so-important "smaller majority."

ACTIVITY IDEAS

Insect Math

TIME:
30 Minutes
MATERIALS:
Paper
Pencils,
colored pencils,
or markers

Naskrecki explains that 95 out of 100 animal species are smaller than your fingernail. Wow! Here are some other mind-boggling numbers. For every one of the 6 billion humans on Earth, there are 1,000,000,000,000,000,000 insects (that's 1×10^{18} or a billion billion)! According to current estimates, over 1.5 million species have been named and described. More than half of these are insects: around 800,000 species, or 53%. By comparison, 450,000 (30%) are plants, 200,000 (13%) are invertebrates other than insects, and only 50,000 (3%) are vertebrates. Meanwhile, hundreds of new insect species are being discovered every year, and some scientists believe that two out of every three species may be an insect! Put your students' math skills to work with these astonishing statistics by devising ways to represent some of these numbers visually. For instance, they could make pie charts or bar graphs depicting the number of insect species compared with species of other living things, or group themselves according to these percentages.

Discover-a-Bug

TIME:
30 Minutes
MATERIALS:
Discover-a-Bug student page
Pencils and art supplies

Take your group on an imaginary rainforest trek. Describe sights and sounds, slog through mud, get soaked in a downpour...have fun with this! Pause to admire interesting insects along the way. Then, with great drama, kneel down and exclaim over your latest find. Something you've never seen before! A brand new species! Hand out the **Discover-a-Bug student page** and tell students it's up to them to imagine, describe, and name this new insect. (They could also use this page to draw and describe real insects they find outdoors.) Brainstorm examples of descriptive common names (e.g., the glitter-spotted tree beetle) or have students invent names using the scientific genus and species format (e.g., *Arboreus glitterati*). This is, in fact, similar to the real process for designating a new species. Scientists compare their organism with existing descriptions to confirm it is unique. Then they propose a name and publish a description in a scientific journal.

Small World Safari

TIME:
45 Minutes
MATERIALS:
For each student:
2-foot length of string
Notebook
Optional:
Magnifying glass

"If I got down on the ground and looked closely around me, a fantastic miniature world would suddenly appear," Naskrecki marveled in this story. Step outside to see for yourselves! Even in winter, a close-up look at nature reveals wonders such as fallen leaves and pine needles, mosses, lichen, tree bark, sparkling frost designs, and exquisite snowflakes. Have each student spread a loop of string on the ground and study what's inside. Try this in several different areas, such as a grassy lawn, meadow, wetland, or woods. Magnifying glasses will offer an extra-zoomed-in view. Students could inventory the living and non-living things inside their circle, make a map or field guide of the contents, or explore and describe the scene from an insect's point of view. To build observation and comparison skills, extend this exercise by repeating it in the same places in several different seasons. Have students refer to their notes and maps to see what appears, disappears, changes, or remains the same over time.

National Wildlife Federation® Ranger Rick® Student Page

DISCOVER-A-BUG

Name your bug here:

_____

Draw your bug in the box.

Describe your bug. How does it move? What does it eat? How does it keep from being eaten? Does it interact with other animals?

Describe the habitat where your bug lives.

2 Return of the Red Wolves

pages 16-19

Learning Links:

Red wolves have been brought back from the brink of extinction by captive breeding and reintroduction programs. The complicated issue of human involvement in the decline and recovery of wildlife populations offers an excellent opportunity for deeper discussion.

DISCUSSION QUESTIONS & WRITING PROMPTS

Pre-Reading Questions:

- Do you like going to the zoo? Why or why not?
- In your opinion, what is the purpose of zoos?

Comprehension Check:

- What did Rick and the gang think was happening when they followed Redmond?
- What was actually about to happen?
- Why were the people from the zoo raising and releasing red wolves?

Critical and Creative Thinking Connections:

- Describe what might have happened in Renee's life before this story takes place. Do you think her history is similar to Redmond's? What do you predict will happen in the lives of the two wolves now?
- Scientists use signals from collars like the ones on Redmond and Renee to track an animal's location over time. How do you think this helps scientists better understand an animal?
- What's your opinion of zoos? Do you agree most with what Boomer, Scarlett, or Rick said? Discuss the pros and cons of zoos, supporting your opinions with examples from your own experience and from this story.

