

Grade 5: Wetlands Presentation



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INTRODUCTION

Students will learn about the different types of wetlands found in Alberta and their importance. The following PowerPoint and activities will develop skills for identification of various wetlands, the plants and animals that live in them, and the importance of wetland ecosystems to the greater environment.

LEARNING OBJECTIVES:

By the end of this lesson, students will:

- Identify the differences and similarities between different types of wetlands
- Identify various plants and animals found in wetlands
- Understand how wetlands clean and store water
- Understand the effects of human impacts on wetland ecosystems

LOCATION:

This PowerPoint can be taught in any classroom with a projector or Smartboard.

SET UP:

- Download the PowerPoint presentation from www.lsfes.org.
- Print 'What in the world is a wetland' & 'Wetland Words' handout sheets for each student.
- Prepare wetland inquiry demo supplies (see Appendix B) on a table or desk.

GRADE: 5

TEACHER PREPARATION TIME: 10 minutes

LESSON DURATION: 60 minutes

PREREQUISITE: None

WORKSHEETS: Attached

CONNECTIONS TO SCIENCE CURRICULUM

TOPIC E:

- E-1 Identify and describe local wetland ecosystems
- E-2 Recognize interacting living and non-living components of a wetland ecosystem
- E-3 Identify plants and animals found at a wetland site
- E-4 Identify and describe adaptations for wetland plants and animals
- E-5 Understand and appreciate that all animals have an important role in a wetland community
- E-6 Identify the roles of different organisms in a wetland food web
- E-9 Identify human actions that can threaten wetland ecosystems

MATERIALS

Attached Worksheets

- 'What in the world is a wetland?' & 'Wetland Words' handout sheets (See Appendix A)

Extra Activity

- Wetland Inquiry Demo Supplies (See Appendix B)

PROCEDURE:

To start the lesson plan download the gr.5 wetlands PowerPoint presentation from www.lsfes.org. Follow the script below as you present the PowerPoint. This script may also be found in the speaker notes of the PowerPoint presentation.

Slide 1. 'Today we are going to learn about wetlands. What in the world is a wetland?'

Answers:

- Bog, fen, swamp, muskeg, etc.
- An area where it is wet
- Land that is full of water

'Look at the three pictures on this slide – are they wetlands?'

Answer: Yes, they all are wetlands.

'The picture on the left is a spruce bog, the middle one is a marsh, and the right picture shows both a marsh and a bog.'

Slide 2. 'We define a wetland as any area that holds water either temporarily or permanently. Some wetlands hold water year-round while others may only hold water for one or two months each spring.'

Slide 3. 'Other definitions of wetlands include areas where land is saturated with water long enough to have poorly drained soils and water loving plants, or the halfway world between land ecosystem and a water ecosystem.'

Hand out the 'What in the world is a wetland?' and 'Wetland Words' worksheets to each student.

'Look at the picture on the front of the handout. What types of wetlands are there?' Answer: Bogs, marshes, fens, swamps, muskegs, etc.

'Notice the progression of trees and plants going from the lake to the swamp. Do you think a lake is a wetland?' Answer: No.

'Lakes have very clear boundaries – you always know where the edge of the lake is – whereas in wetlands the boundaries change all the time depending on how much water is in the wetland. Lakes also have currents flowing through them; the water is constantly moving in a lake. Wetlands usually do not have currents. Lakes usually have an inlet where water enters the lake and an outlet where it leaves the lake.'

Slide 4. 'The first wetland we are going to look at is a bog.' Have a student read the definition of a bog from the handout.

A bog is a type of wetland that received most of its water supply from rainfall.

Vegetation consists mostly of sphagnum mosses and some trees such as black spruce and tamarack. They have thick layers of accumulated peat.

Slide 5. 'This slide shows some common bog plants. Sphagnum moss, shown in the top left picture, is very spongy – walking on it feels like walking on a trampoline.'

'The bottom left picture shows Labrador tea, a common flowering plant in a bog. It is easy to identify because of its fuzzy orange underside. Labrador tea is full of vitamin C; in fact it has more vitamin C than an orange.'

