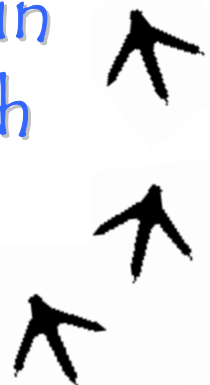


A Closer Look at Whooping Cranes



Whooping Crane Education in
Wisconsin and Eastern North
America

(Rev. 2015)



Whooping Crane Eastern Partnership Founding Members:

Wisconsin Department of Natural Resources
United States Fish and Wildlife Service
International Crane Foundation
Operation Migration
U.S.G.S. – Patuxent Research Center
U.S.G.S. – National Wildlife Health Center
International Whooping Crane Recovery Team
Natural Resources Foundation of Wisconsin
National Fish and Wildlife Foundation



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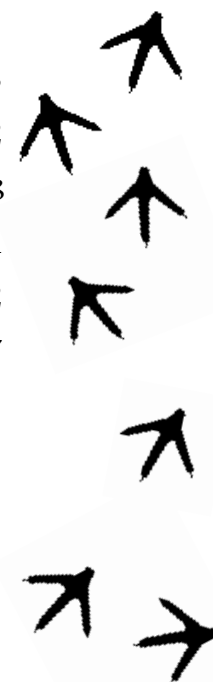
Cover Photo: Ryan Hagerty, USFWS
Trunk Manual & Activity Guide Cover Illustration: Victor Bakhtin, ICF

A Closer Look at Whooping Cranes



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Introduction

Dear Educator,

Thank you for your interest in whooping crane education! *A Closer Look at Whooping Cranes* was developed by the Wisconsin Department of Natural Resources and Whooping Crane Eastern Partnership. This program provides information about whooping crane ecology and biology, details the story of the whooping crane's decline and reintroduction, and offers hands-on activities for classroom teachers and non-formal educators to share with students. Financial support was provided in part from a generous donation by Margaret Van Alstyne and a grant from the Wisconsin Environmental Education Board.

The crane trunk and activity guide were developed for students in grades 4-8, but the activities can be adapted for students school-age through adult. In addition, you may choose to use the trunk materials with other learning activities from your own curriculum or other programs like Project WILD, Project WET, and Project Learning Tree. The resource list included in Appendix 4 provides information about these other programs.

Before using the whooping crane trunk, please read and sign the "Crane Trunk User Agreement" form. Be sure to encourage your students to use care when handling any of the objects, and replace all materials in the trunk when you are through using it.

To help you become familiar with the teaching tools found in the trunk, refer to the *Trunk Manual*. The manual provides information on each item in the trunk and contains background information on whooping cranes and current reintroduction efforts. Feel free to photocopy any pages from the manual for use at a later time.

Please return the crane trunk by the date stated on the "User Agreement" form. We would also appreciate it if you could take a few minutes to complete and return the enclosed evaluation form. The feedback we receive from you will help us improve our educational efforts.

Enjoy these *A Closer Look at Whooping Cranes* materials, and don't hesitate to contact us with any questions or comments.

Sincerely,

The Whooping Crane Eastern Partnership
Beth Kienbaum, Whooping Crane Coordinator, Wisconsin DNR
PO Box 7921, Madison, WI 53707-7921
(608) 266-3219, Beth.Kienbaum@wisconsin.gov



How to Use This Guide



A Closer Look at Whooping Cranes is comprised of three interrelated parts: 1) the *Crane Trunk Manual*, 2) the *Activity Guide*, and 3) the *Wisconsin Whooping Crane Management Plan*, a separate publication. Each serves as a different resource for the educator, and all three should be shared with students.

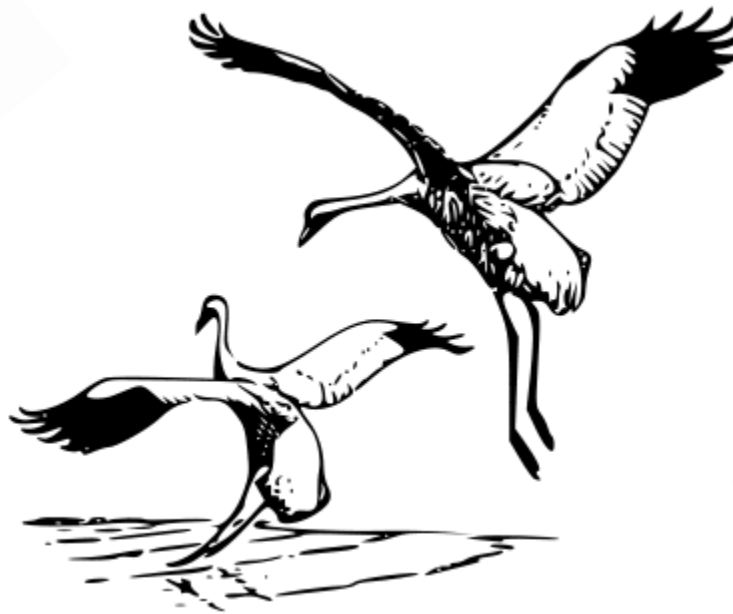
- 1) ***Wisconsin Whooping Crane Management Plan*** – Published in December 2006, this document serves as a guidance tool for restoring the Eastern Migratory Population of whooping cranes. The *Management Plan* serves as a reference to be used with the *Activity Guide*. Each activity in the *Activity Guide* includes a “Link to the Plan” which references one or many sections of the *Management Plan*. The *Management Plan* can and should serve as a resource for both the educator and the students. The *Wisconsin Whooping Crane Management Plan* can be found on the Wisconsin DNR’s website at:
dnr.wi.gov/topic/EndangeredResources/documents/WC_Mgmt_Plan.pdf
- 2) ***A Closer Look at Whooping Cranes Trunk Manual*** – This manual provides background information on the whooping crane reintroduction project and a list of items found in the crane trunk. Educators should read the *Trunk Manual* before presenting activities in the *Activity Guide* to students.
- 3) ***A Closer Look at Whooping Cranes Activity Guide*** – The *Activity Guide* contains thirteen activities to educate students about whooping cranes in an experiential manner using environmental education, science, social studies, English, and art. Every activity meets several of Wisconsin’s model academic standards and a wide variety of teaching objectives. Each activity contains background information for the educator, references to relevant sections of the *Wisconsin Whooping Crane Management Plan*, procedural instructions for completing the activity, and extensions for further enriching your students’ learning. Activities can be completed sequentially or as independent units. It also lists additional educational resources.

We appreciate your interest in the whooping crane project and are thrilled that you have decided to include *A Closer Look at Whooping Cranes* in your curriculum. It is with your support that knowledge of whooping cranes continues to increase, resulting in even greater successes in restoration efforts.

Enjoy *A Closer Look at Whooping Cranes* !



A Closer Look at Whooping Cranes Trunk Manual



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Project Background

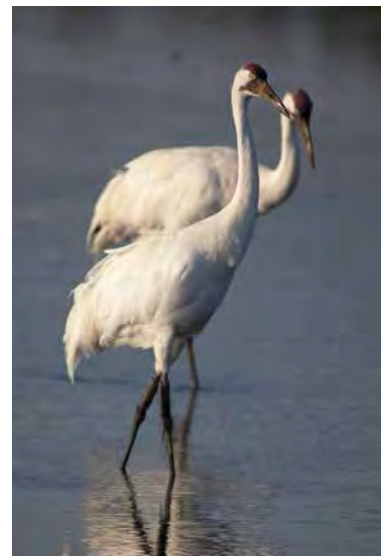
Whooping Cranes: North America's Endangered Legacy

Whooping cranes are the rarest of all cranes. Once numbering only 21 birds in the wild, North America's endangered whooping crane is making a comeback.

What is a Whooping Crane?

Named for their loud, distinctive calls, whooping cranes (*Grus americana*) once lived throughout much of North America. Though their range is more limited today, whooping cranes still live in parts of Canada and the United States (see map on page 8).

Whooping cranes are tall, secretive birds. They are often confused with other species, such as herons, egrets, and the abundant sandhill crane (*Grus canadensis*), also native to North America. You can distinguish whooping cranes from other birds by knowing a few key characteristics including their size, coloration, and behavior.



Whooping cranes stand five feet tall. Photo: International Crane Foundation



Adult and juvenile whooping crane. Photo: International Crane Foundation

Size

Whooping cranes are the tallest birds in North America. They stand five feet tall and have a seven- to eight-foot wingspan. Because whooping cranes have hollow bones adapted for flying, they weigh on average only 15 pounds.

Coloration

Adult whooping cranes are almost entirely white (unlike their grayish-brown cousin the sandhill crane). The only non-white markings on whooping cranes are their black wingtips, black facial markings, the bare patch of red skin on the top of their heads, and black legs and feet. Whooping crane chicks are cinnamon brown, which helps to camouflage them. As the chicks mature during their first year, they develop the characteristic black wingtips, and their body feathers become a mix of cinnamon brown and white.



Flight

Whooping cranes and other crane species fly with their necks and legs outstretched. This helps distinguish them in flight from other wading birds, like egrets or herons (those species hold their necks in an “S”-shaped curve in flight). In flight, their black wing tips are often visible from below. A crane’s wing beat has a distinct pattern, with a slow down-stroke followed by a quick up-stroke. Cranes often take advantage of thermals (rising pockets of warm air) to get up into the air and soar on wind currents while in flight to minimize their energy expenditure.



Whooping cranes fly with their legs and neck outstretched, which helps distinguish them from other wading birds.

Photo: International Crane Foundation

Breeding

Whooping cranes may mate for life and can live 25 years or more in the wild. On their summer nesting grounds, a pair establishes a territory which they defend from other cranes and performs elaborate courtship dances, including their loud unison calls. If mating is successful, the female usually lays two eggs. Both the female and male take turns incubating the eggs for approximately 30 days. Although both eggs may hatch, usually only one chick survives the first few months.



Chicks must grow extremely fast in order to be large and strong enough to migrate only a few months after hatching. Crane chicks grow up to an inch a day during their first summer. This fast growth, along with early “flying lessons,” prepares whooping crane chicks for their first migration. Young cranes learn the migration route by following their parents south in the fall.

The chicks join juvenile flocks during their second summer and remain with other unmated birds in these groups until they are three to five years old. Pairing often begins within these juvenile flocks. A new pair will claim a nesting territory and begin to raise chicks of their own.



In the first few months after hatching, whooping crane chicks can grow up to an inch per day! This chick is 25 days old.

Photo: U.S.G.S. Patuxent Wildlife Research Center



Habitat and Diet

Whooping cranes use wetlands to find their food, to roost (sleep), and to make their nests. A whooping crane diet consists of minnows, insects, frogs, crayfish, crabs, snails, rodents, and smaller birds, all of which are found in wetlands. A wetland nest helps reduce the risk of predation from animals that are not willing to travel through the water to eat whooping crane eggs.



Whooping cranes lay their eggs in wetland nests.
Photo: US Fish and Wildlife Service



Whooping Crane History

Cranes are among the oldest living bird species on Earth. Historically, whooping cranes ranged widely and relied on diverse wetland ecosystems for over-wintering, breeding, and migration stopovers. Whooping crane fossils have been found throughout much of North America, from southern Canada to Mexico.

A Species in Trouble

In the mid-1800s, the whooping crane population was estimated to be between 700 and 1,500. As settlers advanced deeper into North America's wilderness, they altered whooping crane *habitat* and the species' population dropped rapidly. By 1890, whooping cranes had disappeared from the heart of their breeding range in the north central United States. By 1938, only two small flocks remained, one non-migratory flock in southwest Louisiana, and one migratory flock that nested in Canada and wintered in Texas.



The migratory population was reduced to approximately 15 birds in 1941, with an estimated additional six whooping cranes surviving in the Louisiana flock. By 1949, severe weather had decimated the Louisiana population, leaving only the small migratory flock. Whooping cranes were on the brink of extinction.



Unregulated hunting, wetland destruction, and egg and feather collection resulted in the whooping crane's near extinction.

Photo: International Crane Foundation

Reasons for Decline

The two most important factors that contributed to the decline of whooping cranes were habitat loss and unregulated hunting. As European settlers moved westward, they drained marshes and plowed prairies for agriculture, destroying much of the birds' nesting habitat. Many remaining habitats were close to human disturbance, a stress to which this shy and secretive species was unable to adjust. As the number of whooping cranes declined, hunters, hobbyists, and museum collectors scrambled to acquire the rare specimens and eggs for their collections.

Recovery Efforts

During the last century, only one small population of whooping cranes stood between survival and extinction. Ambitious recovery efforts were needed to save the species. Projects to protect this species and to create new populations were put in motion and began the whooping cranes' long journey to recovery.

The Last Wild Population

Hope for the survival of whooping cranes was held in the lone wild population that migrated from the wilderness of Canada to the Gulf coast of Texas each winter. Their wintering grounds were protected in 1937 with the creation of the Aransas National Wildlife Refuge. However, their breeding grounds, 2,500 miles to the north, remained a mystery until accidentally discovered in 1954 by a fire crew flying over Wood Buffalo National Park in the Northwest Territories, Canada.

The discovery of the species' only remaining breeding grounds opened new options to save the species from extinction. Because whooping cranes lay two eggs per *clutch* but usually only raise a single chick, scientists believed that one egg could be removed from each nest without decreasing the productivity of the wild flock. Egg collection began in 1967. The eggs became the foundation for future release programs in North America.



Due in part to habitat protection and hunting restrictions, the “remnant flock” has made a dramatic recovery. More than 300 whooping cranes migrate between Canada and Texas as of January 2014.

Rocky Mountain Reintroduction

The first migratory whooping crane reintroduction attempt began in the Rocky Mountains in 1975. In the absence of wild whooping cranes to teach chicks a new migration route, biologists looked to sandhill cranes to stand in as surrogate parents and began placing whooping crane eggs in sandhill crane nests at Grays Lake National Wildlife Refuge in Idaho.

The sandhill cranes hatched and raised the whooping crane chicks, and the chicks learned the migration route from their surrogate parents. However, when the whooping crane chicks reached breeding age, they did not pair with other whooping cranes. Instead, they pursued sandhill cranes as mates. The chicks had learned their species identity from their sandhill crane foster parents. This improper *imprinting* led the birds to identify with the wrong species. The project was terminated in 1989, and today none of the cross-fostered whooping cranes survive in the Rocky Mountain population.



Whoopers and sandhills are the only crane species in the U.S. In the first reintroduction efforts, scientists wanted to see if sandhill cranes would hatch and raise whooping crane eggs laid in captivity. Two whoopers seen here among several sandhills. *Photo: International Crane Foundation*

Captive Breeding

In 1975 the U.S. Geological Survey’s Patuxent Wildlife Research Center in Maryland began successfully breeding whooping cranes in captivity from eggs collected from Wood Buffalo National Park in Canada. To reduce the likelihood of a catastrophic event wiping out the entire flock, Patuxent transferred 22 whooping cranes to the International Crane Foundation (ICF) in Baraboo, Wisconsin in 1989.



The ability to breed whooping cranes in captivity increased the species' chances of survival. Captive breeding and reintroduction efforts became a possibility with the development of these techniques.

Today whooping cranes are found at ICF, Patuxent, and at four other captive breeding centers and zoos from Calgary, Canada to San Antonio, Texas. To protect the wild population from disturbance, eggs are no longer collected from the wild.

Florida Non-Migratory Population

A second reintroduction effort for whooping cranes began in central Florida in 1993 with releases of costume-reared juvenile cranes hatched in captivity. Unlike the Rocky Mountain reintroduction efforts, the Florida population is non-migratory. Since migration routes have to be learned, the Florida cranes remain in freshwater marsh and open grassland habitat of the Kissimmee Prairie, Florida. Unfortunately, the productivity is low and mortality rates are high in the Florida population, and there are about 11 cranes in the population as of January 2014.



The ability to breed whoopers and incubate their eggs in captivity increased the species' chances of survival. Photo:
International Crane Foundation

The Power of Partnership - Whooping Crane Eastern Partnership

In 1999, the Whooping Crane Eastern Partnership (WCEP) was formed when nine government agencies and non-profit organizations joined together with a similar goal: restoring a migratory population of whooping cranes to eastern North America (see page 15 for a list of WCEP partners). Establishing a second migratory population of whooping cranes will bring the whooping crane closer to delisting from the *Federal List of Threatened and Endangered Species*. The goal of WCEP is to establish a self-sustaining migratory eastern population of whooping cranes with a minimum of 120 birds and 30 breeding pairs that hatch and raise offspring on a regular basis by 2020.

Eastern Migratory Population - Learning the Migration Route

Learning the migration route is an essential part of restoring a migratory population of whooping cranes. Unlike chicks that hatch in the wild and learn the migration route from their parents, captive-born chicks are taught to migrate by following ultralight aircraft from Wisconsin to Florida. After juvenile cranes follow the ultralights down to Florida on their first migration, they are able to make the return trip and subsequent migrations on their own.



Crane School

Each year, 10-30 whooping crane chicks are chosen for migration conditioning at White River Marsh Wildlife Area in Berlin, Wisconsin. Because migration routes have to be learned, biologists, pilots, and airplanes stand in to teach what parent birds would in the wild.

The first step in teaching whooping crane chicks to migrate is conditioning them to follow the ultralight aircraft. Scientists begin preparing the chicks to follow the ultralights before they even hatch. While the eggs are incubating, scientists play the sound of the ultralight engines and whooping crane calls. The crane chicks continue to be exposed to these sounds, and they are exposed to the ultralights just a few days after they hatch.



Captive-bred juvenile cranes are raised by costumed biologists to maintain their natural fear of humans.
Photo: Operation Migration

The cranes are raised by costumed biologists and are never exposed to an unclothed person or the sound of a human voice. The costume conceals the human form, and helps the birds maintain their natural fear of people, a trait that will help them survive once released into the wild.

The chicks imprint on the crane puppet and follow the costumed biologist much as they would follow their parents. Soon, the costumed biologist climbs into the ultralight airplane, and the chicks follow behind on the ground. Both the costume and airplane play recorded whooping crane calls, communicating with the chicks in their own language. The cranes grow quickly and soon are able to fly short distances behind the airplane. The flights become progressively longer throughout the summer, until the chicks are ready to begin migration in autumn.

Lift Off!

In October 2001, the first group of reintroduced whooping cranes departed Necedah National Wildlife Refuge and began their 1,218-mile migration to Florida. Since then, juvenile whooping cranes have been following the ultralights south to Florida every fall, a journey which can take up to three months to complete. The birds spend the winter on the Gulf coast of Florida, where they are monitored by biologists. The whooping cranes then complete the spring migration unaided and return north for the summer. The spring migration is comparatively swift (just a few days or weeks from Florida to Wisconsin). Without the ultralights, the cranes are able to fly more efficiently by riding thermals and soaring, rather than expending energy flapping their wings to keep up with the airplane.



Juvenile whooping cranes learn the migration route from Wisconsin to Florida by following ultralight aircrafts. They are then able to complete the return and subsequent migrations unaided. *Photo: Operation Migration*

Direct Autumn Release

Beginning in 2005, another method of conditioning called ‘direct autumn release’ was used to teach young birds the migration route. Juvenile cranes are directly released into groups of whooping or sandhill cranes that have made the migration in previous years and learn the migration route by following these older, experienced birds. Chicks that learn the migration route in this way are called direct autumn release birds.

Just like the birds that follow the ultralights, these chicks are raised in wetland pens from a young age by costumed handlers and are not exposed to human voices. The chicks are introduced and released to the older, experienced birds in the autumn and spend time associating with them before they follow the birds from Wisconsin to the southern United States.



