

CRANE FACTS...

Cranes belong to a family of birds named Gruidae.

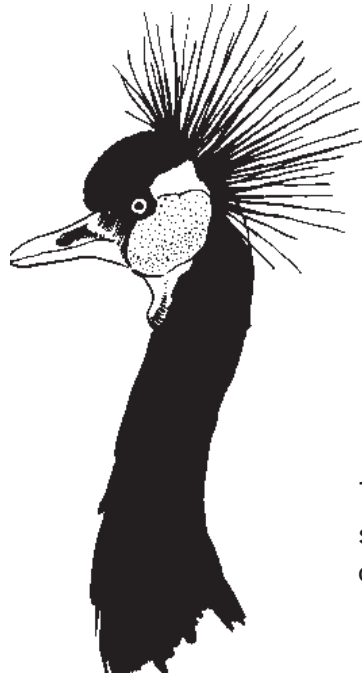
Cranes are a very ancient form of bird. Scientists have discovered fossils of crane bones that are over 25 million years old!

Cranes are found on every continent except South America and Antarctica.

They are different from storks, egrets, and herons, even though they look similar.

Cranes may choose a mate for life, and can live 20 - 30 years in the wild.

Cranes are famous for their courtship dancing and loud calls.



There are 15 different **species** of cranes, of which eleven are now threatened by extinction.

Two of the 15 species of cranes live in North America. Sandhill cranes are found in the Midwest, as well as many other areas of North America. Whooping cranes are found in Canada and the United States.

To many people around the world, cranes symbolize long life and happiness and have an important role in human culture.

Most species of cranes prefer to live in wet, soggy areas called wetlands, but may also find food in grasslands or prairies.

THREATS TO CRANES:



- * **Habitat Loss and Degradation**
- * **Overhunting and Poaching**
- * **Poisoning**
- * **Human Interference**
- * **Biological Factors (Disease, Inbreeding)**
- * **Environmental Factors (Drought, Natural Disasters)**
- * **Hazards during migration (Power Line Collisions)**

WHAT IS A CRANE?

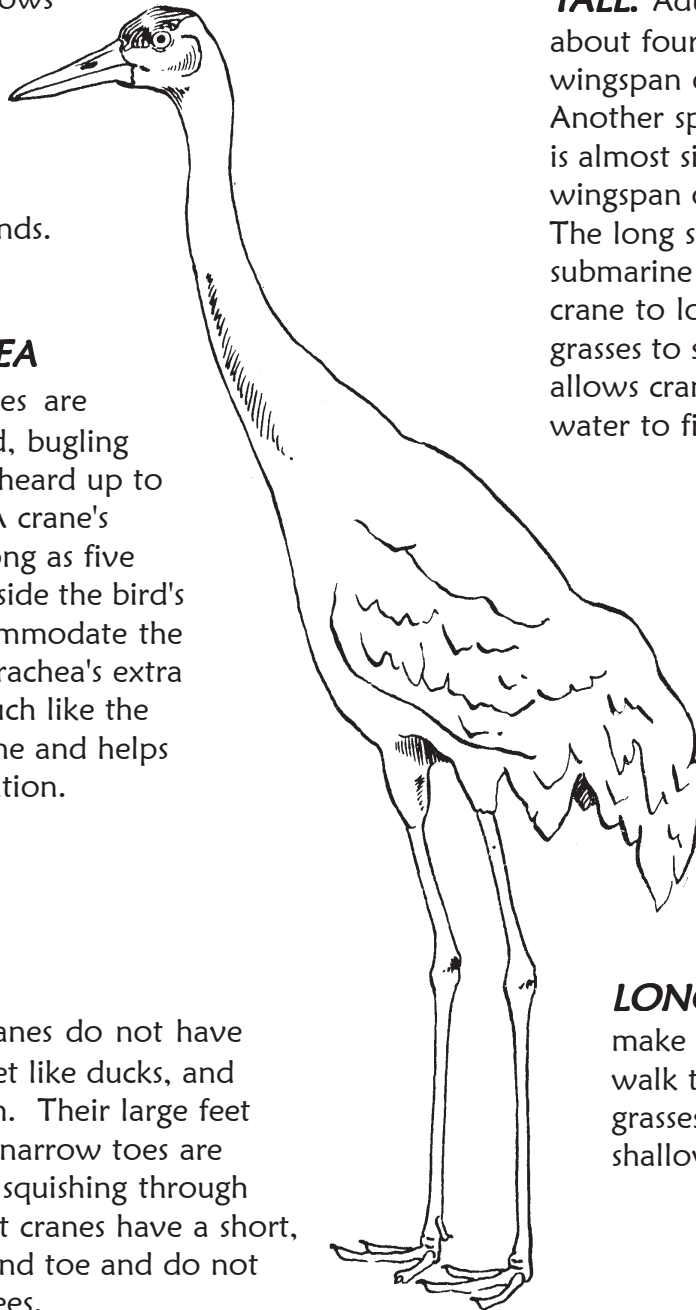
LONG BEAKS: Cranes have long, slender beaks to probe for food in the ground. This “tool” allows cranes to find food where many other animals cannot reach. This is one **adaptation** that cranes have for living in wetlands.