'In a bog you will mainly find two types of trees. One is black spruce, which is an evergreen tree with prickly needles that are attached singly to the branch. These trees are usually not very tall and their short upper branches form a "crow's nest", a cluster of branches at the top of the tree that may be caused by squirrels clipping off the tree's cones. The trunk of a black spruce tree is fairly thin.'

'The second type of tree you will find in a bog is a tamarack or larch. Its needles are very soft and grow in clusters on the branch. This tree is very unique tree because something happens to its needles in the fall –what is it?' Answer: They turn yellow and fall off. 'Although a tamarack is a coniferous tree it acts like a deciduous tree because it sheds its needles in the fall.'

Slide 6. 'Underneath the sphagnum moss is peat.'

Have a student read the definition of peat on the handout.

The dead remains of partly rotted plants that have piled up in deep layers over many years. Peat is mostly made up of mosses but may contain sedges, grasses and rushes.

'Peat can be 1 metre deep or it can be up to 10 metres deep. Places that have peat in the ground, like bogs, are called peatlands.'

'Does anyone use peat in their garden?'

'Peat is full of nutrients. When it is in the bog it cannot decompose quickly because the soil is cold and there is a lack of oxygen. When we take peat out of the bog and put it in a garden it decomposes quickly because the soil is warmer and there is lots of oxygen. All the nutrients that were tied up in the peat when it was in the bog are released into the soil of the garden and can help plants grow.'

Click the mouse and the slide will show a picture of a bog body.

'Over in Europe on the moors – which are a type of wetland – people have found the remains of dead bodies that are hundreds of years old. This guy is 2000 years old and his name is Grauballe man. His body was found in a bog near the village of Grauballe in Denmark.'

Slide 7. 'Other plants such as the sundew, pitcher plant, cranberry, and sedges also grow in a bog. The sundew and the pitcher plant are carnivorous plants. What is a carnivorous plant?'

Answer: A plant that eats insects.

'Insects are attracted to the redness of the plants – they go to investigate and when they land on the plant they can't get away because the plant is sticky. The sundew plant then wraps its tentacles around the bug and slowly digests it. The pitcher plant closes up its leaves and slowly digests the insect.'

'These plants eat insects because the soils in a bog have very few nutrients. The soil is cold and there is very little oxygen for plants and animals to decompose, so by eating insects they get more nutrients to survive.'

'Cranberry plants can also be found in a bog. The cranberry sauce that you eat with your turkey dinner comes from bogs.'

Slide 8. 'The next wetland we are going to talk about is a fen.' Have a student read the definition of a fen from the handout.

A wetland that receives most of its water supply from ground water. It supports vegetation such as sedges, grasses, shrubs or trees. Fens contain more nutrients than bogs.

'Fens, like bogs, are peatlands. While bogs get most of their water from rainfall, fens get most of their water from ground water. What is ground water?'

Answer: Ground water is the water found underground in the cracks and spaces in soil, sand and rock.

Slide 9. 'Fens have the same plants as a bog but they usually have more flowering plants in them because the soil has more nutrients in it. Plants like the three leaved false Solomon's seal, dwarf birch, and round leaf orchid can be found in a fen.'

Slide 10. 'Next let's look at muskegs.' Have a student read the definition of a muskeg from the handout.

A general term used to describe peatlands, especially bogs and fens. The word muskeg is of native origin, referring to areas with mosses, sedges, and sparse, scrubby trees.

Slide 11. 'The next wetland we will look at is a marsh.'

Have a student read the definition for a marsh from the handout.

Also referred to as a slough. A marsh is a depression filled with plants and open water. The roots of the marsh plants are flooded for most of the summer. Marshes have many emergent plants such as cattails. The water can be a few centimetres deep or up to a metre deep, and can change depths from one year to the next.

'What are emergent plants?'

Have a student read the definition of emergent plant.

Plants that grow with their stems partly in and partly out of water.

'Do you see any emergent plants on this slide?'

Answer: Yes, cattails.

Slide 12. 'The next wetland is a swamp.' Have a student read the definition of a swamp from the handout.

Wetlands that are flooded by standing or slow-moving water. The vegetation is dense cover of trees and shrubs. Swamps are not common in Alberta. Many people incorrectly refer to any wetland as a swamp.