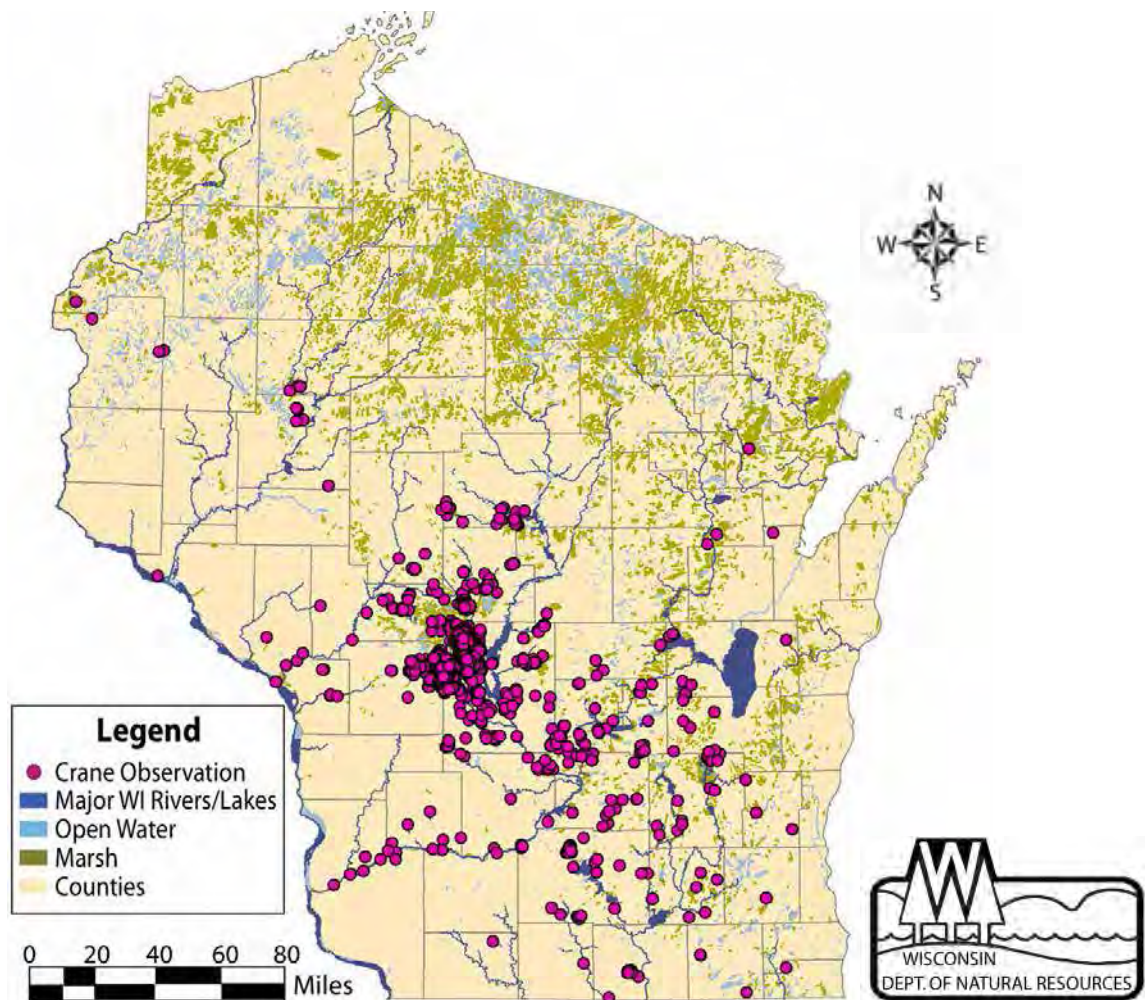
Hope for Success!

Each year we refine our restoration techniques, and the Eastern Migratory Population is continuing to grow. Whooping cranes in Wisconsin appear to be making the right choices. In fact, 2006 marked the first year that whooping cranes hatched in the wild in the Midwest in over 100 years! As of January 2014, there are 106 wild whooping cranes in the Eastern Migratory Population.

Whooping Cranes in Wisconsin: Where Are They?

Just seven years after the first whooping cranes were reintroduced, whoopers have been spotted in 43 Wisconsin counties. Because the whooping cranes depend on wetlands for their survival, they may be found in marshes and shallow wetlands associated with rivers, ponds, and other areas with standing water.

Whooping Crane Observed Locations, 2002~2007





Whooping Crane Eastern Partnership

The Whooping Crane Eastern Partnership (WCEP) represents government agencies and non-profit organizations joining forces to safeguard the rarest crane in the world. Because this experimental flock is migratory, the project extends from Wisconsin to Florida and includes all of the states along and adjacent to the proposed flyway. The number of important partners continues to grow as states sign on to help the whooping crane.

The founding members of the Whooping Crane Eastern Partnership are:

- Wisconsin Department of Natural Resources
- International Crane Foundation
- U.S. Fish and Wildlife Service
- Operation Migration
- U.S.G.S. Patuxent Wildlife Research Center
- U.S.G.S. National Wildlife Health Center
- Natural Resources Foundation of Wisconsin
- National Fish and Wildlife Foundation

Additional information on whooping cranes and crane conservation can be found in Appendix 4: "Additional Resources."



Trunk Contents

Learning occurs not only with the mind, but also with the eyes, the hands – the whole child (or adult!). Items contained in the trunk are meant to be examined, handled, and shared with your students. Of course, some items, like the crane skull and leg, are fragile, so please handle them with extreme care. If an item is damaged in your care, you will be responsible for replacing that item. Check that every crane trunk item is in good shape when it arrives so you are not held responsible for someone else's damage. (see the Whooping Crane Education Trunk User Agreement form in the folder pocket for more information).

Whenever possible, we included real crane artifacts in the trunk for your students to examine. However, because whooping cranes are an endangered species, and certain artifacts are difficult to obtain, some items included are replicas. When replicas are used, it is noted in the inventory below.

We hope you enjoy *A Closer Look at Whooping Cranes. Now dig in and explore!*

Crane Flight Feathers (3)

Flight feathers are stiff, strong, and light. They are shaped to provide lift. Flight feathers are a type of *contour feather*, made of a hollow quill with many *barbs*. The barbs are further divided into *barbules*. Barbules connect to each other like a zipper, forming the flat vane, or surface, of the feather. Birds preen their feathers with their beaks to keep the barbules connected and the surface of the feather smooth.

{ **Fun Fact:** The pigment that makes a whooping crane's wing feather tips black also makes those feathers stronger, which is important on their long-distance flights. }

Crane Leg (1-replica)

Cranes are the world's tallest flying birds. Much of their height is a result of their long legs. The crane leg illustrates several *adaptations* to wetland life. Long legs covered in scaly skin, not feathers, help keep cranes dry when feeding or roosting in water.

Although cranes can swim, they rarely do except as young chicks. Instead, a whooping crane's feet and legs have adaptations that allow for wading. The long, separated toes maneuver easily in wetland vegetation, and provide support on soft, muddy surfaces.



Fun Fact: When baby cranes hatch, their legs are short. Babies hatch early enough in the season that plants are not very tall yet, but a baby crane's legs must grow very fast to keep up with plant growth so they can see over the grass and leaves.

One common misconception about cranes and other birds is that their knees bend backwards. In fact, their knees bend the same direction that ours do. The joint that appears to be bending "backwards" is actually the ankle. Walking cranes only touch their toes to the ground. The knee is normally hidden beneath the feathers of the body.

Crane Skull (1-replica)

The long, probing beak is a distinguishing characteristic of the whooping crane. Many crane species, including whooping cranes, feed in wetlands, probing in mud and even under water. Other crane species, sandhill cranes for example, also feed in uplands such as farm fields and grasslands. Cranes are *omnivores*, and their beaks work well for obtaining and eating both plant and animal foods. The crane skull replica included in the crane trunk was cast from a sandhill crane skull.

Fun Fact: The shape of a whooping crane's skull provides a little bit of shade to its eyes from overhead sun and allows the crane to see in front, to the side, partly above, and partly below.

Whooping Crane Egg (1-replica)

Whooping cranes nest in wetlands in shallow water. They build their nest by piling up vegetation until the nest is raised above the surface of the water. A moat of water often develops around the nest, which helps to protect the eggs and chicks from potential predators. Cranes normally lay two eggs per *clutch*. The eggs are incubated by both parents for approximately 30 days. Usually only one chick is successfully fledged. Crane chicks are extremely aggressive towards each other, and the larger chick (usually a day or so older) outcompetes its sibling for food, resources, and attention.

Fun Fact: Chicks can hear their parents' voices inside the egg. Parents sometimes anticipate hatching by listening to the peeping sounds made by the chicks for the last day or two before hatching. For this reason, scientists play recordings of ultralight motors before the whooping crane eggs hatch to prepare the chicks to follow the ultralights on their first migration.

The whooping crane egg replica is the size, shape, and color of a real whooping crane egg. Because of the weight of the resin used to cast the egg, it is significantly heavier than a real crane egg.

Hand Lens (1)

A hand lens is included for students to use while looking at the crane feathers, legs, and skull. With this simple tool, you can observe the hooking barbules on a flight feather or take a closer look at the scaly skin covering the crane leg. To use the hand lens, grasp it by the



handle. Bring the lens to your eye and the item you are observing up to the lens.

Food Box (1)

Plastic animals: In the wild, a crane's diet consists of a variety of animal and plant foods. Cranes are *omnivores* and eat crabs, reptiles, snakes, seeds, tubers (from the roots of plants), worms, and other invertebrates such as insects. They can even occasionally catch a small bird, mammal, or fish! The food box contains a representative sample of what a crane may eat such as a mouse, a minnow, a small frog, crayfish, leeches, and a blue crab. Whooping cranes in the Texas/Canada flock feed primarily on blue crabs during the winter. This high-protein food is vital for their healthy migration and nesting success the following spring.

Crane Chow: In captivity, cranes eat a modified diet that is produced specifically for them. Cranes are fed "crane chow," which is a specially formulated pellet food made of soy, corn, other grains, and a combination of vitamins and minerals.

{ **Fun Fact:** Whooping cranes are opportunistic foragers, and when there are enough crabs, cranes may eat 80 every day! }

Isolation Rearing Costume and Puppet (1)

The whooping crane isolation rearing costume is worn by biologists when raising whooping crane chicks in captivity. Crane chicks are *precocial*; they are active and able to feed themselves shortly after hatching. They *imprint* on the first large moving object that they see after they hatch. In the wild, whooping crane chicks will imprint on their parents. In captivity, however, whooping crane eggs are often removed from the nest before they hatch and are incubated artificially. These chicks are reared by humans instead of adult whooping cranes.

The International Crane Foundation, Patuxent Wildlife Research Center, Calgary Zoo, and other captive breeding centers in North America are cooperating in raising whooping cranes to be introduced into the wild. In order to be released into wild populations, the whooping cranes must imprint on other cranes and not humans. Crane chicks raised for release are fed, taught to forage, and cared for using the hand puppet and costume so that they do not imprint on people.

The hand puppet and costume hide the human form and introduce the whooping crane chicks to the shape and color patterns of an adult whooping crane. Look at the crane puppet carefully, and notice that the red patch and black mask on the puppet closely match the coloration of an adult whooping crane. The puppet and costume are also the same bright white of the adult whooping crane, and the puppet's form is similar to the silhouette of an adult crane.



Flight Diverter (1)

An important threat to cranes and other birds are power lines, towers, turbines, and other structures. Many cranes fly into utility lines that they cannot see when flying in low light conditions or when landing at wetlands adjacent to power lines. If startled, a crane foraging or sleeping on the ground may also take off quickly and inadvertently collide with unseen lines. An especially risky time for collisions with utility lines is during migration. Cranes may migrate hundreds or thousands of miles, and encounter countless lines throughout their long journey.

To reduce the threat of collisions with utility lines, researchers have developed several ways to mark the lines so that they are more visible to cranes and other birds. An example of one of these devices, called a flight diverter, is included in the trunk. The markers are designed to attach on existing lines, providing a visual alert to flying cranes that the line is present.

Leg Band and Radio Transmitter (1 of each)

Included in the trunk are leg bands used to identify cranes in captivity and in the wild. The bands are placed around the crane's leg above the ankle. Researchers who study cranes in the wild use the colored plastic bands with engraved numbers. These bands are put on birds before they are released, and also fitted on cranes captured from and returned to the wild. Each banded crane is assigned a unique band combination, allowing for visual identification in the field. For example, one crane may have a green and red band on its left leg, while another crane will be fitted with only a green band on its right leg.

The trunk also contains a band with a radio transmitter. Using a radio receiver, researchers can locate the signal from the transmitter on a wild bird's leg and determine the approximate location of the crane.

Fun Fact: When the cranes first receive a radio transmitter, they will often try to preen the antenna as if it is a feather that will not smooth out, but it does not affect flight or their general lifestyle. After a short time, they get used to the transmitter.



Additional Trunk Resources

The following resources are included in the trunk to enrich your students' learning:

DVDs (for reference use only)

- Whooping Crane Eastern Partnership DVD - This documentary focuses on the history and most recent effort to restore migratory whooping cranes to eastern North America.
- Breeding and Reintroduction Program DVD - This includes a series of videos explaining the whooping crane breeding and reintroduction program at the International Crane Foundation.

Books and Publications (for reference use only)

- *Cranes: Symbols of Survival* - This publication outlines the 10 year strategic plan for the International Crane Foundation. The plan builds on lessons and experience from forty years of crane conservation and describes ICF's vision for the next decade.
- *Reflections: The Story of Cranes* - This reference book provides an introduction to cranes, the value of wetlands, and the International Crane Foundation's programs. The book includes color photographs, range maps, and conservation challenges for each of the crane species.

Brochures and Handouts

A variety of brochures and other handouts are provided for your use. Feel free to keep these or photocopy as needed. If you are sending the trunk on to other users, please leave an ample brochure supply in the trunk for their use. Contact us for additional copies.



Vocabulary (words listed are found in italics)

Adaptation: Something that an organism has or does that helps it survive in its environment.

Barbs: One of the parallel filaments projecting from the main shaft of a feather.

Barbules: Small *barbs* or pointed projections, especially one of the small projections fringing the edges of the *barbs* of feathers.

Clutch: The eggs laid by a female in a single nesting. In the wild, cranes usually lay a two-egg clutch.

Contour feathers: Feathers that form the general covering of a bird. They are stiff, strong, and light. Contour feathers are comprised of a hollow quill with many *barbs*.

Habitat: The environment in which an animal lives containing food, water, shelter, and space in a suitable arrangement to meet the animal's needs.

Imprinting: A type of rapid learning commonly found in ground-nesting birds. Chicks imprint on the first object they see and hear after hatching - usually their parent. Imprinting also establishes a species' identity, mating preference, and *habitat* preference.

Omnivore: A species that feeds on both animal and vegetable matter.

Precocial: A term describing a bird which hatches with down feathers, open eyes, and the ability to leave the nest within minutes or hours after hatching. Most ground-nesting birds, including cranes, are precocial-an *adaptation* which serves to reduce losses to predators. "Altricial" chicks are those which are naked and helpless when they hatch, for example, a *clutch* of robins.



Adult and juvenile whooping cranes in a wetland. *Photo by: USFWS*

A Closer Look at Whooping Cranes

Activity Guide

(Rev. 2015)



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Produced under a 2006-2007 grant from the Wisconsin
Environmental Education Board

Activity 1: Name That Adaptation



Summary

Students will explore structural, physiological, and behavioral adaptations of whooping cranes.

Objectives:

Students will be able to:

- Define an adaptation
- Describe several whooping crane adaptations
- Explain how a whooping crane's adaptations help it survive
- Compare whooping crane and human morphology
- Sketch their observations

Standards:

Science F.8.2

Art & Design H.8.3

Materials Needed:

- Copies of "Name That Adaptation" worksheet

All of the following can be found in the trunk:

- Whooping crane skull
- Whooping crane egg replica
- Whooping crane leg replica
- Whooping crane photographs
- Crane flight feathers

Link to the Plan

Read [Section 5](#) (*Whooping Crane Ecology and Biology*) in the Management Plan

Background:

The common name "whooping crane" probably comes from the loud, unique call that the birds make when they are alarmed, defending their territory, or reinforcing pair bonds (securing their mates). Whooping cranes have an elongated trachea, which allows them to produce the loud and distinctive whooping calls for which they are known.

Whooping cranes are one of fifteen species of cranes found in the world. There are only two kinds of cranes found in North America: whooping cranes and sandhill cranes. There are about 650,000 sandhill cranes in the world, but only about 600 whooping cranes. Sandhill cranes are grayish-brown and stand about 3.5 feet tall, while whooping cranes are white and stand about five feet tall. In fact, whooping cranes are the tallest birds in North America, yet they only weigh 15 pounds. They have a wingspan reaching seven to eight feet across.



A whooping crane among several sandhill cranes. What might have caught their attention off in the distance? Photo: Wisconsin DNR

Adult whooping cranes are almost entirely white. The only non-white markings on whooping cranes are their black wingtips, black facial markings, the bare patch of red skin on the top of their heads, and black legs and feet. Whooping crane chicks are cinnamon brown, which helps to camouflage them. As the chicks mature during their first year, they develop the characteristic black wingtips, and their body feathers become a mix of cinnamon brown and white with black wingtips. Whooping cranes have different

types of feathers: down feathers to keep them warm, contour feathers that provide body shape and protection, and strong, stiff and much larger flight feathers (which are a type of contour feather).

Whooping cranes depend on wetlands for their survival. Whooping cranes use wetlands as a source of food, to roost (sleep), and to make their nests. A whooping crane diet consists of



minnows, insects, frogs, crabs, crayfish, snails, rodents, and smaller birds, which are all found in wetlands.



Adult and juvenile whooping cranes.
Photo: International Crane Foundation



Whooping cranes fly with their legs and neck outstretched and have black wingtips. Their wingspan is seven to eight feet across.
Photo: USFWS

Whooping cranes build “floating nests” made of bulrushes and other wetland vegetation that sit in shallow water, six to ten inches deep. Building their nests in water helps to reduce the risk of egg predation by animals that are not willing to travel through the water to get to the eggs. Whooping cranes usually lay two eggs, and both the male and female will incubate them for 29-30 days. Both parents defend their nest and young, but the male is often more aggressive.



A “floating” wetland nest with whooping crane eggs in it. *Photo: USFWS*

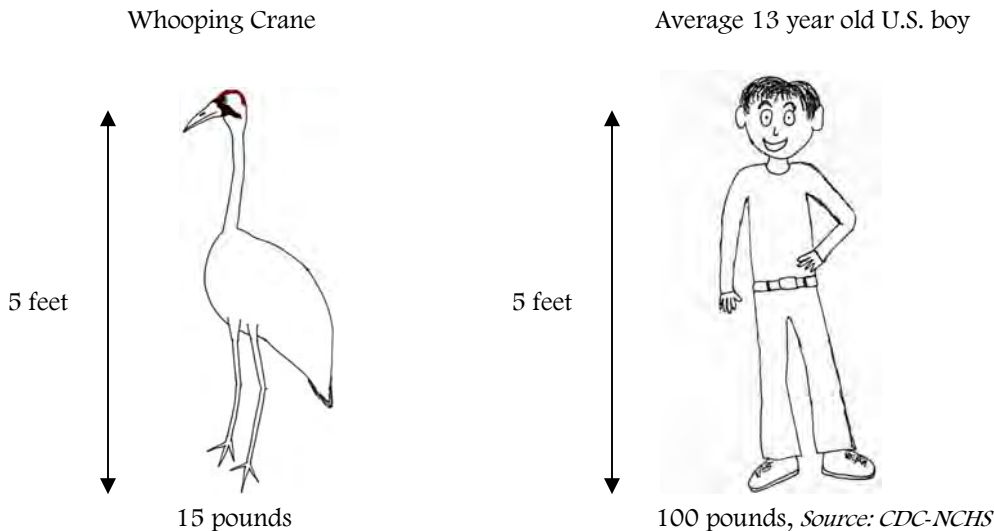


Minnows are one type of food eaten by whooping cranes. *Photo: USFWS*



Whooping cranes have many **adaptations** that help them survive in wetland habitats. An adaptation is a structural, physiological, or behavioral trait that increases an organism's chances of survival and reproduction and helps it become well-adjusted to its environment. For example, an owl's large eyes are an adaptation that allow it to see better at night. Because owls eat other nocturnal animals such as mice and voles, they are more likely to find food at night by being able to see better and are therefore more likely to survive.

Whooping cranes are adapted for flight. They weigh only 15 pounds, despite being five feet tall. Like all birds that fly long distances, whooping cranes have hollow bones filled with air. These bones make a strong yet light skeleton so that birds are able to fly!



