

WALK ON THE WILD SIDE

Self-Guided Program

Grades K-4

Please share this kit with other teachers that are coming to the FWC with your group.

Thank you for booking the “Walk on the Wild Side” Self-Guided program at the Fort Whyte Centre.

Enclosed is your self-guided package. We have designed this package to allow you to guide your group at the Centre as well as to use in your classroom. This package is intended to provide a proper mind set, vocabulary and background without affecting the novelty of the experience. These are only suggested activities. Feel free to use any or all of these activities with your class or use your own materials.

There are many suggested discussions and activities for your program – you will not be able to complete them all. Choose the activities that are most relevant to classroom learning or choose to do some activities on a second visit. There are four sections to this program:

In this package:

- Goal and Objectives
- Curriculum Application
- Supplies to bring
- Habitat Descriptions
- Habitats at Fort Whyte
- Grade-specific Discussions, Activities and Worksheets
- Habitat-specific Discussions for each grade

GOAL

To gain an understanding of the diversity of natural systems within Manitoba by investigating plants and animals in a variety of habitats.

OBJECTIVES

Students should be able to:

1. Recognize that a diversity of habitats exist in our province
2. Name some habitats found in Manitoba
3. Describe various components of these habitats as related to specific grade curriculum outcomes (see chart below)

CURRICULUM APPLICATION

GRADE	CURRICULUM FIT	DESCRIPTION	OBJECTIVES (SLO)
K	Clusters 1 & 3	Collect tree leaves while exploring a variety of habitats and discover the diversity of trees that exists in Manitoba	<ul style="list-style-type: none"> • K-1-01, 02, 04, 06, 07 • K-3-03, 06
1	Clusters 1, 2, & 4	Use your senses to explore how living things meet their needs throughout the different seasons in a diversity of habitats	<ul style="list-style-type: none"> • 1-1-06, 07, 10 • 1-2-01 • 1-4-08, 10, 16
2	Cluster 4	Track water as it exists in a diversity of habitats and watch how it is used by plants and animals	<ul style="list-style-type: none"> • 2-4-01, 06, 07, 10, 11
3	Cluster 4	Discuss how soil changes throughout a diversity of habitats; look for evidence of this at FWC and learn about the animals that make the soil their home	<ul style="list-style-type: none"> • 3-4-01, 02, 04, 09, 10
4	Cluster 1	Examine the components of FWC many habitats and how the plants and animals are adapted to survive there	<ul style="list-style-type: none"> • 4-1-01, 02, 03, 04, 07, 14

SUPPLIES TO BRING

You group will receive a discovery kit when you arrive at the Centre for your use during the program. Other supplies that your students may want to bring are:

- ✓ clip boards
- ✓ pens/pencils
- ✓ extra paper/sketch book
- ✓ bug spray (a must!)
- ✓ long pants (we have poison ivy)
- ✓ field guides

THE DISCOVERY KIT

Upon your arrival to the Centre we ask that you present yourself to the Front Desk. Our receptionist will hand you your Discovery Kit. Your kit will aid you in making the most of your visit to the Fort Whyte Centre. Your kit will contain:

- ✓ tree slices
- ✓ dipnetting equipment including nets, buckets and insect key
- ✓ shovel
- ✓ adaptation riddle cards
- ✓ clipboards
- ✓ goldenrod gall
- ✓ footprint cards
- ✓ magnifying glasses

HABITAT DESCRIPTIONS

The following is a list of the habitats found on Fort Whyte Centre’s property. Use this information to prepare yourself and your class for your visit. This list is meant to be an overview of the different habitats and the plants and animals that live there. The plant and animal listings are not meant to be exhaustive but generally include species found in such habitats. Grade-specific discussions and activities are found in Section III and habitat specific discussions for each grade are found in the chart in Section IV. Prior to your visit choose one or several of the habitats to explore and complete any of the activities as you see fit.

GRASSLAND: Habitat recognized by a lack of trees and the presence of grass cover. Seasonal occurrence of rainfall makes conditions unsuitable for forests, but allows for luxuriant growth of grasses.

In Manitoba there are three types of grasslands:

1. **Short Grass Prairie** (with grasses shorter than knee height)
2. **Tall Grass Prairie** (with grasses five feet and up. These areas are very rare)
3. **Mixed Grass Prairie** (with grasses of varying heights)

Grassland soils have three basic layers:

1. The **Bedrock** (*parent material*) – the deepest level of soil; consists mainly of small rocks which provide drainage and are broken down over time to form soil.
2. The **Mineral Layer** (soil)– the middle layer; resembles soil in home gardens; worms, microbes and bacteria break down the organic layer while water erosion breaks down bedrock to form this soil.
3. The **Organic Layer** (*humus*) – the top layer; composed of dead grass and leaves. This material is broken down to form the mineral layer.

These soil conditions make an ideal base for grasses and small shrubs to grow. These plants, in turn, provide food and shelter for an abundance of wildlife. In addition to ground squirrels, rabbits, hares and foxes, the grassland is home to more conspicuous herbivores such as white-tailed deer and bison. The bison have an intricate connection with the grassland and its other inhabitants. They graze on grasses and help to keep dominant species from invading. Being nomadic they also kick up insects while on the move, which provide a tasty treat for Cowbirds. Ground squirrels and prairie dogs tunnel beneath the earth and help to aerate the soil. Insects also play a vital role in the grassland by pollinating wildflowers.

Animals that live here:

- | | |
|----------------------|---------------------|
| • Bison | • Swallows |
| • Goldfinch | • Cottontail Rabbit |
| • Red Fox | • Insects |
| • Boreal Chorus Frog | • White-tail Deer |
| • Ground Squirrels | • Cowbird |
| • Prairie dogs | • Jack Rabbit |

Plants that live here:

- | | |
|-------------------|-------------------------------|
| • Blue-Eyed Grass | • Sawgrass |
| • Prairie Lily | • Yellow & Purple Coneflowers |
| • Willow Trees | • Dotted Blazing Star |
| • Bluestem | • Sheep’s fescue |

- Meadow Brome
- Wheatgrass
- Prairie Crocus
- Wild Licorice

ASPEN PARKLAND: Habitat recognized by the presence of Trembling Aspen, Burr Oak, Balsam Poplar and Birch trees as well as grasses and shrubs. This area is a transition zone between grasslands and the boreal forest. Parklands are areas where trees have encroached upon grassland and over time will generally develop into forests. They often serve as wildlife corridors for animals that use several types of habitats.

