Amazing Mini Adventure

Conservation Discovery School Program

Ann & Sandy Cross Conservation Area

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1.0 OVERVIEW

1.1 PROGRAM SUMMARY

This day-long program investigates insects, spiders, and invertebrates found locally in the Aspen forest, prairie grassland, and a prairie pothole. Observation of characteristics and adaptations are made and games and hands-on activities are used to further explore these concepts.

1.2 CONCEPTS AND OBJECTIVES

This program will introduce students to the miniature animal world around them, and their importance to humans and all ecosystems. Working individually and in groups students will hone observation skills, characterize and describe some local invertebrates, and investigate adaptations to habitats for survival.

After participating in the program, students will be able to:

OBJECTIVES	KEY POINTS
1) Describe small animals' needs for survival, including their habitat needs, food needs, and adaptations to their environment.	Even small animals have the same basic habitat needs for survival. They need a place with food, water, and shelter. Animals are adapted to specific habitats and rely on it for survival. Insects may have structural adaptations specific to their environment for survival (e.g., gills or camouflaged coloring).
2) Compare, contrast, and classify small animals on the basis of observable characteristics.	Body form, legs, and wings are a few observable characteristics that can be used to compare or classify small organisms.
3) List ways small animals are considered helpful or harmful to humans and the environment.	All species are important to ecosystem health. Humans depend on many plants that insects pollinate. A few insects may become pests and transmit disease or damage crops.
4) Recognize that habitat preservation can help maintain small animal populations. List ways students can assist in habitat preservation.	Habitat preservation is important because all creatures need a place to live. Any habitat is a complex system made up of specific parts. By planting native species you are creating the building blocks of a local habitat and will encourage the continuation of local species, including insects.
5) Show respect for nature and living things by: a) following Area rules b) using proper capture, release, and handling techniques.	Students are encouraged to show respect for other living things by following area rules put in place to protect the animals and their homes. Care must also be taken when handling animals so as not to harm them.

1.3 CURRICULUM CONNECTIONS

How can objects, humans, and other animals move? (Kindergarten)
How can environments be explored? (Kindergarten)
How can movement of objects and animals be understood? (Grade 1)
How do plants and animals survive? (Grade 1)
How do plants and animals live and grow? (Grade 2)
How do plants and animals interact? (Grade 3)

2.0 BACKGROUND

2.1 INSECTS

Insects have been around for over 400 million years. This time has allowed them to adapt to most environments on earth (deep marine environments being the exception). It is thought that because their external skeleton keeps them from drying out that they were the first out of the water and onto the land. Insects were probably the first animals to fly. Their external skeleton limits their size and their small size makes them vulnerable to larger predators. In response to this and other factors such as a short life span insects produce extremely large numbers of offspring.

There are 22 orders of insects. Eight of these orders comprise the largest number and account for seven out of every eight species. Although insects may have various forms throughout their life cycle all adult insects have two characteristics that identify them as insects.

1. Insects have three recognizable body parts, the head, thorax, and abdomen.
2. Insects have three pairs of legs attached to the thorax, or middle body part.

Many insects also have wings attached to the thorax.

All insects go through morphological changes in their life cycle called metamorphosis. Metamorphosis may be gradual, sometimes called incomplete, or complete. Complete metamorphosis has four stages with dramatic physical changes. Adult insects lay eggs (1) that hatch into larvae (2). Larvae are often worm-like and are constantly eating and growing. After several larval molts they pupate. Pupa (3) look dormant, because they don't eat or move around, but there is a lot happening inside. What emerges from this pupal case are mature adults (4) to repeat the cycle. These different stages may not look anything like the other (e.g., butterfly and caterpillar). Gradual metamorphosis has three stages, egg, nymph and adult. These changes are not as dramatic as complete metamorphosis because the nymph usually looks quite similar to the adult insect.

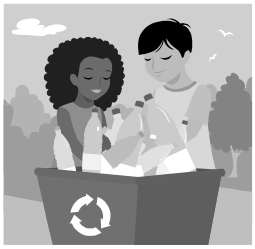
3.0 PRE-VISIT ACTIVITIES

3.1 GET INVOLVED, "TAKE ACTION"

The Ann & Sandy Cross Conservation Area is encouraging youth to take actions that will help protect wildlife and conserve their natural habitats both at the Cross Conservation Area and in their own community.

We wish all students to share their experiences and photos on our website, which could include your visit to the Cross Conservation Area or your own initiatives, from litter-free lunches, building bird boxes or replanting school yards. Let us know any ideas you have for an action plan and we would be happy to promote your successes on our website and provide you with available resources to help make your class' vision a success.

TELL US ABOUT IT



You made a difference! Let us know what actions you have taken to reduce your Eco Footprint. Send us a paragraph and a couple of pictures and your actions could be highlighted on our website to inspire others!

Send your submissions by email to: info@crossconservation.org.
Note: any pictures sent in should have media consent.

3.2 "PICK A PROJECT" DONATION

Objective

This will assist students in understanding that they can take positive action in conservation. It will also assist teachers in developing student values with respect to the environment. *** Note: This donation program is entirely optional.**

Procedure

1)Describe the Cross Conservation Area Donation and its ongoing conservation effort.

2)Tell the students you will be visiting this natural area and it is important that it be preserved for future education. Describe our Pick a Project Donation Program and ask them to Pick a Project they think they would like to financially support.

Sample projects could be: purchasing a class set of magnifying glasses, contributing funds to an ecological study on the area, or purchasing native grass seed for reclamation. Other specific projects will be discussed at the in-service prior to your visit.

