



Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

En Español 
Chasquee aquí

Teachers! Join us in learning more about the mystery and wonder of migration. Follow Maya, a Western Sandpiper, on an exciting often perilous journey from Mexico to Alaska.

Photo by Don Desjardin

▶ [ENTER TO BEGIN](#) ▶ [Teacher Evaluation](#) ▶ [Monthly Activities](#) ▶ [Webcast](#)

Get ready to take flight alongside migrating shorebirds for an exciting trip to the Copper River Delta in Alaska. How can you bring shorebird excitement into your classroom? Check out this [Web site](#) for the story of [Maya's migration](#) for your class and the live, [interactive television program](#).

[Listen](#) to Cordova Alaska's own Bearfoot Bluegrass Band song Boston Boy.

Teachers:

The Winging Northward Website prepares your class for the live broadcast on May 8, 2002 and is an incredible resource for you! Check out the Teacher Resource Center. Lead your class through dynamic classroom activities about shorebirds, wetlands, and migration. New activities appear on the first day of each month. Discover Maya's original migration story. Explore Maya's World!

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- Why Educate about Shorebirds

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Maya's Adventure

This Web site provides teachers with a rich source of information, activities, and links about shorebirds, migration, and wetlands. Be sure to enter the poster contest! These activities culminate in a live, interactive field trip on May 8, 2002, from 1-2:30 PM Eastern Time (for grades 4-8).

[Click here](#) for Live, Interactive Television Program and Web cast.

▶ [Download Flash](#)



[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com

Filnet Site Developed by
Filnet Incorporated

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Monthly Activities:

[Home](#) | [Maya's Sponsors](#) | [Maya's Adventure](#) | [Broadcast Registration](#)

- November, 2001
- December, 2001
- February, 2002
- March, 2002
- May, 2002

Monthly Activities

On the first day of the month from November to April, teachers and students can find new, exciting activities about shorebirds, wetlands, and migration. Some activities include quizzes to assess your students' learning.



November 2001

Introduction to Shorebirds and Building a Basic Vocabulary

Monthly Activity: **Build a Shorebird**

[Download Flash](#) 

- [Shorebird Adaptations](#)
- [Build a Shorebird \(Long Version\)](#)
- [Student Flashcards](#)
- [Build a Shorebird \(Short Version\)](#)
- [Student Activity Sheet](#)
- [Student Answer Sheet](#)
- [Student Quiz \(Both Versions\)](#)

Additional Activities:

- [Maya's Story](#)
- [Maya's Story Word Search](#)



December 2001

Shorebird Adaptations

Monthly Activity: **What Can You Eat with this Beak?**

- [What Can You Eat with this Beak? \(Long Version\)](#)
- [Student Activity Sheet \(Long Version\)](#)

- [What Can You Eat with this Beak? \(Short Version\)](#)
- [Student Activity Sheet \(Short Version\)](#)
- [Student Answer Sheet \(Short Version\)](#)

Additional Activity:

- [Monitor Birds in the Class Backyard](#)
- [Color the Shorebird](#)
- [Maya's Story](#)



February 2002

Migration

Monthly Activity: **Avian Olympics**

- [Avian Olympics](#)
- [Teacher Activity Sheet](#)
- [Student Activity Sheet](#)

Additional Activities:

- [The Incredible Journey](#)
- [Game Cards](#)
- [Shorebird Soap Opera](#)
- [Fueling Up for the Journey](#)
- [Teacher Activity Sheet](#)
- [Student Activity Sheet](#)
- [Maya's Story](#)



March 2002

International Connection

Monthly Activity: **International Pen Pals**

Additional Activities:

- [Bird's Eye View](#)
- [Practice Field Trip](#)
- [How to Use Binoculars](#)

- [Field Trip Etiquette](#)
- [Shorebird Sister School E-mail Listserv](#)
- [Maya's Story](#)



May 2002

Live, Interactive Television Program and Webcast
May 8, 2002 1-2:30 PM Eastern Time Grades 4-8.

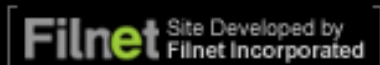
Monthly Activity: [Student Sheet for Broadcast](#)



[Home](#) | [Maya's Sponsors](#) | [Maya's Adventure](#) | [Broadcast Registration](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Sponsors:

[Home](#) | [Monthly Activities](#) | [Maya's Adventure](#) | [Broadcast Registration](#)

▶ About the Live Field Trip

▶ [Download Flash](#)



Maya's Partners, Friends, and Sponsors

Partners:

USDA Forest Service

www.fs.fed.us

Western Hemisphere Shorebird Reserve Network

www.manomet.org/WHSRN.htm

U.S. Fish and Wildlife Service

www.fws.gov

Tec de Monterrey

www.campus.sin.itesm.mx

Shorebird Sister Schools Program

sssp.fws.gov

Prince William Network

www.pwnet.org

Friends and Sponsors:

Ducks Unlimited

World's largest wetland conservation organization.

www.ducks.org

Copper River Delta Shorebird Festival

Official Web site for the Copper River Delta Shorebird Festival.

www.ptialaska.net/~midtown/

Chugach National Forest

USDA Forest Service at Copper River Delta.

www.fs.fed.us/r10/chugach/

Cordova - Alaska's Hidden Treasure

Chamber of Commerce Web site all about this unique place.

www.cordovachamber.com



Cordova Auto Rentals

Local car rentals compliments of Russ Bradley at Cordova Auto Rental.

<http://www.ptialaska.net/~cars/>

Rose Lodge Cordova

Many thanks for the hospitality of our hosts Gaye and Gary McDowell.

www.cordovarose.com

Live, Interactive Television Program and Webcast

Broadcast May 8, 2002

1-2:30 PM Eastern Time

Grades 4-8.



[Home](#) | [Monthly Activities](#) | [Maya's Adventure](#) | [Broadcast Registration](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK

P.O. Box 389 Manassas, VA 20108

Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents
WINGING NORTHWARD
 A SHOREBIRD'S JOURNEY

En Español 
 Chasquee aquí

Broadcast Registration:

[Home](#) | [Monthly Activities](#) | [Maya's Sponsors](#) | [Maya's Adventure](#)

- ▶ About the Live Field Trip
- ▶ How to Receive Program & Register
- ▶ Webcast
- ▶ Participants, Interactive Television Program
 - Dan Logan
 - Pam Van Den Broek
 - Belle Mickelson
 - Sandy Frost
 - Hilary Chapman
 - Mariah Cardona
 - Jay Beaudin
 - Mt. Eccles Elementary

About the Live Field Trip

Experience the world of Maya and her shorebird friends without leaving your classroom.

Produced by Prince William Network in collaboration with the Copper River International Migratory Bird Initiative, USDA Forest Service, the U.S. Fish and Wildlife Service, The Western Hemisphere Shorebird Reserve Network, Ducks Unlimited, and The Pacific Research Station, "Winging Northward: A Shorebirds Journey" will be offered free to you and your class.



Join us and Maya at the Copper River Delta in Alaska free! Your students will be fascinated by shorebird adaptations, their wetland habitat, and their migration flyways across international boundaries. The program will be a culminating activity for the activities contained in this Web site (see [Activity of the Month](#)), but the show will also be useful and informative for classes that have not had prior preparation. Live and interactive this television event that will be broadcast on May 8, 2002, from 1 to 2:30 p.m. Eastern Time. The program is designed for grades 4-8. Educators have designed this electronic excursion for educators and their classes.

[Download Flash](#)




TOP

[Home](#) | [Monthly Activities](#) | [Maya's Sponsors](#) | [Maya's Adventure](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
 P.O. Box 389 Manassas, VA 20108
 Phone: 703.791.7328 E-mail: pwninfo@aol.com

Filnet Site Developed by
 Filnet Incorporated

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

En Español 
Chasquee aquí

Broadcast Registration:

[Home](#) | [Monthly Activities](#) | [Maya's Sponsors](#) | [Maya's Adventure](#)

- ▶ About the Live Field Trip
- ▶ How to Receive Program & Register
- ▶ Webcast
- ▶ Participants, Interactive Television Program
 - Dan Logan
 - Pam Van Den Broek
 - Belle Mickelson
 - Sandy Frost
 - Hilary Chapman
 - Mariah Cardona
 - Jay Beaudin
 - Mt. Eccles Elementary

How to Receive the Program and Register

Winging Northward: A Shorebird's Journey is available by C-Band satellite and as a web cast and is free to all educational institutions.

By registering online, you will receive an e-mail confirmation of your registration with your satellite coordinates.

For additional information, call 1-800-609-2680.

The live, field trip may also be viewed on the web. To review the live web cast, click on "web cast" on the day of the event.

[Click here](#) to download the PDF Electronic Field Trip Brochure.



 TOP

[Home](#) | [Monthly Activities](#) | [Maya's Sponsors](#) | [Maya's Adventure](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com

 Site Developed by
Filnet Incorporated

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Broadcast Registration:

[Home](#) | [Monthly Activities](#) | [Maya's Sponsors](#) | [Maya's Adventure](#)

- ▶ About the Live Field Trip
- ▶ How to Receive Program & Register
- ▶ Webcast
- ▶ Participants, Interactive Television Program
 - Dan Logan
 - Pam Van Den Broek
 - Belle Mickelson
 - Sandy Frost
 - Hilary Chapman
 - Mariah Cardona
 - Jay Beaudin
 - Mt. Eccles Elementary

Webcast

The Prince William Network, Quest Digital Media and Streampipe are pleased to offer you the opportunity to view Winging Northward: A Shorebird's Journey. (Starts at 1:00 pm ET)



[Click here](#) or the image to view via Webcast.

Your computer must meet certain requirements in order for you and your students to participate in the live Webcast.

For optimum viewing, we recommend using Windows Media Player (WMP) and Internet Explorer, although, the webcast can be viewed through the Netscape Navigator browser as well. If you have never used WMP, you can test your machine by linking to our test page at www.streampipe.com/test.

If you are able to view the test video, your system is ready. If not, you will need to download and install the WMP player or view the troubleshooting hints. This will take only a few minutes and the software for the player is free. The links for downloading WMP are listed on the Streampipe Website test page and is listed below.

Windows Media Player:
www.microsoft.com/windows/windowsmedia/en/download/default.asp

▶ [Download Flash](#)



▲
TOP

[Home](#) | [Monthly Activities](#) | [Maya's Sponsors](#) | [Maya's Adventure](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Broadcast Registration:

[Home](#) | [Monthly Activities](#) | [Maya's Sponsors](#) | [Maya's Adventure](#)

- ▶ About the Live Field Trip
- ▶ How to Receive Program & Register
- ▶ Webcast
- ▶ Participants, Interactive Television Program
 - Dan Logan
 - Pam Van Den Broek
 - Belle Mickelson
 - Sandy Frost
 - Hilary Chapman
 - Mariah Cardona
 - Jay Beaudin
 - Mt. Eccles Elementary

Participants on the Live, Interactive Television Program

Dan Logan
USDA Forest Service

Dan Logan is currently director of the Copper River International Migratory Bird Initiative and wildlife biologist for the Chugach National Forest. His work includes managing research and monitoring projects on the Copper River Delta and the Pacific Coast from Canada to Latin America. Dan's current work ranges from vegetation successional modeling on the Copper River Delta to assisting in developing a shorebird conservation plan for Mexico.



▲
TOP

Pam Van Den Broek
USDA Forest Service

As a Wildlife Technician for the US Forest Service in Cordova, Alaska, Pam has worked on waterbird projects for the last 3 years. As a lifelong resident of Cordova, Pam brings a unique view of the Copper River Delta, its wildlife, and especially its shorebirds. She holds a bachelors degree in Education and Biology and is involved in both research and education on the Cordova Ranger District.



▲
TOP

Belle Mickelson
Cordova Schools

Belle Mickelson first visited the Copper River Delta in 1974 and has been a local resident for almost 20 years. She has a biology teaching certificate and a masters in environmental education from the University of Michigan. Belle is an assistant professor who currently works for the Cordova Schools. She is the primary author of the Alaska Sea Week Curriculum, Alaska Oil Spill Curriculum, and Alaska Fisheries Curriculum. She loves to take students to marshes and mudflats.



TOP

Sandy Frost

USDA Forest Service

For the last twenty years Sandy Frost has shared her love of Alaska with visitors and children. Growing up on a 'game farm' in rural Wisconsin, she developed an early love of migratory birds. After studying wildlife management in college, she traveled to Alaska to work for the Forest Service. As an Interpretive Specialist with the Chugach National Forest in south central Alaska she managed a large visitor center on the Kenai Peninsula, and the Alaska Marine Highway interpretive program in Prince William Sound. In the 1990s Sandy worked in Cordova, Alaska and focused her education efforts on the spectacular public resources of the Copper River Delta. Her true love has been educating people about shorebirds and their awe-inspiring yearly migration.



Sandy has had the opportunity to work in developing countries and has developed education and interpretive programs in The Gambia, West Africa, and in Komodo National Park, Indonesia. Currently she works for the Alaska Region of the Forest Service as a public affairs specialist in Thorne Bay, Alaska. But each spring and fall her heart returns to the wonderful wetlands of the Copper River Delta.



TOP

Hilary Chapman
US Fish and Wildlife Service

Ms. Chapman is an education specialist for the U.S. Fish and Wildlife Service's National Conservation Training Center. Her responsibilities include national coordination for the Shorebird Sister Schools Program and projects relating to endangered species, biodiversity, and Project WILD.



Mariah Cardona
Student Host

Mariah Cardona has lived in Cordova, Alaska for most of her life. She went to school in the Philippines for two years. She attends various camps in the Prince William Sound area. Her favorite times at school are science and recess. Mariah has five brothers and sisters. Mariah likes rollerblading around town with her friends.



Jay Beaudin
Cordova Schools

Jay Beaudin has been teaching in Alaska for over 20 years and has also taught in Colorado and Idaho. He enjoys making the outdoors the classroom. Jay believes that the annual shorebird migration is a great time for getting out and learning.



Mt. Eccles Elementary
Jay Beaudin's Fifth Grade Class



Breanna Anderson, Ben Bednarz, Emily Branch, Mariah Cardona, Olivia Kelly, Albert Olds, Mikey Reodica, Justin Ritter, Emma Roemhildt, Victoria Roemhildt, Rachel Sherman, Cody Shipman, Kara Sjostedt, Jack Stevenson, and Holly Urton.



[Home](#) | [Monthly Activities](#) | [Maya's Sponsors](#) | [Maya's Adventure](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative



Winging Northward

A Shorebird's Journey



**Electronic
Field Trip**

May 8, 2002

1:00-2:30 PM ET

GRADES 4 - 8

Paul Fusco, Photography

LIVE FROM CORDOVA, ALASKA'S
COPPER RIVER DELTA
AND FROM SINALOA, MEXICO



BROADCAST LIVE BY
SATELLITE AND WEBCAST

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network

**MONTHLY ON-LINE STUDENT ACTIVITIES-INTERACTIVE-LIVE
INTERDISCIPLINARY-CORRELATED TO NATIONAL STANDARDS**
A FREE ELECTRONIC FIELD TRIP FOR YOUR CLASSROOM!

Winging Northward: *A Shorebird's Journey*

Copper River Delta, Alaska



Sinaloa, Mexico



PREPARING FOR FLIGHT May 6, 2002 • 1:00pm -1:30pm ET
LIVE FLIGHT May 8, 2002 • 1:00pm - 2:30pm ET

Get ready to take flight along side migrating shorebirds for an exciting trip to the Copper River Delta in the Chugach National Forest near Cordova, Alaska. Millions of shorebirds return to the spectacular wetlands of the Copper River Delta to rest and refuel on their long journey to the breeding grounds in western and northern Alaska.