Animals that live here:

- Chipmunk
- Jack Rabbit
- White-tail Deer
- Cottontail Rabbit
- Red Fox
- Groundhogs (Woodchuck)
- Frogs
- Red Squirrel
- Grey Squirrel
- Shrew
- Ground Squirrel
- Songbirds including orioles, jays, chickadees, sparrows and warbler

Plants that live here:

- Trembling aspen
- Burr oak
- Cottonwood
- Birch
- Balsam poplar
- Chokecherry
- Saskatoon
- Red-osier dogwood
- High-bush cranberry
- Golden Rod
- Wild Licorice
- Arrow-leafed Coltsfoot
- Poison Ivy
- Yarrow
- Canada Anemone
- Prairie Lily
- Clover
- Western Dock
- Fox Tail
- Wild Vetch

BOREAL FOREST: Habitat recognized by an abundance of coniferous (needle-bearing) trees including Spruce, Pine, Fir, Birch and Tamarack. Due to a relatively short growing season, trees in Manitoba do not grow to be as old as those in the rainforests of British Columbia. Boreal forests are marked by less plant life in the shrub layer. As the thick canopy does not allow much sunlight through, the few shrubs and grasses that grow in boreal habitats must be shade-tolerant species. *Snags*, standing dead trees, and *deadfall*, fallen dead trees, are prevalent throughout old growth forests and provide shelter for an abundance of wildlife throughout the seasons. Snags also provide ideal perching sites for hunting birds of prey.

Animals that live here:

- Black Bear*
- Hawk
- Shrew
- Boreal Chorus Frog
- Moose*
- Skunk
- Chipmunk
- Owl
- Songbirds
- Cottontail Rabbit
- Raccoon
- White-tail Deer

- Eagle
- Red-Back Vole
- Wolf*
- Grey Squirrel
- Red Squirrel

* Animals that live in Boreal Forests but are **not found at Fort Whyte Centre**

Plants that live here:

- White spruce
- Black spruce
- Jack pine
- Balsam fir
- Tamarack
- Birch
- Currant
- Blueberry
- Labrador tea
- Juniper

AQUATIC/LAKE SHORE: Habitat recognized by the presence of a lake. Lakes are bodies of fresh water over 2 meters deep, completely surrounded by land. Generally there is a current or fast flow of water. Lakes are home to an abundance of animals including crayfish, snails, aquatic insects and the larvae of many land-dwelling insects, as well as several fish species. All these aquatic animals in turn provide an abundance of food for birds of prey and shorebirds such as sandpipers, gulls, and herons.

Animals that live here:

- Arctic Char
- Eagle
- Gulls
- Aquatic Insects
- Grebes
- Snails
- Beaver*
- Muskrat
- Small & Large Mouth Bass
- Blue Heron
- Northern Pike
- Walleye
- Channel Catfish
- Otter*
- Yellow Perch
- Cormorant
- Raccoon
- Crayfish
- Rainbow Trout

* Animals that live in Manitoba Lakeshore habitats but are **not found at Fort Whyte Centre**

WETLAND: Habitat recognized by fresh water, no more than 2 metres deep with very slow flow, surrounded by land. The water is often stagnant and marked by an abundance of aquatic plant growth such as cattails, willows and duckweed, and aquatic insects. Examples of wetlands include swamps, marshes, bogs, ponds, ditches, and puddles. The difference between a swamp and a marsh is that a swamp has trees growing in it but a marsh does not. Marshes on the other hand have an abundance of Cattails. Wetlands are known as “the kidneys of the Earth”, as they naturally filter water in much the same way that our kidneys filter our blood. Fast moving water flows into wetlands where the water is slowed down by Cattails and aquatic plants. The sediment settles out and eventually the water leaves the wetland cleaner than it entered. Wetlands also provide excellent habitat for nesting waterfowl and songbirds, amphibians and reptiles. Amphibians such as frogs require standing water in order to reproduce and the tadpoles that hatch from their eggs are completely dependant on water to survive.

Animals that live here:

- Aquatic Insects
- Leeches
- Snails
- Beaver*

- Moose*
- Coot
- Muskrat
- Tadpoles
- Waterfowl including ducks and geese
- Otter*
- Western Painted Turtle
- Frogs
- Red-winged Black Bird
- Yellow-headed Black Bird

* Animals that live in Manitoba wetlands but are **not found at Fort Whyte Centre**

Plants that live here:

- Bladderwort
- Hornwort Coontail
- Willow Trees
- Cattails
- Marsh Marigold
- Duck Weed
- Sedges
- Rushes
- Silverweed

HABITATS AT FORT WHYTE CENTRE

Once you have selected the habitats you wish to focus on, use this site-specific information on Fort Whyte Centre’s habitats to prepare the students for what they will see on your visit. This information can be used prior to the visit, or read to your students as an introduction when you arrive in the area. Use the map provided in the visitor guide to find each habitat during your visit.

GRASSLAND: This area includes the bison enclosure and the areas adjacent to it along the Carolyn Sifton Trail (refer to map in Visitor Guide).

This is a great place to look for wildflowers including Blue-eyed grass, yellow Lady Slippers, Pale Comandra, Canada Anemone, Goldenrods, Silverweed, wild Rose and Gentians. Watch for birds and butterflies flying in and around this area. The bird houses along the bison enclosure are home to swallows and sparrows. Keep your eye to the sky and watch for soaring raptors such as Red-tailed hawks, Ospreys and Peregrine falcons among others.

The trail rises a total of 12 feet to the top of the bison viewing mound. From there you can see the 80 acre grassland. The enclosure is divided into two pastures to facilitate rotational grazing. Each pasture is equipped with a watering hole, bison mounds and rubbing stones. Bison will stand atop the mounds for wind-removal of pesky flies and insects. Bison rubbing stones will be used in the spring as each animal sheds its heavy winter coat. The grassland is not a native prairie – it has been planted with pasture grasses that include meadow bromes, wheatgrasses and fescues. The grasses provide the bison with all of their feed in the summer, but they are supplemented with alfalfa pellets in the winter when the grass is less accessible. Visitors will see approximately 27 bison in the enclosure. The animals range in age from calves, born at the Centre this spring, to 11 year old bulls. Often, White-tail Deer can be seen within the enclosure as well.

ASPEN PARKLAND: Most of the property is Aspen Parkland forest. You can find forest to walk through along the Carolyn Sifton Trail, Forest Song Trail and Wetland Boardwalk Trail.

The Aspen Parkland is a transition zone between the grassland and boreal forest areas. There are many species of grasses, shrubs and wildflowers growing in this area. There is an abundance of wildlife in

this small area, including squirrels, birds, voles, deer etc., and many signs to indicate wildlife travel through it to get to grasslands or forested regions.