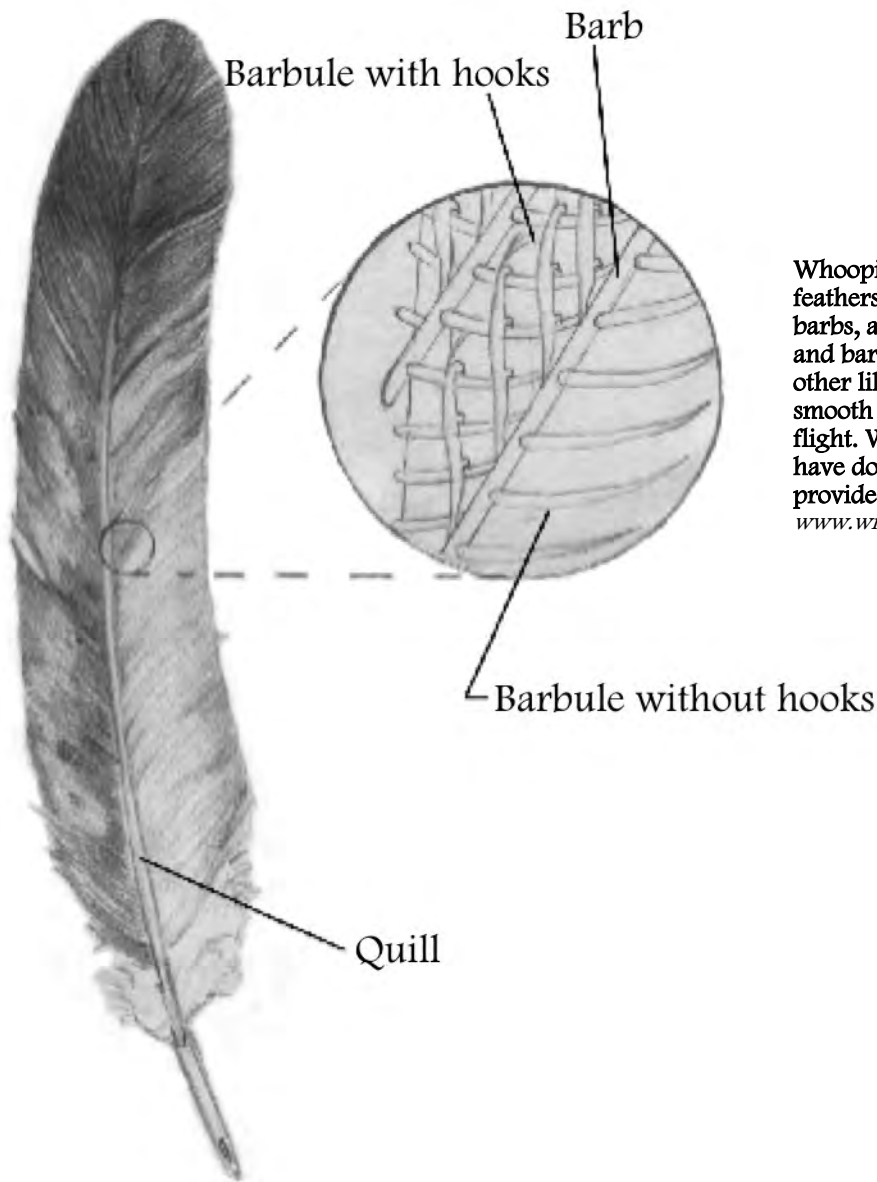
How does the height and weight of a whooping crane compare to yours? Why would a bird weigh 85 pounds less than a human being of the same height?

Whooping cranes also have feathers adapted for flying. They have flight feathers, which are a type of contour feather. Contour feathers are light, strong, and stiff and cover most of the outer surface of the bird. These feathers give the bird its shape and color and protect the bird from sun, wind, and rain. Contour feathers are made up of a hollow quill with many barbs that branch out from the quill. These barbs then branch out into barbules, which connect to each other like a zipper to form a flat, smooth surface that retains the shape of the feather. These barbs and barbules provide the resistance to air that the birds need to fly. Whooping cranes also have down feathers, small, soft, and fluffy feathers that are under the contour feathers and provide insulation for the bird.

Whooping cranes display several behavioral adaptations. For example, males and females exhibit “dancing behavior,” which consists of bowing, jumping, running, stick or grass tossing, and wing flapping. Whooping cranes are often seen dancing during courtship, to relieve tension, and when they are preparing to migrate. Whooping cranes are also behaviorally adapted in their mating patterns. Whooping cranes keep the same mate for many years, and sometimes for life. This behavior is an adaptation because courtship often requires animals to expend a large amount of energy, which can then prevent the animals from spending energy on other important activities (such as finding food or defending a territory). By keeping the same mate for many years, a whooping crane will have more energy to use for



migrating, establishing a territory, laying and incubating eggs, defending its nest, and caring for its young.



Whooping cranes have flight feathers, comprised of a quill, barbs, and barbules. The barbs and barbules connect to each other like a zipper to form a flat, smooth surface that allows for flight. Whooping cranes also have down feathers which provide insulation. *Illustration: www.wings.avkids.com*



Procedure:

- 1) Have students complete a webquest on adaptations. Here are some ideas for webquests:
 - For upper elementary and middle school students: “I Will Survive!” at: questgarden.com/47/15/7/070303074334/index.htm
 - For middle school science students: “Adaptations and Evolution” at: questgarden.com/127/14/1/110526073851/
- 2) Distribute the “Name That Adaptation” worksheet. Display the whooping crane skull, egg replica, leg replica, feathers, and photographs that are in the crane trunk. Students should examine the items and fill out the worksheet to explain how each characteristic is an adaptation and describe how it helps a whooping crane survive. Pages 24-27 can be photocopied and distributed to students to help them fill out the worksheet.
- 3) Ask the students to examine the replica of the whooping crane leg again. Ask students to point to where the ankle is and where the knee is. *Many people mistake the whooping crane’s ankle for the knee and wonder why the “knee” bends backwards. In fact, the whooping crane’s leg joints are similar to a human’s, but the proportions are different.*

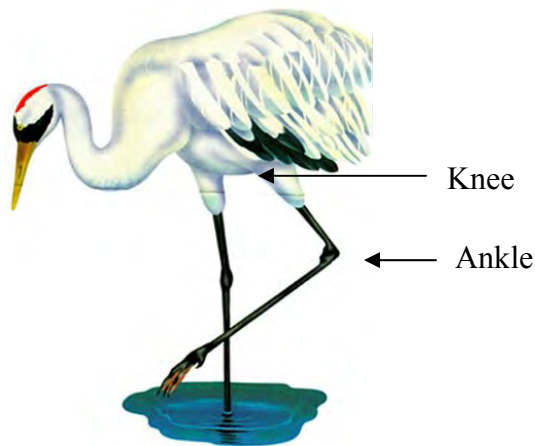


Illustration: U.S. Environmental Protection Agency

- 4) Have students compare and contrast the anatomy of a human and whooping crane leg by sketching a picture of each. Students should explain why the proportions of the whooping crane leg might be useful to an animal that wades in the water, whereas the proportions of a human leg are better suited to an animal that walks on land. *Long legs help cranes wade through water and walk through tall marsh grasses. Their long toes help distribute their weight so they can easily walk on soft surfaces like mud.*
- 5) Have students research the mechanics of flight in birds. They can research in the library or on the Internet. Ask students to research on their own or in pairs how the shape of the wing and feathers provide lift for the birds. Students should then share their findings in small groups. Have them sketch a bird’s wing. Does it lay perfectly flat? Some informative websites about the dynamics of flight include:
The Aeronautics Internet Textbook:
ww35.wings.avkids.com/Book/Animals/intermediate/birds-01.html
Earthlife on the web: www.earthlife.net/birds/flight.html



A bird's wing is shaped as an airfoil. Air must travel over the top and bottom part of a wing. Because the wing is concave rather than flat, the air traveling over the top of the wing has a little farther to go than air traveling under the bottom of the wing. The arch on top causes the airflow to increase as the air travels over it and results in reduced pressure on the top side of the wing. Meanwhile, the airflow on the bottom side slows down, and results in increased pressure on the bottom side. This pressure differential allows the wing to provide lift.

- 6) Let students examine the whooping and sandhill crane feathers using the magnifying lens. Have students sketch a whooping crane flight feather and label the quill, barbs and barbules. How does the structure of this feather type relate to its function?
The flight feathers are light, strong, and stiff and provide resistance to the air. The flight feather gives the bird lift and propels it as it flies.

Extensions:

- 1) Divide students into small groups. Assign each group a different ecosystem (desert, rainforest, tundra, alpine forest, beach, etc.). Each group should design a plant or animal that is adapted to survive in that environment. Each group should draw their organism and describe five different adaptations that it has that help it survive in its environment.
- 2) Select an ecosystem and have students select an organism in that ecosystem to research. Once students determine what kinds of adaptations their organism exhibits, have them do a brief presentation sharing these adaptations with the rest of the class.



Name: _____

Name That Adaptation

Characteristic	Describe the characteristic.	Explain how the characteristic serves as an adaptation for the whooping crane.
Example: <i>Nest construction</i>	<i>Whooping cranes build their nests in shallow water.</i>	<i>A nest in water helps protect the eggs from predators that live on the land such as raccoons and bobcats.</i>
Egg color		
Chick color		
Beak shape		
Legs		
Feet and toes		
Height		
Weight		
Elongated trachea		
Bone structure		
Mate selection		
Courtship behavior		
Feathers		

Activity 2: Wetland Wonders



Summary

Students explore the components of a Wisconsin wetland and design a wetland energy pyramid.

Objectives:

Students will be able to:

- Describe a Wisconsin wetland
- Identify biotic and abiotic components of a Wisconsin wetland
- Understand the different levels of an energy pyramid
- Design an energy pyramid for a Wisconsin wetland
- Explore where whooping cranes fit into a wetland energy pyramid

Standards:

Environmental Education B.8.6
English Language Arts B.8.1

Materials Needed:

- Copies of “What’s in a Wetland?” worksheet
- Copies of “Energy Pyramid” worksheet
- Whooping crane food box (in crane trunk)
- Pencils
- Clipboards

Link to the Plan

Read [Section 5.7.7.6 \(Food Preferences\)](#) in the Management Plan

Background:

Ecosystems are made up of both **biotic** (living) and **abiotic** (nonliving) factors. For example, biotic factors in a forest would be raccoons, trees, birds, and squirrels. Examples of abiotic factors are soil, sunshine, wind, and rocks.

All organisms require energy to grow and reproduce. An energy pyramid is one way of describing how organisms relate to each other based on their energy consumption. Organisms are placed at different trophic (energy) levels in an energy pyramid depending on what they eat and where they get their energy. Trophic levels indicate an organism’s position in the food chain. The different trophic levels are made up of producers, consumers, and decomposers. The organisms on each trophic level get their energy by consuming organisms on lower levels.

Producers are the green plants that get their energy from the sun. These organisms produce their own food (through photosynthesis) from the energy they get from the sun. Carrots, roses, algae, and grass are examples of producers.

Consumers are organisms that get their energy from consuming (eating) other organisms. There are three different levels of consumers in an ecosystem: primary, secondary, and tertiary.

1. **Primary consumers** are organisms that eat producers. Primary consumers are **herbivores**, animals that eat only plants and vegetation. Mice and rabbits are examples of primary consumers.
2. **Secondary consumers** are organisms that eat primary consumers. Secondary consumers can be **carnivores** (animals that eat only meat) or **omnivores** (animals that eat both meat and plants). Cranes and snakes are examples of secondary consumers.
3. **Tertiary consumers** are organisms that eat primary and secondary consumers. They can be either carnivores or omnivores. Bobcats are tertiary consumers because they eat whooping cranes. Owls are tertiary consumers because they eat snakes.

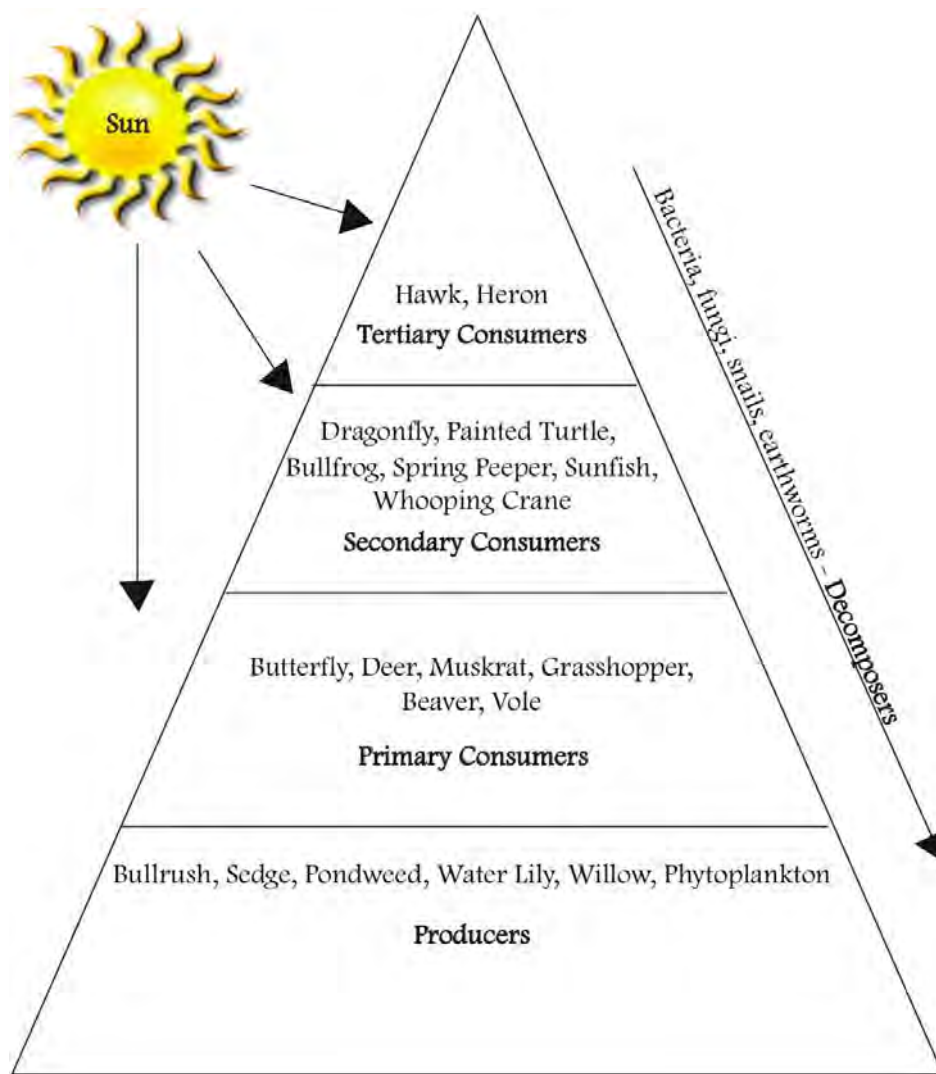
Decomposers are organisms that eat dead material in an ecosystem and help break it down into smaller pieces. Did you ever wonder why a log begins to disintegrate into smaller pieces over time? It is because decomposers are hard at work breaking down the log. Often, decomposers are too small to see without the magnification of a microscope. Fungi, bacteria, and earthworms are examples of decomposers.



As we move up the trophic levels, there is less and less energy available for animals to use. This decrease in available energy occurs because there is not a 100% transfer of energy when an organism on one level eats an organism on a lower level. In other words, not all of the energy is transferred to the consumer. For example, when a rabbit eats a patch of grass, not all of the energy in the grass becomes incorporated into the rabbit. Some of it goes to helping the rabbit perform everyday functions like moving and breathing. Some of it is simply lost. Then, when a fox eats a rabbit, some of the energy is lost again, so the pyramid becomes even narrower.

As we move from one trophic level to another, the amount of energy available for organisms to consume decreases by a factor of 10. If the producers (grass) have 10,000 kilocalories of available energy per square meter per year ($\text{kcal/m}^2/\text{yr}$), the primary consumers (rabbits) only have 1,000 $\text{kcal/m}^2/\text{yr}$, the secondary consumers (fox) have 100 $\text{kcal/m}^2/\text{yr}$, and the tertiary consumers only have 10 $\text{kcal/m}^2/\text{yr}$. Because available energy decreases, there are fewer and fewer consumers as we move up the energy pyramid. A lot of producers are required to support a smaller number of herbivores and even fewer carnivores and omnivores.

Below is an example of an energy pyramid that might be found in a Wisconsin wetland:





Whooping cranes have a broad diet and feed on grain, tubers, rhizomes, blueberries, terrestrial insects (especially grasshoppers), fish, frogs, and aquatic invertebrates. Whooping cranes are often found in mudflats or shallow wetland areas where water levels have dropped so they can feed on animals that have been trapped in the remaining water. It appears that whooping cranes are especially fond of bullheads, crayfish, tadpoles, and blueberries.



Bullheads are a major component of the whooping crane's diet when they spend the summers in Wisconsin. Photo: MI DNR



Whooping cranes eat a lot of crayfish when they are available. Photo: WI DNR



Tadpoles are a favorite snack among whooping cranes. Photo: WI DNR

Procedure:

- 1) Have students write a paragraph or two describing what they think a wetland is (including a list of the types of organisms that they think they would find in a wetland) and explaining the importance of wetlands.
- 2) Visit a wetland and have students record what they see using the "What's in a Wetland?" worksheet. List the biotic and abiotic factors in a Wisconsin wetland.
- 3) Using the list of organisms that they observed and would expect to observe in a wetland, have students create an energy pyramid of a wetland ecosystem on the "Energy Pyramid" worksheet. Where do whooping cranes fit in this energy pyramid?
- 4) Students should examine the food items in the food box. How is the sample of crane chow (which is fed to cranes in captivity) different from what cranes would eat in the wild?



Extensions:

- 1) Students can make an energy pyramid based on what they consume. Have the students keep track of everything that they eat in one day and make an energy pyramid. Where do they fit in? Is there anything that can eat them?



Name: _____

What's in a Wetland?

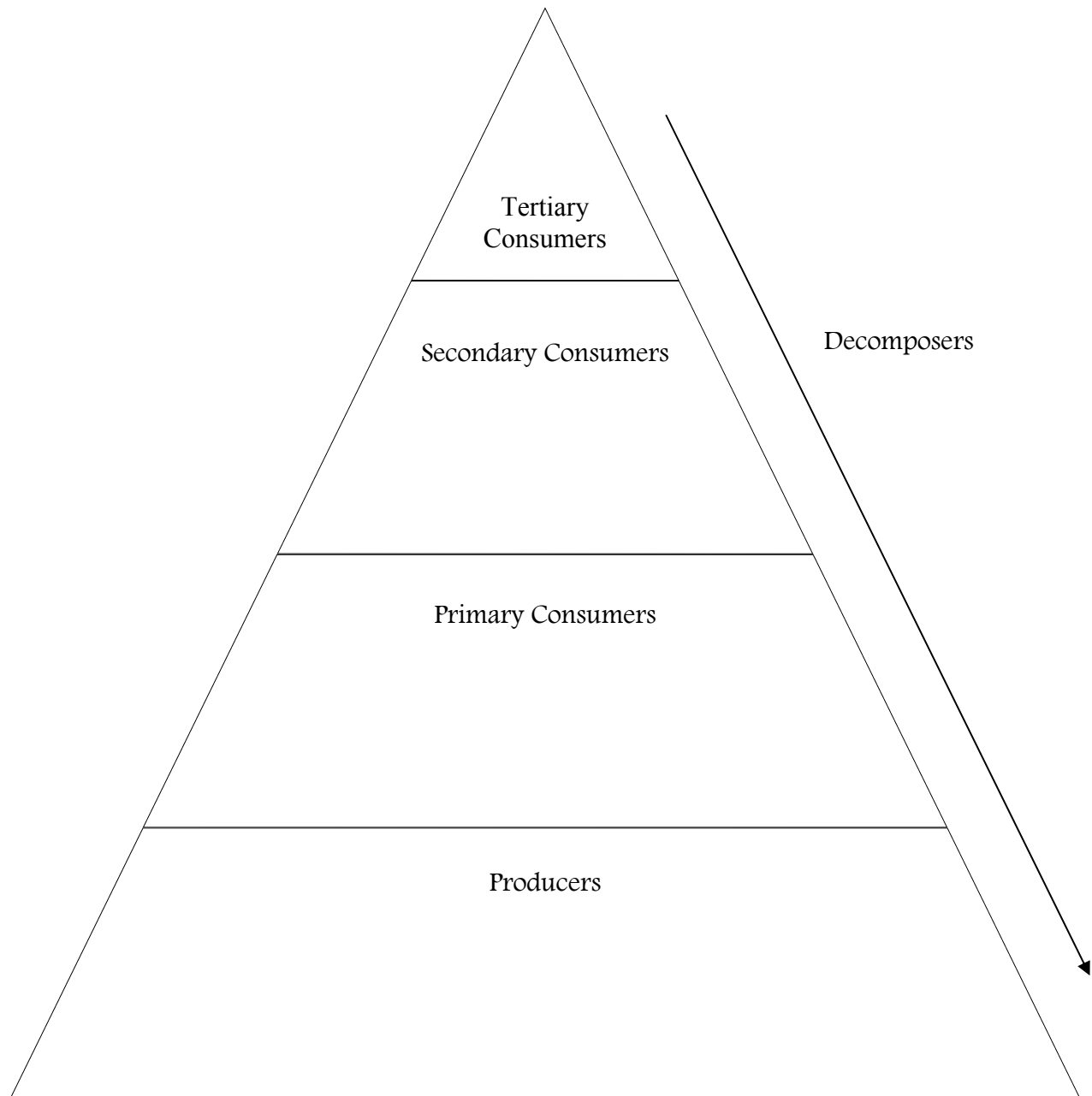
Biotic factors		Abiotic Factors
Plants	Animals	

Are there other organisms that live in a wetland that you didn't see while you were visiting it? List those organisms below. Why do you think you didn't see them?