Shorebirds are truly ambassadors to our world. Migrating to Alaska from many places, such as Mexico, Central and South America, Japan, Hawaii, and the West Coast of the United States, some shorebirds fly as many as 10,000 miles one way. However, shorebird numbers are declining and scientists are concerned about their future.

How can you bring the shorebird excitement into your classroom? *Winging Northward: A Shorebird's Journey* is a free electronic field trip that brings the birds to you! Your students will be fascinated by shorebird adaptations, their wetland habitat, and their migration flyways across international lines. No matter where they live, students will learn how public and private lands, whether a neighborhood park or national forest, provide wetland habitat and how students can help protect them in the United States and around the globe.

PROGRAM TOPICS CORRELATED TO NATIONAL STANDARDS



Shorebirds

Students will learn how shorebirds are adapted to live in wetland habitats and are an important part of the wetland environment.

Wetlands

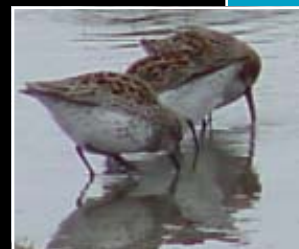
Shorebirds depend on healthy, abundant chains of wetland habitats. Students will also learn why wetlands are important to humans and how humans protect and affect wetland habitats. Wetlands are found in many places including neighborhood parks, farms, national forests and wildlife refuges in the United States and around the world.

Migration

Students will learn that the success of a shorebird's journey depends on wetlands for wintering, migration stopovers, and nesting habitat.

The International Connection

Your class will see how they are a part of the international connection between shorebirds, migration and wetland habitats. There are no borders to wetland and shorebird conservation. Even urban and suburban dwellers can help protect wetlands.



WINGING NORTHWARD: A SHOREBIRD'S JOURNEY is available by C-Band satellite and as a webcast and is free of charge to all educational institutions. To receive satellite coordinates and support materials, including an extensive study guide with pre- and post flight activities, you must register on-line at www.pwnet.org. Click on Electronic Field Trips and complete form. You will receive email confirmation of your registration. For additional information call: 800-609-2680.

TWO WAYS TO RECEIVE PROGRAM: BY SATELLITE AND INTERNET WEBCAST

Prince William Network

Prince William County Public Schools
Box 389
Manassas, Virginia 20108

FREE
To all Educational
Institutions

NON-PROFIT
ORGANIZATION
U.S. Postage
PAID
PERMIT NO. 58
MANASSAS, VA 20108

Register On-Line: www.pwnet.org

Communication Solutions by **NEXTEL**

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service and the Western Hemisphere Shorebird Reserve Network
Special thanks to Ducks Unlimited, Pacific Northwest Research Station, U.S.D.A. Forest Service International Programs



Build A Shorebird

Teacher Shorebird Adaptations

Concepts

- Shorebirds have many physical, or *morphological*, adaptations to help them walk, find food, and reproduce in their habitat, and to fly long distances in migration.
- Shorebirds are also adapted *physiologically* to their migrating lifestyle, particularly in their fat-loading abilities which enable them to maintain energy for their long flights.
- Adaptations are naturally selected for over a long period of time, and specialized animals like shorebirds cannot adapt overnight to damage or alteration of their habitat.

General Information

One definition of *species* is a group of *organisms* (lifeforms) that can breed and produce fertile offspring. In other words, bulldogs and collies belong to the same species (dog) because they can mate and produce puppies which can grow up and have their own puppies. Another, perhaps easier to picture, definition of species is a group of organisms which have similar physical traits. All dogs are mammals with a certain type of teeth, skull structure, etc.. Different species have different physical *traits*, or characteristics.

These traits help a plant or animal (or other organism) use particular resources found in their habitat for food and reproduction. A habitat is the environment in which an organism lives, its "home." You will learn more about shorebird habitat later. Say an individual bird is born with a trait which differs slightly from other members of its species. If that trait gives it an *advantage* (extra boost or help as compared to what other individuals of the species have) in *surviving to breed* (reproduce), it will successfully pass on the genes for that trait. The trait may persist as long as it gives the bird an advantage, or at least the possibility of *competition*, in its environment.

The helpful traits are called *adaptations* because they help an organism *compete* (perform as well as other individuals in such actions as surviving to breed) in its particular environment. The Theory of *Natural Selection* explains this process. If something in the organism's environment changes, say the climate or a food source, the old trait may not be as helpful as another adaptation. Perhaps the organism will eventually not survive to pass on its genes.

Shorebirds are birds with adaptations to help them survive in the environment of the shore or other open wetlands. Some of these adaptations include: plumage that conceals chicks and adults from predators (it is the color of the shore or speckled like the tundra), long legs for wading, and bill shapes that help them probe for buried food items. Other adaptations are behavioral, such as parents distracting intruders away from their nests.

Although adaptations may be physical or behavioral, the activities in this section will focus primarily on physical traits of shorebirds. Physical adaptations have to do with an organism's morphology, physiology or both. *Morphology* refers to *anatomy*, or the *form* and appearance of an organism. *Physiology* refers to the bodily *functions*, like reproduction or digestion, of the organism.

You will find behavioral adaptations like migrating and nest defense explored in later sections. Of course, many behavioral and physical adaptations are very closely entwined! For instance, the shape of a shorebird's bill affects the way it uses it, or is it the other way around?! Also, if a shorebird chick's defense is camouflage (a physical adaptation), will it be more likely to behave in a way that conceals or draws attention to itself? We don't know all the answers yet, but science is all about discovery!



Teacher

This activity is adapted from The Shorebird Sister School Arctic Nesting Shorebirds Curriculum.

Description

By dressing a classmate as a shorebird, students will learn about physical adaptations that are unique to all birds and adaptations specific to shorebirds.



Objectives

Students will be able to:

1. Describe adaptations unique to birds
2. Describe adaptations unique to shorebirds
3. List threats to shorebirds and their habitat

Time Required

Teacher Prep: 1 day to find props and prepare flash cards

Activity: One 40 to 60-minute class period.

Subjects

Environmental Science

Skills

Observing, Communicating, Applying Information, Predicting, Evaluating, Team Work, Discussing, Interpreting and applying information

National Science Standards

- K-4: Life Science
Characteristics of organisms
- 5-8: Life Science
Structure and function of living systems
- K-8: Unifying Concepts and Processes
Evolution and equilibrium
Form and function

Build A Shorebird

Long Version

Materials

Color-coded flash cards (download PDF file "flashcards" from website)
Cardboard bill, or tweezers tied on a string necklace
Several drinking straws or cardboard toilet paper rolls
Camouflage-patterned hat, vest, or cloth
Cardboard or paper bottle of baby oil
Picture of comparison between "M & Ms" or "Gummy Worms"
2 large paper bird wings
down and contour feathers
Popcorn
Black paper oil splashes
Blue paper wetland
Chicken bone
6-pack rings or a net
Balloons
String (20 - 40 feet)

Clothespins
Down jacket or vest
Scissors
Spray bottle
Duct tape

Optional:
Electric fan
Rubber boots or waders

Preparation

1. After gathering materials, students or teacher need to construct one student-sized set of paper wings, which will be cut and modified during the activity; one blue paper wetland to stand on; one cardboard bill; one paper bottle of baby oil; and several black construction paper cut-outs of oil spills.
2. Create flashcards in three different colors. "General Bird Adaptation" cards can be yellow. They give the name of the adaptation on one side, and a description on the other. "Special Shorebird Adaptation" cards are blue. "Threat to Shorebird" cards are red. You can use the masters found in the flashcards download. There should be enough cards so that every student besides the bird volunteer has at least one. For large classes, duplicate cards are fine.

Procedure

1. Discuss and define **adaptation** (characteristic or behavior that helps an organism survive in its environment). Explain that the aim of this activity is to explore the world of shorebirds and examine adaptations by building a shorebird.
2. Ask for a volunteer. This person will be turned first into a bird, then into a shorebird, and finally into a Western Sandpiper. He/she will also be subjected to some threats a shorebird may face (the volunteer must have a strong constitution!).
3. Distribute all the flash cards to students to prompt their involvement in the activity.
4. Begin building a bird. Start with the yellow cards. See the chart on the following pages for adaptations. Use the clothes pins to attach most items to the student.
5. Download BASquiz.pdf from website. Have students take the "Build A Shorebird" quiz after the activity is over.



Activity **General Bird Adaptations: Yellow Flash Cards**

Adaptation	Description	Material Needed
<p>1. Down Feathers Ask students to imagine they are birds in flight. Ask how it feels to be soaring above the earth. Is it cold? Skin isn't enough to insulate you up there. You have had to adapt to temperature extremes. How? With feathers.</p> <p>2. Contour Feathers What sort of material is strong and flexible enough for the wings and tail to help you fly?</p>	<p>Feathers are a unique adaptation found only in birds. Two kinds of feathers are found on all birds:</p> <p>1. Down feathers - fluffy, under-feathers for insulation. These are the bird's underwear.</p> <p>2. Contour feathers - strong outer feathers for flight. These are also the bird's clothes and coloration.</p>	<p>Dress bird in down jacket and bird wings.</p> <p>Study comparison pictures of down and contour feathers.</p>
<p>3. Hollow bones Ask students to think about how much they weigh. Then ask how much they think a Bald Eagle weighs. It only weighs between 8 - 14 lbs and has a 7 - 8 ft wing span.</p>	<p>Hollow bones help a bird keep its weight low. Most of the bird's weight is in the breast and wings (where the flight muscles are). Our bones are not hollow, but instead are filled with marrow for red blood cell production. Birds have marrow only in their breast bone (sternum).</p>	<p>Attach drinking straw or cardboard paper roll to down jacket.</p> <p>Pass chicken bone around for the students to examine its weight and structure.</p>
<p>4. Air sacs Ask a volunteer to stand up and become a crow by flapping his / her wings 20 times in 10 seconds. Ask how much effort that was on his / her breathing. Harder than walking? Yes!</p>	<p>Air sacs enable a bird to take in enough oxygen to help transfer energy into a usable form for flight. Birds have lungs like humans, but they require more oxygen intake. Air sacs, rather like balloons, extend from the lungs and between, and into, hollow bones. During inhalation and exhalation air flows through the lungs and the air sacs to maximize the absorption of oxygen.</p>	<p>Attach balloons with clothespins: each student with a yellow card places one balloon on the bird.</p>

5. Our volunteer has been turned into a bird, and now this bird will become a shorebird. Explain that shorebirds are birds of open spaces which fly long distances (migrate) to spend their winter ("nonbreeding" season) on beaches, mudflats, and estuaries (the "shore").

Special Shorebird Adaptations: Blue Flash Cards

Adaptation	Description	Material Needed
<p>5. Long, pointed wings Ask students to think about the different shape of bird's wings. Compare the stubby wings of a penguin to the big, broad wings of a soaring eagle. Do you think that wing shape might be related to what the bird uses them for (lifestyle)?</p>	<p>The shorebird way of life includes flying long distances between the summer home where it breeds to shores where it spends the rest of the year just feeding and avoiding the cold weather of the higher latitudes ("North" in the Northern Hemisphere). This is called <i>migration</i>. In order to fly fast and far, having long, pointed wings is helpful.</p>	<p>Use the scissors to shape the tip of the volunteer's paper wings so that they look long and pointed.</p>
<p>6. Camouflage Plumage Ask students to think about how a small bird can protect itself from larger predators. Would small shorebirds have much luck <i>fighting</i> with hawks on the beach or with foxes on the tundra?</p>	<p><i>Cryptic coloration</i>, or <i>camouflage</i> helps these birds be less conspicuous. Because they spend much of their time on mudflats, beaches, or grassy tundra, their <i>plumage</i> is generally shades of brown, black, white, or russet which blends in with their habitat. (Larger shorebirds, like Avocets and Oystercatchers, can't hide as easily, and therefore don't generally bother with camouflage.)</p>	<p>Place the camouflage clothing on the bird.</p>
<p>7. Long Legs Ask students if they would need big legs to sit in a tree or fly. Do they need them to walk? How about running from the waves? Next ask students what adaptation humans use to walk and work in wet conditions.</p>	<p>Shorebirds seldom perch in trees, but rather walk or roost on the ground when they are not flying. Many shorebirds walk on shorelines or mud to find food. Having long legs helps them to wade through water or mud. (Actually, the length of the legs of a shorebird gives a clue to where it feeds.)</p>	<p>Place the blue material representing a wetland on the ground for the shorebird to walk on.</p> <p>Optional: Put the rubber boots/ waders on the bird.</p>

Special Shorebird Adaptations: Blue Flash Cards

Adaptation	Description	Material Needed
<p>8. Long Toes What are your toes for? Toes are for stability in walking.</p>	<p>Shorebirds do not spend much time swimming like seabirds do. Therefore, they don't need webbed feet, just long toes for stability and walking.</p>	<p>Using duct tape, attach three long drinking straws to each toe of the bird.</p>
<p>9. Bill Ask students what humans use to feed themselves (forks, straws, chopsticks, fingers, lips, teeth, etc.). Do you use different things to help you eat different foods?</p>	<p>Bills, or beaks, are used for picking up food, nest construction, and courtship, as well as preening and defense. Compare the bills of some shorebirds and explain the different feeding niches the birds fit into. For example: <i>Curlews probe deeply into the ground with their long, curved bills to reach buried invertebrates.</i> <i>Plovers and Surfbirds have short, stout bills to pick up prey they spot on the surface of sand or rocks.</i> <i>Sanderlings have tapering, tweezer-like bills to help them "stitch" the sand - a rapid, repeated probing to pull up worms and crustaceans right below the surface of the beach.</i></p>	<p>Attach a cardboard bill to the volunteer bird. Alternatively, tie tweezers on a string necklace around the neck of the bird to represent the shorebird's bill.</p> <p>Place "Gummy worms" in the mouth of the volunteer. These represent the segmented worms or the long, stretchy Nemertean worms that some sandpipers like to eat. May also feed to the bird M & Ms or other candy-coated treat, representing crunchy-coated crustaceans like the clams that Maya loves to eat.</p>
<p>10. Oil gland Pour oil (cooking or other oil that is different color than water) and water into a beaker and observe the separation. Does oil get wet? What does "get wet" mean? "Wet" means saturated with water. Ask students how they keep dry in the rain. Is raingear treated with any special coating? Yes!</p>	<p>The oil gland helps keep a shorebird's feathers waterproof. Seabirds have oil glands too. Feathers are kept clean and smooth by constant preening with oil from the oil gland found above the base of the tail. The oil is transferred to the plumage (feathers) with the bill or back of head.</p>	<p>Attach the baby oil bottle to the back of the down jacket. Ask the bird to try and preen!</p>

6. Shorebirds are adapted for a lot of walking and running, but they have to rest those feet sometime! Have the volunteer stand on one foot, just like a roosting shorebird.

7. Spray the volunteer lightly with the water spray bottle. Our bird is now a wetland-loving shorebird. Discuss the special adaptations of shorebirds as you use the blue flash cards to transform the volunteer.

8. Now discuss the importance of shorebird scat (guano). What goes in must come out! Sprinkle the popcorn around the volunteer shorebird. Guano from shorebirds, just as from other birds and bats, contributes to the chain of life. Nutrients from guano are returned to the wetlands that the shorebird uses. The (elemental and molecular) nutrients in guano are made available for manufacture of food by tiny plants and plankton. These "food makers" (photosynthesizers) become food in turn for small fish, crustaceans, and other animals. The food web is continued, and eventually it includes the shorebirds and even humans. Every organism and its activities plays a part in the chain of life on our planet.