Dead and dying trees support a great diversity of life. Look for standing *snags* in FWC's forest. Woodpeckers take the holes and nest in them. Wood Ducks, Mergansers, and Chickadees also nest in these places. Red squirrels prefer a cozy tree cavity to bear their litters. Some species of bats take shelter and hibernate in tree cavities. Owls also use these holes as nurseries.

People often think dead trees are ugly or dangerous, and we tend to cut them down and remove them as quickly as possible. Think of the consequences for the animals that depend on these trees.

Dead wood and leaves also support a whole different segment of the forest's population: the **decomposers**. These are the animals, plants, bacteria, and fungi that eat dead material. They recycle forest resources into soil. Without these decomposers, the forest would quickly fill up with fallen trees and leaves.

Various species of **fungi (mushrooms)** make an appearance in the form of fruiting bodies. Fungi are an odd mix of plant and animal, having characteristics of each kingdom. They feed themselves by secreting a digestive fluid which liquefies their meal, which they then reabsorb. They are the primary decomposers of plant material.

The bird feeding station is an excellent place to observe the variety of animals that thrive in an aspen parkland forest.

AQUATIC/LAKE SHORE: These areas can be found along any of the lake shorelines (refer to map in Visitor Guide)

The lakes at FWC were dug by the Canada Cement Company for clay extraction in the early 1900s, and have since filled in with rainwater and snow melt to create ideal habitat for aquatic life. FWC's lakes were stocked with Pike (Jackfish), Walleye (Pickerel), Bass, Rainbow Trout, Perch, Catfish, and Char.

Fish Characteristics:

1. Fish are ectothermic ("cold-blooded") vertebrates.
2. They are purely aquatic, using gills to breathe.
3. Most fish have scales; a few have lost their scales entirely.
4. Fish have fins rather than limbs.
5. Fish lay eggs.

Fish are the largest group of vertebrates. Some use a swim bladder (see the walleye model) to control their buoyancy. Fish scales grow by adding rings around the outside. Like rings in a tree trunk, these can be used to tell the age of the fish.

A fish's body is designed to move through water, which is much denser than air. Movement is made easier by smooth scales and a covering of mucus (slime) over the entire body. This mucus layer also protects the fish from fungi, bacteria and other parasites. Steering and balance are controlled by a

number of fins; dorsal (top), pectoral (frontal and side), pelvic (frontal and bottom), anal (back and bottom), and caudal (tail). The size and shape of these fins help to identify species.

At least 84 different species of freshwater fish are known to live in Manitoba. The two aquariums at Fort Whyte contain a sampling of Manitoba's freshwater fish. The actual species may vary - not all fish on the wall chart will be in the aquariums. There are also minnows in the marsh, swamp and ponds. Perch, Bass, Walleye, Northern Pike (Jack fish), Arctic Grayling, Trout and Carp live in the four lakes.

In winter fish remain active. However, being cold-blooded, the colder temperature of their surroundings slows down their activity. Their feeding may decrease substantially.

WETLAND: The swamps and marshes can be viewed from the boardwalks along the Wetland Boardwalk Trail. The ponds can be visited along the Waterfowl Garden Trail (refer to map in Visitor Guide).

All wetlands at Fort Whyte Centre were designed and constructed by the Centre, on a reclaimed industrial site. The wetlands are connected to one another and the water flows from them into the lakes. Examples of wetlands found on the property include swamps, marshes, ponds and occasionally puddles.

GRADE-SPECIFIC DISCUSSIONS & ACTIVITIES

KINDERGARTEN

This program is designed to meet outcomes in Cluster 1 on Trees and Cluster 3 on Paper.

1. In the first habitat you visit, find a tree and use it as an example to review the parts of a tree (*trunk, branch, leaf, needle, bark, root, seed*). Make sure you visit both *leaf-droppers* (deciduous trees) and *leaf-keepers* (evergreen trees). Have the students “Make Friends with a Tree”. They can talk to the tree and compare their body parts to the tree’s “body parts”. Be sure to give your new friend a hug! Use the “Tree Cookies” provided to show the students how to figure out how old a tree is. The thick, paler part of the ring shows when the tree grew in the spring/summer. The thin dark ring shows when the tree slept over the winter. Therefore, to figure out the age, simply count either the dark or light rings.
2. **“Be a Tree”**. Have the children stand with their branches (arms) stretched out and act out what happens to trees through the seasons.... “It’s winter and our tree is sleeping (snore loudly, with clasped hands under chin). It’s getting warmer now, the sun is shining and it feels so good on the tree (hold out your arms and look up to the sun). Then the ice in the ground starts to melt! Our tree can take up some water with its roots (wiggle your toes). And that water goes all the way up the trunk (wiggle your hips) and to the buds (hold out your clenched fists). And the water and the sun help our tree until one day the leaves come out (one, two, three, pop! and open your hands). It’s summer and our tree drinks up lots of water and waves happily in the wind (wave arms back and forth). But then it gets cold again and our tree starts taking in less water and it’s time for our leaves to drop (shake your hands). And eventually we go back to sleep for the winter (snore loudly, with clasped hands under chin)”.
3. As you move throughout the habitats, explain the changes that take place in trees throughout the seasons, and how *leaf-keepers* and *leaf-droppers* are different.
4. Give the students examples of how animals use trees. They use them to make their homes, for shelter during storms, for protection from predators, and for food. Ask the students what humans use trees for. We need trees for building materials and to make paper. What do we use paper products for in our lives? Writing paper, newspaper, magazines, paper towel, kleenex, toilet paper, etc. We also use trees for shade and recreation.
5. As you visit each of the habitats, collect leaves from different trees. Back at school the students can make drawings of the trees they saw at FWC, or use the collected leaves to make tracings or impressions. Place the leaf under a piece of paper and using a pencil or crayon color over top of it; the shape of the leaf will appear on the paper. You may also choose to make a collage or display of the leaves.
6. Refer to the chart in Section IV for habitat specific discussions.

GRADE 1

This program is designed to meet outcomes in Cluster 1 on Needs of Living Things, Cluster 2 on The Senses and Cluster 4 on Daily & Seasonal Changes.

1. At the beginning of your visit, pass out the clipboards with the Sensory Observation Sheets. At some point have the students sit down and draw what they are seeing, hearing, smelling, and touching throughout the hike. If your visit is during the winter season, this can be completed back at school.
2. In each habitat discuss how the plants and animals are meeting needs such as obtaining food and water, and building shelters. Explain how these needs are met in different seasons. In the fall animals prepare for the winter by gathering and storing food (squirrels), eating more to fatten up for winter (deer) and migrating to warmer areas (waterfowl). In the winter animals are hibernating in shelters (frogs and turtles), using snow as a water source (birds), and hunting for food. In the spring most animals are having their babies – now they have to find food and shelter for their young too. The summer is spent raising the young and beginning preparations for the fall. For example, ducks *molt*. They lose their feathers and grow new ones for the fall migration. Be sure to include seasonal changes in plants as well. Plants and grasses die in the fall and new ones grow in the spring when water and sunlight are plentiful. *Leaf-droppers* (deciduous trees) lose their leaves because there is no water for them to drink – it is all frozen.
3. Have the students explain how humans meet their needs. Is it very different from the animals? Yes!
4. Refer to the chart in Section IV for habitat specific discussions.

