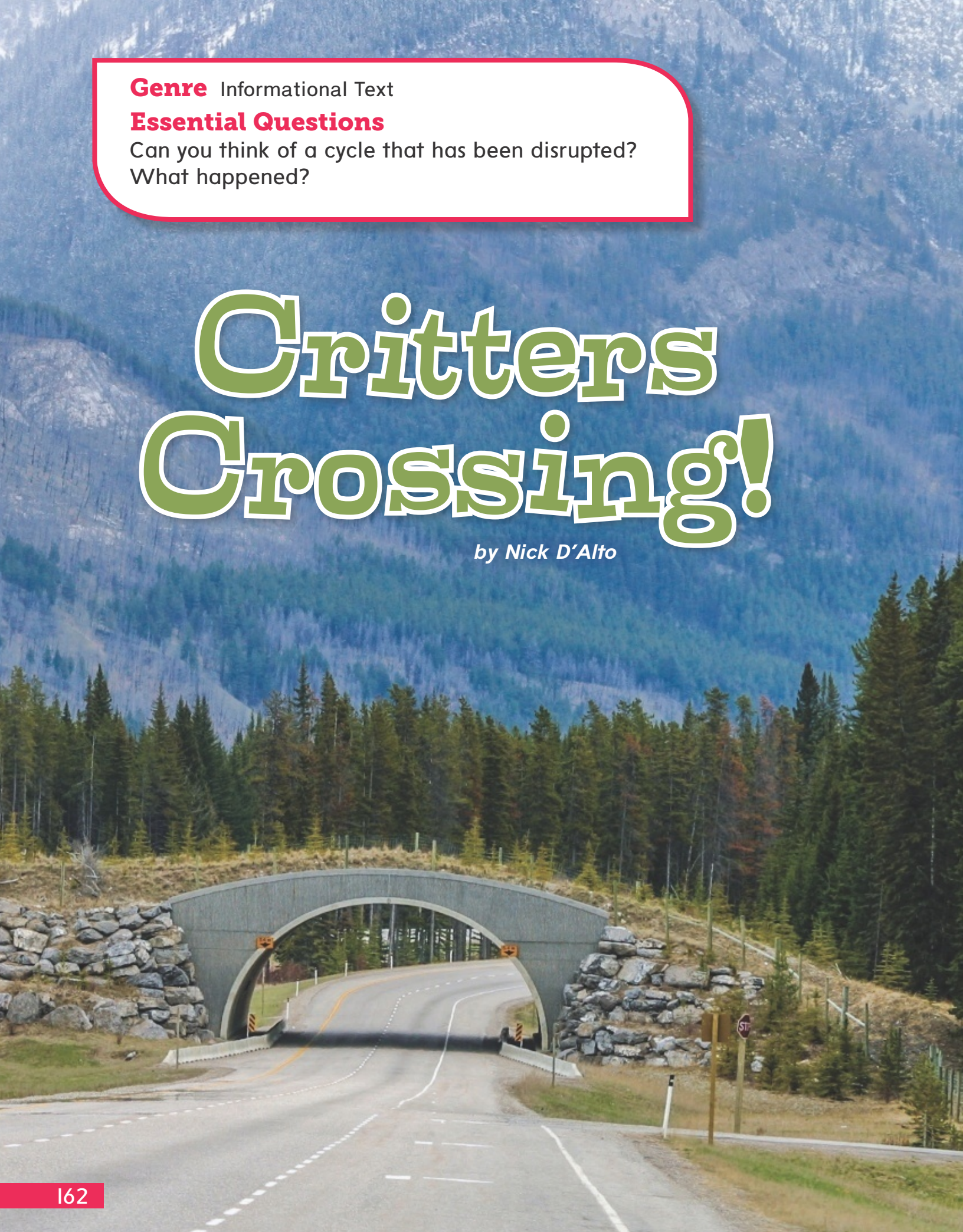
Genre Informational Text

Essential Questions

Can you think of a cycle that has been disrupted? What happened?

