Habitats of North Dakota

WETLANDS

By Gwyn Herman and Laverne Johnson

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HABITATS OF NORTH DAKOTA

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About Habitats of North Dakota

Distribution of these **Habitats of North Dakota** units is made possible by the North Dakota Game and Fish Department in collaboration with the North Dakota Center for Distance Education.

The information presented in **Habitats of North Dakota** seeks to promote teaching and learning about the wildlife and conservation topics of North Dakota. Five separate units have been developed to discuss the habitats. They are ***Wetlands***, ***Prairie***, ***Badlands***, ***Woodlands***, and ***Riparian Areas***.

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Dr. Gwyn Herman and Ms. Laverne Johnson were born and raised in rural North Dakota, and both have a deep love for their home state. They are educators who have over 60 years of combined teaching experience at all grade levels, including the teaching of North Dakota Studies to both fourth and eighth grade students.

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Ms. Johnson received her bachelor of science and master of science degrees from Minot State University. Her experience includes 23 years as an elementary teacher in grades ranging from kindergarten through eighth grade, and 10 years as a speech/language pathologist in grades nine through twelve. She is currently an adjunct professor at the University of Mary where she supervises pre-service and student teachers.

Gwyn Herman (left) and Laverne Johnson (right)

Welcome

Welcome to the study of *Wetlands of North Dakota*! This book is filled with interesting and useful information about wetlands—what they are, where they are located, which animals and plants depend on them, how they are threatened, and why they must be saved. Through reading and engaging in the variety of activities that accompany this text, you will find yourself on a dynamic and educational journey of discovery. **Read on....**

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Wildlife Habitats and Conservation History by Chris Grondahl, Wildlife Biologist

Wildlife has long been an important part of the North Dakota prairies. American Indians depended on this abundant resource for their food, clothing, and shelter for thousands of years before Euro-Americans arrived in the area.

In European countries, wildlife resources were scarce. The only people who were allowed to hunt in Europe were wealthy landowners and members of royal families.

In the 1800s, Euro-Americans immigrated to North Dakota. The earliest settlers depended on hunting and trapping game animals to help feed their families and make a living. At the same time, market hunting for these wildlife resources began.

Market hunters killed large numbers of wildlife for furs and feathers, which they sold to people in the clothing industry on the East Coast and in Europe. They also sold meat to restaurants.

No laws existed to protect wildlife in North Dakota in those early years. Populations of wildlife such as the white-tailed deer, bighorn sheep, elk, and pronghorn decreased to very low numbers.

In 1883, Theodore Roosevelt came from New York to the Badlands of northern Dakota Territory to hunt. He liked the area so much that he bought two ranches in the Badlands and spent summers enjoying the wildlife and wide-open spaces of North Dakota.

Theodore Roosevelt's adventures in a land of wildlife and open spaces inspired his interest in wildlife conservation. Conservation is defined as caring for, managing, and protecting natural resources, including wildlife. When Theodore Roosevelt became President of the United States in the early 1900s, one of his major goals was to preserve and protect these natural resources. He set aside 230 million acres of land throughout the United States in the form of national parks, national forests, and other areas for conservation and public use. Other conservationists during this time realized the importance of protecting habitat and wildlife and developed plans to manage these resources.

During the 1900s, laws were passed to protect wildlife. In 1930, the North Dakota Game and Fish Department was created. Its purpose was to manage the state's wildlife resources for public enjoyment. Hunting was an important part of this management plan.

In order to pay for managing wildlife conservation, the U.S. government began collecting a special tax on hunting equipment such as guns and bullets. The money collected was given to state wildlife agencies for wildlife and conservation programs. A similar system was also adopted to fund fisheries programs. In this way, the group that uses and enjoys the resource pays for its management.

The state Game and Fish Department has used these funds along with money collected from sales of hunting and fishing licenses to purchase tracts of land that could be used by hunters and anglers. These public areas are called "Wildlife Management Areas," or WMAs. Public lands that were purchased by the federal government included National Grasslands, waterfowl production areas, and wildlife refuges. These lands were purchased for the public, not only for protecting habitats for wildlife, but also for providing places for people to enjoy all kinds of outdoor recreation. Habitat (food, water, shelter, and space) is the key to sustaining healthy wildlife populations, and quality habitats have been created and preserved by individuals, conservation organizations, and governments.

An example of a very important habitat development for wildlife in North Dakota is a program called the "Conservation Reserve Program" (CRP). CRP was established by the U.S. government and farmers to plant grass on some less fertile land that had been plowed for crop-raising. For 10 to 20 years, these grass habitats have replaced low production farm ground. CRP has increased populations of wildlife such as white-tailed deer, pheasants, ducks, and nongame species.

Figure 1. Teddy Roosevelt traveled to North Dakota over 100 years ago. Here, he learned to enjoy and appreciate the wide open spaces and the importance of hunting and conservation. *(State Historical Society of North Dakota, 0410-127)*

The "North American Model of Wildlife Conservation" was developed as a result of all the effort wildlife conservationists put forth in the last 100 years to create good wildlife habitat and keep wildlife available for everyone to use. This model promotes equal access to wildlife for everyone and is in contrast to the European model in which wildlife was controlled and used only by wealthy people.

Just like what happened 100 years ago when some people sold wildlife for personal profit, there are commercial interests doing that today. The public owns the wildlife in North America. Our North American wildlife conservation system has been extremely successful. Activities that prevent access to wildlife by the public destroy the framework of this system. The more that people of all ages understand the importance of the North American model, the better chance present and future generations will have of enjoying this great American resource.

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WETLANDS

Which of the following has something to do with Wetlands of North Dakota?

- Cattails not found on cats
- A table under the ground
- Nurseries without babies
- Wetlands that are dry
- A redhead with no hair
- Flyways without flies
- A hammerhandle that does not hold a hammer
- A tiger that is 6 inches long
- A leopard that hops
- A drum that is not played
- A pen that swims
- A cob without corn

So which of the choices above has something to do with Wetlands of North Dakota? Answer: All of them!

Introduction

A **wetland** is a basin, or low area of land, that holds water. Some wetlands hold water for only a few days or weeks, while others are filled with water year round.

Wetlands are fed by watersheds. Water runs downhill; therefore, the precipitation that falls on land drains to the lowest part of the land. The higher land sheds (removes) the water, which then runs downhill into the lowest point—a wetland. A **watershed** is an area of land that drains downward to the lowest point.

Wetlands have three common characteristics: (1) water, (2) a wetland soil called "hydric" soil, and (3) plants that can live in water. Wetlands come in all shapes and sizes. They include rivers, streams, large and small lakes, reservoirs, and potholes.

Most of the wetlands of North Dakota were formed by the action of **glaciers** that inched over the land thousands of years ago. The last glacier to move over North Dakota was the **Wisconsinan** (wis-Kon-sin-an) **glacier**. This gigantic mass of ice entered the area from Canada about 40,000 years ago and covered all of North Dakota except for the southwest corner.

The Wisconsinan glacier advanced and retreated several times over the next 28,000 years. It acted like a giant bulldozer, scraping the land and moving huge amounts of earth. In some places, it also gouged into the water table located under the surface of the ground, releasing water that made the ground wet. By the time the glacier melted about 12,000 years ago, it had completely changed the landscape in several states and some Canadian provinces.

The masses of material the glacier had been carrying were deposited in various places, forming rolling hills. Over time, a prairie, or grassland, developed on the flat and rolling plains. This prairie contained millions of **potholes**, or low spots in the ground, where water collected or came up from underground. The "Prairie Pothole Region" had been created.

The Prairie Pothole Region

The **Prairie Pothole Region** is known for its rolling hills and its millions of potholes. Some people in North Dakota call potholes "sloughs" (slews). The Prairie Pothole Region covers about 300 thousand square miles, as it is about 1,000 miles long and about 300 miles wide. The area includes large parts of Alberta, Saskatchewan, Manitoba, North Dakota, South Dakota, Minnesota, and Iowa. Because the Wisconsinan glacier did not cover the southwestern corner of North Dakota, that area of the state is not part of the Prairie Pothole Region.

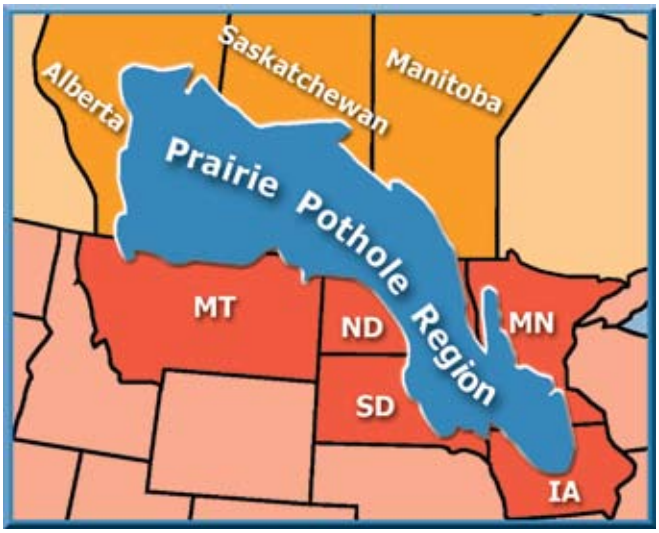

Figure 2. The Prairie Pothole Region is known for its high number of wetlands and waterfowl habitats.

North Dakota lies in the heart of the Prairie Pothole Region. The Prairie Pothole Region is the greatest producer of waterfowl in the world.

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Comprehension

1. Name three common characteristics of wetlands.

2. How were most of the wetlands in North Dakota formed?

3. Which glacier shaped the surface of almost all of North Dakota? How long ago did it leave the state?

4. The Prairie Pothole Region is known for what?

5. Name the seven main states and provinces included in the Prairie Pothole Region.

6. The Prairie Pothole Region produces more what than any other place in the world?

Critical Thinking

1. Describe what you think North Dakota may have looked like if glaciers had not entered the area.

Types of Wetlands

Wetlands are classified into four major types: temporary, seasonal, semi-permanent, and permanent. Each of the types is an important provider of habitat. A **habitat** is an environment that provides the food, water, shelter, and space for wildlife to make their homes.