GRADE 2

This program is designed to meet outcomes in Cluster 4 on Water in the Environment

1. Read the following to the students:

“Today we will be going on an Incredible Journey as we travel through many different types of habitats. I need you to use your imaginations and pretend that you are a drop of water. You have already traveled many miles in the water cycle to be here, through lakes and rivers, across oceans and in clouds throughout the sky. On your journey today you will see how important water is in the environment and how plants, animals and people use water in their lives.”

2. Review the water cycle with the students. You can do it story-style. “This water molecule will start its journey in a lake at the FWC. S/He is joined to millions of other water molecules in the lake. The water is in the *liquid state*. The sun is like the engine that drives the hydrologic cycle. What happens to water that is heated? It *evaporates*. This means that water *changes state* from a liquid to a gas. (Heating = Hyperactive molecules = Evaporation). So our water molecule is evaporated and bouncing around up in the sky - it’s pretty hyper too! But the atmosphere is cooling down and the water molecule is starting to slow down (Cooling = Calm molecules = Condensation). S/He is starting to see more water molecules too and then s/he realizes - s/he’s in a cloud. All the water molecules are joining together. As the gaseous water slows down and becomes cool due to the temperature of the air, it turns into its *liquid state* - this is called *condensation*. We can see condensation in the sky as clouds. We can also see condensation on windows in winter, on the sides of cool drinks, and when we open the freezer and see fog (that’s just like a cloud). As more water vapour joins the cloud, the drops of water become larger and larger. Soon they will be large enough for gravity to pull them out of the sky. This is called *precipitation* and it can take many forms including: rain, snow, hail and sleet. In the winter, this liquid water may be in the *solid state* as snow or ice. This sums up the *Hydrologic Cycle* (hydro meaning water) or the Water Cycle because water is continuously going around in a circle like the tire on your bicycle! Water is not really created or destroyed - it is just recycled. It moves all around the world by clouds, glaciers, rivers, plants and animals. The hydrologic cycle is the cycle of evaporation and condensation that controls the distribution of Earth's water. It is the continuous circulation of water between the earth and the atmosphere.
3. During the hike, point out the ways in which water exists in the environment. You can see lakes, streams, ponds, puddles, clouds, swamps, marshes, dew, and bison watering holes. Discuss how the plants and animals are using the water for drinking, bathing, shelter, and to find food. Be sure to use some examples of animals that never leave the water (fish, tadpoles, snails, leeches, etc.). Water is still used in the winter, only it is in the frozen state. Frogs and turtles hibernate below the ice, birds eat snow, and animals use snow as insulation for shelter from cold conditions.
4. At some point during your hike, pass out the clipboards with the Water Match Sheets. Have the students cross off the correct squares as they match them with water in the environment. If you choose you can have the students play it “Bingo” style.
5. Refer to the chart in Section IV for habitat specific discussions.

GRADE 3

This program is designed to meet outcomes in Cluster 4 on Soil in the Environment

1. As you visit each habitat, use the shovel provided to sample the soil in the different habitats. Have the students look for distinguishable layers (if there are any), leaves, rocks, color, texture and any animals living in the soil. Help them to list various components within the sample. Look for *clay*, *sand*, *pebbles*, *organic matter*, *humus*, *rocks*, etc. Be sure to point out that the *litter* on top of the ground is part of the soil. Distribute the clipboards with Soil Sample Data Chart and have the students record their observations.
2. Throughout the hike have the students act as “Footprint Detectives”, by searching the soil for animal footprints. In the winter they can look for prints in the snow. Use the cards provided to figure out what animal made them.
3. Animals also live underneath the soil. Some of the animals that make the soil their home include ground squirrels, worms, centipedes, and microscopic organisms. These animals are an important component to the soil as they help to aerate the soil, and break down *parent material* and *humus* to form soil.
4. While Fort Whyte Centre’s soil does not change drastically from habitat to habitat, feel free to discuss how soil quality differs in different areas. For example, forest and wetland soils are generally more moist than grassland soil. Also include how these differences affect the plants growing there and therefore how humans use the habitats. Grassland grasses and plants are very well adapted to drier conditions and the soil quality provides excellent conditions for growing crops.
5. Have the students brainstorm ways of returning organic matter to the soil. This can be done by spreading manure on fields, or using fertilizer. Fertilizer however has negative impacts on the environment. A much better method would be to compost. Composting is nature’s way of recycling. Anything that once lived will decompose and become part of the Earth. Composting is a natural process in which organic materials (kitchen and yard wastes) are broken down to produce nutrient-rich soil.
6. Refer to the chart in Section IV for habitat specific discussions.

GRADE 4

This program is designed to meet outcomes in Cluster 1 on Habitats and Communities.





1. Begin by explaining that a *habitat* is a place where a plant or animal lives. It does not include only their homes, but all the area surrounding it that they use. For example, ask the students, “Is a beaver lodge a beaver’s habitat?”. No, it is the beaver’s shelter, a wetland is a beaver’s habitat. Discuss with the students what their habitat includes (school, home, friends’ homes, the grocery store, the shopping mall, etc.). A habitat provides 5 essential things that all living things need in order to survive: food, water, shelter, air and space (plants also require sunlight for photosynthesis).
2. An *adaptation* is anything that a plant or an animal has or does to help it **survive** in its habitat. Help the students to understand that there are two types of adaptations. *Physical* or *structural adaptations* which include anything that a plant or animal has on its body that helps it to survive and *behavioural adaptations* which include anything an animal does to survive in its habitat. Examples of physical adaptations include long roots, webbed feet, fur, feathers, camouflage, specialized teeth, claws, etc. Behavioral adaptations include hibernation, migration, hunting strategies, etc.
3. Include a discussion on how human changes to habitats effects the plants and animals that live there. For example, “if we decided to drain our lakes and build a shopping mall what would happen to all the things that live there?” The animals would either die, move or adapt. Plants however, cannot get up and walk away, so they would either die or adapt. The problem is that human impacts generally happen so quickly that plants and animals do not have time to adapt. Adaptations are very special and can take thousands, even millions of years to occur.
4. Use the “Insect Gall” provided to demonstrate a behavioural adaptation of insects. Ask the students, “Do we see insects in the winter?” No! “What happens to them?” Most of them die. “So why are there still insects every summer?” Because the larvae survive in galls. In the fall, adult insects lay their eggs on tree branches and plants. The plant reacts to the egg in the same way that we react to a mosquito bite...they get a big bump. The eggs hatch inside, the larvae survive by eating the plant material throughout the winter and in the spring they will emerge. Galls are similar to cocoons which the students are likely familiar with.
5. Distribute the clipboards with the Critter “Rap” Sheets. The students can use these to record the plants and animals seen in each habitat, as well as the adaptations that help them to survive. As you visit each habitat choose one of the corresponding riddle cards to read to the students.
6. Refer to the chart in Section IV for habitat specific discussions.