Name: _____

Wetlands Energy Pyramid



Activity 3: Web of Life

(A Project Learning Tree ® Activity)



Summary

Students will understand that ecosystems are made up of interdependent organisms and other components.

Objectives:

Students will be able to:

- Describe the predator and prey relationships of wetland organisms
- Create a web of life to show how organisms both depend on and contribute to the balance of organisms in an ecosystem
- Explain how organisms in an ecosystem are all connected
- Explore how removal of whooping cranes from a wetland affects other organisms in the wetland

Standards:

Science B.8.8 and F.8.8

Art and Design E.8.1

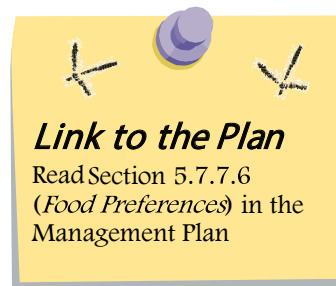
Environmental Education B.8.3

Materials Needed:

- A ball of string or yarn
- Resource materials about wetland plants and animals
- Folders (optional)
- Web of life cards (have students make their own)

Due to copyright laws, we are unable to make this activity available on the web. To receive a hard copy of this activity, contact Davin Lopez at:

Davin.Lopez@wisconsin.gov or 608-266-0837



Permission to adapt Activity 45 – *Web of Life*, from Project Learning Tree's *PreK-8 Environmental Education Activity Guide* (Copyright 2008, American Forest Foundation), for wetlands has been granted by the American Forest Foundation to the Wisconsin Department of Natural Resources for a one-time use in the *Whooping Crane Activity Guide*. Permission to adapt should not be interpreted in any way as an endorsement of this adaptation by the American Forest Foundation. The complete set of Project Learning Tree's educational materials can be obtained by attending a Project Learning Tree workshop. For more information on how to attend a PLT workshop, please contact Nicole Filizetti, WI Project Learning Tree Coordinator at wcee-plt@uwsp.edu or (715) 346-2014. For more information about Project Learning Tree, please visit www.plt.org.

Activity 4: Extra! Extra! Read All About It!



Summary

Students create a newspaper and poster to educate people in their community about whooping cranes and threatened and endangered species.

Objectives:

Students will be able to:

- Define threatened and endangered species
- Describe causes that lead to species reaching threatened or endangered status
- Understand the causes of whooping cranes reaching endangered status
- Explain why it is important to recognize species at risk of extinction
- Educate others about whooping cranes and threatened and endangered species
- Understand visual techniques used in mass media

Standards:

Social Studies A.8.1.1

Science E.8.6

Art and Design F.8.2

Materials Needed:

- Paper, computer, and art materials necessary for creating a newspaper
- Bird Flight Diverter (in crane trunk)

Link to the Plan

Read [Sections 1 and 6.7.4](#) (*Background and Collisions with Power Lines*) in the Management Plan

Background:

As defined by the U.S. Fish and Wildlife Service, “An **endangered species** is one that is in danger of extinction throughout all or a significant portion of its range. A **threatened species** is one that is likely to become endangered in the foreseeable future.” The U.S. Fish and Wildlife Service provides species and state specific information on threatened and endangered species on their website at: www.fws.gov/Endangered/

One or many factors can result in the decline of a species to the point that it is nearly eliminated from the Earth. Some reasons that species become threatened or endangered are:

1. **Loss of habitat** – When an organism loses its home, it can be difficult to find food, shelter, and protection. Many populations decline because their habitats are modified or destroyed, and they can no longer use them.
2. **Overexploitation** – Species are excessively hunted or collected so that organisms are removed from a population at a higher rate than they are added. (For example, 100 birds are collected from a population each year, but only 75 eggs hatch per year. Of the 75 hatchlings, only 43 chicks survive because of predation and limited resources.)
3. **Power line collisions** – Collisions with power lines are a significant cause of whooping crane mortality during migration. Cranes often hit power lines after being disturbed from a roost (a place where the cranes nest and/or sleep). There is an increasing number of power lines in the U.S. that are being marked with Bird Flight Diverters, like the one in the crane trunk, to reduce the risk of collision.
4. **Introduction of exotic species** – Organisms can be considered



Habitat loss, such as wetland destruction, is an important factor in species' decline.
Photo: USFWS



Zebra mussels are an exotic invasive species in the Midwest. *Photo: Ohio Sea Grant*

native or **exotic** to an ecosystem. Native species are organisms that naturally occur in a certain area. Exotic species are organisms that did not historically live in the area but have



been introduced either accidentally or on purpose. Exotic species can reduce populations of native species when they are **invasive**; that is, they move into a native species' habitat and eventually take it over, so that the native species no longer has available habitat.

An example of an exotic, invasive species is the zebra mussel. The zebra mussel was originally found in Europe and Asia but was introduced to the Mississippi River and Great Lakes in the 1980s by shipping vessels as they traveled across the ocean. There are many native mussels that have been living in the Mississippi River for a long time that now have to compete with zebra mussels for food and space. As a result, many of these native species of mussels have become threatened or endangered.

Between 1860 and 1870, the whooping crane population was estimated to be between 500-1,400 individuals. By 1944, approximately 21 birds remained in the whole world. Six of these birds lived around a lake in Louisiana and did not migrate. Fifteen birds belonged to a population that migrated between the Aransas National Wildlife Refuge in Texas and the Wood Buffalo National Park in Canada. In 1949, severe weather killed all of the birds in Louisiana, leaving an estimated fifteen whooping cranes. With so few birds left, the whooping crane was on the brink of extinction.

The two most important factors that led to the decline of whooping cranes in the early 20th century were habitat loss and overexploitation from unregulated hunting. As European settlers traveled westward, they drained marshes and plowed prairies for agriculture, destroying much of the birds' nesting habitat. Many remaining habitats were close to human disturbance, a stress to which this shy and secretive species was unable to adjust. As the number of whooping cranes declined, hunters, hobbyists, and museum collectors scrambled to get hold of the rare specimens and eggs for their collections.

The United States Fish and Wildlife Service (USFWS) listed the whooping crane as threatened with extinction in 1967 and endangered in 1970. Canada designated the whooping crane as endangered in 1978.

The ultimate goal of current restoration efforts is to remove the whooping crane from the *Federal List of Threatened and Endangered Species*. One way to reach this goal is to have two self-sustaining migratory populations of whooping cranes that can breed and raise young on their own. Currently, there is one self-sustaining population of whooping cranes that migrates between Texas and Canada and reproduces on its own. This is a small population of birds that spends each winter in the same vicinity on the Gulf Coast of Texas. Any catastrophic event



Habitat loss and unregulated hunting were the two major causes of the decline of whooping cranes. Whooping cranes were designated endangered in the U.S. in 1970.

Photo: International Crane Foundation



such as a natural disaster (severe storm, hurricane, or tornado) or disease outbreak could eliminate the entire population.

In 1999, the Whooping Crane Eastern Partnership (WCEP) was formed when nine government agencies and non-profit organizations joined together with a similar goal: restoring a second migratory population of whooping cranes to eastern North America. Restoring a second migratory population in another part of the country will help safeguard the species from extinction; if something catastrophic happens to one population, the other population could still survive. Establishing a second migratory population of whooping cranes will bring the birds closer to delisting from the *Federal List of Threatened and Endangered Species*.

The whooping cranes in the Aransas-Wood Buffalo population (that migrate between Canada and Texas) are designated endangered. The whooping cranes in the Eastern Migratory Population, the Louisiana Population and the Florida Population have been designated nonessential experimental populations (NEP). Whooping cranes in a nonessential experimental population are treated as a threatened species, which provides more flexibility and discretion in managing the population. Because whooping cranes in the Eastern Migratory Population fall under the nonessential experimental population designation, they are not considered endangered in Wisconsin and other eastern states (see below).



Procedure:

- 1) Let students examine the Bird Flight Diverter found in the whooping crane trunk. Ask them to consider how it reduces whooping crane collisions with power lines. Ask the students to give possible explanations of how the Bird Flight Diversers work.
- 2) Have the students research color vision in diurnal birds (on the Internet or in the library), and ask them to compare color vision in humans and birds. How do they compare? Do humans and birds see the same range of colors? (*Diurnal birds can see ultraviolet light, but humans cannot. Light is made of electromagnetic waves of different lengths, or*



wavelengths. Organisms have cones in their eyes that allow them to detect different wavelengths of light. Humans have three types of cones that only detect wavelengths in what we refer to as the visible light spectrum. Many diurnal birds have four types of cones that allow them to detect light in the visible light spectrum as well as in the ultraviolet light spectrum.)

- 3) After students explain the difference between human and diurnal bird color vision, ask them again to explain how they think the Bird Flight Diverter works (*It reflects ultraviolet light, which appears very bright to the birds. In fact, research has shown that most diurnal birds will not fly or land within 25 feet of the diverters because the reflection hurts their eyes. The diverters are attached on power lines and absorb ultraviolet from the sun. There are two types of stickers on the bird flight diverters; one sticker humans see as a bright color (yellow or orange), and the other we see as white. The white sticker absorbs ultraviolet light, so the birds see it as a brightly colored sticker. After absorbing the sun's rays all day, the white sticker becomes so concentrated with UV light that it hurts the birds' eyes to look at it. The sticker can emit UV light for ten to twelve hours after it has stopped absorbing radiation, which means that it also glows in the dark.*)
- 4) Divide students into small groups and have students design a newsletter to educate people in their neighborhood about whooping cranes and the importance of recognizing threatened and endangered species.
 - The newsletter should include biological information about the whooping crane, an explanation of why it is important to recognize endangered species, current whooping crane restoration efforts, and suggestions of what people can do to help remove whooping cranes from the endangered species list.
 - The newsletter should include written as well as graphic materials. Here are some questions that students should address in creating their newsletter:
 - a) What specific causes resulted in the whooping crane becoming an endangered species?
 - b) Why is it important to recognize threatened and endangered species? Include in your response the different types of value that a species can have. Is it worth money? Does it serve a specific function in an ecosystem? Does the species provide a specific service important to people? Is there a moral importance in conserving a species?
 - c) Why is it important to restore the population of whooping cranes in North America?
 - d) What are the possible effects of the permanent loss of a species from the earth?
 - e) What are three ways that people in the community can help the whooping crane? Threatened and endangered species in general?
- 5) Have student groups come up with a slogan and design a poster to encourage the people in their neighborhood to save the endangered whooping cranes.



Extensions:

- 1) Students can research other threatened and endangered species in their state. How many endangered species are there? How many of them are birds? Mammals? Plants?
- 2) Ask each student to give a presentation on a threatened or endangered species. Students should provide life history information on the species, causes for the decline of the species, and restoration efforts currently underway.
- 3) Have students research and create a presentation on species that have been removed from the *List of Threatened and Endangered Species*, such as wolves, turkeys, trumpeter swans, and bald eagles.
- 4) Students can check out Wisconsin State Threatened and Endangered Species on the Wisconsin DNR website at: <http://dnr.wi.gov/files/PDF/pubs/er/EROO1.pdf>
Which animals and plants do they recognize? Which species have they seen and which have they heard about? How and what do they know about them?

Activity 5: Have to Have a Habitat



Summary

Students roleplay a mock town council to explore different issues, attitudes, and consequences associated with developing a natural area.

Objectives:

Students will be able to:

- Identify some of the issues faced in developing a natural area
- Evaluate how developing a natural area may affect an endangered species
- Assess short-term and long-term effects of development on the species and ecosystem levels
- Examine how personal beliefs can influence environmental decisions
- Take a position and advocate that position in a debate
- Effectively participate in a discussion

Standards:

Science F.8.9

Art and Design E.8.4

Environmental Education B.8.10 and B.8.15

Materials:

- Area set up for a debate, such as two tables facing one another in the front of the classroom
- Paper
- Writing utensils
- Bird Flight Diverter (in crane trunk)

Link to the Plan

Read [Sections 5.6, 5.7, and 6.7.4](#) (*Migratory Behavior, Habitat Use, and Collisions with Power Lines*) in the Management Plan

Background:

Many species of birds migrate south every winter, heading to warmer areas where food is plentiful, and return north to their nesting grounds after the spring thaw. Many birds have an internal clock that informs them when it is time to migrate south for winter. It is thought that as the amount of daily sunlight decreases with the approaching winter months, hormone production is stimulated. These hormones then result in changes in the birds' physiology and behavior that prepare them for migration.

In whooping cranes, migration is a learned behavior. In autumn, young birds learn the migration route by following their parents or older members of the population from their summer nesting grounds to their winter habitat. Whooping cranes migrate south as pairs, in family groups, or as small units of three to five birds. Pairs with young birds are among the last to leave the nesting habitat.

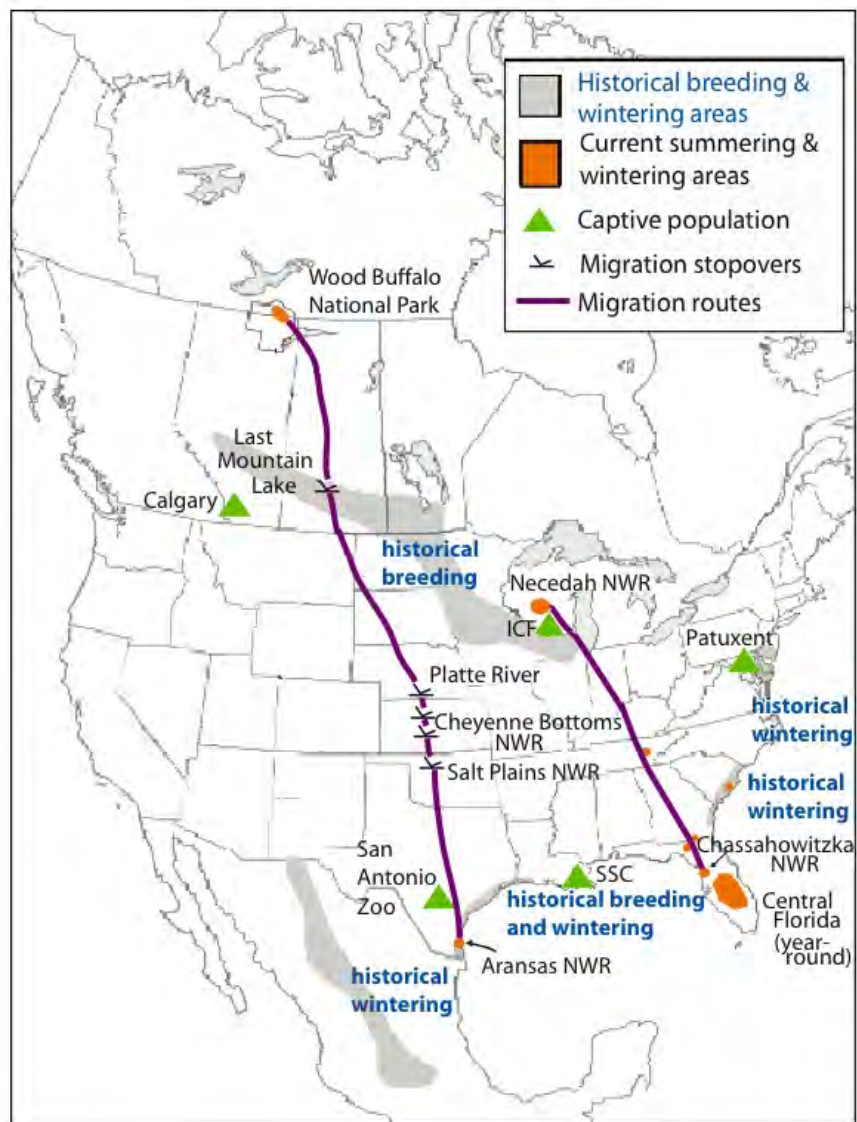
During every migration cycle, whooping cranes leave their summer nesting habitats in the northern U.S. and Canada and migrate to their wintering habitats in the southern U.S. Along the migration route, cranes use many stopover habitats. Stopover habitats are used for different lengths of time (days or weeks) to gather the food and energy needed during migration, and to take advantage of abundant resources. Whooping cranes are opportunistic foragers, which means that when a certain food in their diet is plentiful, they will take advantage of the abundance and continue to eat it. For example, if during migration, whooping cranes find a cornfield with a lot of unharvested waste corn and the weather is good, the cranes will likely stay at the stopover site and continue to eat for awhile until resuming their migration.

Most whooping cranes use the same summering, wintering, and stopover sites year after year when conditions permit. However, habitat availability may change every year based on weather conditions (drought), resource availability (food), or environmental conditions (draining or filling of wetlands, power line construction). Whooping cranes vary their wintering, stopover, and nesting grounds as changes in habitat availability occur.

Currently, there are two migrating populations of whooping cranes. The Eastern Migratory Population (EMP) migrates between Wisconsin and the southeastern U.S. The Aransas-Wood Buffalo Population of whooping cranes migrates between Canada and Texas.



Autumn migration for the whooping cranes in the Eastern Migratory Population typically begins between late October and early December. Most birds usually depart Wisconsin in mid-November. The birds find wintering habitat in many states of the southeastern U.S., including Florida, Tennessee, South Carolina, North Carolina, Georgia, and Alabama.



Historical and current breeding and wintering areas and migration routes of whooping cranes (adapted from Meine & Archibald, 1996).

As spring approaches, whooping cranes begin displaying more “dancing” behavior (such as running, leaping and bowing, unison calling, and flying), indicating they are preparing for migration. Family groups and pairs usually leave the wintering grounds first, with the help of the seasonal strong winds at their backs to make their flight a bit easier. Cranes migrate during the day, making regular stops to feed and rest. Cranes in the EMP leave their wintering habitat between late February and early April. Spring migration is usually completed in two to four weeks.



Habitat availability is a critical factor in whooping crane migration. Because migratory whooping cranes require nesting, wintering, and stopover habitats, losses of or changes to these habitats can have significant effects on population numbers. Habitat is lost and changed through both natural factors (droughts, hurricanes) and human-induced factors (draining wetlands for development or agriculture, designating an area to be a wildlife refuge, or even building a subdivision adjacent to an important habitat use area).

Other factors can affect whooping crane populations as well. Over-hunting in the 1900s played a large role in the decline of whooping cranes. Collisions with power lines are a significant cause of death in whooping cranes during migration (see Section 6.7.4, *Collisions with Power Lines, Towers, Turbines, and Other Structures*, in the *Management Plan*). Predator populations are also important. If, during one year, bobcats are abundant, then more whooping cranes will likely be predated.



Increased “dancing” behavior in the spring is a sign that whoopers are getting ready to migrate.

Photo: U.S.G.S. Patuxent Wildlife Research Center

Restoration efforts in recent years have helped to rebuild the whooping crane population which was nearly extinct in the 1950s when there were approximately only 15 wild whooping cranes left on Earth. However, many natural- and human-induced factors still lead to variation in the population numbers from year to year.

Procedure:

- 1) Present students with the following scenario:

You live in Belle River, Wisconsin. Belle River is a small town with a 20-acre wetland preserve called Belle Wetland. Every spring for the past five years, two whooping cranes have stopped at this wetland to spend two or three weeks feeding on the insects, frogs, and minnows that live there. Belle Wetland is also home to many other species of plants and animals, such as bullfrogs, sunfish, green herons, and an endangered species of orchid.

