

The Incredible Journey

Adapted with permission from "Ecosystem Matters: Activity and Resource Guide for Environmental Educators," Rocky Mountain Region of the USDA Forest Service.

Grade Level: upper elementary/middle school

Duration: 1 hour to 1 hour and 30 minutes

Skills: comparison of similarities and differences, critical thinking, vocabulary, discussion, observation, and prediction; using technology (with additional activities)

Subjects: science, physical education, social studies, geography, history, and math; technology (with additional activities)

Overview

Through an active simulation game, students learn about the many threats shorebirds face on their migratory journeys.

Concepts:

- During each year of their lives, most shorebirds migrate between habitats located in different geographic areas.
- Arctic-nesting shorebirds undertake some of the longest migrations of any animals.
- Migratory shorebirds depend on at least three habitats: breeding, nonbreeding, and migratory stopover sites.
- Shorebirds concentrate in great numbers at their stopover sites.
- Because shorebirds fly together in large numbers, their populations are extremely vulnerable to threats along their migratory routes.
- Most important migratory stopovers are nutrient-rich habitat, like estuaries, which also provide resources desirable to humans, making them vulnerable to alteration, pollution, and destruction.

- Shorebirds migrate between northern breeding areas and southern wintering areas to take advantage of seasonal food resources.

Vocabulary

- aquatic habitat
- aquatic insects
- breeding grounds
- nonbreeding grounds
- body mass
- clutch
- fat loading
- fledging
- flyway
- foraging
- invertebrates
- juvenile
- migrate
- migration route
- nesting
- pesticide
- pothole
- predator
- probing
- shorebird
- species
- survivorship
- territory
- wetlands
- amphipods
- critical habitat
- Central Flyway
- Atlantic Flyway
- Pacific Flyway

Objectives

After this activity, students will be able to:

- List five characteristics unique to shorebirds.
- Locate the three main flyways in the United States.
- Name four hazards shorebirds encounter along their annual migrations.
- Explain why these birds migrate from the far north to the far south of the Western Hemisphere.
- Explain what "fat loading" is and why it is important to migrating shorebirds.

Materials

- Playing field or gymnasium
- Cones, string, rope, or hula hoops to mark breeding grounds, wintering grounds, and staging areas
- One classroom set of Northern, Southern and Staging Area Cards
- *Western Hemisphere Shorebird Reserve Network Poster* (included with the education guide)

Introduction

There are approximately 50 different species of shorebirds throughout North America. Most shorebirds spend their summers in the northern areas of the United States, Canada, and Alaska and *migrate* to southern United States, Central America, and South America to spend their winters where food is available. The White-rumped Sandpiper, for example, migrates each year from the Arctic Circle to the southernmost tip of South America and back, a round trip of 20,000 miles every year! However, not all shorebirds migrate such long distances. Some, like the American Avocet, breed in the north and winter in the southern part of the United States.

In North America, three primary flyways are heavily used as *migration routes*, connecting the shorebirds' *breeding grounds* in the north to their *nonbreeding grounds* in the south. The *Pacific Flyway* follows the coast from Alaska to the southern part of South America. The *Atlantic Flyway* runs along the Atlantic Coast from northwestern Canada to the very southern tip of South America. The *Central Flyway* stretches from north central Canada, down through the center of the United States into northern South America. The activity focuses on the Central Flyway.

To learn more about the spectacular migrations of shorebirds, read *Magnificent Shorebird Migration* found in the *Shorebird Primer*. To learn more about the threats shorebirds face along the way, as well as the ongoing efforts to protect them and their critical habitats, read *Threats to Shorebirds*, also found in the *Shorebird Primer*.

Activity Preparation

1. Read the background information *Magnificent Shorebird Migration* found in the *Shorebird Primer*. It is essential to understanding this activity. Read through the game cards as well in order to be aware of the situations presented to the students.

