

## Wetland Components

Wetlands are home to an amazing number of plants and animals. In Alberta alone, close to 160 species of birds depend on wetlands for some part of their life cycle.

Approximately 100 other species of birds use wetlands for feeding, nesting or cover.

Along with birds, about 75 species of mammals and 15 species of amphibians and reptiles must have wetland habitat to survive in Alberta. Wetlands also serve as spawning and rearing areas for many different kinds of fish such as northern pike. In fact, world-wide, two thirds of the fish we eat depend on wetlands at some stage of their life cycle! Non-game fish such as sticklebacks and minnows inhabit wetlands. The Iowa darter occurs on lakes and clear, slow streams, and depend on wetlands to keep their habitat sediment-free.

Wetlands support 20 rare plant species and about one third of animals at risk in Alberta! Wetlands are an important part of human lives too. Fishing, hunting, wildlife viewing and trapping contribute millions of dollars to Alberta's economy. Wetlands provide us with food, such as cranberries and wild rice, and gardening supplies such as peat moss. And wetlands help to control flooding and keep our water clean, reducing costs for water control and water treatment.

For a wetland to contribute benefits, it must be healthy and well functioning. A healthy wetland ecosystem should incorporate three sections: an **aquatic zone** (water), **riparian area** (vegetative zone bordering the water) and **upland** habitat. See next page for an illustration.

The **aquatic zone** is defined as the area below the high water mark. In this area the water levels change both seasonally and annually. Within this zone, three distinctive types of plants grow – emergent, (out of water) submergent (below water) and floating.

The **riparian area** is the green buffer of moisture-loving plants that surrounds the edges of wetlands, lakes, rivers and streams. This vegetation can tolerate only periodic flooding. The riparian is the transition zone between the aquatic environment and the drier uplands. The riparian area is characterized by forbs, rushes, grasses, shrubs and deciduous trees (willow, cottonwood).

**Uplands** are the driest areas furthest from the wetland, occupied by trees, shrubs and grasses. The uplands provide vital food and shelter for wetland animals.

## Wetland Components Working Together

The three zones (**aquatic**, **riparian** and **upland**) do not function in isolation. Rather, they are closely tied and work together to produce a healthy ecosystem. The land surrounding water affects water itself. If there is disturbance or pollution on the uplands, then the riparian will have to work harder to filter out any impurities before they reach the water and affect the aquatic zone.

If the riparian area is damaged, there is virtually no buffer between the uplands and water. Sediments and contaminants will flow freely from the upland into the water, reducing water quality and increasing sedimentation. If the aquatic zone has been filled in, reduced in size or damaged, water running to the wetland will have nowhere to go. Instead, it will continue to flow until it reaches a resting place.

Without wetlands on the landscape, water will move quickly in the watershed, from the source of excessive water to lower “catch basins” or rivers. Without many wetlands along the way to trap excess water, waterways can become flooded, polluted or filled with sediment carried by the flowing water. Depressions on the landscape, even when dry, are important areas for holding and storing excess water when it occurs. When there is drought, the water stored in the wetland is slowly and naturally released to surrounding lands and into the groundwater aquifer below.

Wildlife relies on all three zones for habitat: food, water, shelter and space, as well as escape cover and for rearing young. A good example of an animal that uses all three zones is the beaver; ask students to describe how.