Critters Crossing!

by Nick D'Alto



We're driving west along the Trans-Canada Highway, near Banff, Alberta, and a huge bridge overpass looms ahead. Wait, are those deer walking across it? A bridge that lets animals cross over a highway?

The bridge is just one of 41 different crossing structures designed to accommodate animals inside Canada's Banff National Park. These crossings include six overpasses, which are bridges that cross above a road, and 35 underpasses, which are roads that go under a road. Since monitoring began in 1996, a dozen species of large mammals, including black bears, grizzly bears, elk, and deer have crossed the road over 200,000 times using these unique structures. Worldwide, thousands of wildlife crossings are in use today. In the United States, wildlife crossings protect bighorn sheep in Colorado and panthers in Florida.

Tie-Up on Alligator Interstate 75

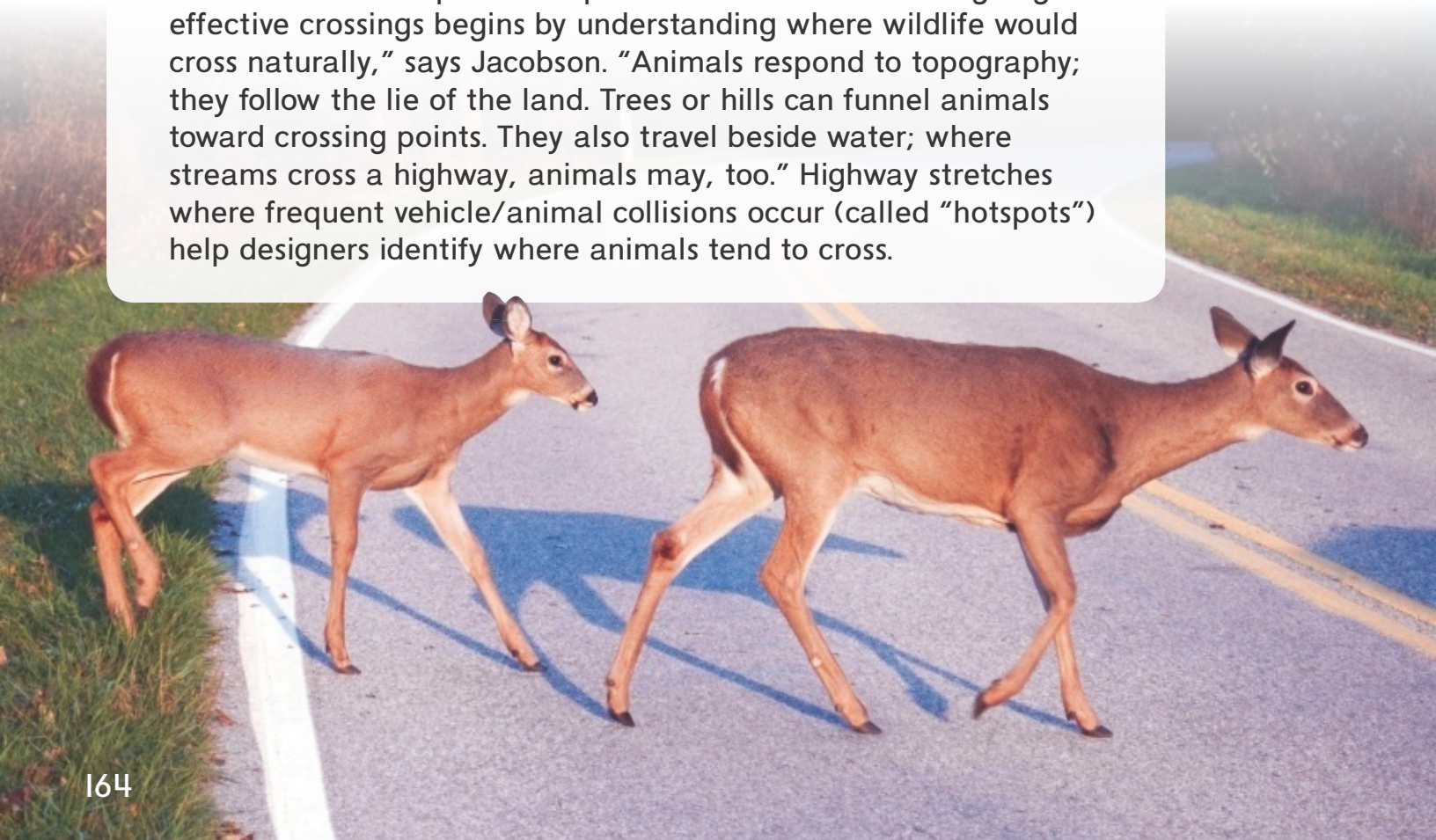
GPS and other technologies have revolutionized how people travel. Now, a computer model is helping scientists do the same for wildlife travel. The Geographic Information System (developed at the University of Florida's Landscape Ecology Program) maps habitats of animal populations across the state. Then it overlaps this data with maps of Florida's highway system to identify points where both animals and vehicles cross roads.