LONG TRACHEA

(Wind Pipe): Cranes are noted for their loud, bugling calls, which can be heard up to two miles away. A crane's trachea can be as long as five feet and is coiled inside the bird's breastbone to accommodate the extra length. The trachea's extra length resonates much like the tubing in a trombone and helps project the vocalization.

FEET: Cranes do not have webbed feet like ducks, and rarely swim. Their large feet with long, narrow toes are perfect for squishing through mud. Most cranes have a short, elevated hind toe and do not perch in trees.

RED PATCH: Most cranes have a bright red patch of bare skin on their head or neck. They often display the red patch to another crane to warn it away from their **territory**.



TALL: Adult sandhill cranes are about four feet tall and have a wingspan of five to eight feet. Another species, the sarus crane, is almost six feet tall and has a wingspan of nearly eight feet! The long slender neck, like a submarine periscope, allows the crane to look over tall marsh grasses to spot predators. It also allows cranes to reach into deep water to find food.

TAIL FEATHERS?

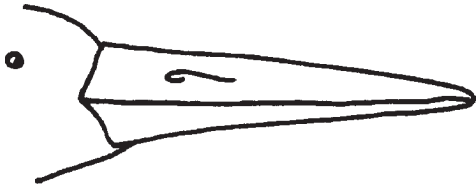
Wing feathers are so long that they cover the short tail feathers when they are folded and give the appearance of a large tail.

LONG LEGS: They make it easy for cranes to walk through tall marsh grasses and wade in shallow water.

AMAZING ADAPTATIONS

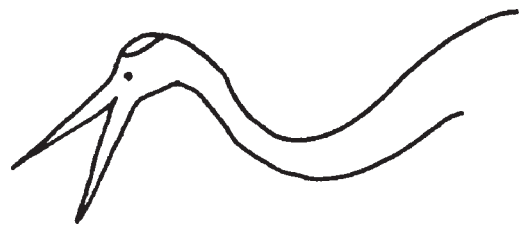
Cranes have developed special equipment, or adaptations, to help them live in the soggy wetland environment, or feed in some of the dry uplands.

Let's take a look at some of these **physical adaptations**:



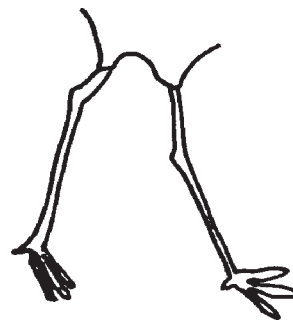
Observe the **beak**! It is long, straight, and narrow--perfect for digging in mud and shallow water. Lots of goodies, like roots and insects, live down there in the mud. The beak is also a very agile tool for snatching crickets in the uplands.

Ah Ha! The **neck**. It's useful for reaching for food, or for looking over tall grasses to spot predators.



Like many wetland birds, cranes have a special gland that secretes oil. The official name for this gland is the **uropygial gland**. When cranes preen, they spread the oil over their feathers to help clean and condition them.

Their **legs** are extra long for wading through shallow water and walking through tall grasses.



And last, but not least, the **feet**. Large, weight-bearing feet with long toes cut down the risk of becoming bogged down in the soft mud of the wetlands. Notice that the back toe is very short. This makes it easy to walk, but it makes it impossible to grasp a tree branch!

Cranes have also developed **behavioral adaptations**, changing the way they act in response to changes in their surroundings. An example of a behavioral adaptation is demonstrated by the sandhill crane that used to feed in wetlands, savannas, and prairies. Since these habitats are less common today in Wisconsin, cranes now often feed in agricultural fields, like corn fields.



WETLANDS: HOME SWEET HOME

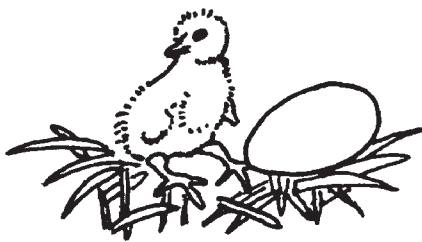
All animals have the same basic needs: food, water, shelter, and a safe place to rear their young. The place where an animal finds these things is called its **habitat**.

Cranes find many of their needs in **wetland** habitats. Wetlands are places where water collects and saturates the soil for at least part of the year. Wetlands may be as big as a shallow lake, or as small as a ditch along the side of the road. They are known by many different names: **swamps, marshes, estuaries, sloughs, kettleholes, bogs** and **fens**, to name just a few. All of these wetlands are important to many different plants and animals, and all have unique characteristics, such as their location or annual water cycle.

