

Wonder of Wetlands

Theme: Water Science

Curriculum:

- Understanding Earth and Space Systems, Grade 2 (Air and Water in the Environment)
- Understanding Life Systems, Grade 2 (Growth and Changes in Animals)
- Understanding Earth and Space Systems, Grade 3 (Soils in the Environment)
- Understanding Life Systems, Grade 4 (Habitats and Communities)

Activity Overview:

In this activity students will learn about the different types of wetlands, their importance, and compare everyday objects to the many functions wetlands perform in an ecosystem.

Key Messages:

- Wetlands are an important part of the landscape of Ontario. They provide many important functions including: reduce flooding, retain water, decrease erosion, buffer against and filter out nutrients and pollutants, provide habitat and nesting/spawning/reproduction grounds, offer recreational opportunities etc.

Background Information:

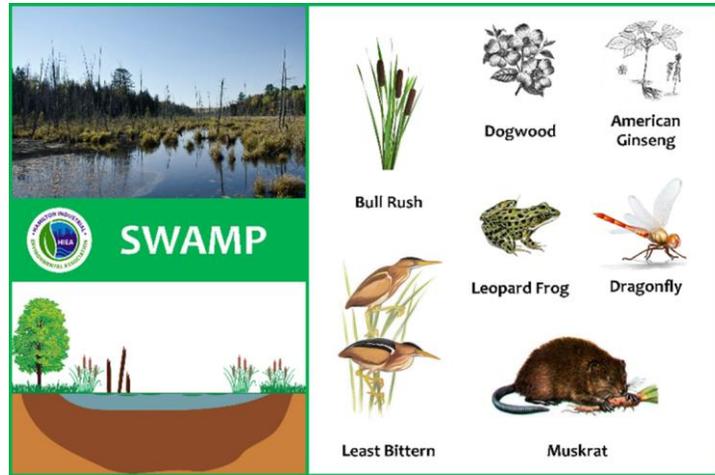
A wetland is an area characterized by the presence of water, saturated or hydric soil, and plants adapted to saturated soil conditions (hydrophytic plants). Wetlands play a critical role in the ecosystem and are beneficial to humans, plants, and animals.

The four major types of wetlands recognized in Ontario are marshes, swamps, bogs and fens. All four are wetlands but they have different characteristics with different things living in each area.

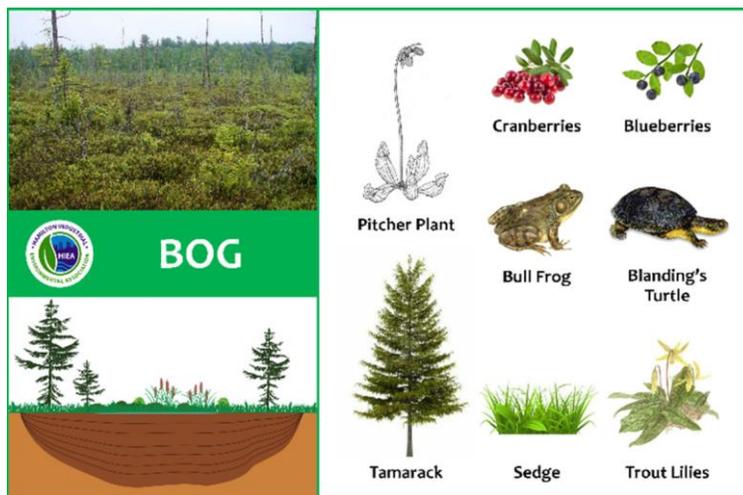
A marsh is a wetland that is periodically or permanently flooded with water. Marsh vegetation typically consists of non-woody plants such as cattails, rushes, reeds, grasses and sedges. In open marshes, floating and submerged plants such as water lilies and pond weeds can be found. Marshes are fairly common throughout Ontario, with the most productive ones occurring along the shoreline of the Southern Great Lakes.



