

# Amazing Migrations

A Reading A-Z Level Z Leveled Book  
Word Count: 1,733

## Connections

### Writing

Research to learn more about one animal from the book and its migration. Create a poster to display what you learn, including when and why the animal migrates. Include a map to show the route it takes.

### Science

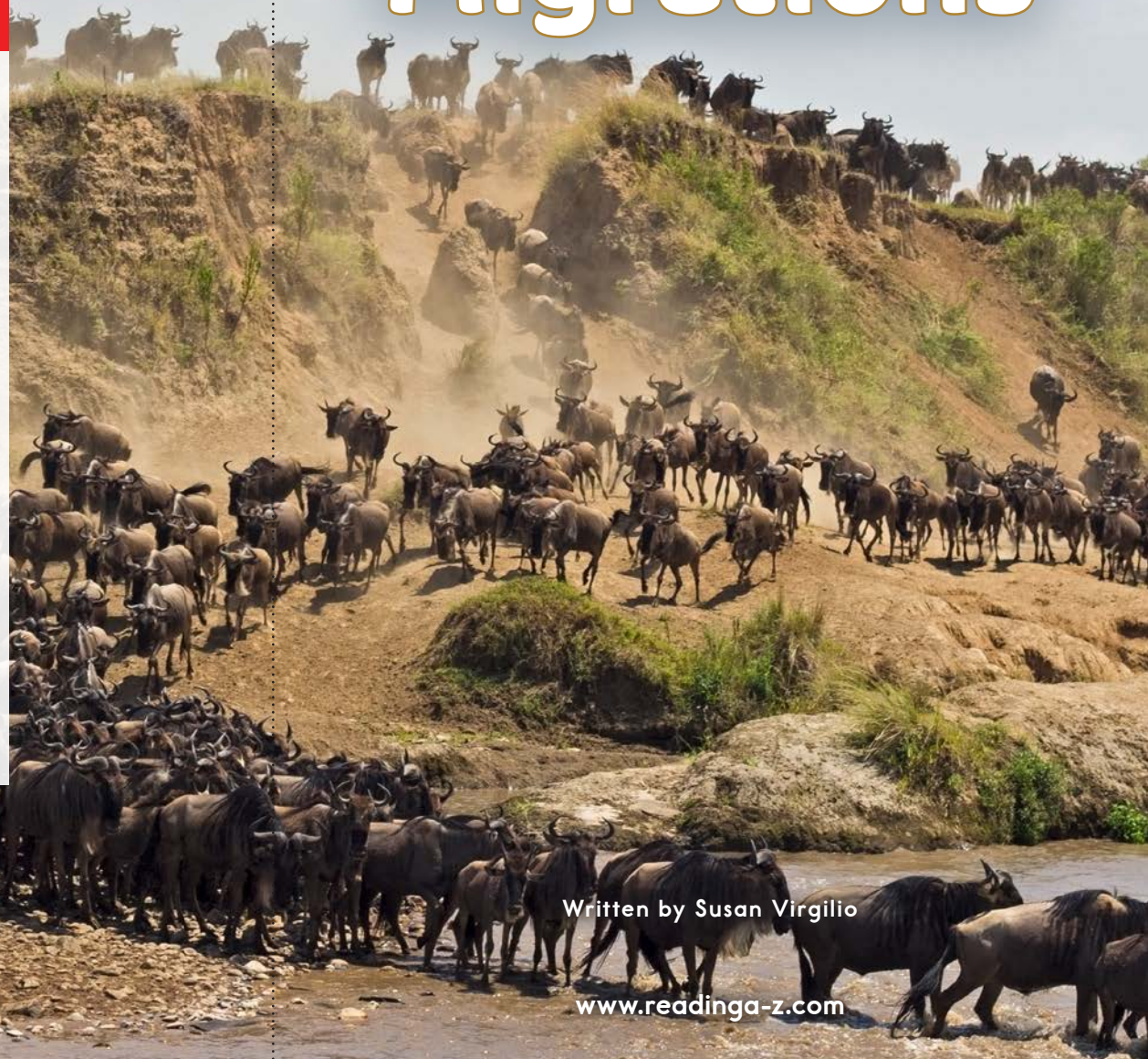
Salmon use their sense of smell to find their way back to the streams and lakes where they were born. Think of a place you often go to. Draw a map of the path you take to get there. Include details that draw on your five senses.

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## Focus Question

How and why do animals migrate?  
What challenges do they face?

## Words to Know

celestial bearings	multigenerational
dormant	navigational
hazards	obligates
imprinted	optimal
magnetic field	relocation
monitor	triggers

Front cover, back cover: A herd of wildebeest migrate north across the Mara River in Tanzania.

