PARKS AND PROTECTED AREAS

Ecology Connections

Alberta
COMMUNITY DEVELOPMENT

Kananaskis Country

This publication is part of a series of field study programs produced by the Environmental Education Program of Parks and Protected Areas in Kananaskis Country and Fish Creek Provincial Park. These publications have been written to address the goals of Alberta Community Development and increase students' environmental awareness, understanding, interaction, and responsibility for the natural world in which they live.

The publications are developed in a close working relationship with teachers, community educators and program writers. Programs focus on the areas of environmental education, science, social studies, and language arts. They are also developed to emphasize elements of environmental literacy, lifestyle, and citizenship.

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Ecology Connections

ISBN: 0-7785-0831-5 Pub. No.:I/767 (printed edition)
ISBN: 0-7785-0832-3 Pub. No.:I/767 (on-line edition)

Friends of Kananaskis Country

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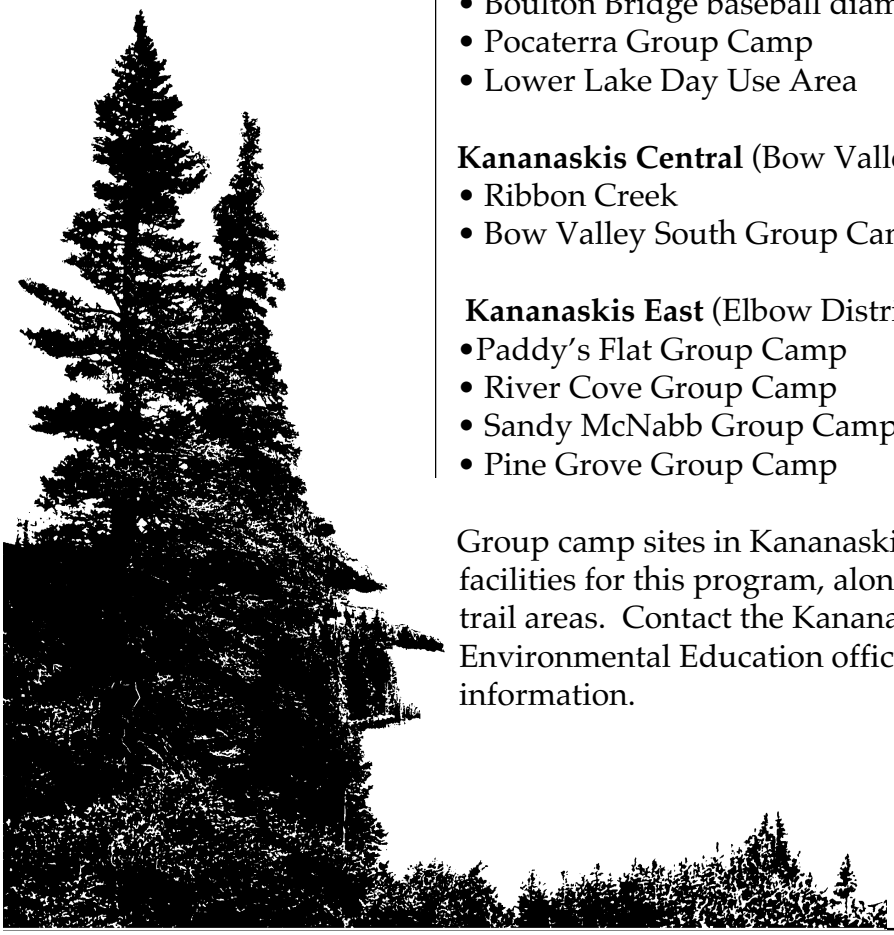
February, 1991

1.0 OVERVIEW

1.1 AT A GLANCE

TOPIC	Animal Ecology - Communities and Interactions
PROGRAM LEVEL	Grades 4-9/ ages 9-15
TIME REQUIRED	Pre-Field Study: 40-60 minutes Field Study: 3-4 hours for all activities Post Field Study: varies with activity
STAFF REQUIRED	One teacher, with one adult volunteer per ten students
BEST SEASON	Spring, summer or fall
SUGGESTED LOCATIONS	Can be taught in any forested or wildlands location that includes an open playing area. Locations in Kananaskis Country include: **Kananaskis West** (Peter Lougheed Provincial Park) • Boulton Bridge baseball diamond • Pocaterra Group Camp • Lower Lake Day Use Area **Kananaskis Central** (Bow Valley Provincial Park) • Ribbon Creek • Bow Valley South Group Camp **Kananaskis East** (Elbow District) •Paddy's Flat Group Camp • River Cove Group Camp • Sandy McNabb Group Camp • Pine Grove Group Camp Group camp sites in Kananaskis Country offer excellent facilities for this program, along with selected day use and trail areas. Contact the Kananaskis Country Environmental Education office at 678-5508 for site information.



1.2 PROGRAM SUMMARY

Ecology is defined as the study of interactions between living things and the environment in which they live. The program ***Ecology Connections*** investigates the dynamics of ecology, focusing on animal communities and the interactions between the living and non-living components of an ecosystem.

After defining the words ecology, habitat, communities, ecosystem and needs in the classroom, students will participate in a three-part field study, which includes the following activities:

- ***A Day in the Life*** **-** students select an animal from a forest community and then seek out and investigate the habitat suitable for that particular animal.

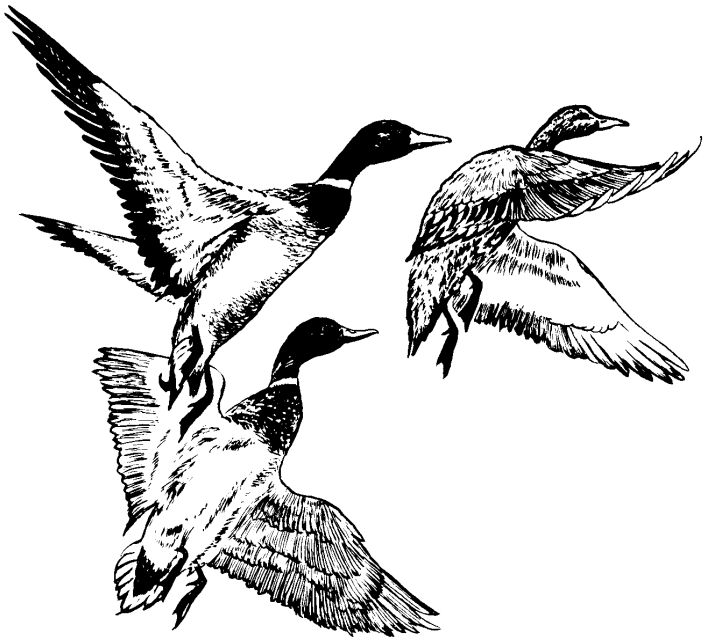
- ***The Eat or Be Eaten Game*** **-** students role-play the animal identity they investigated in ***A Day in the Life*** and participate in an active predator-prey game.

- ***The Food Web Simulation*** **-** students build a food web to illustrate the relationships between the animals they have portrayed. Humans, with their influence on these relationships, are discussed in the conclusion of the field study.

After the field study, students will have an opportunity to continue their explorations of ecology by participating in a variety of post-field study activities in the classroom.

The program ***Ecology Connections*** has been written as a guide for a field study in animal ecology. To ensure program success, read over the materials well in advance of your field study. This will allow you time to add your own activities or variations, which you can include in the **Teacher's Notes** section of ***Ecology Connections*** .

Discussion



1.3 PROGRAM OBJECTIVES

This program will assist students in:

1) Evaluating habitats and their suitability for a given species of animal.

2) Understanding how certain animals and plants are dependent on each other for survival.

3) Understanding that plants and animals in a community are always interacting and that one of the interactions is the predator-prey relationship.

4) Identifying predator-prey relationships and the necessity of these relationships for maintaining ecological balance.

5) Examining the roles of animals which make up a food web.

6) Identifying the effects of human-caused or naturally-caused interruptions to a food web.

1.4 CURRICULUM TIE-INS

These materials can be used to fulfil curriculum requirements in the following grade or subject areas:

Grade	Subject	Topic Area
4-6	Science	Living Things and Environment (Environmental Factors) • organisms live in habitats that have environmental factors favourable to their survival Living Things and Environment (Adaptations) • structural or behavioural adaptations or characteristics of plants and animals contribute to their continued survival
7	Science	Topic 1: Characteristics of Living Things • living things are complex, capable of making adaptive changes to survive in their environment
8	Science	Topic 6: Interactions and Environment • complex relationships exist between the different organisms in a community
9	Science	Topic 1: Diversity of Living Things • living things show a diversity of structural and behavioural adaptations • the process of natural selection plays an important role in the development of adaptations

2.0 PRE-FIELD STUDY

2.1 ACTIVITY: INTRODUCTION TO ECOLOGY

All organisms have physical needs which must be met to survive. Humans, too, have readily identifiable needs. The topic of ecology may be examined by working with the concepts of habitat, community and ecosystem; one way that students can understand this topic is by comparing their **own** ecosystem to a natural one.

Objective
Students will demonstrate an understanding of the ecological concepts of habitat, community, and ecosystem.

Curriculum Tie-In
See Section 1.4.