Temporary wetlands are shallow depressions that hold water from melting snow or heavy rain. They usually contain water or have soggy ground from the time the snow melts in the spring until early June when they dry out. However, during years of deep snow or heavy spring rains, these wetlands may not dry out until the middle of July. They may fill with water again if heavy rainfall occurs in the summer or fall.

Temporary wetlands are necessary for migrating and wetland birds. Because temporary wetlands are shallow, they warm rapidly in the spring. This results in an abundant supply of **aquatic** (ah-Kwa-tik) (water) insects, which serve as a major food supply for migrating birds. Early-nesting wetland birds also feed on these insects. Insects provide the nesting hens (females) with the necessary food for laying eggs.

Farmers can sometimes plant crops in temporary wetland areas, but if the wetlands do not dry out early enough for planting, they may be used for pasture (land used for cattle grazing) or for cutting hay (dried grass used to feed cattle).

Seasonal wetlands are depressions that usually contain water from the time of snowmelt until the middle of July. Most years, seasonal wetlands are not planted to crops but are used for pasture or hay land. Heavy rains often refill these wetlands.

Figure 3. Temporary Wetlands. A temporary wetland is a shallow depression that holds water for a short time in the spring. These wetlands often form within agricultural fields and are important sources of food for migratory birds.

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Figure 4. Seasonal wetlands hold water longer than temporary wetlands, usually until sometime in July. They provide both food and cover for adult and young ducks.

Two vegetation zones are found in seasonal wetlands. The outer area is made up of a wet meadow consisting mainly of fine-textured (very thin stemmed) grasses, sedges, and rushes. **Sedges** look like grasses, except they have solid, triangular stems. **Rushes** have hollow stems that may have a pithy (sponge-like) center. The bulrush is a common rush found in North Dakota wetlands.

Figure 5. Blue-winged teal brood. Blue winged teal are the most common nesting duck. They migrate farther south than any other duck in North America.

The central zone of seasonal wetlands consists of a shallow marsh. A **marsh** is an area of low, soggy land containing a variety of aquatic vegetation.

Seasonal wetlands provide nesting habitats and brood cover for many species of birds. **Broods** are groups of young birds from the same nest. Broods need wetlands to find certain foods they require to grow quickly in order to escape from predators.

Semi-permanent wetlands are basins that generally hold water all year long, except during very dry years. Three vegetation zones are found in semi-permanent wetlands. The two outer rings consist of a wet meadow circling a shallow marsh area, as found in the seasonal wetlands. The central zone of semi-permanent wetlands is a deep marsh. These wetlands are usually full of submerged (underwater) aquatic vegetation.

Semi-permanent wetlands provide habitat for many kinds of wildlife. They are also important as nesting areas for water birds, cover for broods, resting places for migrating birds, and food sources for birds and other wildlife.

Cattails can often be found growing in semi-permanent wetlands in water less than 3 feet deep. **Cattails** are tall marsh plants with seeds embedded in the thick, brown tops of the plant. In the fall, the tops break open, shedding a soft, downy material, which spreads the seeds.

Even though cattails may provide cover for wildlife such as deer and pheasants, too many cattails may make a wetland unusable for waterfowl. This is called a "cattail choked wetland."

Figure 6. A wetland full of cattails with no open water is "cattail choked." *(Courtesy of Neil Howe)*

Permanent wetlands are basins that hold water all year long. They only go dry if there are several years of drought (drout) (long period with no precipitation).

Most permanent wetlands are quite large and deep and are often called "lakes." Permanent wetlands are made up of four zones—the central deep

Figure 7. A semi-permanent wetland holds water all year round except in drought conditions. Aquatic vegetation such as bulrushes or cattails is common in these wetlands.

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Figures 8, 9, & 10. Permanent wetlands are areas that hold water all the time. They include lakes and reservoirs such as Devils Lake, Lake Oahe, Lake Sakakawea, as well as smaller, deep wetlands. **INSET** (lower left). A boat ramp at Lake Sakakawea. **INSET** (upper right). A young angler and a prize catch.

water without vegetation, surrounded by rings of deep marsh, shallow marsh, and wet meadow.

These wetlands are less important for migratory birds and other wildlife, but many permanent wetlands contain fish. This feature makes permanent wetlands attractive for fishing and other recreational activities.

Figure 11. Sandhill cranes on shallow prairie wetland. Sandhill cranes roost on shallow prairies and wetlands where they eat a variety of foods including frogs, salamanders, mice, and voles. Young sandhill cranes are called colts.

Other wetlands are **saline** (say-leen), or salty. The saline wetlands do not have vegetation zones. Instead, they are surrounded by muddy shorelines, often covered with salt. These wetlands can be important nesting areas for endangered species like the piping plover and resting stops for migratory waterfowl such as sandhill cranes.

Two forms of wetlands that do not receive their water from precipitation are fens and bogs. These swampy wetlands are fed year-round by seepage from ground

water (water that is found under the surface of the ground). Fens and bogs are not deep and usually are smaller than most other wetlands.

A **fen** is fed year-round by seepage from ground water. The water is often high in alkaline (salt). Fens are found on sloping river valleys and in the Turtle Mountains.

Bogs are similar to fens, but bogs contain a lot of dead plant material, or peat. Peat is decaying mosses or other vegetation which people sometimes dry to use as fuel or fertilizer. Bogs and fens often occur alongside streams. In the Turtle Mountains and Pembina Hills, fens and bogs are old lake beds.

Locations of Wetlands

North Dakota is divided into three major natural regions from east to west—the **Red River Valley**, the **Drift Prairie**, and the **Missouri Plateau** (pla-Toe). These regions are almost like three sloping stair steps as they go up in elevation (height) from east to west. The locations of North Dakota's wetlands match the landforms left by the Wisconsinan glacier.

The Red River Valley is the floor of ancient Lake Agassiz (Ag-ah-see), which was formed when glaciers in Canada blocked the flow of water moving north. This lake has been gone for thousands of years, but its lakebed, the Red River Valley, is extremely flat. Because of its flatness, the Red River Valley has fewer wetlands than the other regions. Much of this land has also been drained to raise agricultural crops such as sugar beets.

Figure 12. Thousands of years ago, Lake Agassiz covered the area known as the Red River Valley. *(Graphic by Cassie Theurer)*

Oxbow lakes, however, are common in parts of the Red River Valley. Oxbow lakes are small lakes that were formed when a crooked river straightened out, and the U-shaped curves became separated from the river.

The Drift Prairie is sometimes called the "Glaciated (Glay-she-ate-ed) Plains" because of the effect glaciers had on the land. The largest number of wetlands in North Dakota are located in the Drift Prairie region. This region also has the most temporary and seasonal wetlands of any region in the state.

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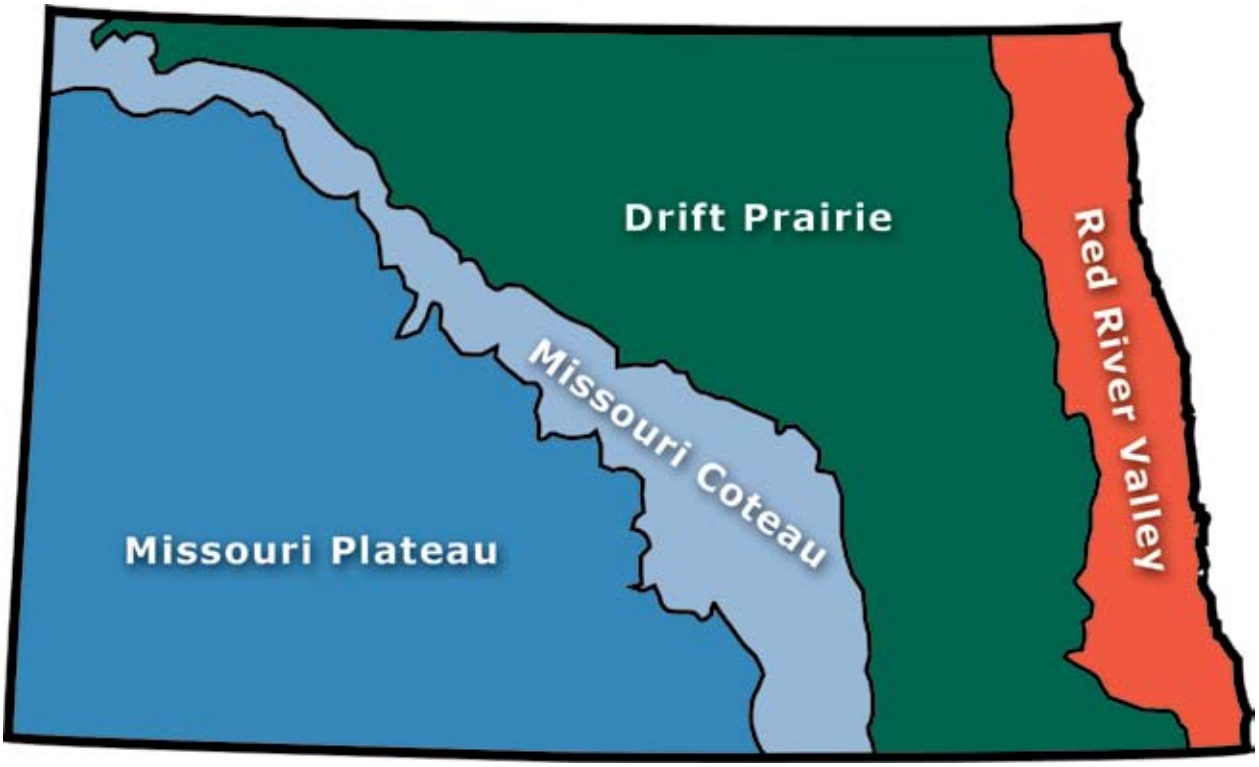

Figure 13. The three major natural regions of North Dakota are the Red River Valley, the Drift Prairie, and the Missouri Plateau. The Missouri Coteau is considered part of the Missouri Plateau. *(Graphic by Cassie Theurer)*

The Missouri Plateau (pla-Toe), the highest land in the state, lies west of the Drift Prairie and reaches to the Montana border. The eastern part of the Missouri Plateau is called the "Missouri Coteau" (koe-Toe). "Coteau" is a French word meaning "little hill."