3)Some fund-raising options could be:

- Have each child make a small donation ($1) to a collection
- Hold a bake sale or car wash
- Conduct a BOTTLE DRIVE, recycle and contribute to conservation at the same time!

- Sell artwork, poetry, cards made from experiences at the Cross Conservation Area.

4)For groups that find time or money to be a concern, consider a donation of a service on the visit day. For example, arranging to have the whole class help out with the area, (e.g., cleaning up after themselves before returning to school, picking up garbage on the trail, or growing some native plants in the classroom and returning to transplant them here).

5)This activity is not meant solely as a fund-raiser, but as a means to encourage students to become actively involved in a conservation effort and to enhance the area for future visits.

6)Have the students prepared to make a presentation of their donation to ASCCA staff on the visit day. This will give us a chance to personally thank the students. We will give each class a special certificate as a small token of our appreciation. If you make a donation after your visit, we will send you the certificate to your class.

3.3 HOME SWEET HABITAT?

Objective

Students will identify their own basic needs for survival (e.g., food, water, shelter, and space). They will also generalize that wildlife and other animals have the same basic needs.

Procedure

1)Ask students what they need to survive. Write the habitat words (i.e., food, water, shelter and space) on the chalkboard when they are mentioned in the discussion. Shelter and space may be a bit more difficult and need some prompting.

2)Discuss the habitat words making sure their meaning is clear.

3)Have students draw their home labeling where they find food, water, shelter, and space. Shelter may be the roof. Space might be their room, apartment, yard, or neighborhood, since space actually includes all areas used for survival.

4)Tell students that when food, water, shelter, and space go together in a special way, so that animals and people can live, it's called habitat. Habitat is a place where an organism finds what it needs to survive in a suitable arrangement. To make the point that arrangement is also important, ask the students if they could live in a home where the bathroom was 6 km north, the kitchen 20 km west and the bedroom 15 km

east? A home like that is certainly not suitable for people but it is realistic for some animals.

5)To physically show that all components are important, you might want to try "Habitat Lapsit". This game requires cooperation. Have students form a circle. Standing shoulder to shoulder have students turn so that their left hand is inside the circle. Have everyone take one small step to their left, into the circle. Tell the students they are each going to be one of the four components of habitat, and designate each student food, water, shelter, or space alternating around the circle so that every fourth person is the same. The lapsit is done by having everybody slowly bend their knees, and sitting on the lap of the person behind them. They may balance themselves by putting their hands on the shoulders of the person in front of them. Congratulate them and have them stand up. Tell them that there's been a drought and there's no more water left. All the water steps out of the circle. Without making the circle smaller does the lapsit work? Without any water animals would die. The same goes for any of the components. You can make up your own scenarios.

3.4 WHO ARE YOU?

Objective

Students will recognize various invertebrates and match juvenile and adult stages.

Procedure

1)Ask the children to bring two photographs of someone to class. One photo should be of an adult, such as a parent, and the other one of that person as an infant or child.

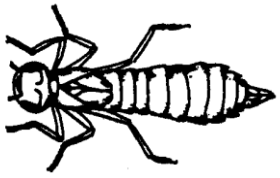
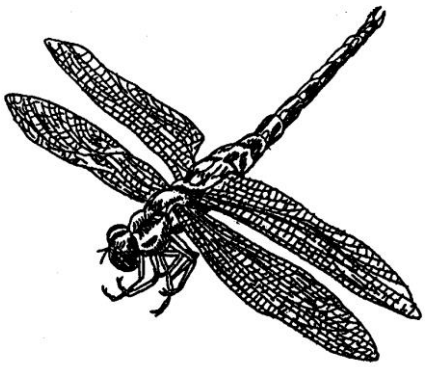
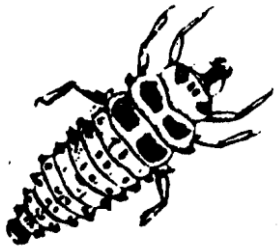
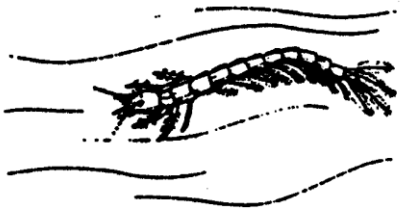
2)Divide students into small groups; assign each group a table or station. Have them place their photographs on the table and mix them randomly. Have groups switch stations and try to match the photographs into pairs. When all groups have finished have them return to their original station. Are the photos paired correctly? Discuss the difficulty or ease in pairing the photographs.

3)Introduce the idea that some animals look very different throughout their lifetime.

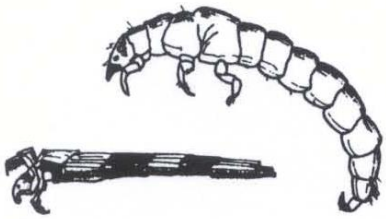
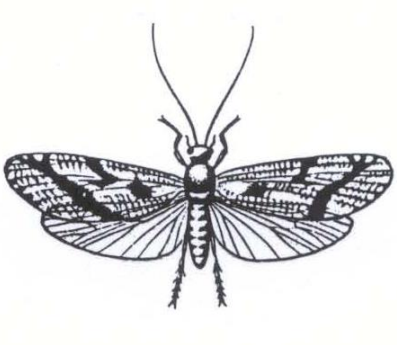
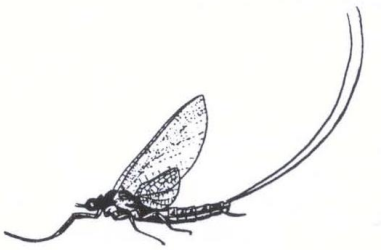
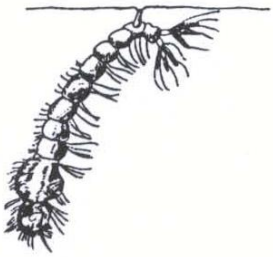
4)Introduce invertebrate cards. See the following diagrams. You may designate students adult or young, or randomly distribute cards. Have students try and find their match. You may want to put the cards on strings to hang around students necks.

