



PREDATOR AND PREY

Grades 4-12

2 Hours

Thank you for booking our “Predator and Prey” program at FortWhyte Alive. This program is designed to help your students learn hands-on about the ecological pyramid, food webs and the challenges that local wildlife face in order to survive.

Appropriate Dress for Your Field Trip

To ensure that students get the most out of their FortWhyte experience, we ask that they be appropriately dressed for a two-hour outdoor excursion. This program takes place outdoors, regardless of weather and ***the play area is often very muddy, especially in the spring or following rain. Shoes and pants will get wet and muddy.*** Long pants are suggested due to the possibility of coming into contact with poison ivy. Comfort and safety are key in making this an enjoyable and memorable experience.

Suggestions for Outdoor Dress

- ✓ Dress in layers
- ✓ Bring a full change of clothes to replace muddy or wet gear from the program
- ✓ Rain jacket and rain pants
- ✓ Rubber boots or old ***closed toe*** running shoes that can get wet and muddy
- ✓ **Long pants are preferable to shorts** (avoid scrapes, ticks, and **poison ivy**)
- ✓ Insect repellent and sunscreen

Remind the students that they will enjoy their time better if they are prepared.

*Please share this information with other teachers that are coming to FWA with your group.



GOAL

To understand the interactions between herbivores, omnivores and carnivores and simulate the stresses they experience during survival situations.

OBJECTIVES

Students will:

1. Experience firsthand the struggle for survival that an animal must face each day.
2. Identify a food pyramid and the predator prey relationship within it.
3. Identify at least 4 factors that can affect the size of a wildlife population.
4. Identify the 5 basic needs for survival.
5. Recognize the importance of suitable habitat to wild species.





VOCABULARY

Bioaccumulation:	The accumulation of a toxic substance at a rate faster than can be eliminated from an organism's body. Top level consumers are at risk of bioaccumulating toxins to dangerous levels, because of the presence of the toxins in their prey.
Carnivore:	An animal that eats only meat.
Ecological Pyramid:	A table that shows either the relative numbers, the biomass or the passage of energy from plants up to top predators. A food chain with additional information.
Food Chain:	Shows the relationships of who-eats-who, starting with a species that eats no other species and ending with one that is eaten by no other species.
Food Web:	Shows the relationships of who-eats-who, starting with a species that eats no other species and ending with one that is eaten by no other species.
Habitat:	A place where an animal or plant lives. The five components of a habitat are food, water, air, shelter and space.
Herbivore:	An animal that eats only plants.
Interaction:	One organism impacts another, on an individual or population basis.
Omnivore:	An animal that eats a variety of foods including plants and other animals.
Predator:	An animal that hunts and kills other animals for food.
Prey:	An animal that is hunted for food.

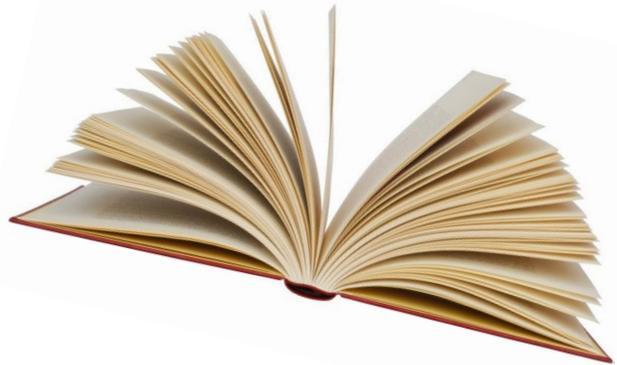




LITERATURE CONNECTIONS

All of the books listed below relate to the theme of ecology, are recommended for young adults, and are available through the Winnipeg Public Libraries and/or the Manitoba Education Instructional Resources Library. You may wish to make these titles available in your classroom surrounding your 'Predator and Prey' field trip.

Books and activities with an Indigenous perspective are indicated with a medicine wheel.



Fiction

- > **Song of the Water Boatman** by Joyce Sidman
- > **Wolf Island** by Celia Godkin
- > **Food Chain Frenzy (The Magic School Bus)** by Anne Capeci
- > **The World of Food Chains with Max Axiom, Super Scientist** by Liam O'Donnell
- > **Sparrow Girl** by Sara Pennypacker

Non-Fiction

- > **Saskatchewan and Manitoba Nature Guide** by Krista Kagume
- > **Ocean Sunlight: How Tiny Plants Feed the Seas** by Molly Bang and Penny Chisholm
- > **World of Wonder: The Food Chain** by Frank Staub
- > **Pass the Energy, Please!** by Barbara Shaw McKinney
- > **Avati: Discovering Arctic Ecology** by Mia Pelletier 
- > **A Feast for All Seasons: Traditional Native Peoples' Cuisine** by Andrew George Jr. 
- > **Animal Planet: The Most Extreme Predators** by Discovery Channel
- > **The Hunt for Food** by Anita Ganeri





PRE-VISIT ACTIVITIES

HABITAT LAP SIT (1 lesson – All Ages)

Science

In the program *Predator and Prey*, students will be involved in a simulation where they will have to survive in a particular habitat. A habitat includes five crucial elements for plants and animals alike—food, water, shelter, air, and space (sunlight may also be included for plants). In this quick game, students will see how all five parts are necessary for a strong and healthy habitat.