Your town has recently discovered that a development firm would like to turn the wetland into a mall with a new supermarket, a pizza restaurant, a video arcade, and a parking lot. Some of the town residents are strongly opposed to the idea of losing the only wetland habitat in Belle River. The people who work and volunteer at the Preserve are upset that the development will destroy the wetland habitat. Other residents, however, would like to see a new pizza restaurant in town. The developers are pushing hard to turn the wetland into a profitable business area. To address the issue of developing the wetland, roleplay and evaluate the different perspectives of people involved in the debate.

- 2) Divide students into groups and have students assume the following roles:
 - a) Developer (1-2 students)
 - b) Belle River wildlife manager (1 student)
 - c) Belle River Wetland Preserve employee(s) (1-2 students)
 - d) Owner of the future Belle River Pizzeria (1 student)
 - e) Belle River resident(s) in favor of the development (1-2 students)
 - f) Belle River resident(s) in opposition to the development (1-2 students)



- g) There will also need to be a meeting mediator (can be the educator or a student).
- 3) Allow the students 15 minutes to prepare questions, arguments, and viewpoints for the meeting. Students should be prepared to discuss both short-term and long-term effects that the development could have on the wetland. Have students present their arguments for the “town council.” While one group is presenting their arguments, students who are not presenting are members of the Town Council and should be taking notes and thinking of questions to ask the presenters.
 - 4) Give each group an opportunity to present their arguments to the Town Council. Here are some questions the students should consider in preparing for the debate:
 - Who are they and who do they represent?
 - What do they think should happen to the Belle River Wetland? List three reasons to support their view.
 - What are the short-term advantages and disadvantages of their view?
 - What are the long-term advantages and disadvantages of their view?
 - What are the short-term and long-term disadvantages of the opposition?
 - 6) Following the meeting, have the students list the pros and cons of developing the Wetland Preserve. Ask them to provide examples, based on the town meeting, of how people’s beliefs can affect environmental decisions such as whether or not to develop a wetland. Have students write a brief synopsis detailing their own opinions of what they think should happen to the Wetland Preserve and why.

Extensions:

- 1) Have the students look up the zoning laws for the county in which they live and consider whether the current laws are protective of wetlands. Is there more than one level of protection for the wetlands in their area? If so, what are they?
- 2) Collisions with power lines adjacent to wetlands are a significant cause of whooping crane mortality. Cranes often hit power lines after being flushed or disturbed from a roost. Ask the students to research bird collisions with power lines. (Students can do a Google search using the keywords “bird power line collisions.” The students should receive several results with links to information.) Show the students the Bird Flight Diverter in the crane trunk. Ask them to identify it and think about how it might work. (*It attaches on power lines to reduce bird collisions. The Bird Flight Diverter reflects high concentrations of ultraviolet light, which is visible to many diurnal birds. The Diverter appears very bright to the birds, so they will not fly or land within 25 feet of it because the light hurts their eyes. See step three in the “Procedure” section of Activity 4 on page 43 for more information.*) Use of Bird Flight Diversifiers is one technique to reduce the negative impact that development can have on whooping cranes. Ask students to consider other steps that can be taken to reduce the impact of wetland development. Have them brainstorm in small groups and list five techniques that can be used to reduce the effects of wetland development on wildlife.
- 3) Scientists are concerned about the impact that global warming may have on wetland habitat. Conduct research to determine the potential impacts that global warming may have on wetlands. How will this affect where you live? How will your neighborhood look 50 years from now? What will be different?

Activity 6: Migration Headache (Adapted from Project Wild Aquatic)



Summary

Students portray migrating whooping cranes traveling between nesting habitats and wintering grounds.

Objectives:

Students will be able to:

- List limiting factors affecting habitats and populations of whooping cranes
- Predict the effects of such limiting factors
- Describe the effects of habitat loss and degradation on populations of migrating whooping cranes
- Make inferences about the importance of suitable habitat for migrating water birds

Standards:

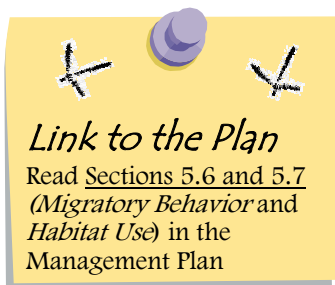
Science F.8.9

Art and Design E.8.4

Environmental Education B.8.10 and B.8.15

Materials:

- Large playing field or gymnasium
- Two bases (paper plates or carpet squares, for example) for every two or three students



Due to copyright laws, we are unable to make this activity available on the web. To receive a hard copy of this activity, contact Davin Lopez at:

Davin.Lopez@wisconsin.gov or 608-266-0837

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Activity 7: A Journey Through Time



Summary

Students explore the history of whooping crane restoration efforts and the importance of imprinting by watching a DVD, creating a timeline, and writing a fictional story.

Objectives:

Students will be able to:

- Define imprinting and understand how it relates to whooping cranes
- Explain how whooping crane behavior evolves through adaptation to its environment
- Explore the importance of costume-rearing chicks
- Describe a whooping crane's life cycle
- Write a fictional story depicting a crane's life
- Create a timeline depicting the history of whooping crane management over the past century

Standards:

Science F.8.7

Art and Design B.8.1

Environmental Education B.8.24

Materials:

- WCEP DVD (in trunk)
- Copies of "Crossword Puzzle"
- Whooping crane costume (in trunk)
- Copies of "Whooping Crane Timeline"
- Paper and writing utensils



Link to the Plan

Read Sections 2, 3, and 4 (*Introduction and Purpose, History and Current Distribution, and Recovery Goal and Strategy*) in the Management Plan

Background:

In 1880, there were an estimated 1,500 whooping cranes. As a result of habitat loss and unregulated hunting, by 1950, there was only one small population of approximately fifteen whooping cranes left that migrated between Texas and Canada. The whooping crane was on the brink of extinction, and people realized that ambitious recovery efforts were needed to save the species. Projects to protect the wild population and to create new populations were put in motion and began the whooping crane's long journey to recovery.

A **clutch** is the number of eggs that a bird lays at a time.

Whooping cranes lay two eggs per clutch. However, they usually only raise a single chick. In order to collect eggs for restoring the population, scientists believed that one egg could be removed from each new nest without decreasing the productivity of the wild population. Egg collection began in 1967. In 1975, the U.S. Geological Survey's Patuxent Wildlife Research Center in Maryland began successfully breeding whooping cranes in captivity, and these eggs became the foundation for future release programs in North America.



Whooping cranes usually lay two eggs per clutch, but usually only one survives. Photo: International Crane Foundation

Slowly, the population of whoopers was being rebuilt as birds were bred in captivity. However, with only one population of whooping cranes remaining in the world, scientists feared that any catastrophic event such as a natural disaster (storm, hurricane, tornado) or disease outbreak, could eliminate the entire population of birds.

In 1993, biologists experimented with re-establishing an extirpated population of whooping cranes in Florida. This population would be non-migratory. Birds were released into the Florida population for 13 years. Unfortunately, nesting success by the introduced birds was poor, and only a few chicks have survived past the juvenile stage. Overall mortality rates have been high, primarily due to predation. No birds have been released into the Florida population since 2004.



Captive breeding of whooping cranes allowed for restoration projects. Photo: U.S.G.S. Patuxent Wildlife Research Center



In 1999, the Whooping Crane Eastern Partnership (WCEP) was formed when nine government agencies and non-profit organizations joined together with a similar goal: restoring a second migratory population of whooping cranes to eastern North America. Restoring a second migratory population in another part of the country will help safeguard the species from extinction; if something catastrophic happens to one population, the other population could still survive. Establishing a second migratory population of whooping cranes will also bring the birds closer to delisting from the *Federal List of Threatened and Endangered Species*. WCEP's goal is to establish a self-sustaining eastern migratory population of whooping cranes with a minimum of 120 birds and 30 breeding pairs that hatch and raise offspring on a regular basis by 2020. A self-sustaining population means that the whooping cranes in the wild are laying enough eggs and raising enough chicks that grow up and reproduce to keep the population size stable or growing. Eggs laid and hatched in captivity would no longer be needed to supplement the number of birds in the population.

Raising chicks in captivity requires a lot of hard work and special attention. Scientists need to pay special attention when the chicks are very young because during this time they undergo **imprinting** (a phenomenon exhibited by many species, but especially birds, in which after chicks hatch, they become socially attached to the first moving object they see). This bonding then influences how they choose a mate later in life. In a famous study, biologist Konrad Lorenz found that if he took on the role of mother goose by feeding and caring for the goslings, then the goslings mistakenly thought he was their mother and followed him everywhere he went.

Because whooping cranes are susceptible to imprinting, precautions need to be taken when humans work with young chicks. Crane costumes are worn by scientists and pilots so that when the cranes are released into the wild, they will not be accustomed to humans. Wearing costumes masks the human face and figure so that chicks will not imprint upon humans.



Biologists wear crane costumes when interacting with young cranes to prevent them from imprinting on humans. Photo: U.S.G.S. Patuxent Wildlife Research Center

Chicks that hatch in captivity have no parents to teach them how to migrate. There are currently two methods of teaching chicks the migration route: ultralight conditioning and direct autumn release (DAR). Ultralight conditioning involves conditioning the chicks to follow ultralight aircraft flown by pilots in crane costumes on a 1,200 mile journey from Wisconsin to the southeastern United States. Direct autumn release birds are chicks that are released into groups of older whooping or sandhill cranes and learn the migration route from these experienced birds that have made the migration in previous years.



A costumed biologist feeds whooping crane chicks that are attending “flight school,” where chicks are conditioned to follow ultralight aircraft in order to learn the migration route from Wisconsin to Florida.

Photo: Operation Migration

Procedure:

- 1) Hand out copies of the “Whooping Crane Crossword Puzzle” and let students look them over. Show students the “Bringing Back the Cranes” DVD to introduce them to whooping crane history, the specifics of the restoration project, the visual footage of the cranes and the habitats they use, and the techniques used in ultralight migration conditioning. Have students fill out the crossword puzzle as they watch the DVD.
- 2) Have the students try on the crane costume. The costume is not meant to make the humans look like a whooping crane, but the crane chicks do imprint on the puppet head.
- 3) Have students create a timeline illustrating the history of whooping cranes since 1880 and the management efforts that have been undertaken to restore the whooping cranes. Students can create their own timeline or use the worksheet provided.
- 4) Students should be able to explain some of the risks taken when whooping crane chicks are raised in captivity by humans. Have students address the following issues in small groups or individually to understand how whooping crane behavior is influenced by the environment in which cranes mature:
 - a) When considering the potential effects of imprinting, explain why it is important for the scientists who raise the chicks to wear costumes. (*So that whooping cranes will want to mate with other whooping cranes, rather than associate with people.*)
 - b) What are some behaviors that can evolve in whooping cranes raised in captivity when they are not exposed to certain elements of a “wild” environment while they are maturing? Consider the possible differences in behavior between birds that are raised in the wild and birds that do not have to hunt their own food or worry about fleeing from predators because they are raised in captivity. (*They may not know how to find their own food; they will not know how to migrate; they may not be familiar with potential predators.*)
 - c) Describe how scientists are able to condition the chicks to learn the migration route by following the ultralight aircraft. (*Scientists play the sound of the ultralight engines and whooping crane calls while the eggs are incubating and to the newly hatched chicks; they wear whooping crane costumes and never speak in front of the cranes to minimize exposure of the chicks to the sound of a human voice and the form of a human body; chicks are exposed to the ultralight aircraft when they are only a few days old; recordings of crane calls are played from the ultralight aircraft.*)

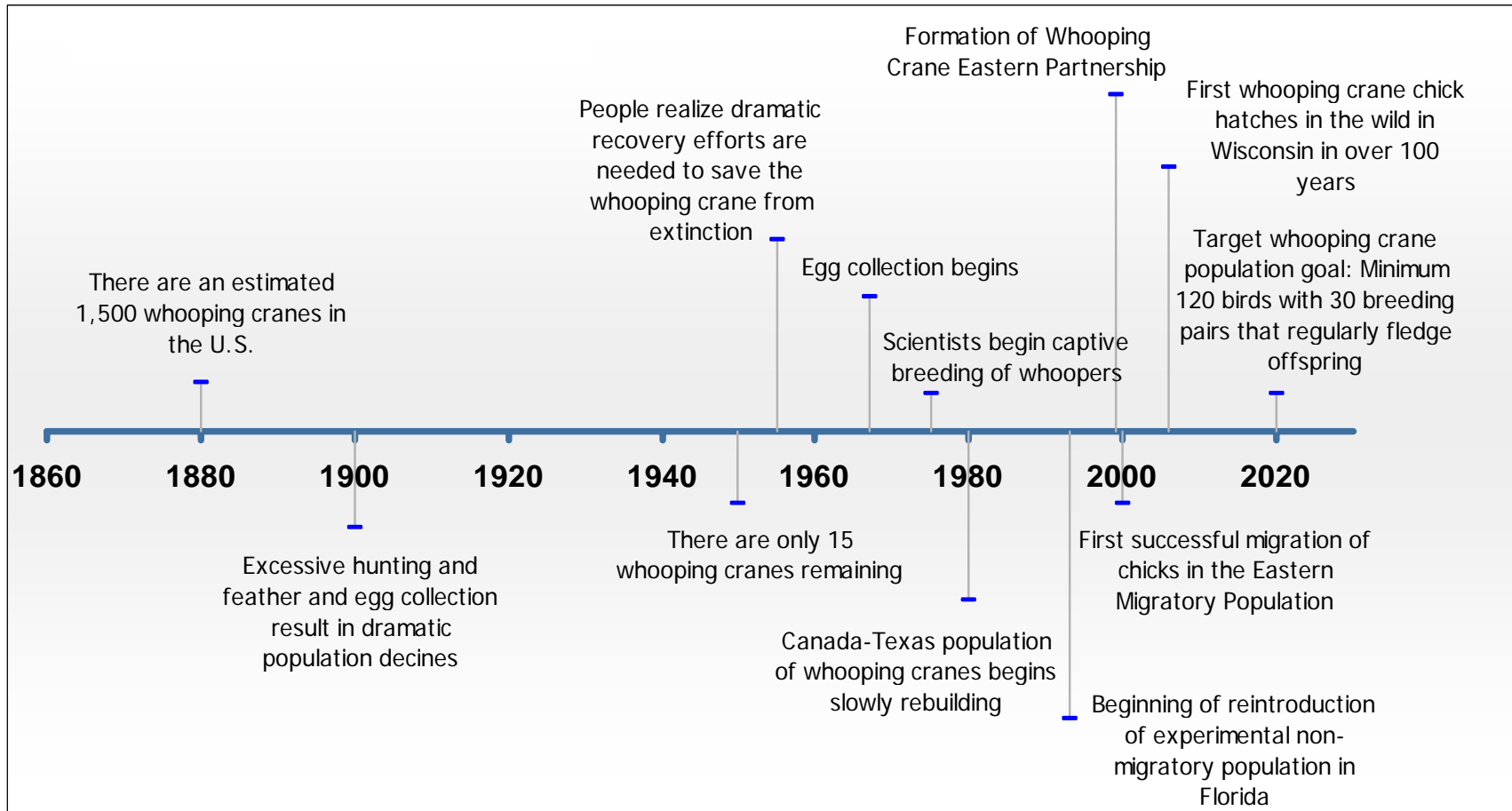


Following ultralight aircraft is one way that young whooping cranes that hatch in captivity learn the migration route. *Photo: Operation Migration*

- 5) Adopt a Crane ~ Students should track the life of a “typical” whooping crane. Have students “adopt” a crane by writing a story about the life of a whooping crane in the Eastern Migratory Population. Students should do some research (using periodicals and Internet information) to track some of the current events involving whooping cranes over recent years. The story can be fictional but should also reflect some of the actual events. Students can visit a variety of organizational websites for current events. The story can be illustrated as well. Have students draw their crane as a chick and as an adult. Stories should answer the following questions:
- Where did the bird hatch? In captivity? In the wild? In what state did the chick hatch?
 - What was its first year of life like? Was it hard to learn to fly? To learn to find food?
 - How did the chick learn to migrate? From its parents in the wild, from following ultralights, or was it a direct autumn release (DAR) bird that learned to migrate by following other whooping or sandhill cranes who have already made the migration on their own in previous years?
 - Where did the chick spend its first winter? In Florida? Georgia? Tennessee? What was it like down there?
 - What is the bird’s diet like? What does it like to eat and where does it find food most often?
 - Where is the crane’s favorite place to spend time and why? At a marsh? In a wetland on a wildlife refuge? At a farm with a small pond?
 - Does it like to interact with other whooping cranes? Why or why not?



Example of Whooping Crane Timeline





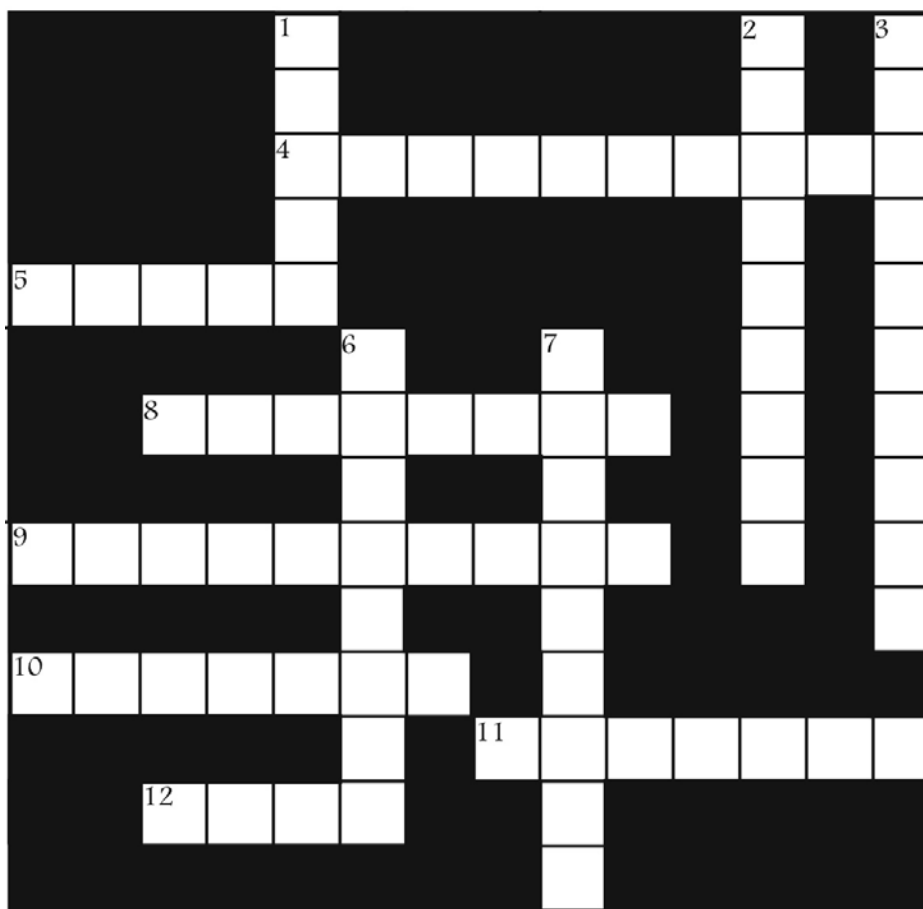
Name: _____

Whooping Crane Timeline





Whooping Crane Crossword Puzzle



Across

- 4) Whooping crane chicks raised in captivity are conditioned to follow this type of aircraft
- 5) The color of an adult whooping crane
- 8) A primary food source for whooping cranes in Texas during the winter
- 9) Collisions with these structures have killed dozens of whooping cranes over the years
- 10) Whooping cranes declined because of habitat loss, egg collection, and this activity
- 11) By 1941, there was only one remaining whooping crane flock in the world with this estimated number of birds
- 12) Birds lay these

Down

- 1) The first step in reintroducing a second migratory population of whooping cranes was establishing a migratory _____
- 2) When birds travel south for the winter
- 3) When a species disappears forever; the Endangered Species Act was created to prevent this.
- 6) Whooping crane populations declined when this North American ecosystem began to disappear
- 7) Biologists track whooping crane chicks on their return migration using radio transmitters and this



Whooping Crane Crossword Puzzle Answer Key

- 1) Route
- 2) Migration
- 3) Extinction
- 4) Ultralight
- 5) White
- 6) Wetlands
- 7) Satellite
- 8) Bluecrab
- 9) Power lines
- 10) Hunting
- 11) Fifteen
- 12) Eggs

Activity 8: Your Field Notes Make History



Summary

Students observe and record notes in the field to examine data collection strategies.