5)When students have made their choices let everyone help to see if the matches are correct. Some are more difficult than others and may be confusing. Choose those you feel most comfortable with. Show the students the correct matched images.

6)Looking at the correctly matched pairs, have students look for similarities and differences. You may want to repeat this a couple of times to familiarize the students with a variety of invertebrates.

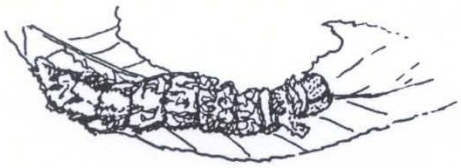
	
	
	

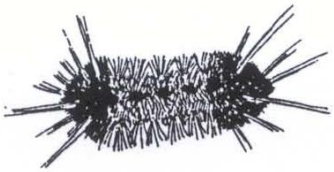
Dragonfly Nymph — Dragonfly
Ladybug Larvae — Ladybug (Ladybird Beetle)
Whirligig Larvae — Whirligig Beetle

Caddisfly Larvae
Mayfly Larvae
Mosquito Larvae

Caddisfly
Mayfly
Mosquito





White Admiral Caterpillar (Larva)
Tiger Swallow Tail Caterpillar
Black and Yellow Woolly Bear

White Admiral Butterfly
Tiger Swallow Tail Butterfly
Spotted Tussock (Tiger) Moth

3.5 KIDS CAN KEY

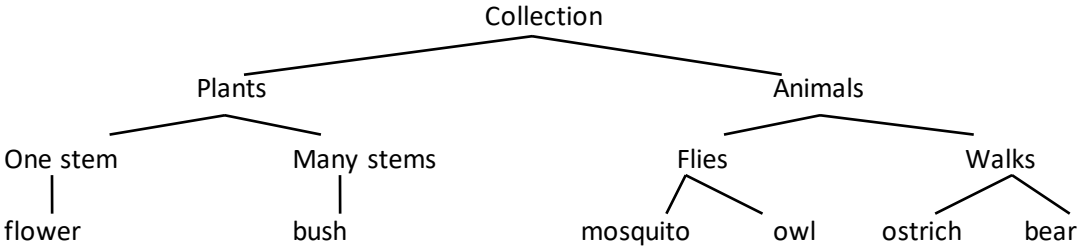
Objective

The students will understand how to identify things by using a dichotomous key.

Procedure

1) For a physically active keying activity have students each contribute one shoe and physically classify them by building a key on the floor. Let them know for any characteristic there are only two choices (e.g., the object is either green, or it isn't. If it isn't green it's something else).

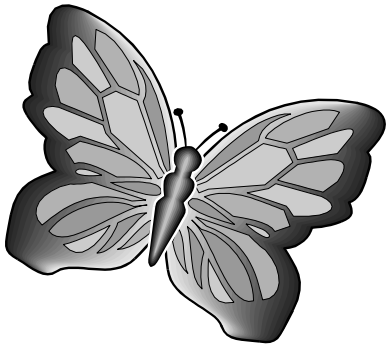
2) Have students collect pictures and photographs. Working in small groups have students use pictures of plants and animals to develop a key starting with the whole group and branching down to individual plants and animals, pasting or drawing each animal that corresponds to that branch. For example:



Allow children to make up their own distinctions (e.g., flies, walks) related to what is most important to them.

3) Have the groups share their keys with the class and discuss the different distinctions each group used. Have children consider how another culture or isolated region may use different distinctions. If you only ate plants, perhaps you wouldn't classify animals beyond dangerous and non dangerous.

OR



4.0 ON-SITE VISIT

4.1 A TYPICAL ON-SITE VISIT

9:30 a.m. Your group arrives by bus at the Cross Conservation Area.
- **Please drop off and pick up in the lower parking lot and walk up to Belvedere House.**
- Organize group in orientation area.

9:45 a.m. Orientation talk given by ASCCA staff or volunteer.
Orientation will:
- Welcome students.
- Introduce them to the Cross Conservation Area.
- Explain area rules and expected behavior.
- Introduce them to the program.
- Accept a Pick a Project donation (if applicable).

10:00 a.m. Snack and bathroom break inside. Teachers divide students into groups.

10:15 a.m. Both groups head outside with their ASCCA volunteer or staff.

12:00 p.m. Lunch break back at Belvedere House, or other designated picnic area.

12:30 p.m. Classes resume investigations.

1:50 p.m. Classes return to building for washroom break and wrap-up talk by ASCCA staff or volunteer.

2:00 p.m. Group heads back to school.