Slide 13. 'This slide shows the difference between peatlands and non-peatlands.'

'Which wetlands are peatlands?' Answer: Bogs and fens.

'Which wetlands are non-peatlands?' Answer: Swamps, marshes and shallow water.

Slide 14. 'This slide shows the Natural Regions of Alberta and where different wetlands are found. Bogs and fens, or peatlands, are found mostly in Northern Alberta. Marshes are also found in Northern Alberta, but peatlands are more common.'

'Marshes and ponds, or non-peatlands, are found mostly in southern Alberta. Bogs can be found in southern Alberta but marshes are more common.'

'The different colours on the map show the different natural regions in Alberta – what are they?'
Answer: Canadian Shield, Boreal Forest, Foothills, Parkland, Grassland, Rocky Mountain.

Slide 15. 'This slide shows two different types of wetlands: a bog on the left and a marsh on the right. What difference/similarities do you see between the two?' Here are some examples:

Bog	Marsh
Trees – black spruce, tamarack	Trees – lack of trees
Plants – moss, carnivorous plants	Plants – cattails, grasses, flowers
Animals – beavers, moose	Animals – foxes, frogs
Birds - owls	Birds – ducks, songbirds, geese, heron
Industry – peat mining	Industry – farming
Human use - hunting	Human use – hiking, birdwatching

This poster is from Alberta Environment & Parks (AEP) Educational Resources and can be found at <http://aep.alberta.ca/about-us/documents/Wetlands-FullColourPoster-2009.pdf>

Slide 16. 'Now we're going to find out how wetlands store and clean water.' Have a student read the definition of groundwater from the handout.

Water that is found below the ground surface. It is water that passes through or stays in the soil and underlying layers. This water is free to move by gravity, soaking into the ground from wetlands and lakes or precipitation.

'Groundwater is below our feet right now. It is everywhere- sometimes it is at the surface of the ground like a lake or a pond – and sometimes it is way below the ground and we would have to dig a well to find it.'

'The water table is the level at which water in the ground is located. Wetlands are important because they link ground water to surface water such as a lake.'

'When the water table is high, wetlands can store water. When the water table is high marshes will have lots of water in them. But how does a bog store water? Sphagnum moss can store 200 times its weight in water so when the water table is high the sphagnum moss stores the water and when the water table is low the sphagnum moss releases the water back into groundwater.'

'Wetlands are also good for cleaning our water. As the water is released back into the groundwater it is filtered through the soil and the rocks and by the time it reaches the groundwater it is clean.'

Do the Wetland Inquiry demo experiment with your class. See Appendix B for experiment instructions.

Slide 17. 'Why are wetlands important? The first reason is for life support; many plants and animals depend on wetlands to survive.'

'Labrador tea lives mostly in peatlands like bogs and fens; its main habitat is in wetlands.'

'Moose can swim and love to eat plants that grow at the bottom of marshes and ponds. They will dive down to the bottom to get their food.'

'Dragonflies depend on wetlands for part of their lifecycle; they lay their eggs in the water and when they hatch the dragonfly nymphs live underwater for 2-7 years before they will emerge from the water as an adult dragonfly.'

'Wetlands are also important for birds like this mallard duck. Mallards love to nest near marshes and ponds, and will eat aquatic plants, snails, and insect larvae that live in the water. When they migrate in the spring and fall, ducks use wetlands like a ladder, flying from one wetland to another to rest and feed on their way north or south.'

Slide 18. 'Wetlands are also important for water storage; they are natural reservoirs and can help replenish water sources in times of drought, or store excess water in times of flooding.'

Whether in sphagnum moss like a bog, or in open water like a marsh, wetlands can hold lots of water.'

Slide 19. 'Wetlands are important for water quality as well; they are natural water filters. Just like the sponge filtered out the dirty water in our experiment, wetlands filter excessive nutrients and pollutants from water before it reaches the water table. They are sometimes called 'nature's kidneys' because the way they filter water in the ecosystem is similar to how kidneys filter toxins out of our bodies.'

Slide 20. 'Wetlands are good for the economy. Some businesses depend on wetlands such as agriculture, peat mining, hunting, fishing, trapping, and gardening.'