From a "crane's-eye view" what are wetlands good for?

Food and Water Supply

Wetlands provide an abundance of insects, plant tubers, snails, frogs, small fish, and other tender morsels for cranes to eat. Sandhill cranes are adaptable and find food such as seeds, roots, insects, worms, and mice in upland areas like **prairies** and **savannas** as well. But other types of cranes are not as adaptable. When their wetland food supplies are no longer available, they either must fly to another wetland, or starve. Most **endangered** cranes live in areas where wetlands are rapidly disappearing.



Nesting Sites

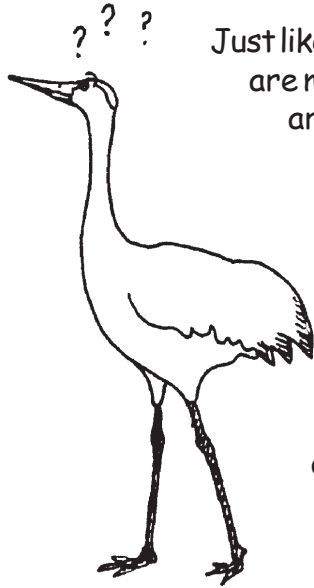
Cranes build their nests with plants such as cattails and rushes. They choose a remote part of a wetland, so their eggs and chicks are protected from **predators**, such as raccoons, wolves, coyotes, bears, and sometimes even people. The tall vegetation of the wetland helps to hide the cranes and their nest.

Roosting Sites

Wetlands are a safe place to sleep, or **roost**, at night. The splashing of a predator walking through the water alerts the cranes of approaching danger!



WHAT COMMUNITY ARE YOU IN?



Just like people, cranes live in communities. **Biological communities** are made up of all the plants and animals that live in a certain area. Wetlands, prairies, savannas, and forests are examples of biological communities. Each plant or animal interacts with the other plants and animals living in a community.

The **habitat** of cranes includes parts of biological communities such as wetlands, prairies, and savannas. But how do you know which community you're looking at? How do you identify these communities?

WATCH FOR "SIGNPOSTS" DURING YOUR TRIP TO ICF AND YOU WILL KNOW WHAT COMMUNITY YOU ARE WALKING THROUGH!

Trees that grow in a forest have branches that reach up rather than out. But if you see an old tree with branches that reach out to the sides as well as up, it must have grown in the open. Wide-branched trees like this are found in a biological community called **savanna**.



Plants like cattails, reeds, or rushes growing out of a wet or damp area indicate a **wetland** community.



Tall grasses, like big bluestem and indian grass growing in the open sun are the "signposts" for the **prairie** community.

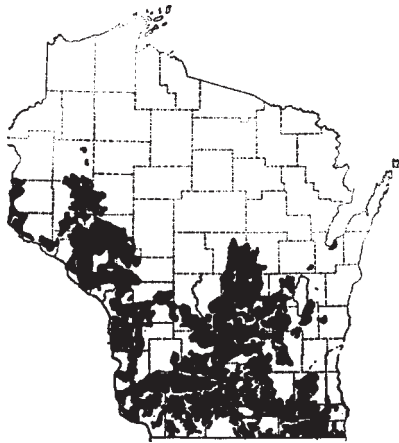


Do you have any of these communities near your home or school? If so, which ones?

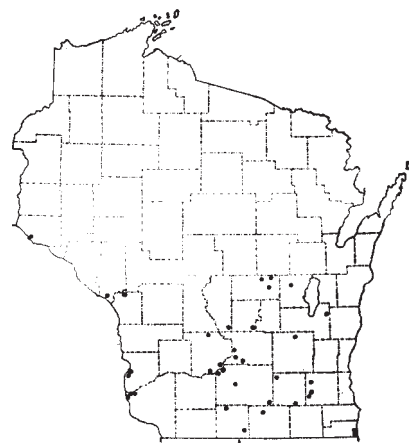
The Conquering Heroes?

In the early 1800s, southern Wisconsin was a mix of **biological communities** like **wetlands**, **prairies**, and **savannas**. When European settlers arrived, they altered the natural areas. Settlers needed to build homes and plant food crops for their families and livestock. Prairies and wetlands soon became farms and cities. The **wildfires** and **herbivores**, such as bison and elk, that maintained the prairies and savannas were eliminated, and trees and shrubs began to invade the remainder of the savanna.

For example, in *The Vegetation of Wisconsin*, author John Curtis estimates that there were about 7,257,000 acres of oak savanna in Wisconsin when Europeans arrived around 1840. That's an area larger than the state of Maryland! Today, there are only about 1,360 acres of oak savanna left.



