

Nesting and Breeding

Concepts

- During a shorebird's breeding season, its habitat is where it courts, nests, and raises its young.
- The Arctic tundra is critically important breeding habitat for many migratory shorebirds.
- Your local environment may be important breeding habitat for some shorebirds.
- Shorebirds migrate to higher latitudes (like the Arctic) for breeding so they can take advantage of the summer's abundance of invertebrates.
- Some shorebirds defend breeding territories.
- Shorebirds nest on the ground.
- Shorebirds face numerous threats at their breeding grounds.
- Shorebirds have elaborate behavioral adaptations for courtship display and protection of their nests and young.
- The elaborate behaviors of shorebirds for attracting mates and protecting young are some of the most spectacular and complex of all birds.
- Shorebird nests are camouflaged. Chicks use both camouflage and behavior to stay concealed from predators.
- Most shorebirds look different during the nonbreeding and breeding seasons.

Activities

Colorful Changes

(lower elementary, upper elementary/middle school; upper middle/high school)

Students discover that some shorebirds have dramatically different breeding and nonbreeding plumage. They then create an artistic representation of a shorebird species in both seasons.

Guard Your Nest

(lower elementary, upper elementary/middle school)

Students, pretending to be shorebirds, must guard their nests from a multitude of predators and threats. They discover that camouflage and distraction displays are two strategies that increase a shorebird's chance of nesting success.

Behave Yourself!

(lower elementary)

Students participate in a game in which they attempt to communicate with each other by acting out shorebird gestures and vocalizations.

Musical Nests

(lower elementary)

Students play a version of musical chairs and learn about the hazards that nesting shorebirds face.

It's a Tough Life!

(upper elementary/middle school)

Students play a game that simulates the challenges shorebirds face when trying to feed along many coastal beaches. Students actively begin thinking about what shorebirds need and the things that are threatening their survival.



Colorful Changes

Grade Level: lower elementary, upper elementary/middle school; upper middle school/ high school

Duration: one class period for research, two or more class periods to complete the art work depending on the medium used.

Skills: communication, observation, and visualization

Subjects: science and fine arts

Concepts

- During a shorebird's breeding season, its habitat is where it courts, nests, and raises its young.
- Most shorebirds look different during the nonbreeding and breeding seasons.

Vocabulary

- camouflage
- courtship
- plumage
- breeding season
- nonbreeding season
- cryptic coloration
- polyandrous
- breeding plumage

Overview

Students discover that some shorebirds have dramatically different breeding and nonbreeding plumage. They then create an artistic representation of a shorebird species in both seasons.

Objectives

After this activity, students will be able to:

- Define the term plumage.
- Name at least one shorebird that looks different during the breeding and nonbreeding seasons.
- Explain the purpose for this change in appearance.

Materials

- *Shorebird Coloring Pages* (for lower elementary students)
- *Shorebird Field Guides* (refer to the *Appendix* for a list of suggested books)

- Magazine or newspaper photographs of shorebirds
- Shorebird posters (including those in this education guide)
- Illustration and coloring materials (depending on the medium you and your students choose)

Introduction

In the world of shorebirds, it is often hard to distinguish between males and females, as well as juveniles and adults, of the same species. This is partly due to their *cryptic coloration*. The colors and patterns on their feathers, or *plumage*, provide effective *camouflage* and makes it a challenge to tell them apart.

For some shorebirds, however, this is not true during the short and hurried *breeding season*. Males rush ahead of females to establish a breeding territory, sometimes even selecting a nesting site before finding a mate. It is in the best interest of the pair—and the species for that matter—that males and females find each other quickly. They may have as little as three months to breed before winter returns. A more colorful male stands out against other species, females of the same species, and the surrounding habitat. The males' colorful breeding *plumage*

helps a female find an appropriate mate more quickly on the crowded nesting grounds.

While it is male songbirds that have the brighter breeding colors, that is not always the case with shorebirds. In *polyandrous* species, such as the Red-necked and Red Phalaropes, it is the female that is more brightly colored in the breeding season.

Shorebirds do not rely only on *breeding plumage* to attract a mate. They also use a complex and elaborate set of breeding rituals, including gestures and calls to get each other's attention.

For more information on shorebird breeding, refer to *Shorebird Nesting and Breeding* in the *Shorebird Primer*. For a list of shorebirds in your flyway that have significantly different breeding and nonbreeding plumage, refer to the table below.

Activity Preparation

For Lower Elementary Students

1. Make a list of shorebirds found in your area that display different breeding and nonbreeding plumage. Use the information in this activity and in the *Shorebird Profiles*, located in the *Appendix*, for help making your list.

Shorebirds with Different Breeding and Nonbreeding Plumage

<i>Atlantic Flyway</i>	<i>Central Flyway</i>	<i>Pacific Flyway</i>
Black-bellied Plover Dunlin Red Knot Sanderling Spotted Sandpiper Western Sandpiper	American Avocet Black-bellied Plover Dunlin Hudsonian Godwit Spotted Sandpiper Western Sandpiper Wilson's Phalarope	Black-bellied Plover Dowitcher Dunlin Pacific Golden-Plover Ruddy Turnstone Sanderling Spotted Sandpiper Western Sandpiper

2. Photocopy the *Shorebird Coloring Pages* that match the birds on your list. Make enough copies so each student in your class will have two copies of the same shorebird illustration.
3. Display pictures of these shorebirds in both breeding and nonbreeding plumage around the room. Use shorebird posters (included in this guide) and shorebird pictures from magazines or newspapers, or pictures from these Web sites: <http://sssp.fws.gov>, <http://www.manomet.org/WSRHN/Prairies/index.htm>

For Upper Elementary/ Middle School Students

1. Make a list of shorebirds found in your area that display different breeding and nonbreeding plumage. Use the information in this activity and in the *Shorebird Profiles*, located in the *Appendix*, for help making your list.
2. Set up a shorebird reference corner in your classroom that includes magazine and newspaper photographs of shorebirds, shorebird posters (provided in this education guide), and shorebird field guides. Use the resource list in the *Appendix* for ideas.

For Upper Middle/ High School Students

1. Ask your students to make a list of shorebirds found in your area that display different breeding and nonbreeding plumage. Provide them with the list in this activity and the *Shorebird Profiles*, located in the *Appendix*, for help making the list.
2. Have your students work together to assemble a shorebird reference corner in your classroom that includes magazine

and newspaper photographs of shorebirds, shorebird posters (provided in this education guide), and shorebird field guides. For ideas, provide them with the resource list found in the *Appendix*.