Materials
- ❑ chalkboard
- ❑ paper and pencil

Time Required
40-60 minutes

Instructions for the Teacher
1. Divide the class into groups of four or five students. Have each group come up with a definition for each of the following words:

ECOLOGY	The study of the relationship between organisms and their physical and biological environment
HABITAT	The place where an organism lives and meets its needs
COMMUNITY	An assemblage of plant and animal species living together within a defined area
ECOSYSTEM	An assemblage of living organisms that interact with each other and with the non-living environment

After the groups have defined the words, have the class discuss and agree upon a set of definitions for these words.

2. Ask the students the following questions:

- **What is your habitat?**
  Students' answers will vary and may include their home (dining room and bedroom, etc.), neighbourhood, or school.

- **Who lives in your community?**
  Answers may range from the people living closely around them (parents, peers, siblings) to everyone in their town or city.

- **How big is your ecosystem?**
  Humans interact with their environment and each other in very complex patterns. Although we generally only deal with people and things in our own community, occasionally we interact with people and things from much farther away; for example, when we buy something from a foreign country. Depending on the scale of observation, the human "ecosystem" can actually be as large as the earth itself.

3. After defining the words, briefly address **why** habitats, communities, ecosystems and ecology are important to humans. Discuss the following questions:

- **What are the things you absolutely need in order to survive?**
  One at a time students can offer their answers, which can then be categorized into the elements of **food, water, shelter, and space**. One that may not be mentioned is **air**, which is essential but usually more readily available than the others. Other suggestions, such as friendships, family, love, and happiness are equally important but are social, not physical, needs. Essentially, all animals need food, water, shelter, and space.

- **Name one natural ecosystem that provides food, water and shelter for various animals' needs.**
  Answers might include:
  - the forest (wolves, deer, rabbits, etc.)
  - a pond (fish, insects, plants, birds, etc.)
  - a field (insects, grass, birds, etc.)

- **What are the names of ecosystems which provide for human needs.**
  Answers will show the close relationship and importance of natural ecosystems to the human community.

4. After students have developed working definitions of the words **ecology, community, habitat, and ecosystems,** other related terms can be introduced. From the set of definitions in Table 1 (next page) select words which are appropriate for the grade level being taught.

<u>Teacher's Notes</u>

TABLE I: LIST OF DEFINITIONS

ADAPTATION:	Any change in the way an organism appears or behaves that makes it better suited to its environment.
CARNIVORES:	An animal that eats other animals to obtain nutrients and energy
COMMUNITY:	An assemblage of plant and animal species living together within a defined area.
COMPETITION:	The interaction that occurs between two or more organisms when both share a limited resource
CONSUMER:	In a food chain, an organism that eats another organism.
ENVIRONMENT:	The environment is where we all live. It is the sum of the physical, chemical, and biological conditions found in a certain area
ECOSYSTEM:	An assemblage of living organisms that interact with each other and with the non-living environment.
FOOD CHAIN:	A sequence of events that occurs when something eats something else. Each organism can be thought of as a link in the chain.
FOOD WEB:	A series of interconnected food chains resulting in a picture that can resemble a spider's web.
HABITAT:	The place where an organism lives and meets its needs.
HERBIVORE:	An animal that eats plants to obtain its energy and nutrient supply.
INTERDEPENDENCE:	Two or more organisms interacting with one another in some way that affects their survival.
LIMITING FACTOR:	A condition that keeps an organism's population from growing in an uncontrolled manner.
NICHE:	The role that an organism occupies in a community. For example, teachers fill a certain niche in our society by educating people.
OMNIVORE:	An animal that eats both plants and animals to obtain nutrients and energy.
PREDATOR:	An animal that kills another animal for food.
PREY:	An animal that is killed and eaten by other animals.
PRODUCERS:	An organism that produces its own food and is a source of food for other organisms. Most plants are producers.

3.0 FIELD STUDY: ACTIVITY GUIDE

3.1 ACTIVITY - A DAY IN THE LIFE

Animals live only in places where their needs can be met. These places are called **habitats**. By going to a wooded area and examining an animal's habitat, students will have an opportunity to examine how an animal's needs are met by its habitat.

Objective
Students will demonstrate an understanding of the importance of habitat for an animal.

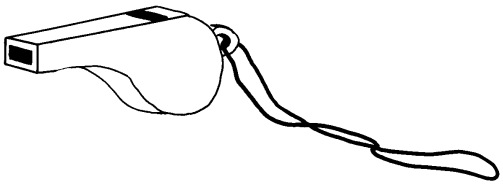
Curriculum Tie-Ins
See Section 1.4.

Materials
Each student requires:

- ❑ 1 **Habitat Investigation card** (in Appendix I)
- ❑ 1 12 x 20 cm (5 x 8") file card on which to paste the **Habitat Investigation card**
- ❑ 1 pencil
- ❑ 1 brown envelope 22 x 28 cm (8.5 x 11") in size (optional)

In addition, the teacher can bring:

- ❑ 1 whistle
- ❑ flagging tape



Time Required
A Day in the Life takes approximately 45 minutes. The time required for the combined group of three field activities will vary, depending on the length of time for discussion and the age of the students. Plan on 3 to 4 hours to complete the three field activities.

Pre-Field Study Preparation

1. For each student, you will need a **Habitat Investigation card.** Based on the number of students in your class, use Table II to determine the number of different animals for this activity. Photocopy the appropriate number of **Habitat Investigation cards** . For example, if there are 28 students in the class, you will need the number of animals as outlined under column three (25 - 28). Give each student one of the cards.

	Number of Players in Class						
Animal	15-19	20-24	25-28	29-33	33-36	37-40	41-45
Hare	3	4-5	4-5	5-6	6-7	7	7-8
Deer	0	0	0	3	3	3-4	4
Grouse	3	4-5	4-5	5	5-6	6	6-7
Squirrel	3	4-5	5	5-6	6	6-7	7
Chickadee	3-4	4-5	7-8	5-6	6	7	7-8
Lynx	1	1	1	2	2	2-3	3
R.T. Hawk	1	1	2	2	2-3	3	3-4
Coyote	1	2	2	2-3	3	3	4

Table II: Assigning Animal Roles

2. Have the students cut their **Habitat Investigation card** page in half, then glue one half of each activity card on each side of a 12 x 20 cm (5 x 8") file card. If desired, cards may be placed in a brown envelope until the field study.

3. If time permits, have the students conduct a library search to find out about their chosen animal, focusing on the animal's needs and habitat requirements.

4. Arrange for parent volunteers to assist during the field study.

On-site: Instructions for the Teacher

1. Select a location for the field study which includes an open field next to a forested area. A location that also borders a shallow stream is ideal and provides even greater diversity of habitat (see Section 1.1 for suggested locations). It is strongly recommended that teachers visit the site a few days before the field study to examine the site and to plan for the activities.

2. Outline the boundaries of the playing area. Roads, paths, streams, or easily removable flagging tape can be used to mark the boundaries. If you use flagging tape, please remember to remove it when you leave the site.

Hint: When using flagging tape, place it at the eye level of the students. This will make it easier for the students to locate.

3. Assemble the class in a large circle. Once the students are seated, ask them:

- **People and other animals have four basic needs. What are they?**
  From their pre-field study activities (Section 2.1), students should be able to answer food, water, shelter and space. If necessary, the teacher may want to review these four basics.

FOOD: a habitat has to provide an animal with the right **variety** and **amount** of food. For example, the lynx needs an area that has sufficient numbers of snowshoe hares.

WATER: all animals need water. The quantity varies from animal to animal. Examples of water sources can include rivers, lakes, streams, ponds, puddles, and hollows in trees.

SHELTER: animals need shelter to protect them from unfavourable weather and predators. Examples include dens, nests, tree hollows, and burrows in the ground. Plants need shelter from unfavourable conditions such as wind in order to grow.

SPACE: the amount of space an animal needs will vary according to its size. A list of questions are provided below to expand on this last concept.

- **What animals need a lot of space?**
  Elk and bear wander over a large area.

- **What animals do not require a lot of space to live?**
  A squirrel travels only a kilometre from its home. Some animals can share the same space because they have different needs.

- **What animals can share the same space?**
  Squirrels, birds, deer and bear can all share part of the same space because their needs for food, water and shelter are different.

- **How does mankind change his environment to obtain the food, water, shelter and space that is needed?**
  Answers might include the fact that man can grow gardens, dam rivers, and irrigate dry areas.

- **Can animals also change their environment?**
  Yes they can - but on a much smaller scale. Beavers can build dams, birds can build nests, etc. However, unlike man, other animals usually cannot **create** a habitat which provides them with all of their basic needs. They must **find** a suitable habitat.

4. Explain to the students that they are going to investigate an animal's habitat on their own. Pass out the envelopes containing the **Habitat Investigation cards**.

   Tell the students that all the animals in the study are found in Kananaskis Country. The students will read about their animal on their **Habitat Investigation card,** and then find a habitat setting similar to the description on the card and work through the various exercises. Each card includes several activities that will help the students look at the basic needs (food, water, shelter) of their animal.

   Have students read over their cards and make sure they understand the questions that are asked. If a student cannot find one of the items, have them note this on their card. For example, students playing the role of a snowshoe hare may not be able to find evidence of snowshoe hare droppings.

