



The Mackenzie Valley Wetlands

A wetland is an area of land, usually close to a river, lake or ocean, that's damp or wet some or all of the time. There are many types of wetlands:

- **Ponds** can be deep, and are homes for many fish, animals and tall grasses.
- **Swamps** are fringed by grasses, shrubs and trees.
- **Marshes** are grassy and shallow, providing a safe place for fish to spawn and lay eggs.
- **Bogs or fens** are often covered over by peat and moss.

Until recently, wetlands were misunderstood. We thought of them as muddy, stinky areas filled with annoying mosquitoes, and creepy crawlies like snakes and frogs. We drained them to make room for farms, cities, towns and highways. But now we know that wetlands provide homes for hundreds of species of birds, fish and animals. Without wetlands these animals would be extinct.

The spongy, damp soil in the wetlands is also home to many species of plants and bacteria that soak up toxins and waste from water. In this way, wetlands help provide clean drinking water for animals, including humans.

> Section A) A Wetland Ecosystem in Canada

1. Can you name two species that live in the mud of a wetland?

i) _____

ii) _____





Name: _____

In the box below, draw one wetland species that lives in the mud.

2. Name two birds that live or hunt in the water of a wetland:

i) _____

ii) _____

3. Many species lay eggs in the water. Can you think of two?

i) _____

ii) _____

4. Many species build homes or nests in the wetland grasses. Name two:

i) _____

ii) _____





Name: _____

In the box below, draw one wetland species in its home or nest.

5. How are swamps and fens different?

6. _____ breed in marshes.

7. Which of the following three statements is true?

- i) Ponds make water dirty.
- ii) We drink water out of swamps.
- iii) Bogs and fens help to filter water.





Name: _____

> **Section B) The Mackenzie Valley Wetland Ecosystem**

Each wetland has its own ecosystem of animals, plants and even different types of water. The Mackenzie Valley Wetlands are unique in that they have only one amphibian, the wood frog. Unlike many other wetlands, there are no turtles or snakes. Also, the wetlands here are very delicate. Things grow slower, and therefore take longer to heal if we damage the ecosystem.

From the list of Mackenzie Valley plants and animals below, pick one you want to know more about. In groups, research your animal or plant, and present what you learned to your class. Try to be creative in how you present your species. Use pictures, maps and drawings to make your presentation interesting.

Mackenzie Valley plants and animals:

- wood frog
- crane fly
- Mackenzie Valley wolf
- canvasback duck
- nematodes
- inconnu



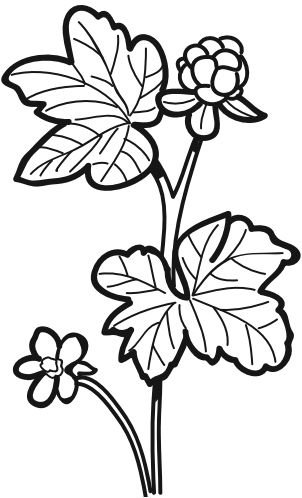


> **Section C) Living and Non-Living Resources in the Mackenzie Valley Wetlands**

1. Interactions in a Mackenzie Valley Wetland

As sunlight falls on a cloudberry on the shores of a pond, the centre of the flower warms a few degrees above the air temperature. The leaves of the cloudberry also capture the sunlight's energy and use it to make food for the plant. But, even as the leaves are making food, a tiny insect is eating the leaf for breakfast. Because the inside of the cloudberry flower is warm, a bumblebee is attracted to its centre to hang out. Nearby, the pond water is rippling from the wind that is blowing. To stay out of the wind, the bumblebee flies close to the ground and around the cattails that are growing along the water's edge. Also near the edge is a mallard's nest, very well hidden. On top of the nest is the mother, keeping her eggs warm and staying low to hide from the foxes that are out looking for a meal from a nearby hillside. High above the pond a raptor circles the wetland as he knows there are birds nesting along the shores. A goose is nibbling in the soil near the waters edge, hoping to find some roots to eat. As she is too far from her nest, the raptor swoops down, breaks her eggs, and begins to eat. The mother goose returns to her nest and frightens off the raptor, who takes the remains of an egg with him.