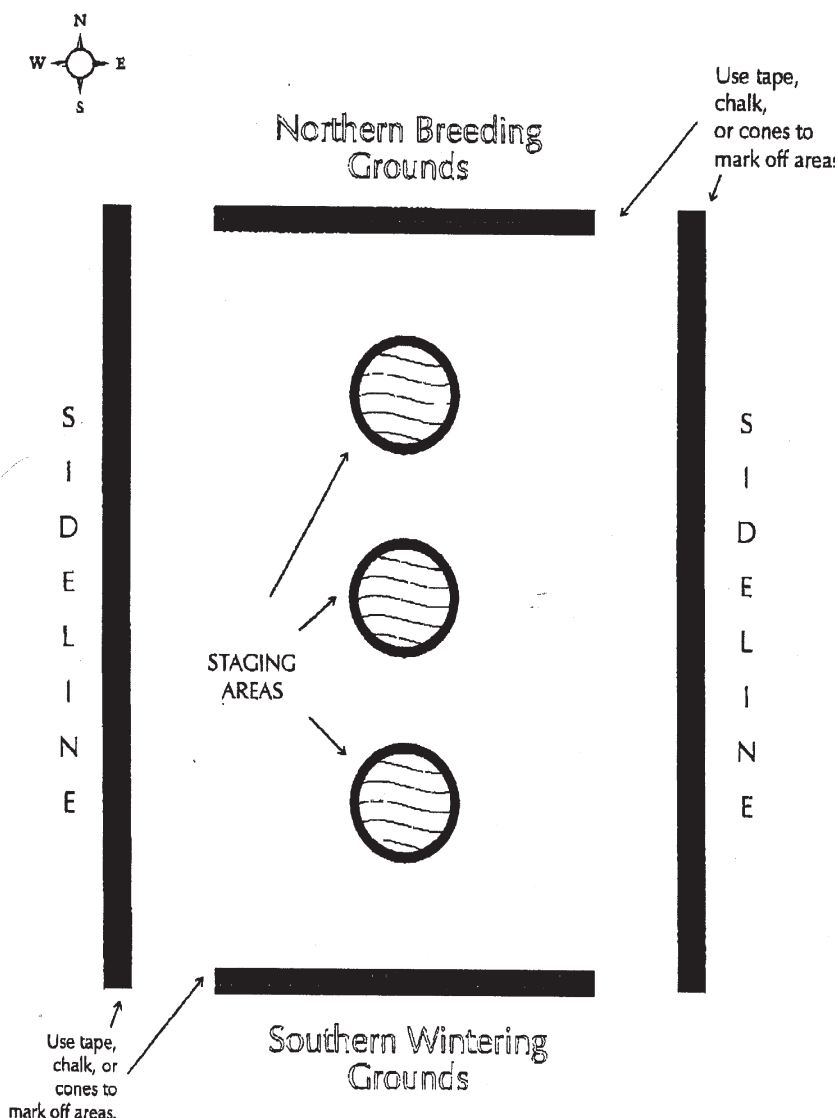
2. Photocopy and cut out the following game cards:
10-Northern Cards
10-Southern Cards
14-Staging Area Cards

3. Set up your playing field according to the directions and diagram below.

- Place a rope or other line across each end of the playing field and mark one end “the nonbreeding grounds” and the other “the breeding grounds.”

- Place three circles in the playing field, using rope or hula hoops. The circles represent staging areas.

4. Disperse the Staging Area Cards evenly among the three staging circles. Spread the Northern Cards in the breeding area and the Southern Cards in the nonbreeding grounds.



Procedure

1. Talk briefly about *migration*, *staging areas*, *breeding grounds*, and *nonbreeding grounds*. Explain that students will be migrating shorebirds. Locate the three main flyways on a map of North and South America, using the *Western Hemisphere Shorebird Reserve Network Poster* with the education guide. For purposes of this game, players are to imagine they have migrated on the Central Flyway.

2. Explain how the game works.

- Each player must pick up one card at the wintering ground, each staging area, and the breeding ground.
- Players must follow the directions written on the cards and return the cards to the pile before they continue their migrations. For example, a card from the breeding grounds may instruct its holder to take a person who has been labeled “dead” by another card and return him or her into the game as a young bird.