5. Indicate the study area boundaries by showing students what the natural boundaries or flagging tape boundary markers look like. Tell the students they are to find a location within the boundaries that most closely resembles the habitat described on their habitat card, and investigate the site until the end of the exercise.

6. Tell students they will have 20 minutes to complete the tasks on their cards. They should remain **inside** the boundaries, and return to a central location when the signal to return is given.

Discussion

7. When the students return, have them sit in groups of the same animal type (squirrels sit with squirrels, etc.). Each group will work together to agree on one food source, one place to find shelter, and one place to find water for their animal within the study area. Have each group in turn select a spokesperson who will tell the other groups about their animal. Ask the students:

   - **Did anyone have trouble finding food, water, or shelter in the habitat area?**
   - **Do you think this area is a good habitat for your animal?**
   - **If not, can you think of a place that would be a better habitat?**
   - **Are there any animals competing for the same needs within the habitat? What do you think will happen because of this competition?**

8. Have students put their names on their **Habitat Investigation cards** and then collect the cards and pencils.

   ELECTIVE: For a smaller group of older students, do a sharing circle. Have each person tell one thing they learned about their animal during the activity. The aim is to sum up the main points of the **investigation**, while allowing students to share interesting things about their animals.

9. Remind students they have looked at the different requirements of each animal in the area. During the next activity, the ***Eat or Be Eaten Game,*** the students are going to

become those animals. We're about to add a bit of excitement...

<u>Teacher's Notes</u>

3.2 ACTIVITY - THE EAT OR BE EATEN GAME

In ***A Day in the Life***, students investigated and assessed a habitat to see if it would meet an animal's needs. Although the need for food was discussed, the ***Day in the Life*** activity had none of the life and death perils that are ever-present in the natural environment. The ***Eat or Be Eaten Game*** offers an action-packed simulation of real life: a chance for students to realize that it truly is "a jungle out there..."

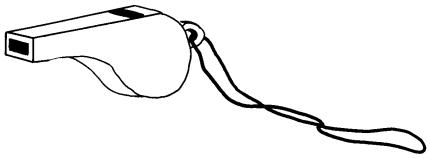
Objective
Students will gain a hands-on appreciation of the dynamics of a food chain.

Curriculum Tie-Ins
See Section 1.4.

Time Required
The Eat or Be Eaten Game can be completed in 60-90 minutes. The time required for the combined group of three field activities will vary, depending on the length of time for discussion and the age of the students. Plan on 3 to 4 hours to complete the three field activities.

Materials
The teacher needs to bring the following:

- ❑ 1 **Animal Role card** per student (in Appendix II)
- ❑ 1 labelled **Animal Figure card** per student (in Appendix III)
- ❑ 1 index card per student 10.2 x 12.7 cm (4 x 5") in size
- ❑ 1 safety pin to attach animal figure
- ❑ 30 pieces of thin rope each 30 cm in length
- ❑ 1 set of game rules for the class to read (in Appendix IV)
- ❑ 1 whistle



- ❑ flagging tape
- ❑ a number of 5 x 5 cm (2 x 2") coloured paper or cardboard squares. The number of paper squares that need to be cut is indicated by Table III.

CAUTION: As with any natural system, a small change in the ratio of predators to prey can have a huge effect on the outcome of the game. For best results try to maintain a predator:prey ratio of between 1:3 to 1:4.

Colour of squares	Number of Students		
	up to 30	30-40	40-50
Blue	80	100	125
Brown	32	36	44
Green	55	70	84
Red	60	80	100

Table III - Number of Squares

Label one third of all the blue cards "#1". Label the second third of the blue cards with "#2", and the last third with "#3". Divide the brown and green cards in the same way. The red cards are life cards - every player begins the game with 2 red life cards.

❑ 10 containers (e.g., ice cream pails or milk cartons) for coloured squares. Containers may be covered with a single milk carton panel, held in place with rubber bands, during storage.

Label the 10 containers as follows:

-- 3 containers -- Tape **green** card labelled **Food** to the outside of the container. Number the containers 1, 2 and 3.
-- 3 containers -- Tape **blue** card labelled **Water** to the outside of the container. Number the containers 1, 2 and 3.
-- 3 containers -- Tape **brown** card labelled **Insects** to the outside of the container. Number the containers 1, 2 and 3.
-- 1 container -- White card labelled **Recycled**.

Place each of the three groups of numbered blue cards in the correspondingly numbered blue container (i.e. #1 blue cards with #1 blue container). Do the same with the green and brown cards.

Pre-Field Study Preparations

1. For each animal, students will need an **Animal Role card.** Based on the number of students in your class, use Table IV to determine the number of different animals for Activity 2. Photocopy the appropriate number of **Animal Role cards**.

   NOTE: This table is identical to Table II, except for the inclusion of the disease and famine characters.

	Number of Players in Class						
Animal	15-21	22-26	27-30	32-36	37-40	41-45	46-51
Hare	2-4	4-5	4-5	5-6	6-7	7	8-9
Deer	0-1	0	0	3	3	4-5	4
Grouse	3-4	4-5	4-5	5	5-6	6	6-7
Squirrel	3-4	4-5	5	5-6	6	7-8	8-9
Chickadee	2-4	4-5	7-8	5-6	6	7	7-8
Lynx	1	1	1	2	2	2-3	3
R.T. Hawk	1	1	2	2	2-3	3	3-4
Coyote	1	2	2	2-3	3	3	4
Disease	1	1	1	2	2	2-3	3
Famine	1	1	1	1	2		

Table IV: Animal Numbers

2. Have students cut out their **Animal Role cards** and paste them onto small index cards. The **Animal Role cards** have been designed to fit onto a 10.2 x 12.7 cm (4 x 5") card.

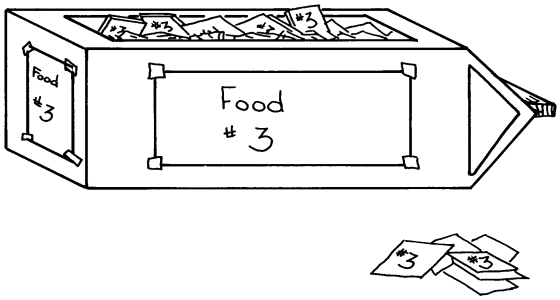
3. Photocopy a class set of **Animal Figure cards.** Photocopy all of the prey figures onto white paper, and all of the predator figures (including the words **Famine** and **Disease**) onto red paper, so that students can readily identify the role being played.

   These animal figures can be attached to the students in one of the following ways:

   a) laminate the paper, and attach to clothing using safety pins. Prey should wear their figures on their backs, while predators wear their figures on their chests. The laminate must be reinforced with fibre tape where the pin passes through it, otherwise the laminate will rip.

   b) figures may be mounted on cardboard. The teacher may choose to make two signs for each student; one for the front and one for the back. Signs may be joined together by string or fibre tape and slung over the student's shoulders. Side strings may be added for extra stability.

4. Arrange for parent volunteers to assist during the field study.



On-Site: Instructions for the Teacher

1. Select a location for the field study which includes an open field next to a forested area- see Section 1.1 for suggested locations. It is strongly recommended that teachers visit the site a few days before the field study, to examine the site and to plan for the activities.

2. While the students are studying their animals' habitats in ***A Day in the Life,*** the teacher or adult volunteers can outline the boundaries of the ***Eat or Be Eaten Game*** playing area. Roads, paths, streams or easily removable flagging tape can be used to mark the boundaries. If you use flagging tape, please remember to remove it when you leave the site.

   Hint: When using flagging tape, place it at the eye level of the students. This will make it easier for the students to locate.

3. Set up the nine food and water stations needed for ***The Eat or Be Eaten Game***. These can be scattered throughout the forest and open field area. Flagging tape can be tied near the stations to make it easier for students to locate each station. An additional area cordoned off with flagging tape needs to be set up close to the class discussion area. This area will become the **bone pile**.

4. If you did the first activity (***A Day in the Life***), have the students assume the role of the animal they investigated; otherwise, assign an animal role to each student. At this time designate two students (one squirrel and one chickadee) to play the roles of **disease** and **famine**. Disease should be given the 15 lengths of rope to tie up the arms of its victims.

5. Pass out the appropriate **Animal Role cards** and **Animal Figure cards** to each of the students. Have each student attach their figure to themselves.

6. Explain to the students that the game they are about to play will last between 20 and 30 minutes. **The object of the game is for all animals to obtain their food, water and life requirements as outlined on their Animal Role cards**. For example, the snowshoe hare must get three different plant cards (numbered 1, 2, 3; one from each container) and three water cards (also numbered 1, 2, 3).

7. Review the game rules with the students and discuss **why** these rules apply. During the game, rules can be posted in strategic locations. Appendix IV contains a complete list of the game rules that appear below, and can be photocopied onto a larger sheet of paper for easy visibility.