Oak Savanna in 1840



Oak Savanna Today

Calculate how much of these biological communities are left in Wisconsin:

Wetlands: $\frac{5,400,000 \text{ acres in 2000}}{10,000,000 \text{ acres in 1840}} * 100 = \underline{\hspace{2cm}} \%$

Prairie: $\frac{2,000 \text{ acres in 2000}}{2,000,000 \text{ acres in 1840}} * 100 = \underline{\hspace{2cm}} \%$

Savanna: $\frac{1,360 \text{ acres in 2000}}{7,257,000 \text{ acres in 1840}} * 100 = \underline{\hspace{2cm}} \%$

How big is an acre?
A football field is about one acre if you include the end zones and sidelines. There are 640 acres in one square mile. Wisconsin is about 56,153 square miles. What is the size of Wisconsin in acres?

If your classroom was a model of Wisconsin, how much of your classroom would be wetland, prairie, and savanna?

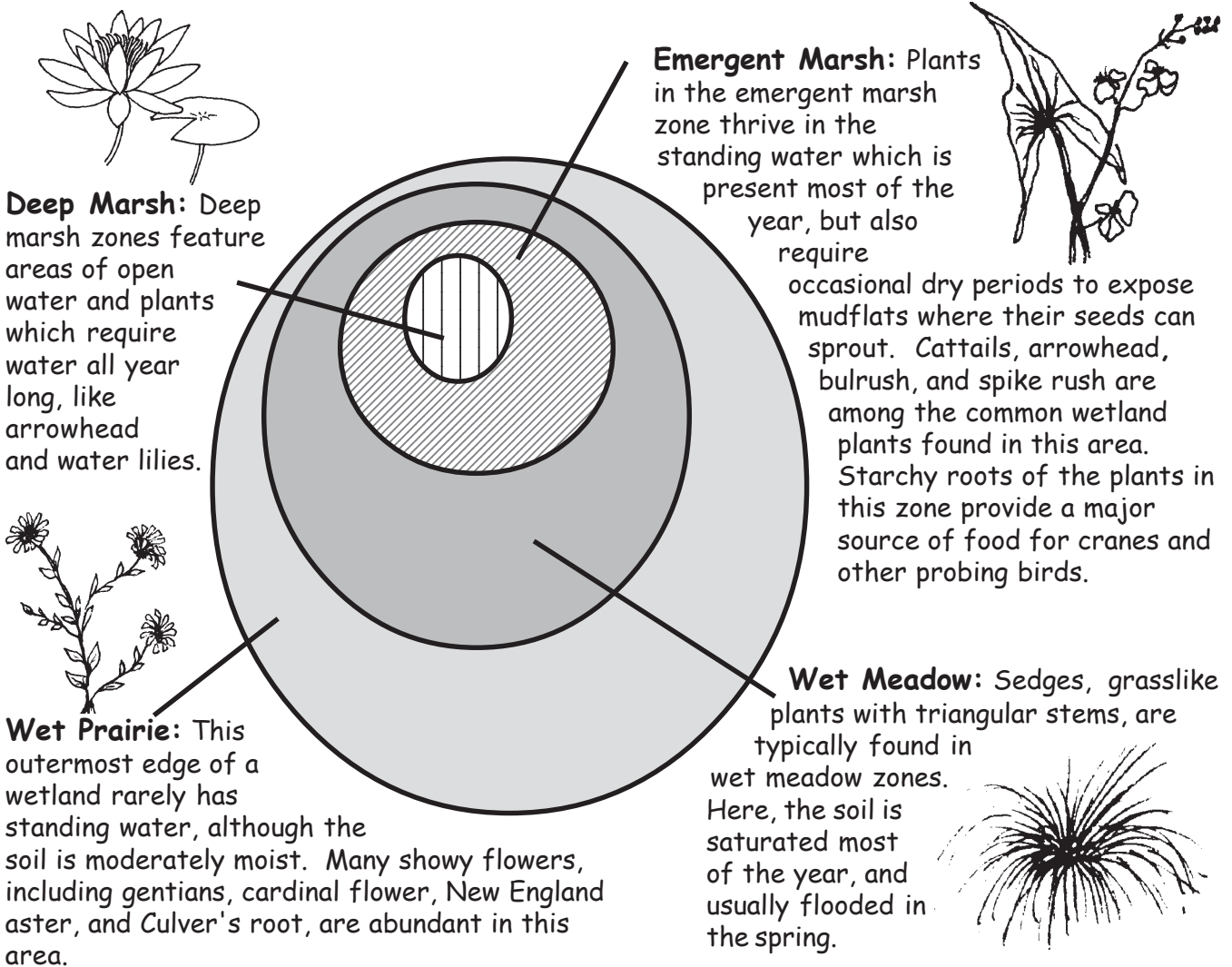
Loss of biological communities is a national problem, too. Twenty-two states had lost over half of their wetlands between 1780 and 2000. At the time of European settlement, there were about 200 million acres of wetlands in the lower 48 states. By 2000, only 52% remained. How many acres of wetlands were left as of 2000?