RESOURCES

www.redwolves.com/about_wolves/topten.html Answers to FAQs about red wolves from the Red Wolf Coalition in Columbia, North Carolina.

www.redwolves.com/about_recovery/timeline.html The Coalition also has a timeline of important events in the decline and recovery of the red wolf.

www.wolf.org/wolves/learn/learn.asp The International Wolf Center in Ely, Minnesota is an excellent source of information about wolves. This page includes information and activities for kids, as well as an online curriculum for educators.

Journey of the Red Wolf by Roland Smith (Cobblehill Books, 1996). The full story of the Red Wolf Recovery Program, illustrated with photos taken throughout the project.

Red Wolf Country by Jonathan London (Puffin, 1999). Follows a pair of red wolves from winter into spring as they avoid danger and raise a litter of pups.

ACTIVITY IDEAS

A Tale of Two Wolves

TIME:
30 Minutes
MATERIALS:
Paper and pencils

Although this story ends just as Redmond and Renee meet, their adventures are just beginning. Ask students to imagine and write the next installment of their story. What will Redmond learn about his new home? Will the pair meet any other red wolves in the area? Will they raise a family? If so, what further adventures will the pups have?

Tracking Down Wolves

TIME:
45 Minutes
MATERIALS:
Internet access to research radio tracking

Like Redmond and Renee, red wolves released into the wild wear radio collars. Scientists pick up signals from the collars with a special receiver and use them to track the wolves' movements. Students can read a scientist's account of tracking red wolves by plane in North Carolina at www.fieldtripearth.org/article.xml?id=715. For an in-depth look at how radio tracking works, see the International Wolf Center's Web site www.wolf.org/wolves/experience/telemsearch/vtelem/telem_intro.asp. You'll find general information about radio tracking (telemetry) plus an online telemetry database with real data you can use to track the movements of gray wolves in Minnesota. You could also contact a local nature center or university and ask if wildlife biologists in your area use radio tracking. If so, they may be willing to show students the equipment they use and discuss how it helps them with their studies.

Wolf Reintroduction: Red and Gray

TIME:
45 Minutes
MATERIALS:
Books/Internet to research gray and red wolves

Red wolves and their larger cousins, gray wolves, have a number of things in common. Both have disappeared from large portions of their habitat and later been reintroduced to parts of their former territory. Have students use the suggested resources or others from a local library to research similarities and differences between gray wolves and red wolves and also to compare the reintroduction efforts for both species. What are the present and former ranges of each species? How successful has reintroduction been for each, and what are the current estimates of their numbers? How have the wolves affected other animal populations and the ecosystem as a whole? You may want to have half the students work on each species and then come together as a group to compare findings.

Zoos Then and Now

TIME:
1 Hour or more
MATERIALS:
Books/Internet to research zoos
Paper and pencils

Engage students in a discussion about zoos and the purposes they serve. Give them an opportunity to conduct some research to find out how zoos have changed over time. If possible, arrange a field trip to a local zoo for students to gather firsthand information and interview a zoo employee. Generate a list of questions to investigate, focusing on how the zoo operates and what goals the zoo staff uses to guide decisions about design and animal care. Afterward, students could compile their findings into a news article or write an opinion piece about the purpose and value of zoos.

3 Red, Green & Hoppin'

pages 22-27

Learning Links:

Red-eyed treefrogs get lots of press, but here students find out the reason for their photogenic appearance, as well as details about their behavior and life cycle and even a newly-discovered mechanism for escaping predation.

DISCUSSION QUESTIONS & WRITING PROMPTS

Pre-Reading Questions:

- Imagine you've suddenly been transported to a tropical rainforest at night. What sights, sounds, and smells would you experience?
- Have you ever seen or held a live frog? Describe what it looked and felt like.

Comprehension Check:

- How does a red-eyed treefrog's coloring help it avoid being eaten?
- Is this animal *diurnal* (active during the day) or *nocturnal* (active at night)?
- What's the purpose of a treefrog's sticky toes?
- If a snake begins to eat red-eyed treefrog eggs, what sometimes happens?
- How did scientist Karen Warkentin discover this behavior?