The game rules and explanations are as follows:

a. **The game lasts 30 minutes.**
Three long whistles will signal the end of the game.

b. **Each student should have one Animal Role card and two red life cards before the game starts.**
The **Animal Role card** tells about the animal a student will play. For example, a deer is a herbivore/prey and a lynx is a carnivore/predator. The role cards also describe what food and water requirements they need to attain in order to survive the game and reproduce or pair. Although each animal begins the game with two red life cards, some will lose them to predators. When both cards are lost, they "die".

c. **Each student must wear the labelled Animal Figure card given to him or her.**
This is so that other animals know what animal they are.

d. **Each student must meet the plant, insect, water, and life card requirements listed on their Animal Role cards.**
Some of the animals, such as the carnivores, must obtain a number of red cards by capturing prey. The herbivores just have to find food and water, and avoid the predators.

e. **When a predator tags a prey, the prey must give up one of its red life cards to the predator. The prey cannot struggle or put up a fight if tagged.**
In reality, a prey animal would struggle or fight if attacked, but for the purposes of the game this will be avoided to prevent injuries. Once an animal has run out of red life cards it is "dead" and must go to the **bone pile.**

f. **If a prey animal loses all its red cards, that animal must go to the bone pile and await release by two animals of the same species.**
The teacher can set aside an area where dead animals can go to await re-entry into the game. The **bone pile** will be an animal graveyard and can be set off by flagging tape. The container labelled **recycled** is placed inside the bone pile. Dead animals must place all of their food and water cards in the recycle container when they arrive at the pile.

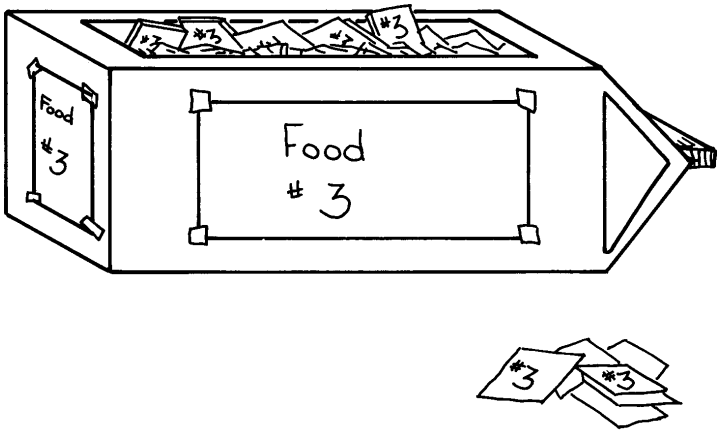
g. **An animal can only pair with another if it obtains all of its food and water requirements. The way animals pair is by finding another animal of the same species that has also met all its requirements. The two animals then proceed to the bone pile and release an animal of the same species.**
Another way of stating this rule is to say that paired animals can "bail out" an animal that has been in the bone pile. This rule illustrates how animals that are able to meet their needs have the ability to reproduce. The more they are able to eat, the better their chance of being healthy and of repopulating their species.

h. **When two animals release a third animal from the bone pile, all three must leave their food and water cards in the container marked *Recycled.***
Reproduction expends a great deal of energy. To make students aware of this, they are required to "pay a price" by forfeiting their hard-won food and water cards. The released animal is issued two red life cards.

i. **If disease tags an animal, that animal's arms will be tied together in front. Again, no struggling or fighting allowed.**
This is to illustrate how diseased animals are at a disadvantage in escaping from predators, as well as in fulfilling their food and water requirements. To prevent unnecessary injuries, fighting or struggling is not allowed. The rope can only be removed if and when an animal dies (has all its life tags removed) and goes to the bone pile.

j. **If famine tags an animal, that animal must give famine all of its food cards (the brown insect or green plant cards).**
This illustrates how famine can create a shortage of food, thus causing animals to have more difficulty meeting their food requirements. Ask the students who play the role of Famine to bring their accumulated cards to the recycle box every 5 minutes, so that food supplies do not run out during the game.

8. During the game, have one adult or teacher supervise the **bone pile** area. This person will ensure **dead animals** remain in this area until they are released by two other **paired** animals of the same species. This adult or teacher will also check to ensure the paired animals have obtained the food and water cards they need, as stated on their role cards.



9. Another volunteer should also be available to redistribute the recycled squares to the containers scattered throughout the play area. Remember to place the same numbered squares in their original containers i.e., #2 green squares return to the container for #2 green squares.

10. After you have answered any questions the students may have, show the students where the game rules will be displayed. The **bone pile** is a good location. Students can consult the rules during the game if they forget some of the rules or procedures involved.

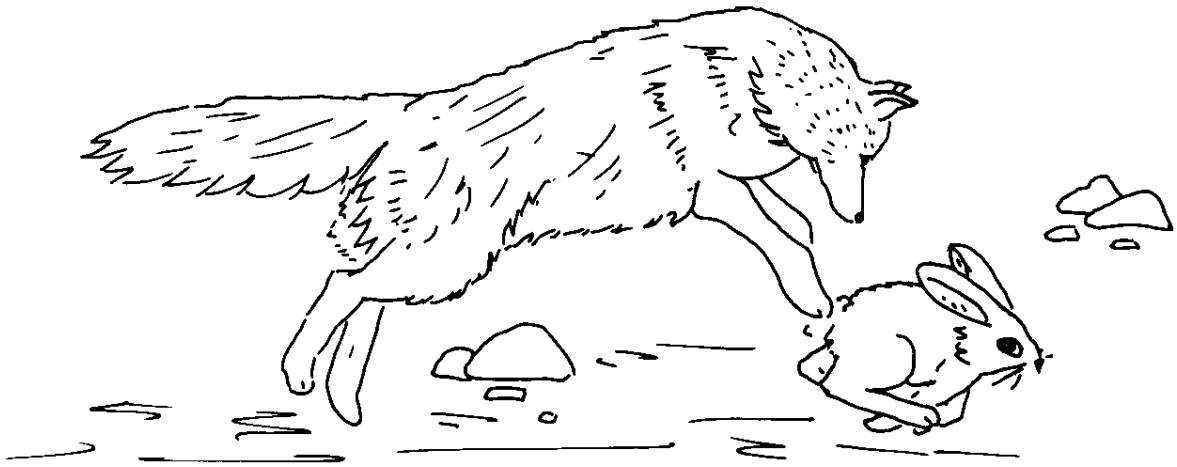
11. Immediately before the game begins, send each of the three groups (predators, prey, and famine/disease) to three different areas of the playing ground. This ensures that animals have at least a few minutes of freedom. Blow the whistle to indicate the beginning of the game.

Discussion

12. After 15-40 minutes (the duration can be decided by you, and will depend on factors such as students' age and stamina) signal for the game to end and for players to return to the discussion area. As the students return collect the food, water, life and **Animal Role cards**. Have the students keep their animal figure cards for the next activity.

    Several approaches can be used in the discussion phase of this activity. Teachers may want to record the results from this activity in the form of a statistics chart: i.e., which animals survived, what survival strategies worked or which type of food was most difficult to obtain, etc. Teachers may also choose from among the following questions to guide a discussion.

- **How did you feel playing this game? Do you think wild animals spend their lives feeling as excited as you did during the game?**
  In answering this question students may express elements of fear, weariness, and stress. The wilderness can be a difficult place to spend your life in.



- **Which is easier: being a predator or a prey?**
  A number of answers may result.

- **How many animals in the group survived the game?**
  Those animals that either succeeded in reproducing or obtained their full quota of food, water and life cards survived. A typical group might have between forty and sixty percent survival rate.

- **Could this game have gone on forever?**
  It depends. If the number of predators and prey were such that the populations were kept in balance, then the ecosystem might have sustained itself. However, if all of the predators selected for this game happened to be unusually fleet-footed, the bone pile would have filled up too fast for the game to continue.

  Most natural systems have been sustained for millennia; they tend to oscillate around a natural equilibrium that allows the "game" to go on for very long time periods.

- **What would happen if the numbers of predators in the game had been doubled?**
  It is possible that a trend may have become apparent even in a half-hour game. For example, if the predator/prey ratio had been 1:2 instead of the recommended 1:3, the prey would probably not have survived, leading to an unbalanced predator:prey relationship and a short game.

- **What animals did Disease choose to attack? Did these animals have any difficulties in obtaining sufficient food? Did any fail to reproduce due to their disability?**
  Prey animals will recognize that disease may only strike down certain species and affect their ability to survive.

- **What senses did you use during this game?**
  Most students will agree that they mainly used sight and hearing.

- **If this game had been played during the night, would you have used any different senses?**
  Students should realize that they would rely more on their sense of hearing at night. A keen sense of smell would also be useful at night.

- **How are some animals better suited to being active during the night?**
  Many animals have acute night vision and hearing, enabling them to find their food in the dark.

- **Did any of the predators tend to congregate in one spot?**
  In this game, predators frequently tend to congregate around the bone pile, since this represents the highest concentration of prey animals - especially when pairing is occurring. This is why the instructions call for flagging tape around the bone pile.

Predators also frequent the food and water stations, areas of great activity and opportunity.