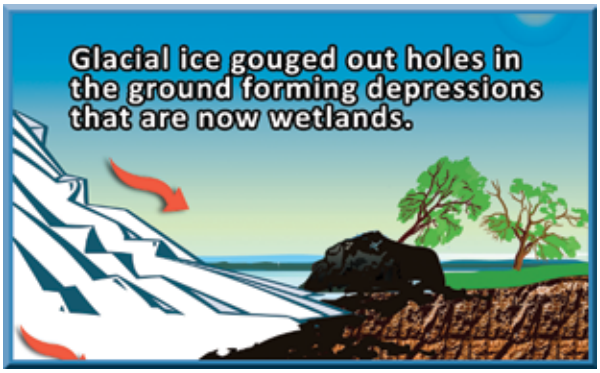

Figure 14. Glacial Ice. This side view shows how rocks and ice from glaciers formed wetlands.

The **Missouri Coteau**, formed by the melting Wisconsinan glacier, contains larger, deeper, and more permanent wetlands than does the Drift Prairie. More semi-permanent wetlands are found in the Missouri Coteau than in any other area of the state.

The Badlands, located in southwestern North Dakota, were not formed by the Wisconsinan glacier; therefore, they do not contain the types of wetlands found in other parts of the state. The Badlands were carved out of the landscape by the actions of the Little Missouri River, as well as by thousands of years of wind erosion.

Comprehension

1. Name the four major types of wetlands.

2. Temporary wetlands provide what primary food supply for migrating birds?

3. In what way can most seasonal wetlands be used by farmers?

4. Name five important functions of semi-permanent wetlands.

5. What do many permanent wetlands contain that other wetlands do not?

6. What two forms of wetlands do not receive their water from precipitation? How do they get their water?

7. Name the three major natural regions of North Dakota. Which region has the fewest wetlands? Why?

8. What are small lakes called that were formed when a crooked river straightened out?

9. Which natural region has the most wetlands?

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10. What is the Drift Prairie sometimes called?

11. What is the eastern part of the Missouri Plateau called? How was this area formed?

12. What part of North Dakota was not shaped by the Wisconsinan glacier? How was this area formed?

Critical Thinking

1. Explain why a farmer might be taking a risk by planting crops in a dry temporary wetland.

2. Explain why saline wetlands do not have vegetation zones.

3. Explain why the Red River Valley is so flat.

Wetlands in a Nutshell

- Wetlands are basins, or low areas of land, that hold water.
- The Wisconsinan glacier, which melted 12,000 years ago, formed the Prairie Pothole Region.
- The Prairie Pothole Region, covering large parts of seven states and provinces, has rolling hills and millions of potholes.
- The Prairie Pothole Region is the greatest producer of waterfowl habitat in the world.
- There are four major classes of wetlands: temporary, seasonal, semi-permanent, and permanent.
- Temporary wetlands provide a necessary food supply for migrating birds.
- Seasonal wetlands provide nesting habitats and brood cover for many species of birds.
- Semi-permanent wetlands provide habitats, nesting areas, brood cover, and food sources for birds and other wildlife.
- Some permanent wetlands contain fish.
- Saline wetlands do not have vegetation zones but instead are surrounded by an alkaline shoreline.
- Fens and bogs receive their water from groundwater seepage.
- The three major natural regions of North Dakota from east to west are the Red River Valley, the Drift Prairie, and the Missouri Plateau.
- The Drift Prairie contains more wetlands than the other natural regions.
- The Missouri Coteau, located on the eastern part of the Missouri Plateau, contains larger and deeper wetlands than the other regions.
- More semi-permanent wetlands are found in the Missouri Coteau than in any other area of the state.
- The Badlands were formed by water erosion from the Little Missouri River and by wind erosion, not by the Wisconsinan glacier.

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Wetlands Vocabulary

Aquatic:
- Refers to water

Bog:
- Wetland that contains a lot of peat, or dead plant material
- Receives its water from groundwater seepage

Brood:
- Group of young birds from the same nest

Cattails:
- Tall marsh plants with seeds embedded in the thick, brown tops of the plant

Fen:
- Wetland that receives its water from groundwater seepage

Glacier:
- Gigantic mass of ice thousands of feet thick

Habitat:
- Environment that provides the food, water, shelter, and space for wildlife to make their homes

Marsh:
- Area of low, soggy land containing grass-like vegetation

Missouri Coteau:
- Eastern part of the Missouri Plateau
- Formed by melting of the Wisconsinan glacier
- Contains more semi-permanent wetlands than any other area of the state

Permanent wetlands:
- Basins that hold water all year long

Potholes:
- Low spots in the ground where water collects

Prairie Pothole Region:

- About 300,000 square mile area carved by Wisconsinan glacier
- Covers large parts of Alberta, Saskatchewan, Manitoba, North Dakota, South Dakota, Minnesota, and Iowa
- Known for its rolling hills and millions of potholes

Rushes:

- Plants with hollow stems that may have a pithy (sponge-like) center

Saline:

- Salty

Seasonal wetlands:

- Depressions that usually contain water from the time of snowmelt until the middle of July
- Consist of two vegetation zones

Sedges:

- Look like grasses except they have solid, triangular stems

Semi-permanent wetlands:

- Basins that generally hold water all year except during very dry years

Temporary wetlands:

- Shallow depressions that hold water from melting snow or heavy rain
- Usually dry out in early June

Watershed:

- An area of land that drains downward to the lowest point

Wetland:

- Basin, or low area of land, that holds water

Wisconsinan glacier:

- Last glacier that moved over North Dakota
- Stayed about 28,000 years
- Melted away about 12,000 years ago
- Covered all of North Dakota except for the southwest corner

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WETLANDS WILDLIFE

Nurseries of Life

Wetlands are sometimes called "nurseries of life." The water, the abundance of food, and the natural shelter make ideal habitats for countless numbers and different kinds of wildlife.

Insects and other **invertebrates** (animals without backbones) are essential members of the food chain. Millions of waterfowl and shore birds depend on these tiny animals as a major food source.

The plants that grow in and around wetlands provide food and shelter, not only for birds, but also for many different species of mammals, amphibians, reptiles, fish, and invertebrates. Native prairie and CRP lands are important nesting areas for some duck species. The **Conservation Reserve Program** (CRP) is a government program that pays farmers to plant grass on land that had been plowed for crop-raising.

Figure 15. Ducks depend on a variety of wetlands.

Birds

North Dakota is one of the most important waterfowl breeding areas on the continent of North America. **Waterfowl** are wetland birds that include ducks, geese, and swans. These swimming birds, which are dependant on a variety of wetlands, have webbed feet and water-repellent feathers. Waterfowl are migratory birds that may be hunted.

Figure 16. The mallard is the most common type of duck in North America.

Figure 17. The green-winged teal is the smallest puddle duck.

Figure 18. Map Showing the Central Flyway.

Countless numbers of waterfowl use the wetlands of North Dakota, not only as nesting places and homes, but also as rest stops along their migration routes. These migrating birds often use the same route, or flyway, as they travel between their summer and winter homes twice each year. The route taken by those that pass through North Dakota is called the **Central Flyway**.

Thousands of water and shore birds depend on North Dakota's wetlands for breeding and for raising their young. North Dakota produces more ducks than any other state except Alaska. Ducks can be classified into two main groups—dabbling ducks and diving ducks. **Dabbling ducks**, also called "dabblers" and "puddle ducks," feed in

Figure 19. The northern pintail gets its name from its long, pointed tail.

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Figure 20. The northern shoveler gets its name from its very large, spoon-shaped bill.

Figure 21. The gadwell often steals food from diving ducks and coots.

shallow water or on land. Their legs are centered on the body so it is easy for them to tip forward in the water to get food.

The **drakes** (male ducks) generally have brightly colored feathers, but the **hens** (female birds) have drab colors so that they are camouflaged on the nest. Dabblers are able to fly straight up out of the water.

Figure 22. The American widgeon is also called baldpate because of its large, white-colored crown.

Dabblers common in North Dakota include blue-winged teal, green-winged teal, gadwall, American wigeon, mallard, northern shoveler, and northern pintail. The most common duck in North Dakota is the blue-winged teal. **Blue-winged teal** and other dabbling ducks nest in grasslands, such as native prairie and CRP land, often miles away from water.

Figure 23. The wood duck nests in cavities within dead and dying trees.

The **wood duck** is considered to be a dabbler, but it is also a perching duck that spends time out of the water perched on tree branches. It has stronger feet than the other dabblers and also has large, gripping claws. These claws allow the wood ducks to reach the hollow cavities of trees where they nest. **Cavities** are open spaces in dead or dying trees where wildlife raise their young.

Dabblers eat aquatic plants and seeds. They also eat seeds, insects, small clams, and other aquatic invertebrates, especially in the spring. This helps fuel migration and nesting.

Diving ducks, or divers, get their food by diving to the bottom of ponds or lakes. Their feet and legs are larger than the dabblers, and the legs are set farther back on the rounded body. This set-back leg position makes them excellent underwater swimmers, but it is awkward for them to walk on land. Diving ducks nest on floating platforms of vegetation in the water rather than on the upland grasses like the dabbling ducks.

Divers have shorter wings than dabblers. In order to fly out of the water, divers must first run across the surface of the water to get started. They cannot fly straight up out of the water as dabblers can.

Figure 24. The bufflehead is the smallest duck overall. It nests in the forests of Canada. *(Courtesy of the U.S. Fish and Wildlife Service)*

The diet of diving ducks consists of aquatic plants, aquatic insects, small clams, snails, crayfish, and other invertebrates. Divers common in North Dakota include lesser scaup, redhead, ring-necked duck, canvasback, ruddy duck, bufflehead, and common goldeneye.