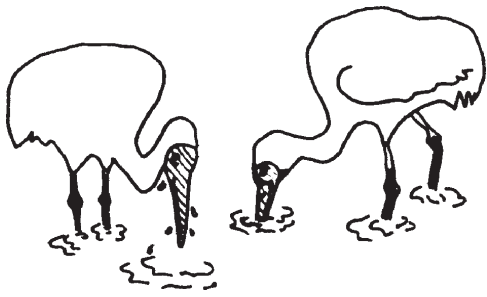
WHAT MAKES A WETLAND?

As you might expect, wetlands depend on water. But how and when the water arrives at a wetland can determine the type of **biological community** that results. Many wetlands get their water from rain and snow. Other wetlands, however, get their water from beneath the ground. Water from the ground may carry many minerals. Therefore, the type of plants in this community are different from other wetlands.

Wetlands also do not stay the same from year to year or even from month to month. Wetlands change over time, sometimes dramatically. Some changes are seasonal: the water in many wetlands is very deep in the spring, but water levels may drop as summer progresses. Other changes can last for years: **droughts** or floods may drastically alter the type of plants that live in a wetland.

Within a single wetland, different water levels provide many different **habitats** for a variety of plants and animals. Some species grow best in deeper water, while others thrive in shallow water or mud. When you look at a wetland from above, you can see rings of vegetation which correspond to different water levels. As wetlands change over time, zones of vegetation may shift or disappear completely.





Understanding Soils

From Muck to Sand

Don't laugh at the word "**muck!**" It is the official, scientifically-approved word for a type of wetland soil. Understanding soils is important for understanding what plants and animals will be found in a particular place. Let's take a close look at the qualities that are most important to understand about soils:

Color

Simply noticing the color of a soil will tell you a lot about the amount of **organic matter** in it. Organic matter is material from decomposed plants and animals. It helps hold water and is a natural fertilizer. Topsoil is usually black because it contains a large amount of organic matter.

Texture

The texture, or feel, of soil can indicate how well it can hold water. Small particles, like clay and silt, can catch water in the small gaps between the particles. Soils made of these materials are good at holding water and feel smooth and fine. Therefore, moisture-loving plants usually grow in clay soils. Soils composed of larger particles, like sand and gravel, will feel rough and gritty. They do not hold water well. Therefore, plants adapted to live in dry soil usually grow in sandy soils. As a result, biological communities which live on clay soils are different from those growing on sandy soils.

Soil Profiles

If we look at a cross section of the ground, or a **soil profile**, we see the different layers that make up the soil. Each of these layers is called a **soil horizon**. Looking at the soil profile can tell you the soil's history.

Each type of plant community tends to produce soil profiles of a certain pattern. Prairie soils, for example, have a thick, dark topsoil (called the "A" horizon), as much as four feet deep! Forest topsoils, however, are only two to four inches thick.

The "B" and "C" horizons contain larger-sized particles and rocks, and can tell us about the materials that the soil is made from.



"A" Horizon

"B" Horizon

"C" Horizon

The Value of Wetlands

Wetlands are obviously important from a crane's point of view, but why are they important to people? In the past, most people thought that wetlands were wastelands. But natural areas help support human life, as well as wildlife. Wetlands have many functions that are vitally important to the quality of our lives. All wetlands do one or more of the following:



Groundwater Recharge

Much of the water we use is pumped out of the ground, from water-bearing soil and rock layers. But how does water get back into these underground storage layers to replace what we pump out? In certain situations, wetlands will collect rainwater and snowmelt and allow it to seep into the soil, thus replenishing the water in the rock and sand layers below.

Flood Control

Wetlands absorb and hold huge amounts of water after heavy rains, then slowly release it downstream. Without wetlands this water would rush directly into streams and cause flooding. Floodplains are areas where water accumulates during floods, and often have one or more different types of wetland. Parts of the floodplain may only flood once every 25, 50, or 100 years. People forget that this land is occasionally flooded, and often build homes, businesses, or plant crops in the floodplain. Then when a big flood occurs, their homes and businesses are damaged or destroyed.

Pollution Control

When rainwater washes into wetlands from fields and lawns, it often contains amounts of chemical pollutants and eroded soil. Wetland bacteria and plants use the extra fertilizer, eroded soil settles, and pesticides may float to the surface where they break down in the sun. Water often comes out of a wetland cleaner than when it went in. Some cities even use wetlands to further filter water from sewage treatment plants!

Food Sources and Recreation

In the past, humans depended on the plants and animals they could find in wetlands for food. Today, wetlands are still important for human nutrition. Do you ever fish for or eat pike, perch, or walleye? Do you enjoy shrimp or lobster? These animals all require wetlands at some point during their lives. Wetlands are also important for plant foods, such as wild rice.