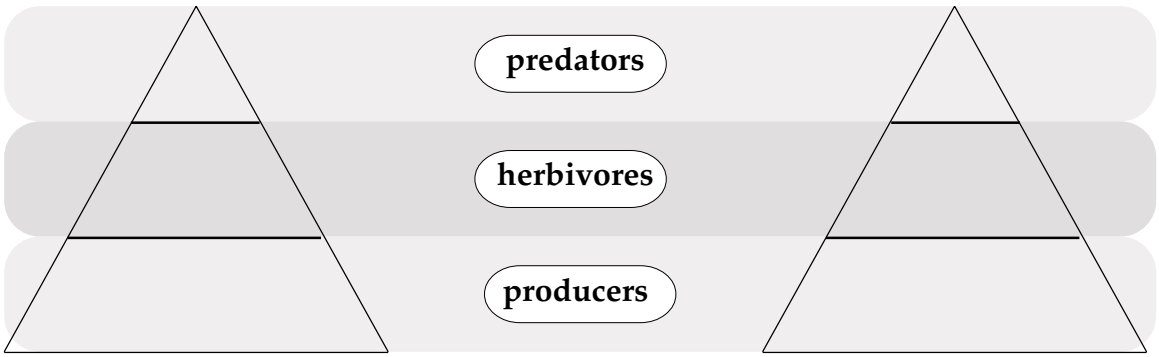
- **Recycling is an ongoing process in nature. What is recycled in the game? In nature, what is necessary before nutrients can return to the soil?**
  In the game, food and water cards are recycled. In the natural environment, food and water are consumed by living organisms and eventually recycled back into the system.

  Decomposers such as bacteria and fungi (e.g. mushrooms) break down any dead material so it can be reused. This decay process allows nutrients to return to the soil for plants to use. Decomposers allow recycling to occur.

- **What happens to the energy in a food chain?**
  Energy is used by living organisms to fuel their life processes. Only a small part of the energy taken in by an animal over its life span is stored; the majority is used by the animal to help it keep warm and perform bodily functions such as breathing, eating and moving. For this reason, the energy available to organisms at each successive stage of a food chain is always less than the total energy taken in by the preceding organisms. Energy, unlike most components in an ecosystem, does not recycle - it simply diminishes with each step in the food chain. Fortunately, with the sun as the ultimate source of energy, there is a considerable amount of energy remaining to fuel the food chains of today and tomorrow.

  The **Pyramid of Numbers** is a useful way to visualize this concept. Ask the students how many lynx (predators) there were, how many hares (herbivores), and how many food cards (producers) there were in the ***Eat or Be Eaten*** game. Numerically, the relationship appears as a triangle or pyramid of numbers, with the more numerous producers at the base of the triangle and the less numerous carnivores at the apex.

  A **Pyramid of Energy** exists as well: at each step of the pyramid there is less energy available, due to the energy that is used by the animals at each level and not passed on to the level above.



Number of Organisms **Amount of Energy Available**

- **What would happen to the animals in this area if a shopping centre was built here? What happens to the large and small plants and animals when their habitat is altered by human activities?**
  This may be an eye-opening question for some students, one which can be used to reinforce the concept of **habitat** and the effects of habitat alteration.

  NOTE TO TEACHER: This game can be modified to reflect the habits of diurnal (most active during the day) and nocturnal (most active during the night) animals - see Section 3.4 for details.

Teacher's Notes

3.3 ACTIVITY - FOOD WEB SIMULATION

The concept of a food chain is that of a linear progression of food consumption: a grass seed is eaten by a mouse, the mouse is eaten by a snake, the snake is eaten by a hawk. But snakes are not the only animals interested in mice. A food web shows all of the food connections or relationships in a community or ecosystem. Such a web can be shown by using a string to connect students representing different roles in an ecosystem.

Objective
Students will see and demonstrate an understanding of the complexity of a food web.

Curriculum Tie-Ins
See Section 1.4.

Time Required
The ***Food Web Simulation*** takes about 30 minutes to complete. The time required for the combined group of three field activities will vary, depending on the length of time for discussion and the age of the students. Plan on 3 to 4 hours to complete the three field activities.

Materials
- ❑ A ball of at least 100 m of twine, strong wool, or very thin rope for each group of 10 students
- ❑ 1 set of **Animal Figure cards** for each group of ten students.
  These are the same cards that were used in ***Eat or Be Eaten game***, except for three special cards contained in Appendix IV: plant, insect and sun cards. Therefore, the characters for this activity are hare, deer, grouse, squirrel, chickadee, lynx, red-tailed hawk, coyote, plant, insect, and sun.
- ❑ 1 large safety pin per student.

Instructions for the Teacher
1. This activity can be started after the discussion in the ***Eat or Be Eaten Game*** or it can stand on its own.

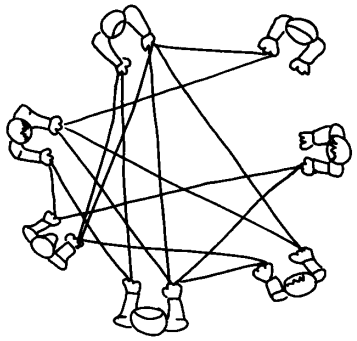
2. Divide the class into groups of ten. Have each group form a circle and hand out one set of Figure cards to each group. Have the students attach their card to the front with a safety pin. Give the **sun** student a ball of string. Have the student hold onto one end of the string and toss the ball to something in the circle that "feeds on" or needs the sun. (**NOTE:** Alternatively, students can sit on the ground and roll the ball of twine between them).

Tell the students that they can toss the ball either to an organism **that it eats or that it is eaten by** (i.e. the hare can toss the ball either to plants or to a coyote). When a student catches the ball of string have them unravel a few metres of string and grasp the loose string firmly before tossing the ball to the next student.

Supervise the process closely so that no organism is left out; eventually all of the students should be holding part of the string.

3. Ask students to note how a **web**-like pattern results, and how the interdependency joins everyone to the same rope - predators and prey alike.

4. Explain that a food web looks something like a spider's web, and that it is a complex system in which animals can be part of more than one food chain. For example, a hare can be eaten by a lynx, a red-tailed hawk, or a coyote.



5. To illustrate interdependence, have all of the organisms pull gently on their part of the web to take up the slack, and then have the hares drop their part of the rope. Next, have all of the animals who felt a slackening of the rope when this happened to raise their hands. Then have these students in turn drop their part of the rope. In a very short time, the rope is lying on the ground. This exercise illustrates the strong degree of interdependence that exists within a food web.

Discussion

6. Discuss how easily humans can influence a food web; for example, if all the chickadees, grouse and squirrels were poisoned by an insecticide found in the insects they ate, what would happen to the rest of the members of the food chain? Point out that activities such as farming, forestry, and urban development can cause major changes to the habitat on which wildlife depend, which then affects the food web.

7. Discuss **more diverse** versus **less diverse** communities:

- **What would be the advantage of having a food web with many different kinds of organisms in it as opposed to having a web composed of just a few organisms?**

  If a predator depended on a specific type of prey (as it would have to in a food web that contained **just a few** kinds of organisms) it would be greatly affected by a sudden decrease in the population of that prey. The predator would be less affected by a sudden decrease if there were more prey types (a more diverse food web) to choose from for food.

8. To sum up, remind students that in a ***Day in the Life*** each of them explored and investigated an animal habitat to determine how suitable the area was for a particular animal. They then became that animal in ***Eat or be Eaten***, a game in which they experienced the dynamics of meeting needs in animal communities. In the ***Food Web Simulation*** they created a picture of the interdependencies in a natural community.

NOTE TO TEACHER: At this point in the program you may choose to mention the post-field study activities which will be conducted back in class. Your choice of activity can reflect the concept(s) that you wish to emphasize, as a wrap-up to the field study.

Teacher's Notes

3.4 ADAPTATIONS AND MODIFICATIONS TO FIELD STUDY COMPONENTS

Night and Day Variation

To demonstrate to students how some organisms are better suited for daytime activity (diurnal), and some are better suited for the night (nocturnal), the teacher can make the following modifications to the activities:

The Eat or Be Eaten Game can be divided into two equal segments: the first segment represents day, the second segment represents night. At the beginning of the day segment, nocturnal animals (lynx and hares) can be issued something that will impede their vision; dark sunglasses, a blindfold over one eye or eyeglasses with small peepholes. After fifteen minutes, nocturnal animals can give the glasses or blindfolds to the diurnal animals (grouse, black-capped chickadee, and red-tailed hawk) who wear them for the duration of the **night** segment. This modification will demonstrate how some animals are better suited to be active during the day, and some are better suited to be active at night.

In an interesting variant of the day/night scenario, take the nocturnal prey (hare and deer) aside and suggest that they should try and hide during the daytime, only running to escape a predator in the event that a coyote or hawk stumbles upon them. Conversely, the diurnal prey (squirrels, grouse, and chickadee) should try to remain in one spot during the fifteen-minute night. This modification will demonstrate the advantage of an animal remaining quiet when not active and searching for food.

Simplifications for Grades 4 and 5

A Day in the Life

This activity can be conducted by dividing the class into groups of like animals. Each group could have one adult to assist them in working through the **Habitat Investigation cards.**

The Eat or Be Eaten Game

Instead of giving out individual **Animal Role cards**, give each student an animal figure. Apply the following rules to the game:

- The object of the game is to act out the life of the animal.

- **All animals** must find the three water stations and collect three blue cards. All prey animals are given two red life cards at the start of the game. You cannot pick up more than one card at a time from the same station.

- **All prey species** (grouse, deer, squirrel, chickadees and snowshoe hares) must find the three food stations and collect three green food cards. You cannot pick up more than one card at a time from the same station.