Procedure

1. Discuss the term *plumage* with your class. Ask them why they think some shorebird species have a different plumage during the breeding and nonbreeding seasons. Do all shorebirds have a dramatic change in coloration during the breeding season? Ask them to speculate why they do not.
2. Show the students the shorebird resources you have. Explain that their task is to create an artistic representation of one shorebird that does have dramatically different breeding and nonbreeding colors. Assign or let the students choose from the species list you have prepared.

Lower Elementary Students

3. Ask them to color two *Shorebird Coloring Pages* for the shorebird they selected, using crayons, colored pencils, markers, or chalk. One coloring page should represent the shorebird in its nonbreeding plumage and the other in its breeding colors. Encourage them to be as realistic as possible.

Upper Elementary/Middle School

3. Ask these students to make two drawings of their shorebird species using the reference material provided. These can be simple outline drawings (similar to the *Shorebird Coloring Pages*) or more elaborate pencil or pen and ink drawings. Instruct them to add color to their drawings so that one illustration represents the shorebird in its nonbreeding plumage and the

other in its breeding colors. Encourage creativity and artistic expression. For example, an enthusiastic student might choose to add habitat to their drawings. Make sure they have done their research and know where their shorebird spends its summers and its winters.

Upper Middle/High School

3. Encourage older students to create three-dimensional models of their shorebirds. Suggest using clay, cardboard, fabric, or papier-mâché. The only requirement is that their work show the shorebird in both its breeding and nonbreeding plumage.
4. Arrange a shorebird art show to display the students' work within the school or the community. Upper Middle/High School students may want to include a brief description of their work that explains their choice of medium and how their work progressed.

Additional Activities

Shorebirds on Display and Shorebird Fair

Make *Colorful Changes* one part of a larger shorebird fair. Look up *Shorebirds on Display* and *Shorebird Fair* found in the section *The Big Shorebird Picture*.

Guard Your Nest

Grade Level: lower elementary, upper elementary/middle school

Duration: 20 to 30 minutes of preparation and post-activity discussion; and one full day or 60-minute class period where this activity can run simultaneously with other classroom activities.

Skills: communication, observation, prediction, critical thinking, problem solving, discussion, and evaluation

Subjects: science and fine arts

Concepts

- During a shorebird's breeding season, its habitat is where it courts, nests, and raises its young.
- Shorebirds nest on the ground.
- Shorebirds face numerous threats at their breeding grounds.
- Shorebirds have elaborate behavioral adaptations for courtship display and protection of their nests and young.
- Shorebird nests are well camouflaged. Chicks use both camouflage and behavior to stay concealed from predators.

Vocabulary

- camouflage
- cryptic coloration
- distraction display
- courtship
- scrape
- tundra
- jaegers
- egging
- piracy

Overview

Students, pretending to be shorebirds, must guard their nests from a multitude of predators and threats. They discover that camouflage and distraction displays are two strategies that increase a shorebird's chance of nesting success.

Objectives

After this activity, students will be able to:

- Give three examples of natural threats to shorebird nests.
- Describe two ways people hurt shorebird nests.
- Explain what role camouflage plays in the protection of shorebird nests and eggs.
- Describe two distraction displays shorebirds use to protect their nests and chicks.

Materials

- Construction paper or paper plates
- Scissors
- Masking tape
- Crayons or colored pencils
- One set of Shorebird Threat Cards (included here)
- An activity or lesson to conduct simultaneously

Introduction

Most shorebirds nest on the ground. Many breed in the high Arctic, mating and nesting on open tundra. The nests are generally very simple, shallow, saucer or cup-shaped depressions hollowed or "scraped" into the ground. These scrapes are often lined with grass, leaves, pebbles, or bits of shell. Other birds, including ptarmigan, grouse, and some ducks, make scrapes. Black Oystercatchers and Snowy Plovers, which nest on coastal beaches, also make simple scrapes.

Shorebirds protect their nests in a variety of ways. Nests are concealed within the surrounding landscape. The eggs are camouflaged with speckled coloration. Incubating parents have cryptically colored plumage and sit very still on the nest so they will not attract a predator's attention.

Shorebird parents are known for their clever predator distraction displays. One or both parents

pretend that they have a broken wing or are small mammalian prey. Using these wing-dragging, hunching, or stiff-walking gestures, they attempt to lead the intruder away. Shorebirds also use exaggerated gestures for courtship.

After the chicks have hatched, they learn to drop into a prone position at a parent's alarm call. This quiet, flattened posture, combined with their cryptic coloration, helps conceal them from hunting predators.

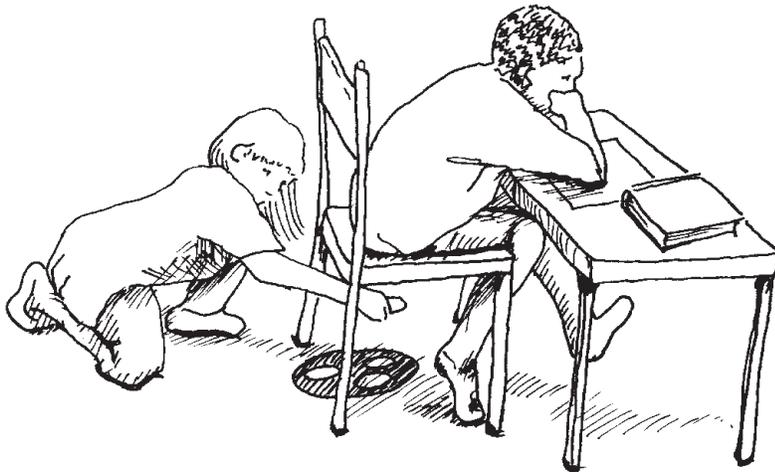
For more information on shorebird nesting and displays, read *Elaborate Shorebird Mating Systems and Displays* in the *Shorebird Primer*.

Activity Preparation

1. Copy and cut out a set of the Shorebird Threat Cards (included in this activity). Space is provided for you to add local issues and threats to the deck. There should be one card for every three students in the class. Duplicate cards are okay.

Procedure

1. Have each student construct a simple shorebird scrape using either a paper plate or a six inch diameter circle of construction paper. Add four construction paper eggs to the nest, taking care to make sure that all eggs fit within the diameter of the nest, touching but not on top of each other. Do not glue or tape eggs onto the nest.
2. Help your students brainstorm a list of possible threats to shorebird nesting success in each of the following categories: Arctic tundra, sandy coastal beaches, and/or grasslands. Write their ideas on the chalkboard in a table like the one below.