9. Our volunteer shorebird will now become a Western Sandpiper in a huge flock. Western Sandpipers are very small, Arctic-nesting shorebirds with a rufous or chestnut color to their speckled backs. They are familiar to many people because of the huge flocks they form during migration. The teacher selects a few students to join the volunteer shorebird, perhaps holding hands, as members of a Western Sandpiper flock. Western Sandpipers could be chosen based on who is wearing a reddish shirt or the four smallest students, etc..

Alternatively, the volunteer shorebird could become a Dunlin, another flocking Arctic nesting shorebird with a striking black breast during breeding season. Students with black on the front of their shirts could join the flock as other Dunlin.

10. Now we will explore why life is not easy for a shorebird. In addition to the difficulties of migrating long distances over the ocean or in bad weather, shorebirds are also subject to human-caused dangers. Market-hunting for shorebirds killed them by the millions in the past. Shorebirds are no longer killed to be sold as food, but other threats have grown significantly. **Habitat loss** is the biggest threat to shorebird survival today. Discuss this threat and others listed below, while referring students to red flash cards.

Threats to Shorebirds: Red Flash Cards

Threat	Description	Material Needed
<p>11. Habitat Destruction Discuss the terms “estuary” and “wetlands.” Ask students about any places where they see shorebirds locally. What kind of place is it? Is there any threat of it being destroyed? If there is not a local concentration of shorebirds, another well-known local animal can be substituted for discussion.</p>	<p>“Habitat” is where something lives. In any year, most shorebirds depend on at least three habitats: breeding, nonbreeding, and migration sites. Most important migratory stopovers for Arctic-nesting shorebirds are estuaries or other types of wetlands. These fragile areas are also very attractive to humans as water sources or home sites. Water is drained away or its course altered, and bridges, houses, and docks are built. Animals and plants which provide food and shelter for the shorebirds are destroyed.</p>	<p>Restrict the habitat available to the shorebird flock by penning them in with desks, or winding string around the student birds to tie them together.</p> <p>Now say “all the shorebirds with habitat get Gummy Worms!”and pass out treats to those in the habitat. What about everyone else? Ask them “Can we make new habitat. How about fixing ruined habitat?” Ask for ideas.</p>

Threats to Shorebirds: Red Flash Cards

Threat	Description	Material Needed
<p>12. Oil Contamination</p>	<p>Oil spills can be very damaging to estuaries. Devastating oil spills, killing shorebirds and destroying habitat for many years, have occurred in many places in the world when oil tankers were disabled near shores.</p>	<p>Pin oil splashes on the volunteer shorebirds.</p>
<p>13. Disturbance Ask students how disturbing a shorebird or flock could harm it or its young.</p>	<p>When the seasons change, flocks must migrate very quickly, either to take advantage of the short Arctic summer to breed, or to avoid the coming cold of winter in the North. If flocks are disturbed and cannot refuel with food at their traditional stopover points, they may not have another chance to find enough food for the journey. Planes and people approaching can also disturb shorebirds on their nests, exposing eggs and chicks to predators and the weather.</p>	<p>Have the students make noise to simulate ATVs or motorcycles.</p> <p>Alternatively, turn the electric fan on and point it towards the flock to simulate a disturbance.</p>
<p>14. Trash on the beach or in other wetlands Ask students if they have ever seen trash littering their local wetlands. Where did it come from? What should have been done with it? Besides cutting down on the use of “disposable” trash and putting trash in its place, one should also cut up plastic rings or long strings before throwing it away. Never leave tangled fishline behind in the water or on the shore, and cut it into small pieces before disposing of it in the trash.</p>	<p>Plastic debris and other trash can be mistaken for food by birds, and can kill them. Shorebirds can also become entangled in discarded fishline and 6-pack rings. Abandoned cars, appliances, and other trash items can leak poisons into wetlands.</p> <p>What sort of message do people get when they see trash? Seeing trash on the beach can give children and visitors the impression that the land is not valued, or teach them that it's ok to discard more trash.</p>	<p>Place netting or plastic 6-pack rings somewhere on the sandpipers.</p>

11. For an evaluation of the activity, refer to the quiz posted on the web page.

down feathers

down feathers

These are the fluffy
under-feathers for
insulation (the bird's
underwear).

contour feathers

contour feathers

Strong outer feathers are used for flight. These are also the bird's clothes and coloration.

hollow bones

hollow bones

These help a bird keep
its weight low so it can
fly.

air sacs

air sacs

A lot of oxygen is needed to give birds energy to fly. Air sacs extend from the lungs, between and into hollow bones. They help maximize the absorption of oxygen.

long, pointed wings

long, pointed wings

To fly fast and far,
having long pointed
wings is helpful.

camouflage plumage

camouflage plumage

Camouflage, or cryptic coloration, helps birds to be less visible because they blend in with their background.

long toes

long toes

Shorebirds need long
toes for stability and for
walking on the mud.

long legs

long legs

Long legs help
shorebirds wade
through the mud and
water to find food.

Bill

Bill

Bills or beaks are used for picking up food, nest construction, courtship preening and defense.

oil gland

oil gland

The oil gland, found near the base of the tail, helps keep a shorebirds' feathers waterproof.

guano

guano

Shorebird scat, or guano, contributes to the chain of life. Nutrients from guano are returned to the wetlands and are used by tiny plants.

habitat destruction

habitat destruction

Changing or developing wetland habitats can destroy animals and plants which provide food and shelter for shorebirds.

oil contamination

oil contamination

Oil spills can kill
shorebirds and destroy
habitats for many years.

disturbance

disturbance

Planes, boats, and people
approaching can disturb
shorebirds while they are
feeding or on their nests.

trash

trash

Trash can be mistaken for food by birds and can kill them. Shorebirds can get caught in fishing line, 6-pack rings and old fish netting



This activity is adapted from The Shorebird Sister School Arctic Nesting Shorebirds Curriculum.

Description

By doing the student activity sheet, students will learn 3 physical adaptations specific to shorebirds.



Objectives

Students will be able to:

- Describe the 3 adaptations that shorebirds have to live in wetlands

Time Required

Preparation: 15 minutes to make copies, 1 hour or longer to find props which are optional

Activity: 20 to 30 minutes of one class period

Subjects

Environmental Science

Skills

Applying Information, Comparing, Evaluating, Team Work (if students work in groups), Interpreting and drawing conclusions (if students are given props and decide how they relate to shorebirds and they develop explanations for their choices on the student activity sheet.)

National Science Standards

K-4: Life Science

Characteristics of organisms
Unifying Concepts and Processes
Form and function

5-8: Life Science

Structure and function of living systems
Unifying Concepts and Processes
Form and function

Build A Shorebird

Short Version

Materials

Copies of the student activity sheet for each student.

Copies of the student activity answer sheet for each student.

Optional props for demonstration:

Down Jacket

Pictures of down or feathers

Drinking straw

Cardboard paper roll

Chicken bone

Balloons

Scissors and paper

Camouflage clothing

Rubber boots

Drinking straws

Tweezers

Gummy Worms and M&Ms

Bottle of baby oil

Preparation and Procedure

1. Print off the student activity sheet and answer sheet provided on the web. Make enough copies so that each student has an activity sheet.

2. Review the background information on general bird adaptations. If you like, show your students props such as down vest, picture of bird wing, straws, and balloons to help students envision the unique adaptations that all birds have. **Table 1** will explain how the bird uses its adaptations and give you ideas for props to help explain to your students. If you have an advanced group, you could even give each group one prop and ask them how it represents some aspect of bird characteristics. Their answers don't have to be correct but it can start lively conversation and debate among them so that they are eager for the correct answers. *(If you are short on time you can skip step #2 and go to step #3.)*

3. Then, referring to the background information on shorebird adaptations, introduce the unique adaptations that shorebirds have through interactive discussion with your class. You can refer to **Table 2** for explanations and prop ideas and use them similar to step #2.

4. Pass out a student activity sheet to each student. They can work independently or in groups to work through the answers on the work sheet. For advanced groups, have students not only choose which part fits on Maya but have them develop an explanation for their choice. You will see that the activity sheets only highlight some of the shorebird adaptations.

5. Pass out the shorebird activity answer sheets and review with the class. See the quiz on the web page for an evaluation of what they have learned.



Activity

General Bird Adaptations: Table 1

Adaptation	Description	Demonstration
<p>1. Down Feathers Ask students to imagine they are birds in flight. Ask how it feels to be soaring above the earth. Is it cold? Skin isn't enough to insulate you up there. You have had to adapt to temperature extremes. How? With feathers.</p> <p>2. Contour Feathers What sort of material is strong and flexible enough for the wings and tail to help you fly?</p>	<p>Feathers are a unique adaptation found only in birds. Two kinds of feathers are found on all birds:</p> <p>1. Down feathers - fluffy, under-feathers for insulation. These are the bird's underwear. 2. Contour feathers - strong outer feathers for flight. These are also the bird's clothes and coloration.</p>	<p>down jacket</p> <p>make a paper wing</p> <p>Study comparison pictures of down and contour feathers.</p>
<p>3. Hollow bones Ask students to think about how much they weigh. Then ask how much they think a Bald Eagle weighs. It only weighs between 8 - 14 lbs and has a 7 - 8 ft wing span.</p>	<p>Hollow bones help a bird keep its weight low. Most of the bird's weight is in the breast and wings (where the flight muscles are). Our bones are not hollow, but instead are filled with marrow for red blood cell production. Birds have marrow only in their breast bone (sternum).</p>	<p>drinking straw or cardboard paper roll</p> <p>Pass chicken bone around for the students to examine its weight and structure.</p>
<p>4. Air sacs Ask a volunteer to stand up and become a crow by flapping his / her wings 20 times in 10 seconds. Ask how much effort that was on his / her breathing. Harder than walking? Yes!</p>	<p>Air sacs enable a bird to take in enough oxygen to help transfer energy into a usable form for flight. Birds have lungs like humans, but they require more oxygen intake. Air sacs, rather like balloons, extend from the lungs and between, and into, hollow bones. During inhalation and exhalation air flows through the lungs and the air sacs to maximize the absorption of oxygen.</p>	<p>balloons</p>

Special Shorebird Adaptations: Table 2

Adaptation	Description	Demonstration
<p>5. Long, pointed wings Ask students to think about the different shape of bird's wings. Compare the stubby wings of a penguin to the big, broad wings of a soaring eagle. Do you think that wing shape might be related to what the bird uses them for (lifestyle)?</p>	<p>The shorebird way of life includes flying long distances between the summer home where it breeds to shores where it spends the rest of the year just feeding and avoiding the cold weather of the higher latitudes ("North" in the Northern Hemisphere). This is called <i>migration</i>. In order to fly fast and far, having long, pointed wings is helpful.</p>	<p>Use the scissors to shape the tip of the paper wings from above so that they look long and pointed.</p>
<p>6. Camouflage Plumage Ask students to think about how a small bird can protect itself from larger predators. Would small shorebirds have much luck <i>fighting</i> with hawks on the beach or with foxes on the tundra?</p>	<p><i>Cryptic coloration</i>, or <i>camouflage</i> helps these birds be less conspicuous. Because they spend much of their time on mudflats, beaches, or grassy tundra, their <i>plumage</i> is generally shades of brown, black, white, or russet which blends in with their habitat. (Larger shorebirds, like Avocets and Oystercatchers, can't hide as easily, and therefore don't generally bother with camouflage.)</p>	<p>Camouflage clothing</p>
<p>7. Long Legs Ask students if they would need big legs to sit in a tree or fly. Do they need them to walk? How about running from the waves? Next ask students what adaptation humans use to walk and work in wet conditions.</p>	<p>Shorebirds seldom perch in trees, but rather walk or roost on the ground when they are not flying. Many shorebirds walk on shorelines or mud to find food. Having long legs helps them to wade through water or mud. (Actually, the length of the legs of a shorebird gives a clue to where it feeds.)</p>	<p>blue material (water) rubber boots</p>

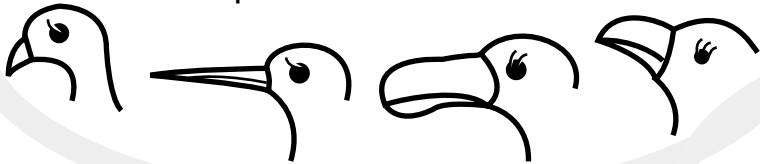
Special Shorebird Adaptations: Table 2 Continued

Adaptation	Description	Demonstration
<p>8. Long Toes What are your toes for? Toes are for stability in walking.</p>	<p>Shorebirds do not spend much time swimming like seabirds do. Therefore, they don't need webbed feet, just long toes for stability and walking.</p>	<p>drinking straws</p>
<p>9. Bill Ask students what humans use to feed themselves (forks, straws, chopsticks, fingers, lips, teeth, etc.). Do you use different things to help you eat different foods?</p>	<p>Bills, or beaks, are used for picking up food, nest construction, and courtship, as well as preening and defense. Compare the bills of some shorebirds and explain the different feeding niches the birds fit into. For example: <i>Curlews probe deeply into the ground with their long, curved bills to reach buried invertebrates.</i> <i>Plovers and Surfbirds have short, stout bills to pick up prey they spot on the surface of sand or rocks.</i> <i>Sanderlings have tapering, tweezer-like bills to help them "stitch" the sand - a rapid, repeated probing to pull up worms and crustaceans right below the surface of the beach.</i></p>	<p>Tweezers Gummy worms M & Ms or other candy-coated treat, representing crunchy-coated crustaceans like the clams that Maya loves to eat.</p>
<p>10. Oil gland Pour oil (cooking or other oil that is different color than water) and water into a beaker and observe the separation. Does oil get wet? What does "get wet" mean? "Wet" means saturated with water. Ask students how they keep dry in the rain. Is raingear treated with any special coating? Yes!</p>	<p>The oil gland helps keep a shorebird's feathers waterproof. Seabirds have oil glands too. Feathers are kept clean and smooth by constant preening with oil from the oil gland found above the base of the tail. The oil is transferred to the plumage (feathers) with the bill or back of head.</p>	<p>baby oil bottle</p>

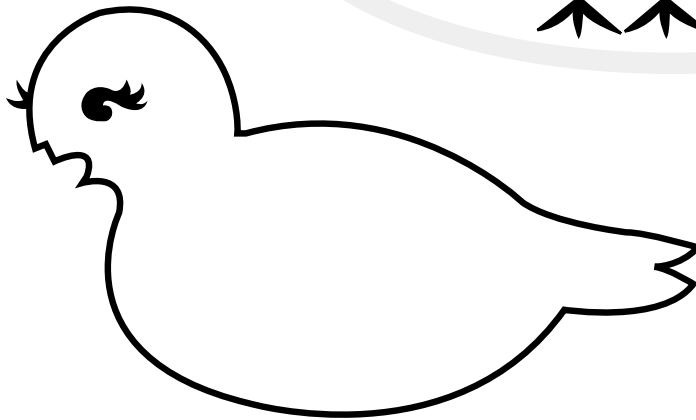
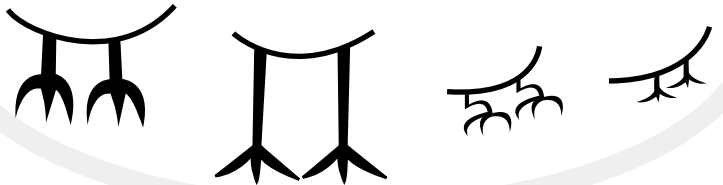
Add the beak, legs, feet and wings to

Build a Shorebird, Maya!