ANIMAL ADAPTATIONS

ANIMAL	PHYSICAL	BEHAVIORAL
Deer	<ul style="list-style-type: none"> • Thicker fur to keep warm in winter • Skinny legs make travelling through snow easier • White-tail for communication 	<ul style="list-style-type: none"> • Walk in single file to conserve energy • Rest in sheltered areas
Fish	<ul style="list-style-type: none"> • Streamlined • Camouflaged • Dorsal Spines 	<ul style="list-style-type: none"> • Slow down to save energy • School = protection from predators
Bison	<ul style="list-style-type: none"> • Thick fur to keep warm • Broad noses for digging through snow 	<ul style="list-style-type: none"> • Use nose to dig through snow for grass
Bees	<ul style="list-style-type: none"> • Black and yellow striping indicate to predators to stay away • Stinger for defense 	<ul style="list-style-type: none"> • Store food in the hive for winter • Cluster: clump and buzz to keep the queen warm
Voles	<ul style="list-style-type: none"> • Fur to keep them warm 	<ul style="list-style-type: none"> • Build tunnels under the pukak layer of snow which acts as insulation and protection from predators
Muskrats and Beavers	<ul style="list-style-type: none"> • Thick 2-layered fur to keep warm • Oil secreted from a gland that waterproofs the fur • Webbed feet • Beaver tail = communication 	<ul style="list-style-type: none"> • Build shelters where they remain during extremely cold conditions • Muskrats chew holes into the ice, plugging them with weeds to make domes called push ups where they stop to breathe
Mink	<ul style="list-style-type: none"> • Fur to keep them warm 	<ul style="list-style-type: none"> • Retreat to dens in rock piles, tree roots, & logs; on occasion they will use an abandoned beaver or muskrat lodge
Snowshoe Hare	<ul style="list-style-type: none"> • Large ears give them a keen sense of hearing – they are rarely surprised by predators • Large, flat, fur-covered feet allow them to move fleetly over the snow • Decreased daylight hours stimulates fur to change to white, keeping them camouflaged and warm; white hair is hollow to trap body heat 	<ul style="list-style-type: none"> • Communicate danger to others by drumming with their hind feet
Cottontail Rabbit	<ul style="list-style-type: none"> • Cottontails do NOT change color...they remain brown, reflecting their more southern distribution where they would blend in with tree stumps 	<ul style="list-style-type: none"> • Exhibit coprophagy: feces eating as an alternative energy source • Den up for very cold weather in logs, under tree roots, etc.
Turtle	<ul style="list-style-type: none"> • Camouflaged • Webbed feet • Shell for protection 	<ul style="list-style-type: none"> • Bask in the sun to absorb heat • Hibernate in winter
Frog	<ul style="list-style-type: none"> • Camouflaged • Webbed Feet • Breathe through skin 	<ul style="list-style-type: none"> • Hibernate in winter
Lynx	<ul style="list-style-type: none"> • Long legs, fur-covered foot pads, and claws make for efficient movement over snow and across slippery surfaces 	<ul style="list-style-type: none"> • To ensure good footing back paws are placed exactly on the front paw prints

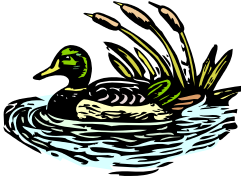



GRADE 1: SENSORY OBSERVATION SHEET

Taken from Project Wet Curriculum & Activity Guide, 1995

Sights	Smells
	
Touch	Sounds
	

GRADE 2: WATER MATCH CARDS

THESE ARE DIFFERENT WAYS IN WHICH WATER EXISTS IN THE ENVIRONMENT.
CROSS OFF EACH ONE WHEN YOU SEE THEM.

 <p>MARSH (Liquid or Solid)</p>	 <p>RAIN (Liquid)</p>	 <p>POND (Liquid or Solid)</p>
 <p>LAKE (Liquid or Solid)</p>	 <p>FOG (Liquid)</p>	 <p>CLOUD (Liquid)</p>
 <p>SNOWFLAKE (Solid)</p>	 <p>WILD CARD</p>	 <p>ICE (Solid)</p>
<p>AIR (Gas)</p>	 <p>SWAMP (Liquid or Solid)</p>	 <p>WAVE (Liquid)</p>
 <p>BREATH (Gas→Liquid)</p>	 <p>STREAM (Liquid or Solid)</p>	 <p>PUDDLE (Liquid)</p>

BACKGROUND INFORMATION

1. WETLANDS

After rain forests, wetland habitats have the greatest biodiversity. Marshes and swamps are very productive habitats, capable of amassing 10 tonnes of organic matter (animal and plant life) for every one acre.

Why do wetlands smell like rotten eggs sometimes? Wetland soil is waterlogged and often heavily sedimented, and therefore contains very little oxygen. Millions of different **bacteria** live in wetlands, feeding on the waste left by animals and plants, as well as each other. These single celled organisms cannot always find enough oxygen to breathe, so instead some switch over to breathing sulfates. The waste product they "exhale" includes **sulfides**, the rotten egg smell we all know.

Wetland biodiversity is one of the richest, in part, because of the vast number of waterfowl species the habitat supports. Ducks can be divided loosely into two structural/behavioural groups:

Divers- Canvasbacks, Redheads, Scaups, Goldeneyes and Buffleheads are included in this group. Their legs are further back on the body to facilitate diving. They generally feed on plants and invertebrates deeper in the water column, further from the shore. To take off, they must run and patter across the water to gain momentum and lift.

Dabblers- Mallards, Wood Ducks, Gadwalls, Widgeons, Teals and Pintails all belong to this group. Their legs are more central on the body. To feed, they tip upside down, with their behinds poking up into the air. They forage closer to shore and among vegetation, in shallower water. Unlike the divers, they can take off simply by jumping upwards.

Note the conifers in the waterfowl gardens. Evergreens are specifically designed for dry conditions. They have small needle-like leaves with a waxy covering to protect from water loss. They breathe through their leaves via small pores (stomata), and can close them during hot dry periods to slow evaporation.