4.2 SUMMARY OF ACTIVITIES

Forests		**Ponds and Prairies**	
BAT AND MOTH	1A	MAKE A PARK	1B
SHADY SHADES	2A	POND PUZZLES	2B
SHAKE A SHRUB	3A	CAMOUFLAGE	3B
BUG SEARCH	4A		

4.3 ON-SITE PROGRAM DESCRIPTIONS

A) FORESTS

1A	Bat and Moth
ACTIVITY DESCRIPTION: Students will understand that insects are important to other animals through predator-prey relationships.	
TIME REQ'D: 15 min.	**LEADER:** ASCCA Educator
MATERIALS NEEDED: We provide: Blindfolds	
BACKGROUND: Bats use echolocation to maneuver through their world and help them locate food. Bats send out a signal, or noise, and interpret the noise as it bounces off an object and returns towards them. The sound that returns to them tells them what and where things are. Bats have fascinating (but weird looking) adaptations to make and interpret sounds. Scientists still don't fully understand how these adaptations work. Bats are nocturnal so even though bats have good sight their echolocation is beneficial. This predator prey game helps demonstrate where some insects fit into the food chain. Bats in Canada eat insects. A bat can eat up to 600 mosquitoes per hour. Bats elsewhere may eat fruit or pollinate night blooming plants (like some moths).	
DIRECTIONS: 1. Students form a circle. Choose one bat and three moths to enter the circle. The students forming the circle are the trees of the forest and should hold hands. 2. Blindfold the bat. Explain that bats hunt using echolocation. This bat will use sound to hunt. Each time the bat calls out "bat," moths must call out "moth." 3. When a moth is tagged they return to the forest. 4. Play a few rounds with different bats and moths. Change the size or shape of the forest, or the number of bats and moths to vary the game. You can also make the game more challenging by having the trees call out "tree" when the moths call out, simulating the noises that return to the bat indicating trees. 5. Ask for other examples of insect predator-prey relationships.	

2A	Shady Shades
ACTIVITY DESCRIPTION: Students will examine how color can be a beneficial adaptation for insects and/or plants.	
TIME REQ'D: 15 min.	**LEADER:** ASCCA Educator
MATERIALS NEEDED: We provide: Color palettes	
BACKGROUND: This activity helps focus attention and introduces the Aspen forest. Students who think the forest is just green may be surprised to see grays, browns, oranges, blues, yellows, and reds. The color of plants and animals are adaptations to their environment. Insects use color to camouflage or hide, so that they will not be seen and eaten, or advertise by making themselves conspicuous, this usually warns predators that they are poisonous or taste bad. Colors are also used by some flowers to attract insects for pollination.	
DIRECTIONS: 1. Divide students into pairs or groups and give them a color palette. 2. Ask them to find as many color matches with their palettes as they can. Have them move along the trail making sure they stay on the trail.	

3. When you think they've had enough time and found several matches, gather them together.
4. Discussion questions should include: Did they find all the colors? What color did you find most of? What was the hardest color to find? How do insects use color? How do plants use color (attract insects)?

3A	Shake a Shrub (combine with 4A)
ACTIVITY DESCRIPTION: Students will examine different insects in the forest habitat and their various features.	
TIME REQ'D: 15 min.	**LEADER:** ASCCA Educator
MATERIALS NEEDED: We provide: White sheets, ID sheets, and magnifying glasses	
BACKGROUND: Insects can be found almost anywhere. This activity lets students see insects and spiders without having to get too close. Some students may have fear or discomfort when it comes to dealing with insects. Working in small groups can take pressure off individuals. Because most specimens will not stay still for long, only general characteristics can be observed. Look for body shape, number of segments, number of legs, and number of wings. Color identification (ID) sheets are provided to help classify insects into the eight most common orders according to observable characteristics. Although some insects are easily identified by the orders characteristics, others are difficult because of hard to see features, immature life stage, or large variations in the group.	
DIRECTIONS: 1. Provide small groups with a white sheet, some magnifying sheets, and some ID sheets. 2. Have groups select a shrub or small tree at the edge of the trail. Place the sheet underneath and gently shake the shrub. 3. Observe any animals that fall out and onto the white sheet. 4. What observable characteristics can you see? Do they have six or eight legs? Wings? Color? Refer to the Insect ID sheet and compare characteristics. 5. Wrap up with questions about characteristics. Did you find any insects? How did you know it was an insect? Did you find any larva? Did any have wings?	

4A	Bug Search
ACTIVITY DESCRIPTION: Students will collect and inspect insects up close and try to classify them.	
TIME REQ'D: 20 min.	**LEADER:** ASCCA Educator
MATERIALS NEEDED: We provide: Bug jars, magnifying glasses and ID sheets	
BACKGROUND: Even small hands can damage or crush insects. This activity provides students with the opportunity to catch bugs in bug jars and have a closer look at these fascinating creatures.	
DIRECTIONS: 1. Remind the students about their role as "Gentle Giants" for the day and discuss ways that they can catch bugs in their jars to have a closer look at them. Explain the importance of putting the bugs back exactly where they found them. 2. Give students their bug jars. 3. Find a creature you would like to examine closer. Getting down to "bug level" might be the best way to find some of these tiny creatures. Gently encourage the bug to crawl into the	

container or carefully shake it into your container off of a leaf or a blade of grass. Close the container and observe.
4. When students catch something have them observe it and categorize it according to the ID sheet. What physical/structural adaptations can you observe?
5. When everyone has caught an insect gather for a sharing circle (Ask for nominations for the weirdest insect, the most colorful, the biggest, and the smallest.).
6. **Return specimens to their home or an area that is similar to where they were found.**
7. Wrap up with: Why would we want to identify different types of insects? (Knowing what is out there helps us to determine what affect we have on insects).