What **beak** would best help a shorebird probe in the mud for food?



Which **legs** would best suit a shorebird for its wetland habitat?



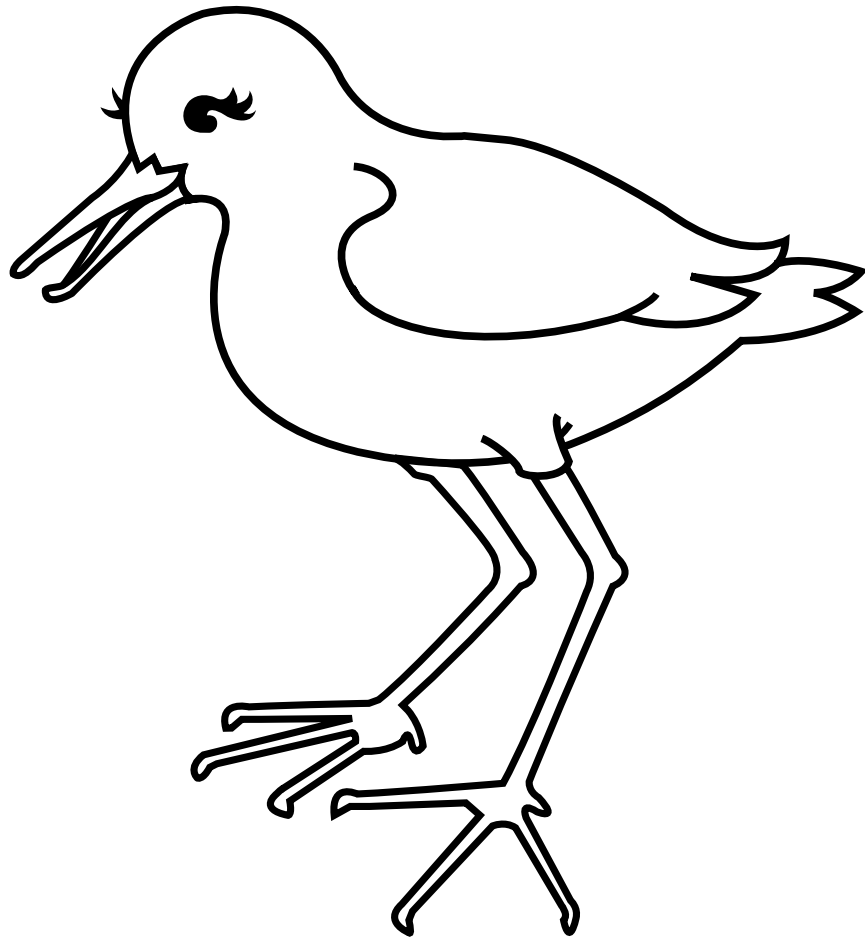
Which **feet** would best suit a shorebird for walking in its wetland habitat?



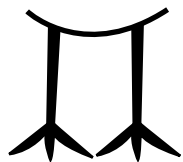
What type of **wings** help the shorebird fly long distance and escape quickly from predators?



Maya the Shorebird!



Correct bird parts





Student Quiz

A quiz on bird and shorebird adaptations.



What makes a bird a bird? Describe three unique adaptations of birds.

Describe three special adaptations of shorebirds.

Why are shorebirds important?

What is the most significant threat to shorebirds today?

Name two other human-related activities that can be harmful to shorebirds



Adapted from The Shorebird Sister School Arctic Nesting Shorebirds Curriculum.

Teacher Quiz Key

Summarize the key points of the activity with a quick quiz:

What makes a bird a bird? Describe three unique adaptations of birds.

- Feathers
- Hollow bones
- Air sacs

Describe three special adaptations of shorebirds.

- Camouflage plumage
- Long, pointed wings
- Legs for walking, wading, and running
- Bill for probing or picking

Why are shorebirds important?

- Add diversity to shore life
- Important part of food web, including prey for raptors and fertilization of wetlands


What is the most significant threat to shorebirds today?

- Habitat alteration or loss

Name two other human-related activities that can be harmful to shorebirds

- Oil contamination (oil spills)
- Contamination from other dumped chemicals
- Trash
- Scaring birds from their nests
- Scaring birds from their feeding and resting spots during migration (Market-hunting in the past)

Copper River International Migratory Bird Initiative presents
WINGING NORTHWARD
 A SHOREBIRD'S JOURNEY

En Español 
 Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Maya's Story

A story for your class

Experience the last 24 hours with Maya, the Western Sandpiper, before she migrates from Mexico to Alaska. [See her route on the [map](#)] Stay tuned to this space, because in January 2002, students will learn about Maya's amazing migratory journey. In March 2002, students will learn how we can help Maya and other shorebirds like her.



Get ready! We are about to embark on an adventure that will take us thousands of miles from Mexico all the way to Western Alaska with only brief stops along the way.

Here are the first ten chapters of Maya's Amazing Journey. Use the story and underlined words as you would any story you are presenting to your class.

- **For Teachers**
- **Chapter 1: Maya on a Mexican Shores**
- **Chapter 2: Maya Gets Ready**
- **Chapter 3: Maya's Unique Design**
- **Chapter 4: Shorebird's Special Gifts**
- **Chapter 5: The Fear of the Falcon**
- **Chapter 6: Maya Heads North**
- **Chapter 7: San Francisco Bay**
- **Chapter 8: Gray's Harbor, Washington**
- **Chapter 9: The Beautiful Copper River Delta**
- **Chapter 10: A Sudden Storm**
- **Glossary: Helpful Words Relating to Shorebirds & Wetlands**

Who is Maya?


TOP

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)


Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents
WINGING NORTHWARD
 A SHOREBIRD'S JOURNEY

En Español 
 Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
 - Copper River Delta, AK
 - Sinaloa, Mexico
 - Why Educate about Shorebirds
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Program Description

Get ready to take flight alongside migrating shorebirds for an exciting trip to the Copper River Delta in the Chugach National Forest near Cordova, Alaska. Millions of shorebirds return to the spectacular wetlands of the Copper River Delta to rest and refuel on their long journey to the breeding grounds in western and northern Alaska.



Shorebirds are truly ambassadors to our world. Migrating to Alaska from many places, such as Mexico, Central and South America, Japan, Hawaii, and the West Coast of the United States, some shorebirds fly as many as 10,000 miles one way. However, shorebird numbers are declining and scientists are concerned about their future.



(Click on the map to enlarge)

How can you bring the shorebird excitement into your classroom? "Winging Northward: A Shorebird's Journey" provides this information-rich web site and free electronic field trip that brings the birds to you! Your students will be fascinated by shorebird adaptations, their wetland habitat, and their migration flyways across international lines.

No matter where they live, students will learn how public and private lands, whether a neighborhood park or National Forest, provide wetland habitat and how students can help protect these habitats in the United States and around the globe.

The television broadcast originates live from Alaska, Mexico, and Virginia. The program will be broadcast live on May 8, 2002, from 1 to 2:30 PM Eastern Time. The show is designed for grades 4-8.

Live from
 Cordova,
 Alaska's
 Copper
 River Delta & from
 Sinaloa, Mexico



Broadcast Live by
 Satellite and Webcast

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)


Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents
WINGING NORTHWARD
 A SHOREBIRD'S JOURNEY

En Español 
 Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
 - Copper River Delta, AK
 - Sinaloa, Mexico
 - Why Educate about Shorebirds
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Copper River Delta in Cordova, Alaska

Where is the Copper River Delta?

The Copper River winds between the rugged Chugach Mountains and meets the Gulf of Alaska just east of the coastal community of Cordova. Along with the town's remote location, the prized Sockeye and King Salmon that return each year drive the town's economy and give Cordova a unique Alaskan flavor.



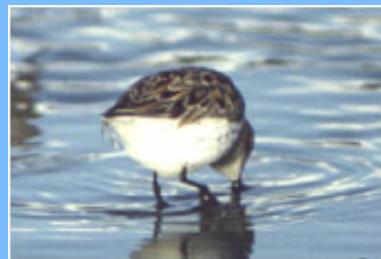
The Copper River runs 287 miles through Southcentral Alaska from the headwaters in the Alaska Range to the tidal mudflats bordering the Gulf of Alaska. Linked to five other glacial rivers and their wetlands on the perimeters of the Copper River, the Delta forms the largest continuous wetland on the North Pacific coast.

What kinds of wetlands are found within the Copper River Delta?

Tidal flats and sloughs, saltwater marshes, estuaries, freshwater ponds, and waterlogged muskeg (peat soils) of the Copper River Delta compose this vast interwoven wetland of 700,000 acres. The Copper River Delta provides abundant vegetation and endless mud flats for shorebirds and other animals to feast. Did you know that the Delta is considered one of the most productive wetlands in the world?

Why is the Copper River Delta so special to shorebirds like Maya?

Five to seven million shorebirds visit the Copper River Delta every spring! The Delta has 36 species of shorebirds, primarily Western Sandpipers and Dunlins, with the astonishing amount of energy they require to make the next leg of their journey during spring and fall migrations. South of the marshes of the Delta, the tidal mud flats present Maya and her friends with tasty, energy-rich morsels like pink Macoma clams and marine worms. Some shorebirds remain on the Delta to breed, but most head further north to other Alaskan wetlands. The Copper



River Delta is a major stopover site in the western hemisphere, making this wetland a vital link in the chain of wetlands.

How is the Copper River Delta formed?

In the summer months, "The Copper" carries a million metric tons of sediment each day and dumps it along its meandering journey to the sea. The Copper adds more sediment to the Pacific Ocean than any other source. Six glacial rivers contribute to the Copper River's enormous load, which has formed over thousands of years the 600-foot deep mud flats at its mouth. These mud flats offer shorebirds a feast of mollusks and other invertebrates living beneath the surface.

What other fish and wildlife use the Copper River Delta besides shorebirds?

The Cordova Ranger District of the U.S. Forest Service manages this magnificent wetland habitat primarily for fish and wildlife. The savored salmon runs of the Copper River depend on the cold, silty waters as a highway to the streams where they hatched and will lay the eggs of the next generation. In addition, brown bear, black bear, moose, wolves, coyotes, mountain goat, sheep, Stellar sea lions, trumpeter swans, and three species of amphibians make the Copper River Delta their home.



[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

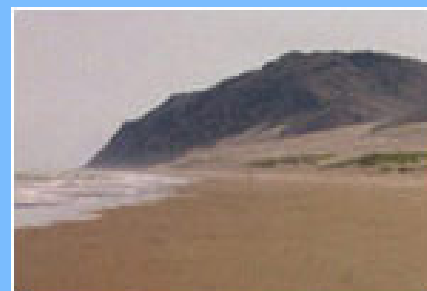
[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
 - Copper River Delta, AK
 - Sinaloa, Mexico
 - Why Educate about Shorebirds
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Sinaloa, Mexico

Where is Santa Maria Bay, Sinaloa?

Sinaloa, one of the 32 states of Mexico, is located on the northwest coast long the southern Gulf of California. To the north is the state of Sonora (which borders the U.S.) and to the south is Nayarit. On the east are the states of Durango and Chihuahua with the Sierra



Madre Mountains. Sinaloa is famous for its natural beauty with tropical beaches, rain forests, and great coastal wetlands with large lagoons and mangroves. If you've enjoyed fresh mangoes, tomatoes, cucumbers, or sweet peppers in the winter they may have come from Sinaloa!

What are the wetlands like at Santa Maria Bay?

Santa Maria Bay, recognized as one of the country's most important wetlands by the government of Mexico, is a large coastal lagoon in western Sinaloa made up of dense flooded mangrove forests and extensive open tidal mud flats. The Bay provides important wetland habitats for millions of birds, including ducks, pelicans, herons, gulls, terns, and, of course, shorebirds by the thousands. Also, there are approximately 60,000 people living around the Bay in 10 principal communities. Primary economic activities are agriculture, fishing, and shrimp farming.

Why is Santa Maria Bay so important to shorebirds?

At least 1/3 of all the Pacific flyway shorebirds spend their winter in the Bay area (almost one million shorebirds!) plus many thousands more use it as a stopover on their way to and from Panama and South America. There is no other wetland of this size or quality along the entire west coast of Mexico so shorebirds really depend on this site for their habitat.



What other wildlife use the Santa Maria Bay wetlands?

Almost one-half of the 1,018 bird species of Mexico can be found in Sinaloa, including beautiful exotic birds like the blue-footed booby, elegant terns, and brown pelicans. Offshore from the Bay are the famous waters where the Gray Whales spend the winter with their newborn "calves".



TOP

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)


Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents
WINGING NORTHWARD
 A SHOREBIRD'S JOURNEY

En Español 
 Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
 - Web Links
 - Photo Gallery
 - Shorebird Sister Schools
 - Teacher Evaluation
- ▶ Live, TV & Web cast

Teacher Resource Center

This section gives you knowledge at your fingertips: links, lesson plans, and more. These information sources add to your success in the classroom and expand your students' horizons and appreciation of the natural world.



Why educate about shorebirds?

Integration into Many Subjects!

The sheer magnitude of what shorebirds accomplish in their effort to survive is truly amazing and a great tie into numerous subjects. Calculating distances and mapping where these birds migrate also make great opportunities for bringing math and geography into the classroom in a relevant and fun way.

Hook for Wetland Conservation!

Shorebirds are the hook for wetland conservation. By learning about and protecting shorebirds, we are protecting an entire ecosystem and all the flora and fauna that depend on these important natural areas.

Found Throughout the Country!

Because shorebird migration is worldwide and through all 50 states many more people can actively participate in the program.

Schedule Field Trips! Shorebirds migrate in huge flocks and stop at relatively predictable times of the year and at the same places. This allows for planning of educational events, festivals, and field trips. This also allows for schools along the flyway to take part and report on the migration of shorebirds through their community.

Darn Cute and Fun to Watch!

Shorebird behavior and their variable features make them a wonderful observable species to teach and learn about.


TOP

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)


Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents
WINGING NORTHWARD
 A SHOREBIRD'S JOURNEY

En Español 
 Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
 - Why Educate about Shorebirds
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Goals and Objectives

This web site and the culminating live, interactive television broadcast is designed for grades 4-8. Students will learn that they can make a difference by understanding shorebird migration, wetland habitats, and what we can all do to protect these valuable natural resources.



- [Goals](#)
- [Objectives](#)

Goals

Shorebirds

Students will learn how shorebirds are adapted to live in wetland habitats and are an important part of the wetland environment.

Wetlands

Shorebirds depend on healthy, abundant chains of wetland habitats. Students will also learn why wetlands are important to humans and how humans protect and affect wetland habitats. Wetlands are found in many places including neighborhood parks, farms, National Forests, and wildlife refuges in the United States and around the world.

Migration

Students will learn that the success of a shorebird's journey depends on wetlands for wintering, migration stopovers, and nesting habitat.

The International Connection

Your class will see how they are a part of the international connection between shorebirds, migration, and wetland habitats. There are no borders to wetland and shorebird conservation. Even urban and suburban dwellers can help protect wetlands.

 TOP

Objectives

By the end of the broadcast students will be able to:

1. Describe how shorebirds are uniquely adapted to live in wetlands.
2. List the three habitat areas shorebirds need for a successful life cycle.
3. Explain why shorebirds depend on wetlands in these three habitat areas for a successful life cycle.
4. Demonstrate that students can help wetlands by developing a class project that shares their new knowledge with others or helps protect a local wetland.