Critical and Creative Thinking Connections:

- Why do you think red-eyed treefrogs are such popular "poster frogs"? Are some animals more appealing to you than others? Why do you think this is?
- Treefrogs are a group of frogs with some special characteristics that make them different from other frogs. Compare the frogs in this article with other frogs you've seen or read about. What do you think all treefrogs have in common?
- What was Karen Warkentin's hypothesis about the signal that causes the tadpoles to hatch? How did she test this hypothesis?
- The tadpole hatching behavior must have evolved in response to predation by snakes. In the future, how might evolution change the snakes' behavior in response to what the tadpoles are doing?

RESOURCES

You can learn more about red-eyed treefrogs at the Web sites of these two zoos:

www.nashvillezoo.org/redeye.htm

www.honoluluzoo.org/Red-eyed_Tree_Frog.htm

Red-Eyed Tree Frog by Nic Bishop (Scholastic Press, 1999). Minimal text and stunning photos tell the story of a red-eyed tree frog's night out hunting in the rainforest.

ACTIVITY IDEAS

My Frog, Your Frog

You won't have red-eyed treefrogs for neighbors unless you live in the rainforest. But you can find out about frogs that live near you at www.enature.com. Have students use this information to make a field guide to the frogs they could find when spring comes around, and ask them to point out how your resident frogs are similar to and different from red-eyed treefrogs.

TIME:
30 minutes
MATERIALS:
Internet access
Paper
Pencils
Art supplies

Snake Sequence

On the Internet, call up the video of Karen Warkentin's experiment with the snake and frog eggs at http://people.bu.edu/kwarken/KWvideoSMALLER.html. Play it for students, and hand out copies of the Great Escape student page. Have them draw a series of pictures showing what happens as a snake approaches and begins to eat a cluster of eggs. Then ask them to write a description of what is happening in the picture sequence or explain it aloud to someone who hasn't read the article. Discuss how Warkentin used the scientific method to investigate the reason for the tadpoles' early hatching, and then ask students to complete the final questions on the worksheet.

TIME:
30 minutes
MATERIALS:
Internet access
Great Escape student page

Colorful or Camo?

Many animals are either cryptically colored (to help them blend in with their surroundings) or brightly colored (to startle or warn predators away or to attract a mate). But red-eyed treefrogs do both! They are brightly colored or well-camouflaged depending on their position. A few other animals use this same strategy. For instance, some butterflies are drab and brown until they spread their wings, revealing colorful patterns or startling eyespots. Collect photographs that show examples of several different kinds of coloring to share with students. Discuss the advantages of each strategy. Then have students make side-by-side drawings of red-eyed treefrogs that show their two different looks.

TIME:
30 minutes
MATERIALS:
Books/Internet to find pictures of camouflaged animals
Art supplies

Living Science

What if, instead of going to school, you could be a scientist's field assistant for a day? Ask students to imagine they have this opportunity. Would they hop into Karen Warkentin's boat in Panama and help her find frog eggs? Or would they prefer to search the rainforest for new insect species with Piotr Naskrecki, help track red wolves in North Carolina, or bundle up and observe the behavior of arctic foxes in the snowy north? After they choose where and what they'd like to study, have them research their chosen location and write a journal entry about the day's adventures and discoveries.

TIME:
30 minutes
MATERIALS:
Paper
Pencils

National Wildlife Federation® Ranger Rick® Student Page

THE TADPOLES' GREAT ESCAPE

1. What happens when a snake finds a cluster of red-eyed treefrog eggs? Draw the sequence of events in the boxes below.

2. Explain what is happening in your drawings.

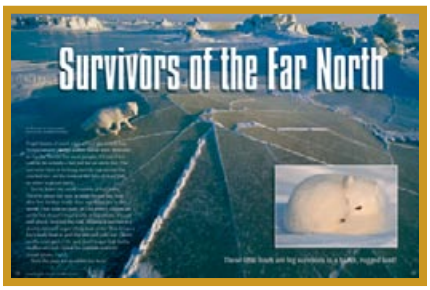
3. What was scientist Karen Warkentin's hypothesis about what caused the tadpoles to hatch early?