B) PONDS AND PRAIRIES

1B	**Make a Park**
ACTIVITY DESCRIPTION: Students will search for an ideal location in the grasslands to meet the needs of a variety of insects and small animals.	
TIME REQ'D: 15 min.	**LEADER:** ASCCA Educator
MATERIALS NEEDED: We provide: Rope lassos and insect i.d. charts	
BACKGROUND: Observation is a valuable skill that requires practice. This activity will help hone students' observation skills while looking at habitat. Biodiversity refers to the amount or number of different species in any given area or ecosystem. Native grassland supports higher biodiversity than introduced grassland because native grasses, such as Rough Fescue, grow in clumps therefore allowing other species to grow around it. In the native grasslands at the Area, Fescue and Oat grasses are common along with Wild roses, Anemones, Northern Bedstraw, and Goldenrod and a variety of other plants. Introduced grasses, such as Brome grass, support fewer species because they grow in a mat and leave little space for other species.	
DIRECTIONS: 1. Ask the students where they would rather shop, at a store that only has one type of food on its shelves or thousands of types on its shelves. The one with more items means that it has more variety and can support more life because different types of people need different types of food. 2. In a large group, introduce the concept of a park being a special place that allows for a variety of plants and animals to live there and meet their needs. Tell them they are going to be looking for the best insect park in the grasslands. Brainstorm what the grasslands should include for a variety of insects to use it as habitat (E.g., soil, tall grasses, short grasses, flowers, shrubs, rocks, water etc.). 3. Organize students into small groups. Give each group a rope lasso and have them find the best park in the grasslands. 4. Have groups observe their park. What do they see? How many different types of plants do they see? What is the soil like? What other natural objects are in their park that insects or small animals could use? Are there any actual insects - how many, what kind? If time, they can collect and try to identify insects using the i.d. sheets. 5. Wrap-up: Ask each group why the place they chose was the best park? Ask the students 'What does the word "biodiversity" mean?' "Bio" means "life" and "diversity" is another name for "variety". Therefore, biodiversity means "the variety of living plants and animals in the world." Point out the two types of grasses – Fescue and Brome – and the differences in biodiversity in native and introduced grassland.	

2B Pond Puzzles

ACTIVITY DESCRIPTION: This activity is a short pond study, focusing on insect life in the water.

TIME REQ'D: 30 min. **LEADER:** ASCCA Educator

MATERIALS NEEDED:

We provide: White basins, plastic vials,
field guides, and keys

BACKGROUND: Ponds are complex and fascinating ecosystems. Most children are drawn to water, be it puddle or pond. Water striders, Diving beetles, tadpoles, and frogs can provide endless hours of entertainment and learning.

The pond edge or emergent zone is probably the most fragile and impact on it should be minimized. Taking sizable samples away from the edge for observation helps reduce impact, while keeping the sights and sounds of the pond close at hand.

The prairie pothole, pond, slough, or dugout attracts both large and small animals. Some visit it for water and others live in it. Not all the things you see will be insects. Amphibians such as Wood frogs and Boreal Chorus frogs may be found. Invertebrates also found include: Fairy shrimp and side swimmers, Water mites and worms. Whirligig and predaceous Diving beetles, Water striders and Water boatmen, Caddisfly, Dragonfly and Damselfly nymphs, and Mosquito larvae are some of the common insects found in the pond. The pond is an insect nursery where many nymphs and larval insect stages can be found. These life stages can be confusing so you may want to use some of the resources provided.

DIRECTIONS:

1. Gather students away from the pond edge and have them sit on the bank of the pond in the line facing the pond. Being completely silent, have the students listen for the sounds of the pond and put up a finger each time they hear a different sound. After about three minutes of listening, ask the students what they heard.
2. Send parent/adult volunteer to collect a water sample and take it to their space on the bank where their group will gather to do the pond study while you explain the pond study expectations and demonstrate where needed.
   Expectations:
   - Only parent helpers go to the pond's edge to get water, students stay on bank
   - Handle all pond insects with respect and be gentle giants. Only use containers to pick up insect, tadpoles, and frogs.
   - Pour water that contains insects from a low height.
   - Use identification sheets to figure out what's in the bucket.
3. Let the dirt and debris settle (Collecting some from the bottom gives you more of a chance to collect "bottom dwellers.").
4. Have the students find their parent/adult volunteer with their bucket. Remind the students that they are "Gentle Giants" and that they should be careful when catching these creatures. Students explore the sample using "catchers" to isolate organisms. Try to identify them using keys and guides provided.
5. Use examples as teachable moments. When you have identified something discuss what it might eat, and hence where it would fit into a pond food chain. Different stages of a life cycle also have different adaptations. Why? What advantage do winged adults have? (Dispersal for reproduction) What other adaptations can you identify for feeding, locomotion, and reproduction?
6. Return samples to the pond. Hold the container close to the water's surface and gently pour

it back into the pond.
7. If there is extra time at the pond, do one of the optional activities. See optional activities and games section below.