This broadcast and activities on the Web cover the following subject areas:

- Life Science
- Environmental Science
- Earth Science
- Ecology
- Geography
- Language Arts
- Mathematics
- Government
- Economics
- Social Studies
- Art

Students will use the following skills by participating in the broadcast and activities on the Web:

- Comparing
- Evaluation
- Observing
- Predicting
- Gathering and organizing information
- Interpreting and applying information
- Drawing conclusions
- Creative writing
- Drawing
- Discussing
- Debating
- Reading
- Communicating
- Inferring
- Understanding cause and effect



[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)


Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents
WINGING NORTHWARD
 A SHOREBIRD'S JOURNEY

En Español 
 Chasquee aquí

Maya's Adventure::

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

For Teachers

Before reading the story ask your students:

- Does a parent have to travel a long way to get to work? Or does he or she work at home? Some parents travel far distances to get to work. Some parents work at home.



Some animals stay in the same habitats all year, and other animals travel long distances to find food and space to reproduce. Can you think of some examples of animals that move from place to place to do their "jobs"? Some birds, butterflies, fish, and caribou migrate, or move during the seasons. This is a story about a shorebird who has a winter home and a summer home.

- Read the story to your students or have them read it in reading groups.
- After reading the story ask and discuss with your students the following questions, or divide the class into groups for discussion. The questions are divided by chapter.

Maya on Mexican Shores

What kind of bird is Maya?

A Western Sandpiper, a type of shorebird

What is Maya nervous about?

Maya is nervous about migrating from Mexico to Alaska.

Why do you think Maya and other shorebirds make such long trips each year?

Shorebirds move during the year to take advantage of the abundant food and daylight of the arctic in the summer and leave to avoid cold, harsh winters. They enjoy warm, mild winters in Mexico.

Scientists are still figuring out how shorebirds find their way during migration. How do you think that shorebirds find their way to their destination?

Shorebirds may navigate by the stars, the sun, the coast,

and buildings. They use their senses, instinct, and landmarks to guide them.

Maya Gets Ready

How do you get ready for a trip?

Students may prepare for a trip by packing a bag of clothing and gathering snacks or games.

What is Maya getting ready for? How is she preparing?

Maya is getting ready to migrate, or move, from Mexico to Alaska for the summer. She is doubling her body weight by eating lots of litter critters, like clams, in the mud in Mexico.

Think of two examples where you move from place to place based on time or season.

Students may live in other cities or states in the summer, go to camps every summer, or visit relatives during the holidays.

Maya's Unique Design

How do Maya's long legs, beak, and oil gland help her live in wetlands?

Maya long legs allow her to wade in the water while she feeds. She sticks her bill into the mud to pick out the tiny animals. Her long, pointed wings help her fly fast and far.

Shorebirds' Special Gifts

Why would a shorebird pretend to have a broken wing to protect its nest?

Predators that are interested in eating the eggs may follow the parent instead.

The Fear of a Falcon

Maya and other shorebirds have to watch out for predators. What other predators can you think of besides the falcon in the story?

Shorebird predators include eagles, hawks, gulls, and foxes.

How do Maya and other Western Sandpipers hide and protect themselves from predators?

Their feathers change with the seasons so that they blend in with the mud in Mexico or the tundra in Alaska. When they fly with other shorebirds in groups, the movement scares predators away.




Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents
WINGING NORTHWARD
 A SHOREBIRD'S JOURNEY

En Español 
 Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Chapter 1: Maya on a Mexican Shores

Hi! Hola!

My name is Maya. I am a Western Sandpiper and just a little under one year old. I am basking in the warm Mexican sun and listening to the waves crash on the beach in the distance. I am on the edge of an estuary. While it is a beautiful day with a warm breeze at my back, I am nervously considering what migration means. What is migration? As far as I can tell, it is scary because it means a very long journey without many stops. My family flies this marathon two times a year with a few short stops along the way to rest and eat. That's like driving thousands of miles in a car with fewer than five rest stops! We travel north up the Pacific coast to our breeding grounds in Alaska. At the end of the summer in Alaska, we migrate south back to Mexico. "It's ... well... like endless summer!"



I was born in an Alaskan wetland and flew all the way down to Mexico at the end of last summer. But that was many months ago and I was so young then. I barely remember the trip. The amazing part about the journey is the fact that shorebird parents leave their fledgling babies ["yep, like me!"] behind to find their way south all by themselves! I can't believe I really did that! Somehow, the stars and some kind of internal compass guide us all the way to our final destination. The fact that we can do this all alone is an incredible mystery--even to scientists, who are still trying to figure it out. And then upon our arrival in Mexico, we reunite with our families.

Since I don't remember my first migration very well, I am told that when I arrived in Mexico, I was exhausted and so, so very happy to see everyone again. Jorge, my brother, and Abulito, my grandfather, showed me how to quickly regain my energy by eating nutrient-rich food and getting the rest I needed. Once I recovered, I soon met Oxy and Maria, who are now my two best friends. They are young Western Sandpipers, too, and they will soon join my family and me as we embark on my first migration north from Mexico. It can be confusing: we live in Mexico in the winter and in Alaska in the summer. Humans call my winter home in Mexico "wintering grounds."

Historically, I'm told, my family makes four stops along the Pacific Coast. [Click the map to enlarge and to find the wintering, staging, and breeding areas we will visit.]

Our journey will take us to the Alaskan tundra where I will find a mate and breed. Such a long journey makes me very nervous. We start off from here, Sinaloa, Mexico, and make our first stop in Southern California. After this stopover, called a "staging area", we stop in other wetlands along the West Coast like the Copper River Delta, my brother Jorge's favorite place in the world. Jorge tell us that there's a huge variety of clams and worms as well as many different kinds of shorebirds to meet here, in the Mexican State of Sinaloa, and make.



[▲](#) [▶](#)
TOP NEXT

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com


Filnet Site Developed by
Filnet Incorporated

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

En Español 
Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Chapter 2: Maya Gets Ready

In part I'm nervous because my body tells me to eat faster, eat faster!!! This is an unsettling feeling. I'm trying to eat as much as I possibly can. My body says, "stuff yourself!" before taking off for spring migration. Oxy and Maria are puzzled by many of the same things and share some of the same fears, although everyone agrees that I ask too many questions and have far too active an imagination for my own good!



From my vantage point on the shoreline, I can see my brother, Jorge, in shallow water, probing in the sand with his beak for aquatic insects and invertebrates. He, like all of us, is working on increasing his body weight by 50%! Can you imagine? If you weighed 75 pounds you would weigh 112.5 pounds in just a week! That is one gigantic difference. And he will soon lift off the ground in spite of this load! I am envious that he has migrated several times already and knows all the tricks of survival as well as the lay of the land.

I'm amazed that Jorge can continue to noodle around in the mud--non-stop--without stopping for a break. Even if Maria or Oxy tease him by screeching, he ignores them and continues to search for little marine worms. No doubt in the back of his mind he's thinking about how he can get them back later.

The sun is now setting and I admit that I am tired from gorging on so many little marine critters. But more than that, I am frustrated that my parents and Jorge cannot explain something so simple: why do we have to take such a huge journey? Their answers are always different. My mother says it's because we need to take advantage of the plentiful insect life in the Arctic during the summer months. No one disagrees with her, but my father says it's because we have some instinctual need or urge to head north, one that has existed for many, many generations. We will fly over 250 miles a day!

I get worried not so much because of migration, but because our survival depends on healthy wetlands and resting areas where we stop during the journey to the nesting grounds. My grandfather, Abuelito, tells us that

each time he flies north there are fewer wetland habitats and more houses and developments built by humans. How can we be sure that we will find the resting spots (also known as "stop over" sites) that we depend on for rest and food?

Abuelito, is nearby and I look over at him. He has been on the beach for years and years. After he completes a full migration, he gets a bit grizzled and his feathers get a bit frayed. But now, his feathers are clean and shiny and ready for our imminent departure. He tells us amazing stories about his adventures and "near misses" during migration. It is miraculous he's lived so long considering how many times he's been close to dying. He always reminds me that I should be very proud to be a "Western Sandpiper." I wonder what this label really means. I guess it's "Western" because we migrate along the west side of the continent while many other shorebird relatives fly through the middle of the continent, or along the East Coast--the two other primary migratory corridors, or flyways. There are over 79 species of shorebirds in South and North America and they all use one of the flyways.

Abuelito is old and we have a lot to learn from him. The one thing I hear over and over again is how neat he thinks it is that other shorebirds have different types of bills. This means that we don't compete for the same food on the shoreline. For instance, Jorge's best friend is a Long-billed Curlew. He is very elegant and probes deeply into the ground with his long curved bill to reach buried invertebrates. Curlews especially enjoy ghost shrimps that live in very deep burrows. And then Jorge's other friend couldn't be more different! He is a Snowy Plover and has a short, stout bill, which he uses to pick up prey from the surface of sand and rocks. Abuelito reminds me, too, that Western Sandpipers are special, because our beaks aren't either long or short. This means they are more versatile so that we can choose between a larger variety of food and habitats, too.

When I get scared about our coming migration, Oxy and Maria tell me not to be so nervous, because nature has blessed us with many advantages. I'm told that by the time I reach Alaska my feathers will change and I will have "breeding plumage." This means my head and shoulders will be rust and tan speckled, my belly will be a light color, and my breasts and sides will have dark, arrow-shaped spots. This is comforting. These colors will make me blend into the environment better so that it is more difficult for predators to spot me. I see it as my own "camouflage." They tell me that before the winter I will grow once again, new, gray feathers that blend well with the sand and mudflats.


BACK TOP NEXT

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK

P.O. Box 389 Manassas, VA 20108

Phone: 703.791.7328 E-mail: pwninfo@aol.com




A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

En Español 
Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Chapter 3: Maya's Unique Design

Jorge thinks I worry too much and tries to relax me by focusing on all the amazing qualities that we have. He gets very excited when he lists off to me the remarkable number of adaptations that help us survive.



He insists that we are unique and different than other birds--and much better (but how would he know?). One thing is for sure: an adaptation gives us an advantage, or an edge, for survival in our wetland habitats.

According to Jorge, my entire body--from the tip of my bill to my tiny toes--is uniquely designed so that I can survive more easily in a wetland habitat. This means that I am "physically adapted" I am told. Last night as we were feeding by the shadow of the moon, Jorge rambled on and on about how I need to begin to appreciate how lucky we are. These are the reasons he gave:

- Our bills are like surgical instruments that can probe the mud for tiny animals and work just beneath the surface. (And Papa reminds us that our bills are also important for building nests and courtship as well.)
- My long, pointed wings allow me to fly long distances at a fast speed during migration. In fact, some of my shorebird friends can fly 50 miles per hour. If I had short, stubby wings, I wouldn't be able to fly great distances, or I'd have to migrate slower and stop more often, which would slow me down.
- I have hollow bones that keep me "light as a feather." They help make flying easier.
- I have large air sacks that supply me with lots of oxygen to nourish my flight muscles. I fly hours and hours at a time.
- Located at the base of my tail I have an oil gland. Even though I live in and around water, I like to stay dry. Oil from my gland keeps my feathers waterproof--it's like an instant raincoat that goes with me everywhere I go. All I do is preen my feathers with the oil using my bill or the back of my head. The oil also keeps my feathers clean.
- My long legs allow me to wade in water or mud while my long toes give me stability when walking, kind of like wearing the right types of shoe. I don't swim so I don't need webbed feet.

Certainly this means that our chances of survival are greater--and I feel much better. I thank Jorge for reminding me of these advantages. Oxy interrupts me by raising her beak from the sand and screeching from the mudflat, "You can't argue with that. Now, that's enough talking--you'd better get eating." She gets easily annoyed with Jorge for being a know-it-all, but the truth is that she is right. Almost every minute must be used to build our fat reserves--which to humans is like extra gas for a car. The food we eat is the energy that allows us to fly for long distances without stopping. So last night was a long night of stuffing our faces with as many little pink clams as we could get our beaks on. Thank goodness we have long, pointed beaks to help with this job. Well, I'm going off to use my bill right now!


BACK TOP NEXT

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)


Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com

 Site Developed by
Filnet Incorporated

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents
WINGING NORTHWARD
 A SHOREBIRD'S JOURNEY

En Español 
 Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Chapter 4: Shorebirds Special Gifts

Earlier this afternoon I watched Maria fly over to Jorge. I could hear her chirping to him quietly. She wants to be sure he understands that not all adaptations are physical. I heard her suggest that, in fact, shorebirds also possess behavioral adaptations. She explained, for example, that these adaptations include migrating and defense mechanisms (such as dragging a wing to distract a predator from a nest of eggs). It's incredible what she has learned in less than a year. She gives Jorge another example of a behavioral adaptation. For instance, when we migrate, we fly at high altitudes to take advantage of the stronger more prevailing winds than can be found at lower altitudes (and the air is not so hot!). I could see the expression on Jorge's face. He was feeling a little embarrassed that he had overlooked this point. He responded with a quick retort: "Well, we might as well fly incredibly high since we shorebirds can't set down in the ocean to rest--because as you know, we can't swim!--at least for very long."



◀ TOP ▶
 BACK TOP NEXT

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
 P.O. Box 389 Manassas, VA 20108
 Phone: 703.791.7328 E-mail: pwninfo@aol.com

 Site Developed by
 Filnet Incorporated

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

En Español 
Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Chapter 5: Fear of the Falcon

Suddenly I hear my mother cry with a high-pitched cheet, "Falcons are coming--take flight!" Her short song consists of a few notes rising in pitch and then fades off with the breeze. What she "cheets" to us may sound like a strange suggestion, but the best defense for a shorebird against a raptor is to become airborne. Once in the air, we can get up to an evasive flight speed, maintain a tight flock formation and thus outmaneuver that menacing beast.



I can see through the grasses at my back that they aren't threatening. I "cheet" back to my mother so that she doesn't worry about me and knows that I am ok. I scan the shoreline and see Oxy and Maria in the distance. They look safe, too.

I look back again at my mother and think about how beautiful she is. Now that the danger of the falcon is gone, she is preening her feathers. She has arrow shaped spots on her breast and sides--and has other common Western Sandpiper features like a belly that is a light buff color. She looks identical to other shorebirds, but she is my mother and very special to me. I'm told that when we reach the breeding grounds in Alaska her coloring will change so that she has a rust- and tan-speckled head and shoulders. In other words, we have two sets of clothing: the breeding plumage and the non-breeding plumage, which are like two different dresses to humans. In each situation, a change in the way we look ensures that we blend into the background. That way, we can hide from predators.

Now the sun has set into the ocean and the breeze has died down completely. This is the time of day when I think about the future and make myself more nervous than usual. But I have a good reason to be. Tomorrow we start off on our very long journey north. Jorge, Oxy, Maria, Abuelito, and my parents have gone to great lengths to help me prepare. We will be together for the whole journey, which makes me happy.

I doubt I will be able to sleep tonight. I see Abuelito just six feet away, and he already has one leg tucked into his chest for at least part of the night. I want to ask my mother one last question, but she is already asleep. She did a good job

over the past two weeks insisting that I eat and eat and save my energy for the long flight ahead of me. I am as ready as I can be. I have doubled my body weight in just a few weeks; I have preened and re-preened my feathers so that they are clean and prepared for the upcoming journey. I have asked all the questions I can think of and can picture many wetlands from Abuelito's stories, which we will soon see.