- Any player who picks up a card indicating death of the bird must drop out of the game and stand along the sidelines until there is an opportunity to rejoin the game.
- 3. Select one or two players to represent the Peregrine Falcon and/or the Merlin as predators in flight. Their job is to tag students as they move among the staging areas. They must escort each tagged victim to the edge of the playing field before tagging another migrating student.
- 4. As the players run to the other side of the playing field, they must stop at each of the staging areas to refuel (unless otherwise instructed). They collect one card at each staging area and follow the directions on the card.
- 5. Players must make four complete migrations (from south to north and back to south). Each migration (in one direction) will begin with a signal from the teacher.
- 6. Plot the survival rate of each migration. Discuss some of the following questions to identify what affected the survival rate.
 - What were some of the unexpected situations described on the cards? How did these things affect migration?
 - What events caused bird deaths? Which were “natural” and which were “human-caused?” List these on the chalkboard.
 - Discuss the list of “human-caused” deaths and evaluate the pros and cons of each situation. How do people’s actions affect other animals and each other? (DDT is an insecticide used to protect crops from damaging pests. It has been outlawed in the United States for over 20 years. Scientists discovered that DDT can be passed on from one animal to another, poisoning all the organisms it comes in contact with.)
 - What are some of the weather changes shorebirds experience during their migration?

Additional Activities



Cultural Connections

- After the activity, lead a discussion with students discussing cultural beliefs about the environment and their influence on survival of shorebirds.
- Students can pretend to be shorebirds migrating from Paraguay to Nunavut, Canada. They can research Spanish and Inuit or French words, phrases, or sentences to speak to each other when they arrive in those countries—phrases such as “welcome,” “I am hungry,” and “be careful.” Students can also work with the school’s Spanish or French teacher to come up with words and sentences.

Prairie Pothole/Playa Lake History Lesson

Ask each student to search for ten facts regarding the formation and history of the Prairie Pothole or Playa Lake Region in the central United States. Have them share the information they discovered and then assemble a class report based on the facts they uncovered.

Local Shorebird Migration

Working in small groups and using the <http://sssp.fws.gov>, have your students research local shorebirds, including the migration routes they take and the places where they stop to rest and feed. Ask them to draw migration maps to plot known and possible stopover sites. Have them report on what they learned.

Local Shorebird Threats

Invite a state wildlife officer to speak to the class about what impacts the migratory birds in your community. Find out how students can help to lessen the effects of these impacts.



The Incredible Journey Game Cards

Ten - Northern Cards

(Make one photocopy.)

<p>NORTHERN CARD Bad news! Unusually bad weather has limited your feeding time. You are too weak to make it to the first staging area. You die and must go to the sideline.</p>	<p>NORTHERN CARD Severe weather in the Arctic tundra kept you from laying eggs. You have difficulty finding a sufficient supply of invertebrate prey (animals you eat). You struggle to keep up with the flock. Hop on one foot to your first staging area.</p>
<p>NORTHERN CARD Yeah! Good weather and only a few predators have made it a great nesting season. Pick two people from the sidelines to migrate with you.</p>	<p>NORTHERN CARD Lost wetlands on the way to your breeding grounds made you late and weak. You do not have time to reproduce. Crane flies and bloodworms are abundant so you double your weight. Begin your migration.</p>
<p>NORTHERN CARD Hurrah! It's been a warm, wet summer. There was an abundance of shoreflies and danceflies to feed on. Your nesting is successful. Take one person from the sidelines with you. Begin migration.</p>	<p>NORTHERN CARD Yikes! It's been a good year for weasels and a bad year for eggs. None of your young survive. Food was abundant. Begin migration.</p>
<p>NORTHERN CARD Great! You have successfully hatched and fledged one of your young. Pick one person to migrate with you.</p>	<p>NORTHERN CARD You are young and are not able to put on a sufficient fat load before migration begins. You are not so strong as the adults. Skip to the first staging area.</p>
<p>NORTHERN CARD Bummer! A large fox population this year has increased fatalities. You are eaten. Go to the sidelines.</p>	<p>NORTHERN CARD Yum! There is an abundance of amphipods and snails this year. You have easily doubled your body weight. You have had a successful nest. Take two people to migrate with you. Begin migrating!</p>



The Incredible Journey Game Cards

Ten – Southern Cards

(Make one photocopy.)

