Seasonal Safaris: Comparing Migrations

Epic Journeys: The Great Migrations illustrates the richness and variety of migrations in nature. As the Earth turns and seasons cycle, living creatures respond with different journeys to different havens. What do migrations have in common? What makes each unique?

Every year, monarch butterflies arrive at their ancestral wintering grounds in Mexico, even though it's a place that none has ever been before.

Try This!

Circles in Time.

1. Have students choose one of the featured species: zebras, monarchs, whales, or red crabs. Divide the class into four "specialist" groups according to chosen species. Give all members of each group copies of:
   - the calendar strip along the right side of this page
   - species information sheets for their chosen species (see pages 8-15).
2. Challenge students to ferret out key events in their species' yearly migratory cycle and place them on the annual calendar, writing in the open space to the right of each month on the reproduced page.
3. Ask students to research seasons and climate where their species lives and record the seasonal weather patterns for the region on the monthly calendar strip.
4. When the calendars are complete, overlap the ends and staple, creating Circles in Time that describe species' responses to changing seasons.
5. Ask specialist groups to separate and form into new groups including one member from each of the four different species. Within the new groups, each takes a turn to describe the Circle in Time for their species. Starting with the current month, they tell what their species is doing now. Through this sharing, students compare the various migrations and the seasonal changes to which the animals are responding.
6. Summarize with a class discussion. Ask: *What do migrations have in common? What makes each unique? Knowing what you know, how would you define migration?*

Tip

Cover the text on this page, exposing only the calendar strip, before reproducing for students.

December
November
October
September
August
July
June
May
April
March
February
January

Monarch Butterflies

Danaus plexippus

Each spring, we look for the fluttering orange monarch butterflies that appear in gardens and yards of North America. But rarely do we stop to marvel that these mere wisps of life, each weighing less than a paper clip, make the longest migration of any insect in the world. How do they do it?

Amazingly, no single butterfly makes the whole trip. Only the last generation of summer completes the epic migratory journey all the way to Mexico. On the way south in September and October, these monarchs stop to nectar, actually gaining weight along the way! They follow an invisible path to a winter home they have never seen, a place their ancestors have found without fail for centuries.

A tiny patch of oyamel fir trees in Central Mexico is their destination. Some monarchs have flown up to 3000 miles (4828 kilometers) to find it—an area of only 60 square miles (155 sq. km). Their mountain habitat provides a unique microclimate that helps the monarchs survive for four to five months with almost nothing to eat.

The forest acts as umbrella and blanket, protecting the monarchs from moisture and cold. At 10,000 feet (3,048 meters) above sea level, overnight temperatures can drop to freezing. Millions of butterflies warm themselves in closely packed clusters, sometimes heavy enough to bend branches.

From early November to mid March, they spend the winter living off the precious energy contained in their fat reserves. During March, lengthening days and warmer temperatures signal the time to leave. With only a few more weeks to live, the monarchs bid farewell to the forests that sheltered them in winter. As they depart, they carry with them the incredible instincts that will guide their great-grandchildren to the same forests the following fall.

Flying north with wings tattered and colors faded, they mate and lay eggs as they race to produce the next generation and complete their life's journey. By May, after living for up to eight months, this over-wintering generation of butterflies has died. In the northern US and Canada, the first butterflies that arrive in May or June are their children. Up to three generations will live during the summer—feeding and flying, mating and laying eggs on milkweed all summer long. The summer monarchs live only two to five weeks.

JOURNEY NORTH ONLINE

Join with students from Mexico to Canada to track the monarch migration each year. Report your own observations!

www.learner.org/jnorth

In late summer, the final generation born is the special migratory generation. Their bodies and behaviors are different from all the others. Come fall, the miraculous circle of life starts over. By instinct alone, these monarchs set out in September or October for the marathon air voyage south, returning to the very same place their ancestors left seven months before.

Recognize milkweed?

Use this helpful online guide to learn to identify milkweed.
Monarch Watch Field Guide to Milkweed
http://MonarchWatch.org/milkweed/guide/index/htm

One female monarch can lay several hundred eggs, usually laying only one egg on each milkweed plant she chooses.

From Egg to Adult

egg	3-5 days
larva	9-14 days
pupa	8-13 days
Total	20-32 days

Would you like to tag monarchs and help study their migration?

Contact Monarch Watch:
http://MonarchWatch.org

Challenge Questions

1. If a female monarch can lay hundreds of eggs, why don't we see more adult butterflies?
2. How do female monarchs find milkweed?