Mergansers are ducks that catch fish. They have bodies much like the divers,

Figure 25. The lesser scaup dives deeper than other diving ducks.

Figure 26. The ruddy duck has a long, stiff tail that it often holds vertically. *(Courtesy of the U.S. Fish and Wildlife Service)*

Figure 27. Canvasback. Canvasbacks migrate to both the East Coast and south to the Gulf Coast.

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Figure 28. The hooded merganser nests in cavities like those found in dead and dying trees.

but they have long, thin bills with rough, tooth-like edges. The **hooded merganser**, common in North Dakota, catches small fish and minnows under the water. It also eats frogs, crayfish, and aquatic insects. Hooded mergansers, like wood ducks, nest in cavities of dead trees.

Red-breasted mergansers visit North Dakota from time to time. They catch fish in swift underwater dives. Like divers, mergansers need to run across the water to fly into the air.

The most common geese seen in North Dakota include the lesser snow goose, Ross's goose, greater white-fronted goose, and Canada goose. Only the giant Canada goose nests in North Dakota. The **giant Canada goose** can have a body 3 feet long, a wing spread up to 5½ feet, and can weigh up to 14 pounds.

The largest waterfowl in the state are swans. **Tundra swans** migrate through North Dakota. The tundra swan stands about 4½ feet tall.

Figure 29. Lesser snow geese have dark patches called "grin patches" on the sides of their bills. These make it look as if they are smiling when viewed from the side.

Figure 30. Greater white-fronted geese. The greater white-fronted goose is the only goose with black bars on its belly. This is often referred to as "speckle belly."

Figure 31. The tundra swan nests far north in the tundra regions of Canada and Alaska. They are found in North Dakota during migration.

Cobs (male swans) are larger than **pens** (female swans), but they have the same coloring. The bodies are white, but the bills, legs, and webbed feet are black.

Swans eat water plants and use their long necks to reach plants underwater. They can also use their strong, webbed feet to dig into the bottom of the pond or lake for roots and shoots. **Cygnets** (Sig-nets), or young swans, eat bugs and other invertebrates from the surface of the water, as well as vegetation.

Geese and ducks have some characteristics in common but are quite different in several ways.

Ducks

- Smaller body
- Shorter neck and legs
- Drakes and duck hens are colored differently from each other
- Feed more in the water
- Call is a "quack"
- Not as much webbing between toes
- Only one parent cares for the young
- Pick a new mate every year

Geese

- Large body
- Long neck and legs
- Same coloring for **ganders** (male geese) and goose hens
- Land grazers that eat grasses and grains
- Call is a "honk"
- More webbing between toes
- Both parents care for their young
- Pairs mate for life

Figure 32. Redhead. Redhead hens sometimes lay eggs in nests of other species of ducks. This is called "dump nesting." It takes away the responsibility of a hen raising her own young.

Figure 33. Canada Geese. A variety of Canada geese species is found in North America, each weighing from 3 to 14 pounds. The only one that nests in North Dakota is the giant Canada goose.

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Figure 34. The American white pelican nests in colonies on the ground. The largest colony in North America is found at Chase Lake National Wildlife Refuge between Bismarck and Jamestown.

Figure 35. The great blue heron nests and roosts in colonies in dead trees.

The **American white pelican** is another large water bird dependant on North Dakota wetlands. These huge birds measure about 5 feet in length with a wingspan of 9½ feet from tip to tip.

Pelicans are not classified as waterfowl because they belong to a different family. Like all migratory birds, they are protected under the **Migratory Bird Treaty Act**. This law makes it illegal to harm or possess them.

Herons, egrets, and bitterns are wading birds. They all have long legs, long necks, and long, pointed bills. The largest heron is the **great blue heron**, which stands over 4 feet in height and has a wingspan of 7 feet. It eats small fish, frogs, snakes, salamanders, and small mammals.

Figure 36. The great egret is the symbol of the National Audubon Society.

Figure 37. American Bittern. When frightened, the American bittern stands perfectly still with its bill pointed in the air to blend in with its habitat.

Figure 38. The black-crowned night heron is known as a "quok" bird from the sound it makes when flushed into the air.

Other marshbirds found in North Dakota include the American bittern, the black-crowned heron, and the great egret. The **American bittern** has a very loud and strange call that sounds like an old-fashioned water pump.

Grebes look something like ducks, but they have thin, pointed bills and lobed (lobe rhymes with robe) toes. Lobed toes are partly, but not completely, webbed. Western grebes, pied-billed grebes, and eared grebes are the most common grebes in the state. The eared grebe got its name from the tufts of feathers on its head that look like ears.

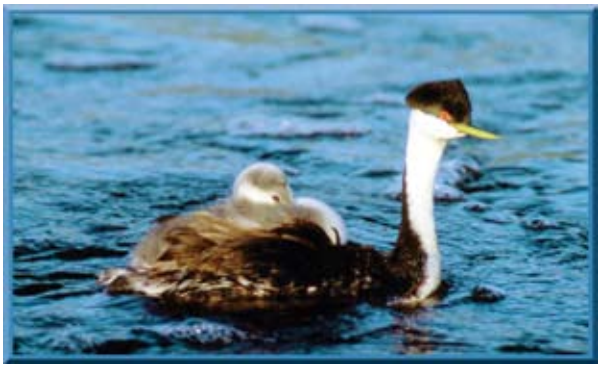

Figure 39. Western Grebe. After hatching, western grebe chicks ride on their parents' backs.

Figure 40. The eared grebe migrates only at night.

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Figures 41 & 42. Sandpipers are one of the smallest shore birds. They are often seen in large flocks feeding on mud flats or flying together over water. **INSET The least sandpiper** is one of the species using North Dakota wetlands. *(Courtesy U.S. Fish and Wildlife Service)*

Figure 43. The killdeer is a common shore bird with a distinct and loud call. It nests in a variety of habitats including gravel roads, farm fields, and many other locations far away from water.

Shore birds are small- to medium-sized birds that generally have long legs, thin bills, and use flat, open areas along wetlands for feeding. The sandy or muddy shorelines contain many invertebrates that shore birds eat. All of the shore birds shown here nest in North Dakota, but there are many more that are seen here only during the spring and fall migrations.

Shore birds like the killdeer and piping plover are very visible on the flat habitats. They can be seen luring predators away from their nests and young by pretending to have a broken wing. The "broken wing" trick makes the adult appear to be wounded and easy to catch.

The American avocet (Av-oh-set), Wilson's phalarope (Fal-ah-rope), lesser yellowlegs, least sandpiper, and willet are other shore birds found in the state.

Figure 44. The avocet has a re-curved bill meaning it bends up at the end.

Figure 45. The willet gets its name from the melody of its whistle—*pill-will-willet*.

Figure 46. The whooping crane almost became extinct in the mid 1900s. There are a few hundred left in the world today. Whooping cranes can be seen stopping in North Dakota during migration. They are about 5 feet tall and have a wingspan of 7 ½ feet. *(Photo by Chet Nelson)*

Figure 47. The piping plover is a threatened species that requires specific sandbar or gravel habitat in which to nest and raise its young.

Figure 48. The ring-billed gull is the most common type of gull in North Dakota. It gets its name from the black ring going around both upper and lower parts of the bill.

Cranes are long-necked birds that look something like herons. Cranes, however, fly with their necks stretched fully forward, while herons fly with their necks in an S-shape. The sandhill crane is a game bird, which means there is a hunting season on it. The **whooping crane**, which migrates over North Dakota but does not nest here, is the tallest bird in North America. It stands about 5 feet tall and has a wingspan of about 7½ feet.

In 1973, the U.S. Congress (lawmaking body) passed a law called the **Endangered Species Act**. Under this law, animals that are in danger of becoming extinct (all of them dead) receive special protection. This protection includes maintaining their habitats. Both whooping cranes and piping plovers are protected by this law since their populations declined to low levels.

Gulls and **terns** are often seen in large flocks near wetlands and shorelines that have little vegetation. Most are white in appearance

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Figure 49. Marsh wrens are small, secretive birds that build nests in wetlands on the stems of cattails and bulrushes. They are not often seen because of the dense habitat in which they nest.

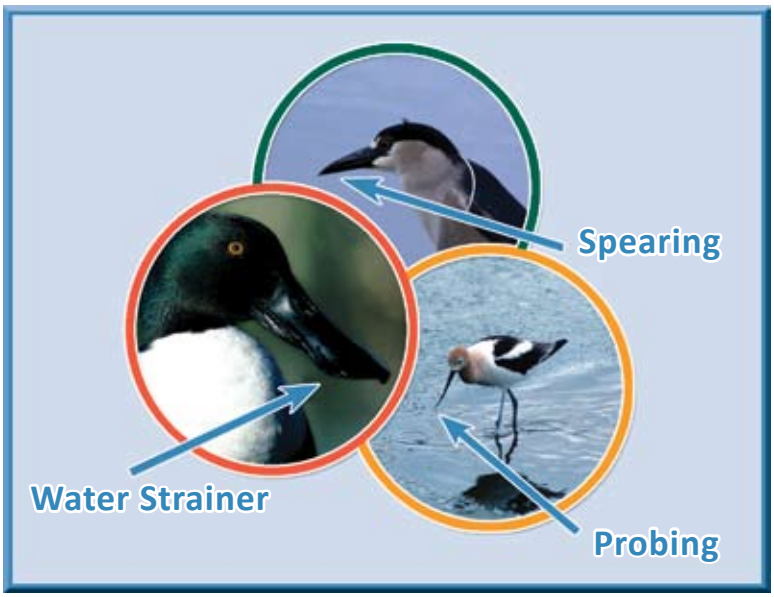

Figure 50. Birds have many adaptations for living in different habitats. Wetland birds do not all eat the same foods, therefore their bills are different. Think about what foods each of these would eat.

with a variety of head and bill markings that tell them apart. Terns look like gulls, except they are smaller.