- **All predator species** (red-tailed hawk, coyote, and lynx) must eat a certain number of meals to survive. A meal is the same as one life card from one of the prey. Predators collect red cards by touching the prey and asking for one life card. You cannot take more than one life card from the same prey.

  Note: The teacher can decide on what the exact number will be by asking predators how many red cards they have, and setting the limit so that only some of the predators survive.

- A **shelter station** is established to give prey refuge. This is a place where the prey are safe. Predators must turn away and hunt elsewhere once their prey reaches the shelter station. Prey are allowed to stay in the shelter station for a count of ten, after which they must leave.

4.0 POST FIELD STUDY ACTIVITIES

4.1 ACTIVITY: KNOWING ABOUT NICHES

An interesting topic of ecology deals with the amazing adaptations that have occurred in the animal world to fill certain niches. For example, the long bill of a hummingbird enables it to draw nectar from flowers, and the feathers of owls allow for silent movement during flight. Niches are, in many ways, ample proof of the expression "nature abhors a vacuum": wherever life's ingredients reside, one can probably find something growing there.

Objective
Students will learn about ecological niches, and the development of natural adaptations to fill these niches.

Curriculum Tie-In
See Section 1.4.

Time Required
1-2 hours.

Instructions for the Teacher

1. Back in class, review the terms **adaptation** and **niche**.

ADAPTATION:	Any change in the way an organism appears or behaves that makes it better suited to its environment
NICHE:	The role that an organism occupies in a community. By way of analogy, teachers fill a special niche in our society by educating people.

2. In a circle have students pick a plant or animal and suggest what **adaptations** have occurred in that species to enable it to live in a specific habitat and carry out its role. Discuss the following questions with the class:

- **What niches do you think would be found in a forest/field/pond community?**
  Within each of these communities, one would find niches occupied by a variety of different producers, consumers and decomposers.

- **How many niches are found in a certain community?**
  There are many **niches** in any community.

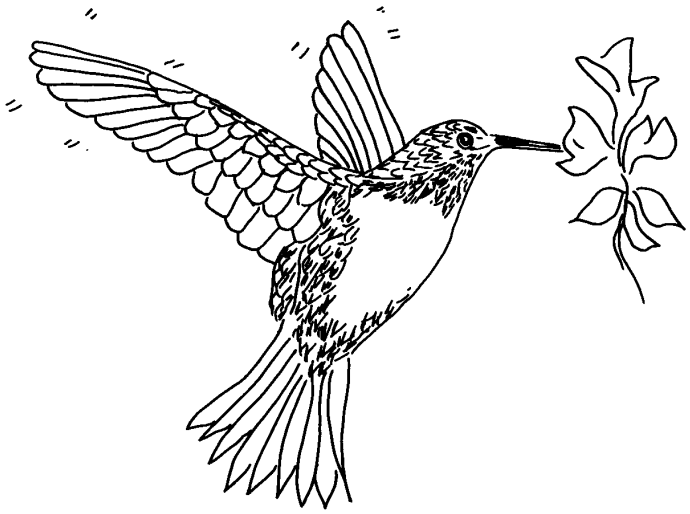
- **Do some niches require more adaptive specialization than others?**
  Yes. The niche of "flower-sipper" is filled by the hummingbird, an animal that has made a number of important adaptations to fill the niche (hovering ability, long bill,

etc.). Adaptations found in a jay, however, are less specific. We can also see this in the world of mammals. For example, a lynx relies chiefly on snowshoe hare populations in order to live in a certain area, whereas coyotes are more opportunistic and can survive in a variety of different habitats.

- **If an organism is more specialized than another, would this increase or decrease its ability to adapt to a change in its environment?**
  Specialized animals are less able to adapt to changes in their environment. In the natural environment, a coyote, who is not specialized in where it lives or what it eats, would have a better chance of surviving the removal of mice or voles from its environment than a lynx would have of surviving the removal of snowshoe hares.
  It might be useful to use the following analogy: a general carpenter has a better chance of finding a job and adapting to new situations or **niches** than a person specializing in cabinet finishing.

- **How does an organism "arrive" at its ecological niche; i.e., how does the hummingbird acquire its long bill?**
  The hummingbird acquired its long bill through a process of natural selection: birds with longer bills were more successful at sipping nectar from flowers than birds with short beaks. This question can open the door to the subject of change, in as much detail as is appropriate, by exploring the various theories of species' development and evolution.

Teacher's Notes



4.2 ACTIVITY: SHALL WE SPRAY?

"Give me the spots on my apples... but leave me the birds and the bees..."
Joni Mitchel

The issue of whether or not to use pesticides presents an interesting and pressing question for students to examine. Farmers often use pesticides because they are required by the consumer market to produce a commercially acceptable product... but what are the costs of this pesticide use to the farmer, the natural environment, and to the consumers of the product? Perhaps a debate would help students understand the issue better...

Objective
Students will demonstrate an understanding of the points of view involved in the issue of pesticides.

Curriculum Tie-Ins
See Section 1.4.

Time Required
one or two 40-60 minute periods

Materials
- ❑ chalkboard and chalk

Instructions for the Teacher
1. Read the dialogue ***Shall We Spray?***, included in this activity, to the class. A number of options are presented for discussion of this material.

2. **Options**

a) What Would You Do?
Discuss with the students how this situation would affect the food web which was examined on the field study. What would happen if the insect (or plant) cards that the students had "eaten" had been sprayed with pesticide? Ask students to write a short paragraph detailing what **they** would do ...

a) in the Wildlife Manager's position
and/or
b) in the farmer's position.

b) Point of View

Ask students to write a short paper or develop a collage, drawing, or poster that focuses on this issue in Canada. Emphasis can be on what they personally could do to help solve the problem. Have students share their solutions.

c) Debate An Issue

Have students debate the dilemma revealed in ***Shall We Spray?*** The following instructional guidelines for an in-class debate may be used:

- The teacher will act both as judge and timekeeper.
- Use three-person teams (if one person is absent the day of the debate the team can carry on).
- Students are to prepare either the "for" or the "against" position.
- Students (or teacher) may either select a group spokesperson or take turns being the spokesperson.

The following table gives an outline for the debate structure:

time allowed (minutes)	**phase of debate**	**description**
3	constructive speeches	each team attempts to justify their position on the issue
2	break	prepare discussion questions
5	discussion	teams ask questions of each other that challenge the other's point of view
2	break	prepare rebuttal statement
2	rebuttal	each side attempts to reject the attacks made upon it

Teacher's Notes

"SHALL WE SPRAY?"

"Those pesky insects have to be stopped before they destroy the whole apple crop. Whenever one of those bugs bites into an apple, it leaves a spot ... doesn't hurt the fruit a bit, but it marks the skin and people just won't buy a spotted apple. If we don't get in there and spray soon we will lose the crop," stormed the farmer.

"I understand your problem," replied Bob Hartley, the local Wildlife Manager, "but you can't use the poisons you have in mind. I know they're very effective in protecting your apples, but poisons last a long time and travel through the food chain. They destroy the animals that eat the insects. For example, we have a lot of different kinds of birds nesting and feeding in the apple orchard. When they eat insects that are dying from the poison - and one bird may eat hundreds in a single day - the birds get a terribly heavy shot of the stuff. If it doesn't kill them directly, it affects them sooner or later. The poison thins their egg shells or weakens the newly-hatched birds. And when we lose the birds and all the other creatures that also eat insects we **really** get an explosion of insect life — not just in the apple orchard but in the whole neighbourhood."

"But this is the only stuff that works fast enough and hits hard enough to do the job," the farmer explained. "When those bugs hatch, we are in trouble right away. I sure don't want to bother those birds, or those other animals either; but my livelihood depends on this fruit being top quality. If I don't spray, my kids don't eat."

(adapted from "Thinking Globally, Acting Locally: Environmental Education Teaching Activities", ERIC Clearinghouse for Science, Mathematics, and Environmental Education, Columbus, Ohio)

4.3 REVEL IN RECYCLING

By recycling the earth's nutrients, decomposers play a vital role in our environment. If the world had no decomposers, all the dead matter and organic waste ever produced would still be around. Life-sustaining nutrients would become a non-renewable resource that would eventually be depleted.

This activity draws an analogy between decomposers (the organisms that recycle the world's nutrients) and humans, who could (and should) recycle the waste that they create, making it a renewable resource.

Objective
Students will draw a parallel between recycling in the human world and in the natural world, and thereby realize the importance of recycling to our society.

Curriculum Tie-Ins
See Section 1.4.

Time Required
1-2 hours (plus at-home work).

Materials
- ❑ several aluminium cans.

Instructions for the Teacher
1. Ask the students:

   - **What happens to a leaf once it hits the ground?**
     Introduce the notion that there are decomposers (bacteria, fungi, etc.,) that are involved in breaking down the leaf.

   - **What would happen if there were no decomposers?**
     If the world had no decomposers, all the dead matter and organic waste ever produced would still be around.

2. Hold up several aluminium cans. Ask the class:

   - **What should I do with these empty cans? Do they have to become garbage?**
     Garbage has to be put somewhere, and we are running out of places to put it. Each person produces about two kilograms of garbage per day. One way to help the environment is to reuse or recycle products rather than tossing them away. Just as the leaf is recycled, so can many of the products that we use everyday. Aluminium is worth money when it is recycled. Since there is only a limited supply of aluminium ore (bauxite) in the earth, collecting aluminium cans for recycling is one way students can help the environment.