3. Explain that every student in the class is going to pretend to be a nesting shorebird. Their job is to protect their nests and eggs from environmental threats and predators (their other classmates). They may protect their nests in any way possible except physically touching the intruder. Help the class brainstorm acceptable ways to protect the nest and list their ideas on the board as a reminder. Here are some suggestions.

Ideas on How to Protect Your Nests

- Hiding the nest
- Making the nest and the eggs the same color as their surroundings
- Staying very close to the nest so as to be aware of any danger that approaches
- Sitting very still and trying not to draw attention to yourself and your nest
- Gesturing at any threatening predator in such a way as to distract it from your nest (For the purpose of this activity, vocal calls may be considered part of a distraction display although they are not always present in actual shorebird distractions.)
- Distracting intruders by leading them away from the nest with some gesture or pretense

4. Explain that several students will secretly get a *Shorebird Threat Card* to use against the other “shorebirds” in the class. If they get a card, they must attempt to “attack” one nest by following the instructions on the card—to take one egg, all the eggs, or the entire nest with all the eggs. “Attackers” have all day to attack, but they must turn in their cards to the teacher as soon as they are successful. Remind the “attackers” that they also must continue to protect their own nests from other “attackers.”

Threats to Nesting Shorebirds in Three Habitats

<i>Arctic Tundra</i>	<i>Sandy Coastal Beaches</i>	<i>Grasslands</i>
Predators: jaegers, gulls, foxes, weasels, etc. Egging (collecting eggs) Hunting Riding ATVs off trails	People jogging and walking unleashed dogs on the beach Children chasing flocks of birds Riding ATVs on the beach Jet Skiing close to the shore Unusually high tides Oil spills Predators: gulls, foxes, raccoons, feral cats etc. Litter Habitat lost to beach homes and hotels	Hunting Predators like falcons, foxes, etc. Agricultural pesticides Habitat lost to agriculture Mowing and harvesting equipment Cattle over-grazing

Attackers Cannot

- Touch the parent bird (In real life, parent shorebirds can fly away from a threat!)
- Attack during periods when the class is leaving or gone for recess, lunch, etc.

5. If a student “shorebird” senses an “attack” coming, the shorebird can protect its nest in any way without touching the “attacker.” “Shorebirds” cannot pick up their nests. Birds may try to distract the “attacker” with talking or gesturing in some wild way. If a “shorebird” can distract the “attacker” long enough, he or she may move on to another unsuspecting classmate.
6. Instruct students to consider carefully where they should place their nests. They must be somewhere on the floor or a countertop, but not up high on top of cabinets (shorebirds are ground nesters). Tell students that the nests cannot be moved from their original location.
7. Encourage students to color their nests and eggs so they are well camouflaged. Instruct them to use a loop of masking tape to secure their nest (but not their eggs). Give the students time to carefully place their nests.
8. It is important to simulate a more natural state. Nesting shorebird parents also need to feed, preen, and guard their nests all at the same time. Predators also have to care for their young while at the same time hunting for prey. To accomplish this, hand out reading or worksheet assignments that

can be completed at the same time with some disruption. Other activities may also proceed during this time. Allow students to work together so that some talking and moving about is okay.

9. Discreetly hand out the *Shorebird Threat Cards* to about one-third of the class.
10. Quietly pass the *Shorebird Threat Cards* to other students as they are turned in. Let the activity proceed for as long as possible so that all the students have a chance to use their *Shorebird Threat Cards*.

Example Game Scenarios

Mona receives a *Shorebird Threat Card* that says “ATV.” She watches for a good opportunity to attack an unguarded nest. Ten minutes later she notices that Daniel is across the room sharpening his pencil. Daniel comes back to discover his inattention has cost him of his eggs and nest. Mona puts all the eggs in her own nest and hands the card to the teacher, who later passes it to Sylvia. Daniel asks the teacher for more paper to make 4 new eggs.

Archie receives a *Shorebird Threat Card* that says “jaeger.” He watches and waits for a good opportunity to “attack.” Five minutes later he tries to sneak up to Chad’s nest and snatch an egg. Chad and Larry see him coming their way and decide to distract him by asking him about last night’s basketball game. To Chad’s disappointment, Archie picks up one of Chad’s eggs anyway, puts it in his own nest, and hands the card to the teacher. Chad may remember that he can choose to make another egg.

11. When the activity is over, ask students to count their eggs.

12. Discuss some of the following questions:

- Was the color of your nest important? Could you have concealed it better? Would you have chosen a different habitat?
- Did you lose time making a new nest or new eggs? Is time important to shorebirds? What might keep a second brood from fledging? (some possible answers are: insect hatch dies off, weather changes, and the parents’ need to migrate.)
- Are humans effective predators? Why were human predators allowed to take only one egg? (Humans who egg frequently leave some eggs so that more shorebirds will be born.) What other human activities pose a threat to shorebird nests? (They may inadvertently drive over nests on the beach or the tundra with ATVs, get too close on Jet Skis or when walking or jogging nearby. Researchers and other people who find nests may leave a scent trail. Weasels can follow human scents, and ravens and magpies sometimes look for nests by watching people. If you find a nest, walk on past it in the same direction you were going. Don’t leave a “v-shaped” scent-trail.)
- What happens to a shorebird nest if the parents are killed? What could kill them? Why are the parents in less danger than the eggs or chicks? (They can fly and they are experienced at avoiding predators.)

- Did you see any of your classmates work together to protect their eggs? Did distraction work? If not, why? (Card-holding predators wanted the egg more than whatever else was offered.) Why do birds use distraction displays? (A predator may be fooled into thinking that the distracting parent bird is injured and can be snatched easily.)

Additional Activities



Cultural Connection

Shorebird Egging: Ask students to research the sensitive issue of shorebird and seabird egging (the harvesting of eggs for subsistence purposes) in the Arctic.

Students can research how the Exxon Valdez oil spill affected nesting birds and the local communities.

Shorebird Chick Development

Have students research the chick development for a particular shorebird species. How many eggs does this species lay? What type of nest does it build? How many days old are the chicks when they fledge? What do the chicks look like? What are the biggest threats these chicks encounter? How old are these shorebirds when they first breed? Have scientists determined the nesting success of this species? Ask older students to pick two shorebird species and compare and contrast the chick development information they find.