3B	Camouflage
ACTIVITY DESCRIPTION: Students will recognize that insects can use camouflage as an adaptation for survival and test out their camouflage abilities.	
TIME REQ'D: 15 min.	**LEADER:** ASCCA Educator
BACKGROUND: Camouflage, the ability to blend into one's surroundings, is a structural adaptation for survival. Many predators, like birds hunt by sight, and if they don't see the insect or see it move then they can't eat it. Camouflage and staying perfectly still go together, as most predators detect movement more readily than detail. Camouflage depends on the animal's environment. Greens, grays, and browns are good forest camouflage colors.	
DIRECTIONS: 1. Have parent volunteers be the boundaries (boundary posts), and teacher be the predator. The game can be played in tall grass, or along the forest edge. Make sure that students stay inside the boundaries and an adult can see them at all times. 2. Have the predator close eyes and count to 20. Students spread out and hide within boundaries. 3. Have the predator announce they are looking for food. Opening their eyes and turning around, but not moving from where they are standing, have them call out the names of those who they see. Those caught may gather at a designated point. 4. When the predator has called out all those who they can see, they will call out "food and water for ___seconds". All of the remaining hidden students have to run up touch their teachers hand and go hide again within whatever timeframe the teacher yells out. 5. The game continues as before until everyone is caught of food and water is at 5 secs. Then everyone left should stand up. The closest person not called wins, and may be made the predator for a second round. 6. Wrap up with: How challenging was it to camouflage? What would you change to survive longer?	

C) WRAP UP

At the end of the day a debriefing or wrap up should be done. This may be done as a whole group back at Belvedere House. Draw on examples encountered during the day. The white board can be used to write important points. See orientation/wrap up script for more details.

D) OPTIONAL ACTIVITIES

These games can be played at lunch or any other time during the day if time permits.

The Gall	
ACTIVITY DESCRIPTION: Students examine a gall as another adaptation for survival.	
TIME REQ'D: 10 min.	**LEADER:** ASCCA Educator

MATERIALS NEEDED:
We provide: Rose or Goldenrod gall sample

BACKGROUND: Many insects lay eggs on plant stems. Some of these insect larvae burrow into the stem for food and protection. In response to the insect the plant grows around it, usually enlarging the tissue and forming a gall. This behavioral adaptation is an important survival tool for many larvae. Although galls provide protection from the elements galls don't always protect larvae form other insects. Some insects look for galls to feed on the larvae inside. Rose and Goldenrod galls are common locally. Rose galls are caused by a wasp, and Goldenrod galls may be caused by a moth or fly larvae. Elliptical goldenrod galls are caused by the moth larvae and round or ball galls by the fly (Eurosta solidaginis). The fly that infects goldenrod over winters in the gall as larvae and emerges after pupation in the spring as an adult. Galls generally don't kill the plant.. Most plants flower and go to seed even when they have galls.

DIRECTIONS:

1. This can be done on the way down to the dugout or on the way back up but it should be kept short.
2. Ask students to speculate about the lumpy plant stalks. Explain that an insect laid eggs on the stem and the larva burrowed into the plant. The plant grew around the developing larva, and the larva fed on the plant. They are protected, and generally safe from predators.
3. Use the examples in the vials provided to cut open a gall. Can you see larvae or tunnels? If there is a hole in the gall it may mean that the larvae inside have matured and crawled out, or that the fly is pupating (and almost ready to emerge).

Optional Games

Metamorphs

These game shows the change in the number of eggs initially laid to the number that successfully become adults. Most eggs that are laid will not survive to become adults, this is why many insects will lay lots of eggs, that way there is a better chance some will make it to adulthood. Ask why all the eggs don't survive to become adults? What would happen if they did?

Instructions

1. The object of this game is to start as an egg and progress all the way through the 4 stages of metamorphosis to become an adult.
2. Go over the stages of metamorphosis with the kids – egg, larva, pupa, adult
3. Choose an insect with a well known life cycle (like a butterfly)
4. Assign an action to each stage (eggs say "egg" with arms crossed, larvae arms at side, jump and say "Larva", pupa/cocoon hands on hips and spin while saying "cocoon" (or touch knees and waddle saying "pupa" if you want a quiet game), adults flap their wings and say "Butterfly")
5. Explain that everyone will start as an egg; in order to proceed to the next stage in metamorphosis they must play rock, paper, scissors with another egg. The winner becomes a larva, and the loser goes back to being an egg. No matter what stage you are, when you lose you go back to being an egg. You can only play rock paper scissors with someone at the same stage (larva with larva, butterfly with butterfly etc.)

Make Yourself into an Insect

1. Ask the kids an insect question, "what kind of insect….?"

2. When the question is answered have the kids work as a group to form the shape of the insect.
3. If they are having trouble, ask about the different characteristics that make up the insect, such as the number of legs, if it has wings and anatine, what the body shape is, etc.
4. Repeat with more insect questions.

Metamorphosis
Divide students into four groups for the four stages of complete metamorphosis. Arrange students so that they can move from one station or stage to the next. Have EGGS huddle together around a flower, parent volunteer. When ready crawl to the CATERPILLAR stage. CATERPILLARS crawl on their hands and knees pretending to eat leaves. Have them crawl towards PUPA station. PUPA pretend to hang from a plant, parent volunteer or hide under a blanket. When ready have PUPA emerge and stretch their wings. Newly emerged BUTTERFLIES flap their wings and fly towards the butterfly station where they pretend to feed from a flower. A bird or predator may be introduced into the game. Have birds Waddle like ducks and try to catch caterpillars. Birds must bring caterpillars to a designated point or nest to feed their young. Repeat cycle.

Frozen Food Chain Tag
Like frozen tag, Mosquitoes run around and Swallows chase them. When caught the Mosquitoes freeze and turn into grass, stick arms out and can only be unfrozen by another Mosquito running underneath their arms. Start with a large habitat and reduce size.

Insect Who Am I
Place an insect picture card on the back of each student. The students then ask questions to try to find out what kind of insect they are. The questions should be ones that have yes/no answers, such as 'Do I have wings?' or 'Do I live in water?' Once students have figured out what kind of insect they are then can switch with a different picture. As an extension, connect all the insects through the web of life. Each student will take turns passing the ball to another insect (holding onto one end to link them) that they would be connected to perhaps because they live in the same habitat, are connected through the food chain, or are a different phase of their growth cycle.