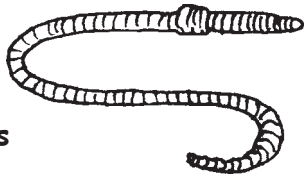
Environmental Stability

You've probably heard how important rainforests are to protecting the world's environment. Well, just like rainforests, the water in wetlands can affect the moisture content and temperature of the air, influencing cloud formation and rainfall nearby. Wetlands also keep gases like oxygen, nitrogen, carbon dioxide, and methane in the correct proportion in the atmosphere. Wetlands are also home to about one third of all endangered plants and one half of all endangered animals in the U.S., making them important in the preservation of rare species and in protecting the Earth's biodiversity.

CREEPY CRAWLY CRITTERS

Cranes and plants aren't the only members of a wetland community. Many species of animals also share wetlands. They depend on wetland plants and often on each other for food. Animals are also sensitive to changes in the water level of a wetland.

1. Which animals benefit the most from wetlands with permanent water? Which would prefer areas of lower water or occasional dry periods?
2. Draw lines from each animal to the other animals it would eat. How many of these creatures would be eaten by cranes? Can you think of other animals that live in wetlands?



Worms

Water and damp soil are home to many kinds of worms: roundworms, flatworms, earthworms. Worms are high in protein. Many animals eat them, including cranes.



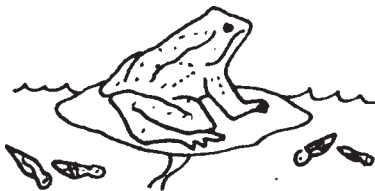
Insects

Flying and crawling insects feed, and lay eggs in wetlands and prairies. Crane chicks eat lots of them. In fact, hatching of chicks usually occurs when the insects are at their peak! Why?



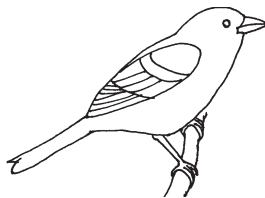
Snails

Snails are often found in wetlands. Eating them benefits the cranes because snail shells are high in calcium, and the female cranes need the extra calcium to make egg shells in the spring.



Frogs and Tadpoles

Though frogs may live in forests or wet prairies most of the year, they require water for laying their eggs. Frogs eat lots of insects and even worms. Cranes eat both frogs and tadpoles.



Red-winged Blackbird

You will often find red-winged blackbirds perched on cattails or other marsh vegetation. Since cranes may eat other birds' eggs, blackbirds try to chase them away from their nests.



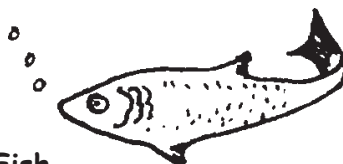
Raccoons

Dogs, coyotes, and raccoons may enter a wetland to prey on crane eggs and chicks. Nests built in deeper water are safer from these predators.



Sandhill Crane

Sandhills prefer wetlands with permanent water. Low water may allow predators, like raccoons to reach the nest. High water may flood the nest.



Fish

Many species of fish spawn in wetlands. Cranes and other large birds, like herons and egrets, will eat fish.



Waterfowl

Ducks and Canada geese depend on deeper wetlands for food. Wetlands are critical resting and foraging areas during migration.

WHERE IS THE PRAIRIE?

When you look at a prairie, you don't see the half of it! That's because most of the prairie is actually living under the ground as a root structure. Why have prairie plants adapted this kind of strategy?

FIRE...

Set by lightning and Native Americans, **wildfires** often swept through the Midwest's prairies. While plants with most of their growth above the ground fared poorly, the large roots of the prairie plants were protected. After the fire, the prairie plants simply would put up more stems and leaves.

WEATHER...

At one time, prairies stretched from the Great Lakes to the Rocky Mountains. This mid-continent area is usually exposed to intense heat in the summer and extreme cold in the winter. Having the majority of the living portion of the plant underground helps to insulate it from these temperature extremes.

NUTRIENT CYCLING...

Fire and herbivores return nutrients trapped in dead stems and leaves to the ground as ashes and manure. As the nutrients move into the soil, they are absorbed into the roots of plants to fuel new growth.

GRAZING...

Large animals called **herbivores**, like bison and elk, ranged the prairie, grazing and browsing on the lush vegetation. But smaller herbivores, like grasshoppers, also ate large amounts of grass and other plant leaves. The constant cropping of the vegetation caused the plants to grow more quickly. But the plants could only do this if they had a large root system and food reserves below ground where these animals could not reach!

SOIL...

Some prairie soils contain a lot of sand and other coarse material. This soil does not hold water very well, so water seeps down deep into the ground. Deep roots, some as long as 18 feet, ensure that prairie plants will be able to reach water. This is especially important during times of **drought**, when plants with smaller root systems may die.

