LEVEL: Grades 4-8

SUBJECTS: *Environmental Education, Science, Geography, Physical Education, Social Studies, History, Math.*

PROCESS: *Through an active simulation game, students learn characteristics of migratory shorebirds and the importance of wetlands to them.*

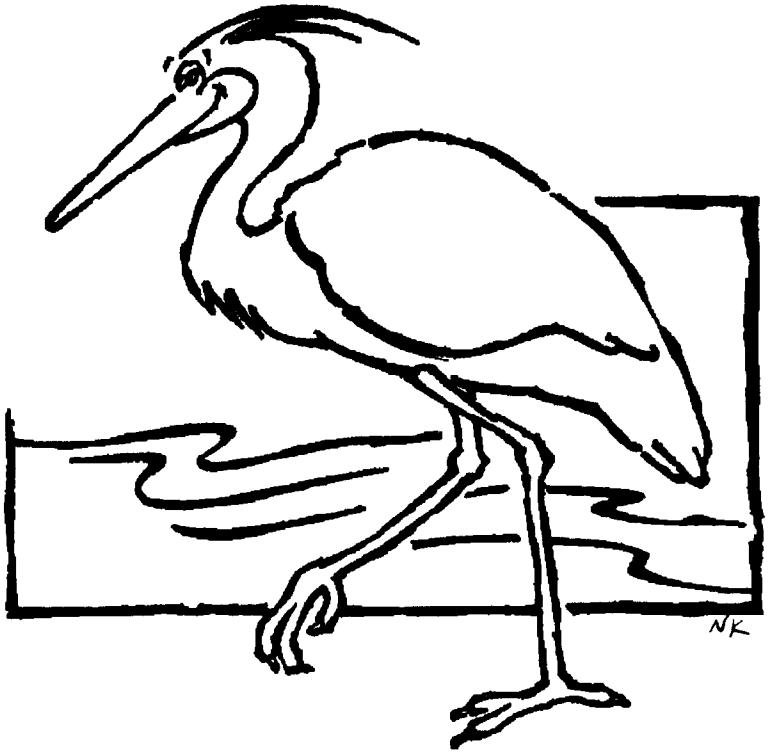
OBJECTIVES: *The student will:*
1. *List five characteristics of a shorebird.*
2. *Locate the three main flyways in the United States.*
3. *Name four hazards shorebirds encounter along their annual migrations.*
4. *Explain why these birds migrate from the far north to the far south of the Western Hemisphere.*
5. *Explain what "fat load" is and why it is important to migrating shorebirds.*

TIMEFRAME: *1 hour to 1 hour 30 minutes.*

SKILLS: *Comparing similarities and differences, counting, developing psychomotor skills, developing vocabulary, listening, kinesthetic learning, role playing, understanding cause and effect.*

MATERIALS: *Playing field or gymnasium, cones, string, rope or hula hoops to mark breeding grounds, wintering grounds, and staging areas, "Norther Cards," "Southern Cards," and "Staging Area" cards (attached).*

VOCABULARY: *Aquatic habitat, aquatic insects, body mass, clutch, fat load, fledging, flyway, foraging, invertebrates, juvenile, migration, migratory route, nesting, pesticide, pothole, predator, probing, shorebird, species, survivorship, territory, wetlands, (amphipods, critical habitat).*



THE INCREDIBLE JOURNEY

OVERVIEW: There are approximately 49 different species of shorebirds throughout North America. Shorebirds all have two common characteristics: longer legs and longer beaks than other bird species. Their body shapes, sizes, habitat uses, and foraging behaviors (how they collect food) are quite varied. Shorebirds feed along the edges of ponds, lakes, wetlands, coastal beaches, and any other places that they can find food in the mud and shallow waters. Many different sizes and shapes of beaks help them specialize in ways of eating. Some, like the Semipalmated Sandpiper, have thin beaks for probing in the mud; others, such as the Lesser Golden Plover, have shorter, thicker beaks for gleaning invertebrates from the surface of mud and water. Still others have beaks for snatching flying insects. The Wilson's Phalarope is a unique shorebird because it swims in deeper water, kicking up food with its feet.

Shorebirds have certain needs that can only be met in very specific habitats. They must live by shallow water and muddy shores in order to find their food. They eat mostly freshwater worms (bloodworms = fly larvae), shoreflies, danceflies, craneflies, amphipods, and snails.

Most shorebirds spend their summers in the northern areas of the United States and in Canada and Alaska. They migrate to southern United States, Central America, and South America to spend their winters in a warmer climate. Countries south of the equator have the opposite seasons to ours. When we are having winter, countries south of the equator are having summer.

