



## Next Stop, the Watsonville Wetlands

### Summary

Students play games to learn the process of bird migration and understand that migrating birds depend on the wetlands. The students then follow the migration of the American white pelican from Mexico through the Watsonville Wetlands in an interactive online computer game.

### Objectives

Students will:

- define migration
- understand how wetlands are important to migrating birds

### California Content Standards Addressed

Grade Six - *Science content 5.e*: "Students know the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition."

Grade Six - *Writing applications 2.1.b*: "Write narratives: Include sensory details and concrete language to develop plot and character."

Grade Seven - *Science content 3.5*: "Students know extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival."

Grade Seven - *Writing applications 2.1*: "Write fictional or autobiographical narratives."

### The Basics:

#### Grade Level:

6 - 8

#### Subject areas:

life sciences

#### Duration

75 minutes

#### Materials:

*for the hopscotch activity:*

#### for the teacher:

1. chalk or masking tape
2. set of laminated location cards, bird cards, threat cards, and restoration cards (teacher's kit)
3. (optional) bean bags or seed packets

*for the computer learning activity*

#### for the teacher:

1. on each computer: open the file "pelican game/pelican1.html" from the WERC website

*for the journal prompt:*

#### for each student:

1. colored pencils and markers, science notebooks, one of five double-sided bird coloring/informational pages (available in teacher's kit)

## Outline

*There are five pieces to this lesson:*

- 1) Bird flocking game (15 minutes)
- 2) White pelican interactive computer activity (10 minutes)
- 3) Bird migration hopscotch (35 minutes)
- 4) Journal Prompt (10 minutes)
- 5) Closing circle (5 minutes)

## Background Material

*Bird Migration Facts by Kerry Scanlan, Vicki Piaskowski, Michelle Jacobi and Steve Mahler*

### WHAT IS MIGRATION?

Migration is the seasonal movement of birds, generally between breeding and non-breeding areas.

### WHY DO BIRDS MIGRATE?

Food: The change of seasons causes a change in food supply, causing birds to move to an area with a more plentiful food supply.

Reproduction: Birds also migrate to a specific area to breed and raise their young.

Many birds that breed in North America migrate to areas south of the Tropic of Cancer (southern Mexico, Central and South America and the Lesser and Greater Antilles in the Caribbean Sea) in the fall (August-October) because of a decrease in their food supply. Many of these birds are insectivores; they eat mainly insects. (Most insects do not survive the North American winters except in larval or egg forms.) These birds remain on their non-breeding (wintering) grounds until April. Then in spring they migrate back to their breeding grounds in North America to take advantage of the plentiful insect food supply to breed and raise young.

These birds that migrate south of the Tropic of Cancer are called Neotropical migrants. A more correct term now used is Nearctic migrants. Nearctic is a word that refers to the Arctic as well as the temperate parts of North America. Since these birds spend more time in the tropics than on their North American breeding grounds, they would be migrating into the Nearctic region. Thus, they would be Nearctic migrants. They actually may be tropical birds that have learned to fly north to exploit the plentiful insect food resources there.

## **HOW DO BIRDS PREPARE FOR MIGRATION?**

To prepare for migration, birds become hyperphagic. That means they eat more food, which is stored as fat for their long journey. Fat is normally 3% to 5% of the bird's mass. Some migrants almost double their body weights by storing fat before migration. The ruby-throated hummingbird weighs only 4.8 grams and can use stored fat to fuel a non-stop, 24-hour flight across a 600-mile stretch of open water from the U.S. Gulf coast to the Yucatan Peninsula of Mexico!

## **WHEN DO BIRDS MIGRATE?**

During the day:

Many soaring birds, such as hawks, migrate by day. They travel inland by flying and catching thermals that occur only over land. (Thermal updrafts are rising columns of warm air that spiral upward and lift the birds up so they can fly without flapping, saving energy. Raptors also use thermals when they are not migrating.) Hawks and other raptors do not like to migrate over water. When they reach Mexico and Central America, where the land narrows between the Pacific Ocean and the Caribbean Sea, the hawks are funneled over this land bridge. As so many birds try to stay inland, you will see huge concentrations of raptors, sometimes as many as 100,000 in one day.

Insectivores, such as swifts and swallows, also fly during the day, feeding on insects as they fly. Flocking birds such as waterfowl and some finches fly during the day, too.

During the night:

Most songbirds travel at night. They spend the daylight hours resting and searching for food in the unfamiliar places where they stop to rest. It is thought that the lower night temperatures and stiller air make better flying conditions.