Title page: A gray whale mother and calf swim in the warm waters off Mexico's Baja Peninsula.

Page 3: Caribou cross a river in Alaska's Arctic National Wildlife Refuge.

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Level Z Leveled Book  
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## Correlation

### LEVEL Z

Fountas & Pinnell	U-V
Reading Recovery	N/A
DRA	50



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African elephants migrate through Kenya. During a very dry season, they may cover more than 100 kilometers (62 mi.).

## The Journey Begins

It has been said that a journey of a thousand miles begins with a single step. It may also begin with a swish or a flutter. Traveling by land, sea, and air, many animals journey hundreds and even thousands of miles yearly to feed and breed. This seasonal or annual **relocation** is known as *migration*. Such long hauls are not only impressive because of their great distance and exact routes. They are also amazing because of the many challenges migrating animals face as they travel.



## The Migration Mission

In many parts of the world, the presence or absence of certain wild animals marks the seasons. Forests filled with birdsong in summer grow quiet in winter. The stillness of early spring is broken by the chirps of tiny frogs as temperatures start to rise.

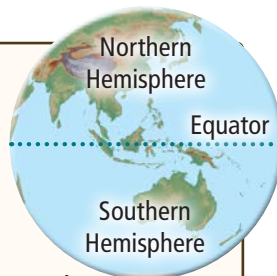
Some of the creatures that seem to come and go may simply be **dormant** during months when food is scarce and conditions are harsh. Frogs, for example, burrow underground in winter or when extreme dry spells occur. Many other animals, however, do not go dormant. Instead of reducing their need for food and water, these animals temporarily relocate to habitats where they and their young will have plenty of both.



In Australia, burrowing frogs emerge from the ground after the first winter rains.

### Do You Know?

In the Northern Hemisphere, many animals head south for the winter. In the Southern Hemisphere, it's just the opposite—they head north. That's because on the bottom half of the globe, the seasons are reversed.



A road closing helps Christmas Island red crabs cross safely during their annual migration.

Some migratory animals travel a relatively short distance. Australia's Christmas Island red crabs, for example, make an annual 8-kilometer (5 mi.) journey from the island's forests to breed on nearby beaches at the start of the rainy season. Compare their migration to that of North America's monarch butterflies. These beautiful, delicate insects fly up to 4,800 kilometers (3,000 mi.) in the fall and again in the spring!



Monarch butterflies pollinate many types of wildflowers. However, they need milkweed plants to lay their eggs and reproduce.

## Timing Is Everything

All animal migrations are cyclical, meaning they take place regularly at certain times of the year. How animals know just when to begin their migrations, however, is a bit of a mystery. Getting started before food supplies run out is key, but what **triggers** migrators to get moving?

Day length cues some birds to begin migrating. These migrators are called **obligates**—they are hardwired to go at a certain time, no matter what. One example of such a migrator is semipalmated sandpipers. These birds breed and nest on Arctic coasts in summer. There, they feast on coastal marine life to build up fatty reserves. Plumping up is important to these long-distance migrators. As the days begin to shorten, the sandpipers set out on an amazing 4,000-kilometer (2,500 mi.) nonstop journey. They fly south to their winter homes in South America. Most of the route is over open waters with nowhere to stop for a snooze or a snack!



semipalmated sandpiper



Half a million migrating sandhill cranes are common along Nebraska's Platte River in early spring.

Other bird species, such as sandhill cranes, seem to start their spring and fall migrations based on changes in temperature and weather. The cranes' long migration between the Arctic Circle and Mexico may be delayed or advanced by days or even weeks. That's because the cranes use tailwinds and rising columns of warm air called *thermals* to carry them up to 650 kilometers (400 mi.) in a single day. Waiting for **optimal** conditions reduces the birds' effort as they journey over North America.





Optimal conditions may also trigger migration in other animal species. For instance, gray whales summer in the cold waters between Siberia and Alaska. There, they spend up to twenty hours a day eating. The whales begin to migrate south when ice cover expands over the sea in the fall. Gray whales seek warmer water where pregnant females can safely give birth to calves. The whales eat very little as they migrate between 16,000 and 23,000 kilometers (10,000–14,300 mi.). Instead, they live off the fatty blubber they have built up during the summer.

## Which Way Do We Go?

Humans use memory, maps, and technology to help them find their way. Long-haul migrators use a mix of **navigational** tools as well.

Airborne migrators like birds and insects have a built-in sense of direction that is based on something called **celestial bearings**. During daylight hours, they determine their position in relation to the Sun's position in the sky. Migrating birds that travel at night, such as warblers and blackcaps, use the stars.