Volunteer to Guard Real Shorebird Nests

If you live on the coast of the Atlantic or Pacific Flyways in the United States, you could help protect plover nests!

- Atlantic Flyway: Piping Plover – Volunteer Opportunities <http://pipingplover.fws.gov>
- Pacific Flyway: Snowy Plover – Do an Internet search for Snowy Plovers with volunteers in quotes



Shorebird Threat Cards

(Photocopy so there is one card for every three students.)
 (Write your own local examples on the blank cards.)

Predator Threat	Predator Threat	Predator Threat	Predator Threat
People (Take one egg.)	Jaeger (pronounced "yay-ger") (Take one egg.)	Fox (Take one egg.)	Weasel (Take one egg.)
Predator Threat	Predator Threat	Predator Threat (Local)	Predator Threat (Local)
Gulls (Take all the eggs.)	Falcon (Take one egg.)		
Habitat Threat	Habitat Threat	Habitat Threat	Habitat Threat
Inexperienced Parents (Take one egg.)	Flooding (Take the entire nest and all the eggs.)	Dangerous Waves (Take the entire nest and all the eggs.)	Loss of Habitat (Take the entire nest and all the eggs.)
Habitat Threat	Habitat Threat (Local)	Habitat Threat (Local)	Habitat Threat (Local)
Extra High Tides (Take the entire nest and all the eggs.)			
Human Threat	Human Threat	Human Threat	Human Threat
Egging (Take one egg.)	Hunting (Take the entire nest and all the eggs.)	Jet Skis (Take all the eggs.)	ATVs (Take the entire nest and all the eggs.)

Shorebird Threat Cards

(Photocopy so there is one card for every three students.)
 (Write your own local examples on the blank cards.)

Human Threat	Human Threat	Human Threat	Human Threat
Dog Walking (Take one egg.)	Jogging on the Beach (Take one egg.)	Trash (Take one egg.)	Chasing Flocks of Birds (Take one egg.)
Agricultural Threat	Agricultural Threat	Agricultural Threat	Agricultural Threat
Mowing Equipment (Take the entire nest and all the eggs.)	Pesticides (Take all the eggs.)	Habitat Loss to Agriculture (Take the entire nest and all the eggs.)	Harvesting Equipment (Take the entire nest and all the eggs.)
Human Threat (Local)	Human Threat (Local)	Human Threat (Local)	Human Threat (Local)
Agricultural Threat (Local)	Agricultural Threat (Local)	Agricultural Threat (Local)	Agricultural Threat (Local)

Behave Yourself!

Grade Level: lower elementary

Duration: one 30 to 40-minute class period.

Skills: communication, observation, application, and comparison of similarities and differences

Subjects: science, fine arts, and physical education

Concepts

- Shorebirds have elaborate behavioral adaptations for courtship display and protection of their nests and young.
- Elaborate courtship displays include vocalizations and gestures to attract mates.
- The elaborate behaviors of shorebirds for attracting mates and protecting young are some of the most spectacular and complex of all birds.

Vocabulary

- gestures
- breeding territory
- nonbreeding grounds
- mates
- aerial displays
- vocalizations
- polyandrous

Overview

Students participate in a game in which they attempt to communicate with each other by acting out shorebird gestures and vocalizations.

Objectives

After this activity, students will be able to:

- Give three examples of shorebird gestures or vocalizations.
- Explain why shorebirds make these gestures and vocalizations.
- Identify that males are most often the ones that perform vocalizations and gestures.
- Define the term polyandrous.

Materials

- One classroom set of *Shorebird Behavior Cards*
- One classroom set of *Shorebird Charades Cards*

Introduction

Shorebirds are renowned for elaborate mating *gestures*, *vocalizations*, and *displays*. Some of these displays are *aerial* (performed in the air), while others are performed on the ground. Shorebirds engage in these complex displays for a variety of purposes. The most spectacular displays sometimes involve plunging and hovering flights, accompanied by trilling, hooting, or buzzing sounds. They are used to attract and court *mates* and to protect nests and young. They are also performed as acts of aggression, particularly when defending *breeding territories*. Many shorebirds also defend their winter feeding territories on their *nonbreeding grounds*.

Gestures and vocal displays are vital forms of shorebird communication. Repeated, commonly understood rituals help shorebirds express their intentions quickly. This is especially important to tundra-breeding birds that are rushed by the short Arctic summer. Territorial displays allow birds to retreat from another's territory without risking a battle.

For more information about shorebird breeding and nesting, read *Elaborate Shorebird Mating Systems and Displays* in the *Shorebird Primer*.

Activity Preparation

1. Photocopy and cut out a set of *Shorebird Behavior Cards* (included in this activity). There should be one card for each student.
2. Photocopy and cut out a set of the *Shorebird Charades Cards* (included in this activity). There should not be duplicate cards. There should be one card per pair of students. To personalize your card set, write a few shorebird scenarios that are specific to your local species or issues on the blank cards provided.

Procedure

1. Have students stand in two lines facing each other. Join the line if there is an odd number of students. Students in one line are male shorebirds. These are the ones who will act like shorebirds trying to get the attention of a possible mate. The students in the second line represent female shorebirds.
2. Choose a pair of *Shorebird Behavior Cards* for each pair of students. Separate the cards into two identical decks. Shuffle each deck.
3. Take one of the decks and pass out a card to each "male shorebird." Let the students look at the cards, then collect them. Pass out the other deck to the "female shorebirds." The students can huddle with the shorebirds of their gender for help reading or understanding their cards. But male shorebirds cannot see the females' cards or vice versa.

4. Now explain to the “male shorebirds” that they must attract their mates by acting out the gestures listed on their cards. The female shorebirds must find their matches as quickly as possible. “Male shorebirds” need to exaggerate their gestures and sounds and repeat their actions until they are recognized.
5. Give a signal like “Behave Yourself!” to prompt the “male shorebirds” to begin.
6. End the round when all the students have found their mates.
7. Pick a shorebird pair to select a *Shorebird Charade Card* from the deck (maybe the last or the first pair to have found each other, the loudest “male shorebird”, etc.). Give them a few minutes to decide how they can act out the scenario. After they perform their charade, ask the class to guess the sentence that was on their card. It is not necessary to guess the exact words—only the general meaning.
8. The pair that correctly guesses the charade can pass out the next round of cards.
9. Repeat the activity until all students have had a chance to perform displays and charades. Alter the roles by announcing that the class is now a flock of *polyandrous* shorebirds, and the “female shorebirds” must gesture to attract the males!