## **HOW FAR DO BIRDS MIGRATE?**

It depends on the bird species.

The arctic tern may hold the record for longest migration distance since it flies about 30,000 km (18,600 miles) each year traveling between its arctic breeding ground and non-breeding area in the Antarctic. This amazing feat is possible because terns eat fish and can feed during their long journey.

Most songbirds don't fly to their non-breeding grounds non-stop. They stop a number of times to rest and feed during migration. The places they stop are called stopover sites, or

staging areas. Birds remain at stopover sites for varying amounts of time based on the weather and how much fat they have stored. Some birds stop only one day to rest and feed, and then continue their migration. Others will remain at stopover areas for weeks. Most Neotropical migrants stop along the way to rest and feed.

Some birds are short-distance migrants and migrate only as far as they need to find food such as insects, seeds and berries.

Some birds are austral (southern) migrants. In the tropics, they migrate north to breed, then head south at the end of the breeding season. In Belize, they also are called dry-season residents because they migrate north to breed during Belize's dry season.

### **AT WHAT ALTITUDES DO BIRDS MIGRATE?**

Some geese and ducks fly at incredible heights. Bar-headed geese have been recorded as high as 29,000 feet when they migrate over the Himalayas! That's five miles above our heads, even higher than Mount Everest!

Most night-migrating songbirds fly below 2000 feet (600 m) when flying over land. Some will fly as high as 6,500 feet (1,980 m). Occasionally, they may fly higher to reach favorable winds.

The wind sometimes causes birds to fly at certain heights. When the bird is flying into the wind (called a headwind), it flies very low. When the wind is blowing the same direction as the bird, pushing it along (called a tailwind), it will fly high, where the wind is the fastest.

### **HOW FAST DO BIRDS FLY?**

In still air, most songbirds fly at 20 to 30 mph. Waterfowl and shorebirds can fly at 30 to 50 mph. A tailwind allows the bird to fly faster.

### **HOW DO BIRDS NAVIGATE?**

Birds have excellent vision and rely on visual landmarks for local and long-distance migration. They use key land features such as mountains, rivers, coasts or even large buildings. There are three types of "compasses" a bird uses to find its way. Birds can use the sun, the stars and the Earth's magnetic field.

Birds use the sun as a compass. They use the positions of the sun during the day to navigate. They also can use the setting sun as an indication of due west. □

Night flyers use celestial navigation, which means they find their way by knowing the patterns of the stars in the sky, and by knowing special stars like the North Star. In their first year

of life, birds memorize the position of the constellations in relation to the North Star. These star patterns stay the same even though the Earth moves through space, making the constellations appear to move to different spots in the sky during the year. □

Birds have tiny grains of a mineral called magnetite just above their nostrils. This mineral may help them to navigate using the Earth's magnetic field, which tells the bird what direction is true north.

Petrels and pigeons can use their sense of smell to find their way, but it is used only in addition to the sun, stars and magnetic field.

### **HOW DO WE LEARN ABOUT MIGRATION?**

Scientists throughout the world conduct many types of research to learn about migration.

Heavy concentrations of migrating birds can be seen on weather radar screens. Many bird observatories conduct migration counts to learn about the numbers and species of birds that migrate each year. Bird-banding research has allowed scientists to learn about migration.

Scientists band many birds every year and sometimes those birds are caught again, or found after they die. By checking the band number and reporting it to the Bird Banding Laboratory, scientists can learn where the bird was first banded and how far it traveled.

### **Procedure**

#### **1) Bird flocking game** *(adapted from Elkhorn Slough's bird flocking game)*

*Participants move as a group simulating a flock of birds to show movements, flock advantages, and predation strategies.*

- Gather the group into a tight “flock”. Students should stand with their arms to their sides. (Flapping outstretched arms requires too much room, makes it difficult to stay in a tight flock, and encourages chaos!)
- Tell the group they must travel as a unit but that their shoulders may not touch. Shoulders are their pretend wing tips so if they brush against one another, they can cause mid-air collisions!
- Choose a point ahead of the group. Have the group “fly” at a slow jog toward that point.
- When they arrive at the designated point, tell them to veer off in one direction. Do not tell them which direction to go. (Birds cannot talk or use hand signals, so neither can the students!)

- The objective is to try and get a feel for the challenge birds have while migrating in flocks. The result? Probably some confusion, possibly a follow-the-leader strategy.
- Ask students how they think birds stay together in flocks. How do they know when to turn? How do they keep from bumping into each other? (No one really knows!)