Ant Hill/Dead Tree
The ant hill and the dead tree are located by the Alberta Wild Rose sign on the Chevron Aspen Trail. The hill and the tree have been visited frequently by groups and as a result, the area around them is starting to erode. To minimize our impact on this area, we ask that you do not take your groups up and around the hill or down to the dead tree. Instead have the students observe from the trail and talk about the ants and the creatures that live in or use the dead tree and their role in the natural environment.

The following is an excerpt taken from Guests in your Garden that might give you some insight into the ant world:

"There are nearly 8, 000 species of ants ranging in colour from jet black to pale yellow. Ants are among the most shapely guests in our gardens - their impossibly small waists provide flexibility so the tiny creatures can waggle their bottoms to sting, lay eggs and communicate.

The relationship between ants and plants is an important one. Ants disperse seeds and in some cases help open tightly budded flowers. Have you ever seen ants in peony blossoms? They're helping to pry open the massive buds. Plants provide nutrition for ants and, in return, any poop provides nutrients for plant and seed growth. Ants are also active recyclers. They're second only to earthworms in the amount of nutrients they return to our garden soil.

Ants are social creatures, living together in colonies. And as in any well-ordered society, many ants have jobs, the details of which come to them naturally. These include entrance-blockers, seed-crushers, and honeypot workers (who store reserves of food for lean times).

Each colony has a queen whose sole responsibility is to reproduce. An ant queen can live up to twenty years and produce a community of some 500,000 ants.

…(Ants) use chemicals to mark their food and nest trails: an ability that helps other ants find their way. When I go hiking the woods, trails are roughly marked and occasionally I veer off course. But when I catch sight of that precious piece of pink or yellow flagging tape, I heave a sigh of relief and think of those clever ants marking their trails with no visual clues at all." (Davidson, Michele. *Guests in your Garden*. Vancouver, B.C.: Arsenal Pulp Press, 2001.)

5.0 POST-VISIT ACTIVITIES

5.1 EAT DIRT!

Purpose

This is a purely fun activity.

1)You'll need some helping hands and the following ingredients. Chocolate pudding/whipped topping (this way it isn't quite so rich), chocolate cookie crumbs, candy worms, and jelly bean grubs.

2)Mix the pudding and whipped topping and put in bowls. Mix candy worms into the "dirt" and top with cookie crumbs.

3)Serve your "dirt" with a smile. We recommend bringing a camera, the faces are priceless!

5.2 100 CENTIMETER BUG CRAWL!

Purpose

Explore your own backyard at school or home to discover who uses it as their habitat.

1)Give each student a meter stick, measuring tape or length of string measuring one meter.

2)Get everyone to find a spot they would like to explore. Somewhere they think they may be able to find a variety of insects or small animals. Have them think about being really small like an insect as they slowly crawl along their meter, millimeter by millimeter, looking for insects, worms, slugs or signs of these. Count how many different kinds of insects you found.

3)Compare what you found with what you saw at the Cross Conservation Area. Brainstorm why there may be more or less insects along their meter. What does it tell you about the habitat?

4)Discuss what you could do to improve the habitat for insects or other small animals. (I.e., plant flowers or bushes).

6.0 OTHER RESOURCES

6.1 INSECT IDENTIFICATION

Begin with question number one and decide which of the two options, A or B, fits the insect in question. Whichever one you choose will either reveal the order or direct to another part of the key until the order is disclosed. Read each question carefully and examine the insect closely. Some orders have members that are both winged and wingless, so they are listed twice.

1. Does the insect have wings?

A Yes Go to # 2
B No Go to # 17

2. How many pairs of wings does the insect have?

A One **Diptera** Flies
B Two Go to # 3

3. Do the pairs of wings differ greatly in structure, the first being thick and hard or leathery?

A Yes Go to # 4
B No Go to # 7

4. Is the first pair of wings rigid, and do they meet in a straight line down the middle of the back?

A Yes Go to # 5
B No Go to # 6

5. Is there a pair of prominent pincer-like cerci ("feelers" at the tip of the abdomen?

A Yes **Dermaptera** Earwigs
B No **Coleoptera** Beetles

6. Does the insect have:

A chewing mouth parts, front wings leathery and heavily veined, and hind wings folded like a fan? **Orthoptera** Crickets and Grasshoppers
B sucking mouth parts and front wings leathery at the base, membranous and overlapping at the tip? **Hemiptera** True bugs

7. Are the mouth parts a coiled tube and the wings covered with scales?

A Yes **Lepidoptera** Butterflies and Moths
B No Go to # 8

8. Are the wings roof-like, sloping downward and outward from the middle of the back?

A Yes **Homoptera** Aphid, Cicadas and Leafhoppers
B No Go to # 9

9. Is the insect slender and moth-like, with long, slender antennae and wings that are widest past the middle?

A Yes **Trichoptera** Caddisflies
B No Go to # 10

10. Do the wings have few or no cross veins?

A Yes Go to # 11
B No Go to # 12

11. Does the insect have chewing mouth parts and hind wings somewhat smaller than the front wings?

A Yes **Hymenoptera** Bees, Ants and Wasps
B No **Thysanoptera** Thrips

12. Are there two or three long, slender, tail-like appendages on the tip of the abdomen?

A Yes **Ephemeroptera** Mayflies
B no Go to # 13

13. Does the head have an elongated trunk-like beak with chewing mouth parts at its tip?

A Yes **Mecoptera** Scorpion flies
B No Go to # 14

14. Does the insect have inconspicuous antennae, long narrow wings, and a long slender abdomen?

A Yes **Odonata** Dragonflies and Damsel flies
B No Go to # 15

15. Does the insect have 2 short cerci ("feelers") on the tip of its abdomen and front wings narrower than the rear wings?