4. How did she test her hypothesis?

5. Did the results support her hypothesis? Why or why not?

4 Survivors of the Far North

pages 32-39



Learning Links:

Arctic foxes survive—and thrive—in an extreme environment. How do they do it? A variety of adaptations, some shared by other arctic animals, are the key to success.

DISCUSSION QUESTIONS & WRITING PROMPTS

Pre-Reading Questions:

- How do you and your family get ready for winter?
- What are some things other animals do to prepare for and survive the cold part of the year?

Comprehension Check:

- Where do arctic foxes live?
- How does an arctic fox stay warm in the cold, cold winter?
- What are three tricks a fox uses to stay well-fed in the winter?
- How does an arctic fox's color change throughout a year? Why does it change?
- What do arctic foxes and their pups eat? Are they *herbivores*, *carnivores*, or *omnivores*?

Critical and Creative Thinking Connections:

- Day length, not cold weather, triggers the color change in foxes and other northern animals. Days grow shorter and longer at the same rate every year, but weather often varies. If snow came late or warm weather arrived early, what would it mean for these animals? (*An animal could be snow white before any snow falls or after it all melts, making them highly visible to predators or prey.*)
- A few arctic animals, including polar bears and snowy owls, stay white all year long. Why do you think some animals change color while others do not?
- Can you think of any other environments where it might be helpful to animals to be different colors at different times of the year? Where and why?

RESOURCES

www.mnh.si.edu/arctic/html/wildlife.html The Smithsonian's Arctic Studies Center has an online portfolio of arctic wildlife.

www.arctic.uoguelph.ca/cpl/index.htm Canada's Polar Life is full of facts, images of arctic animals, and other things polar, organized in a very engaging format.

Fox by Caroline Arnold (Harper Collins, 1996). An in-depth look at the world of foxes, highlighting each of the six fox species in North America.

Winter White by Joanne Ryder (Morrow Junior Books, 1997). A contemporary fable about how Fox and Lemming gained their white fur when they traded sun for snow and thus created the seasons of the Arctic.

ACTIVITY IDEAS

Fox in Action

This story is full of active verbs: trot, peer, lurk, dash, snatch, pounce, leap, hurtle, etc. After students read the article, have them revisit the text to create a list of vivid, descriptive verbs. Discuss how these words help readers form pictures in their minds of the foxes in action. Then ask students to look at each photograph from the story and choose one or more verbs to describe the action it depicts. Challenge them to come up with their own words to supplement the ones on their lists.

TIME:
30 Minutes
MATERIALS:
Paper
Pencils

Life in the North

Before reading this story, have students list some of the characteristics of the Arctic: long days during the short summer, followed by darkness, bitter cold, snow and ice during the long polar winter. Ask them to think of some adaptations (both physical characteristics and behaviors) that could help animals survive in this extreme environment. Then, after reading "Survivors of the Far North," have them draw connections between their ideas and the fox's adaptations described in the story. Using arctic foxes as a starting point, investigate some of the common adaptations that help arctic animals stay warm, find food, and move over snow and ice. A good resource for further information is www.arctic.uoguelph.ca/cpl/index.htm.

TIME:
30 Minutes
MATERIALS:
Books/Internet to research arctic animals

White for Winter

Arctic foxes aren't the only ones that change color to match their winter surroundings. Other animals who employ this disappearing act include the snowshoe and arctic hare, ptarmigan, long-tailed weasel, short-tailed weasel (ermine), and collared lemming. Find out more at the Web sites www.wildlifenews.alaska.gov/index.cfm?adfg=wildlife_news.view_article&articles_id=31&issue_id=10 and www.arctic.uoguelph.ca/cpl/index.htm To illustrate the advantages of this strategy, paint a wintry white scene on one large sheet of paper and a brown-and-green summer scene on another. Then have students draw each of the color-changing animals and cut them out of both white and brown paper. They can "hide" their animals in each scene and invite others to try to find them all. Switch the summer animals into the winter scene (and vice versa) and discuss the contrast. Why is this such a useful strategy for both predators and prey?