3. Not everyone recycles. Ask the students:
   - **What prevents humans from recycling newspapers, glass, and aluminium on a regular basis? Is it because we are lazy or don't care - or do we just not know *how* to recycle?**
   - **In what ways does recycling help the environment?**
   - **How might your home and community be affected by your recycling efforts? How might the world be affected?**

4. Introduce students to the four R's: Reduce, Reuse, Recycle and Refuse. Ask the students what is meant by these terms and have them give some examples. Here are some examples.

- **Reduce**: reduce the amount of materials thrown away (e.g., by writing on both sides of the paper)
- **Re-use:** finding a new use for old materials (see below).
- **Recycle:** allow waste materials (e.g., used paper) to be turned into new materials.
- **Refuse:** use consumer power; don't purchase materials that are not environmentally friendly (e.g., candy that is over-packaged).

5. To begin class efforts in waste reduction, begin with **reuse**. Ask students to copy the following chart into their notebooks. For the next week have the students fill in the chart by conducting a home survey and citing examples of **new uses** for **old products**.

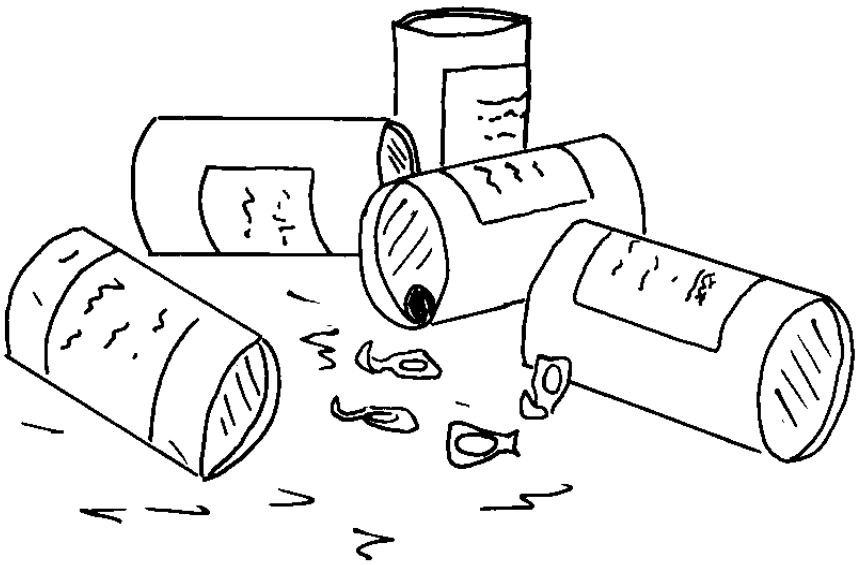
NEW USES FOR OLD PRODUCTS

PRODUCT	OLD USE	NEW USE	ENVIRONMENTAL BENEFIT
1. cracked coffee mug	beverage container	pencil holder	no solid waste
2.			
3.			
4.			
5.			
6.			
7.			

6. After the students have filled in their charts (based on what they found in their household) have them place their ideas on new uses for old products on a class list. Compile the list and make it available for students to discuss with their parents.

7. Complete the activity by reviewing the role of decomposers and discussing how we can act as "decomposers" with our own waste materials.

Teacher's Notes:



4.4 OTHER ACTIVITY IDEAS

- Make up a display on different animals, highlighting their food, their water source, and their shelter. Title it **Animals and Their Needs**.

- Have students **adopt-a-habitat** in the schoolyard or nearby community. They can find an area that can be improved to benefit both wildlife and the community. After a general discussion, students could outline a plan of action, including the location of the improvement site, the goals of the project, and a hand-drawn map of the area. Other items in the outline could include:

  1. cost of improvement
  2. help available from the town or city
  3. wildlife living in the area
  4. plant life in the area
  5. major improvements needed for the site (planting more trees, shrubs, cleaning up the area, introducing wildflowers, etc.) and
  6. possible funding sources for the project.

  Display the maps, and plan and discuss what seems realistic and what does not. Consider the feasibility of implementing the plan.

- Have each student write a short poem or story based on what they have learned from the field study. Students can write something that is light-hearted, humorous, exciting or interesting. This could be accompanied by a picture if desired.

  Compile these into a booklet or paste them onto a large piece of newsprint. Put them up in the school hallway or in your own classroom as a reminder of your field study experience.

5.0 *ECOLOGY CONNECTION* - PROGRAM EVALUATION

Kananaskis Country Environmental Education materials have been developed to provide you with teacher-directed units of study. These are *living documents* that undergo changes on a continual basis.

The purpose of this questionnaire is to find out if these materials are meeting your teaching needs. Your comments are valuable to us. Please take a few minutes to complete this evaluation so that we may continue to improve your materials.

School name	Grade level taught	Your name (optional)
_____	_____	_____

★ How did you hear about the program?
❑ workshop ❑ administration ❑ in-service ❑ newsletter ❑ fellow teacher
❑ other (please specify)_____

★ Did you use all of the program? ❑ yes ❑ no

If you answered **no**, which part did you **not** use and why?

_____

★ On the bar line below how would you rate the program in the following categories:

	YES				NO
• **appropriate for grade level** (✔)	├	┼	┼	┼	┤
• **clear instructions**	├	┼	┼	┼	┤
• **text easy to follow**	├	┼	┼	┼	┤
• **relevant to curriculum**	├	┼	┼	┼	┤
• **materials easy to use**	├	┼	┼	┼	┤
• **did you enjoy the material**	├	┼	┼	┼	┤
• **did your students like the material**	├	┼	┼	┼	┤
• **program of appropriate length**	├	┼	┼	┼	┤

★ Approximately how long did it take you to complete these materials?

❏ 1-2 weeks ❏ 3-4 weeks ❏ 5-6 weeks ❏ longer than one month

❏ program was spread over the year

★ Were you satisfied with how these materials fulfilled the curriculum objectives?

❏ yes ❏ no

If you **were not** satisfied, please elaborate: _____

_____

★ Did you require any additional information to complete any part of the program?

❏ yes ❏ no

If **yes** please tell us what was required:

_____

_____

★ Would you use these materials next year?

❏ yes ❏ no

If you answered **no** please tell us why:

_____

_____

★ Any additional comments about the program in general?

_____

_____

Thank you for completing this questionnaire. Please place the completed questionnaire in an envelope and mail to:

Environmental Education Coordinator
Alberta Environment, Natural Resources Service
Kananaskis Country
Suite 201 - Provincial Building
800 Railway Avenue
Canmore, AB T1W 1P1

APPENDICES:

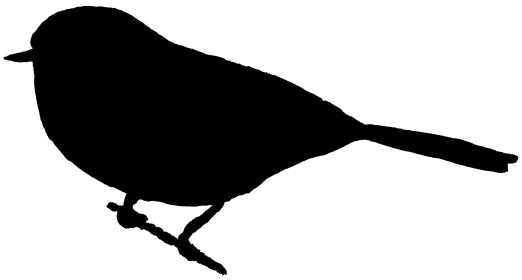
I HABITAT INVESTIGATION CARDS

II ANIMAL ROLE CARDS

III ANIMAL FIGURE CARDS

IV GAME RULES

V EXTRA CARDS FOR FOOD WEB GAME



Chickadee

❑ Shelter

Chickadees live in forests and open areas with trees. They nest and roost in evergreens sheltered from the wind and the snow. Can you find the trees that chickadees use for shelter?

❑ Evergreen trees have needles which they keep all winter, and produce cones.

Does this area meet the shelter needs of Chickadee's ? If so, check off the shelter box

❑ Water

Chickadees obtain their water from the foods they eat and from streams and small puddles. Can you find any of these sources of water in your area? Explain: _____

_____

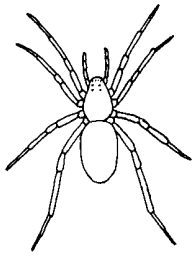
_____

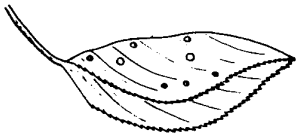
(check off the water box)

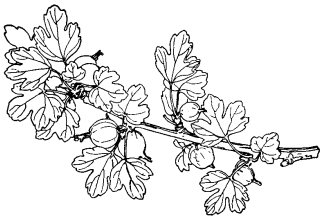
❑ Food

Chickadees search tree twigs for tiny insects, insect eggs or small fruit to eat. Have a close look at the branch of a tree. Do you see any of the following types of food?

❑ spiders or adult insects ❑ insect eggs ❑ small fruit (strawberry, raspberry, gooseberry)







Does this area meet the food needs of Chickadees? If so, check off the food box at the top of the page.

Habitat is the word we use to describe an area that an animal uses to satisfy its basic needs of food, water, and shelter. How does this area rate as habitat for your animal?

Habitat ❑ excellent ❑ good ❑ poor ❑ terrible

Red Squirrel

❑ Shelter

Red squirrels live best in areas where most of the trees are coniferous: trees with cones and needles instead of leaves. Can you find these trees in your study area?

❑ Evergreen trees have needles which they keep all winter, and produce cones.