'Farmers can use water from wetlands to help water their crops or livestock.'

'Peat from a bog can be mined and used in gardening because it is so rich in nutrients. Once out of the bog the peat breaks down quickly and helps the plants to grow.'

'Wetlands also provide important areas for people who trap, hunt, and fish. Animals like moose, beavers, muskrats, fish, and minks (pictured in this slide) all frequent wetland areas.'

Slide 21. 'Wetlands also provide recreational opportunities; lots of fun activities take place in wetlands such as bird watching, hunting, trapping, fishing, research and educational field trips.'

'Wetlands are an excellent place to go birdwatching. Many species of birds use wetlands for feeding, nesting, or as stopover sites to rest in during their migration. Wetlands are very productive and provide lots of fish, insects, and plants for birds to eat.'

'Wetlands are important places to do research to learn more about the water quality in a given area and the ways that wetlands filter water. Researchers in Norway used peat moss from a bog to develop a product that can help clean up oil spills.'

'Wetlands are also a unique and interesting place to go for a field trip. The students in this photo on the right are exploring a marsh to find aquatic insects.'

Slide 22. 'What different types of wetlands do we have in Alberta?'

Answer : D- All of the Above

Slide 23. 'Which two coniferous trees are most commonly found in a bog?'

Answer: A – Larch and Black Spruce

Slide 24. 'Which of these are peatlands?'

Answer: C - bog, fen, muskeg

Slide 25. 'Which of these are non-peatlands?'

Answer: B- marsh, swamp

Slide 26. In closing, here are some fun facts about spruce bogs:

- Peat in Alberta grows only 3 – 7 cm in a century
- Peat lands provide a record of the climate going back as far as 6000 years
- Water in a bog may be 300 years old because the water passes through so slowly
- The expression “to be bogged down” comes from the experience of sinking into the soft moss of a bog and sometimes getting stuck

Appendix A: What in the World is a Wetland?

The following 'What in the World is a wetland?' and 'Wetland Words' handout is from Alberta Environment & Parks (AEP) Educational Resources. For a copy of this and other environmental education activities, visit <https://open.alberta.ca/publications/0778539989> or <http://aep.alberta.ca/about-us/education-resources/default.aspx>.

Wetlands

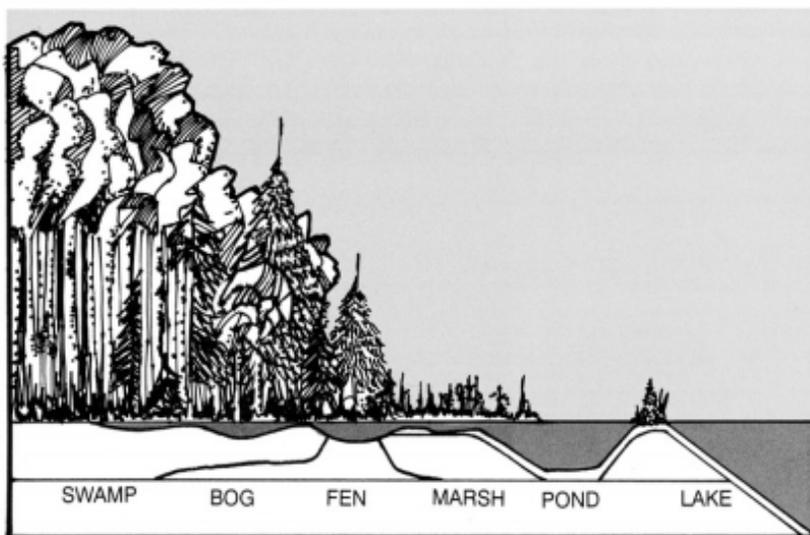
WEBBED FEET NOT REQUIRED

WHAT IN THE WORLD IS A WETLAND?

Some people say that wetlands are areas too wet to be considered land but not wet enough to be lakes. They are areas where the land is saturated with water long enough to have poorly drained soils. Wetlands also have water-loving plants and biological processes suited to wet areas.