One scientist projected images of night skies on a domed ceiling to study how some of these night travelers determine

direction. He noticed that when caged indigo buntings were placed beneath a display of the night sky, they fluttered and turned themselves

in the direction they would normally migrate.

When he rotated the starry display, the birds shifted to realign themselves. The experiment showed that birds use the position of the stars as a guide.



What do birds do when skies grow cloudy? Birds and some other animals use Earth's **magnetic field** to navigate. Earth is sort of like a giant magnet surrounded by this field. Certain animals can sense the pull of the magnetic field at their location and use it to guide them. Researchers are still studying just how animals do this.

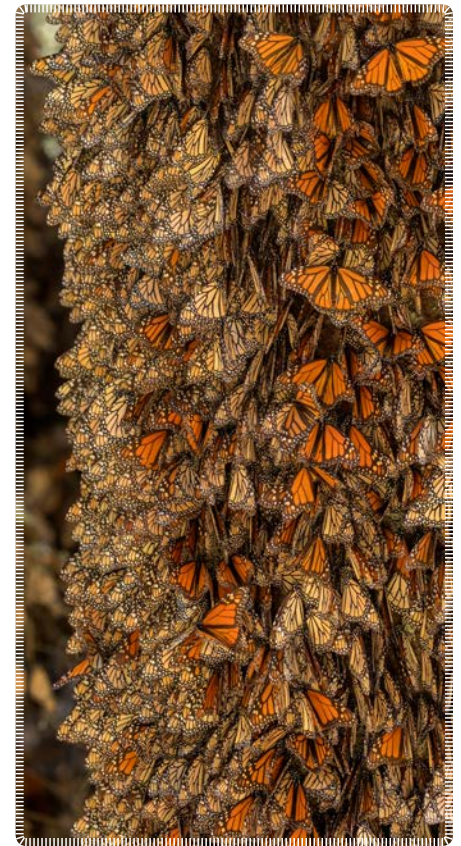
One theory is that animals such as sockeye salmon have an internal compass that points them to their destination. When salmon are born, they can somehow sense exactly where they are within Earth's magnetic field. This location becomes **imprinted** in their memory. After spending up to four years in the Gulf of Alaska, the salmon return to their freshwater birthplace. They travel thousands of kilometers to release eggs, or spawn, at this exact spot. The salmon are able to reference this point as they make their way back from the sea.



Sockeye salmon return to their birthplace in British Columbia to spawn.

But what accounts for the **multigenerational** migration of monarch butterflies? The round-trip migration from Hudson Bay to Mexico takes longer than a monarch's life span. The generation that is born in Mexico must find its way back to a place it has never been.

Just as some animals have the instinct to begin migration on specific days, monarchs have the instinct to follow the same routes taken by previous generations. The idea of a magnetic “map” stored within their genes may explain this instinct. Genes are basic units of heredity that transfer a trait from one generation to the next. In the case of monarchs, their genes somehow code their destination in their memory.



Thousands of monarch butterflies cover a single tree in the oyamel fir forest of central Mexico. They pack in tightly for warmth, wait out the winter, then fly north in spring.





Many migrating mammals depend on landmarks and a sharp sense of smell to guide them. Africa is home to two of the largest mammal migrations known. The great Serengeti wildebeest migration takes place yearly when 1.5 million wildebeest make their way between feeding grounds in Tanzania and Kenya. Their journey takes them 2,900 kilometers (1,800 mi.) across grassy plains and the rushing Mara River. As they follow the rain and greener pastures to the north, the wildebeest are often joined by zebras and gazelles.



Just as impressive is the Kasanka bat migration—the biggest mammal migration on Earth. From almost every corner of sub-Saharan Africa, ten million straw-colored fruit bats gather on a patch of swamp forest in northern Zambia. For several weeks, they feast on the fruit that grows after the start of the rainy season. By day, they cover the trunks of the trees and fly out to forage at dusk.

### Math Minute

The sooty shearwater is a dark seabird that migrates great distances over ocean waters. Its migration route can stretch 14,000 kilometers (8,700 mi.) between New Zealand and the North Pacific Ocean. If it takes a shearwater 29 days to make the trip, how far does the bird travel in an average day?

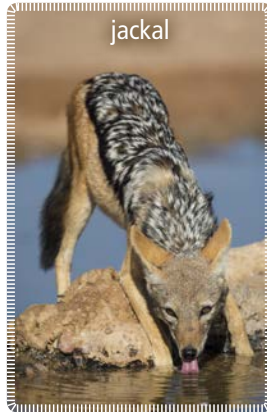
Answer: 483 kilometers (300 mi.)



## Overcoming Obstacles

Knowing when and where to go are just two of the problems migratory animals face. An increasingly bigger problem is dealing with both natural and constructed **hazards**.