*EXTENTION:*

The Peregrine as Predator - Now introduce the concept of predators. Peregrine falcons use a spectacular technique of diving to flying flocks from above. When the flock splits, the falcon captures indecisive stragglers.

- To simulate a falcon, kneel down a few yards ahead of the group. Tell the flock that you are invisible to them, just like the peregrine falcon is invisible to a flock of birds.
- Tell the flock to fly straight toward you as if they can't see you. Tell them that once you stand, they CAN see you, and they must split to avoid being eaten.
- You may only run straight ahead with your arm (talons) outstretched. You may ONLY tag birds that are directly in your line of flight. (This rule is used because when falcons dive or "stoop", they cannot do a lot of maneuvering or chasing; they are basically committed to the path in front of them.
- Try it again, only this time run at an ANGLE through the flock.
- Evaluate who got caught and why. Did the Peregrine catch a bird every try? Where is the safest place in the flock? Would that change depending on where the falcon split the flock?

**2) White pelican migration activity (computer/interactive) (10 minutes)**

- Ask students each sit at a computer (with a partner if necessary) where the White Pelican Migration story is visible on the computers.
- Tell students to read through the information on the screen. Tell students that each time they click to turn the page, they will answer a question about the material they just read.
- Be sure to watch and ask if anyone needs help.

**3) Bird migration hopscotch (40 minutes)**

*Do this activity either out in back of the classroom on the cement or inside on the carpet.*

- Draw a large sized hopscotch course or vertical grid - either drawn on the pavement with chalk or marked in the classroom with masking tape. The squares should be approximately 3'x3', and the course should contain about 10 squares.

- Place a laminated location card (teacher's kit) in each square.
- Each student will play the role of a migratory bird, so ask each student choose a bird card and place it around his/her neck.
- Ask students to line up at the beginning of the course. Tell the students that they are birds starting on their journey north. Tell the students that each of the squares represents a wetland between Mexico and Alaska.
- Challenge students to migrate northward on the course. They do not have to step on every square, however they must not go outside the course.
- All students should be successful in the first migration.
- Now use the laminated threat cards (teacher's kit) to put obstacles in the way of successful migration. (For example, tell the students you are a developer and will destroy a wetland area in order to build condos. Place the card in the square.)
- Tell students to make the migration once again. The students may not set foot on the destroyed wetlands. If they do, they die and thus may not participate in any further migrations. After all students have run through destroy two more and repeat the procedure. Repeat this until all students fail to make the migration. (Try to "X" off the squares in such a way that not all are destroyed but are so far apart students cannot make the jump. This will help with the debriefing.)
- Finally, use the restoration cards (teacher's kit) to restore some wetland areas. Ask students to make the migration course one last time. You don't have to restore every square, but restore enough so that all students can make a successful migration.

*OPTIONAL:*

- Ask students to make it through the course within a certain amount of time. If students exceed their time limit, the migration was not successful, and they die.
- Instruct students to stop and gather food along the way. (Use bean bags, seed packets, or other item to represent food.) Take away food as obstacles and threats arise.

*ASSESSMENT:*

- Have a group discussion with the students. Ask the following questions:
- What happened? Why?
- How did you feel after each round? How tired were you?

- What did you notice about the food supply?
- How does this game represent migration?
- How do migrating birds depend on wetlands during their migration?
- Do you think a wetland area that has been restored will benefit migratory birds?
- What do you think would happen to a species of birds if they lost all their migratory stops?

#### 4) Journal Prompt (10 minutes)

- Give each student his or her science notebook, clipboard, and pencil or colored pencils.
- Read over the directions and ask if anyone has any questions.

#### 5) Closing circle (5 minutes)

- Gather students in a circle. Pass a feather around the circle and ask each student to say something interesting they learned today.

### Bibliography and Resources

Able, K.P. 1999. A Gathering of Angels. Comstock Books. Cornell University Press, Ithaca, N.Y.

### Appendices

*Appendix B: Wetland notebook journal prompt 10*

*page 9*

MIGRATION

NAME \_\_\_\_\_ DATE \_\_\_\_\_

*Imagine you are a migrating bird, and write a story about your adventures. Use the back of the page if you need more space. Try to include: What kind of bird are you? What do you see on your migration? Where do you stop for food and rest? Do you run into any trouble? Use your imaginations along with what you learned about migration today.*