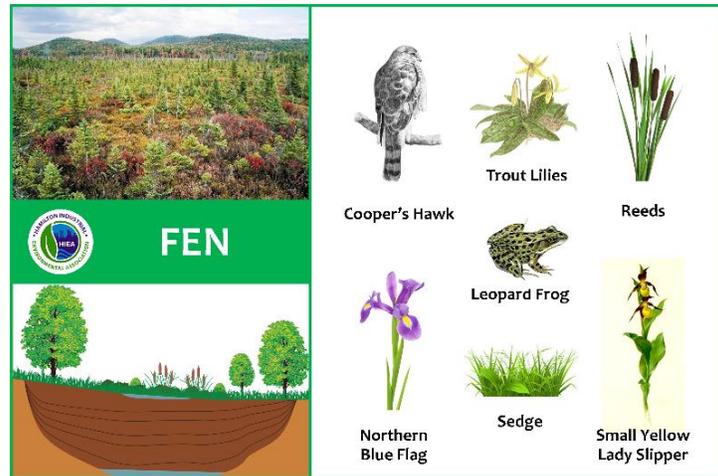
A swamp is a wooded wetland that is often flooded for a portion of the year. Swamp vegetation is dominated by trees, including coniferous and or deciduous species, and tall shrubs, such as willows, dogwood and elder. Common throughout Ontario, swamps are incredibly diverse, exhibiting a wide array of vegetation, age and ecological settings.



A bog is a peat-filled depression that receives their water and nutrients from rainfall. Peat consists of partially decomposed plants. Bogs are extremely low in nutrients and tend to be strongly acidic. They are typically covered with a carpet of Sphagnum mosses. Other vegetation includes stunted black spruce trees, heath plants such as laurels and blueberries, and carnivorous plants such as sundews and pitcher plants. Bogs can take thousands of years to form and are extremely rare in the southern part of the province but are common throughout northern Ontario.



A fen, like a bog, is a peatland – that is, wetlands that accumulate peat. Fens are located in areas where groundwater discharges to the surface. A fen typically has more nutrients than bogs, and the water is less acidic. Typical fen vegetation includes sedges and mosses, along with some grasses, reeds, low shrubs, tamarack and white cedar, sundews, pitcher plants and orchids. Fens are fairly rare in southern Ontario but are quite common in northern Ontario.



Importance of Wetlands

Wetlands can absorb large quantities of water, making them particularly useful when rivers and streams overflow their banks because they help minimize the effects of flooding. Because it soaks up excess water and prevents the surrounding areas from being flooded, a wetland can be compared to a sponge. If a wetland is destroyed, the area has a better chance of being flooded because excess water will have nowhere to be absorbed and water will spread over shorelines. Another property that both wetlands and sponges share is that wetlands can hold water even after all the standing water, like ponds, creeks, or puddles, has been absorbed or dried up. There is still enough moisture in wetland soil for vegetation and animals to survive.

Wetlands also prevent erosion by retaining enough moisture to support plants whose root systems hold the soil in place. Where wetlands are destroyed, erosion and flood damage are much more devastating.

In addition to soaking up and retaining large quantities of water, wetlands can filter out sediment and debris that are carried in the water column. Wetlands can also sequester or take up nutrients and pollutants that are dissolved in water. As water passes through a wetland, the water movement is slowed, allowing suspended sediments, pollutants, nutrients and debris to settle out and become part of the sediment of wetlands. As a result, water that comes out of wetlands is generally much cleaner than water that enters wetlands. Water that has passed through a wetland is also of better quality because wetland vegetation absorbs and assimilates or incorporates dissolved nutrients and pollutants into its tissues, thereby removing those nutrients and pollutants from the water. Many plants native to wetlands can even convert toxic pollutants into less potent forms. Wetlands can also neutralize acid rain.

In general, wetlands act as buffers or protective cushions between harmful variables in the environment and plants, animals, humans, and habitats. Without wetlands, toxic levels of pollutants and nutrients could kill plants and animals. Because of their ability to improve water quality by filtering out sediment and debris, sequestering nutrients, and transforming pollutants, some municipalities have begun to use wetlands in sewage treatment processes. In fact, in some areas of China, wetlands are being used in lieu of conventional wastewater treatment facilities! The wetlands remove waste from the water when the plants absorb it or when it settles out.

Wetlands provide a habitat or a home for many animals and plants. Therefore, wetland ecosystems have high biodiversity, meaning that they can support lots of forms of life. Furthermore, numerous other animals depend on wetlands for one or more parts of their life cycle. Many migratory birds stop in wetlands on their way south in the winter or north in the summer; these birds depend on wetlands as a

place to rest and eat on their journey. Birds also use wetlands as a nesting place to lay their eggs and raise their young. Many fish species rely on wetlands as spawning grounds and numerous amphibians and insects reproduce and mature in swamps, marshes, vernal pools (short-lived or ephemeral wetlands) and other wetlands.