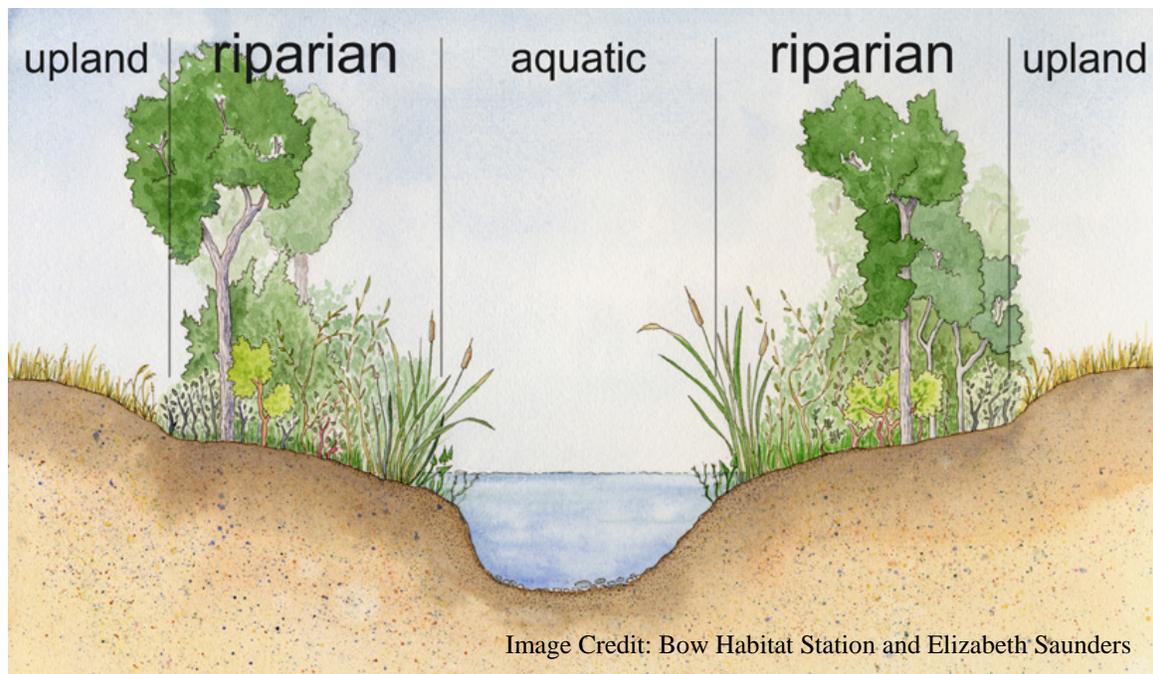


Image Credit: Bow Habitat Station and Elizabeth Saunders

Exhibiting characteristics of both land and water, there is an abundance of life in a wetland. Canada has approximately one-fifth of the world's fresh water, and nearly one-quarter of the world's wetlands. Wetlands are one of the key components to a healthy water cycle. Within this cycle, water evaporates from the surface of wetlands, lakes, dugouts, rivers, oceans and land, condenses into clouds and falls back to earth as precipitation. Since water gives life to every living thing, it is vital that we keep our watersheds—and wetlands—healthy.

### **Protecting our watersheds is a common concern these days. What exactly is a watershed?**

A watershed is an area of land that catches precipitation and drains it to a common point such as a river, lake, stream or wetland. The water that flows through a watershed connects the land in a particular area. To help you remember the definition, you can think of the land as “shedding” the water. It then runs downhill to a common point. Keeping our wetlands intact will help to maintain a healthy watershed.