For example, the system predicts high-priority sites along Florida's I-75 (also known as "Alligator Alley"), and on U.S. 41, which runs near Florida's Everglades. Using this information, highway planners can modify existing structures (such as fencing and vegetation), or develop new crossing systems.

"Roads and highways connect our built environments, but they can divide natural habitats," says Sandra L. Jacobson, a wildlife biologist and wildlife-crossing expert who works for the USDA's Forest Service Research Station in California. "Animals need to travel from place to place to perform different life functions; they move for water, food, and seasonal migration. But imagine if a highway separated, say, your bedroom from your kitchen—how dangerous!" Road collisions kill wildlife, endanger motorists, and interrupt traffic. "Over one million deer are hit each year on our nation's highways," reports Jacobson. "In the eastern United States, cars kill more deer than their natural predators." In a way, two transportation systems are colliding: our roads and the "habitat corridors" that animals follow.

Highway engineers have traditionally used fences and signs to address this problem. (You've probably seen animal-crossing signs.) Now, experts are adapting crossing structures normally associated with people, such as bridges, tunnels, and overpasses, to the needs of animals. It's all part of *transportation ecology,* an emerging science that considers how natural and built environments interact. "It's a new field," notes Jacobson. "Not much was known [about habitat corridors] before the 1970s." Transportation ecology draws together many experts, including biologists, highway engineers, and geologists.

But the most important experts are the animals. "Designing effective crossings begins by understanding where wildlife would cross naturally," says Jacobson. "Animals respond to topography; they follow the lie of the land. Trees or hills can funnel animals toward crossing points. They also travel beside water; where streams cross a highway, animals may, too." Highway stretches where frequent vehicle/animal collisions occur (called "hotspots") help designers identify where animals tend to cross.



"Jumpouts" allow wayward animals to escape from the highway.

A Gate for Every Gait

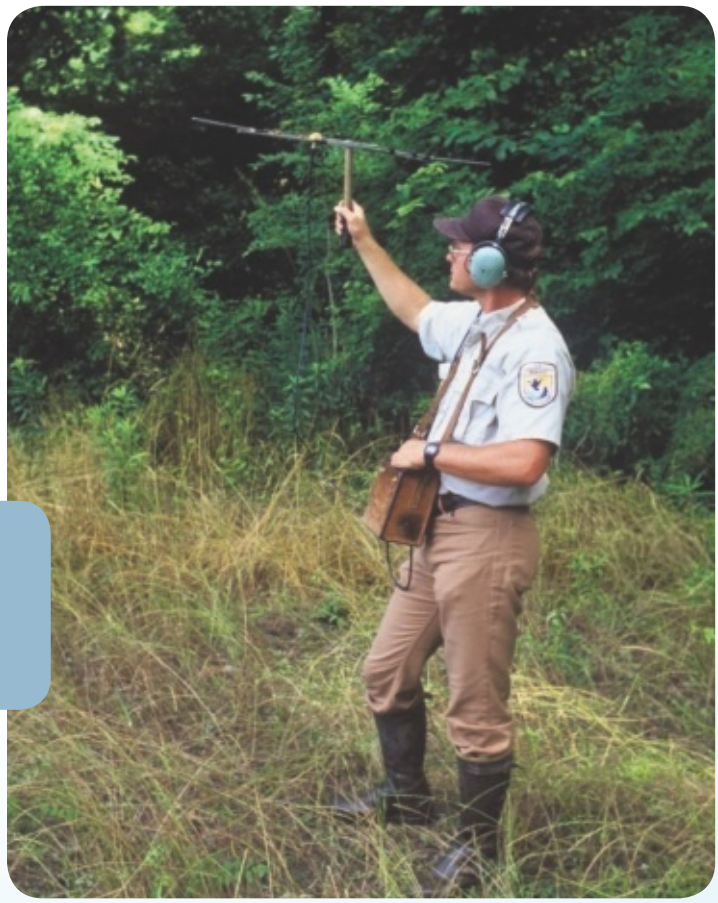
The best wildlife fences are sized and located to keep particular species off the highway. Yet some animals still stray and become trapped on the road. When this happens, one-way gates, jumpouts (which are raised platforms), and other escape structures built into the fences can help trapped animals exit the roadway safely.