Several species of songbirds also depend on wetland habitats. **Songbirds** are small, perching birds that sing a variety of songs. **Yellow-headed blackbirds** and **marsh wrens** both make their homes in the cattails and bulrushes of prairie wetlands. **Red-winged blackbirds** commonly nest in cattails also. The blackbirds eat insects and seeds, while the marsh wren eats insects, spiders, and other small invertebrates.

Figure 51. Yellow-headed blackbird. This blackbird is unmistakable with its bright yellow head and breast, black body, and white wing patch.

Figure 52. The common yellowthroat. This wetland songbird is secretive and easily identified by its black mask.

Comprehension

1. Name North Dakota's waterfowl.

2. What are characteristics of waterfowl?

3. What is the migration route through North Dakota called?

4. Name the two main classifications of ducks.

5. Which dabbler is a perching duck?

6. Which type of duck seems awkward walking on land? Why?

7. Which ducks catch fish?

8. How do ducks and geese differ in their eating habits?

9. What are the largest waterfowl in the state?

10. What law makes it illegal to harm or possess certain birds?

11. Which bird looks something like a duck except it has a thin, pointed bill and lobed toes?

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12. **What law gives special protection to animals that are in danger of becoming extinct?**

13. **Name three songbirds that depend on wetland habitats.**

Critical Thinking

1. **North Dakota has a hunting season for sandhill cranes but not for whooping cranes. Why is there no hunting season for whooping cranes?**

Aquatic Insects

Wetlands provide habitat for millions of aquatic insects (insects that hatch or live in the water). Many waterfowl, shore birds, amphibians, reptiles, fish, and other animals depend on aquatic insects as food for survival.

Besides being a food source, aquatic insects also serve other important roles. Some of them help keep wetlands clean by eating dead animal and plant material in the water. Others filter out particles from the water, which helps keep the water clear. This allows sunlight to reach plants growing on the floor of the wetland.

A number of aquatic insects are predators that prey on other invertebrates. The **dragonfly** and the **damselfly** are two predatory insects that lay their eggs in ponds, streams, and other wetlands. The eggs hatch into larvae (Lar-vay), which live in the water.

Adult dragonflies and damselflies prey on small insects. They help control the population of harmful insects such as mosquitoes.

Figure 53. Dragonfly. This shows a newly hatched dragonfly and the larval case from which it emerged. Dragonflies are beneficial (helpful) insects of North Dakota wetlands.

Figure 54. Damselfly. Damselflies help control the population of small insects like mosquitoes.

Amphibians and Reptiles

Wetlands are significant habitats for many species of amphibians and reptiles. **Amphibians** are cold-blooded animals that lay their eggs either in the water or else on moist land near the water. They have gills and live in the water during their tadpole, or immature, stage but develop lungs for their adult stage on land. Amphibians common in North Dakota include salamanders, frogs, and toads.

Besides needing wetlands for their tadpole stage, adult amphibians depend on wetlands for their primary food source. Insects, spiders, and other small invertebrates are prey for amphibians.

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Frogs and toads look somewhat alike, but there are basic differences.

Frogs

- Smooth, wet skin
- Narrow body
- Long hind legs for leaping
- Live in or near water
- Webbed feet for swimming

Toads

- Rough, dry skin
- Chubby body
- Shorter legs for small hops
- Breed in water but live on land
- No webbing between toes

Figure 55. Leopard frog. These frogs are eaten by garter snakes, snapping turtles, fish, and birds.

Figure 56. Woodhouse's toad. Hognose snakes have special adaptations in order to eat this toad.

The **tiger salamander** is found throughout North Dakota. This amphibian commonly measures from 6 to 12 inches in length. Salamanders eat almost anything smaller than themselves that crawls, such as insects, spiders, and worms. Tiger salamanders often come out into the open after a heavy rainfall, especially at night.

The **leopard frog** is the most common frog found in the state. It can be recognized by its coloring of green with spots like a leopard. Its underside is

Figure 57. Tiger salamanders are harmless creatures that are often found in large numbers on North Dakota roads after a rain shower.

Figure 58. The painted turtle is the most common turtle found in North Dakota. The underside of the shell is a bright orange color. These reptiles are often seen sunning themselves on rocks or tree snags within wetlands.

Figure 59. Snapping turtles live in creeks, rivers, and other wetlands. They feed by lying still in the water and grabbing prey with their powerful jaws.

Figure 60. Garter snakes are found statewide, often near wetlands where they eat frogs. **INSET** Like other snakes, they can unhinge their jaws and swallow prey larger than their own heads.

white. These frogs can grow to be over 4 inches long.

Amphibians are sensitive to environmental pollutants because their skin easily absorbs poisons. This makes amphibians a group that we should watch closely for changes, which might indicate that toxins (poisons) are in the water.

Many reptiles depend on wetlands as their primary habitat. These cold-blooded, egg-laying animals include turtles and snakes. The most common turtles in North Dakota are the **western painted turtle** and the **snapping turtle**.

The diet of turtles consists of insects, spiders, worms, crayfish, minnows, other invertebrates, and aquatic plants. Snapping turtles also eat other reptiles, amphibians, and small mammals.

The most common snakes in North Dakota are **garter snakes**. These reptiles have black bodies with three yellow stripes running the length of the body. They eat a variety of foods including frogs, toads, small salamanders, insects, worms, and minnows.

Mammals

Mammals that make their homes in North Dakota's wetlands include beaver, muskrat, mink, and raccoon. Beavers tend to live in moving rivers, streams, and creeks.

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Muskrats are herbivores that eat the leaves, shoots, and roots of wetland plants. They use cattails and bulrushes as building materials for their dome-shaped homes. The domed homes, called "huts," may be over 3 feet high. The entrances are always underwater. During the winter, muskrats have a supply of food because they can eat the cattail roots and other plants forming the walls of their homes.

Mink are **carnivores** (meat eaters) that prey on muskrats. They either catch muskrats by swimming after them, or they dig into muskrat huts. Mink also eat fish, birds, turtles, frogs, snakes, mice, and other small animals.

Raccoons are mammals found living near wetlands. Wetlands provide the raccoon with foods such as snails, crayfish, freshwater mussels, and bird eggs. They often are found living in nearby grasslands and farmlands where they eat corn and other farm crops. Raccoons raise their young in dead trees or abandoned farm buildings.

Muskrat, mink, beaver, and raccoon are called **"furbearing" mammals**. Regulated trapping has been successfully used as a wildlife management tool, as well as a technique to obtain high-quality furs.

Figure 61. Muskrat populations follow the high and low cycles of water within wetlands. Muskrat numbers can rebound quickly after a drought since more than one litter can be produced per year.

Figure 62. Mink live in wetlands and feed on muskrats. They also eat snails, frogs, and other small aquatic animals. *(Courtesy **http://bioimages.vanderbilt.edu/**. Photographer Ron E. VanNimwegen)*

Figure 63. Trapping is a wildlife management tool to prevent overpopulation and destruction of some habitats.

Fish

Permanent wetlands are home to many species of fish. Three of the most important gamefish in North Dakota are northern pike, perch, and walleye. **Gamefish** are fish that are caught by **anglers**, or people who fish.

The **northern pike**, the state fish of North Dakota, is a large fish that can measure 4 feet in length and can weigh over 30 pounds. It has a pointed snout and one dorsal (on the back) fin that is set near the tail. The coloring is yellow-green with horizontal body spots.

Northern pike are predators that hunt by sight in shallow water. They have large, strong jaws with teeth used to eat other fish such as perch. Pike have many common names used by anglers. Very small pike are referred to as "hammerhandles" because of their size and shape.

Several species make up the perch family of fish. Perch are identified by two dorsal fins that are separated. The first dorsal fin has sharp spines, but the second one is soft. Walleye and yellow perch are common members of the perch family in North Dakota.

Figure 64. Walleye are found in many lakes in North Dakota including Lakes Oahe, Sakakawea, and Devils Lake. They have special eyes for hunting in dark, deep water where they live.

Walleye have an olive color with dark blotches on their sides. The belly of a walleye is white. These fish reach about 30 inches in length and weigh about 15 pounds.

Figure 65. Northern Pike. Pike are long, slender, fast-swimming fish that feed during daylight hours. Their long jaws are full of sharp teeth for grasping prey.

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Sport Fish Restoration Program

The Sport Fish Restoration Program is a project that is carried out by both federal (United States) and state government agencies. The purpose of this program is to provide the following: (1) more opportunities for sport fishing, (2) better boating conditions, (3) habitat improvement, (4) wetlands conservation, and (5) aquatic education.

Figure 66. Sport Fish Restoration Program Logo. *(Courtesy U.S. Fish and Wildlife Service)*

Money to support the Sport Fish Restoration Program is collected in the form of special taxes from the people who participate in wetland activities. Items that are taxed include fishing equipment, boats, water-sport equipment, and fuel for boats. The Sport Fish Restoration Program is designed so that the people who pay for the program are the ones who enjoy its benefits.

The **yellow perch** is yellow-green in color with 6 to 8 dark horizontal bars on its body. It has the general body shape of its relative, the walleye. Yellow perch grow to 14 inches in length and up to 2 pounds in weight.

Figure 67. Paddlefish. This prehistoric fish lives in the Missouri and Yellowstone Rivers of North Dakota.

Several members of the sunfish family live in North Dakota's permanent wetlands. Among these are the **largemouth bass**, **smallmouth bass**, and **bluegill**. Members of the sunfish family have two dorsal fins with the first being spiny. The dorsal fins of sunfish are connected to each other.

Many other species of fish are found in North Dakota waters, but most of them have habitats in moving rivers and deep lakes. Among these fish are the **catfish**, **paddlefish**, **drum**, **trout**, **sturgeon**, and several **minnow** species.

Wetlands Food Chain

A **food chain** is a transfer of energy from one species to another. It begins with plants that are formed by energy from the sun, along with materials from the soil, water, and air.

The plants that grow in and around wetlands provide food for many different species of invertebrates (animals without backbones), amphibians, reptiles, fish, birds, and mammals.

Insects and other invertebrates of the wetlands are essential parts of the wetlands' food chain. The millions of water birds and shore birds are only a small part of the community that depends on insects and other invertebrates. Without this significant food source, the balance of all living things in the area would be affected.