Objectives:

Students will be able to:

- Understand the scientific method
- Describe different methods of monitoring whooping cranes in the wild
- Record written data in the field
- Sketch their observations in the field
- Explore variation that results from data collection
- Explain how and why different people make different observations

Standards:

Science C.8.2 and C.8.6
Art and Design K.8.4
Social Studies B.8.4

Materials:

- “Wisconsin DNR Whooping Crane Observation Form”
- “Eastern Migratory Whooping Crane Population Distribution Map”
- Pencils
- Clipboards
- A few sheets of paper or copies of the “Data Observation Sheet”
- An area (preferably a wetland) to make observations
- Radio transmitter (in trunk)

Link to the Plan

Read Sections 6.4 and 6.5
(Data Management and Monitoring Strategies) in the Management Plan

Background:

The scientific method is the process that people use to gather information about the world around them. Data collection is an important part of this process. People ask questions, come up with hypotheses (educated guesses to their questions), collect data, analyze the data, and draw conclusions. For more information and lesson plan ideas visit Nature Net at http://www.naturenet.com/subject_resources.html students complete a webquest on the scientific method. Here are some ideas for webquests:

For upper elementary school students: “Scientific Method” at: questgarden.com/109/05/5/100914141254/

For middle school students: “Finding the Lighthouse Diamond Thief” at: projects.edtech.sandi.net/kroc/scimethod/

Data can be collected in a variety of ways depending on what types of questions people are asking. For example, if we were interested in discovering what types of foods captive whooping cranes prefer, we might select the top five foods that we think they eat, offer those to the cranes, and see which ones they prefer the most. If monitoring whooping cranes in the wild, we can examine their scat (poop) to see what types of foods they are ingesting. Or, we could observe them from a safe distance with binoculars and record everything that we see them eating over a specific time period. We could collect and identify the plants they are consuming. Many kinds of information can be collected to help people answer questions about whooping cranes and their environment.

Sometimes people ask specific questions and collect data to answer those questions. For example, we may want to know what materials whooping cranes use to build their nests. To answer this question, we would design a particular method of data collection to examine nest materials. We could visit abandoned nests and collect a pint of materials from every nest to take back to our laboratory for examination. Other times, we may ask more general questions, such as, “What types of plants and animals will we find in one wetland compared to another? What kinds of plants and soils are found in each wetland, so we know how to classify them? Is one a marsh? A bog? A wet meadow?” When answering these more general questions, a survey method of data collection works well. We could visit each wetland with a



pencil and notebook and record the species of plants and animals that we observe.

Consistency is an important part of collecting data. Scientists develop specific guidelines that they use while gathering information so that the conclusions they draw from their data are not biased. That is, scientists try to gather data objectively so that their own beliefs and assumptions do not affect the way that they answer scientific questions.

Even though people try to be as objective as possible in collecting data, everyone has different perceptions of the world, and different people may notice different things. For example, if you and your friend go to the pond with a pencil and paper and are asked to record what you see, you will likely notice some different things and some of the same things. Maybe you notice the chirping of the birds and the ripples across the water caused by a light breeze. Your friend notices ants busy in an anthill and sees a robin making a nest far off in the distance. Perhaps you both notice the large clouds in the sky and a pair of ducks swimming across the pond with their ducklings. If you were busy watching the wind ripple across the surface of the pond, it's likely that the robin your friend was observing could have flown away by the time you looked away from the water.

An important part of collecting data is writing it down. In fact, it is also helpful to consider what type of recording tools to take in the field. Ideally, one would like to have a pencil and water-resistant paper (often found in outdoor or sporting goods stores). Ballpoint pens are not effective for recording data because they freeze when it gets cold outside, and the ink runs if it gets wet.

Whooping cranes are monitored when people all over the United States and Canada share their observations. Biologists use observation forms like the one developed by the Wisconsin DNR (see page 64). Birds are also monitored by all WCEP (Whooping Crane Eastern Partnership) agencies' biologists; some are tracking interns that travel between Wisconsin and Florida every year to track birds as they migrate and move around in search of wetland habitat.

All whooping cranes in the Eastern Migratory Population wear color-coded bands and radio transmitters that help identify individual birds. These bands are placed around the birds' legs before they are released from captivity. Biologists can then track the whooping cranes from aircraft or vehicles with large roof-mounted antennae or by using handheld antennas and receivers that will pick up the radio signal from transmitters glued to the birds' bands. If both the bird and the tracker are on the ground, the range of signal is only about three miles. If both are in the air, however, the signal can travel over 100 miles! These radio transmitters run on batteries that last about 1.5 years, so biologists replace the batteries whenever they capture birds for health checks. Have students examine the radio transmitter in the crane trunk.

Some birds also wear a transmitter that emits a satellite signal called a PTT, or a satellite-monitored platform transmitter terminal (try saying that five times fast!). These transmitters have an antenna, but are very light (they weight 30 grams, or a little over an ounce). While the birds might find them funny at first and try to preen them off with their beaks, it seems they eventually get used to them.

The signal from the PTT is not emitted continuously. Instead, it only transmits on certain days. It will emit a signal for eight hours on days when it is transmitting. This signal allows birds to be tracked within 15 to 1,000 meters of their location.



These whooping cranes all wear colored bands so that they can be easily identified. The arrow indicates the radio transmitter attached to the chick's leg. *Photo: USFWS*

Activity 8: Your Field Notes Make History

USFWS: Whooping Crane Observation Form

U.S. Fish & Wildlife Service
Endangered Species

Midwest Region

Search

Form for Reporting Whooping Crane Observations in the Eastern U.S.

If you've seen whooping cranes in the **eastern U.S.**, please complete and submit the form on this web page (below).

If you have seen whooping cranes in the **western U.S.**, please go to <http://whoopingcrane.com/report-a-sighting/> to report your sighting.

Thank you!

When you are lucky enough to see whooping cranes, please do not approach them closely, even in a vehicle, to avoid habituating the birds to human presence. Habituation is one of the greatest dangers that whooping cranes face because it puts them at greater risk from vehicle collisions, predation, and illegal shooting.



Your Contact Information:

First Name

Last Name

Phone Number

E:mail Address

Location of Your Observation:

State County

Additional Location Information: If you have any information that would help us pinpoint the location, please include it here. For example; nearest town and distance and direction from that town; nearest road and/or road intersection; GPS coordinates; landowner; or Township, Range, and Section.

Date of Observation:

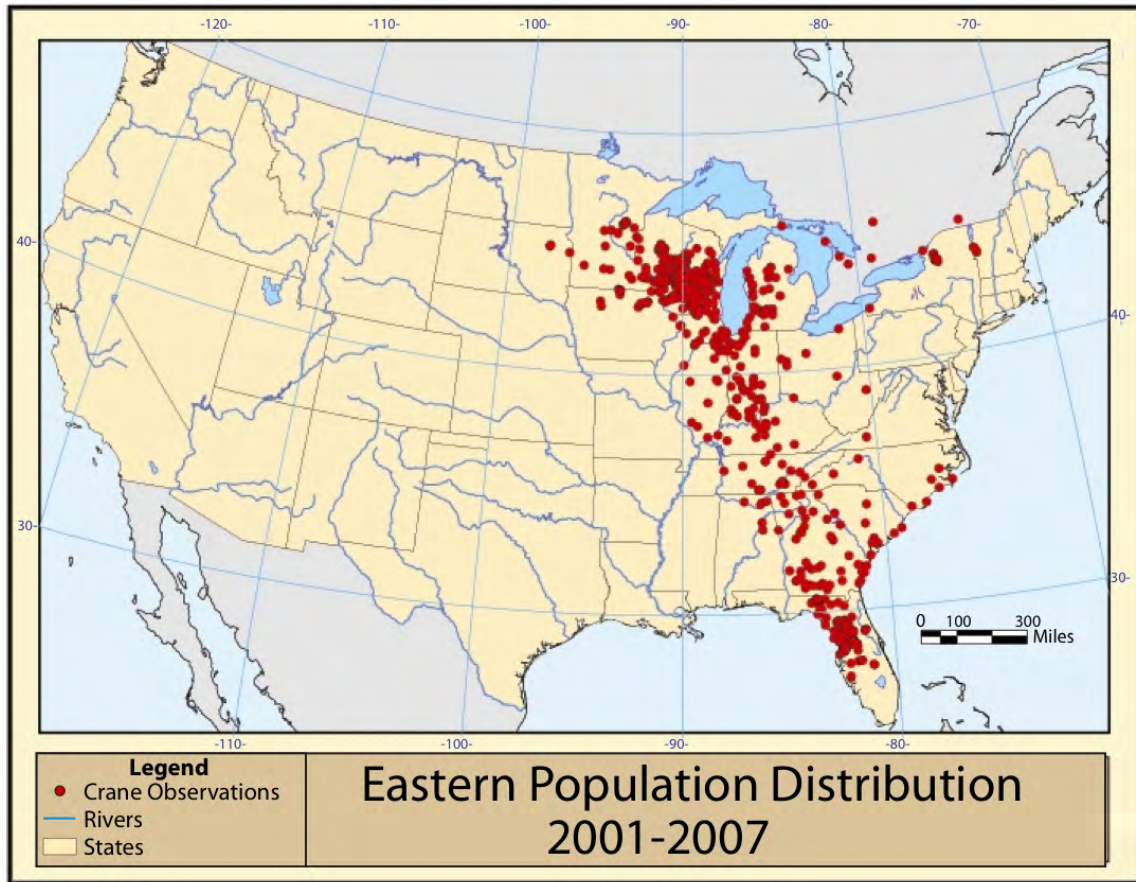
Internet | Protected Mode: On 100%

Whooping crane observation form developed by WCEP for biologists and the public to document their observations.

Produced under a 2006-2007 grant from the Wisconsin Environmental Education Board



Eastern Migratory Whooping Crane Population Distribution Map



Source: Wisconsin Whooping Crane Management Plan



Procedure:

- 1) Let students examine the radio transmitter (in crane trunk) worn by cranes in the EMP. Ask the students to think of a time when they had to get used to wearing something they were not used to. For example, have any of them had braces put on their teeth?
- 2) Ask students why they think it is important to write down observations in the field instead of just trying to remember them. *(No matter how great our memories are, we still forget some things, and it is nearly impossible to keep track of all the data we collect – especially if we are trying to count something. Writing things down allows us to perform statistical analyses with our data, compare our data to the data collected in other studies, and go back to our records at a later date to review our data if necessary.)*
- 3) Ask students what kinds of information they think are important to record when observing wildlife. Have students list all of the types of information that they think are important to record when making observations in the field.
- 4) Show students the “Wisconsin DNR Whooping Crane Observation Form”. This is an online form that DNR biologists use when they observe whooping cranes. It is helpful to project staff and database managers to have as much information as possible when someone sees a crane in the wild. Ask students what is included on this form that they did not include on their list. What is included on their list that is not included on this form?
- 5) Show students the “Eastern Migratory Whooping Crane Population Distribution Map”. Have students list the states that whooping cranes have visited. What states have the whoopers been to that the students have also visited?
- 6) Take the students out in the field to practice data collection. A list of local field trip locations to explore wetlands can be found in Appendix 1. Students should take a pencil, a clipboard or something to write on, and a few sheets of blank paper or copies of the “Data Collection Sheet” with them. Have students head outside to a place where they can make some observations. If students are not using the “Data Collection Sheet”, have them include the following information in their data collection:
 - a) Who are you? How can people contact you if they have questions?
 - b) What is the date? Time of observation?
 - c) Where are you? What is your general location? Specific location?
 - d) Describe the habitat you are observing.
 - e) What do you see? Include both sketches and written descriptions.
 - f) Describe the behaviors of any wildlife that you observe. What are they doing?
 - g) What are the weather conditions? Hot? Cool? Sunny? Cloudy? Windy?
 - h) Is there anything that you don’t see that you would expect to observe?



Here are some ideas of places and things to observe:

- Go out to an area with trees, and watch for birds. Which bushes or trees are receiving the most bird visitors? Why? What other wildlife is here?
 - Visit a wetland, and record the types of plants and animals found there.
 - Visit a few different habitat types, such as a forest, wetland, and prairie, and compare and contrast what you find in the different ecosystems.
 - Pick a field, stream, or wetland near the school, and record what plants and animals you find.
- 7) After completing their observations, have students work in pairs or small groups to answer the following questions:
- a) What similar observations did you make?
 - b) What did you notice that your partner did not and vice versa?
 - c) What do these similarities and differences tell us about data collection in general?
 - d) Is there anything that you recorded today that you think you would not observe a month from now? Why or why not?
 - e) What types of things would you have observed a month ago that you did not observe today?
 - f) How do the time of year and time of day affect what we observe?
 - g) Explain how different people's perceptions can result in different information being recorded.
 - h) When recording their observations, what can people do to keep differences in perception to a minimum?



Data Collection Sheet

Name:

Today's Date:

Time:

Location - (exact spot, i.e., on the north side of the school, approximately 20 feet SE of the oak tree. Are you on private or public property?):

Street address:

City:

State:

County:

Temperature:

Weather conditions:

Observations:



Use this section to sketch three things you thought were interesting or were surprised to see during your observation period.



Summary

Students make maps of their communities to explore whooping crane habitat close to their neighborhoods.

Objectives:

Students will be able to:

- Use a variety of geographic representations, such as maps and/or aerial photographs, to gather information about whooping crane habitat in their community
- Draw maps of their community
- Identify wetlands close to where they live that whooping cranes could use as habitat

Standards:

Science C.8.2 and C.8.6
Art and Design E.8.4 and H.8.5
Social Studies B.8.4

Materials:

- Copies of “Map of Whooping Crane Observed Locations”
- Sheets of paper for creating maps
- Illustration materials such as markers or colored pencils
- *Wisconsin Atlas and Gazetteer*

Link to the Plan

Read [Sections 6.8 and 6.9](#)
(*Managing Public and Private Lands and Nest Site and Territory Management*)
in the Management Plan

Background:

Whooping cranes depend on wetlands for feeding, safe roosting, building nests, and raising their chicks. Whooping cranes can use many types of wetlands, even small isolated ones, for meeting different needs, as long as there is minimal human disturbance. Whooping cranes use small wetlands to feed, but an average nesting territory is 4.1 square kilometers. They have been observed in public areas, such as wildlife refuges, state parks, and county lands. Just as importantly, whooping cranes have been observed on private property. In fact, 75% of wetlands in Wisconsin are privately owned (*WI DNR Wetland Team*).

Between 2002 and 2007, whooping cranes were observed in 41 of the 72 Wisconsin counties. Whooping cranes were most often spotted in wetlands along the major rivers and wetlands in central and southern Wisconsin, but as the Eastern Migratory Population continues to grow, whooping cranes are being observed in more and more locations. Whooping cranes spend their time in Wisconsin wetlands at places such as Necedah National Wildlife Refuge, Mill Bluff State Park, Black River State Forest, and Meadow Valley, Sandhill, McMillan Marsh, and Horicon State Wildlife Areas, as well as wetlands in Winnebago County and along the lower Wisconsin River.

Learning about wetlands in your own community is important for several reasons. The presence of wetlands in your community means that you may have an opportunity for whooping cranes to visit! Having wetlands determines whether certain species that depend on them, such as birds, amphibians, reptiles, and aquatic invertebrates, live in the community. Wetlands also play important ecological and environmental roles such as reducing the likelihood of floods in the area and cleaning the water supply by filtering contaminants. Wetlands can increase the property value of houses in a neighborhood, and serve as an excellent source of outdoor recreation.

Recently, many people and organizations have been working to conserve and restore wetlands. The Wisconsin DNR wants to protect and restore the remaining wetlands across the state. Federal programs such as the U.S. Department of Agriculture’s Wetland Reserve Program (WRP) and the U.S. Fish and Wildlife Service’s North American Wetlands Conservation Act (NAWCA) offer landowners a financial incentive to preserve or restore wetlands on private property. For example, farmers can be paid to cease agriculture on their land and restore parts of their farm to a wetland.



Whooping cranes use many wetland types if there is minimal disturbance by humans. This small wetland on private property in the Baraboo Hills has been used by whooping cranes. *Photo: U.S. Fish & Wildlife Service*

One incentive to restore wetlands is to increase whooping crane habitat (and habitat for herons, egrets, and other birds, too!). In fact, two large wetlands in Jefferson and Walworth counties were recently restored, and whooping cranes used the areas!

An excellent way to explore where there is wetland habitat suitable for whooping crane use is to examine aerial photographs (photos taken from flying planes) or maps of an area. One benefit of using aerial photography is that it includes specific features such as telephone lines and houses that are not included on most maps. These factors can be important in deciding whether or not a wetland would serve as good whooping crane habitat. One benefit of using maps is that they are usually labeled, and topographic maps offer precise information about changes in elevation. Both are helpful tools for locating potentially useful wetlands for whooping cranes.



An aerial photograph of wetlands on private property used by whooping cranes. This photograph captures both small and larger wetlands. Whooping cranes use smaller wetlands to feed but require larger wetlands to nest. *Photo: U.S. Fish & Wildlife Service*

Let's make some maps and see how much wetland habitat the students have in their community.

Procedure:

- 1) Have students examine the map of "Whooping Crane Observed Locations." Where does their nearest city or town lie on the map? Have whooping cranes been observed close to where they live?
- 2) Have students do some research to locate wetlands in their community. They should gather information using their own knowledge of the community, the Internet, by collecting maps and photographs of the area, and by talking to people in their community such as friends, parents, and neighbors. Remind students to include wetlands on public lands, such as city, county, and state parks, and on private lands, such as country clubs, sanctuaries, and people's backyards in rural areas.
- 3) Students should draw their own maps of their community. They should label major landmarks such as where they live, their school, major roads and highways, and any prominent features that would help orient someone. Students should draw and label any wetlands in their community, large and small.



A *Wisconsin Atlas and Gazetteer* may also be included in the crane trunk. Students can also find maps online at: www.wisconsin.com/counties/index.html

The Wisconsin DNR offers information on maps and photographs at: dnr.wi.gov/maps/

- 4) Once the students have completed their maps, have them identify the wetlands in their area that would serve as suitable whooping crane habitat. Which wetland areas could whooping cranes use and why? Which areas would not be good whooping crane habitat and why? Which areas would serve as short-term habitat for feeding? Which could serve as long-term breeding grounds?

When considering potential habitat for cranes, keep the following questions in mind:

- Is the wetland close to a busy highway or road?
 - Are there utility lines nearby?
 - Do motorboats use areas close to the wetland?
 - Is there enough food for the whooping cranes to eat?
 - Who owns the wetlands? Are they publicly or privately owned?
 - Will the area still be wetlands ten years from now? Twenty years from now?
 - Does the area have a lot of human disturbance or disturbance from wildlife that could be disruptive to whooping cranes?
- 5) After the students have identified the whooping crane habitat in their communities, have them list the features and guidelines that they think are important to consider in determining whether an area is suitable for whooping crane use.
 - 6) Students can then discuss their lists in small groups, and each group can list eight to ten things that they think are essential to consider in locating whooping crane habitat. Do any of the wetlands in their community meet the criteria that they listed?
 - 7) Have students examine Appendix 5: “Whooping Crane Location by Wisconsin County” to explore the wetland areas visited by whooping cranes. Are any of the listed locations within or near their county? Are any of the listed locations similar to wetlands within their county?