There are many different types of wetlands in Alberta (See **Wetland Words**). Each type has certain kinds of plants and animals that live there. Most of Alberta's wetlands (93%) are bogs and fens. Although these are mostly found in the northern part of the province they extend as far south as Edmonton and Rocky Mountain House. Sloughs or marshes can be found throughout the province but are most common in central and southern Alberta.

Many wetlands, particularly *bogs* and *fens*, build up a supply of peat. Peat is a build up of partially rotted plants that grow in wet conditions. Peat is mostly made up of mosses, but also of sedges, rushes or grasses. One type, made up of Sphagnum moss, is called *peat moss*. Over the years, tonnes of peat are produced and it is gradually compacted by the weight of the new growth on top. Since plants die at a faster rate than they decompose, the decaying material builds up and forms peat. In bogs, the decay process is slowed down by wet ground, a lack of oxygen, colder temperatures and the acidic conditions.



Action In The Wetlands

Because wetlands are so rich in resources, there can be a great deal of human activity there. Some examples are hay cropping on the margins of wetlands, trapping, fishing, timber and wild rice harvesting, and peat mining.

Peat mining is the digging up of peat from wetlands. Peat accumulates very slowly, only renewing itself over a long period of time. Therefore, if peat is extracted in large amounts and the living surface is destroyed, it will not continue to renew itself. If extraction is done carefully, peat harvesting can be a sustainable activity.

Peat can be used to improve soil for gardening. Another use for peat is to burn it for fuel. There are two ways peat is harvested in Alberta. Both methods require the area to be drained to allow the peat moss to dry out. Some harvesters use a backhoe to remove the peat. Larger operations use a machine that vacuums up the dry peat (see poster front).

Wetlands can bring both costs and benefits to agriculture. The native grasses and sedges found in and around wetlands may be grazed by cattle or cut for hay. Prairie wetlands are also valuable for reducing erosion, increasing moisture in the soil and supplying water both for livestock and human use.

Wetlands can also be a hindrance to agriculture. They may result in less available land for crops and water-logged crops after rain storms. On the other hand, drainage of wetlands can make more land available for crops. It also allows earlier access to the land in the spring when the snow melts.

The most extensive use of land in the northern third of the province is from forestry. If a wetland has to be disturbed because of forestry operations, the forest company will require an approval.

Wild *rice* is a growing renewable resource industry in Alberta. In 1989, more than 45,555 kilograms of wild rice was harvested. Wild rice is grown in shallow water often found around the edges of wetlands and lakes.

Other plant and animal species are collected from wetlands for scientific study and medical supplies. Wetlands even contribute to art and culture. Willows are used for furniture and baskets, birch bark for some canoes and photographs, and paintings of wetlands hang in many places.

As water flows into fens, calcium may be deposited in the bottom sediment. This is called marl. It is mined out of some of these fens and used as cement. This is most common in the mountains but can also be found and mined in other parts of Alberta (near Edmonton).

WETLAND WORDS

There are many words used to describe wetlands. Here are some you may hear or see:

Wetland Types

The distinctions between different wetland types are gradual and there may be several types of wetlands in one area.

BOG

A type of wetland that received most of its water supply from rainfall. Vegetation consists mostly of sphagnum mosses and some trees such as **black spruce** or **tamarack**. They have thick layers of accumulated peat. Plants such as the sundew, pitcher plant, cranberry, and sedges also grow there. Bogs are mostly found in the northern part of the province.

FEN

A wetland that receives most of its water supply from groundwater. It supports vegetation such as sedges, grasses, shrubs or trees. Fens contain more nutrients than bogs.

MARSH

Also referred to as a **slough**. A marsh is a depression filled with plants and open water. The roots of marsh plants are flooded for most of the summer. Marshes have many **emergent plants** (see Wetland Words) such as cattails. The water can be a few centimetres or up to a metre deep, and can change depths from one year to the next.

MUSKEG

A general term used to describe peatlands, especially bogs and fens. The word **muskeg** is of native origin, referring to areas with mosses, sedges and sparse, scrubby trees.

POND

A general term for an open water wetland (either seasonal or permanent).

POTHOLE

A specific type of small wetland in the rolling hills on the prairies; left behind by glaciers. Potholes are generally isolated from other marshes by higher land. They can be deep or shallow.