OAK SAVANNA

Have you ever heard the word “savanna?” What does that word make you think of? Lots of people think of African grasslands with lions, giraffes, and elephants walking among widely spaced trees. It's a pretty picture, but did you know that we used to have savanna in the Midwest? No, we didn't have lions, giraffes, and elephants, but we had the same type of scene with wolves, elk, and bison. It must have been an exciting place.

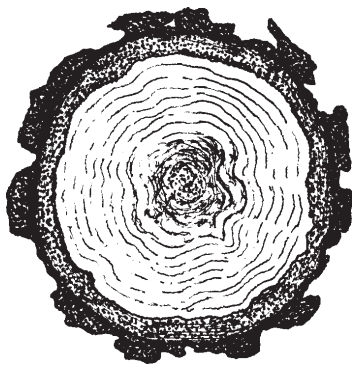
At one time there was more savanna in southern Wisconsin than any other type of **biological community**. Now savanna is the rarest community left in the state.

You can sometimes see where savannas used to be. When trees grew in the open savanna, they grew a full, rounded **crown**. Trees that grew in the forest, however, needed to reach for the light, so their branches grew upwards rather than to the sides. Their trunks are often bent or twisted too, since they lean towards open areas where they can find more light.



Compare the shape of the trees shown. Can you tell which tree grew in a savanna and which one grew in a forest?

The trees in Wisconsin's savannas are usually *bur oak* trees. Wildfires often swept through the savanna killing some trees, but not the bur oaks. Compare the cross-section of the bur oak tree below with the cross-section of the maple tree. Which tree would have a better chance of surviving the heat of a fire? Why?



BUR OAK



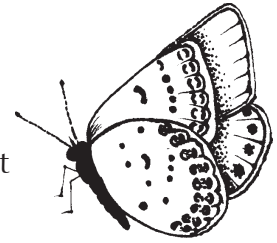
MAPLE

The thick, corky, bark on the bur oak protects the inside of the tree by *insulating* it from the heat of the wildfire. Watch for open-grown oak trees on your trip to and from ICF. Where you see these old trees used to be savanna!

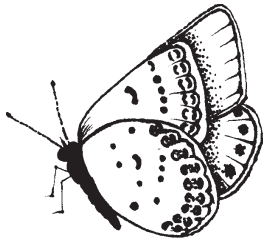
A bur oak's investment in its bark has a cost, too. Although the two cross-sections come from trees about the same age, the bur oak was only 12 feet tall while the maple was over 20 feet tall. In the absence of any fires, which of these trees will likely survive? Why?

To Save A Butterfly...

Each species of plant or animal depends on many other organisms. In order to protect any individual member of a community, we need to make sure that the whole community is healthy. As an example, let's examine the Karner blue, a butterfly considered endangered in the United States. The survival of the Karner blue depends on the survival of a plant called wild lupine, as well as many other members of the **savanna** community.



Adult Karners require a variety of nectar sources during the summer, including bergamont and butterflyweed.

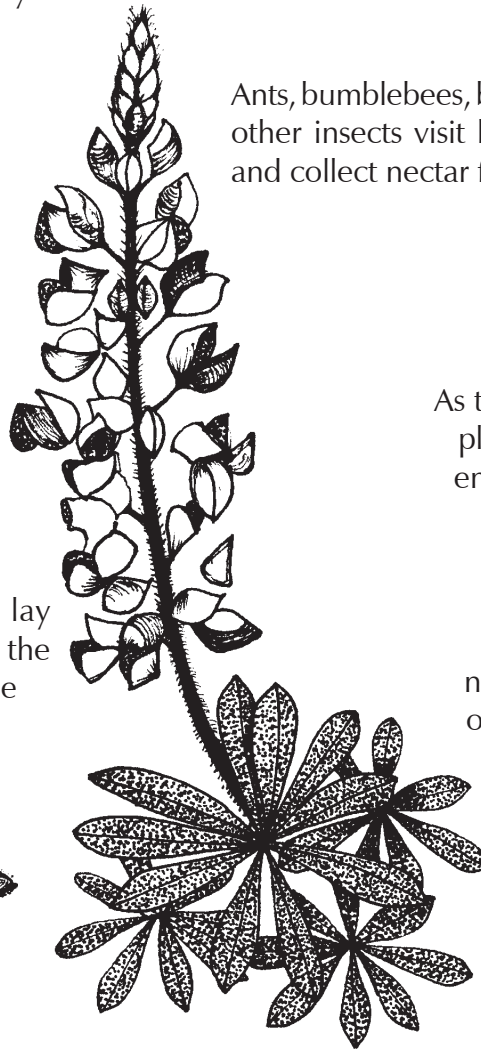


Karner blues will lay their eggs *only* on the leaves of wild lupine

Karner blue larvae secrete a sweet juice which the ants will feed on.



Ants tend the **larvae** on the lupine leaves and will aggressively attack any potential predator which approaches the larvae.