Have your class stand in a circle and number off students by fives as “food”, “water”, “shelter”, “air” and “space”. Have students all turn to face along the circle (front to back) and tighten the circle up until everyone is almost touching. On the count of three, have everyone sit on the lap of the person behind them. Practice a few times to represent a healthy, balanced habitat. Next, have everyone sit down but ask those in one particular category (e.g. “space”) to remove themselves. The circle will quickly topple. Repeat with other groups and discuss how living things cannot survive in a habitat unless it has all five components.

**Modified from Project WILD*

<http://cwf-fcf.org/en/explore-our-work/education/for-educators/project-wild.html>

BECOMING PREDATOR AND PREY (1-3 lessons – All Ages)

Science/Language Arts

Have your students name some of the animals that they might find at FortWhyte or elsewhere in Manitoba. Depending on their age, you may wish to have them compile a more extensive list from guidebooks or the internet. Animals could be categorized according to different regions/habitats (e.g. aquatic, boreal forest, tundra, prairie and aspen parkland). Have them decide which animals are carnivores, omnivores or herbivores (for higher grade levels discuss producers, primary, secondary & tertiary consumers).

Use the lists of animals you have compiled to review the concepts of food chains/food webs/ecological pyramids (depending upon grade level). Where does each animal fit in? Where do plants fit in? Where do humans fit in?

Have students select one local animal to research in depth. For younger grades this might include topics such as diet, habitat, adaptations, and babies. For older grades topics could extend to physiology, classification, evolutionary history, population dynamics and research being conducted on this species.





During the program *Predator and Prey*, students will take on the role of a particular local animal (carnivore, omnivore, or herbivore). Having students take on the role of an animal they have studied in depth will increase the authenticity of the game. To assign animals to research in appropriate ratios you will want to divide your class as follows:

- Carnivores (tertiary consumers):** 10-15%
- Omnivores (secondary consumers):** 25-30%
- Herbivores (primary consumers):** 55-70%

Listed below are some examples of local animals from each trophic level (not an exhaustive list):

- Carnivores:** fox, wolf, coyote, hawk, eagle
- Omnivores:** skunk, raccoon, black bear
- Herbivores:** mouse, deer, rabbit, squirrel, muskrat

Visual Arts Extension:

Have students paint, sculpt, or collage images of their animal in its natural habitat. Students could even create masks for their field trip to help them get into character for the Predator and Prey simulation.

**Please let FortWhyte know in advance if you have completed this activity so that we can modify the program accordingly.*



SURVIVAL STRATEGIES (1-3 lessons – All Ages)

Science/Language Arts





In the program *Predator and Prey* students will be involved in a food web simulation. In the role of predator or prey they will need to make decisions about how best to ensure their own survival. Listed below are some ways that different animals adapt to hunting and/or being hunted. Review these strategies with students and ask which ones they think are most effective and why. Students might even debate these strategies, suggest others and defend their choices with research they have conducted:



Predators	Prey
<p>Ambush Predators (sit and wait):</p> <p>These predators hunt by hiding and then pouncing on the prey, perhaps waiting near water stations. They depend on active prey, usually take on fairly large prey, and are less vulnerable to higher predators and humans than those predators that run around in the open seeking prey. They are energy efficient (don't spend lots of energy chasing prey), but also eat less, because they don't encounter prey as often as active seekers.</p> <p>Examples: Spiders, Northern Pike</p>	<p>Hiding/Camouflage/Crypsis:</p> <p>Prey may attempt to fool predators by becoming cryptic. These animals may have coloration that blends well with their background (camouflage), for example the females of many bird species. Others may freeze and remain quiet and still to blend in with their surroundings.</p> <p>Examples: Cottontail Rabbit, White-Tailed Deer</p>
<p>Active Seekers:</p> <p>These predators search for prey by swooping or actively looking for food. They will usually take on smaller prey, and are more vulnerable to predators/humans because they are actively moving foragers and can be spotted. Active seekers require much energy, but they catch more prey than sit and wait predators.</p> <p>Examples: Dragonflies, Foxes</p>	<p>Protection in Numbers (Herding/Flocking):</p> <p>Groups of animals living, feeding, or traveling together can escape predation in various ways. A group of animals can spot a predator more effectively than a single animal. This is called mutual vigilance. Upon attack, the group of prey animals may react by scattering, to confuse the predator; or they may even try to defend as a group, such as when a group of crows attacks an owl.</p> <p>Examples: Crows, Bison</p>
<p>Hunting Together:</p> <p>Some predators work as a group in order to capture prey. As active seekers, they will flush animals out of hiding and then proceed to chase and surround them until the prey is killed. That hunter then shares its meal with the pack.</p> <p>Examples: Wolves, Walleye</p>	

After exploring the benefits and drawbacks of the survival strategies above, take students outdoors for a game.