- Mindy Willett



Canon



Name: _____

2. Mindy Willett's short story shows us how living and non-living resources interact in the Mackenzie Valley Wetlands. Every **ecosystem** consists of both **biotic** (living) and **abiotic** (non-living) resources that interact with each other. Biotic creatures obtain all the abiotic resources they need to live and grow from their ecosystem.

- **Biotic:** Living things (includes plants and animals).
- **Abiotic:** Non-living things (like air, soil, sunlight and water).

Scientists believe that all biotic things have five things in common. They all:

- grow
- reproduce
- move
- have cells
- need food for energy

3. Re-read Mindy Willett's short story. Then, fill in the chart below, listing all the biotic and abiotic resources mentioned in the story.

Abiotic	Biotic





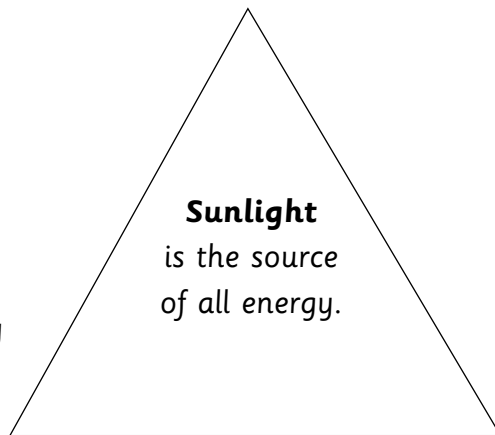
Name: _____

4. Which column did you put the egg in? Defend your answer.

> **Section D) Understanding the Cycle of Energy in the Mackenzie Valley Wetlands**

1. Energy, used by both abiotic and biotic resources, moves through an ecosystem (in this case, wetlands). Every ecosystem needs three types of biotic organisms to function: producers, consumers, and decomposers. Each uses energy in a different way.

Consumers get energy from the producers who generate it from sunlight.



Producers get energy from decomposers who recycle waste products and use it for energy.

Decomposers get energy from the waste products of consumers and producers.





Name: _____

- **Producers** – green plants that make their own food from the sunlight's energy.
- **Consumers** – animals that eat producers or other consumers to get food energy.
- **Decomposers** – living organisms, such as molds, fungi, bacteria, insects and worms that reuse and recycle food and waste to break down energy.

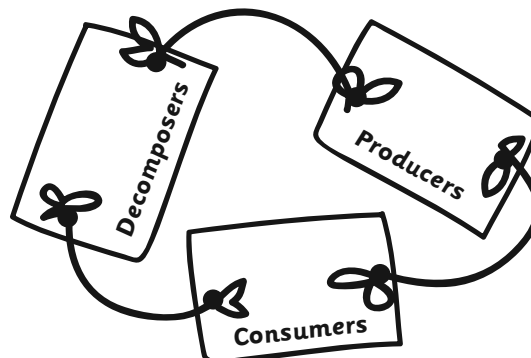
2. Producers, Consumers and Decomposers

i) Sort the biotic Mackenzie Valley wetland inhabitants listed into three groups: producers, consumers and decomposers. Write each list on the supplied cards. At the bottom of the card, add a list of abiotic resources, and explain how each group relies on them.

- | | |
|----------------|-----------------|
| • Algae | • Tundra Swan |
| • Mallard Duck | • Sphagnum Moss |
| • Fungus | • Bacteria |
| • Beaver | • Mink |
| • Bulrush | • Mosquito |
| • Cattail | • Snail |

ii) Cut out each card, and punch two holes in each card, one over each X.

iii) Next, to complete your diagram of the cycle of energy, tie the cards together with three pieces of string, as shown below.



Canon



Name: _____

Producers

X

X

Abiotics Needed:

Consumers

X

X

Abiotics Needed:





Name: _____

Decomposers

X

X

Abiotics Needed:





Name: _____

> Section E) More Ways to Generate Energy

1. Are humans producers, consumers, or decomposers?
Explain your answer:

2. Humans use more energy than any other living organisms because we use energy not just for food, but also to power our houses, our cars, and to cook our food. Can you name three sources of power we use?

i) _____ iii) _____
ii) _____

3. What kind of power runs your car?

4. What kind of power heats your stove?

5. How many kinds of power have you used today, from the time you got up this morning to now? List them, along with what you used them for.