Some conifers prefer to live in boggy or moist soil, like Black Spruce, Tamarack, and Balsam Fir. Why would these plants still need water conservation structures? The majority of conifers have a northern and/or alpine distribution. The long, cold winters in these climate zones lock water up in solid a phase for six or seven months a year, creating desert-like conditions for plants.

2. HOW TO DIPNET

Take your group to a dipnetting background as indicated on the map. Have them find a partner. Remove **one bucket** and **one dipnet** from your bag.

1. Fill the little bowl with water from the wetland.
2. Dip the net in the water swishing it back and forth a few times.
3. Pull the net out of the water and IMMEDIATELY turn it upside-down over the water filled bowl.

4. Poke the net through like an inside-out sock into the water.
5. Swish it around gently to rinse any small critters out.
6. Look at your catch and identify!
7. When pouring a bowl back, do so close to the water surface, and gently, as not to harm the insects inside.

You must rinse the net immediately in your water bucket. These are aquatic insects. Many of them take oxygen directly from the water. Do not drown them in air! (An effective scenario is to ask the children how they would like it if a fish netted them from the beach, pulled them underwater, and didn't put them in an air chamber).

Dispense a bowl and net to each pair of students and have fun!

3. BIODIVERSITY

Biodiversity is the variety of life on Earth, or a given part of it. There are an estimated 10-100 million different species of life on our planet, many have yet to be discovered and named.

Biodiversity has four components:

A. *Genetic Diversity*

Genes transmit characteristics to offspring. The mechanism of inheritance is influenced by natural selection. Individuals who are best adapted to a habitat and climate are selected to reproduce.

Genetic diversity ensures the stability of a population. An unfortunate example of a population of animals that has inadequate genetic diversity is the cheetah. Because there are so few cheetahs left, the population is severely inbred. Sibling and other closely related animals mate with each other. As a result, there is very little genetic variation among cheetahs. If a disease were to attack the population, it is possible that all the animals would die because they are all equally susceptible to the illness.

B. *Species Diversity*

The most familiar form of biodiversity, the variety of different species on Earth. According to some sources, the number of species lost globally every year due to human activities is 27 000. Each species has taken approximately one million years to evolve.

Life on Earth is interconnected, and different species depend on each other for survival. If we continue to cause extinction at this rate, the ecological integrity of the planet will be undermined, and entire food chains and related systems will collapse. In other words, a sort of domino-effect extinction on a mass scale will occur.

C. *Habitat Diversity*

A habitat is the natural dwelling place of a living thing. An ecosystem is a natural unit with living and non-living parts occupying a defined area living things occupy habitats in different

ways. Some animals require a lot of habitat that is unfragmented by housing developments, roads, or farmland. They become endangered or extinct when their habitat is divided into small pieces. Others require very little space to fulfill their needs.

By nature, a living thing can survive in a healthy habitat because it is adapted to do so. Organisms require their natural habitat to exist. By eliminating habitats, we eliminate species.

D. Ecological Function Diversity

Living organisms act with the purpose of supporting themselves and their offspring. Their activities often serve other species.

example 1: fungi feed off the sap of tree roots while providing the tree with precious nitrogen

example 2: bees collect pollen and nectar from plants, in turn, pollinating the plants

example 3: invertebrates and bacteria break down dead plant matter, in turn, creating nutrients for plants

4. PLANTS

Factors that influence the type of plants that grow in an area include:

- a) CLIMATE (rainfall, temperature, wind, sunshine)
- b) SOIL QUALITY AND TYPE
- c) drainage of soil (swamp, bog, flatland)
- d) topography (rolling, steep, flat, mountainous)
- e) existing vegetation (which may shade out other plants)
- f) altitude (height above sea level)
- g) air quality (pollutants, salt from ocean spray)
- h) water quality (acid rain, dissolved nutrients)
- i) grazing animals

Climate and soil type are the most important factors that determine the plant growth in a region.

Plants are both producers and caretakers in our environment. They play a major role in maintaining environmental quality by producing oxygen, absorbing carbon dioxide, reducing noise, preventing soil erosion, and collecting snow which later melts into water. Plants also provide us with food, clothing, shelter, wood products and are the basis of many medicines.

Plants produce their own food by a process called photosynthesis, a series of chemical reactions that results in sugar production and food for the plant. This requires carbon dioxide, light and water. Air provides the carbon dioxide, as well as oxygen for respiration. Light from the sun provides the energy for the chemical reactions. Water is essential in photosynthesis and is also used to transport nutrients from the soil and through the plant itself. A bit of plant trivia - plants do use oxygen as well as carbon dioxide; they just produce more oxygen than they use.

Moss

Mosses belong to the family of primitive plants that also include the liverworts. These life forms thrive in damp conditions, and are found readily in wetland habitats, forest floors, and around waterfalls. There are about 20 000 species of mosses.

Perhaps the most notable thing about moss is that it is the main constituent of peat. Peat bogs, particularly like those in Ireland and Denmark, are formed by massive blankets of Sphagnum moss. As the old moss dies, the next generation grows directly on the corpses of the dead and dying. In this manner, year after year, layers of spongy dead moss accumulate to several metres thick, while a sinister new layer greens the surface. What is particularly dangerous is that this moss conceals water. An unsuspecting hiker, thinking that the ground is solid, would fall through the soft mat into dark, brackish waters, only to be smothered by the waterlogged dead layer of Sphagnum. What is equally fascinating is that the moss makes the water slightly acidic due to its extremely slow decomposition process. Bodies trapped in the bog do not rot- they are mummified by the singular qualities of the water.

Fungi

The **fungi** ("fun-guy") include mushrooms, but also a startling diversity of other forms as well. From creeping slime-molds to red toadstools to the fuzz on old bread, this group of organisms is a constant source of discovery. Fungi share characteristics from both the animal and plant kingdom. They contain cellulose, a substance found in true plants, but they also contain **chitin**, a compound present in insect exoskeletons.

When we think of fungi, most of us automatically think of mushrooms. Mushrooms are actually the **fruiting bodies** (reproductive structures) of the organism. The body of the fungus lies underground, and consists of an extensive network of tiny thread-like filaments called **hyphae**. The collective term for all the hyphae is the **mycelium**. A single fungal body may be several kilometers long!

Fungi cannot make their own food like plants, since they have no green chlorophyll for photosynthesis. Instead, they secrete digestive enzymes onto food, and then absorb the liquefied meal. Many insects, spiders, and other invertebrates feed in this manner as well.

Many trees and plants depend on fungi to live, especially in boggy areas where nitrogen (an important plant nutrient) is scarce in the soil. Fungi can produce nitrogen from other substances present in poor soil conditions. The fungi forms a partnership (**symbiotic** relationship) with the roots of the plant. The plant absorbs essential nitrogen from the fungus, while the fungus feeds on the sap of the plant.