The chain of energy transfers from one species to another and ends with the dead animals that are broken down and used as food for tiny life forms called "decomposers" that put the nutrients back into the soil. **Nutrients** are substances that are necessary for living things to grow and maintain life.

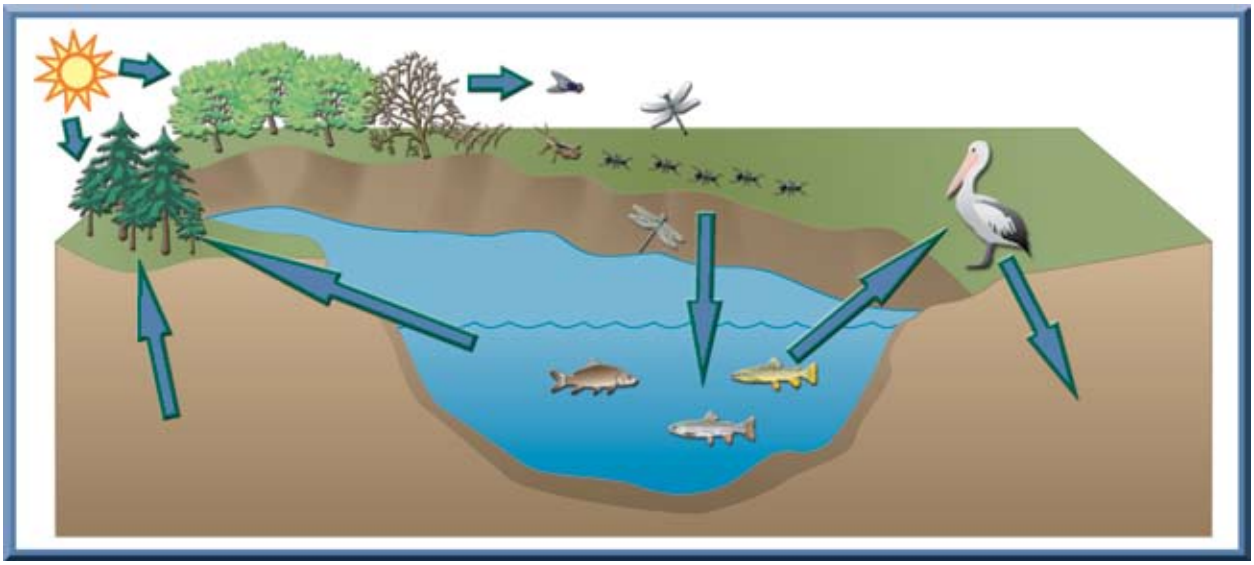

Figure 68. Food Chain. A food chain (food web) is a series of connections between all species. The sun and Earth begin the formation of this web. The sun and rain create plants that feed insects, amphibians, reptiles, mammals, birds, and fish. Some birds eat fish. Some fish eat insects. Bird droppings and dead animals decompose and provide fertilizers which grow more plants. Every group is connected and important to the survival of the other groups in the food web. *(Graphic by Cassie Theurer. Some symbols courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science.)*

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Comprehension

1. What class of animals has a tadpole stage with gills and an adult stage with lungs?

2. Which North Dakota tiger is less than 1 foot long?

3. What group of animals can be good indicators of environmental pollutants?

4. What is the most common snake in North Dakota?

5. Name the wetland furbearing mammals in North Dakota.

6. What are three important gamefish of prairie wetlands in North Dakota?

7. What is the state fish of North Dakota? What length and weight can this fish reach?

8. To what fish family do largemouth bass belong?

9. What is the transfer of energy from one species to another called?

Critical Thinking

1. People in North Dakota do not eat mink. Explain how a dead mink can help provide food for people.

Wetlands Wildlife in a Nutshell

- Millions of water and shore birds depend on invertebrates as an essential source of food.
- North Dakota's waterfowl include ducks, geese, and swans.
- The migration route through North Dakota is called the Central Flyway.
- North Dakota produces more ducks than any other state except Alaska.
- The two main classes of ducks are dabbling ducks and diving ducks.
- Mergansers are ducks that catch fish.
- Drakes have bright-colored feathers, while duck hens are drab.
- Ganders and goose hens have the same coloring. Cobs and pens also have the same coloring.
- The Migratory Bird Treaty Act makes it illegal to harm or possess certain birds.
- Grebes resemble ducks, but grebes have thin, pointed bills and lobed toes instead of webbed feet.
- Cranes fly with their necks stretched out; herons fly with their necks in an S-shape.
- The killdeer and many other birds lure predators away from the nest by the "broken-wing" trick.
- The Endangered Species Act protects animals that are in danger of extinction.
- Several species of songbirds depend on wetland habitats.
- Amphibians need wetlands for their tadpole stage and also for their primary food source.
- The leopard frog is the most common frog in North Dakota.
- Turtles and some snakes depend on wetlands as their primary habitat.

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- **Muskrat, beaver, mink, and raccoon are furbearing mammals that make their homes in North Dakota wetlands.**
- **During the winter, muskrats can eat the roots and other vegetation that make up the inside of their "huts."**
- **Northern pike, perch, and walleye are the most important gamefish in the state.**
- **Northern pike have one dorsal fin; members of the perch family have two dorsal fins that are separated; members of the sunfish family have two dorsal fins that are connected.**
- **A food chain begins with plants making their own food from the sun's energy and materials from the soil, water, and air.**
- **The last link in a food chain is the decomposer, which puts nutrients back into the soil.**

Wetlands Wildlife Vocabulary

Amphibian:
- Cold-blooded animal that lays its eggs either in the water or on moist land near the water
- Has a tadpole stage with gills to live in water and an adult stage with lungs to live on land

Anglers:
- People who fish

Carnivore:
- Meat eater

Cavities:
- Open spaces in dead or dying trees where wildlife raise their young

Central Flyway:
- Route of migrating birds that passes through North Dakota

Cob:
- Male swan

Conservation Reserve Program (CRP):
- Government program that pays farmers to plant grass on land that had been plowed for crop-raising

Cygnet:
- Young swan

Dabbling duck:
- Feeds in shallow water or on land
- Tips forward in the water to get food
- Can fly straight up out of the water
- Also called "puddle duck"

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Diving duck:

- Gets food by diving to the bottom of a pond or lake
- Excellent underwater swimmer, but awkward walker on land
- Must run across the surface of water to get started flying
- Also called "diver"

Drake:

- Male duck

Endangered Species Act:

- Law that gives special protection to animals that are in danger of becoming extinct

Food chain:

- Transfer of energy from one species to another
- Begins with plants that are formed by energy from the sun, along with materials from the soil, water, and air
- Ends with dead animals that are broken down and used as food for tiny life forms that put nutrients back into the soil
- Also called a food web

Gamefish:

- Fish caught by anglers

Gander:

- Male goose

Hen:

- Female bird

Invertebrates:

- Animals without backbones

Merganser:

- Duck that catches and eats fish

Migratory Bird Treaty Act:

- Law that makes it illegal to harm or possess most species under the protection of the law

Nutrients:

- Substances that are necessary for living things to grow and maintain life

Pen:

- Female swan

Shore birds:

- Birds that live around the shallow waters of wetlands
- Generally small- to medium-sized birds with long legs for wading and pointed bills for eating insects and other invertebrates that live in mud flats and shallow water

Songbirds:

- Small, perching birds that sing a variety of different songs

Waterfowl:

- Migratory wetland swimming birds that may be hunted
- Includes ducks, geese, and swans

Other Vocabulary I Want to Know:

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THE IMPORTANCE OF WETLANDS

A National Treasure

The wetlands of North Dakota are so significant that they have been called a "national treasure." A large variety and countless number of plants, animals, and insects depend on wetland environments for life itself.

Wetlands are of great importance for other reasons as well. These include natural flood control, improving water quality, recharging groundwater, and public use.

Natural Flood Control

Floods cause danger to people and damage to property. An important function of wetlands is to provide natural flood control.

When the snow melts in the spring, wetlands act as water storage areas. Wetlands also store water after periods of heavy rainfall. The wetlands slowly release the stored water by evaporation into the air or by drainage into the ground. They also act as natural sponges to increase soil moisture for crops.

Wetlands reduce the amount of water that would otherwise quickly drain to the rivers and lakes, causing them to overflow their banks. Even in low-lying areas where flooding occurs, wetlands slow down the harmful effects.

Figure 69. Spring snowmelt and heavy rain can cause flooding. Flooding happens when the land does not have wetlands to store and slow down the water moving into creeks and rivers.

Improving Water Quality

Water quality refers to how clean or polluted the water is. Wetlands actually help remove pollutants (things that pollute) from the water.

Water pollution comes from many sources—wastes from sewage and manufacturing plants, fertilizers, pesticides (poisons that kill insects and other pests), herbicides (chemicals that kill unwanted plants), and many other sources. As water is being stored in wetlands, these pollutants are absorbed by plants and filtered out of the water.

Wetland plants also filter soil nutrients that have been transported by watersheds from farm fields to the wetlands. Soil nutrients may come from cattle manure, farm fertilizers, and other sources. Wetland plants improve water quality by absorbing these extra nutrients and preventing them from causing problems in rivers and lakes.

The filtering action of aquatic plants results in cleaner lake and river water. Clean water means healthy drinking water for people and livestock (farm animals). It also provides good habitat for fish to survive year-round.

Figure 70. Settling ponds are man-made structures built to increase water quality in wetlands. The Game and Fish Department's **Save Our Lakes** program has constructed these areas to help prevent soil and nutrients from running directly into a lake after a rain or spring snowmelt. The photo shows an area that was once a cattle feed lot with no vegetation. The landowner agreed to help prevent cattle manure and soil from entering a nearby lake by constructing a settling pond and planting vegetation.

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Recharging Groundwater

Water is one of North Dakota's most valuable natural resources. A **natural resource** is a supply of something useful that comes from nature.

Water located on the surface of the land in rivers, lakes, and other wetlands is called **surface water**. **Groundwater** is water that is found under the surface of the ground in natural storage areas called **aquifers**.