Engineers can apply this data to build fences along the highway. These fences are designed to keep animals out while moving them toward a structure where they can cross safely. "Overpasses (also called wildlife bridges or bio bridges) take animals over the highway," Jacobson says. "Underpasses let animals travel beneath." The structures can range from a small tunnel for tortoises (and other slow crossers!) to Banff's largest highway overpass (which has a 180-foot span). A few crossings are specialized, such as pipes that are kept moist just for amphibians. Others let a wide range of species cross.

Selecting the best structure depends on understanding species' behavior. "For example, bears will go through a fairly small underpass," notes Jacobson. "They're accustomed to tight spaces from hibernating. But pronghorn antelope must see clearly in all directions, to escape from predators. They won't tolerate a tunnel. They need a high bridge, or an overpass they can look out from. My job is describing these kinds of animal behaviors to the engineers, so they can design a suitable structure."

Convincing animals the finished crossing is natural can make the structure less intimidating. The Lava Butte Underpass helps mule deer and other species cross U.S. 97 in Oregon. Its design team worked with botanists to incorporate native plants along the path. These were grown in soil and compost piled on the tunnel's concrete floor to simulate the countryside (much the way habitats are designed and constructed in zoos). "It's not easy to get the plants to grow under there without direct sunlight," says Jacobson. "But floor terrain is especially important for smaller animals. For example, mice want cover from aerial predators. They won't go out in the open, and won't enter a big, open tunnel, either. So we've included fallen logs as mini tunnels, to give them hiding places along the way."

Engineers sometimes use tripwires to count how many cars pass a stretch of highway. Transportation ecologists have monitoring tools, too. "Motion-triggered cameras have snapped thousands of pictures of animals crossing different structures," says Jacobson. "We also use *track plates*, soot-covered flat sheets of paper or metal." Animals walk across the plates and leave footprints behind, letting biologists estimate the number and kinds of wildlife that crossed. Scientists have also experimented with "hair snagging." Sticky or prickly wires stretched near ground level catch a few hairs from a passing animal. Then DNA testing of the hair reveals the species. (Bear or moose?) This kind of testing can even determine each animal's ancestry, showing scientists the genes that are "crossing" from one habitat to another.



Researchers use a variety of equipment to capture the traffic patterns of deer.

An animal bridge, like the one shown above, allows animals to safely cross highways. The natural terrain of the bridge encourages animal traffic.

"It's all about discovering what works best so we can use results to improve for next time," says Jacobson. For example, in Banff National Park, the crossing systems have reduced traffic-related mortality of large mammals by over 80 percent, improving safety for both animals and motorists. For the future, transportation ecologists are developing new methods to make wildlife crossings more effective and affordable. For example, wildlife bridges might be built from lighter, recycled materials, since even large animals are much lighter than vehicular traffic. Other proposals capitalize on biological differences, such as color sensitivity; for example, humans will spot a bright red bridge (meaning animal crossing ahead), but a deer's less color-sensitive vision sees just a muted pathway encouraging it to cross.