<p>SOUTHERN CARD Yippee! It's been a good winter! A new wetland reserve area has been added to your winter grounds. There was plenty of food. Fly to your first staging area.</p>	<p>SOUTHERN CARD Yuck! You are feeding on aquatic insects contaminated with DDT from the runoff of agricultural lands surrounding your wetland habitat. You become sick and die. Go to the sideline.</p>
<p>SOUTHERN CARD How disappointing! You have had a rough nine months at your wintering grounds. Part of the wetland you have always returned to has been drained, causing more birds to compete for less food. You are weak. Hop on one foot to the first staging area.</p>	<p>SOUTHERN CARD Bang! Hunting of shorebirds is still legal in South America. A hungry hunter shoots you. Go to the sideline.</p>
<p>SOUTHERN CARD Too bad! Agriculture is spreading on your wintering grounds and, as a result, so is DDT. You die from pesticide poisoning. Go to the sideline.</p>	<p>SOUTHERN CARD You're starving! Overcrowding due to the loss of wetlands has increased competition for what little food there is. You do not have an adequate fat load and your migration is difficult. You may skip to your first staging area.</p>
<p>SOUTHERN CARD Oh no! More wetlands have been drained and turned into agricultural areas. You are unable to find enough food and eventually die. Go to the sidelines.</p>	<p>SOUTHERN CARD Moo! The cattle industry is booming in South America. Your winter habitat is severely overgrazed, making it difficult to eat enough to put on an adequate fat load for migration. You must skip to your first staging area.</p>
<p>SOUTHERN CARD Worms! Oodles of freshwater worms! It's been a great winter with lots of food. You easily increase your body weight from 20 grams to 40 grams for the long migration to the Arctic tundra. Migrate to the first staging area.</p>	<p>SOUTHERN CARD Good news! Educating people about the need to preserve wetlands has paid off. More wetlands mean more food. You begin your next migration in good health.</p>



The Incredible Journey Game Cards

Fourteen – Staging Cards

(Make one photocopy.)

<p>STAGING AREA Bye, bye! You did not find enough food to replenish your fat load, and the flock you were traveling with has left without you. You must wait one turn to continue on with another flock.</p>	<p>STAGING AREA This is unnerving! You are on the perimeter (outer edge) of the flock and must constantly be on the look-out for predators. You do not eat enough to put on an adequate fat load. Hop to the next staging area.</p>
<p>STAGING AREA Gobble, gobble! You have had warm weather and abundant food at this staging area. You have easily increased your weight by 100%! Begin your migration again.</p>	<p>STAGING AREA Yikes! Your usual staging area has been drained for farming. You must scrounge to find enough food for the next leg of your journey. Hop on one foot to the next staging area.</p>
<p>STAGING AREA Bad stuff! You find that this staging area has been contaminated with pesticides from surrounding agricultural lands. You become ill and die. Go to the sideline.</p>	<p>STAGING AREA WHEEEEEEEE! You've got a full stomach and a tail wind pushing you on to your next staging area. A predator can't even catch you! Arrive at your next staging area quickly and safely.</p>
<p>STAGING AREA Brrrr! Bad weather makes for a slow migration! Side step to your next staging area.</p>	<p>STAGING AREA Bad stuff! Bad weather makes for a slow migration! Side step to your next staging area.</p>
<p>STAGING AREA What? Your usual staging ground is swarming with people! A new recreation center has opened at your staging area. Being around so many people makes feeding difficult. You do not store enough energy. Walk to your next staging area.</p>	<p>STAGING AREA Hooray! The Western Hemisphere Shorebirds Reserve Network has done a great deal to preserve important shorebird sites along your migration route. You find a surplus of food and quickly refuel for your continued migration.</p>



The Incredible Journey Game Cards

Fourteen – Staging Cards

(continued)

(Make one photocopy.)

<p>STAGING AREA Gooney! You find one of your coastal staging areas covered in oil. You become covered with the thick goo and are unable to eat, fly, or maintain any body heat. You die. Go to the sideline.</p>	<p>STAGING AREA Ugh! You have run into a head wind (wind blowing against you) and you are burning up a lot of energy. Take two steps forward and one step back as you make your way along your migration.</p>
<p>STAGING AREA Whoopee! Education about wetlands has gained public support for the restoration of wetland areas. You have an abundance of snails and freshwater worms to feed on! You begin your migration in good health.</p>	<p>STAGING AREA ZAP! New radio towers have been built across your migration route. You are zapped and die. Go to the sideline.</p>
<p>STAGING AREA You find yourself feeding in the safety of the flock. Craneflies, danceflies, and shoreflies are abundant. You double your weight easily. Move on to the next staging area.</p>	