Ants, bumblebees, butterflies, and other insects visit lupine flowers and collect nectar for food.



As the insects travel from plant to plant, they then transfer pollen, enabling the flowers to produce seeds.

Ants also feed on nearby plants, creating open patches of sandy soil where lupine seeds can **germinate**.



Only lupine seeds whose roots grow in contact with a special bacteria in the soil can grow into an adult plant.

Bacteria form **nodules** on the roots of the lupine. Through their metabolic cycle, the bacteria add nitrogen to the soil that is used by other plants.

1. How many other organisms do Karner blues depend on? If any of these other organisms disappear, what happens to the Karner blues?
2. Like the relationships between Karner blues and other members of the savanna community, sandhill cranes depend on the wetland community. What happens to cranes if wetlands disappear?
3. When we try to protect an individual species, why is it important to preserve the entire biological community?



YOU MAKE THE CALL



It's easy to blame others for the trouble with our environment. But it's important to remember that each of us plays a role in how our environment is used. Decisions we make every day affect the environment. Our decisions are based on our **values**. The word "value" has many meanings. For instance, one meaning of value is "to regard highly." We can value many things, but oddly we sometimes say one thing, then do another. Perhaps we haven't linked our decisions to our values, or maybe we have competing values.

For example, most students would agree with the following value. Do you?

Value: The Earth is important to me, so I want to do what is best to preserve the environment.

The following example shows how this value has an impact on decisions you make every day:

Situation: You are sitting on a picnic table in a park on a hot day finishing a drink of soda. You know that you should take your empty can to the recycling container, but the recycling center is at least a two or three minute walk.

Options: You have to make a decision and choose from several different options:

1. You can take the can to the recycling container.
2. You can leave the can on the picnic table at which you are sitting.
3. You can throw the can away in the nearby garbage can.

Which option would you take? Why?

You may have found this decision to be relatively easy (one hopes you decided to take it to the recycling center). But what if you were sitting on the picnic table with friends and they wanted to leave and your path would not take you near the recycling center? What option would you choose? Does it match your value statement above? Why or why not?

Try the following situations. Be sure to make a value statement and list as many decision options as possible. Then decide which of the following options would be best for you. Next, write a paragraph explaining why you made your decision.

- * Your clothes are still in good shape, but not the current style and school is going to start soon.
- * You would prefer to have Mom or Dad drive you to school rather than taking the bus or walking.
- * You have a small garden in the backyard, but rabbits and bugs are eating about half of your fruits and vegetables.

Do you agree with the following statement: "Each choice you make has consequences. Sometimes our choices are difficult because one option may seem best right now, but may not be the best for us later." Explain why you agree or disagree.

CHANGES: GOOD OR BAD?

In this unit we've learned about the recent changes in Wisconsin's landscape. How would you answer the following questions?



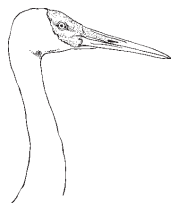
1. Do you think cranes would benefit if their natural habitat always stayed the same? Why or why not?
2. Change is part of nature. Plants and animals change their physical and behavioral adaptations as landscapes and climates slowly change. Why do the changes which people cause sometimes mean trouble for wildlife?
3. Some say that people should stop changing the environment and let nature take its course. Do you think it's possible for people to stop changing the environment? Why or why not?
4. Much of southern Wisconsin was once covered by prairie and savanna. Today there are still some savanna and prairie remnants left between farm fields and woods. Why can't these ecosystems just grow back on their own? Why do people need to get involved? Think of at least two reasons.
5. Do you think cranes can adapt to new situations as well as people can? Why or why not?
6. People are always adjusting to changes. What changes have you made in your life in the last year? Do you think people are better off if their environments stay the same, change, or a little of both?



Using The Old Cranium



1. Name five things cranes find to eat in a wetland. At what time of year would cranes need lots of high protein animal foods? Why? At what time of year would cranes need lots of high-carbohydrate plant food? Why?



2. Name two predators who might eat crane eggs or chicks.



3. Why are cranes safer while nesting and roosting in a wetland?



4. Why do cranes have such long legs and necks? Would you expect most wading birds to have long necks and legs? Why? Name another bird that looks very much like a crane.



5. How is a crane's beak adapted for use in a wetland?



6. What adaptation do you have for grasping tools? How would your family adapt to a gasoline shortage? Which of these is an example of a *behavioral adaptation* and which is a *physical adaptation*?



7. What are three important features to study about a particular soil? Why is topsoil black?



8. Name five ways in which wetlands benefit people. Note whether these are direct, economical benefits or indirect, non-economical benefits and why.



9. If you saw an oak tree with a rounded crown, what plant community would you be standing in? Why is the tree crown rounded?



10. Draw a picture of a soil profile. Indicate the topsoil horizon. Why is this layer so important?