On your next road trip, you might see an astonishing wildlife crossing, such as Montana's Animals' Bridge, used by bears and mountain lions. Australia's Christmas Island even has an overpass for migrating crabs! Other crossings, like badger tunnels (used in the United States and Europe) are far less obvious. You might drive by these and never notice them. That's all right, because the animals will.

Respond

Comprehension

You will answer the comprehension questions on these pages as a class.

Text Connections

1. Why do you think Ookpik, unlike other owls, does not hunt secretively in the dark during the southern winter?
2. Do you think animal bridges are more effective than signs warning drivers to watch for animals? Explain.
3. Describe an adaptation that helps snowy owls survive cold weather.
4. How do people in "Critters Crossing!" and "Monsoons" work with nature?
5. Why do you think wildlife crossings are especially important in national parks like Banff?
6. What information in "Critters Crossing!" would you want to research on your own? How could you research it?

Did You Know?

If built, a proposed wildlife overpass over a 10-lane Los Angeles highway could be the largest in the world. This overpass would allow mountain lions to travel between the Santa Monica Mountains and other areas. Without it, researchers fear the mountain lions could end up extinct.

Look Closer

Keys to Comprehension

1. Explain the ways the mother snowy owl in "Ookpik" interacts with her owlets in order to help them survive. Quote details from the text to support your answer.
2. Infer why transportation ecologists need so many different strategies for counting animal crossings. Quote details from "Critters Crossing!" to support your inference.

Writer's Craft

3. Describe the treatment of the topic of animal migration in "Ookpik" and "Critters Crossing!"
4. Explain what the term *transportation ecology* means, based on information in "Critters Crossing!"
5. Consider the ways in which "Ookpik" and "Critters Crossing!" describe things that scare traveling animals. Compare and contrast their representation of this topic.

Concept Development

6. Describe challenges faced by traveling animals based on the information in both "Ookpik" and "Critters Crossing!"

Write

Write about one animal's journey across a wildlife bridge from the perspective of that animal.

Read this Science Connection. You will answer the questions as a class.

Text Feature

A **bulleted list** organizes items that do not need to be in a particular order.

Protecting Migrating Birds

In North America, many bird species migrate each spring and fall to take advantage of areas with the most food and the best types of weather. Their migration patterns can be complex. People are still learning how birds navigate. Although birds use senses besides sight when traveling, the setting sun, stars, and other landmarks are very important to their orientation as they make their long journeys.

In the darkness of night, however, artificial lights can cause huge problems for birds. As birds fly over towns and cities, lights shining from skyscrapers, homes, and businesses can confuse the birds. Birds can become trapped and lost within a city. Many die by flying into lighted buildings.

As birds fly in daytime, window reflections, rather than artificial light, become the problem. When windows reflect natural objects nearby, birds mistake them for open space. They can accidentally veer into the glass. Ironically, many buildings designed in the hopes of helping nature include extra windows for solar lighting and heating.

So what can be done? As people have studied this issue, they have found some solutions:

- Cities can change aerial radio tower lights so that they blink, which makes them easier for birds to navigate around.
- Offices in skyscrapers can turn off their lights at night or install types of light shields.
- People can put special decals on existing windows.
- Large windowed buildings can install specialized glass that has a pattern etched into it so birds can better see the windows.

Although good, these ideas do not totally solve the problem. For the sake of endangered migratory birds, scientists and engineers must continue to study this situation. They must find new and better ways to help birds safely travel each year.

Reflections of the sky are often clear enough to confuse birds.

1. What are some things migrating birds use when navigating?
2. Give two examples of how windows can be dangerous for migratory birds. Explain why they are dangerous.
3. Choose a building near you that has a lot of windows. Make a list of problems this building could cause for migratory birds. For each problem, identify one or two solutions. Identify what might be involved in implementing your proposed solutions.

Go Digital

As birds migrate, they need safe places to rest. Research ways people can change their yards in order to make them friendlier to migratory birds.