The White-Rumped Sandpiper is one shorebird that has an especially incredible migration. Each year it migrates from the Arctic Circle to the southernmost tip of South America and back to the

4. Ask players to recall some causes of the birds' deaths. Have them categorize the causes as "Natural" and "Human Caused." They may need to define the criteria for each of these categories before listing the causes. Write the lists on the chalkboard.

5. Discuss the list of "Human Caused" and evaluate the pros and cons of each of these situations. How do they affect other animals and people? (i.e. DDT, outlawed in the United States for over twenty years, is very poisonous and is passed on from one animal to another poisoning each. Yet it saves crops from infestation of insects.)

ASSESSMENT:

1. Have students locate the three main flyways on a map of North America and South America. Ask:

-What are some of the weather changes shorebirds experience during their migration?

-What are some of the more predominant wetlands, lakes, or coastal shores they pass during their migration?

Students draw their own maps and plot possible staging areas on it.

2. Have students draw or design the perfect shorebird from junk and be ready to explain the adaptations they have added to their birds.

EXTENSIONS:

1. Working in small groups, students research to learn more about specific shorebirds in their local area. Have students report on it and trace its migration route.

2. Visit a wetland area near your community and list the different birds you find. Perhaps a person from the local Audubon Society or State Wildlife Agency could accompany you.

3. Invite your local State Wildlife officer to speak to the class about what impacts wildlife in your community and how students can help to lessen the negative impacts.

4. Have students research the formation and history of the Prairie Pothole Region.

5. Have students create a role play/debate between a person in support of draining wetlands for agricultural or urban building purposes and a person in support of saving wetlands for migratory shorebirds. Allow students time to prepare their arguments.

RESOURCES:

Conservation Biology, Susan K. Skagen and Fritz L. Knopf, "Toward Conservation of Midcontinental Shorebird Migrations," 7(3) (September 1993): 533-541.

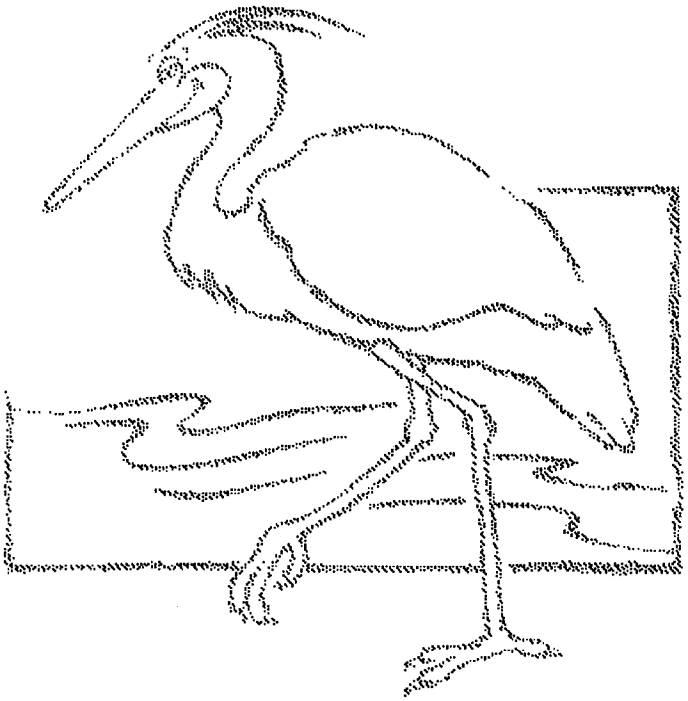
Shorebirds: an identification guide to waders of the world, P.J. Marchant Hayman and T. Prater, Houghton Mifflin Co., 1986.

Shorebird Education Project Newspaper, Julie Sibbing.

Shorebird Management Manual, Douglas L. Helmers, Western Hemisphere Shorebird Reserve Network.

"Semipalmated Sandpipers," *The Birds of North America 6*, (1993): 1-20, Cheri L. Gratto-Trevor.

"Protecting Prairie Potholes Saves Shorebirds," Shorebird Education Project.



The loss of wetlands has caused declines in shorebird populations of 60 - 80% in some species. The remaining birds must then compete for less food with more birds. If birds using the potholes as a staging area cannot get enough food to replenish their fat load, they will have to make many more stops. They may not reach their breeding grounds in time to mate and hatch their young before returning south for the winter.

Human recreation and hunting also affect nesting areas and some nests are deserted or destroyed. In the late 1800's many shorebirds were hunted in great numbers by market hunters in Canada and the United States. These two countries signed the Migratory Birds Convention in 1916, agreeing to protect migratory birds. Some hunting still exists in northern South America.

Efforts are being made to protect shorebirds. The Western Hemisphere Shorebird Reserve Network identifies important shorebird sites and helps protect them. There is an increased awareness of the importance of wetlands and the need to preserve them. These efforts will insure the shorebird populations a more secure future.