Silent Hunter





Prior to this activity, hide a variety of objects along a designated trail (ideally a natural space, but could also be a sidewalk or marked portion of the schoolyard). Make sure to count the total number of objects before hiding them so that you can easily retrieve them. Objects could be pencils, legos, printed out images, cards, or anything else you have handy. Hide them at a variety of levels but make sure they are all visible to students without them having to leave the trail or touch any of their surroundings.

Have students walk down the designated trail and count the number of objects they can find individually. Have them share how many each of them saw. Next, repeat the activity but have the students work together. Designate one leader to keep a tally of total objects found and have the rest of the students silently point out objects as they walk along the trail. The leader must be careful to only count each object once and to only count objects that are pointed out by other students. At the end of the trail find out how many objects the leader counted in total.

Usually, the total number of objects found will be much higher when the students work together as a team because many pairs of eyes are keener than just one. How does this play into the success of the hunting strategies listed above? An individual hunter may not spot prey as easily, but when the prey is caught the hunter will be able to eat all of it. Hunting in a pack makes spotting and killing prey easier, but food must be shared amongst many animals. How will the survival strategies of prey change based on the hunting strategies of the predators?

SINGING THE FOOD CHAIN (1-3 lessons – Elementary)

Science/Language Arts

There are many original songs written about the food chain. Links to some examples are listed below:

<https://www.youtube.com/watch?v=iWfEn8J5xKM>

<https://www.youtube.com/watch?v=VQFhd3X8p6g>

<https://www.youtube.com/watch?v=ttpNGJcpJ68>

Have students create and perform original songs about the food chain or re-create the lyrics of popular songs. As an extension, have students illustrate their songs as picture books and share them with students from younger grades.





NETTING AN AQUATIC FOOD WEB

(1-2 lessons – Elementary)

Science/Art



Net some aquatic insects from a nearby water source (a pond, ditch, marsh, or even a large puddle will do). Examine them in margarine containers using magnifying lenses, or set up an aquarium in your classroom to keep them for a longer period of observation. Identify and sketch insects from each level of the ecological pyramid (primary, secondary, and tertiary consumers). Research the fascinating adaptations and predator/prey relationships that exist in this tiny yet complete food web. An aquatic insect identification key (**Attachment #1**) and ecological pyramid (**Attachment #2**) can be found in at the end of this document.





POST-VISIT ACTIVITIES

CAMOUFLAGE GAME (Movement Break – Elementary)

Science/Physical Education

In this game students will attempt to hide from a predator (you). Define boundaries in a large outdoor area. Close your eyes and count out loud to ten while students scatter and try to hide or camouflage themselves. Open your eyes and, without moving from your place, call out the students you can see. When you have called out all the students you can see hold up a “secret number” on your hands for those who are still hiding to observe. Call out any more students you see in the process. Finally, call out the remaining students. Any students who remained hidden and were able to see the “secret number” have survived. They were able to camouflage themselves while also keeping an eye on the predator (you). This is a quick game and always a favorite with students.



EXPLORING WILDLIFE MANAGEMENT (1-3 lessons – Middle/High School)

Science/Social Studies

During the program *Predator and Prey*, students learn about the natural balance that exists between predator and prey populations within a given ecosystem. But what happens when that balance is impacted by an outside influence such as human development, disease, pollution, natural disasters, climate change, or the introduction of exotic/invasive species? Events such as these can cause populations of animals to grow or shrink in dramatic ways.

Introduce the idea of Wildlife Management to your students. What happens when humans take responsibility for managing populations of animals and how does this impact the greater environment? What are natural and unnatural causes of animal population fluctuation and how should it be handled?

Invite a biologist or resource management professional to speak to your class about the complexities of wildlife management in our city, province, and country. Issues such as hunting, disease control, management of invasive species, sustainable land development, and re-introduction of threatened species affect all Canadians and can be explored and debated by older students. Examining real case studies and current projects within our province will allow students to think critically about the value of wildlife in their own lives and extend their awareness of human/animal interactions.