Additional Activities

Shorebird Simon Says

(good for younger groups)

Use the shorebird action cards to play “Simon Says” and follow up with a game of charades afterward.

Escalating Confusion

Increase the complexity of the game by asking the “male shorebirds” to make four to five different gestures at the same time. Add sound distractions into the game by playing background music. The “male shorebirds” will have to be even louder and gesture more wildly to be recognized.



Shorebird Behavior Cards

(Make one photocopy.)

Actions and Sounds	Actions and Sounds
Wing flash Bow Hoot	Wing flash Bow Hoot
Actions and Sounds	Actions and Sounds
Purr Stretch neck Walk stiff-legged	Purr Stretch neck Walk stiff-legged
Actions and Sounds	Actions and Sounds
Stamp feet Stretch/extend neck High trill	Stamp feet Stretch/extend neck High trill
Actions and Sounds	Actions and Sounds
Wing spread Hop Whistle	Wing spread Hop Whistle
Actions and Sounds	Actions and Sounds
Beat wings rapidly Open bill Call loudly and endlessly	Beat wings rapidly Open bill Call loudly and endlessly
Actions and Sounds	Actions and Sounds
Dip-shake Food exchange Purr	Dip-shake Food exchange Purr

Shorebird Behavior Cards

(Make one photocopy.)

Actions and Sounds	Actions and Sounds
Droop wings Scrape (kick backwards) Chatter gurgle (gargle)	Droop wings Scrape (kick backwards) Chatter gurgle (gargle)
Actions and Sounds	Actions and Sounds
Flutter wings Zig-zag chase Hoot loudly	Flutter wings Zig-zag chase Hoot loudly
Actions and Sounds	Actions and Sounds
Beat wings slowly Wing-vibration Hum	Beat wings slowly Wing-vibration Hum
Actions and Sounds	Actions and Sounds
Bow Lunge head first Laugh	Bow Lunge head first Laugh
Actions and Sounds	Actions and Sounds
Rear up Spread wings Hoot loudly	Rear up Spread wings Hoot loudly
Actions and Sounds	Actions and Sounds
Dance Jump Whistle	Dance Jump Whistle

Shorebird Charades Cards

(Make one photocopy.)

Shorebird Charade	Shorebird Charade
I am a wounded rabbit and you can catch me.	I am retreating (running away) from you.
Shorebird Charade	Shorebird Charade
My leg is broken and you can catch me.	You are in my territory (home) and I want you to stay.
Shorebird Charade	Shorebird Charade
I am a hungry chick.	Look at me!
Shorebird Charade	Shorebird Charade
Where do you want to build the nest?	My eggs are gone!
Shorebird Charade	Shorebird Charade
I am going to migrate now.	I am thirsty.
Shorebird Charade	Shorebird Charade
I see a fox.	Get out of here!

Shorebird Charades Cards

(Make one photocopy.)
(Write your own scenarios on the blank cards provided.)

Shorebird Charade	Shorebird Charade
Get down, kids!	Come back here, kids!
Shorebird Charade	Shorebird Charade
I like you.	
Shorebird Charade	Shorebird Charade
Shorebird Charade	Shorebird Charade
Shorebird Charade	Shorebird Charade
Shorebird Charade	Shorebird Charade

Musical Nests

Adapted with permission from “Musical Nests” in “Bridges to Birding.” The North American Bluebird Society.

Grade Level: lower elementary
Duration: one 30-60 minute class period
Skills: interpretation of data, discussion, and vocabulary
Subjects: science, physical education, and math

Concepts

- During a shorebird’s breeding season, its habitat is where it courts, nests, and raises its young.
- Shorebirds nest on the ground.
- Shorebirds face numerous threats in their breeding habitat.

Vocabulary

- habitat
- scrape
- clutch
- nesting success
- breeding grounds
- camouflage
- predators

Overview

Students play a version of musical chairs and learn about the hazards that nesting shorebirds face.

Objectives

After this activity, students will be able to:

- Explain the relationship between nesting success and shorebird population numbers.
- Give at least three examples of shorebird predators.
- Give two other threats, besides predators, that shorebirds face on their breeding habitat.

Materials

- Chairs
- Game cards
- Portable tape or CD player
- Music
- Data sheet or chalk board
- Classroom set of *Musical Nests Game Cards* (included here)

Introduction

Most shorebirds nest on the ground in a simple grass-lined depression called a *scrape*. Their *clutch*, typically two to four or four to six eggs, are well *camouflaged* with earth-colored speckles. In spite of their inconspicuous nests and dull-colored eggs, shorebirds face a number of threats that affect their *nesting success*.

Many *predators* such as raccoon and fox hunt not only the shorebird’s chicks, but will eat their eggs as well. Birds like crows, gulls, and hawks are also fierce shorebird predators. Agriculture and development is replacing many grassland, wetland, and shoreline *habitats*. Agricultural and industrial pollution weaken many birds and reduce their chances at successful nesting.

Nesting success is a critical factor in the survival of shorebirds. Faced with the perils of long migratory flights each spring and fall—and the threats they face on their nonbreeding grounds—a sufficient number of juvenile birds must be raised on *breeding grounds* to replace the adults that will not return the next year to breed.

To learn more about shorebird nesting and breeding, read *Elaborate Shorebird Mating Systems and Displays*. To learn more about the threats shorebirds face, read *Threats to Migrating Shorebirds*. Both of these sections are found in the *Shorebird Primer*.

Activity Preparation

1. Photocopy the Musical Nests Game Cards (included in this activity) on cardstock. You will need a set of cards equal to two and one half times the number of participants.
2. Plan for a group of 20 by photocopying and cutting 50 cards as follows:

20 copies of the
SAFE NEST CARDS
10 copies of the
UNSAFE NEST CARDS
10 copies of the
SHOREBIRD CARDS
10 copies of the
THREAT CARDS

Procedure

1. Place chairs as you would for a traditional game of musical chairs. You will need a set of chairs equal to half the number of participants. Shuffle the safe and unsafe nest cards and place one face down on each chair. Participants should not look at these cards!
2. Before beginning the game, discuss the different habitats where shorebirds nest. Brainstorm a list of threats nesting shorebirds face that might limit nesting success. Explore what habitats might be safer for nesting and which might be more hazardous. Make a list of these threats under the habitat headings where they belong: tundra, grassland, sandy beach, rocky-intertidal habitat, and freshwater/saltwater marsh. Refer to the chart below for ideas.