A Yes **Plecoptera** Stoneflies
B No Got to # 16

16. Do the tarsi (segments on lower part of the leg) each have 5 segments?

A Yes **Neuroptera** Lacewings
B No **Isoptera** Termites

17. Is the insect ant-like, with a narrow waist?

A Yes **Hymenoptera** Bees, Ants and Wasps
B No Go to # 18

18. Is the insect ant-like, but with a wide waist?

A Yes **Isoptera** Termites
B No Go to #19

19. Is the insect small and flattened, with chewing mouth parts and a head about as wide as its body?

A Yes Go to # 20
B No go to # 21

20. Are the antennae long, and composed of many segments?

A Yes **Psocoptera** Book lice
B No **Mallophaga** Biting lice

21. Is the insects body soft and rounded, with 2 short tubes protruding from the abdomen, and with a small head?

A Yes **Homoptera** Aphids, Cicadas and Leafhoppers
B No Go to # 22

22. Is the insect very small, with a vertically flattened body, hook-like claw on each leg, and sucking mouth parts?

A Yes **Anoplura**
B No Go to # 23

23. Is the insect very small and narrow (flattened laterally) with sucking mouth parts?

A Yes **Siphonaptera** Fleas
B No Go to # 24

24. Is the insect:

A delicate with chewing mouth parts and threadlike tails and antennae?
Thysanura Silverfish
B very small with a spring-like lever folded under its abdomen which it uses for leaping? **Collembola** Spring tails

6.2 OTHER INSECT RESOURCES

The Practical Entomologist	Rick Imes	ISBN 0-671-74695-2
Critters (AIMS)		
About Insects that Help Plants	Gertrude Hevener Gibson	
Bug Bites: Insects Hunting Insects and More	Diane Swanson (White Cap books)	
A Golden Guide, Pond Life		
How to know the AQUATIC INSECTS	Dennis M. Lehmkuhl	

INSECT SURVEYS

The Canadian Wildlife Federation's Coast-to-coast Butterfly Survey
2740 Queensview Dr.,
Ottawa, Ontario,
K2B 1A2
Tel: 1-800-563-9453
E-mail: info@cwf-fcf.org
Website: http:/www.toucan.net/cwf-fcf/cwfhome.html

Spot the Ladybug. Canadian Nature Federation Lady Beetle Survey 1996.
Canadian Nature Federation,
1 Nicholas St., Suite 520,
Ottawa, Ontario,
K1N 7B7
Tel: 1-800-267-4088
Website: http://www.web.net/~cnf
Teachers Package available

6.3 GLOSSARY

ABIOTIC:	A non-living factor in an environment (i.e. light, water, temperature)
ARACHNIDS:	A subgroup of Arthropods including spiders, scorpions, ticks, mites, and daddy-long legs with 2 body parts, 4 pair of legs.
ARTHROPODS:	A group of invertebrates with external skeletons and jointed limbs including insects, arthropods, crustaceans, millipedes, and centipedes.
BIOTIC:	A factor or process which is biological in nature or results from a living organism.
CARNIVORE:	An animal or meat eater.
CARRION:	The bodies of dead animals usually in a state of decay.
CERCI:	Abdominal appendages that arise from the tip of the abdomen.
COMMUNITY:	A group of different organisms which all rely on the same physical habitat to meet their needs.
COMPETITION:	An interaction between two species in which both require the same limited resource. Interspecific competition occurs between two different species. Intraspecific competition occurs between two individuals of the same species.
CONSERVATION:	The protection of natural resources.
CONSUMER:	Herbivores and carnivores that consume energy and transform it into biomass. A Primary Consumer is an organism that eats plants (i.e. aphid). A Secondary Consumer is an organism that eats animals that eat plants (i.e. Ladybug). A Tertiary Consumer is an organism that eats animals which eats secondary consumers (i.e. insect eating bird).
DECOMPOSER:	Organisms that convert dead organic material into inorganic materials.
ECOSYSTEM:	All living things and their environment in an area linked together by energy and nutrient flow.
HABITAT:	The arrangement of food, water, shelter and space suitable to an animals needs.
HERBIVORE:	A plant eater.
INSECTIVORE:	An insect eater.

LIFE CYCLE:	The continuous sequence of changes undergone by an organism in changing from one stage to another in its lifetime.
METAMORPHOSIS:	A term for the physical changes animals undergo during their life cycle.
MICRO-ORGANISMS:	Microscopic one or multi-celled organisms such as bacteria, fungi, and algae.
OMNIVORE:	An animal which eats both plants and animals.
PREDATOR:	An animal that eats other animals.
PREY:	Animals that are eaten by other animals.
PRIMARY PRODUCER	Green plants which are able to make their own food from simple organic substances.
SCAVENGER:	An organism that feeds on refuse or carrion, e.g. a Coyote or a Dung Beetle.
TARSUS:	The end or tip of the legs (Does not include the hooks or claws).
WEB OF LIFE:	The concept that every living thing interrelates with others so if we alter one organism we alter all others.
WILDLIFE:	Animals which are not domestic or tamed.