Extensions:

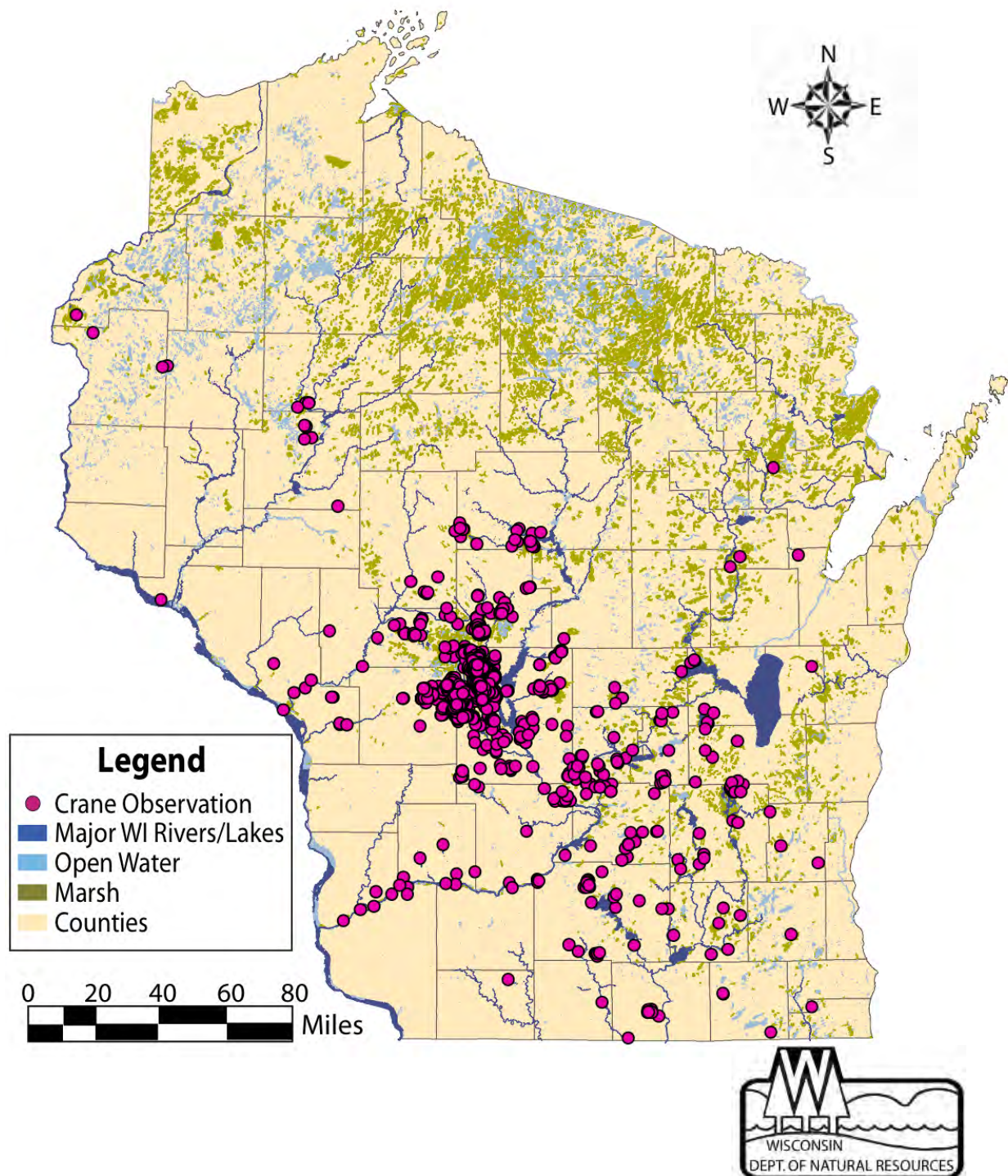
- 1) Take a field trip to a local wetland, and have the students explore the habitat. Be sure to listen for cranes calling! Have whooping cranes visited the area before? If so, what makes it good whooping crane habitat? If not, are there any characteristics that make it potentially good or poor whooping crane habitat?
- 2) Have students research an ecosystem restoration project in their area. What was the land like historically? What activities resulted in a change to or degradation of the land? Who is restoring the land and why? What steps are being taken to restore the land? Students should prepare materials to educate their classmates about the restoration project.
- 3) Take a field trip to view whooping cranes using wetlands in Wisconsin. Head to Necedah National Wildlife Refuge and view the whooping cranes from the wildlife viewing tower (call the Refuge office to determine when is a good time of year to see the cranes)



there). Travel up to the International Crane Foundation in Baraboo to view the whooping cranes in the wetland exhibit. See Appendix 1 for more information. Be sure to listen for the sounds of sandhill or whooping cranes calling! Even if these birds can't be seen, their calls often can be heard from great distances.



Whooping Crane Observed Locations 2002~2007



Activity 10: What's the Plan, Stan?



Summary

Students create an endangered species management plan for their community.

Objectives:

Students will be able to:

- Explain the need for laws and policies to regulate science and species management
- Describe and explain the means by which groups meet the needs of individuals, societies, and organisms
- Describe cooperation among individuals in creating a management plan
- Produce a management plan

Standards:

English Language Arts B.8.1 and B.8.2

Social Studies B.8.9, E.8.5, and E.8.14

Materials:

- Paper
- Pens or pencils
- Illustration materials

Link to the Plan

Read [Sections 1 and 2](#) (*Background and Introduction and Purpose*) in the Management Plan

Background:

A management plan is a tool that is used by people to help guide them in completing a project. The purpose of a management plan is to explain the specifics of a project, such as the background, the purpose, the goals, and, most importantly, to provide guidance in the methods for accomplishing those goals. A management plan sets the stage for work on a project, but it can also be modified along the way as the needs and priorities of the project itself change.

The *Wisconsin Whooping Crane Management Plan* was compiled by people with a variety of specialties and interests. Individuals from government and non-government organizations, non-profit groups, and the general public all pitched in to develop the priorities and guidelines for restoring an Eastern Migratory Population of whooping cranes. It is important to include a wide range of interests when developing a management plan for an endangered species to ensure that as many viewpoints as possible are taken into account when deciding how to best manage that species. That way, the interests of everyone involved, such as biologists, refuge managers, landowners, and the public, are all considered.

Compiling a management plan often takes a lot of work because there are so many different viewpoints, and sometimes they are conflicting. One of the hardest parts can be trying to reach a consensus within a group about how to set certain protocols. For example, there may be different ideas about how closely people should approach a whooping crane in the wild. Another difficult part may be determining what the priorities should be. For example, one person may think that a priority for the whooping crane project should be developing a top-notch tracking system that would be able to locate any bird at any given time. Another person's priority may be educating people in the community about the restoration project. Others may be more concerned that new

land restrictions are not established because of the cranes, such as closing established hunting grounds. For others, the risk of disease and environmental contaminants may be of interest. A successful management plan should address all interests and important issues.

Let's examine what it takes to put together a management plan.

Wisconsin Whooping Crane Management Plan

December 6, 2006



P.O. Box 7921
Madison, WI 53707
PUBL-ER-450 06



Procedure:

- 1) Divide students into groups of four or five. Present students with the following scenario, and let them examine the *Wisconsin Whooping Crane Management Plan* for guidance in creating their own plans:

A bird species in your state is on the verge of extinction. One hundred years ago, there were almost 3,000 birds in the population. Today, there are less than 100 birds left, and most of them live in your county.

It is up to you and the members of your group to devise a management plan in order to save this endangered species. First, however, you must come up with a name and description for the bird. How big is it? What does it look like? Where does it live? What does it like to eat? What size habitat does it require for nesting? What size habitat does it require for foraging? Does it migrate somewhere to spend the winter? If so, where? Be creative, and make sure to include illustrations.

- 2) Next, students should develop a brief history of the bird over the last 100 years. What were the reasons for its decline? Was it over-hunted? Was its habitat destroyed? Was the population affected by disease or contaminants in the environment?
- 3) Once students have described their fictional bird species, have them develop some guidelines on how to manage the bird with the ultimate goal of restoring its population. Have students create a management plan with the following sections. Each section should be discussed by the group as a whole, but students should each pick one section to write individually.
 - a) Background, Introduction, and Purpose: Who are you and why are you putting a management plan together? What does it mean for a species to be endangered and why does that make it important to put together a management plan for this species? What is the purpose of your management plan? What do you hope to achieve with it? Specifically state your goals.
 - b) Species Description - Biology and Ecology: What does your bird look like? How long does it live? What type of habitat does it prefer? What does it like to eat? What other animals feed on it? How often does it reproduce? How many eggs does it usually lay? What does its call sound like? Make sure to include illustrations of your bird.
 - c) History and Current Distribution: Where was the bird found 100 years ago? Where is it found today? Does it migrate? What happened over the last 100 years that led to the bird's decline? Are the birds that are still living today healthy? If not, why? What are the major threats to the population today? How many individuals are there in the population today? How many males? Females? Chicks?
 - d) Management and Monitoring: What is the goal of your management plan (make sure the goal that you state here is consistent with the goal stated in the Introduction)? What is currently being done to restore the population? What precautions are you taking to protect the birds from harmful events like disease outbreaks or natural disasters? Are your breeding birds in captivity? Do you occasionally capture birds to make sure they



are healthy? What type of monitoring are you doing to keep track of the birds? Are they marked or banded in some way?

- e) Project Needs: What do you still need to figure out about the species? What don't you know yet? Why would it be important to fill in this missing information? What are you doing or planning on doing to try to get the missing information? What are you doing to educate people about the bird?

Extensions:

- 1) Students should discuss the obstacles they faced in compiling their management plan. Have each student write a report detailing the easiest and more difficult parts of putting together their plan. What made certain parts simple and other parts more complex?
- 2) Have each group present their bird species to the class. What type of plan did they put together to help restore the species? How did they go about developing this plan?

Activity 11: Working for Whoopers



Summary

Students investigate the skills they would need to pursue a career in whooping crane restoration.

Objectives:

Students will be able to:

- Identify and investigate the skills people need for a career in a whooping crane restoration project
- Identify the academic courses that a person pursuing that career would need
- Identify government and private agencies responsible for whooping crane reintroduction and management
- Perform research and produce a written description of how professionals achieve career employment

Standards:

Environmental Education B.8.22 and B.8.23
English Language Arts B.8.1 and F.8.1
Science G.8.1

Materials:

- Pens or pencils
- Paper
- Library and/or Internet access to research potential careers

Link to the Plan

Read Section 1.1
(Whooping Crane Eastern Partnership) in the Management Plan

Background:

Since the Whooping Crane Eastern Partnership was founded in 1999, nine organizations have been working together to restore an Eastern Migratory Population of whooping cranes. There are many different jobs involved in the restoration efforts. Some of these jobs include ornithologists, veterinarians, field biologists, geneticists, educators, photographers, journalists, pilots, refuge managers, fundraisers, and management specialists.

Procedure:

- 1) Ask students to consider what their ideal profession would be if they were working on restoring the whooping crane population and have them explain why.
- 2) Once students have chosen a profession, have them research what they need to do to pursue that career. They should answer the following questions in several paragraphs:
 - a) What would their profession be and why?
 - b) What academic courses and training would be required in order to pursue the career?
 - c) What would be their responsibilities?
 - d) What would be their annual salary?
 - e) Explain a typical day in their profession. Be specific.

For specific information about the responsibilities of each organization within the Whooping Crane Eastern Partnership, students can visit the following websites:

- 1) Wisconsin Department of Natural Resources - dnr.wi.gov/topic/endangeredresources/animals.asp?mode=detail&speccode=abnmk01030
- 2) U.S. Fish and Wildlife Service - www.fws.gov/midwest/whoopingcrane/
- 3) U.S.G.S. Patuxent Wildlife Research Center - www.pwrc.usgs.gov/whoopers/
- 4) Operation Migration – www.operationmigration.org
- 5) International Crane Foundation – www.savingcranes.org
- 6) The National Fish and Wildlife Foundation - www.nfwf.org
- 7) The Natural Resources Foundation of Wisconsin - www.wisconservation.org/index.php?page=Overv
- 8) U.S.G.S. National Wildlife Health Center - www.nwhc.usgs.gov/

Activity 12: Cranes and Culture



Summary

Students will use visual and language arts to explore how whooping cranes are tied into everyday culture.

Objectives:

Students will be able to:

- Read, interpret, and critically analyze poetry
- Read and discuss nature poetry in order to understand the human experience
- Write their own nature poetry
- Work independently and collaboratively to produce ideas and works of art
- Explore their own ideas about the purposes and meanings of art
- Connect their knowledge and skills in art to other areas, such as science and social studies
- Explore the similarities and differences of world cultures by studying their fine arts

Standards:

Art and Design I.8.7, J.8.5, K.8.1, and K.8.6

English Language Arts A.8.2, A.8.3, B.8.1, and B.8.2

Materials:

For Crane Origami:

- Square pieces of paper
- Copies of “Make Your Own Origami Crane!”

For Crane Art:

- Materials for making crane art using dance, theater, illustration, literature, or music

For Crane Poetry:

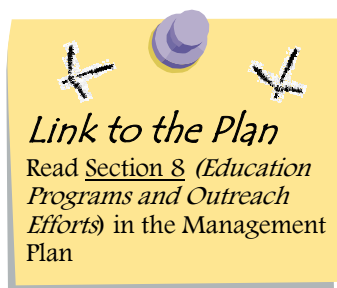
- Copies of nature poems
- Pencils and paper

Background:

Cranes of all species have served as cultural symbols across the world. In Japan, the crane represents health, happiness, peace, and longevity. It is frequently represented at Japanese weddings as a symbol of honor and loyalty, because cranes often mate for life. In China, cranes symbolize wisdom, nobility, longevity, immortality, and determination. In Vietnam, cranes are a symbol of longevity. In Africa, cranes represent love, long marriage, and happiness. In fact, the blue crane is the national bird of South Africa. In ancient Greek times, cranes were considered intelligent, and it was thought that the crane served as a guide to Hades, the Greek god who ruled the underworld of the dead.

Cranes have also played an important role in North American cultures. For example, the crane is a symbol found in the totem of many Native American cultures. The Crane is one of the clans for the Ojibwe people here in the Midwest. The members of the Crane clan were known for their excellent speaking skills, displaying loud and clear voices, and were one of the clans granted Chieftanship.

Cranes are celebrated in many different ways. In Japan, people make origami cranes. It is thought that a person who folds 1,000 cranes will have a wish granted, such as living a long, healthy life. Some cultures perform crane dances that copy the exaggerated leaps, bows, and wing-flapping that cranes display when they are seeking a mate or reinforcing their pair bonds. These dances date back thousands of years and often involve elaborate crane costumes.



Source: www.inkart.net



Cranes have been included in stories and myths. For example, *The Cranes of Ibycus* by Friedrich Schiller is a poem based on ancient Greek mythology. The great poet Ibycus was traveling to a theater in Corinth where he was to perform at the chariot races. He walked alone through the forest carrying his lyre (a harp played by the ancient Greeks), as a flock of cranes was flying overhead, which he considered to be a good omen. As he was crossing a bridge, he was suddenly approached by two murderers. Trained as a musician and not as a warrior, he was unable to defend himself. Ibycus was mortally wounded, and realized he was about to die alone in a faraway place. As he lay dying, he called upon the cranes to avenge his death.



Drawing of what a costumed crane dance might have looked like thousands of years ago. Illustration: John-Gordon Swogger

Word of Ibycus's death quickly spread through Corinth, and he was greatly mourned because he was so adored as a poet and singer.

The two murderers then went to the theater in Corinth. One of the murderers looked up to the sky and saw the flock of cranes rapidly approaching the theater. "See there, see there, Timotheus! Behold the cranes of Ibycus!" he cried as the cranes drew nearer. The murderer knew that the cranes were coming to avenge the death of Ibycus. In exclaiming these words, he revealed his heinous crime to the crowd in the theater. Word quickly spread through the theater that the murderers were present, and the crowd demanded the arrest of the man who spoke the words to expose his own guilty deeds:

"Of Ibycus!" - That name so blest
With new-born sorrow fills each breast.
As waves on waves in ocean rise,
From mouth to mouth it swiftly flies:
"Of Ibycus, whom we lament?
Who fell beneath the murderer's hand?
What mean those words that from him
went?
What means this cranes' advancing band?"

And louder still become the cries,
And soon this thought foreboding flies
Through every heart, with speed of light -
"Observe in this the furies' might!"

The poets manes are now appeased:
The murderer seeks his own arrest!
Let him who spoke the word be seized,
And him to whom it was addressed! "

That word he had no sooner spoke,
Than he its sound would fain invoke;
In vain! his mouth, with terror pale,
Tells of his guilt the fearful tale.
Before the judge they drag them now
The scene becomes the tribunal;
Their crimes the villains both avow,
When neath the vengeance-stroke they fall.



The cranes revealed the guilty murderers and serve as the messengers of justice in the poem.

The poem in its entirety can be found online at:

www.fln.vcu.edu/schiller/ibykus_e.html

Cranes have been celebrated across cultures using various forms of art. Let's explore some of these different types of art and symbolism with the students.

Crane Origami Procedure:

Using blank sheets of paper and the instructions in Appendix 6, have students make origami cranes. The PDF is also available on Operation Migration's website at:

www.operationmigration.org/Origami.pdf

Crane Art Procedure:

Divide students into groups of three or four. Have each group create an art project to celebrate and educate others about whooping cranes. Students can use any type of art form they wish, including dance, theater, illustration, literature, or music. Each group should share their project with the class. Ask the class to interpret each group's work, and then ask the group to explain what their artistic intentions were. Students should describe why they chose the art form that they did, how they created their work, what they learned in creating it, and the challenges that they faced.

Crane Poetry Procedure:

- 1) For an introduction to poetry, have students read and learn about poems involving animals and nature. You can use the poems below, or select your own. For example, choose one or some of the well known nature writers (Robert Frost, Walt Whitman, Henry David Thoreau, etc.) and discuss some of their poems in detail. Some topics for discussion include:
 - In which style of poetry did the poet write?
 - What type of rhythm and meter did the poet use?
 - Which parts of nature is the poet describing?
 - Does the poet relate what he or she sees in nature to his or her own life? If so, how?
 - Does the poet use similes or metaphors? What is the poet comparing nature and its components to?
 - What type of symbolism is found in the poem?
- 2) Have each student write their own nature poem involving whooping cranes. The poem can be written in any poetic form or genre, but should include at least one simile, metaphor, and hyperbole. The poem can be factual (such as describing how whooping cranes are bred in captivity and learn to migrate by following ultralight planes) or fictional (such as the tale of the hardships of an individual crane).
- 3) Have the students share their poems with one another in small groups.



Extensions:

- 1) Have students select a threatened or endangered species and trace how it has been used symbolically in visual and/or language arts throughout different cultures. Students should write up their findings in a report.
- 2) Have students define anthropomorphism and explain why it is important for biologists to try to avoid being anthropomorphic in their work. How can biologists be careful to avoid being anthropomorphic?



THE OVEN BIRD

By: Robert Frost

There is a singer everyone has heard,
Loud, a mid-summer and a mid-wood bird,
Who makes the solid tree trunks sound again.
He says that leaves are old and that for flowers
Mid-summer is to spring as one to ten.
He says the early petal-fall is past
When pear and cherry bloom went down in showers
On sunny days a moment overcast;
And comes that other fall we name the fall.
He says the highway dust is over all.
The bird would cease and be as other birds
But that he knows in singing not to sing.
The question that he frames in all but words
Is what to make of a diminished thing.

I SAW IN LOUISIANA A LIVE-OAK GROWING

By: Walt Whitman

I saw in Louisiana a live-oak growing,
All alone stood it, and the moss hung down from the branches;
Without any companion it grew there, uttering joyous leaves of dark green,
And its look, rude, unbending, lusty, made me think of myself;
But I wonder'd how it could utter joyous leaves, standing alone there, without its
friend, its lover near--for I knew I could not;
And broke off a twig with a certain number of leaves upon it, and twined
around it a little moss,
And brought it away--and I have placed it in sight in my room;
It is not needed to remind me as of my own dear friends,
(For I believe lately I think of little else than them:)
Yet it remains to me a curious token--it makes me think of manly love;
For all that, and though the live-oak glistens there in Louisiana, solitary, in a
wide flat space,
Uttering joyous leaves all its life, without a friend, a lover, near,
I know very well I could not.

Activity 13: Whooping Crane Campaign



Summary

Students design a campaign to educate people about whooping cranes.

Objectives:

Students will be able to:

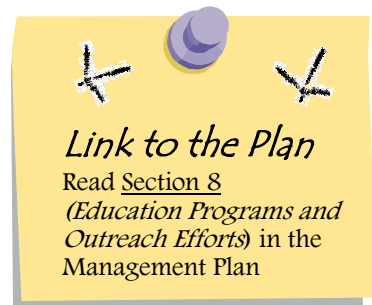
- Explain how personal actions can impact whooping crane restoration
- Develop a plan for improving or maintaining some part of the local environment and identify their role in accomplishing this plan
- Formulate a plan for educating people about whooping cranes

Standards:

Environmental Education D.8.5, D.8.6 and E.8.1

Materials:

- Poster-size sheets of paper
- Flyer-size sheets of paper
- Illustration materials such as markers or colored pencils



Background:

One of the most important parts of protecting and restoring a threatened or endangered species is education. For recovery efforts to be successful, people first have to be aware that a species is at risk of going extinct. Then people need to understand what factors are putting the species at risk. Lastly, people need to understand how they can help prevent a species from disappearing forever. By learning about threatened and endangered species, people can get excited about the prospects of helping them recover, take action to help the recovery process, and help spread the word.