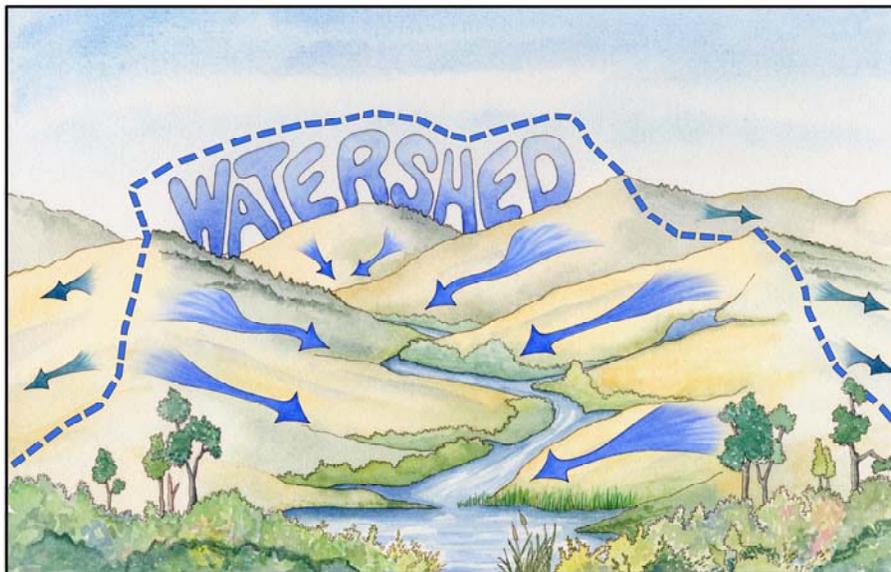


Image Credit: Bow Habitat Station

### **Defining a wetland**

In Alberta, wetlands are generally defined as areas where the land is saturated with water long enough to have poorly drained soils, water-loving plants and biological processes suited to wet areas. There are five main classes of wetlands within the Canadian Wetland Classification system: bogs, fens, marshes, shallow water ponds and swamps. Within these classes there are 70 different types of wetlands identified! So, as you can imagine, trying to classify each one can be a challenge for the untrained eye. Wetlands are very dynamic in nature. They range over different geographical areas; they may change from one type into another over time; their distinctions are subtle and their vegetation is varied. For these reasons, there is no universally recognized definition of a wetland.

## Where are wetlands found?

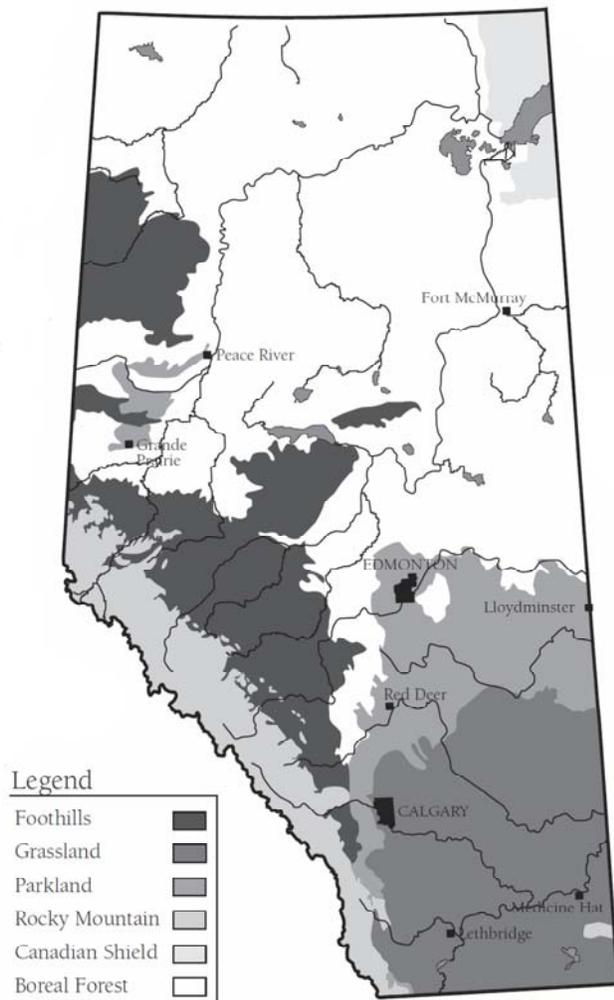
Here in Alberta, wetlands cover approximately 21 per cent (13.7 million ha.) of the province. Approximately 93 per cent (12.7 million ha.) of these wetlands are peatlands (bogs and fens) located in mostly northern but also western regions. Most of the wetlands in the central and southern parts of the province are marshes (sloughs) and shallow water ponds. These make up a portion of the prairie pothole region of Canada.

Wetlands vary according to their geographical location. Most of Alberta's wetlands are bogs, fens, marshes, and shallow waters. Many of our shallow waters are commonly called prairie potholes.