Wetland plants also play an integral role in keeping oxygen cycling through wetland ecosystems. These plants release oxygen during photosynthesis and animals, including humans, use this oxygen. Animals and humans then release carbon dioxide, which is used by the plants during photosynthesis. Wetland plants provide food for animals and nutrients that cycle through the food web, benefiting all organisms, including humans, while also attracting animals in search of food, shelter, nesting or spawning areas, or a place to hide from predators.

Another function to add to the long list of wetland benefits is that wetlands serve as recharge zones, or areas where water flows from wetlands into the ground, adding water to aquifers. An aquifer is an underground layer of substrate that holds water and allows it to percolate through. Wells tap into aquifers to provide drinking water.

On a more aesthetic level, wetlands are beneficial because they are often beautiful areas that serve as tourist attractions and vacation spots and provide recreational opportunities.

Vocabulary:

A Wetland is an area that is wet and often covered with water. In Ontario, they are classified as swamps, marshes, fens or bogs depending on the types of soil and plants they have. Wetlands are one of the most crucial ecosystems for the biodiversity of plants and animals, as well as, the overall health of the surrounding environment.

Biodiversity is the degree of variation of species over a geographic area. The word 'bio' means 'life', and 'diversity' means 'variety'. The more diversity of species (animal and plant), typically the healthier and more resilient an ecosystem.

An ecosystem is where the plants and animals are found together in a particular location. Here, all living things interact with the sun, soil, water, air, and each other in a specific way.

Procedure (What Will I Be Doing?):

1. Provide background information on the types of wetlands and the importance of wetlands (ie. how they reduce flooding, retain water, decrease erosion, buffer against and filter out nutrients and pollutants, provide habitat and nesting/spawning/reproduction grounds, offer recreational opportunities etc.)
2. Encourage students to share what they already know about wetlands, possibly by listing wetland functions in google slides or discussing their opinions on the importance of wetlands.
3. Explain the concept of a metaphor, giving an example and then soliciting examples from students.
4. Place students into pairs or groups and assign them each an item from the Wetland Metaphors list.
5. Within their pairs/groups, have students discuss how wetlands are comparable to the different objects they received. Have each pair/group present to the rest of the class.

6. Encourage students from other groups to add their interpretations of the objects after each group has finished presenting their items and metaphors.

Reflection and Extension:

1. Have students think back to their pre-activity thoughts on wetlands. After doing the activity, how do their impressions/knowledge/opinions of wetlands compare to those initial thoughts? If their opinions have changed, how and why? Allow students to share their initial and current thoughts on wetlands.
 - How are wetlands important for humans? What objects represent this?
See background section and the Wetlands Metaphors Functions List.
 - How are wetlands important to wildlife? What objects represent this?
See background section and the Wetlands Metaphors Functions List.
 - How are wetlands important to water quality? What objects represent this?
See background section and the Wetlands Metaphors Functions List.
2. Have students identify additional objects in the classroom or around their homes that could also be used as metaphors for the characteristics/functions of wetlands.

Wetland Metaphors Functions List

Object	Wetland Function Represented by Object
Antacid	Neutralizes acid. Wetland can neutralize acid rain.
Bottle of water	Source of water. Wetlands store and retain water and recharge aquifers, which, in turn, are tapped as sources of clean water.
Box of animal crackers	Biodiversity is high in wetlands. Wetlands support many different forms of life by providing necessary habitat and needs for living organisms.
House	Habitat (homes) for animal life. Wetlands provide habitat for wildlife, from mammals to migrating birds, amphibians and aquatic organisms such as fish and aquatic insects.
Coffee filter	Wetlands filter out pollutants, nutrients, sediment and debris.
Baby Cradle	Nursery that shelters, protects and provides food for young wildlife.
Duct tape	A "fix-all" for improving water quality. Just like duct tape can fix anything, wetlands help fix numerous water quality and quantity problems.
Frisbee	Recreational opportunities. People hike, bird watch, observe nature in wetlands.
Hotel	Stopping point/resting place for migratory animals, especially birds.
Paper towels	Used to soak up water, clean up a mess. Wetlands soak up excess water and help remediate pollution causes by industry, agriculture etc.
Postcard	Tourist or vacation destination. Wetlands such as the Everglades in Florida are tourist attractions.
Rice	Wetlands provide us food resources ie. rice, cranberries, fish etc.
Soap	Help keep the water clean. Wetlands sediment filtering and nutrient uptake improving water quality.
Speed Limit Sign	Slows down the flow of water through a watershed, allowing it to soak into the ground instead of washing away quickly into watercourses.
Sponge	Soaks up rainwater or floodwaters.