Many migrators are prey animals that must be wary of predators as they travel. The wildebeest of the Serengeti are a main food source for lions and jackals as well as crocodiles lurking in lagoons and rivers. Hawks and humans hunt African fruit bats, which grow plump from eating dates and figs. Hawks also hunt the migratory routes of songbirds that travel North America's flyways.



Bad weather presents other challenges to migrating species. Sudden storms can disrupt the flight plans of migrating birds and force large flocks to land unexpectedly in unusual locations. This type of event is known as a fallout. One songbird fallout occurred in South Texas in April 2013. Thousands of tired and hungry migrating songbirds landed on South Padre Island, off the coast of Texas. Island residents put out fruit and worms to help the birds gain enough strength to resume their migration north.

Shifting weather patterns have sometimes interrupted land and water migrations as well. Warm spells can cause early snowmelt, leading to flooding that complicates the migration of animals such as elk. Flooded rivers can overrun their banks and send migrating salmon off course, leaving them high and dry when waters recede. Droughts can not only make food scarce but can also spark wildfires that put migrating herds in peril.

Human-made barriers threaten long-haul migrators as well. Dams block waterways that migrating fish once used. Highways that cross migration routes put animals and people on a collision course. Fences block migrating range animals from following centuries-old trails that lead to important feeding grounds.

A herd of migrating pronghorn encounter a barbed wire fence in Wyoming. A closer look at the bottom wire, however, reveals that it is not barbed, so pronghorn can slide under it without cutting themselves.



Even well-intentioned structures harm migrators. The huge blades of giant wind turbines used to generate clean electricity are deadly to migrating birds and bats. Large-scale solar farms, such as the Ivanpah solar plant in California's Mojave Desert, are responsible for killing thousands of birds that fly into the concentrated beams of sunlight and are instantly burned to death.

To address these problems, researchers use tracking devices to **monitor** migratory animals. They include the information in studies showing the impact of construction on the environment in hopes that new construction can be placed away from migration corridors. New awareness of migration routes and the behavior of migrators has inspired people to find ways to help rather than hurt them.



## The Grand Champion of Migration

If any one species deserved to be crowned the grand champion of migration, it would be the arctic tern. Tiny tracking technology enabled scientists to follow the flight of this bird on its long migration between the North and South Poles. What researchers learned was astounding: the tern's journey was twice as long as once thought, an unbelievable 70,800 kilometers (44,000 mi.)!

Instead of following a straight north-south line, many Arctic terns zigzag from Greenland to Antarctica and back again. They do this to take advantage of swirling wind currents that carry them on their way. The additional distance saves these birds the tremendous effort of having to fly directly into the wind.





Some regions now have wildlife overpasses and underpasses where roadways and land migration routes cross. These wildlife-only bridges and tunnels help keep migrators and drivers away from each other and safe. Engineers are working to improve clean-energy devices that unintentionally harm migrators. Vertical wind turbines in development may one day replace the giant horizontal propellers on wind farms.

Specially constructed “fish ladders” have been placed next to dams on salmon migration routes so that the fish can safely reach their spawning grounds. Information about how pollution affects migrators already stressed from their long journeys could lead to regulations designed to keep migrators safe.



A salmon leaps up a fish ladder in Alaska.

What’s most impressive about amazing migrators is how, despite these obstacles, they set out on their epic journeys year after year. These migrations across land, in the air, and through the sea are critical to the survival of these species. Understanding their importance can inspire us to take action to ensure that these important journeys continue for many years to come.

## Glossary

<b>celestial bearings</b> (n.)	an understanding of one’s location in space and time as it relates to the Sun, Moon, stars, and other celestial bodies (p. 10)
<b>dormant</b> (adj.)	not active but able to become active again (p. 5)
<b>hazards</b> (n.)	possible dangers or risks (p. 15)
<b>imprinted</b> (v.)	fixed permanently in the mind or memory (p. 11)
<b>magnetic field</b> (n.)	an area around a magnetic material, electric current, or moving electric charge where there is a magnetic force (p. 11)
<b>monitor</b> (v.)	to observe or check the progress of something over time (p. 17)
<b>multigenerational</b> (adj.)	relating to or occurring over more than one generation or life cycle (p. 12)
<b>navigational</b> (adj.)	relating to steering a course toward a destination (p. 10)
<b>obligates</b> (n.)	animals that must repeat a certain behavior or live in certain conditions to survive (p. 7)
<b>optimal</b> (adj.)	best or most well-suited (p. 8)
<b>relocation</b> (n.)	the act of moving from one place to another (p. 4)
<b>triggers</b> (v.)	causes something to happen (p. 7)