Other types of wetlands are found in North America and around the world. Tidal saltwater marshes occur along coastlines near oceans or seas while tidal freshwater marshes occur further inland where freshwater rivers meet and flow into the ocean. Swamps dominate areas in low latitudes of the Southern Hemisphere, in Hokkaido, Japan, and the Danube and Volga Deltas. In south Florida, mangrove and cypress swamps can be found. Cedar and hardwood swamps can be found in eastern Canada.

In Alberta we have “thicket swamps” where willows and other water-tolerant shrubs will grow in shallow, standing water.

Alberta's large trees are not adapted to growing in standing water, like trees are in true swamps in warmer parts of the world. Floodplain wetlands occur near large rivers like the Mackenzie and St. Lawrence Rivers as well as near smaller rivers. Here, wetlands occur when water floods over the rivers' edges.

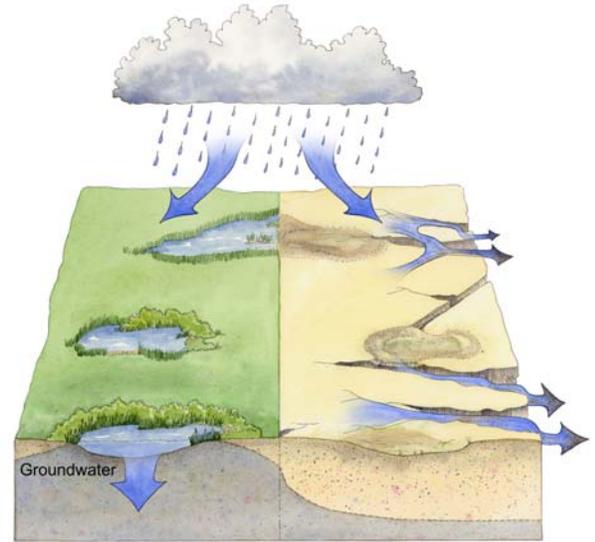


### Where does the water come from?

The water in wetlands comes from two main sources: surface water and groundwater. Surface water is precipitation, snowmelt, runoff or water from streams or rivers. This surface water finds its way to wetlands by gravity. It runs downhill until it finds a low spot in which to rest. Groundwater may also enter wetlands by seepage or underground springs. Some wetlands are fed both by surface and groundwater.

### Do wetlands filter our water well enough to make it potable (drinkable)?

Wetlands and their associated riparian areas and upland habitats help to maintain water quality by retaining sediments, absorbing excess nutrients, absorbing heavy metals, degrading pesticides and reducing pathogens (microorganisms which can cause disease in other organisms or in humans, animals or plants). Good drinking water must be free from disease-causing organisms (i.e. viruses, bacteria, protozoa), harmful chemical substances and radioactive matter. It must also look good, be colourless and odour free! Wetlands are not capable of doing all of this; they merely provide a “pre-treatment” for our “source” water. The “pre-treatment” and water-storage capacity provided by wetlands is significant in reducing our costs for attaining and supplying potable water.



**Wetlands = reduced runoff**      **No Wetlands = increased**

Image Credit: Bow Habitat Station and Elizabeth Saunders

### Where, exactly, is the "Prairie Pothole Region"?



Image Credit: Duck Unlimited Canada

The Prairie Pothole Region (PPR) is part of what used to be the largest expanse of grassland in the world - The Great Plains of North America. Stretching 2,400 kilometers from the Peace Lowland of Alberta southeast to the Tall Grass Prairie of Iowa, the PPR encompasses an area of 777,000 square kilometers. Over 10,000 years ago the glaciers molded this landscape, leaving behind millions of depressions that are known today as prairie potholes.

## **We hear a lot of talk about the importance of the prairie pothole region, but what about the boreal forest wetlands?**

The boreal forest is one of the world's last remaining wilderness areas. It contains more fresh water in wetlands, lakes, and rivers than any other place on the planet! As Canadians, we have the responsibility to look after more than one-quarter of the world's boreal forest region. The boreal forest, which encompasses most of the northern parts of Alberta, is ranked as the second most important region in North America for breeding waterfowl (next to the prairie potholes of course). High nutrient content in the pond systems may be a factor in attracting the 14 to 15 million waterfowl of 23 different species found breeding in this area. Most of Alberta's peatlands (bogs and fens) are found in the boreal forest. However, Alberta's boreal forests and their wetlands are under increasing pressure from forest harvesting, oil and gas development, mining and agriculture.