Threats to Nesting Shorebirds

<i>Tundra</i>	<i>Grassland</i>	<i>Sandy Beach</i>	<i>Rocky Intertidal Habitat</i>	<i>Freshwater and Saltwater Marshes</i>
Predators like jaegers, gulls, foxes, weasels, etc.	Predators like falcons, foxes, weasels, etc.	People jogging and walking dogs on the beach	Oil spills	Wetland Drainage
Egging	Habitat loss to agriculture	Children chasing flocks of birds	Predators like gulls, foxes, raccoons, wild cats, etc.	Runoff water that contains oil, pesticides and agricultural chemicals
Junting	Agricultural chemicals	Riding ATVs on the beach	Litter	Habitat lost to coastal & agricultural development
	Mowing and harvesting equipment	Jet Skiing close to the shore		
	Cattle grazing	Extra high tides		
		OPl spills		
		predators like gulls, foxes, raccoons, wild cats, etc.		
		Beach litter		
		Habitat lost to beach homes and hotels		

3. Select ten of the threats the students identified and write them on the THREAT CARDS.
4. Shuffle the SHOREBIRD and THREAT CARDS and give one to each participant. Participants may look at these cards.
5. Each player who receives a SHOREBIRD CARD should walk around the chairs as the music plays. When the music stops, each shorebird must “nest” in the nearest site (chair). Instruct them not look at the cards on their chairs!

6. Now that the shorebirds have settled into their nests, the students with a THREAT CARD begin to prowl. Ask the students to really play the part. Snakes should slither, birds flap, raccoons creep, a bulldozer rumble, etc. Play some appropriate, less jolly music. When the music stops, the “threats” choose the closest nests.
7. Now players may look at what is written on the cards on their chairs. If the card reads SAFE NEST, then the shorebird gets

to stay. If it reads UNSAFE NEST, the “threat” gets the chair because it has eaten or destroyed the shorebird’s eggs. Total the number of chairs, shorebirds, and safe nests.

8. Play the game for two to three rounds, shuffling and replacing the nest cards each time. Re-deal the second deck so participants have the chance to play different roles. Add some additional factors such as habitat loss for nest sites. Just remove one chair between rounds. At the same time, you must remove one THREAT CARD and one SHOREBIRD CARD before shuffling and dealing.
9. Keep track of totals and graph shorebird numbers at the end of each round. Players will notice that when there are more safe places to nest, more shorebirds survive!

Additional Activities

Guard Your Nest

In this classroom activity, students become nesting shorebirds that must guard against predators and threats, while at the same time take care of their own needs.

Shorebird Detective Work

Investigate the shorebird habitats of your area to uncover the threats shorebirds face right in your own backyard. Organize what you learn into two categories: Natural Threats and Human Threats. Which of the human threats can you do something about?

Musical Nest Cards

Safe Nest Cards
(Make two copies for a group of 20.)

SAFE NEST	SAFE NEST

Musical Nest Cards

Unsafe Nest Cards
(Make one copy for a group of 20.)

UNSAFE NEST	UNSAFE NEST

Musical Nest Cards

Shorebird Cards
(Make one copy for a group of 20.)

SHOREBIRD	SHOREBIRD

Musical Nest Cards

Threat Cards
(Make one copy for a group of 20.)

<u>THREAT</u>	THREAT
THREAT	THREAT

It's a Tough Life!

Adapted with permission from "Plover Survival: A Simulation Game." U.S. Fish and Wildlife Service.

Grade Level: upper elementary/middle school

Duration: one 50-minute class period

Skills: vocabulary, critical thinking, discussion, visualization, and interpretation of data

Subject: science and physical education; language arts (with additional activity)

Concepts

- During a shorebird's breeding season, its habitat is where it courts, nests, and raises its young.
- Shorebirds nest on the ground.
- Some shorebirds defend breeding territories.
- Shorebirds have elaborate behavioral adaptations for courtship display and protection of their nests and young.
- Shorebird nests are well camouflaged. Chicks use both camouflage and behavior to stay concealed from predators.
- Your local environment may be important breeding habitat for many migratory shorebirds.
- Shorebirds face numerous threats in their breeding habitat.
- Disturbance from human activities, animals, and trash limit a shorebird's opportunity to feed and nest successfully.

Vocabulary

- invertebrates
- behavior
- threat
- human disturbance
- predator
- chicks

Overview

Students play a game that simulates the challenges shorebirds face when trying to feed along coastal beaches. Students begin to think about shorebirds' needs and what

threatens their survival.

Materials

- Outdoor or indoor playing field with enough room to move around freely
 - One rope at least 16 feet long
 - Four small brown bags or sandwich bags
 - One beach ball, Frisbee, or small ball
 - One additional 16-foot rope marked in four foot intervals or five orange goal cones or other markers to establish boundaries
 - Soda cans, candy wrappers, a couple of bags of chips (to simulate litter)
 - One to two bags of dried beans, the same color as the playing field
 - One copy of *It's a Tough Life! Record of Feeding and Survival Success* data chart
 - One large sheet of paper or flip chart for recording data
 - Markers for recording data
- ### Optional
- One large inner tube, tire, or ball
 - One kite

Introduction

Shorebirds face many *threats* and *disturbances* that can interfere with their ability to nest and feed. One of the biggest threats to beach-nesting shorebirds is *human disturbance*. As our population grows, so does our need for recreational space. This is especially true in rapidly growing coastal communities. Many times shorebird nesting coincides with the peak of our summer beach recreation season. Since shorebirds are naturally wary, they will move away from their nests and important feeding areas when disturbed, often before people even notice their presence. Of course, noisy beach activities such as personal water crafts and off-road vehicles scare shorebirds away; but so do more passive, seemingly unobtrusive activities like jogging or walking along the beach.

For more information about the threats shorebirds face, read *Threats to Migrating Shorebirds* in the *Shorebird Primer*. To learn more specific information about a sandy beach-nesting shorebird, read the *Snowy Plover Shorebird Profile* located in the *Appendix*.

