



# Magnificent Migration

Appropriate Ages 8-12

Expected Time: 50 min

Students will explore the challenges and benefits of migration by acting out a seasonal bird migration.

This activity satisfies one of the required JNMN lessons needed to complete the Junior Zoology Master Badge.

## BEFORE YOU TEACH

### Learning Objectives:

Students will learn that when migrating, birds form large groups which help individual birds accurately navigate to where there is available food.

Students will learn about the electromagnetic force and its connection to the Earth and birds.

Students will learn of unique physical adaptations that birds use when preparing their bodies for long migrations.

Students will learn that birds make behavioral changes when processing information from sensory receptors.

### NE Science Standards:

Grades 3-6

SC.3.7.2.A

SC.3.7.2.D

SC.4.6.3.B

SC.5.11.3.C

SC.6.6.2.D

SC.6.9.3.B

### Did You Know...

The largest crane migration in North America flies through Central Nebraska every year!

Birds use Earth's magnetic field like a compass to assist with navigation.

### BACKGROUND KNOWLEDGE

Birds are warm-blooded, egg laying, animals with wings and feathers. Most birds can fly using their wings to create lift. Many of the birds here in Nebraska are migratory birds, including geese, ducks, cranes, and songbirds. Migratory birds usually migrate seasonally, flying South for the winter and North for the summer. This can be stimulated by changing temperatures, seasonal food availability, and more.

### MATERIALS AND PREP:

- Migration Game Cards
- Laminated photos of Hummingbird tongue/beak
- Hummingbird nest/egg and skull
- Medium sized poster paper
- Laminate of Indigo Bunting
- Flash drive containing Omaha's purple martin roost or youtube <https://youtu.be/g2y-IQcNF4s>
- <https://birdcast.info/science-to-action/> - (Opened and ready before class)
- <https://birdcast.info/migration-tools/migration-forecast-maps/>

### VOCABULARY

**Migration:** When an entire population moves to find food.

**Nocturnal:** Active at night.

**Electromagnetic Field:** result of the movement of liquid iron in the outer Earth's cores. As the liquid metal moves, it generates electric currents creating a magnetic field.

### Engage: 5 Minutes

Ask if students can identify a physical adaptation with the beak and tongue. Why might their shapes be useful?

Have students brainstorm the reasons they leave their house. Examples could be shopping for groceries, doctor visits, school, or to play. Instruct students to create a map of their house and all the spots they visit frequently relying solely on their memory. Explain that this demonstrates how animals use their senses and memory to migrate. Explain that birds migrate for many of the same reasons that we leave our house, including to find food.

Show video of the purple martin Roost in 2016 that illustrates volume of birds, their speed and spacing. Open the <http://birdcast.info/science-to-action> map and insert your city to see live migratory bird estimates traveling through your area overnight. Nearly all species of birds migrate in groups. Have students consider why a group may increase survival?

### Explore: 20 Minutes

Since most songbirds migrate at night, turn out the lights to mimic their migration. Randomly assign a bird card to each student and have students line up on one side of the room. Secure the masking tape on the floor or outside surface to denote both the beginning and end lines for the migration. Their goal is to "migrate" to the other side as quickly as possible. Explain that each student is going to pretend they are the bird they were assigned and will follow instructions from the provided migration game cards. Not all birds will move after each card is read. When something that benefits migrators occurs, students will move forward. Like the Purple Martins from the video, have them migrate very close together. When something negative for migrators occurs, students may have to move backwards. Shuffle the provided migration game cards and read aloud the instructions on each card, one at a time. Once they reach their final destination they will no longer need to move forward or backward. After all of the cards have been read, inform them that any 'bird' that did not make it to the finish line did not survive their migration.



**Explain: 5 Minutes**

When students have finished the game, ask them what challenges they faced while migrating? What challenges did they expect and which ones were unexpected? What kinds of birds faced the most challenges? What birds had the farthest distance to travel? The shortest?

Ask students what environmental factors may change that initiate a bird's migration? When birds are ready to migrate they tend to do so seasonally. The length of daylight to nighttime is very important, as well as temperature, and having enough food availability. Physical adaptations occur in the body too. Fat deposition is necessary so that birds can endure their migration journey. Other physical adaptations involve the change in steroid and hormone levels within the birds' bodies. A 'restlessness' also happens before migration. Have students predict how birds are able to fly thousands of miles and yet return to their home range.

Introduce the words electromagnetic field and its definition: A result of the movement of liquid iron in the outer Earth's cores. As the liquid metal moves, it generates electric currents creating a magnetic field.

- Scientists believe birds rely on the position of the sun, the stars and the Earth's electromagnetic field in order to migrate. Scientists who have captured birds and allowed them to fly are able to sense when they leave the electromagnetic field, and quickly fly back into it.
- Research is being done that is looking for how birds bodies can help them stay on course and results point to a physical adaptation, a sensory protein near their eye that allows them to sense the electromagnetic field.
- Each place on Earth has its own electromagnetic signature based on how near or far that place is from the North and South Poles, kind of like GPS. Birds likely have in addition to the five senses their own GPS-like sense.
- Then there's flying within a group so the newly hatched and first year birds follow the group and as they grow, they learn from the older birds.