With rising concerns over the health of our watersheds and boreal wetlands, organizations such as Ducks Unlimited Canada, in collaboration with university scientists, first nations groups, industry, government, and other organizations, are working rapidly to develop a conservation strategy for this region of Alberta.

## **Where and why is peat harvested?**

Peat, or peat moss, is the decaying layers of organic material that lie below the surface of the living moss in a peatland. Peatland is the collective name for bogs and fens that form under cold, wet conditions in northern and western Alberta. The moss in a peatland is primarily sphagnum moss. The sphagnum moss dies each year, and begins a very slow process of decomposition. Under such cold and wet conditions, there is hardly room for oxygen. Decomposition is very, very slow, and is rarely complete. The partially decomposed moss, along with fallen leaves and other decaying plants build up to become thicker and thicker layers each year, and is very desirable for landscaping purposes. Peat in bogs is harvested for commercial purposes. Fens usually have a flow of groundwater beneath them. The thickness of the fen is unpredictable, as the water is sometimes close to the surface. Machinery might fall through! There are regulations surrounding the peat mining (also called peat harvesting) industry. In Alberta, there are five areas where peat is harvested: Athabasca, Newbrook, Seba Beach, Vilna and Wandering River. These five areas supply 15 per cent of the peat in Canada, often exported to fill demands for peat around the world. Peat has properties that retain water, loosen up soils and contributes nutrients in the form of organic matter for gardens everywhere!

## **Are lakes wetlands too?**

Just to confuse us, some wetlands are called lakes, such as "Weed Lake" and "Frank Lake" in southern Alberta. But these are just local names and, like some other "lakes," are actually wetlands. In reality, lakes are not wetlands. To be a lake, a body of open water must have well defined beds and banks, some type of inlet and outlet for water to enter and exit, some degree of current or flow and be reasonably permanent. However, wetlands may be associated with areas adjacent to lake shores (e.g. inlets, outlets or shallow bays) or stream or river floodplains that are regularly flooded. These areas

support wetland communities since they have all the necessary conditions (see wetland definition, above).

### **Changing attitudes**

Throughout history, attitudes toward wetlands have ranged from reverence to disgust and fear. Some valued them as sources of food and recreation. Others held them in low regard, viewing them as worthless bug-infested wastelands or havens for mythical monsters. Most often, they have been dredged, filled in, built upon and used as dumping grounds for trash. As the wilderness frontier was pushed back to make way for homes, roads, agricultural and resource development, the disappearance of wetlands was not considered particularly important. It is estimated that 70 per cent of wetlands in the settled part of Canada have been lost, with more disappearing each year. Today, more Canadians are appreciating the value of wetlands and the benefits they provide. Wetland numbers and health can be maintained and increased through conservation and restoration, government policies, education and communication efforts. In the long run, the survival of wetlands will only come about because wetland conservation has become a societal goal.