Examples might include:

- > Polar Bears interactions in Churchill
- > White-Tailed Deer overpopulation in Winnipeg
- > Mosquito control in Winnipeg
- > Bison herd management in Riding Mountain National Park



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- > Woodland Caribou on the east side of Lake Winnipeg
 - > Rusty Crayfish introduction in southeastern Manitoba

FortWhyte Alive's Prairie Partners exhibit (Burrowing Owls and Prairie Dogs) is also an interesting entry point to get students thinking about the challenges of re-populating threatened or endangered species. Other resources include:

Manitoba Sustainable Development:
<http://www.gov.mb.ca/sd/wildlife/>

Government of Canada Environment and Natural Resources:
<https://www.canada.ca/en/services/environment/wildlife-plants-species.html>

For more information on natural animal population dynamics see the following activity, "Population Dynamics Lab".

POPULATION DYNAMICS LAB (1-2 lessons – Middle/High School)

Science/Math

This inquiry-based lab allows students to simulate and graph the relationship between predator and prey populations (in this case, Clerid Beetle vs. Mountain Pine Beetle). It is a very effective simulation that links directly to learning objectives in math and science.

The lab and all materials can be downloaded at:
<https://www.lessonsinfescience.org/predatorpreygamelesson>





INVESTIGATING BIOACCUMULATION (1 lesson – Middle/High School)

Science

Teach about bioaccumulation in the food chain. Have students research different substances, such as certain pesticides, industrial chemicals and pharmaceuticals that can bioaccumulate in organisms and where they come from. Communicable diseases, such as rabies, can also be passed up the food chain in a similar fashion.

Introduce the concept by using this interesting concept demonstration:

Materials:

You will need 6 small jars (representing prey) and 1 large jar (representing a predator) with lids, water, vegetable oil, and an oil-based dye. (If you can't find oil-based dye, try making your own. Grate several carrots and cover with water in a saucepan. Boil for 5-10 minutes, cool and strain. Beta-carotene (Vitamin A) is an orange dye that is fat-soluble!)

Procedure:

Begin with each small jar $\frac{3}{4}$ filled with water, and the large jar $\frac{1}{2}$ filled with equal parts water and oil. Add one drop of dye to the large jar and shake. Allow the mixture to separate, and you will see the dye partition into the oil. Then add one drop of dye to each of the small jars, and shake well. Throughout the class, have students add 5 of the small jars of coloured water to the large jar, shaking and settling each time. At the end of the class, compare the intensity of colour between the remaining small jar and the large jar. Students will see a much darker colour in the large jar. The oil-based dye has undergone "biomagnification."

INDIGENOUS LINKS (1-5 lessons – All Ages)



Social Studies

First Nations, Métis, and Inuit peoples across Canada consider the earth to be sacred and regard themselves as an integral part of the living landscape. They do not see themselves as separate from the land; they belong to the land and are at one with the plants, animals, and ancestors who inhabit it. Have students research and share traditions, stories, and practices that demonstrate this Indigenous worldview of connectedness. How is this different from the way that other communities view ecosystems and food webs? Where do humans fit into the greater picture? Invite an elder to speak to your class about Indigenous perspectives on the relationship between humans and animals. Is this perspective changing over time?



Aquatic Critters

Arachnids:
Mites and Spiders

Water Mites

1-3 mm

Wolf Spiders

2-25 mm

Annelids:
Leeches and Worms

Leeches
light or dark brown, black

5-30 mm

Earthworms
from the land

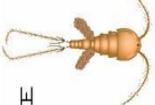

Crustaceans:
Shrimp and kin

Water Fleas

1-2 mm

Seed Shrimp

1-2 mm

Copepods

1-2 mm

Side Swimmers
clear, grey, or blue

5-15 mm

Molluscs:
Soft body, hard shell

Snails

2-25 mm



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Insects

- Dragonflies**
35 mm or smaller
Dragonfly nymph
- Damselflies**
15-25 mm
Damselfly nymph
- Mosquitoes**
Larva
Pupa
6 mm
- Phantom Midges**
Larva
Pupa
10 mm
- Springtails**
1-2 mm
- Caddisflies**
15 mm
Caddisfly larva
- Mayflies**
9 mm or smaller
Mayfly nymph
- Midges**
Red or clear
Larva
Pupa
10 mm or smaller
- Flies**
Rat-tailed Maggot
Larva
15 mm, tail can stretch 5 times longer
- Water Scorpions**
40 mm or smaller
- Giant Water Bugs**
25-50 mm or smaller
- Water Scavenger Beetles**
3-15 mm
- Whirligig Beetles**
3-10 mm
- Beetles**
- Water Boatmen**
10 mm or smaller
- True Bugs**
- Water Striders**
15 mm or smaller
- Predaceous Diving Beetles**
3-15 mm
- Predaceous Diving Beetles**
"Water Tiger"
Larva
3-15 mm
- Pygmy Backswimmers**
2-3 mm
- Backswimmers**
15 mm or smaller





Attachment #2

AQUATIC INVERTEBRATES ECOLOGICAL PYRAMID