Activity Preparation

1. Draw the *It's a Tough Life! Record of Feeding and Survival Success* data chart on a flip chart so you can record data as you play the game. You may also want to prepare a transparency of this data sheet for use in the classroom

Procedure

Set up the Scenario

1. Ask students to describe the wave action on a beach or lake. Is the water always at the same level or does it vary? Describe the area where a wave has just passed; is it wet or dry? Ask for two volunteers to move the rope to simulate gentle wave action. Have them demonstrate this motion.
2. Ask students if they have ever seen small birds along the water's edge. If so, what did they observe? Were the birds feeding? Did they move when the water approached? How? (If students have not observed these behaviors, explain that birds move back and forth with the advancing and retreating waves. They peck and poke with their beaks for small invertebrates in the mud.)
3. Ask for four volunteers—two to model the behavior of the adult shorebirds and two to model the behavior of the chicks. You may actually want to label these volunteers so you can distinguish between the adults and chicks.

4. Explain that in this game, or simulation, the birds (played by the students) will be feeding on beans (representing small *invertebrates* found in the mud). Spread the beans on the ground near the “water’s edge” and hand out small sacks or bags (a “stomach”) to each of your shorebirds. When the shorebirds find an “invertebrate,” they must pick it up with one hand and put it in their “stomach.” They can only pick up one bean at a time with one hand—the other hand must be holding their “stomachs.”

5. Have the shorebirds move with the waves. Model this feeding behavior for about 30 seconds. Count each bird’s beans at the end of this time and record the number on the *It’s a Tough Life! Record of Feeding and Survival Success* data chart.

Note: The range of beans collected during this first round will be your standard healthy diet. As the game progresses, if a shorebird collects only half of this amount, it will survive but be unhealthy. If a shorebird collects only one quarter of this number, it may eventually die.

6. Introduce students to the shorebird they will be representing. Select a shorebird that you might find at your local beach, lakeshore, or flyway from the list below.

- Atlantic Flyway: Piping Plover, Wilson’s Plover
- Central Flyway: Piping Plover, Snowy Plover, Wilson’s Plover
- Pacific Flyway: Snowy Plover, Wilson’s Plover

7. Explain that this activity will help them understand some of this bird’s *behaviors* and needs, as well as the things that are threatening its survival.

Add Human Disturbance to the Game

8. Ask students what a typical lakeshore or ocean beach looks like. Ask them to describe different types of people-related activities that take place there. Make sure their responses include some sort of game activities (playing Frisbee or catch, flying kites, etc.). What do you think shorebirds do if people or other animals come too close? Can shorebirds feed when they are constantly avoiding people?

9. Establish an area that will be a “safe haven” for the shorebirds. This should be located at least ten feet away from where they are feeding at the water’s edge. Mark off this area with the second rope, goal cones, or other objects. Establish four foot wide “corridors” through which the plovers will move from the water’s edge to the safe haven if any form of disturbance, like people, approaches. (See the diagram.)

10. Explain to the students that each shorebird will have a corridor in which to feed and move. If a person comes into the shorebird’s corridor, the shorebird has to be in the “safe haven.” This means that the shorebird must anticipate the approach of a human and run to the “safe haven” before the person is actually in its corridor. (In real life, most shorebirds will move long before people get too close.)

11. Ask for six new volunteers. Ask the plovers to resume feeding along the water’s edge. Tell the plovers they must “fly” to the “safe haven” when disturbed and go back to feeding when it is safe again. Then send two student volunteers to walk along the water’s edge at normal walking pace. When they are through, send another two students into

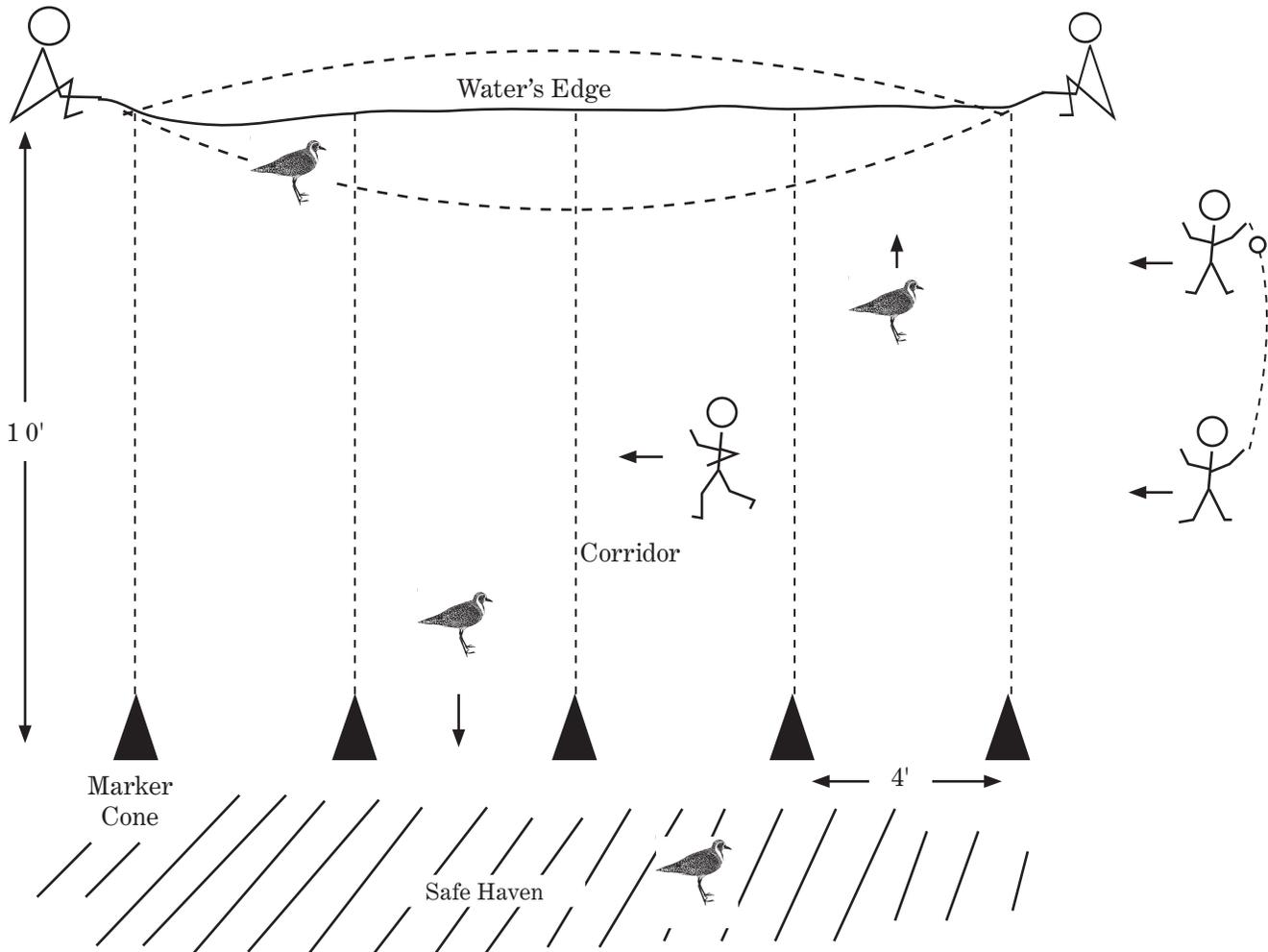
the game—this time playing ball or Frisbee for a few minutes. When they leave the area, send in another two students carrying soda cans, bags of chips, and other trash into the shorebird area. They should walk along, dropping some of their trash. Allow variable amounts of time between each pair of students to allow the plovers to attempt to return and feed.