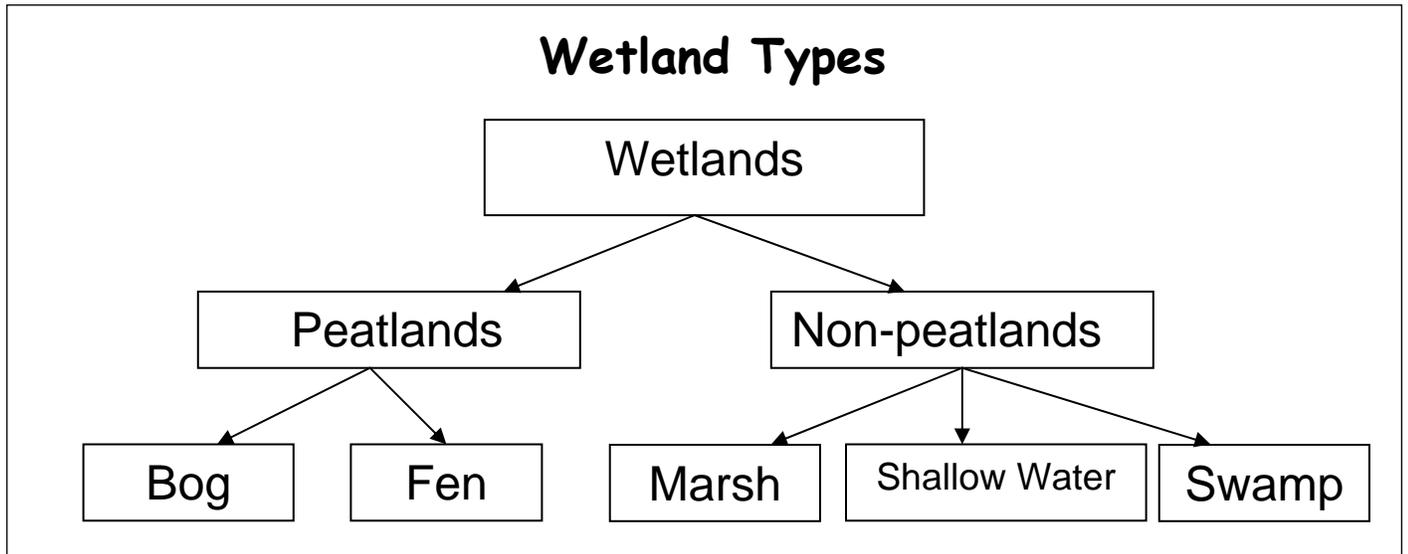
## Which Wetland is Which?

## Teacher Background

Wetland Types	Location in Alberta	Water Source	Common Plants
<b>Bogs</b> (commonly called muskeg or peatland)	Where glaciers left a hollow in the earth. Mostly at northern latitudes, or western Alberta. Forms in a cold, wet climate.	Mostly from precipitation (which includes snowmelt).	Sphagnum moss, larch, black spruce, cotton grass, sedge, horsetails, peat, Labrador tea, bog rosemary
<b>Fens</b> (commonly called muskeg or peatland)	At northern latitudes; similar to bogs.	Ground water and precipitation. (Water is less acidic than bog water).	Similar to bogs but also has sedges, grasses, shrubs and different types of mosses than those found in bogs.
<b>Freshwater Marsh</b> (commonly and locally called sloughs or “ponds)	Where depressions in the landscape fill with open water. Generally throughout Alberta.	Groundwater or surface water.	Emergent plants such as reeds, rushes and sedges, which vary according to location.
<b>Shallow Waters</b> (known in southern Alberta as Prairie Potholes)	In the rolling hills of the Prairies, left behind by the glaciers. Isolated from other marshes by higher ground.	Surface water (rain, snow, streams etc.).	Grasses and emergent plants.
<b>Swamp</b> (thicket swamp in Alberta)	Forested areas that are flooded seasonally.	Flooded during growing season by surface water.	Variety of trees and shrubs. In Alberta there are willows and other shrubs. In Florida, there are Cypress and mangrove swamps.
<b>Tidal Saltwater Marsh</b>	Near ocean shores and other saltwater tides. Not found in Alberta.	Flooded by tides.	Cordgrass, black grass, sea lavender and glasswort.
<b>Tidal Freshwater Marsh</b>	Near tidal saltwater marshes but a bit further inland, with little or no salt. Ones with higher salt content are called “brackish.” Not found in Alberta.	Flooded by tides.	More varied than saltwater marshes and include brightly colored flowering plants.

# What is a Wetland?

A wetland is an area of land that is saturated with water for all or part of the year.