Figure 71. Wetlands are filled by melting snow and springtime rain. Some water held in wetlands seeps into the ground to fill the aquifers. The slow seepage of water from wetlands through the soil and decayed vegetation purifies the water found in aquifers. Aquifers provide water to cities and farms for human use, irrigation, and watering livestock.

Water is a renewable resource, which means that it can be used but does not get used up. The earth is always being supplied with fresh water through the never-ending water cycle.

In the water cycle, energy from the sun heats water on the earth. As the water is heated, it evaporates, or rises into the air in the form of water vapor. When the water vapor mixes with the cool air, it forms tiny droplets of water which collect to form clouds. The water from the clouds then falls back to the earth as precipitation (rain, snow, sleet, hail).

Precipitation refills wetlands and other bodies of surface water. The more surface water an area has, the more evaporation occurs. Therefore, because of the water cycle, wetlands can actually create more precipitation.

Water from wetlands also seeps into the ground to keep aquifers filled with water. This seepage process is called "recharging groundwater."

The top of an aquifer is called the **water table**. Wells are dug into the water table in order to provide water for cities, farms, ranches, and industries. In some places, the water table is so close to the surface that water seeps up, making the ground soggy.

These places are called "springs" and often create their own wetlands in a nearby low area.

Keeping groundwater recharged (keeping aquifers filled) is necessary in order to have water available for drinking, irrigation, watering livestock, manufacturing, and many other uses.

Public Use

North Dakota wetlands have great value for public use, or use by the people. One major use of wetlands is for recreation. Recreational activities include waterfowl hunting, fishing, trapping, swimming, boating, canoeing, bird-watching, and wildlife viewing. Scenic beauty draws many people to wetland areas. Photography of wetlands habitats is also a popular activity.

Tourism is the second largest industry in North Dakota, and millions of dollars are brought to the state every year by people who take advantage of the different types of recreational opportunities in wetlands areas.

Wetlands can be used as "outdoor classrooms." Field trips to wetlands are helpful in educating young people about the ecology of these areas. **Ecology** is the study of the interactions that living things have with other living things and with their environments.

Figure 72. Hunting waterfowl is an important recreational activity in North Dakota. Wetlands are also valuable for fishing, trapping, boating, and photography.

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Comprehension

1. Name five reasons North Dakota wetlands are important.

2. What function do wetlands have when snow melts and heavy rain falls?

3. What is a resource that can be used but does not get used up called?

4. Water seeping into the ground to keep aquifers filled is called what?

5. Where does water come from for cities, farms, ranches, and industries?

6. Name some recreational activities involving wetlands.

Critical Thinking

1. Pretend you are a teacher taking your students on a field trip to a wetland. What lessons would you teach them in this "outdoor classroom"?

Threats to Wetlands

Figure 73. As towns and cities expand, wetlands can often be in danger of being filled or destroyed. There are laws and regulations which prevent the destruction of wetlands without replacing them in some other location. Some cities have chosen to keep wetlands in their natural state for the purpose of cleaning water, preventing flooding, and providing beauty around a developed area.

Before Euro-Americans began living in North Dakota, wetlands covered almost 5 million acres, or about 11 percent of the state. Over the last century (100 years), almost half of the wetlands of the state have been lost. Most of these wetlands were drained so that land could be farmed.

Construction of homes, highways, dams, dikes, and other human activities also destroyed many wetland areas. Unfortunately, draining or filling of wetlands still continues today.

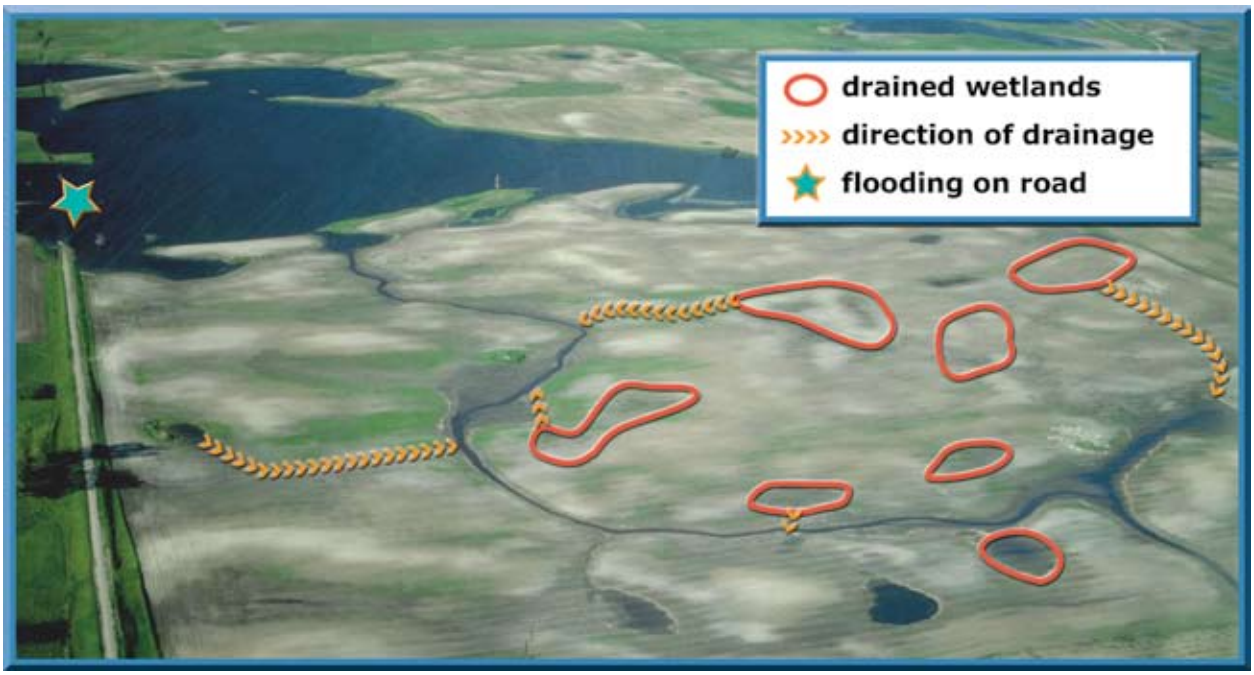

Figure 74. Draining Wetlands. The meandering water that looks like a creek is a drainage ditch. It has been dug out by machinery so water contained in small wetlands can be drained into the larger wetland. The result is loss of wetland values and wildlife habitats as well as flooding, since water that used to be stored on land in small wetlands all runs into one area.

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Figures 75 & 76. Wetland loss in the last 45 years is shown above from a location in Sargent County in southeastern North Dakota. The photo on the left was taken in 1963 and the photo on the right was taken in 2008. Look closely at the large number of small wetlands in the 1963 photo compared to the few small wetlands that remain today. Wetlands have been drained for agriculture. Loss of wetlands decreases areas for aquatic wildlife such as ducks, amphibians, and other wetland birds. Fewer small wetlands to collect spring snowmelt and rainfall means water flows faster over land to rivers and larger wetlands, which can cause flooding.

Sedimentation (sed-ah-men-Tay-shun) is an on-going threat to wetlands. Soil erosion (washing away of topsoil) can result from runoff of melting snow or from heavy rains. Good topsoil is washed off the surface of fields and deposited in wetlands. This washing of soil from fields into wetlands is called **sedimentation**. If sedimentation occurs year after year, the build-up of soil can make lakes shallow, which harms fish habitat.

Another problem occurs when nutrients are carried to the rivers and lakes causing algae (Al-jee) blooms (out-of-control growth). This process is called **nutrification** (nute-rah-fah-Kay-shun).

Figure 77. Erosion can carry soil and nutrients into wetlands.

Figure 78. Nutrients from farm chemicals and cattle manure can enter wetlands either through streams and rivers or from livestock having direct access to wetlands. Water is necessary for livestock, but it should be provided so that livestock create the least damage to wetlands.

Algae are green plant-like organisms (living things) that grow in wet areas. The green color found in or on the top of water is algae. When rain water or snowmelt runs over fields and pastures, it picks up nutrients from farm fertilizers, cattle manure, and soil. These nutrients are carried by watersheds into the wetlands. Sunlight is blocked, and oxygen is used up. The result is that both aquatic plants and fish can die.

Figure 79. Fish Kills. Nutrients carried into wetlands can cause algae bloom. Algae growth uses large amounts of oxygen. Without enough oxygen, fish kills may occur either in winter or summer.

Figure 80. Carp are considered an aquatic nuisance species. Like other aquatic nuisance species, they multiply rapidly, compete with other species for space, and can cause damage to aquatic habitat.

Even though wetland plants absorb and filter out soil nutrients and other pollution, only a certain amount of this material can be absorbed. When there are fewer wetlands, they may not be able to filter out the amount of pollution produced by human activity.

Aquatic nuisance species pose a major threat to wetlands. **Aquatic nuisance species** are non-native plants or animals that have come into a wetland and have a harmful effect on the wetland.

Examples of aquatic nuisance species in North Dakota are curly-leaf pondweed, purple loose-strife, zebra mussel, and carp. **Pondweed** and **purple loose-strife** are plants that crowd out food and shelter for wildlife and also get in the way of swimming, boating, fishing, and other recreational activities.

Zebra mussels are shellfish with two hard, outer shells that protect their soft inner parts. They have caused millions of dollars worth of damage by plugging water-supply pipelines. They also attach to objects such as boats and docks. The shells of these nuisance

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animals have razor-sharp edges that can slice into skin, causing injury to people who touch or step on them.

Carp are fish that compete with other gamefish for space and oxygen. They also lower water quality by stirring up mud and other sediments from the bottom where they feed.

A lake or pond has only enough room for a certain number of fish. This is called carrying capacity. If there are too many carp living in a wetland, not enough room is available for other fish to live.

Some of the aquatic nuisance species that inhabit North Dakota wetlands were brought to the area accidentally by anglers, boaters, and animals. Others were brought by people who did not know that the non-native invading species would cause problems.