The many efforts at work in bringing back the whooping crane are inspirational, and the camaraderie and hard work can serve as an educational example in many ways. The whooping crane can serve as a “flagship” species to educate people about the importance of conserving wetlands and the species that use them. A flagship species is a species that people generally react positively to and want to protect. Flagship species are often associated with the protection of a habitat, and all of the other species that live within that habitat benefit as well. Using the whooping crane to help conserve wetlands would make it a flagship species.

It is also important to educate the public about what to do if they see a whooping crane. Costume-reared whooping cranes (whooping cranes that are raised in captivity by humans in costumes) do not have a natural fear of humans. It is important, however, that they develop this fear so they are able to survive in the wild. Humans should avoid getting within 100 yards of a whooping crane, and it is best to stay out of sight of the cranes, such as by staying in a car. Using binoculars or a spotting scope is an excellent way to get a closer look at whooping cranes from a distance.

Procedure:

- 1) Have students brainstorm ideas of how they can help raise awareness about threatened and endangered species in their area. What can they do to specifically help whooping cranes? Is there wetland habitat in their community that they can help to conserve or restore? What can they do to help teach people in their community about wetlands and whooping cranes?
- 2) Divide students into small groups and tell students they are now members of a campaign team to educate people in their community about the whooping crane. Each group should come up with a slogan for their campaign and a detailed plan of what they will do to raise whooping crane awareness in their community.



- 3) Each group should design a poster with their slogan on it and include graphics. Each group should also create a small flyer for distribution to the public. The flyer can include any information and images that students think are important to share with their community. Remember, a picture says a thousand words!

Extensions:

- 1) Organize a day for students to go out and educate people in their school or community about whooping cranes. Students should take copies of their flyers and posters for distribution. Students can create educational poems, skits, or short stories to share with their audience.
- 2) Have students design informative materials to educate their peers about a threatened or endangered species. Assign each student a different species to research. Students should create a class presentation and one-page informational handout for the other students in the class about their species.

Appendix 1: Plan a Field Trip! Look for Whooping Cranes! Explore Wisconsin's Wetlands!

International Crane Foundation

Visit the International Crane Foundation (ICF) to observe captive whooping cranes up close in a wetland habitat. There are fifteen crane species in the world that can be compared and studied during a tour of ICF. ICF is located in Baraboo and offers tours for school groups of all ages. For more information, visit their website at www.savingcranes.org. Call ICF's Education Department at (608) 356-9462 ext. 127, or email ed@savingcranes.org to book a tour.

Necedah National Wildlife Refuge

Head to Necedah National Wildlife Refuge's observation tower where whooping cranes can be viewed in the wild. Necedah offers environmental educational programs to groups of all ages. For more information, visit their website at fws.gov/refuge/necedah/, call the refuge at (608) 565-2551, or send them an email (necedah@fws.gov).

Wisconsin State Parks, Forests, Recreation Areas, and Wildlife Areas

Many State Parks, Forests, Wildlife Areas, and Recreation Areas contain wetland habitats that can be visited by school and youth groups. The Wisconsin DNR offers an online guide to state lands at dnr.wi.gov/topic/lands/

Below are some ideas of places to visit across the state that make good sites for wetland exploration:

Crex Meadows State Wildlife Area – Crex Meadows is one of the premier wildlife viewing areas in the Midwest. Crex Meadows is located in northwestern Wisconsin and has a diversity of habitats. Wetlands, primarily sedge marshes, comprise more than half of the 30,000 acres that make up Crex Meadows Wildlife Area. Visit their website at dnr.wi.gov/topic/lands/WildlifeAreas/crex.html

Havenwoods Environmental Awareness Center – Located within Havenwoods State Forest in Milwaukee, Havenwoods Environmental Center is an excellent place to take a fieldtrip. There are several wildlife, insect, and plant programs offered for elementary and middle school students. Get more information on their website at dnr.wi.gov/topic/parks/name/havenwoods/

Horicon Marsh State Wildlife Area – Horicon Marsh is the largest cattail marsh in the U.S. and is located in southeastern Wisconsin. As home to more than 290 kinds of birds, Horicon Marsh has been designated a “Wetland of National Importance” and a “Globally Important Bird Area.” Visit their website at dnr.wi.gov/topic/lands/WildlifeAreas/horicon/index.html

Mead (George W.) State Wildlife Area – Mead Wildlife Area is located 11 miles southwest of Mosinee in Marathon, Wood, and Portage Counties. Mead Conifer Bogs contain northern wet forest and are home to many species of wildlife. Visit their website at dnr.wi.gov/topic/lands/WildlifeAreas/mead.html

Richard Bong State Recreation Area – Bong Recreation Area encompasses 4,515 acres of rolling grassland, savanna, wetlands, and scattered woodland. Bong is located just outside Burlington, Wisconsin, about 47 miles from Milwaukee. It offers excellent opportunities for birding,

Appendix 1: Plan a Field Trip! Look for Whooping Cranes! Explore Wisconsin's Wetlands!

especially during the spring months when many birds are making their return migrations north. Bong offers several naturalist-guided programs for school groups correlated to Wisconsin Model Academic Standards. For more information, visit their website at dnr.wi.gov/topic/parks/name/richardbong/

Sandhill Wildlife Area – Sandhill Wildlife Area lies within the bed of ancient Glacial Lake Wisconsin, an expansive region of flat, marshy land interspersed with forests covering parts of seven counties in central Wisconsin. Sandhill Wildlife Area contains several large marshes and flowages that are home to many species of birds including sandhill cranes, ruffed grouse, Canada geese, ducks, loons, bald eagles, shorebirds, songbirds, hawks, and owls. Visit their website at dnr.wi.gov/topic/lands/WildlifeAreas/sandhill/index.html

A complete listing of Wisconsin State Parks, Forests, and Recreation Areas can be found at dnr.wi.gov/topic/parks/

Help safeguard our cranes and other wild birds! Please review the Bird Watcher's Code of Ethics developed by the Wisconsin Society for Ornithology, which is available on the web at wsobirds.org/?page_id=1929

If you see a whooping crane....

Anyone who encounters a whooping crane should report their observation at: www.fws.gov/midwest/whoopingcrane/sightings/sightingform.cfm

Probable sightings or known observations are recorded by staff in a form linked to the monitoring database maintained by WCEP. Please provide date, time, exact location, bird behavior, description, and a photo if available.

When encountering a whooping crane in the wild please give them the respect and distance they need. If on foot do not approach birds within 200 yards; if in a vehicle please remain inside and do not get any closer than 100 yards. Also, please remain concealed and do not speak loudly enough that the birds can hear you. Finally, do not trespass on private property in an attempt to view or photograph whooping cranes. These efforts will help prevent the cranes from becoming tame or used to people. Binoculars or a spotting scope are recommended to increase visibility. It is especially important to avoid disturbing a crane during evening roosting or if they are nesting.

Appendix 2: Evaluation Form

Name of School/Organization: _____

City, State, County: _____

Age/grade of audience: _____

Size of audience: _____

Do you have whooping cranes in your county? _____

Did you request the crane trunk to accompany a certain unit in your classroom?
If so, which one? _____

How did you hear about the crane trunk? _____

Did you read the *Crane Trunk Manual* before teaching the activities? If so, was it helpful? How could it be improved? _____

How much knowledge did your students have of whooping cranes before using the trunk? _____

Which activities did you use? _____

Which activities worked well? _____

Appendix 2: Evaluation Form

Which activities did not work well? How could they be improved?

Was the information presented in a clear and applicable format? _____

Would you recommend the crane trunk to other teachers/educators? Why or why not? _____

Other comments and suggestions: _____

Please send completed evaluation forms to:

Whooping Crane Education – ER/6
Wisconsin Dept. of Natural Resources
PO Box 7921
Madison WI 53707-7921
608-266-0837

Appendix 3: Whooping Crane Trunk User Agreement

Before using the Whooping Crane Education Trunk, please read and sign the “Crane Trunk User Agreement” form. The form should be returned to the Wisconsin DNR or to the WCEP partner who loaned you this trunk as soon as possible via fax or mail. If you borrowed this trunk from the Wisconsin DNR in Madison, you can return the signed agreement form:

By fax to: 608-266-2925
Attention: Whooping Crane Education

Or by mail to:
Whooping Crane Education – ER/6
PO Box 7921
Madison, WI 53707-7921

If you find any items missing or damaged upon receiving the trunk, please contact the WCEP partner who loaned you the trunk immediately.

Appendix 3: Whooping Crane Trunk User Agreement

Name: _____

School/Organization: _____

Address: _____

City, State, Zip: _____

Date Crane Trunk was received: _____

1. **The Whooping Crane Trunk is designed for educational purposes only.** Please feel free to duplicate and share the printed educational materials with students and other teachers as much as you would like. Please do not alter the printed materials in any way.
2. **Materials are loaned for a period of three weeks.** I understand that I can have the Whooping Crane Trunk in my possession for up to three weeks from the date it arrives. The Trunk must be postmarked or returned in person three weeks after it is received. I understand that failure to return the Trunk within this time may result in a late fee.
3. **The Borrower is responsible for any loss or damage.** I have examined the contents of the Whooping Crane Trunk upon its arrival. I will return all materials to the Wisconsin DNR in the same condition in which I received them. I understand that I am responsible for any lost or damaged items while the Crane Trunk is in my possession, and that I will be held financially liable for the replacement of any lost or damaged items.
4. **The Borrower is responsible for returning the Whooping Crane Trunk.** It is the Borrower's responsibility to return the Trunk to the Wisconsin DNR when use is complete. The Borrower is responsible for personally delivering the trunk or paying return postage, unless otherwise noted.

I have read and understand the terms and conditions listed above, and I agree to comply with them. I have kept a copy of this agreement for my records.

Signature: _____

Date: _____

Appendix 4: Additional Resources

Visit the following websites for more information about and photographs of whooping cranes:

Wisconsin DNR: Contains whooping crane news summaries, information about what to do if you see a whooping crane in the wild, and an online link to the *Wisconsin Whooping Crane Management Plan*. dnr.wi.gov/topic/endangeredresources/animals.asp?mode=detail&speccode=abnmk01030

Journey North: Provides information on the characteristics, life cycle, ecology and conservation of whoopers. www.learner.org/jnorth/crane/index.html

Operation Migration: Read daily online updates of the ultralight-led migration of whooping crane chicks. www.operationmigration.org/Field_Journal.html

International Crane Foundation: Learn about all fifteen species of cranes in the world. www.savingcranes.org

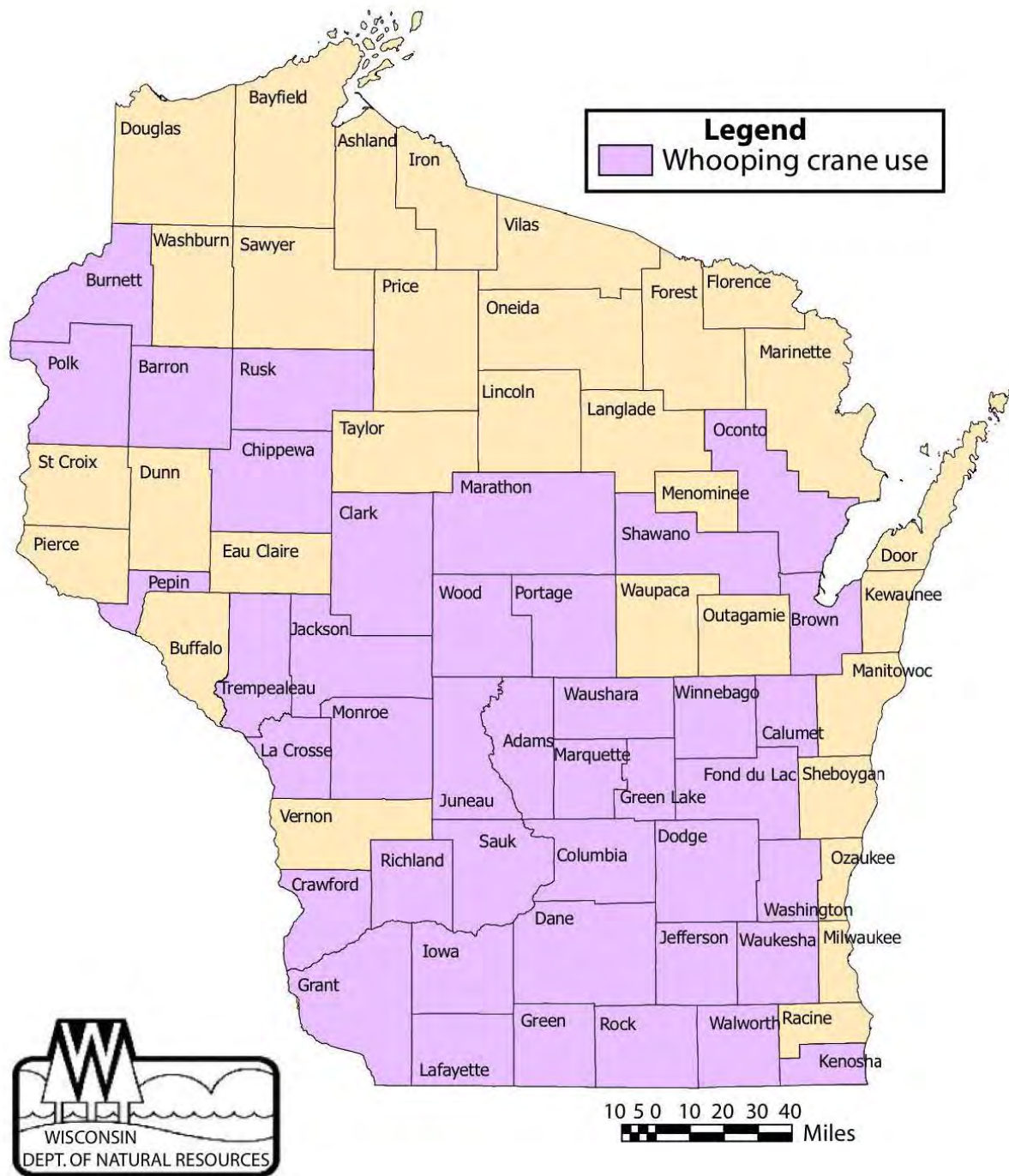
Whooping Crane Eastern Partnership (WCEP): Provides updates of the WCEP project, whooping crane recovery activities, and individual whooping cranes. www.bringbackthecranes.org/

Project Learning Tree (PLT): PLT is an award-winning environmental education program for PreK-8 formal and non-formal educators. Designed for all educators and naturalists, the materials are only available through PLT workshops led by certified instructors. Correlated to Wisconsin's standards, the *Project Learning Tree Pre K-8 Environmental Activity Guide* includes nearly 100 activities in a story-line technique covering themes of diversity, interrelationships, systems, structure and scale, and patterns of change. For more information about the program or to view a schedule of upcoming workshops, visit: dnr.wi.gov/education/educatorresources/plt.html

Project WILD: Project WILD is a nationwide environmental education program consisting of activity guides and supplementary environmental education materials for K-12 classrooms, youth groups, home schools, and nature centers. Project WILD encompasses over 165 environmental education activities. Project WILD includes: *Project WILD K-12 Activity Guide*, with over 165 activities focusing on wildlife, habitat, and responsible human actions; *Aquatic Project WILD Activity Guide*, which explores the fascinating world of water and the aquatic habitats it supports through 48 interdisciplinary activities; *WILD in the City*, a set of urban wildlife fact sheets. For more information about the program or to view a schedule of upcoming workshops, visit: dnr.wi.gov/education/educatorresources/wild.html

Project WET: WET stands for Water Education for Teachers. Wisconsin values its water resources! With almost 15,000 lakes, 33,000 miles of rivers and streams, and 5.3 million acres of wetlands within its borders, Wisconsin needs to protect these waterways. Project WET is a nonprofit water education program and publisher for educators and young people ages 5-18. It is designed to facilitate and promote awareness, appreciation, knowledge, and stewardship of water resources through the dissemination of classroom-ready teaching aids. The core of the program is the *Project WET Curriculum and Activity Guide (Grades K-12)*, a collection of water-related, fun, hands-on, and easy-to-use activities. The 90-plus activities incorporate a variety of formats such as large and small group learning, laboratory investigations, discussion of local and global topics, and involvement in community service projects. Supplementary resources are available to complement and enrich many of the activities. For more information about the program or to view a schedule of upcoming workshops, visit: dnr.wi.gov/education/educatorresources/wet.html

Appendix 5: Whooping Crane Locations by Wisconsin County



Appendix 6: Make Your Own Origami Crane!

Begin with a square piece of paper - ideally one side coloured and the other plain. Place the coloured side face up on the table. In all diagrams, the shaded part represents the coloured side.

1. Fold diagonally to form a triangle. Be sure the points line up. Use your thumbnail to make all creases very sharp.

Now **unfold** the paper

2. Now fold the paper diagonally in the opposite direction, forming a new triangle.

Unfold the paper and turn it over so the white side is up. The dotted lines in the diagram are creases you have already made.

3. Fold the paper in half to the **right** to form a tall rectangle.

Unfold the paper.

4. Fold the paper in half, bringing the bottom up to the top and form a wide rectangle.

Unfold the rectangle, but don't flatten it out. Your paper will have the creases shown by the dotted lines in the figure on the right.

5. Bring all four corners of the paper together, one at a time. This will fold the paper into the flat square shown on the right. This square has an open end where all four corners of the paper come together. It also has **two flaps on the right and two flaps on the left**.

6. Lift the **upper right flap**, and fold in the direction of the arrow. Crease along line a-c.

7. Lift the upper left flap and fold in the direction of the arrow. Crease along the line a-b.

8. Lift the paper at point d (in the upper right diagram) and fold down into the triangle b-a-c.

Crease along the line b-c.

Undo the three folds you just made (steps 6, 7, and 8), and your paper will have the crease lines shown on the right.

9. Lift just the top layer of the paper at point a.

Think of this as opening a crane's beak. Open it up and back to line b-c where the beak would hinge. Crease the line b-c inside the "beak."

Press on points b and c to reverse the folds along lines a-b and a-c. The trick is to get the paper to lie flat in the long diamond shape shown on the right. At first it will seem impossible but with some patience you will get the hang of it!

10. - 13. Turn the paper over. **Repeat** Steps 6 to 9 on this side. When you have finished, your paper will look like the diamond below with two "legs" at the bottom.

14. - 15. Taper the diamond at its legs by folding the top layer of each side in the direction of the arrows along lines a-f and a-e so that they meet at the center line.

16. - 17. Flip the paper over. Repeat steps 14 and 15 on this side to complete the tapering of the two legs.

18. The figure on the right has two skinny legs. Lift the **right upper flap** at point f and fold it over in the direction of the arrow - as if turning the page of a book. This is called a "book fold."

Flip the entire piece over.

19. Repeat this "book fold" (step 18) on this side. Be sure to fold over only the upper flap.

20. Now imagine this image is what you would see if you were looking straight down, at the top of a crane's head. The two points at the top of the picture are the back of the crane's head, and its pointy beak is at the bottom. Open the upper layer of the beak at point a, and crease it along line g-h so that the tip of the beak touches the back of its head (ouch!)

21. **Turn the figure over.** Repeat step 20 on this side so that all four points touch.

22. Your paper should look like this image on the right. Next another "book fold." Lift the top layer on the right (at point f), and fold it in the direction of the arrow to the middle. Be sure to crease the fold.

23. Flip the entire figure over. Repeat the "book fold" (step 22) on this side.

24. - 25. There are two points, a and b, below the upper flap. Pull out each one, in the direction of the arrows, as far as the dotted lines. Press down along the base (at points x and y) to make them stay in place.

26. Take the end of one of the points, and bend it down to make the head of the crane. Using your thumbnail, reverse the crease in the head, and pinch it to form the beak. The other point becomes the tail.

Open the body by blowing into the hole underneath the crane, and then gently pulling out the wings.

Why not use a black and red crayon or marker and give your origami crane the features of a Whooping Crane?

Made possible through the Wild Birds Unlimited Pathways To Nature® Conservation Fund.