Right as I'm about to fall asleep, Jorge swooshes right above my head and cheeps, "Get a good night's sleep, because tomorrow you start one long, wild, and crazy ride!"

[←](#) [↑](#) [→](#)
BACK TOP NEXT

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com

Filnet Site Developed by
Filnet Incorporated

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Chapter 6: Maya Heads North

Late March in Sinaloa, Mexico

The sun rises this morning and I watch it inch up over the horizon. Today, I can't stop thinking about the huge journey ahead of me. I am about to begin a 7,000-mile migration! That is hard to imagine.

We'll fly about 250 miles a day, depending on the weather and other unexpected events. How funny to think that this journey is routine for Abuelito, and the others who have done it before.



As I think of the trip, Jorge lands on the mud next to me and feeds. Most of the time he acts silly or mischievous and flies in funny ways to catch my attention. Today however is different. He knows that I am anxious about leaving and wants to help me feel better. He calls out to me, repeating, "remember... persistence and accuracy, persistence and accuracy." If I focus on these two things I just might make it to the Arctic!

Above us, many kinds of birds fly over in a beautiful sweeping motion. They are heading north. Suddenly our group takes flight and joins the patterns in the sky. I too am swept into the scene and I spot Maria and Oxy off to the west. I know that there will be many days, and even weeks, when we won't see each other. But, maybe, just maybe, we'll land next to each other after our 2,000-mile trip.

Here we go! What in the world makes us take this long journey? How is it that our breeding and wintering grounds are so far apart? It is hard for anyone to answer this question. All we know is that we seek "eternal spring" - warm sun and lots of food resources. During migration, we stop at wetlands along our route to rest and eat. These staging areas, or migratory stopover sites, are nutrient-rich wetlands that give us space to rest and rebuild our food reserves for the next part of the trip. We basically leapfrog -

"hopping" from wetland to wetland all the way from the tropics to the Arctic.

Gusts of wind push me from behind as I think about all of this. It is a "rush" to be carried by the winds at two or even three times my normal flight speed. We spend many hours searching for the best pockets of air to fly in. At 6,000 feet it isn't always easy to see land when many clouds block my view. Abuelito taught me to look for 'visual aids'. A "visual aid" is something that helps me navigate. I look for landmarks like coastlines, rivers, and mountain ranges or even the moon and sun and stars. Some believe that an "internal" compass in my head helps me find my way by following the Earth's magnetic field. Visual aids make our survival possible. If we fly or are blown off course by just one degree, we could miss our destinations and die along the way. The fact that many of us complete our journey shows the incredible accuracy of our navigational aids.



As I fly, I think back to Abuelito and his descriptions of what California looked like from the air. Now, what he described is opening up in front of my very own eyes. It is amazing to peer down and see the coastline and all the human settlements. There are many parts of Southern California where the air has a yellow or brown haze to it. There must be many creatures that live and breathe below this pollution.

◀ ▲ ▶
BACK TOP NEXT

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Chapter 7: San Francisco Bay

First Migration Stop-Over Many Days Later

Excitement surges through the flock as we approach San Francisco Bay. I'm exhausted from hours of non-stop flight, but I feel a tiny burst of energy just before landing. I keep repeating Jorge's last words "persistence and accuracy." I am so tired I can only follow the flock. Each wing beat is painful and is a huge effort. I don't know if I can make it.



San Francisco Bay should offer a number of good places to stop and refuel. There are tidal marshes, mudflats, salt ponds, seasonal, brackish or freshwater wetlands, tide pools, islands, rivers, creeks, as well as bay shoreline. But about 85% of San Francisco Bay's shoreline and tidal wetlands have been altered since the 1950's. This gives us fewer and fewer places to land and rest. Historically, many shorebirds have used the wetlands south of the San Mateo Bridge (South Bay). But this is also where humans built big buildings and where we want to rest and eat. How can we both use the wetlands?

Our flock swooshes down toward this marsh. Huge new condominiums greet us and we panic as we lose energy looking for a new place to feed and rest. There is no choice but to stop. We are too tired to go any further and we have no fat reserves left. We land in a marsh that borders the development and hope that there are no dogs or water pollution.

For three days we gorge ourselves non-stop on crustaceans and mollusks. All I care about is eating and eating and eating. I am not aware of much else around me.

On our fourth day at this marsh, I learn that the decision to stop here saved our lives. If we had tried to find a different wetland not too far away, we would have died. A local bird

told us the sad news. Chemicals from a smoke stack were caught in clouds; they poisoned the rainwater and then poisoned marine life in that wetland.

Shorebirds like us depend on healthy wetlands for survival. When we hear about situations like this it seems like a miracle that we survive our migrations. This has been an exhausting several weeks. But there is still something that pushes me on - something beyond my ability to understand. All I know is that I must move on. My friends and my flock fly north.

 [BACK](#) [TOP](#) [NEXT](#)

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Chapter 8: Gray's Harbor, Washington

Several Days Later

I fly over southern Washington State and think about my family and friends. Even though we are all flying north, we are spread over a wide band along the Pacific Coast. Migration routes are not distinct, direct flyways, but area wide, broad routes. These 'highways' in the air lead us to a place where we get funneled together in a "staging area." Once we arrive at a staging area, we cluster in large numbers. Because we group together in a fairly small area, we are very vulnerable. If something bad happens - like nasty weather, or an oil spill - many of us will die.



These "staging areas" are important because they are very few and very far between. There are not many places along the coast that are good places to stop and rest. There are so many of us flying north and it is only in these special wetland "staging areas" that our huge flocks can rest and feed. Scientists don't know why, but we use the same stopover sites year after year. Due to our adaptations, we are instinctually locked into our staging areas.

Favorable winds push me north. I wonder where Jorge is and if he is being helped by the same winds? As my energy begins to wind down, I spot the coastline of what I think is Gray's Harbor. I see healthy estuaries including open water areas (subtidal) and mudflats with rocky shores (intertidal). Here humans have made some changes to the landscape but there is also open marshland. The flock swoops down to join a busily feeding group. I am relieved to land, but I am SOOOO hungry. Rest can wait. I must eat.

How many weeks has it been since we left Mexico? I spot Abuelito! I am so excited! I try to take off before my wings are ready for flight. I chirp and chirp in glee as I approach him from the west. He looks weathered and drained but is

focusing on eating as many mollusks as he can. Neither of us has energy to do more than push our beaks into the sand. It is so nice to be in the safe presence of someone familiar and wise. I feel like I can relax a little bit. We are lucky because it is low tide. The mud flats are not covered by water and it is easy to find worms.

After many hours of feasting, Abuelito raises his beak out of the mud and wants to know how my journey has been. I tell him that I almost died at San Francisco Bay but that I feel a bit more confident now. Abuelito says that my feathers are starting to change. My head and shoulders are speckled with rust and tan. "Another miraculous advantage that nature provides us," he laughs. We are very fortunate to have "camouflage." We blend into the environment better and predators like hawks can't see us as easily.

Abuelito points out other shorebird friends who use a similar "short-hop" strategy as they migrate to the Arctic. Across the mudflats are flocks of dowitchers, yellowlegs, dunlins, and semipalmated sandpipers.

Several days of gorging with Abuelito has me ready for the next leg of the trip. When the flock lifts, we join the group. Once again, we are airborne and on our own.

 [BACK](#) [TOP](#) [NEXT](#)

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com

 Site Developed by
Filnet Incorporated

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Chapter 9: The Beautiful Copper River Delta

The air is crisp and inviting. The sun feels stronger. I fly hour after hour, thinking about the next stop-over. Many shorebirds like Copper River Delta best of all because there are expanses of beautiful marshes - the Delta is the largest intact wetland on the North Pacific coast!



The best thing about the Delta is the amount of habitat it provides. Over a million birds can use the Delta in a single day. Over 20 million birds use the Delta during spring migration. All my western sandpiper friends will stop at the Delta. Scientists have found that the entire population of western sandpipers passes through this staging area within a week. The Delta is one of most important and heavily used staging areas in the world for western sandpipers!

The Copper River Delta region is a wonderful resource for us. It's wonderful to not worry about human disturbances, like skyscrapers and shopping malls. Here, on the Delta, we just need to worry about falcons and spring storms. Here there are bald eagles, moose, swans, and beavers. It's a very different world from our flight through California. Here we feed on tasty insects, tiny clams (mollusks), worms and crustaceans buried in the mud.

Like all Western Sandpipers, we feel incredibly lucky when we finally reach our final destination at the end of migration. It is wonderful to have some confidence now and feel surer of myself. We are almost there!

As I go over in my mind what will soon happen at our breeding grounds in the Arctic, Maria and Oxy suddenly appear! We are so happy to see each other again. It turns out that they had winds that helped them arrive 36 hours before me. They had a chance to rebuild their energy reserves and could spend the energy to try to find me!

Maria tells Oxy and me all the details of what we should expect when we reach the Arctic. We will each find a nesting site and will defend it against other birds. This is called territoriality and it ensures that my mate has a nesting site when I arrive - which is the first step in starting a family. My mate will show flight displays that may include wing fluttering, tail cocking, or nest scraping. Oxy and I giggle at the thought! These are more examples of behavioral adaptations. The females select the males. Once this happens we will breed and take turns incubating the eggs. After the chicks hatch, both my mate and I will help care for our young until they are almost ready to fly. Taking turns incubating and caring for them are behavioral adaptations of the western sandpiper to ensure the survival of the species.

With that brief lesson finished, the sun is setting and we continue to eat and eat and eat.

 [BACK](#) [TOP](#) [NEXT](#)

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com

 Site Developed by
Filnet Incorporated

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Chapter 10: A Sudden Storm

Today we are supposed to lift off to our final destination, but we can't! The soft snowflakes keep falling and falling. The only thing left to do is eating, and keep eating! So far, two feet of snow have built up in places. It's actually quite beautiful. Finally the snow stops in the late afternoon. A good strong wind arrives from the east. I lift off with the flock and head toward the breeding grounds where I am going to raise chicks of my own. I think about the cycles in nature and how miraculous they are. Off we go... I hope I find Jorge up in the breeding grounds. I have a lot of news to share with him!



Maya begins her journey from Mexico to the Alaska beginning January 1, 2002. Return to the web site then to follow her in her amazing migration north!!!

◀ ▶
BACK TOP

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com




A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

En Español 
Chasquee aquí

Maya's Adventure::

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
 - For Teachers
 - Chapter 1
 - Chapter 2
 - Chapter 3
 - Chapter 4
 - Chapter 5
 - Chapter 6
 - Chapter 7
 - Chapter 8
 - Chapter 9
 - Chapter 10
 - Glossary
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Glossary: Helpful Words Relating to Shorebirds & Wetlands

Adaptation -- a characteristic or behavior that helps an organism survive in its environment. Long pointed wings and long bills are important shorebird adaptations.

Biodiversity -- the variety of life. Biodiversity can be considered at many levels such as the gene, species, population, community, and habitat levels.

Breeding ground -- the place where a bird lays its eggs and raises its young.

Breeding range -- the geographical area in which a bird lays its eggs and raises its young.

Cheet -- the sound a shorebird makes when calling.

Ecosystem -- a network of plants and animals that live together and depend on each other for survival.

Endangered -- a species or ecosystem reduced in size so that it is vulnerable to extinction.

Estuary -- a partly enclosed bay where salty ocean water is mixed with freshwater.

Field marks -- special characteristics that help identify one bird from another.

Flyway -- route used by migratory birds between breeding (summer) and non-breeding (winter) grounds.

Food chain -- a series of living things in which each member feeds on the one before and is in time eaten by the one after.

Food web -- a complex network of many food chains.

Habitat -- an environment of a particular kind, such as the tundra, pampas, or estuary.

Invertebrates -- animals without backbones.

Migration -- seasonal movements of a species, usually from non-breeding areas and back again, often with intermediate stops for feeding and resting.

Morphology -- what an organism physically looks like.

Molt -- the periodical shedding and replacing of feathers.

Mudflat -- a major foraging zone for shorebirds along the edges of the bay. Shorebirds use their bills to probe in the mud for clams, worms, and other animals.

Neotropical -- an adjective used to describe birds that winter in Central and South America.

Neotropical bird -- a bird that migrates seasonally between North America and the migratory tropics of Central and South America.

Nonbreeding ground -- the region where a bird goes to feed, rest, molt (replace feathers), and prepare for the next breeding season.

Non-breeding range -- the geographical area in which a bird lives during the part of the year when it is not breeding or migrating.

Ornithologist -- a scientist who studies birds.

Plumage -- a bird's coat of feathers.

Population -- the number of animals of the same type, usually the same species, that live in a given area.

Potholes -- small, waterlogged depressions.

Predator -- an animal that lives by killing and consuming other animals.

Preen -- to clean and repair feathers. During resting and feeding breaks birds use staging areas to preen their feathers which should be in perfect condition to function efficiently during flight.

Prevailing -- to be frequent; predominant.

Range -- the region throughout which an organism occurs.

Raptor -- a bird of prey.

Shorebirds -- birds that typically have long legs for wading in the mud and long pointed wings for migration. They include sandpipers, plovers, oystercatchers, snipes, and stilts, among others.

Staging area -- an important area for shorebirds along their migration path. These areas provide food and a place to rest and condition (preen) their feathers.

Stopover -- a place to briefly stop to rest and eat while undertaking a journey.

Tundra -- a treeless plain of the arctic and subarctic regions.

Watershed -- an area where water from precipitation (snow, rain, etc.) drains into a particular body of water (stream, pond, river, bay, etc.)

Wetland -- low land covered with water at least part of the year. Examples include marshes, swamps, potholes, bogs, mud flats, river deltas, and floodplains.

Wintering grounds (also known as "non-breeding ground)--a region where shorebirds go to feed, rest, molt and prepare for the next breeding season.



[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com




A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

En Español 
Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
 - Morphology
 - Behavior
 - Migration
 - Feeding
 - Identification
 - Photo Gallery
 - Importance
 - Habitats
 - Gee Whiz Facts
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

What are Shorebirds?**The Shore**

Land and water -- they are the two most basic geographic features of the earth's surface. What happens along the narrow lines where these two great bodies meet? This fragile strip contains some of the greatest diversity (variety of living organisms) on our planet. It is enriched by life-sustaining water, yet must also endure some very powerful natural forces. It is called the shore, and it is land that:



- faces regular and irregular periods of drying out, dampness, or flooding;
- contains a tremendously fluctuating range of salinity; and
- is eroded by wind and water.

Shorebirds

Organisms that live in this precious environment have adapted to thrive in these conditions. Shorebirds are a group of special birds that are adapted to live near these coasts, or shores. Because of their lifestyle, particularly during their spectacular migrations, of walking through water and mud to find food, Europeans call these long legged birds "waders."



Each spring and fall, enormous flocks of shorebirds swarm along the coasts in great migrations. It is a thrilling sight when the shore comes alive with feeding birds, or a flock swiftly wheels and turns in flight. These flocks pulse to and fro with the cycles of the tides, and, on a broader scale, with the cycles of the seasons. Shorebirds eat, breed, travel, and rest as a part of these cycles of nature.

Shorebirds are more accurately described as birds of open land, including, but not limited to, the shore. Shorebirds include the sandpipers, plovers, oystercatchers, snipes, and stilts, among others.

Besides their regular migrations, their lifestyle includes other highly developed rituals of behavior, including elaborate courtship displays. Most of us have never had the pleasure of witnessing these displays, because many migratory shorebirds nest in remote Arctic tundra or open grassland.