TIME:
30 Minutes
MATERIALS:
Books/Internet to research arctic animals
Two large sheets of paper
Paints
Brown & white construction paper

Family Fun!

Dear Parent or Guardian,
Your child is reading Ranger Rick magazine in class. Each month, amazing photos, feature articles, and activities bring nature, wildlife, and conservation to life. Extend the learning and fun at home with these engaging family activities. Enjoy!

PRESENT MOMENTS

After you read "The Best Present of All" on pages 13-15, ask your family to reflect on their best presents and what made them special. Can you think of something that happened to you that felt like a present, even if it wasn't wrapped in fancy paper and you couldn't touch or hold it? Is there something in nature that seems like a gift to you? How do you enjoy it? Could you share it with others? See if you can think of a present like this—the kind that can't be wrapped up—to give a teacher, friend, or family member.

WILD WISHES

Holidays are a time for giving and receiving gifts. The "Critter Wish List" on page 20 is a silly collection of gifts for animals—but what do you think wild animals would really wish for? Think about wildlife near you or around the world. Then make a list of what these animals might actually want and need. (Remember, gifts aren't always things that can be wrapped up!) Which animals are most in need of gifts this year? Could your family do anything to make a wish come true? Check out **www.nwf.org** for some ideas.

TWIRL A TAG OR TWO

Holiday cards and gift tags are in high demand at this time of year. Recycling is great, but reusing is even better. Follow the instructions for "Holiday Twirls" on pages 28-29 to find out how to give old scraps of paper a whole new life.

FROG FRIENDS

Although you'd have to visit the rainforest to find a red-eyed treefrog in its home, most parts of North America have at least one kind of resident treefrog. At Frogwatch USA **www.nwf.org/frogwatchUSA/** you can learn which treefrogs live in your area, the habitat they live in, what they look and sound like, and even how you can help count them next spring by joining the Frogwatch team. Stay tuned for more about Frogwatch in next month's *Ranger Rick*. ("Red, Green, & Hoppin'!" pages 22-27)

COME OUT, CREPUSCULAR CRITTERS!

In "The Buzz" on page 31 you discovered the meaning of the word *crepuscular*. Put your new knowledge to good use by taking a family hike at dawn or dusk. How is this twilight time different from both day and night? Do you see or hear any animals? Go out at both ends of the day to see if certain animals prefer one time over the other. When is your favorite time? Are you crepuscular critters, or nocturnal or diurnal ones?

For more interactive family fun, be sure to visit www.nwf.org/kids

NATIONAL SCIENCE EDUCATION STANDARDS

Science as Inquiry

K-8	Abilities necessary to do scientific inquiry
K-8	Understandings about scientific inquiry

Physical Science

K-4	Properties of objects and materials
K-4	Position and motion of objects
K-4	Light, heat, electricity, and magnetism
5-8	Properties and changes of properties in matter
5-8	Motions and forces
5-8	Transfer of energy

Life Science

K-4	Characteristics of organisms
K-4	Life cycles of organisms
K-4	Organisms and environments
5-8	Structure and function in living systems
5-8	Reproduction and heredity
5-8	Regulation and behavior
5-8	Populations and ecosystems
5-8	Diversity and adaptations of organisms

Earth & Space Science

K-4	Properties of Earth materials
K-4	Objects in the sky
K-4	Changes in earth and sky
5-8	Structure of the Earth system
5-8	Earth's history
5-8	Earth in the solar system

Science & Technology

K-4	Abilities to distinguish between natural and human objects
K-8	Abilities of technological design
K-8	Understanding about science and technology

Science in Personal and Social Perspectives

K-8	Personal health
K-4	Characteristics and changes in populations
K-4	Types of resources
K-4	Changes in environments
K-4	Science and technology in local challenges
5-8	Populations, resources, and environments
5-8	Natural Hazards
5-8	Risks and benefits
5-8	Science and technology in society

History and Nature of Science

K-8	Science as a human endeavor
5-8	Nature of science
5-8	History of science