Lichens

Lichens ("likens") are fascinating life forms. They are a blend of two entirely different organisms that live together in harmony, or in symbiosis. Blue-green **algae** (that green stuff in the water), which produces its own food through photosynthesis, couples with **fungus** (mushrooms and family). The fungus feeds off the sugars produced by the algae. For its part, the fungus functions as a physical superstructure, holding the delicate algae in its tiny, thread-like hyphae. This protects the algae from drying out. What is especially peculiar about lichens is that they don't look anything like fungi or algae.

Lichens come in three major forms: **foliose** (leaf-like), **fruticose** (shrubby or hair-like), and **crustose** (crust-like).

5. ECOLOGY

Ecology can be defined as the study of the interactions between plants and animals and their physical environment. It is taken from the Greek word *oikos* meaning home, house or household.

Ecosystems

The study of ecosystems focuses on all the **biotic** (living) and **abiotic** (nonliving) components of the environment and the relationships that link them. Biotic components include plants, animals, bacteria, and fungi. Abiotic components include soil (soil moisture, minerals, texture, nutrients, etc), climate (sunlight, precipitation, temperature, wind, humidity), topography, and altitude.

Ecosystems are systems in which there is interaction and interdependency between living components and their immediate physical, chemical and biological environments. A *system* is a complex whole, a set of connected parts, an organized body of things. The heart is not a system, but the heart, veins, venules, arteries, arterioles, capillaries and blood make up a complete circulatory system. Similarly, the ecosystem is a complete set of interconnecting things; a complex whole. It contains all that is required to operate on its own - producers, consumers, decomposers, and all the necessary environmental factors to keep these organisms alive. Like the circulatory system, an ecosystem does not live alone, but it depends on other systems. All the world's ecosystems make up the living Earth (the biosphere).

Interdependency

Interdependency is defined as the relationships that occur between organisms and the various elements within their environment, and their reliance on each other. Food chains can be used to illustrate this concept. A food chain shows the transfer of energy in the form of food from one organism to another.

An example of a meadow food chain at Fort Whyte is:

grass → vole → shrew → weasel

An example of a marsh food chain at Fort Whyte is:

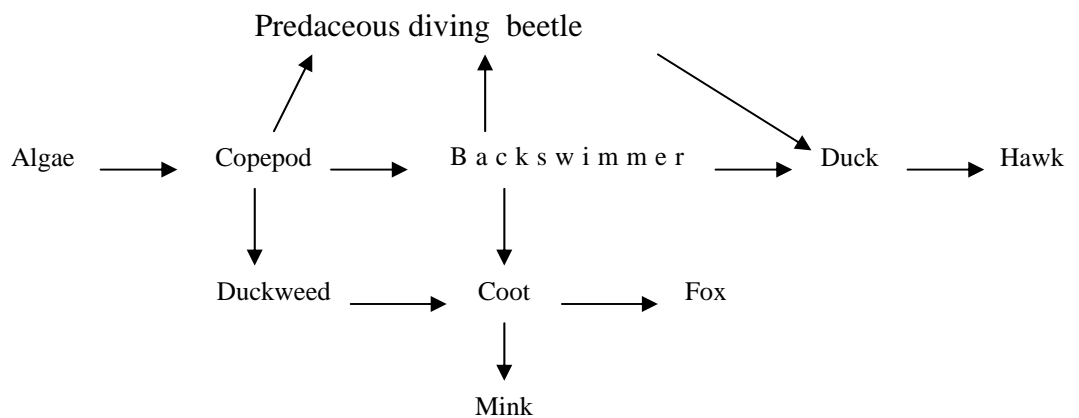
algae → copepod → backswimmer → duck → hawk

Food chains all begin with plants which produce their own food. They are called producers or autotrophs. All other living organisms either feed on plants directly or consume other organisms that do. They are called consumers or heterotrophs. Decomposers are a special type of consumer - they feed on dead matter.

An autotroph is an organism (green plant) that uses solar energy to photosynthesize food (sugar and starch) from carbon dioxide and water. Auto = self; troph = nourishment. A heterotroph is an organism that cannot manufacture its own food and must consume other animals and/or plants. hetero = different.

Each stage in the food chain is fairly specific. Some teachers prefer to show "decomposers" at the end of the food chain, but they should instead name one particular decomposer such as "carrion beetle." In the above meadow example, there would be springtails, beetles, maggots, earthworms, nematodes, bacteria, fungi, centipedes, millipedes, slugs, and many other kinds of organisms involved in decomposition. Since there are so many different species of decomposers involved in the complex process of decay and soil formation, this makes the food chain look more like a food web. If you include decomposers, then add soil and make a food loop instead, or draw a food web. Decomposers play an essential role in recycling nutrients to be reused by the green plants.

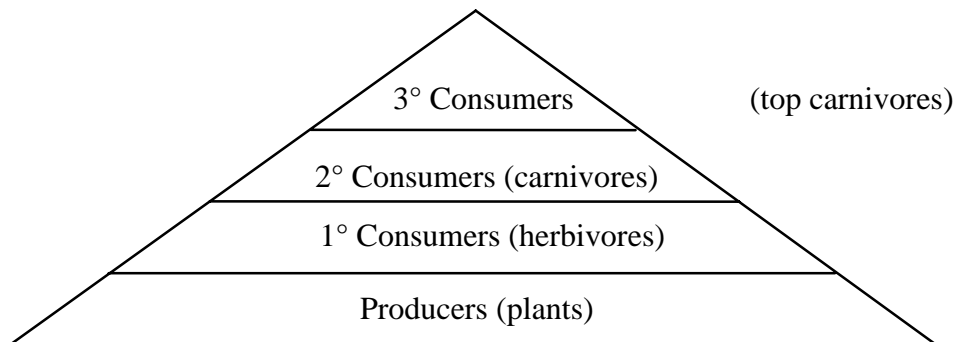
Food chains are simplified versions of what really occurs in most habitats. A food web is a complex, interlocking series of food chains which more accurately reflects the interdependencies between plants and animals. You can build on the food chain and create a web, like so:



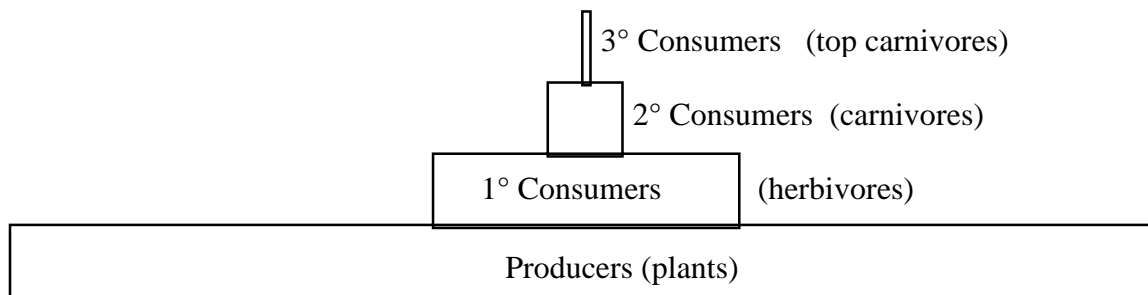
A pyramid can be used to show relative numbers, biomass (living material weight), or energy transfer within an ecosystem. At the base of the pyramid there is a very large amount of energy available in the form of plants. As this energy is transferred upwards, some is lost to heat, respiration and waste. This means there is less available energy for the next higher grouping (or trophic level) of organisms. As a result, the numbers of organisms decline as you move up the pyramid. There is not enough energy available to support a large population near the top. Imagine that the pyramid was reversed - there would be millions of owls but only two or three grass plants. There would not be enough food for one mouse for one day! The base of the pyramid - the plants - must be able to support all the other living things. Each level must support the next.

There are two ways to draw a food (or energy) pyramid. One is triangular like its namesake. The other style shows things in proportion to the amount of energy within each level. This type of pyramid better illustrates how each level has much more energy than the level above it. Also note that some animals fit into more than one category. An omnivore would be both a first and a second level consumer.

A Conventional Food Pyramid Diagram



A Proportional Food Pyramid Diagram



6. SOIL

Soil is composed of inorganic and organic components. The inorganic component is formed by the weathering of rock through erosional processes such as rain, chemical reactions, and ice, which break the rock into smaller particles. Water combines with carbon dioxide from the air and from microorganisms to form a weak acid. The action of the acid and leaching process (the dissolving and downward movement of minerals by water) continues the breakdown of the rock. As plants and animals die, they decompose and contribute organic matter to the developing soil.

Topsoil is the upper layer of soil, composed of minerals (derived from rock) and organic material (derived from dead plants and animals). The rich organic component of topsoil helps make it ideal for plant growth by:

- a) providing the necessary nutrients and
- b) increasing the soil's ability to hold water and air.

Humus is the dark, rich surface layer of soil comprised of decaying plant and animal remains that are broken down by decomposers. Soil fertility is determined by pH (degree of acidity or alkalinity), particle size, and the mineral and organic content of the soil. Most nutrients in the soil are attached to clay particles.

Some organisms enrich the soil. Legumes (peas, beans, wild licorice, clover, vetches, alfalfa) have nitrogen-fixing bacteria living on their roots. They can improve the fertility of the soil by increasing its available nitrogen. This natural method of fertilizing soil is being used by many farmers today (see the soil diorama, where the back of the left-hand field is planted with dark green lentils).

Commercial fertilizers contain phosphates, nitrogen and potassium (and sometimes sulfur) in various forms. The numbers like "16-0-0" or "10-4-6" refer to the percentages of each nutrient in a fertilizer (N-P-K-(S)). Commercial fertilizers are mostly synthetic. Potash mines provide potassium, natural gas purification provides sulfur, etc.

In nature, potassium is from the breakdown of granite and the decomposition of plants, nitrogen comes from nitrogen-fixing bacteria and from protein sources (i.e. the once-living) and phosphates are provided by rock breakdown and/or decomposed plant matter.

Soil Erosion

Soil erosion is the removal of surface soil by the actions of wind and water. Water erosion removes soil, plant nutrients and organic matter, changes the surface texture of the soil, and breaks down soil structure. In severe cases, gullies form on steeply sloping land that is most vulnerable to water erosion. Topography and precipitation are major factors in water erosion. Vegetation is very important in the prevention of erosion, since it anchors the soil and diverts the flow of water, as well as slowing the water and increasing infiltration.

Wind removes the topsoil and wears the particles down into fine powder. The degree of wind erosion depends on wind velocity, vegetative cover, soil moisture and surface roughness. Human activities that increase water and wind erosion include clearing land for farming and for timber harvest, overgrazing, poor agricultural conservation practices (see the soil diorama), and compaction (by heavy machinery).

Decomposers

Decomposers are organisms that return nutrients to the food chain by breaking down dead plant and animal matter and fecal matter. Decomposers include mites, millipedes, earthworms, bacteria, fungi, maggots, beetles, slugs, etc. Decomposers such as earthworms ingest organic matter, break it down into smaller pieces, mix it with soil, and excrete it, thus increasing the nutrient quality of the soil. In dead trees fungi, bacteria and wood-eating insects such as beetles are the first to move in. Their tunnels provide access for other insects and small animals which continue the decomposition process.

7. SUCCESSION

Succession is the orderly replacement of one community (a community is characterized by its dominant plant species) by another. Succession progresses through stages called serals, to a stable, final community called a climax community. Areas may not reach the climax stage due to interruptions by humans (clearing land for buildings and/or agriculture) or by natural events (fire, flood, drought, grazing). The meadow community is characterized by grasses as the dominant

plants. The aspen forest features aspen as the dominant plant. The oak forest is the climax stage of woodlands in this region.

Terrestrial succession, the typical progression on land, begins with grasses, followed by shrubs, ending in a climax forest (the species depends on climate and soil). In areas of low rainfall, grassland may be the climax community, as was the tall grass prairie in parts of southern Manitoba. Each plant species modifies the environment, adding and taking away nutrients, storing water, providing shade, modifying wind patterns, etc. The speed at which succession occurs depends on the growing conditions (soil, water, sunlight, grazing, temperature). And rules are made to be broken - some stages may be missed, or may appear in altered form.

Aquatic succession involves the transition of a wetland to a terrestrial community. Both aquatic and terrestrial succession can be seen at Fort Whyte.

The meadow shows evidence of ongoing succession with the encroachment of the trembling aspen towards its centre. The dominant plant species in the meadow (grasses, shrubs, wild licorice, prairie wild rose, snowberry) will eventually be taken over by aspen trees. Small, young aspens can be seen near the centre of the meadow, with the older aspen further back. The eventual climax community will be bur oak, which gradually replaces the aspen.

The marsh provides an example of aquatic succession. Surrounding the marsh are willows and cottonwood trees. These two plant species are invading the marsh, slowly causing it to become smaller. Cattail is the dominant plant species in the marsh that would be replaced by willow and cottonwood. Cattails collect soil, which settles out and allows other plants to move in. Each year, dead cattails fall into the marsh, which becomes shallower as vegetative matter collects and decays.