There are about 214 species of shorebirds in the world. Almost 80 of these regularly occur in North America. Seventy-five species breed in the Holarctic region. This means they summer in either the North American Arctic (Nearctic) or Northern Europe and Russia (Palearctic). Many species of these great migrators breed in both of these areas. See if you can tell why this might be so by looking at a globe.

[Photo Gallery](#)

[TOP](#) [NEXT](#)

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com

Filnet Site Developed by
Filnet Incorporated

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

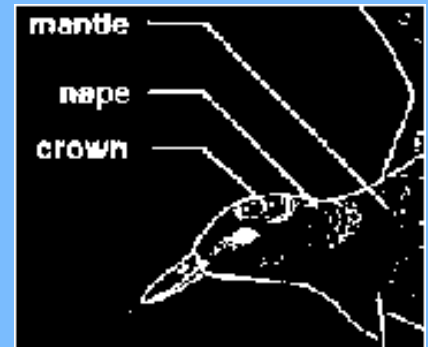
- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
 - Morphology
 - Behavior
 - Migration
 - Feeding
 - Identification
 - Photo Gallery
 - Importance
 - Habitats
 - Gee Whiz Facts
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

What are Shorebirds?**Morphology**

Morphology refers to what an organism physically looks like. Shape, color, and size are all examples of morphology. In his book *Shorebirds of the Pacific Northwest*, Dennis Paulson states, "Each shorebird is a beautifully functioning organism, the parts finely tuned by natural selection to work together to adapt the bird to its environment."



One of the most striking physical traits of shorebirds is their stately posture. They stand up very straight on long legs. Shorebirds that wade to find food have the longest legs. They also have long pointed bills with which they probe in the mud or water for small animals to eat. Shorebirds have long pointed wings and are strong, fast fliers. There is variation among the species, but in general their size is relatively small.



The coloration of shorebirds might at first be thought of as rather ordinary. One realizes the value of their brown, banded plumage the first time one sees a beach with 10,000 legs! Their coloration is an adaptation of camouflage. Shorebirds are generally speckled brown, rusty, and white on the back. Some have white or black patches on the head, breast, or belly. They blend in well with the sandy, muddy, or grassy areas where they feed and nest. Their camouflage helps protect them from predators such as eagles, hawks, gulls, and foxes.

Shorebirds tend to be darker colored on the back than on the belly. Have you ever seen a flying flock of brown sandpipers turn together in the air and suddenly appear white as their undersides are flashed at you? Perhaps this bicoloration is an adaptation similar to that of many fish. When observed from below, against the light, the bird is inconspicuously light-colored to a potential predator. When a flying hawk observes shorebirds from above, their darker backs blend in with the beach or mudflat. As you learn more



about shorebirds and their environment, see if you think this theory makes sense.

[←](#) [▲](#) [▶](#)
BACK TOP NEXT

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
 - Morphology
 - Behavior
 - Migration
 - Feeding
 - Identification
 - Photo Gallery
 - Importance
 - Habitats
 - Gee Whiz Facts
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

What are Shorebirds?

Behavior

One of the most notable and beautiful characteristics of shorebirds is a particular behavioral adaptation - scattered feeders lift off and swiftly consolidate into a graceful flock at the approach of a predator. Each individual's chance of avoiding being eaten is then increased. Some shorebird species are generally solitary, but most will readily join a flock in response to a disturbance. Mixed-species flocks are common. Mixed flocks also make birdwatching more fun for the beginner, who can use contrasts of size, color, or behavior to spot different species.



During the breeding season, shorebird pairs defend territories. In the following lessons, we will learn more about how and why they do that. Individuals of some species also defend mobile feeding "territories" around their moving bodies as they forage during the winter.



Another distinctive behavioral adaptation of shorebirds is their one-legged posture while roosting. Keeping one leg and the bill tucked under the body feathers conserves heat, an important consideration in the often chilly open areas of their habitat.

◀ ▲ ▶
BACK TOP NEXT

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

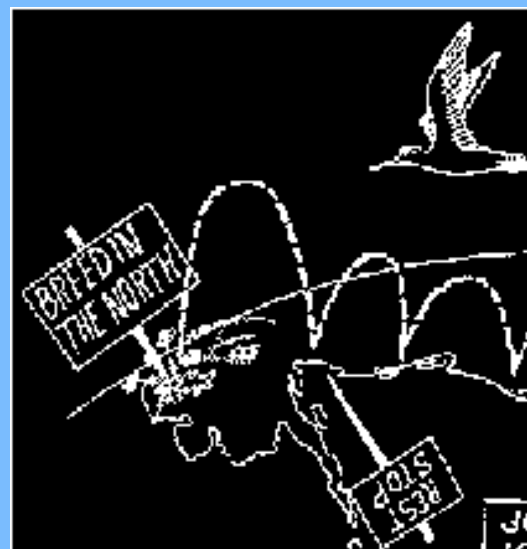
[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
 - Morphology
 - Behavior
 - Migration
 - Feeding
 - Identification
 - Photo Gallery
 - Importance
 - Habitats
 - Gee Whiz Facts
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

What are Shorebirds?

Migration

The tremendous importance of the strategy of migration to shorebirds cannot be overstated. Most shorebirds migrate long distances between their summer and winter homes. They are dependent upon at least three distinct habitats: their breeding habitat, non breeding habitat, and stopover sites along the migration routes. They are physically designed for long distance flight, as you will learn in the activities to follow.



All Arctic-nesting shorebirds migrate. The Arctic refers to that region of our globe that is in the far north, generally north of the imaginary latitude line known as the Arctic Circle. Some shorebirds that breed in northern Alaska spend the winter as far away as southern Chile. Some plovers, curlews, and tattlers fly non-stop from Hawaii and other Pacific islands to Alaska, a distance of over 3,500 miles in two or three days. Many species of shorebirds form large flocks for the long migrations between North America and South America. ([Map of shorebird migration.](#))

◀ BACK TOP ▶ NEXT ▶

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

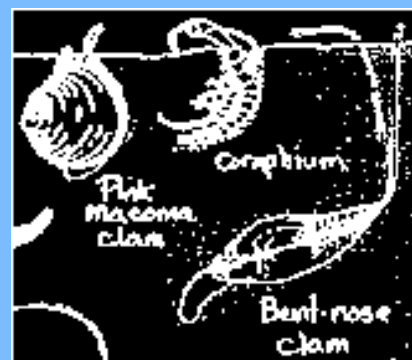
[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
 - Morphology
 - Behavior
 - Migration
 - Feeding
 - Identification
 - Photo Gallery
 - Importance
 - Habitats
 - Gee Whiz Facts
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

What are Shorebirds?

Feeding and Habitat

Shorebirds depend upon wetlands for food. Wetlands include marshes, river deltas, mud flats, tundra, and intertidal areas. While wintering and migrating, shorebirds feed upon tiny clams, snails, sand fleas, and worms in the mud and sand near the water's edge. Bill size and shape, like coloration, is an adaptation to the shorebird's environment. Shorebirds with short bills probe for animals that live very near the surface. Those with longer bills can reach animals buried deeper in the mud. Millions of shorebirds breed and raise their chicks each summer in the Arctic. During this short breeding season in the northern tundra, they feed on insects, grubs, and worms that they capture in the vegetation.



When humans fill wetlands with gravel to construct parking lots and buildings, shorebirds cannot find food. Many shorebirds return instinctively to the same feeding areas every time they migrate. Thousands, hundreds of thousands, and even millions of shorebirds might be found together in one place during migration.



If the wetlands to which they return each year by instinct are destroyed, they do not have the ability to look somewhere else. Even if they did, where would they find another wetland when all the wetlands have been filled? Where will the shorebirds go? What will the shorebirds eat?

◀ ▲ ▶
BACK TOP NEXT

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents
WINGING NORTHWARD
 A SHOREBIRD'S JOURNEY

En Español 
 Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
 - Morphology
 - Behavior
 - Migration
 - Feeding
 - Identification
 - Photo Gallery
 - Importance
 - Habitats
 - Gee Whiz Facts
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

What are Shorebirds?

Identification

Some people think shorebirds are hard to identify, but it's a skill anyone can learn if they know what to look for. Here are some clues:



- Notice the size. Large shorebirds are about the size of robins or pigeons. Small shorebirds are about the size of sparrows.
- Notice the color of the plumage (feathers). Look for distinct white, rust, or black patches. Does the bird have spots or streaks on its breast?
- Is the bill long or short? Is it straight or curved slightly up or down? What color is the bill?
- What color are the legs?
- When the bird is flying, can you see wing stripes or a distinct tail pattern?
- Observe its behavior. Is it picking up its food or probing below the surface for prey? Is the bird you are observing alone, in a small group, or part of a large flock?

[←](#) [▲](#) [▶](#)
 BACK TOP NEXT

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
 P.O. Box 389 Manassas, VA 20108
 Phone: 703.791.7328 E-mail: pwninfo@aol.com

 Site Developed by
 Filnet Incorporated

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
 - Web Links
 - Photo Gallery
 - Shorebird Sister Schools
 - Teacher Evaluation
- ▶ Live, TV & Web cast

Shorebird Photo Gallery

Select Bird:



Bird Species:

Description:

▲
TOP

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com




A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

En Español 
Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
 - Stream & River Corridors
 - Tundra
 - Marshes
 - Rocky Intertidal
 - Mudflats & Sandy Beaches
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

What is a Wetland?

Bog, mudflat, quagmire, muskeg, tundra, swamp, fen, marsh, pothole, beach. These are some of the many areas that people recognize as definitely land, but also definitely wet. What do we need to know about a wetland to understand why it is important and how it functions?



Let's start by looking at some common features of any wetland. They are measured and studied by people with different jobs.

How wet is it?

A hydrologist, someone who studies the water cycle, is concerned with the wetness of a specific area. Wetness varies according to how much water falls on it in the form of rain or snow, flows across it from the ocean or upstream, or enters it as runoff from surrounding higher lands. How long an area stays wet and how wet it stays depend on the type of soil or plants, and how steeply the land slopes to the next downstream area. Water disappears down into cracks and holes between rocks or soil particles, is taken up by thirsty plants, or quickly streams off steep cliff faces. However, some water remains on the surface in areas where a subsurface layer of rock or permafrost won't let it continue down into the ground or where it enters an existing pond or stream. Wetlands are areas where water remains pooled on or near the surface and saturates the soils, leaving no airspace for oxygen between the grains.

What adaptations does it take to live there?

To a biologist, wetlands are places where the plants and animals must have adaptations for both terrestrial (on land) and aquatic (in water) life. If the amount of wetness changes, the organism must be able to quickly respond. What would you do to survive if the tide came over your head twice a day? Also, the saturated soil has limited or no oxygen. This means that plants with their roots in the soil and other organisms that live in the soil must have adaptations to these anaerobic or low-oxygen conditions. The plants and tiny animals with these special traits are part of the wetland food web that includes shorebirds.

How do laws define "Wetlands"?

Because humans use wetlands for many things, and

because humans recognize the importance of wetlands to the overall cycles of nature, there are many laws concerning wetlands. Is the land that you want to build a gravel road across a wetland? Is the land where you saw two rare snowy plovers feeding a wetland? Legal definitions are ones that people use to help answer these questions. These definitions come before the really important questions, like how will people and shorebirds be affected by any changes you make to the area?

There are regulatory agencies that are charged by the Clean Water Act to protect the important functions of wetlands (like providing drinking water). The regulators have a specific legal definition that recognizes hydrological and ecological conditions described above. However, because the water cycle is dynamic and the wetness of an area varies accordingly, determining whether the legal definition is met in a specific area is often very difficult.

- [Stream and River Corridors](#)
- [Tundra](#)
- [Marshes](#)
- [Rocky Intertidal](#)
- [Mudflats and Sandy Beaches](#)



[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
 - Stream & River Corridors
 - Tundra
 - Marshes
 - Rocky Intertidal
 - Mudflats & Sandy Beaches
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Stream and River Corridors

In many parts of the world, wetlands undergo a natural change with the seasons. In the spring, snow and ice melt in the mountains. The meltwater causes streams and rivers to rise and seasonal floods to rush downstream. The streams and rivers overflow all along their routes to the estuaries at the sea and fill lowlands.



The meltwater carries nutrients (natural chemicals from water or minerals needed by plants for making food). These nutrients fertilize plants growing in the flooded lowlands. The plants provide food for many different kinds of small animals. Fish, mammals, and birds feed on the small animals.

Shorebirds flying north stop and probe in the mud for snails, worms, and insect larvae. Inland stream and river corridors are good wetland habitat for shorebirds in the spring. Some shorebirds that can be found in these habitats in the spring include Solitary and Spotted Sandpipers and Yellowlegs. These are migratory shorebirds like the Western Sandpiper but, unlike the Western Sandpiper, they breed primarily south of the Arctic.

After the spring meltwater has all run downstream, the rivers and streams fall to very low water levels. This tends to be true in late summer (July to September, depending on where you live). The plants and animals that live along the river corridors must be adapted to survive a couple of months of dry conditions. Fall rains will then come. They will cause the rivers and streams to rise and flood the lowlands again before winter. Is there a river near where you live? Look carefully for shorebirds and other birds along the

banks of streams and rivers.

[←](#) [↑](#) [→](#)
BACK TOP NEXT

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com




A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

En Español 
Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
 - Stream & River Corridors
 - Tundra
 - Marshes
 - Rocky Intertidal
 - Mudflats & Sandy Beaches
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Tundra

The tundra is a vast, treeless land of northern and western Alaska and northern Canada. The temperature is very cold in winter and cool in summer. The wind almost always blows. Because of the cold and wind, no trees grow on the tundra. All the plants grow very close to the ground because it is warmer there.



Many people think the tundra is flat. Once you've walked on the tundra, you see that it is made up of lots of little mounds of grass, sedges, and lichens. The low spots are wet or even filled with water, forming little ponds or lakes. The ground is squishy. Even where it looks high and dry, it often isn't. Try sitting on a grassy mound for a few minutes!

Although the tundra feels wet, very little rain or snow falls on the tundra each year. Why is it wet? Because there is permanently frozen ground, called permafrost, under the thin layer of topsoil. Because of permafrost under the soil, most of the rain and snow that falls stays on or near the surface. It can't drain away through the frozen soil. Permafrost doesn't thaw, even in summer. You cannot dig more than a few inches into the frozen soil. However, centuries of decaying vegetation have produced a thick, spongy layer called peat.

Because of permafrost, plants on the tundra have roots that grow sideways (prostrate) instead of straight down. One example is dwarf willow. There are also many berry-producing plants like cloudberry and bearberry on the tundra. Fungi and lichens (Are these plants? What are they?) are very important tundra organisms too.

Millions of shorebirds nest each year on the tundra. They feed on the billions of larvae and hatching insects that appear each summer. They also find aquatic prey like copepods and fairy shrimp.

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com




A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

En Español 
Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
 - Stream & River Corridors
 - Tundra
 - Marshes
 - Rocky Intertidal
 - Mudflats & Sandy Beaches
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Marshes

Marshes can fill broad, flat areas or be contained in tiny pockets surrounded by higher land. They are often found on the edges of ponds, lakes, or rivers. Often a saltwater marsh is associated with an estuary, the place where the freshwater of a river mixes with the



saltwater of the ocean. If there is a stream or other water movement through a marsh, nutrients are brought with the water flow. When water drains from a marsh, it carries nutrients to the next wetland or to the ocean.