**Extend: 15 Minutes**

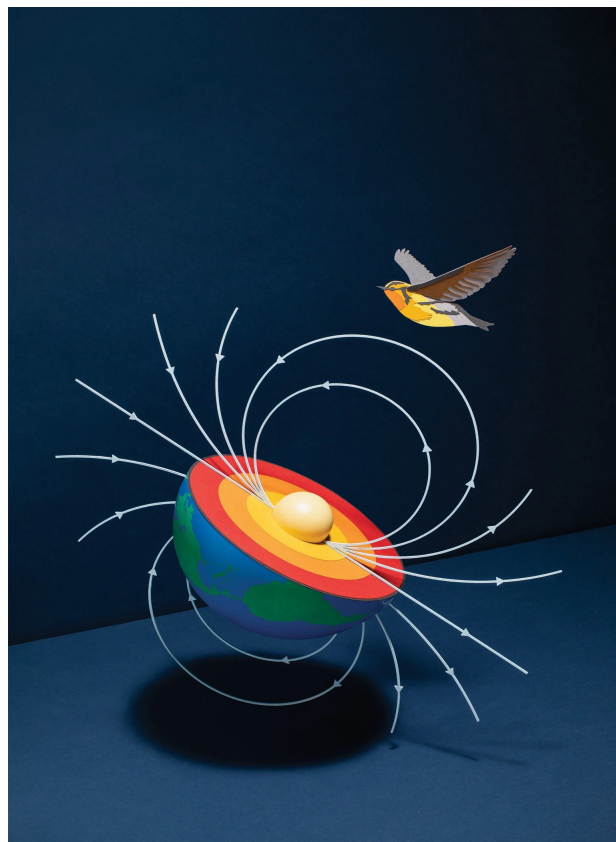
Discuss why birds migrate at night.

- 1) Fewer predators
- 2) Cooler temperatures
- 3) Less wind
- 4) Celestial navigation.

Students will now work in groups to create a solution to a challenge a bird faces while migrating. Split students into groups and have them pick a challenge they faced while playing the migration game. Give them paper and time to design a solution to the challenge. Solutions could be laws that protect land, protecting birds from hunting, bird decals to warn birds of glass windows, etc. Allow the students to be as creative as they want when designing these solutions. They can draw the solution, or write about it. Pass out poster sized papers. or assign one of the following conservation tools to research and on their posters, draw or write a description of their bird protection device: Birdcast.info radar mRHI, Ebird data collection app, the Motus wildlife tracking system of radio transmitters, or the bird tracking satellite receivers, Icarus.

**Evaluate: 5 Minutes**

Have students share their migration challenges and solutions with the class. Have students explain how scientists' inventions are helping track birds' migrations. How can this help protect birds?



## Hands On Extension

### In the Lab:

Download the Ebird App, or use <https://ebird.org> Navigate to Explore, enter the place you are located and compile a list of places within your county where birders have reported in their recent sightings. The locations are found when one selects "details". Perhaps print a copy of the results of two or three birder's accounts so that you will be prepared for the birding field trip. Download the free Merlin ID app and record the birds you encounter. The app is designed to listen and identify birds by their chirps, calls and songs. Keep track of the birds you see or hear, the place you visited and the time of year.

### In the Field:

Visit a nature center with birds on display! One such Nature Center is Fontenelle Forest's Raptor Woodland Refuge. Fontenelle Forest houses a variety of rescued raptors. Head out to well established bird feeders at local parks, such as Platte River State Park, Wildcat hills nature center, Rowe Sanctuary, Spring Creek Audubon Center. Or find a local birding spot via the Nebraska Birding Guide <https://birdtrail.outdoornebraska.gov/>

Or Take a birding field trip to the places identified with IN THE LAB research.

### In the Community:

EBird and Cornell are free community science apps and are a great way to get students involved in community science. It's easy to help bird biologists with their research projects by adding your bird sightings to other birders' data. Students and educators can easily download the ebird app. Create an account and start recording their group's observations. Scientists can use these observations to track migration patterns, habitat ranges, and population changes.

OR

In the Spring or Summer, you may have noticed a bird or two attempting to fly into your window. Have students research ways to keep birds safe from windows and create a classroom or school wide initiative to decorate windows to keep birds from hitting them. Your effectiveness in preventing bird deaths is based on time of year, so be sure and consult [Birdcast.org](https://birdcast.org) forecasts. There are several companies that sell bird window decals, for help in locating them contact your JNMN Coordinator.

**\*COMPLETING ANY ACTIVITY FROM THIS SECTION WILL COUNT AS YOUR SECOND ACTIVITY REQUIREMENT FOR THE ZOOLOGY MASTER BADGE.**

## RESEARCH AND RESOURCES

To become a citizen scientist and help researchers track bird populations and migrations, visit <https://ebird.org/home>

To explore a migration calendar of the birds in Nebraska, visit <https://audubon-omaha.org/go-birding/birding-calendar.html>

Ebird, Cornell's Merlin, and Audubon bird identification mobile apps can be found in your app store.

Gravitational-magnetic-electric field interaction Article: <https://www.sciencedirect.com/science/article/pii/S2211379718314128>

Audubon Magazine: Audubon The Wonder of Migration Spring 2022, Richard Holland, Sensory Biologist, Bangor University & Nathan Senner, Ornithologist, USC <https://www.audubon.org/magazine/spring-2022>

Articles: Endocrine Effects, Rankin Amer Zool 1991 Magnetically sensitive cryptochrome, Robinson, National Academy of Sciences, 2012 <https://www.jstor.org/stable/3883471>