PROCEDURE:

Pre-activity:

1. Read "Overview" thoroughly. It is essential to your understanding of this activity. Read through the game cards as well to be aware of situations presented to students!

2. Using a playing field or a gymnasium, identify one end as the northern breeding grounds and the other end as the southern wintering grounds.

3. Place a rope or other line across each end of the playing field to mark the wintering grounds and the breeding grounds. Then place three circles spaced out between these grounds. (See diagram.) The circles represent the staging areas.

4. Disperse the "staging area" cards evenly among the three "staging" circles. Spread the "Northern Cards" in the breeding grounds area and the "Southern Cards" in the wintering grounds area.

5. Talk briefly about migration, staging areas, breeding grounds, and wintering grounds. Explain that students will be playing the parts of migrating shorebirds.

Activity:

1. Each player must pick up one card at the wintering ground, each staging area, and the breeding ground. They must follow directions written on the cards and return the cards to the pile before they continue their migration. For example, a card from the breeding grounds may instruct its holder to take a person that has been labeled "dead" by another card and return them into the game as a young bird. Any player that picks up a card indicating death of the bird must drop out of the game and stand along the sidelines until an opportunity (eggs hatching in the North) arises to rejoin the game.

2. Select one or two players to represent the Peregrin 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.

3. 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 directions.

4. Players must make four complete migrations (that is from south to north and back to south). Each migration (in one direction) will begin upon the teacher's signal.

After the game:

1. Plot the survival rate of each migration.

2. Locate the three main flyways on a map of North and South America. For purposes of this game, players are to imagine they have migrated on the central flyway.

3. Ask players to share some of the unexpected situations described on their cards. Discuss how these things affect the migrating shorebirds.

THE INCREDIBLE JOURNEY
GAME CARDS

On these five pages cut out the following game cards:

10 - Northern Cards

10 - Southern Cards

14 - Staging Cards

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.

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.

NORTHERN CARD

Hurrah! It's been a warm, wet summer. You have had an abundance of shore flies and dance flies to feed on. Your nesting is successful. Take one person from the sidelines with you. Begin migration.

NORTHERN CARD

Great! You have successfully hatched and fledged one of your young. Pick one person to migrate with you.