	<b>Marsh</b>	<b>Bog</b>	<b>Fen</b>
<b>location of water</b>	Open water	Saturated in ground	Saturated in ground
<b>dominant vegetation</b>	Cattails	Mosses, shrubs	Sedges, grasses
<b>source of water</b>	Precipitation	Precipitation	Ground water
<b>location in Alberta</b>	Throughout Alberta	Northern, western	Northern, western

# Importance of Wetlands

Wetlands provide the following associated functions and values:

## 1. Water resource

Wetlands are an important part of the water cycle. They contribute to recharge and discharge of groundwater; natural reservoirs of water, supplying water for various uses.

## 2. Life support

Wetlands provide habitat (food, water, shelter, space) for many species; support many 'at risk' plant, animal and insect species.

## 3. Water quality

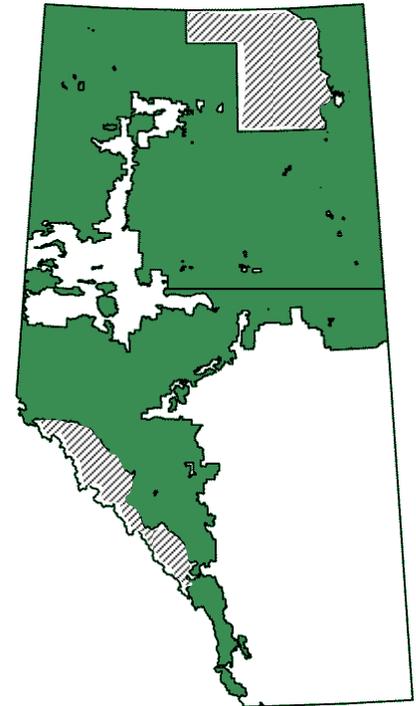
Wetlands help to filter out sediment, absorb nutrients, remove chemical residues, treat wastewater

## 4. Economic values

Wetlands support hunting, trapping and fishing industries; excellent environment for growing some forage crops; wild rice; peat harvesting; non-consumptive recreational activities such as photography and wildlife viewing.

## 5. Social / heritage / educational values

People are drawn to wetlands for recreation and tourism; valuable for scientific research; educational value is outstanding, providing sites for hands-on study of plants and animals in their natural setting.



**Green and White Areas of Alberta**  
(Non-settled and Settled Areas)  
▨ = National Parks

If a trip to a local wetland is not possible, or even if it is and you just want to get the students excited about wetlands, this activity will engage them in a sensory experience. With this activity students will be introduced to the sights, sounds, smells, tastes and feel of the wetland ecosystem. Afterwards it may be used to stimulate a discussion on the value wetlands provide for humans. Use the *Wetlands: Webbed Feet Not Required* poster to introduce students to the three main components of a healthy wetland ecosystem: upland habitat, the vegetative buffer (riparian zone) and the water itself.

## Materials

- Spray bottle
- Dried cranberries
- Fan (electric or one made out of paper)
- CD or cassette player for “Wetland Noises”
- A sample of Foxtail Barley grass or a bunch of tall grasses
- A sample of wetland mud or boiled egg or egg salad sandwich filling

## Wetland Story

It’s an early morning spring in Alberta and you are just walking down to a marsh near your house. From the top of the hill, you can see the mist rising off of the water in the distance and you can hear the frogs croaking as you make your way towards the WETLAND. The air is cool and damp.

**Play a tape of frogs croaking. Solitude Series tapes, available at music stores or libraries, have some wetland sounds such as "By Canoe at Loon Lake" and "Dawn by a Gentle Stream." If you are involved in the Alberta Amphibian Monitoring Program, your tape of frog calls would also be suitable.**

You pass through the aspen trees and balsam poplar growing on the hill, or UPLAND. Looking down you notice some pointy stumps where a beaver has been at work. You are wearing shorts and the rough grasses scratch your legs. A soft breeze touches your cheeks.

**Open a window, turn on a fan or use a paper fan to make a breeze.**

As you walk downhill, you enter another zone of PLANTS where grasses and rushes grow. One peculiar patch of plants, called sedges, catches your eye. Some of the stems are bent over to form the shape of a dome. Peering inside the little structure you discover seven oval eggs! Not wanting to disturb the nest, you continue on.