SLOUGH

A term commonly used in Alberta to describe marshes. It is a type of **marsh** lying in a depression, surrounded by dry land (prairie). They can be a few metres across and up to kilometres long. In dry seasons farmers may cultivate and cut sloughs for hay.

SWAMP

Wetlands that are flooded by standing or slow-moving water. The vegetation is a dense cover of trees and shrubs. Swamps are not common in Alberta. Many people incorrectly refer to a wetland as a **swamp**.

Wetland Plants

BULRUSH

A type of **sedge**. Most bulrushes have solid, triangular stems. Small clusters of brown flowers may hang at the end of the spear-like stems.

CATTAIL

Probably the most recognizable marsh plant, cattails have long brown flower spikes that release fluffy seeds to the wind each autumn. They have rounded stems and flat leaves.

EMERGENT PLANTS

Wetland plants that grow with their stems partly in and partly out of water.

PEAT

The dead remains of partly rotted plants that have piled up in deep layers over many years. Peat is mostly made up of mosses but may also contain sedges, grasses and rushes.

SEDGE

A term for grass-like or rush-like plants with long narrow leaves. Sedges have three sided stems ("sedges have edges"). They usually grow in moist or marshy areas. Bulrushes are a type of sedge.

SUBMERGENT PLANTS

Plants that grow completely under water, e.g. coontail.

Other Wetland Words

GROUNDWATER

Water that is found below the ground surface. It is water that passes through or stays in the soil and underlying layers. This water is free to move by gravity, soaking into the ground from wetlands and lakes or precipitation.

Appendix B: Wetlands Inquiry Demo

Background:

This activity is designed to demonstrate how a wetland functions and its role in water storage and filtration. A video demonstration of this activity can be found at <http://lsfes.org/photo-gallery/videos/>.

Materials:

- Small tub
- 1 large pop bottle with top cut off
- Sponge cut to fit inside the bottle
- 1 bottle of clean water
- 1 bottle of dirty water
- Small pieces of paper to cover the sponge



Set-up:

Insert sponge into the top of the bottle top and ensure there are no gaps for water to run through. Place the top of the pop bottle upside down in the bottom of the pop bottle. Set the bottle in the tub to limit water spillage.



Instructions:

1. 'This sponge represents the world's smallest wetland. We're going to do an experiment to see what happens to our wetland during rainfall or water runoff events'
2. 'First we're going to see what happens to our wetland when we get heavy rainfall. What do you think will happen when we pour water on this sponge?' Let the students make predictions about what they think will happen. Then **slowly add clean water to the**

sponge. Alternatively, you can ask for a student volunteer to pour the water. Stop pouring water before it starts coming out the bottom of the sponge.

‘Where is the water going? What is the wetland doing?’

→ The wetland acts like a sponge and stores water.

3. Now **add more water until the water begins to pour out** of the bottom of the sponge.

‘Why is water pouring out of the bottom?’

→ Exceeded the storage capacity of the wetland to hold water

→ Gravity forces the water downward

After water has stopped dripping, ask ‘Is there still water in the wetland?’ Yes.

Wring out the sponge to demonstrate. ‘Why is this important?’

→ Controls water flow in the environment.

→ Can use water to recharge groundwater, fens, etc.

4. Replace the sponge in the pop bottle and begin to pour the **dirty water** onto it.

‘What will happen when we add dirty water?’

→ The water will come out clean. The dirt will be trapped on the surface of the sponge.

→ Wetlands act like a filter to clean pollutants out of the water.

5. ‘Next we’re going to see what happens if we start building on our wetland.’ **Cover the entire top of the wetland/sponge** with pieces of paper to represent man-made disturbances (i.e. shopping mall, paving roads, restaurants, etc.) Have your students come up with things to build over the wetland.

‘How will the things we have built affect the water flow?’

→ Flooding on the surface.

Pour clean water onto the surface of the paper-covered sponge. The water will remain on the surface and run off the sides instead of being absorbed by the sponge.

‘When we build over our wetland it prevents it from being able to store and clean our water. It is important to protect our wetlands so they can continue to act as water reservoirs and filtration systems.’