See answers on page 20

- *Monarchs found west of the Rockies don't go to Central Mexico. They winter in over 150 small sites along the California coast.*
- *The monarchs' forests in Mexico are being cut for wood and farmland. Experts believe the monarch migration will not survive beyond the next decade unless the forests are protected.*
- *The world learned about the Mexican monarch sanctuaries in the August 1976* National Geographic. *Dr. Fred Urquhart, who invented monarch tagging in 1937, searched for almost 40 years before discovering their over-wintering site. The people of the area in Mexico where monarchs went had seen them returning every fall for centuries, never suspecting the amazing journey they had traveled!*
- *It takes four monarchs to equal the weight of a dime.*

Migratory Birds

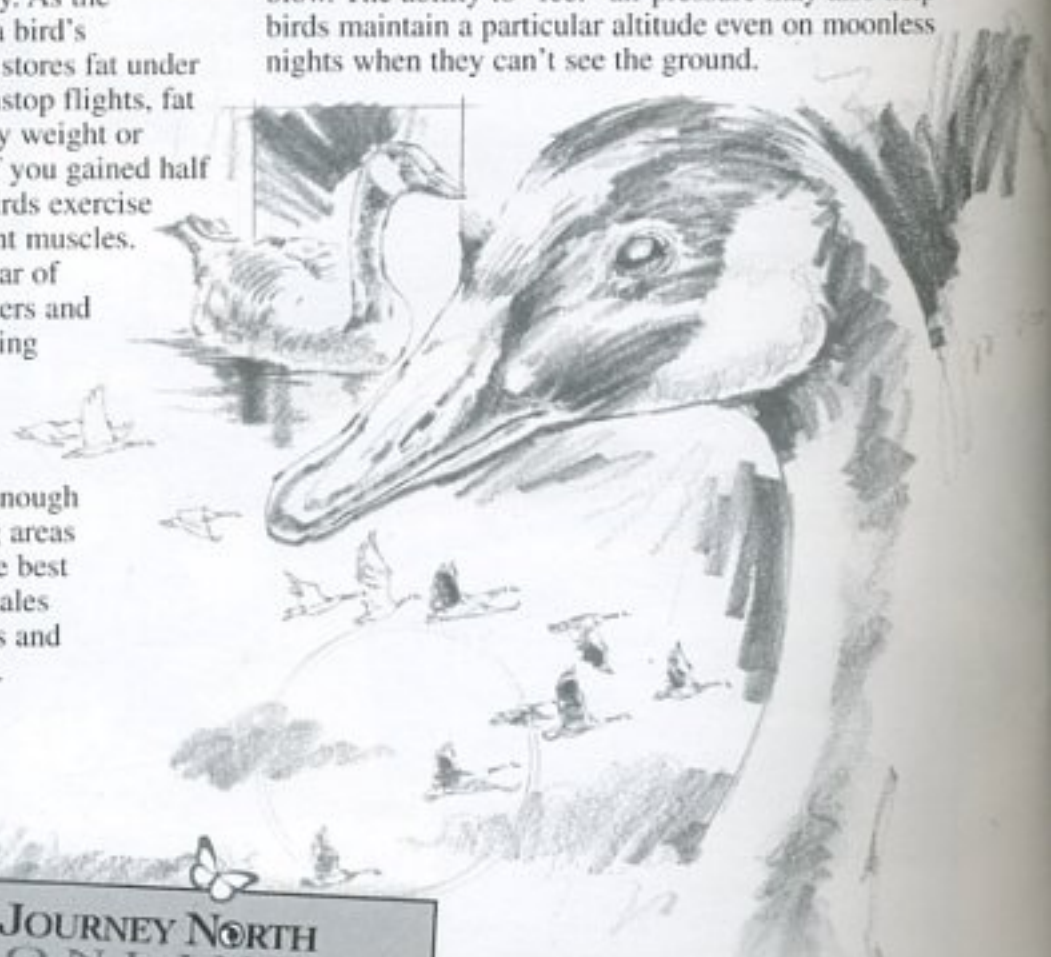
People busy on the ground may hardly notice, but some five billion birds—more than 350 bird species—all over North America are traveling overhead each season. All over the world, birds are migrating as the seasons change. Some don't even fly. Emperor Penguins, emus, and ostriches walk. Other penguins and auks swim.