Marshes are open, wet, grassy areas. There are two kinds of marshes: inland freshwater and coastal saltwater. The inland marshes obtain freshwater from creeks and streams or directly from rain and snow. Tides regularly bring a source of saltwater to the coastal marshes. Both inland freshwater marshes and coastal saltwater marshes have plants that are adapted to the type of water in the marsh. On a windy day marsh plants rustle with their own unique music. The plants that grow in a marsh are special. Their roots are always under the water. Their stems and leaves rise out of the water into the air and sunlight. Marsh plants grow where water is shallow and slow moving. Some marsh plants of western North America include sedges, rushes, and grasses. That's why a marsh looks like a wet meadow. Marshes also have small shrubs and delicate flowering herbs.

Insects, snails, and other small animals thrive among the plants in the slow-moving water. Fish and aquatic insects find shelter among the underwater parts of the plants. Young salmon start their lives in freshwater far upstream. Before they graduate to the ocean, they need time to adapt to saltwater. Coastal saltwater marshes are the perfect place to do that. Shorebirds and other birds can find lots of food to eat in a marsh. They can hide in the tall grass from predators. Have you ever seen a Common Snipe, a Yellowlegs, a Dowitcher, or a Phalarope in a marsh?

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

En Español 
Chasquee aquí

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
 - Stream & River Corridors
 - Tundra
 - Marshes
 - Rocky Intertidal
 - Mudflats & Sandy Beaches
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Rocky Intertidal

The intertidal zone is the part of the ocean shoreline that is covered by saltwater when the tide is high, and exposed to the air when the tide is low.

Life in intertidal areas has both challenges and rewards. Plants, animals, and other organisms like algae ("seaweed") must be very tough to live there. They must be able to adapt to the movement of the tides.

This means being able to live covered and then uncovered by water once or twice a day:



- They must be able to get oxygen in air and in water.
- If living cells dry out, they die. Living creatures of the intertidal must be adapted to keep from drying out when the tide is low.
- They must be able to adjust to changes in salinity (level of saltiness). As the last drops of water dry in the sun at low tide, salt is often left behind and conditions can be even saltier than when underwater (how could you test to see if that is true?). When it rains, these same plants and animals must be able to adjust now to lower salinity.

Saltmarshes, sandy beaches, and mudflats can all occur in the intertidal zone. Because the rocky intertidal zone has no soil to retain water, some might argue that it is not really a "wetland" habitat. Well, the rocky intertidal is that part of the zone made up of boulders or cliffs or gravel or shale or just plain rocks. Wherever there are pools or crevices to retain enough water, the rocky intertidal teems with life. This is why we also know this zone as the place of tidepool habitat. Like most wetlands, it is a very productive place!

There are other challenges facing the tidepool life and the

hardy organisms that cling to exposed rock walls. These include being able to adapt to the rolling or even pounding of the ocean waves. Wave action is often high in these areas, and often the cause of why there is no soil on these exposed rocks.

Almost no plants at all grow in the rocky intertidal habitat. There is no soil for their roots. Large seaweeds and kelp, members of the Protista Kingdom, take the niche of plants. This means that they do the job of plants at the base of the food pyramid and in the general ecology of the habitat. They capture the sun's energy to make food that tiny animals graze on, and they provide a sheltered place for these tiny animals to live.

The larger animals (predators and scavengers) that feed on the smaller animals face their own challenges here. This habitat is exposed to a lot of wind, and there is not much shelter for them. Many shorebird species are well adapted to find food in the rocky intertidal. As a matter of fact, as birds go, shorebirds are the most significant users of the rocky intertidal. The Black Oystercatcher feeds almost nowhere but here most of the year. Its strong, red bill is adapted specifically for prying hardshelled animals off rocks or prying them open. Turnstones and Surfbirds also live here during migration and winter.

[◀](#) [▶](#) [▶](#)
BACK TOP NEXT

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com


Filnet Site Developed by
Filnet Incorporated

A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

En Español 
Chasquee aquí

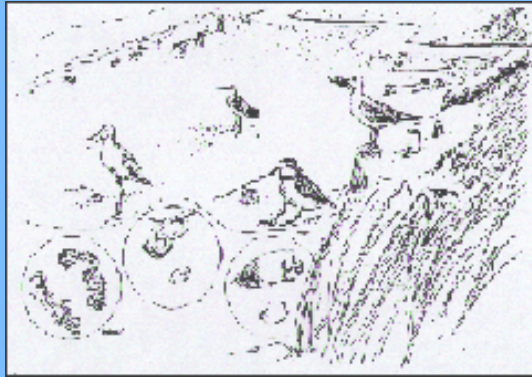
Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
 - Stream & River Corridors
 - Tundra
 - Marshes
 - Rocky Intertidal
 - Mudflats & Sandy Beaches
- ▶ Teacher Resource Center
- ▶ Live, TV & Web cast

Mudflats and Sandy Beaches

Mudflats and sandy beaches are important shorebird habitat. They can occur inland, but sandy beaches especially are found in the intertidal zone along the ocean shores. Mudflats are made of differently sized particles than those composing



sandy beaches. Inland they can occur around inland lakes and rivers. What do coastal mudflats and sandy beaches have in common besides the tide? They are both very open habitats with few plants but often rich in invertebrate prey.

Organisms that can adapt to conditions of periodic wetness and salinity changes do well because there are lots of nutrients in these mudflat and beach habitats. These elements are carried down by rivers and mix with nutrients from the ocean or lake. Such wetlands, especially in coastal areas, are some of the most productive (maker of food) areas on the earth. If you scooped up one pail of mud or sand from the beach below the high water mark and examined it with a microscope, you would see hundreds or thousands of tiny snails, worms, and invertebrate eggs and larva. There would be larger animals like clams and long worms as well. There are millions of clams, shrimp, and worms buried in the mud and sand in intertidal mudflat and sandy beach zones.

The flight path for millions of migrating shorebirds follows the shoreline as they move north in spring or south in fall. The birds need a lot of energy-rich food to fly thousands of miles. Their next stop might be hundreds or thousands of miles away.



 BACK TOP
[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Maya's Adventure:

[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
 - Web Links
 - Photo Gallery
 - Shorebird Sister Schools
 - Teacher Evaluation
- ▶ Live, TV & Web cast

Web links to Shorebird Sites

- [Educational sites](#)
- [Related Activities on Shorebirds](#)
- [Shorebirds sites](#)
- [Mexico sites](#)
- [International Bird sites](#)
- [Alaska sites](#)

Educational Sites

Alaska Wildlife Curriculum

Designed for teachers of K-12 students who wish to open their classroom doors and windows to the natural world.
<http://www.state.ak.us/adfg/wildlife/geninfo/educate/awc.htm>

Junior Duck Stamp Program

Begun in 1989, the Junior Duck Stamp program uses an arts education curriculum to teach about wetlands and wildlife conservation.
<http://www.duckstamp.fws.gov/jrindex.html>

Shorebird Sister Schools

Enables students to track migration and to share their experiences with other "sister schools" around the world.
<http://sssp.fws.gov/sssp.html>

Shorebird Watcher

All about shorebirds, photos, quizzes, festivals, and almost everything else.
<http://home.netcom.com/~djhoff/shorebrd.html>

Western Hemisphere Shorebird Reserve Network

A coalition of over 1,560 private and public organizations in seven countries working to conserve shorebirds throughout their habitats.
<http://www.manomet.org/WHSRN.htm>

Links to Sites with Related Activities on Shorebirds, Migration, and Wetland Ecosystems

Adopt-a-Wetland

A statewide (Texas) model for students and their awareness of the fragility and importance of wetlands. Great ideas!

<http://www.sci.tamucc.edu/aawp/welcome.htm>

The Audubon Society

Information on both migration and wetlands.

<http://north.Audubon.org/facts.html>

Birdsource Birding with a purpose, this is birdwatchers central. Citizen science really works.

<http://birdsource.cornell.edu/>

Cordova Discovery Room-Puppet show

For years the Cordova Discovery Room has put on puppet shows concerning shorebird migration.

<http://fsweb.cordova.chugach.r10fs.fed.us/Discovery/puppets/pages/Directory.html>

Ducks Unlimited

The world's largest wetland conservation organization. The web site contains a section for students and a curriculum guide for teachers.

<http://www.ducks.org>

Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds

This office promotes our understanding of wetlands and watersheds as the "most ecologically productive and ecologically sensitive of habitats."

<http://epa.gov/owow/wetlands/education>

<http://www.epa.gov/owow/owow.pdf>

Fatal Light

The Fatal Light Awareness Program works to educate the public on ways to preserve the lives of migratory birds in urban areas.

<http://www.flap.org/home2.htm>

Junior Duck Stamp Program

Begun in 1989, the Junior Duck Stamp program uses an arts education curriculum to teach about wetlands and wildlife conservation.

<http://www.duckstamp.fws.gov/jrindex.html>

North American Waterfowl Management Plan

The United States and Canadian governments have developed a strategy to help in the shared resource of waterfowl populations through habitat protection, restoration, and enhancement.

<http://www.manomet.org/WHSRN.htm>

National Estuarine Research Reserve

Learn more about wetlands and how to protect them.

<http://www.ocr.nos.noaa.gov/nerr/welcome.html>

National Science Standards

The National Science Education Standards promotes information on standards and assessments for science educators.

<http://www.nap.edu/html/nses/html/>

The Nature Conservancy

Working with communities, business, and the general public it is committed in preserving precious places around the world.

<http://nature.org>

Partners in Flight

A cooperative public and private organization dedicated to monitoring, inventorying, birds and their habitats.

<http://www.partnersinflight.org/description.cfm>

Ramsar Convention on Wetlands

The international program for conservation of wetlands.

<http://www.ramsar.org/>

USDA for Kids

A group of activities on a wide range of topics for kids.

<http://usda.gov/news/useakids/index.html>

USDA Forest Service Programs and activities related to the management, protection, and use of national forests and grasslands.

<http://www.fs.fed.us>

USDA Forest Service International Programs

Promoting sustainable forest management and biodiversity conservation internationally.

<http://www.fs.fed.us/global/aboutus/welcome.htm>

U.S. Fish and Wildlife Service National Wetlands Inventory

All about wetlands, this is a great resource!

<http://www.nwi.fws.gov/>

The Virtual Birder

You can go bird watching on the Internet.

<http://www.virtualbirder.com/>

Western Atlantic Shorebird Association

Follow shorebirds from Argentina to Canada and help scientists with your shorebird sightings.

<http://www.vex.net/~hopscotc/shorebirds/>

Wild Outdoor World

Connecting students with the natural world, the Rocky Mountain Elk Foundation publishes a magazine that supports this link. Geared for ages 8 to 12, the theme stressed is that kids can make a difference in conserving the natural world.

<http://www.wildoutdoorworld.org/>



Links to Shorebird Sites

Shorebird Central

The comprehensive index and search engine for every shorebird.

<http://www.shorebird.org>

Shorebird Sister Schools Program

A resource for educators who wish to teach about shorebirds. Kids pages and information of migratory routes and birds and much more.

<http://sssp.fws.gov/sssp.html>

Shorebird Watcher

All about shorebirds, photos, quizzes, festivals, and almost everything else.

<http://home.netcom.com/~djhoff/shorebrd.html>

U.S. Fish and Wildlife Services

An invaluable resource for all Americans dedicated to conserving, protecting, and enhancing fish, wildlife, and plants and their habitats.

<http://migratorybirds.fws.gov/shrbird/shrbird.html>

Western Hemisphere Shorebird Reserve Network

A coalition of over 1,560 private and public organizations in seven countries working to conserve shorebirds throughout their habitats.

<http://www.manomet.org/WHSRN.htm>

On a Wing and a Prayer: Migratory Birds of the Americas

A photographic exhibit on migratory birds hosted by the Smithsonian Institute.

<http://natzoo.si.edu/zooview/research/asg/artmorris/>



Links to Mexican Sites

Bahia Santa Maria, Sinaloa

Conservation projects and area descriptions, all in Spanish.

<http://www.crc.uri.edu>

Pronatura

The largest environmental organization in Mexico and they support shorebird conservation.

http://www.pronatura.org.mx/english/index_en.html

State Government of Sinaloa

The state of Sinaloa welcomes you and invites you to learn about this very special area.

<http://www.sinaloa.gob.mx/>



Links to International Bird Sites

U.S. Forest Service International Programs

The forest service involved in conservation programs around the globe.

<http://www.fs.fed.us/global/>

Pan American Shorebird Program, PASP

Coordinates the color banding of shorebirds for researchers. Help the scientists. If you see a color band on a shorebird's leg, this is where it can be reported.

<http://www.mb.ec.gc.ca/nature/migratorybirds/pasp/index.en.html>

U.S. Fish and Wildlife Service

Shorebirds winging between hemispheres.

<http://migratorybirds.fws.gov/shrbird/shrbird.html>



Links to Alaska Sites

Birds of the Copper River Delta

A simple listing of all the birds known there.

<http://www.ptialaska.net/~midtown/birdson.htm>

Copper River Delta

The shorebird festival's official Web site.

<http://www.ptialaska.net/~midtown/>

Cordova - Alaska's Hidden Treasure

Chamber of Commerce web site all about this wonderful place.

<http://www.cordovachamber.com>

Cordova Ranger District

Visit the Cordova Ranger District in Cordova Alaska

<http://fsweb.cordova.chugach.r10.fs.fed.us/>

Chugach National Forest

USDA Forest Service at Copper River.

<http://www.fs.fed.us.r10/chugach/>

Prince William Sound Science Center

The site is devoted to informing students and the general public about the interdependence of biology and the economics of Alaska.

<http://www.pwssc.org>



[Home](#) | [Monthly Activities](#) | [Broadcast Registration](#) | [Maya's Sponsors](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution

Copper River International Migratory Bird Initiative presents

WINGING NORTHWARD

A SHOREBIRD'S JOURNEY

Broadcast Registration:

[Home](#) | [Monthly Activities](#) | [Maya's Sponsors](#) | [Maya's Adventure](#)

- ▶ Program Description
- ▶ Goals & Objectives
- ▶ Maya's Story
- ▶ Shorebirds
- ▶ What is a Wetland?
- ▶ Teacher Resource Center
 - Web Links
 - Photo Gallery
 - Shorebird Sister Schools
 - Teacher Evaluation
- ▶ Live, TV & Web cast

Teacher Evaluation

Your ratings and comments will be used to improve future programs. Ratings will be averaged across schools; no information from individual schools will be reported.

All fields required

School Name:

State:

Grade(s):

Describe School:

Urban Suburban Rural

Rate the quality of these aspects of the live broadcast on a five-point scale, where 1 = Poor to 5 = Excellent.

Broadcast Quality:

Video Reception:

Audio Reception:

Rate the quality of these aspects of the Website (www.pwnet.org) on a five-point scale, where 1 = Poor to 5 = Excellent.

Quality of Website:

Usefulness of Teacher Resource Center:

Usefulness of Maya's Story (10 Chapters):

Did you use any other website to prepare the students for the program?

Comments:



[Home](#) | [Monthly Activities](#) | [Maya's Sponsors](#) | [Maya's Adventure](#)

Produced by the Prince William Network in Collaboration with the USDA Forest Service, the U.S. Fish and Wildlife Service, and the Western Hemisphere Shorebird Reserve Network. Copyright © 2001 Prince William County Public Schools. All rights reserved.

PRINCE WILLIAM NETWORK
P.O. Box 389 Manassas, VA 20108
Phone: 703.791.7328 E-mail: pwninfo@aol.com



A Filnet, Inc. Solution