The ground begins to get wet beneath your feet. You can feel your rubber boots sinking into the goo. You have now entered the AQUATIC—or water zone and the cattails and bulrushes tower above your head. Suddenly, a dabbling duck splashes out of the water.

You startled it, and in its haste to escape, it splashes water on your head as it takes off in flight.

**Squirt some water on the students from a spray bottle or sprinkle them with water from your fingers.**

Crouching in the cattails you look across the marsh and there, walking slowly amongst the reeds is a great blue heron. Sploosh! It strikes, and grabs a frog in its beak. For a moment the marsh seems silent.

**Turn off the frog croaking noises.**

You notice some ripples in the water nearby and you watch them carefully. You can see a dark object, about the size of a house cat, swimming with just its head out of the water. It appears to be swimming towards a pile of mud and sticks. You realize as it climbs out of the water, it has a long, rat-like tail. A muskrat!

Standing in the mud you begin to sniff. Something smells like rotten eggs. What could it be? You bend down close to the mud and sniff again. It must be coming from the wetland, full of decaying plant matter! Peeeyeww!

**Circulate with a container of filling for egg salad sandwiches for students to smell. Optional: Collect a sample of wetland "mud" and drop a small amount into a petri dish. Have the students smell it!**

You are feeling a bit hungry so you stop to look in your backpack for something to eat. To your delight, you pull out a bag of dried cranberries! Perfect! Cranberries can be harvested from wetlands!

**Buy a bag of dried cranberries and place one on the desk of each student for them to eat at this point in the story. (note: some cranberries, such as highbush cranberries, grow in uplands, but some, like small bog cranberries grow in peatlands.)**

You begin to walk back along the bank. Watch out! A garter snake rushes past you into the long grass; it had been sunning itself on the path. It slithers away and hisses. SSSSSssssssssssss.

**Hiss like a snake.**

You lie down on your stomach in the upland grasses just above the wetland. Foxtail barley brushes your face. You can hear the familiar song of the red-winged blackbird coming from the cattails. Dreamily, you close your eyes and hope that this wetland is around forever.

**Have some Foxtail Barley ready to brush past the students faces.**

### ***Ending....***

*When you finish the story, use a quiet voice to ask the students to keep their heads down and eyes closed. Ask them to think about the story they just heard. In a minute or so, they will be asked to open their eyes and talk about it.*

### **Follow Up**

When the students open their eyes, ask them questions such as:

- What was most memorable part of the story?
- What didn't you like about the story?
- Do you think you have ever visited a wetland?
- Is a wetland somewhere you would be interested in visiting?
- What part of the story could you most relate to?

### **Alternate materials**

#### ***Sights***

Start a collection of wetland pictures from books or magazines to pass around to the students. One book with stunning photographs is *Wetlands of North America* by William A. Niering and Bates Littlehales, Thomasson-Grant, 1991.

#### ***Tastes***

There are many tasty things that grow in a wetland. Some tastes (beside cranberries) might include: blueberries, high bush cranberry jelly, wild rice and mint! And don't forget ducks, geese and moose too! Students could create a "wetland menu" from these foods.

#### ***Touches***

Other wetland plants that may stimulate the sense of touch are: cattails, pussy willows, peat moss or mud. Some baskets are made out of wetland rushes or cattail leaves; these provide different textures to feel. You could also have the students walk around on damp sponges. This creates a sensation similar to walking on a bog or fen!

#### ***Smells***

Many distinct smells emerge from wetlands. One of the most recognizable is the smell of rotten eggs rising from the mud of decomposing organic matter. It smells this way because the plant material decomposes in the water, where oxygen levels are low. Another more pleasant smell associated with Alberta's wetlands is wild mint. Mint can be recognized by its square stem. Instead of picking mint plants from a wetland, visit your local grocer to buy fresh mint or buy aromas from an aromatherapy store. Remember to wave the odor towards the student's noses; do not have them inhale the vapors directly.