Like an athlete training for a marathon, a bird needs to prepare for the journey. As the migration season approaches, a bird's metabolism changes. It eats more and stores fat under its skin. In species that make long nonstop flights, fat stores can equal half their normal body weight or more. (How much would *you* weigh if you gained half your weight in fat?) Before the trip, birds exercise to increase the size of their major flight muscles. Many also prepare for the wear and tear of migration by molting their flight feathers and growing a new set for the trip. New wing feathers mean more efficient flight. Fit, fat, and with new feathers, birds are ready to take off.

Timing is important. Males must eat enough to remain strong and reach the nesting areas early enough to declare and defend the best territories, and to attract females. Females must arrive healthy enough to lay eggs and raise the young of the next generation.

Birds who head north too early may find cold weather and poor food supplies. Even a few days delay in nesting can make the difference between life and death; baby birds need enough time to grow and gain strength to fly south in the fall.

Like all travelers, birds pay close attention to the weather. They seem to have a keenly sensitive inborn barometer. The ability to detect changes in air pressure helps birds in many ways. Scientists have long noticed that birds feed intensely as air pressure falls. Storms usually are associated with falling air pressure, and birds have a hard time getting food during a storm. The sooner birds can predict a storm before it hits, the more time they have to prepare. Birds often migrate along frontal systems; changing air pressure tells birds when a front is coming and which way the winds will blow. The ability to "feel" air pressure may also help birds maintain a particular altitude even on moonless nights when they can't see the ground.



About one-half of all North American bird species migrate to the tropics each autumn. Fewer and fewer return each summer. Read "Silence of the Songbirds" in the June 1993 issue of *National Geographic* to find out why.

JOURNEY NORTH ONLINE

Is it true that robins return in spring when the average temperature reaches 36 degrees? Test the theory yourself!

www.learner.org/jnorth

Challenge Questions

1. At what times of day do birds migrate?
2. What are some human-caused perils for migrating birds?

See answers on page 20

The Geography of Migration

When North America is freezing cold and covered with snow, the tropics are a welcome refuge for birds. Why don't they just stay "down south" all year? A closer look at landmass offers a big clue. Although migratory directions, distances, and habits are varied, one thing influences them all: geography. Help students connect geography, seasons, and migration with the activity below.

Try This!

A global view of migration.

1. Ask students to write their thoughts: *Why do you think birds migrate, anyway? If things are so good "down south," why don't birds stay there all year?*
2. Use an inflatable globe to help students compare the amount of land to water on Earth. Toss the globe from person to person. At each catch, ask: *Where did your right-hand index finger land—on water or land?* Tally results after at least 20 tosses. Compare tallies, land to water, to see that Earth is about three-fourths water and only one-fourth land.
3. Say: *Now let's take a closer look at where the land is.* Hold the globe so students see a polar view of each hemisphere. (Older students can draw the land they see in each hemisphere.) Compare landmass above the equator to landmass below the equator. Is there more land in the Northern Hemisphere or the Southern Hemisphere?
4. Help students estimate the area of the landmass. Make a grid by drawing lines one-half or one-fourth inch apart on a piece of transparent plastic (from a sandwich bag, for example) with a ruler and felt-tipped pen. Place the grid over Canada and the United States. Count square units. Repeat for Mexico and Central America.

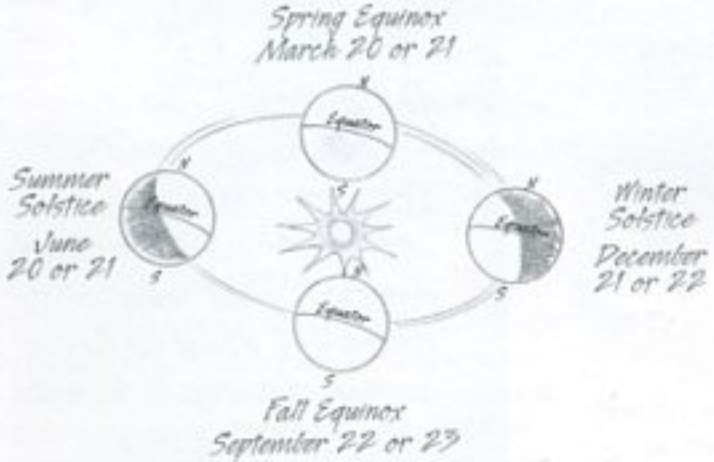
5. Compare square units of land available in Canada and the US with square units of land available in Mexico and Central America. Ask: *What does this geography mean to migratory birds?*
6. Revisit the question to discuss and conclude.
   - *Why don't birds stay "down south" all year?* (An enormous breeding range that was unavailable in the winter opens up in the spring season offering birds plenty of food and space in the summertime. It's a good place to raise their young until the season changes and weather turns cold.)
   - *Why is a larger breeding range helpful to birds?* (They have not only themselves to feed, but also their young.)
   - *Why is habitat loss in the southern regions especially significant?* (Your comparison of square units shows how relatively little land is available in the south. During the winter, it's a refuge for the entire northern region. Habitat there is critical to survival for the resident birds as well as billions of northern birds who winter there. Every acre counts.)