Scientists have determined that wetlands are among the most productive ecosystems in the world. An **ecosystem** is an area that contains organisms (living things) interacting with one another and with their non-living environment. If one part of an ecosystem is changed or destroyed, it has an effect on everything else in that community. For this reason, it is essential to protect the wetland ecosystems.

Serious consequences can occur when wetlands are destroyed or abused. These include flooding, pollution, poorer water quality, a decrease in wildlife populations, and interference with recreational activities.

Saving Wetlands

At one time, wetlands were viewed as nothing more than wasted land or breeding grounds for mosquitoes. Therefore, wetlands were either drained or filled in to make more room for raising crops or expanding cities.

Today, many people are realizing the value of wetlands. Because so much of North Dakota's wetlands have already been destroyed, the wetlands that remain are extremely valuable.

Figure 81. In the past, people often threw trash into wetlands, then filled them with rocks, old cars, and other debris. Today, efforts are being made to clean up, restore, and create wetlands.

Scientists study wetland habitats, note problems, and give advice about protecting and restoring the wetland resources. For example, farmers might be advised to establish grassed waterways. A **grassed waterway** is a farming practice in which grass or other vegetation is left growing in a lowland area that carries water to a wetland. This practice helps prevent soil and nutrients from entering the wetland.

The issue of aquatic nuisance species is a top concern of scientists and concerned citizens. It is important to keep new aquatic nuisance species from invading wetlands. It is also important to control the already existing ones so that they do not spread.

The Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service, the North Dakota Game and Fish Department, North Dakota Wetlands Trust, Ducks Unlimited, and Delta Waterfowl are agencies that work together to achieve conservation goals for wetlands.

The **EPA** works with state and tribal governments, as well as with local governments, organizations, and individuals to safeguard the natural environment. Protecting and restoring valuable wetland habitats is one of the goals of the EPA.

The **U.S. Fish and Wildlife Service** has established nine wetland management districts (WMDs) in North Dakota. These WMDs manage and protect migratory waterfowl habitats in 34 counties of the state.

Figures 82 & 83. Grassed Waterways. The photo on the left is a grassed waterway. It is a portion of the farm field that was left in grass to stabilize the soil and prevent erosion within a natural waterway. The photo on the right is the result of no grassed waterway. Good topsoil was washed downstream possibly carrying chemicals and filling nearby wetlands or lakes with soil.

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John and Janet Henke "Restoring Wetlands"

Figure 84. John and Janet Henke understand the importance of wetlands and have helped restore these areas on their land.

John and Janet Henke are farmers near Gackle (part of the Prairie Pothole Region) who realized the importance of wetlands and helped to restore (rebuild) wetlands on their own land. Like many farmers, John and Janet drained many of their wetlands 20 or more years ago to increase the amount of dry land available for farming. A couple of years ago, they realized the many benefits wetlands provide including flood control, water purification for aquifers, and wildlife habitat. John said they wanted to return the wetland value to the land that they had destroyed over the years.

John entered into an agreement with several conservation organizations to replace the wetlands on a section of land that he had drained himself. He said, "That was a true pothole section," and thought he would be very helpful in doing the work himself since he knew exactly what the wetlands looked like before they were drained. The photograph shows John and Janet looking at wetlands that were restored on their property. Wildlife cover in the form of a variety of native grasses and forbs was planted around these wetlands for ground nesting birds and other wildlife. Before this was done, the farmed field had little value for wildlife.

-by Chris Grondahl

The **North Dakota Game and Fish Department** works with the U.S. Fish and Wildlife Service to achieve conservation goals for wetlands. **Conservation** means caring for, managing, and protecting natural resources.

In 2007, the North Dakota Game and Fish Department received a national award called the "National Blue Heron Award" for its work on preserving wetlands. This award recognizes significant contributions to waterfowl and wetland conservation.

Individuals, as well as government agencies and other conservation organizations, are now working to preserve wetlands that still exist and to restore some of those that have been lost. Farmers, ranchers, and other landowners who work to restore wetlands on their property are seeing positive results. The increasing abundance of wildlife and the opportunity for various recreational activities are among the many benefits seen by landowners who have restored these areas.

Everyone, no matter what age, can participate in wetland management and protection. Becoming educated about conserving wetlands is the first step in this process. The North Dakota Game and Fish Department and other wildlife and conservation agencies have information available on opportunities for becoming involved in saving North Dakota's "nurseries of life."

The significance of wetlands is enormous. Controlling floods, improving water quality, recharging groundwater, pollution control, and public use are major reasons for conserving wetlands. Millions of migrating waterfowl and other birds, animals, humans, and plants require healthy wetlands. Every year, wetland activities bring millions of dollars into the state.

The Wisconsinan glacier carved North Dakota's wetlands in the heart of the Prairie Pothole Region. This "national treasure" needs to be saved!

Figure 85. Saving wetlands requires that water quality be maintained in and around wetlands. Since rivers and streams feed water to larger wetlands such as lakes, it is important that we keep in mind that building close to wetlands can actually damage them. Oil from roadways and fertilizers used to keep lawns green are more easily washed into wetlands when housing developments such as houses are too close to water.

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Comprehension

1. What has happened to North Dakota wetlands in the past 100 years? Most of them were taken for what?

2. What happens if one part of an ecosystem is destroyed?

3. What problems occur when nutrients and soil are carried to rivers and lakes?

4. Name serious consequences that can occur when wetlands are destroyed or abused.

5. Why was the National Blue Heron Award given to the North Dakota Game and Fish Department?

6. What is the first step in helping with wetland management and protection?

7. What do wetland activities bring into the state each year?

Critical Thinking

1. Explain why the loss of wetlands can threaten some species with extinction.

The Importance of Wetlands in a Nutshell

- Wetlands are necessary for plant and animal life, natural flood control, improving water quality, recharging groundwater, and public use.
- Wetlands help prevent floods by slowly releasing stored water by evaporation or drainage into the water table.
- Wetland plants filter pollutants out of the water.
- Keeping nutrients out of wetlands helps prevent algae blooms, which can kill aquatic plants and fish.
- Wetlands create more precipitation because there is more evaporation from surface water.
- Wetlands recharge groundwater by keeping aquifers filled.
- Wells are dug into the water table to get water for drinking, irrigation, watering livestock, manufacturing, and many other uses.
- Tourists in North Dakota spend millions of dollars each year on wetland recreational activities.
- Almost half of North Dakota's original wetlands have been lost, mostly to agriculture.
- When wetlands are destroyed or abused, the result may be more flooding, poorer water quality, more pollution, and a decrease in wildlife.
- The Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service, North Dakota Wetlands Trust, Ducks Unlimited, Delta Waterfowl, and the North Dakota Game and Fish Department are agencies that work for conservation of wetlands.
- Restoring wetlands results in positive impacts to people, animals, and the entire environment.

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The Importance of Wetlands Vocabulary

Algae:
- Green plant-like organisms that grow in water

Aquatic nuisance species:
- Non-native plants or animals that have come into a wetland and have a harmful impact on the wetland

Aquifer:
- Natural underground storage area for water

Conservation:
- Caring for, managing, and protecting natural resources

Ecology:
- The study of the interactions that living things have with other living things and with their environment

Ecosystem:
- An area that contains organisms (living things) interacting with one another and with their non-living environment

Grassed waterway:
- Farming practice in which grass or other vegetation is left growing in a lowland area that carries water to a wetland
- Helps prevent soil and nutrients from entering the wetland

Groundwater:
- Water that is found under the surface of the ground

Natural resource:
- A supply of something useful that comes from nature

Nutrification:
- Nutrients being carried by rainwater or spring snowmelt into wetlands causing algae bloom or fish kills

Sedimentation:

- Soil being carried from fields into wetlands after a rain or spring melt

Surface water:

- Water located on the surface of the land in rivers, lakes, and other wetlands

Water quality:

- How clean or polluted the water is

Water table:

- Top of an aquifer
- Water is obtained by drilling wells into the water table.

Other Vocabulary I Want To Know:

VOCABULARY

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NORTH AMERICAN MODEL OF WILDLIFE CONSERVATION

Best effort to conserve and manage wildlife that the world has ever seen.

"The nation behaves well if it treats the natural resources as assets...

...which it must turn over to the next generation increased, and not impaired, in value."

— Theodore Roosevelt

Through history, countries in Europe evolved into systems of hunting and fishing where the public did not have access to wildlife. Hunting in North America is being threatened today and may potentially lead toward a European system benefiting only the wealthy. The following ***7 concepts*** *of the North American model are the basis upon which the North American system of hunting and fishing evolved.*

1. Wildlife is Held in Public Trust

Wildlife in North America is public property. North Dakota law further clarifies that the North Dakota Game and Fish Department manage the wildlife resource for the public.

2. Eliminating Commerce in Dead Wildlife

In the past, some hunters killed wildlife for personal profit. This led to the rapid decline of many wildlife species. Eliminating the marketing of dead game animals is one of the most important policies of wildlife conservation.

3. Allocating Wildlife Use Through Law

Every citizen in good, legal standing – regardless of wealth, social standing or land ownership – is allowed to participate in the harvest of wildlife within guidelines set by the public and lawmakers.

4. Hunting Opportunity for All

In North America, all citizens have the opportunity to participate in harvesting wildlife. Because of this opportunity, citizens feel a connection with wildlife and work toward conserving the resource for future generations.

5. Wildlife May Be Killed Only for Legitimate Reasons

Wildlife can be killed only for a good purpose and in a fair chase manner that provides sustainable populations. Legitimate reasons to harvest include food, fur and protection of life and property.

6. Wildlife is an International Resource

Wildlife is an international resource to be managed cooperatively by states. This policy is basic to international wildlife treaties as well as the broad-based, continental cooperation between professionals and conservation organizations. Cooperation is very important in managing wildlife such as waterfowl which use several countries in their migration.

7. Science is the Basis for Wildlife Policy

Science is the proper tool for managing wildlife rather than politics or popular opinion. This assures that public wildlife is managed by trained biologists and favors a hands-off policy by elected or appointed officials.

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