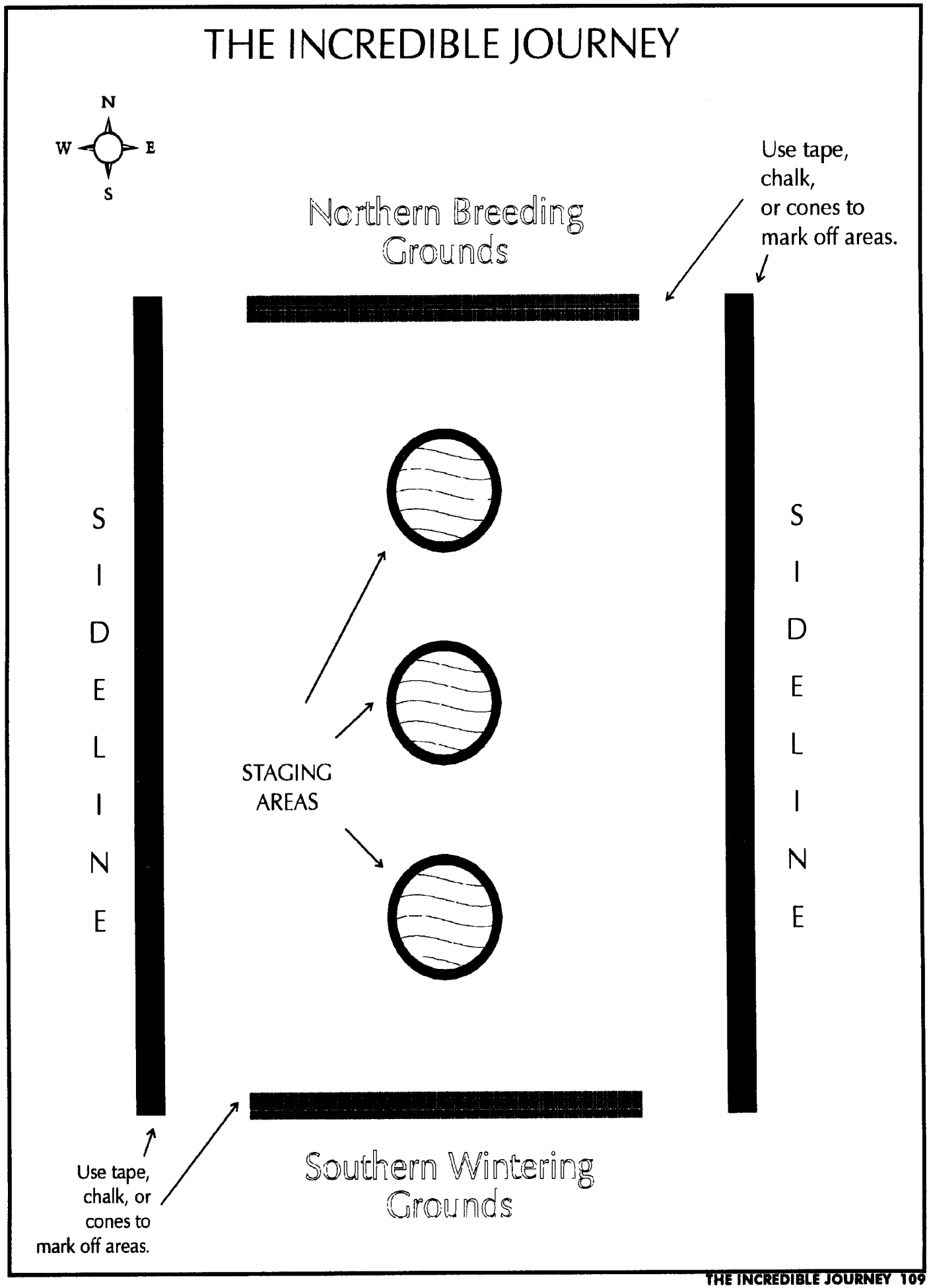
NORTHERN CARD

Bummer! A large fox population this year has increased fatalities. You are eaten. Go to the sideline.

NORTHERN CARD

Yum! There is an abundance of amphipods and snails this year. You have doubled your body weight easily. You have had a successful nest, take two people to migrate with you. Begin migrating!

THE INCREDIBLE JOURNEY



THE INCREDIBLE JOURNEY

GAME CARDS

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 sideline.

SOUTHERN CARD

Worms! Oodles of Freshwater worms! It's been a great winter with lots of food. You are easily able to increase your body weight from 20 grams to 40 grams for the long migration to the Arctic tundra. Migrate to the first staging area.

SOUTHERN CARD

Good News! Educating people about the need to preserve wetlands has paid off. You have more wetlands and abundant food. You begin your next migration in good health.

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.

SOUTHERN CARD

Starvin' Arvin'! Overcrowding due to 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.

SOUTHERN CARD

BANG! Hunting of shorebirds is still legal in South America. You are shot by a hungry hunter. Go to the sideline.

SOUTHERN CARD

Yuck! You are feeding on aquatic insects that have been contaminated with DDT in the run off from agricultural lands surrounding your wetland habitat. You become sick and die. Go to the sideline.

THE INCREDIBLE JOURNEY

GAME CARDS

NORTHERN CARD

You are young and are not able to put on a sufficient fat load before migration begins. You are not as strong. Skip to the first staging area.

NORTHERN CARD

Yipes! It's been a good year for weasels and a bad year for eggs. You have no young survive. Food was abundant. Begin migration.

SOUTHERN CARD

How disappointing! You have had a rough nine months at your wintering grounds. Part of the wetlands you have always returned to have been drained, causing more birds to compete for less food. You are weak, hop on one foot to the first staging area.

NORTHERN CARD

Lost wetlands on the way to your breeding grounds made you late on arrival time and weak. You do not have time to reproduce. Craneflies and blood worms are abundant, you double your weight. Begin your migration.

SOUTHERN CARD

Yipee! 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.

NORTHERN CARD

Continued severe weather in the Arctic tundra caused you to not lay 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.

SOUTHERN CARD

Too bad! Agriculture is spreading on your wintering grounds, and as a result so is DDT. You are poisoned by this lethal pesticide and die. Go to the sideline.

THE INCREDIBLE JOURNEY

GAME CARDS

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.

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.

STAGING AREA

Gooey! You find one of your coastal staging areas to be covered with the results of an oil spill. You become covered with the thick goo and are unable to eat, fly, or maintain any body heat. You die. Go to the sideline.

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.

STAGING AREA

Whoopeee! 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.

STAGING AREA

ZAP! New radio towers have been built across your migration route. You are zapped and die. Go to the sideline.

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.

THE INCREDIBLE JOURNEY

GAME CARDS

STAGING AREA

What!? Your usual staging ground is swarming with people! A new recreation center has been 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.

STAGING AREA

Hooray! The Western Hemisphere Shorebird 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.

STAGING AREA

Brrrr! Bad weather makes for a slow migration! Side step to your next staging area.

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.

STAGING AREA

WHEEEEEEE! 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.

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.

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.