- *The Arctic tern breeds in the Arctic and migrates to the Antarctic, traveling between 22,000 and 25,000 miles (34,405 and 40,233 km) each year.*
- *Although goslings are able to fly at two months of age, Canada geese families stay together during migration and through the winter.*
- *The golden plover migrates from Alaska across 2,000 miles (3219 km) of open ocean to Hawaii.*
- *The Blackpoll Warbler flies 86 hours nonstop over the ocean from the northeastern US to South America. That metabolic equivalent would be like a human running 4-minute miles for 80 hours!*
- *Some birds only change elevation when they migrate. Pine grosbeaks, brown-capped rosy finches, and juncos breed in the alpine zones of Colorado's Rocky Mountains in summer. In winter they head down to lower elevations.*

A Closer Look at Home

You see what you know. Jerome Bruner

Migration takes place everywhere, including your own backyard! Because migration is a behavioral adaptation in response to seasonal change, this is a good time to reinforce the fundamental cause of the seasons: the Earth's tilt results in different amounts of sunlight around the globe. In this activity, students make observations as the seasons change to see how the year's natural events and cycles change in their own backyards.

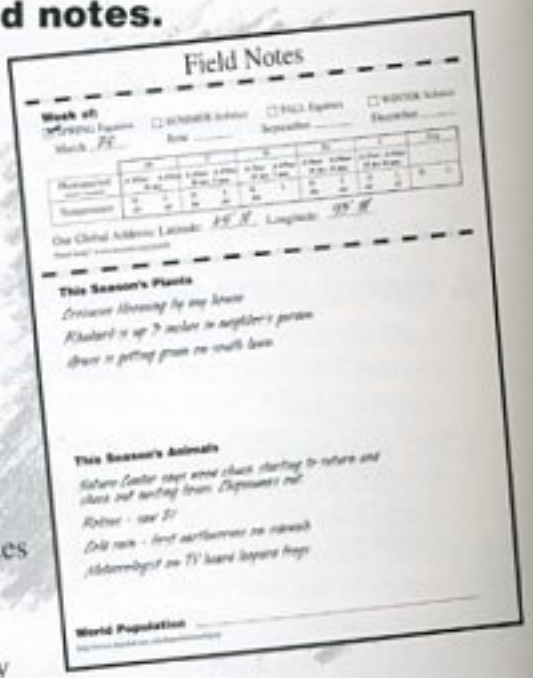


We wouldn't have seasons at all if the Earth were not tilted on its axis. Think about it!

Observe seasonal changes on your own, but remember other sources too! Call a local nature center and find out what's happening there. Interview a naturalist to help you make the most appropriate observations for your region and climate. Put neighbors on alert, tune in to local newscasts, and read the newspaper for seasonal clues and events.

Try This!

Record field notes.


Field Notes

This Season's Plants

This Season's Animals

World Population

1. Photocopy four Field Notes log sheets (page 19) per student and make your observations four times a year. Check your calendar and record exact dates of the current year's equinoxes and solstices.
2. Record the photoperiod by counting the elapsed hours and minutes between sunrise and sunset each day. (Your newspaper usually provides local sunrise and sunset times.)
3. Record the high and low temperature on each observation day. Again, you can check the local newspaper report. Remind students that as energy from the sun changes with the seasons, they'll see temperatures, plants, and animals respond.
4. Notice plants and animals. Remind students that the whole food chain is interrelated.
5. Record population changes during the year of your observation. Humans—their numbers and their actions—are the single greatest challenge to the survival of migratory species.

Tips

Don't worry about having students identify plant or animal species. The important thing is for them to get outside and appreciate what's in their own location.

Don't get discouraged! Good naturalists build their observation skills over a lifetime.

Calendars to the contrary, nature's year begins with spring.

Edwin Way Teale