> **Section F) Renewable vs. Nonrenewable Power Sources**

We get power from many different sources. These sources are divided into two types:

- Renewable energy comes from a source that can be replenished in a short period of time.
- Nonrenewable energy is from a source that we're using up and once used is gone.

1. In the circles beside each source of energy listed below, write an R if you think the source is renewable, and an N if you think it isn't.

- | | |
|-------------------------------------|---|
| <input type="radio"/> wind | <input type="radio"/> food oils (biodiesel) |
| <input type="radio"/> gas | <input type="radio"/> sun (solar) |
| <input type="radio"/> water (hydro) | <input type="radio"/> oil |
| <input type="radio"/> wood | <input type="radio"/> nuclear |
| <input type="radio"/> coal | <input type="radio"/> garbage (biogas) |

2. What types of energy do you think are better for the environment and why? Discuss with your class.





Answers: The Mackenzie Valley Wetlands

Section A) The Wetland Ecosystem in Canada

1. Open – Frog, turtle, worm, larva, salamander, toad, etc.
2. Open – Duck, goose, swan, tern, kingfisher, heron, crane, etc.
3. Open – Dragonfly, mosquito, fish, frogs, toads, turtles, salamander, newt, etc.
4. Open – Duck, goose, swan, turtle, mink, muskrat, heron, crane, snakes, frogs, toads, worms, snails, salamander, newt, etc.
5. A swamp is a wetland fringed by grasses, shrubs and trees. Fens are often covered over by peat and moss.
6. Fish breed in marshes.
7. C

Section C) Living and Non-Living Resources in the Mackenzie Valley Wetlands

3.

Abiotic	Biotic
Sunlight	Cloudberry
Air temperature	Leaves
Hillside	Flower
Water	Insect
Nest	Bumblebee
Wind	Raptor
Soil	Egg
Egg	Mallard

4. An egg can be both biotic and abiotic. If fertilized successfully, eggs are living.





Answers: The Mackenzie Valley Wetlands

(continued)

Section D) Understand the Cycle of Energy in the Mackenzie Valley Wetlands

2. Producers, Consumers and Decomposers

Producers

Algae	Cattail
Bulrush	Sphagnum

Producers rely on sunlight for energy. They all need water and air. Cattails and bulrushes need soil to grow.

Consumers

Mink	Tundra Swan
Mosquito	Beaver
Mallard Duck	

Consumers rely on sunlight for energy. They all need water and air. They all need soil (some directly, some indirectly). Beavers and birds need plants that grow in soil. Mosquitoes and minks feed on animals that eat plants that grow in soil. Minks burrow in the soil.

Decomposers

Bacteria	Fungus
Snail	

Decomposers need sunlight water and air to break down materials. Some live in or break down nutrients in the soil.

Section E) More Ways to Generate Energy

1. Consumers
2. Open – Possible answers: electricity, gas, oil, coal, nuclear, solar, wood, wind, water
3. Gas, diesel, or maybe electricity
4. Electricity, gas or maybe wood
5. Open – Should touch on everything from:
 - Electricity for the alarm clock, lights, and maybe toothbrush.
 - Oil, gas or electric for hot water for washing face.
 - Electricity or gas for the stove/fridge to make breakfast.
 - Gas for the car or school bus.
 - Electricity for computers, phones, lights at school.



Answers: The Mackenzie Valley Wetlands

(continued)

Section F) Renewable vs. Nonrenewable Power Sources

1. wind
 gas
 water
 wood
 coal
 food oils (biodiesel) recycled oils in scraps of meat and vegetables
 solar
 oil
 nuclear
 garbage (biogas) methane or ethanol gas fermented from garbage or vegetables

2. Class discussion.

Possible avenues for discussion:

- Fossil fuels are burned. Release carbon dioxide into the air. Cause of global warming.
- Nuclear power creates toxic wastes that take centuries to break down.
- Hydro is only accessible near bodies of water. Damming up areas can disrupt nearby ecosystems. This should be considered when deciding where to dam.
- Solar power and wind are very efficient, but can be difficult to harness and transport in areas where there is little wind or sunlight. Wind turbines can kill birds that fly into them.
- Food oils are a great way to recycle waste. They still produce emissions when burned, but much less than fossil fuels do.

Canon