12. Count and record the beans collected by the shorebirds in this round. Compare the results with those of the first round. Discuss the number of beans collected. Remind the class that more time was spent on this round but the birds still caught less food! Will these be healthy shorebirds? Will they even survive in this area? Ask the shorebirds how they feel physically. Are they tired? Given that real shorebirds will actually be running farther than the ten feet established in this game, what has the class learned about how much energy shorebirds use to get food? (Point out to students that with human interference, the shorebirds are using more energy to obtain less food.)

Add Predators to the Game

13. Ask students if the trash left by people in the last round affected the birds’ ability to feed. Explain to the students that when people leave trash in an area, it attracts other kinds of animals like dogs, cats, raccoons, skunks, foxes, and gulls.

Note: Gulls are fast-moving birds that prey on shorebird eggs and chicks. When a gull or other predator approaches a shorebird with its young, both the chicks and adult respond. The adult will move away, faking an injury like a broken wing in an attempt to lead the predator away from the



chicks. If both adults are present, the second parent will lead the chicks to safety. Because they are unable to fly, chicks are easy prey for predators.

14. In this round, instruct the chicks to squat on the ground and the adults to remain standing while they feed. Select a volunteer to be a gull or other predator. If the predator can tag a shorebird chick, this constitutes an attack—and the shorebird dies. The adult plover can fake an injury and/or lead the chick away to safety. Allow the predator to enter the area for 30 seconds.

15. Count and record the beans and living shorebirds at the end of the round. Discuss the impact this predator had on the shorebirds' ability to feed and survive.

16. **OPTIONAL:** Play additional rounds, rotating students into the roles of shorebirds. Add a round to introduce recreational disturbances with simulations like kite-flying, playing Frisbee, riding Off-road vehicles (ORVs) on the beach, or walking an unleashed dog. See options below to do these rounds.

Kite-flying: Kites look like large predatory birds to plovers. In

fact, plovers have been known to respond to the presence of a kite that was over 100 meters (109 feet) away!

- Ask two students to fly a kite. By running around, the students can keep the kite in the air for brief periods of time, assuming there is a little wind.
- Every time the plovers see the kite in the air, they must stop feeding and go to the "safe haven."
- Have the plovers feed and let the students fly the kite for 30 to 60 seconds, depending on their success at getting it in the air.
- Count and record the beans the plovers picked up.

Off-road vehicles (ORVs): These vehicles include trucks, four-wheelers, dune buggies, etc. The deep tracks these vehicles create generally run parallel to the water's edge. The shorebird chicks sometimes get stuck in them and cannot feed. In addition, they frequently get run over because they are stuck in the track or their instincts cause them to freeze.

- Have two students “drive” the ORV which can be a large tire, inner tube, or ball. To “drive” it, the students must keep the ORV in between them with their hands on it at all times.
- The chicks should squat and not move in this round. If the tire touches the plover, it dies. However, all plovers should feed.
- Count beans when the round is over.

Discuss the following questions:

- What happened to the shorebird's ability to obtain food based on the number of beans recorded at the end of each round? How did they feel as it got harder and harder to feed? How might feeling tired or frustrated with the interference affect a shorebird's ability to feed?
- What happened to the size of the shorebird population on this beach? Will the plovers continue to nest here? If not, where will they go? What if the same problems occur on other beaches? What does this mean for the survival of this shorebird species?

Discuss Solutions

Plovers need space and so do people. Ask the class what can be done so that both the plovers' and people's needs can be met. Listen to all of their ideas and try to get the class to agree on one. This idea should involve some sort of beach management. Have the class think of what could prevent their idea from working. What happens if people do not want to go along with the management plan? What kinds of things can be done about this? You may want to do one more round, implementing their idea. Explain to students that people are implementing beach management programs to help protect the plovers. Their programs may be similar to the idea of the class.

Additional Activities



Cultural Connection

Students work in teams of two representing the following groups: generation of shorebirds that lived through the spill, generation of shorebirds after the spill, Alaska natives, the oil company, Prince William Sound fisherman, Coast Guard, local chamber of commerce, and U.S. Fish and Wildlife Service. Each team is to research how its group was impacted by the Exxon Valdez oil spill. All the groups then gather to outline what they learned from the oil spill and what they recommend should be done to protect their groups.

Arctic Breeding Challenges and Threats

Because of the relative remoteness and wilderness quality of the high Arctic, loss of habitat is generally not considered to be a major threat. However, other threats exist, including predators and potential over-harvesting by local peoples. Have students research what the threats are in the Arctic.

Develop a Shorebird Management Plan

Ask the class to brainstorm what might be done to meet the needs of shorebirds and people on the beach. Make a list of their ideas. Divide the class into teams. Ask each team to pick one of the management options and develop a management plan. Their plans should consider what might prevent success, including public opposition. Have each team present its plan to the entire class. Take a class vote on which plan to implement or give them the option of putting together a new class plan, selecting the best components of each team's ideas.

Research a Current Shorebird Management Plan

Select a shorebird in your area that is considered in need of special consideration. Have your class research what is being done for this bird. Is it working? Can they think of other ways to help?

It's A Tough Life Record of Feeding and Survival

	Adult Plover #1		Adult Plover #2		Plover #1 Chick		Plover #2 Chick	
	# of beans	health						
Round 1 (undisturbed)		healthy		healthy		healthy		healthy
Round 2 (pedestrian disturbance)								
Round 3 (predator disturbance)								
Round 4 (kite disturbance)								
Round 5 (ORV disturbance)								

Dietary Standards (To be determined after Round 1)

Healthy Range: _____ beans

Unhealthy Range: _____ beans

Dangerous Range: _____ beans
(may result in death)