Red squirrels need holes and cavities for protection from predators and to raise their young.

Do the trees in this area have these? ❑ yes ❑ no. Describe the cavity: _____

_____

_____

Does this area meet the shelter needs of Red Squirrels? If so, check off the shelter box.

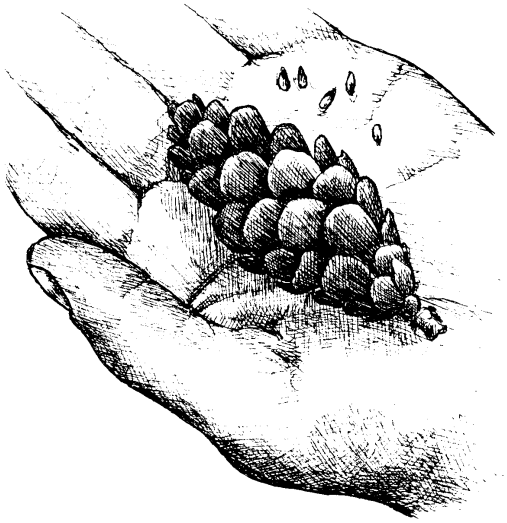
❑ Water

Name one source of water that squirrels could use which is found in the area _____ (check off the water box)

❑ Food

Find a tree that has a lot of pieces of cones under the tree. Squirrels eat the seeds that are found in cones. Look around for a whole cone. Is the cone light brown or dark brown?

_____



A dark cone has been off the tree longer than a light cone. Find a light brown cone. Tip it upside down over your hand, and hit the top of the cone against your palm—you may find a seed falling into your hand!

Does this area meet the food needs of Red Squirrels? If so, check off the food box at the top of the page.

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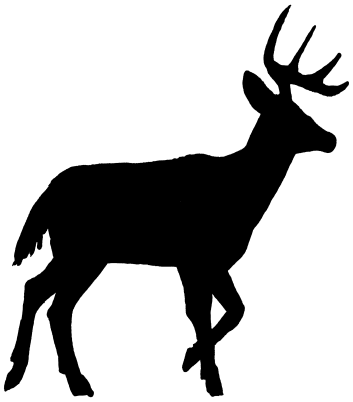
Habitat ❑ excellent ❑ good ❑ poor ❑ terrible

White-Tailed Deer



❑ Shelter

The natural enemies of deer are cougar, lynx, wolves, and coyotes. Look for an area where you think deer could find shelter and be safe from these predators. Describe this place in a few words.

_____

_____

Are there bushes in the area to hide a young fawn while its mother looks for food?_____
Are there dense bushes and trees to act as a windbreak when cold winter winds blow? _____
Does this area meet the shelter needs of White-Tailed Deer? If so, check off the shelter box.

❑ Water

Name one source of water that deer could use which is found in the study area.
_____(check off the water box)

If there is an area of soft ground near the water, check it for deer tracks.

Next, go to an open sunny area. Are there plants growing there?
❑ area is covered ❑ half the area is covered ❑ less than half is covered

Which of the following areas would you go to if you were a hungry deer?
❑ shady area ❑ sunny area ❑ area with aspen or poplar trees ❑ area with willow trees /shrubs

❑ Food

Check off any of the following food sources that are found in the area.
❑ grasses ❑ tender twigs and shoots ❑ deciduous leaves

Does this area meet the food needs of White-Tailed Deer? If so, check off the food box.

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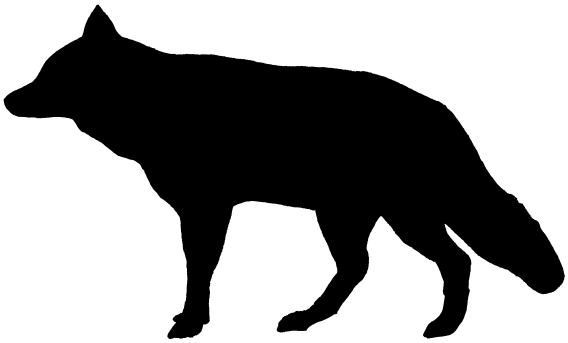
Habitat ❑ excellent ❑ good ❑ poor ❑ terrible



Coyote

❑ Shelter

Coyotes can be found in all parts of Alberta.
Can you find a stream or river close by?

❑ yes ❑ no

Coyotes like to find shelter on the banks of a stream, digging tunnels in the soft soil. Find a place where you think a coyote could live:

❑ a cave ❑ a hollow tree trunk

❑ on the banks of a stream in a concealed spot

Does this area meet the shelter needs of Coyotes? If so, check off the shelter box.

❑ Water

Name one source of water for coyotes that is found in this area._____

(check off the water box)

❑ Food

Coyotes prefer to eat small animals or carrion. Can you find any of the following coyote foods?

❑ Evidence of field mice or snowshoe hares (look for grass for them to eat)

❑ snowshoe hares

❑ carrion (dead animals)

❑ insects (grasshopper, butterfly)

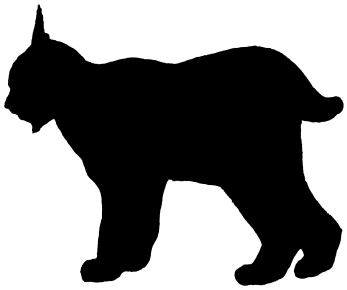
Does this area meet the food needs of Coyotes? If so, check off the food box at the top of the page.

Habitat is the word we use to describe an area that an animal uses to satisfy its basic needs of food, water, and shelter. How does this area rate as habitat for your animal?

Habitat ❑ excellent ❑ good ❑ poor ❑ terrible

Sit in this place for a few minutes (if you are near a stream, stay away from the water). Give one reason why you think this would be a good place to live if you were a coyote:

_____



Lynx

❑ Shelter

Lynx live in the forested areas of Canada and may be found in areas where its main food, the snowshoe hare, lives. The following areas are where snowshoe hares live. Check off any of the following that you can find:

❑ aspen or poplar trees ❑ deadfall (underbrush, etc.) ❑ young spruce or pine trees

❑ willow bushes

❑ wildrose bushes

Does this area meet the shelter needs of the Lynx? If so, check off the shelter box.

❑ Water

Name one source of water for the lynx that can be found in this area

_____ (check off the water box)

❑ Food

Lynx stalk and ambush their prey at close range. Hares are often ambushed beside well-used trails. Snowshoe hare trails can be found by looking for trampled grass and vegetation. Do you see any trails where a lynx might ambush a snowshoe hare? Do you see any other evidence of snowshoe hares?

❑ animal trails ❑ hare droppings (actual size) ❑ hare tracks

Does this area meet the food needs of Lynx? If so, check off the food box at the top of the page.

❑ Space

Lynx are shy animals, and are easily scared away by the presence of humans. They are also mainly nocturnal (this means they are more active at night). Does this area meet a lynx's need for space?

❑ yes ❑ no

Habitat is the word we use to describe an area that an animal uses to satisfy its basic needs of food, water, and shelter. How does this area rate as habitat for your animal?

Habitat ❑ excellent ❑ good ❑ poor ❑ terrible

Red-Tailed Hawk

❑ Shelter

Red-Tailed Hawks live along the edge of forested areas where it hunts for prey. During nesting season it is always found near trees. The nest is made from twigs and branches, and is found high in the tree tops. Look at your area and put a check mark if it has the following:

Forest

❑ aspen and poplar

balsam poplar

❑ pine or spruce

Open Country

❑ grassland

❑ bushes or shrubs

Does this area meet the shelter needs of Red-Tailed Hawks? If so, check off the shelter box.

❑ Water

Name one source of water f the hawk that can be found in this area.

_____ (check off the water box)

❑ Food

Feeding is done in the open country, where the hawk searches for mice and voles. Are there grasses in your area that mice and voles could eat? Is there any long grass for them to find shelter in?

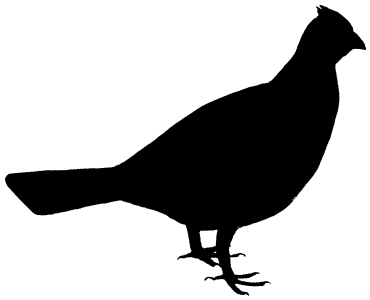
❑ long grass

❑ other evidence of mice and voles

Does this area meet the food needs of Red-Tailed Hawks? If so, check off the food box at the top of the page.

Habitat is the word we use to describe an area that an animal uses to satisfy its basic needs of food, water, and shelter. How does this area rate as habitat for your animal?

Habitat ❑ excellent ❑ good ❑ poor ❑ terrible



Ruffed Grouse

❑ Shelter

Ruffed grouse take shelter in a variety of dense bushy places, including areas which have been recently disturbed by fire or logging. Check off any of the following that you can find:

❑ deadfall (underbrush, etc.)

❑ young spruce or pine trees

❑ willow bushes

Does this area meet the shelter needs of Ruffed Grouse? If so, check off the shelter box.

❑ Water

Name one source of water for ruffed grouse that is found in the area.

_____ (check off the water box)

❑ Food

Grouse eat different foods in summer and winter. Check off any of the following that you can find: (Summer)

❑ clover ❑ seeds ❑ berries ❑ flowers ❑ insects

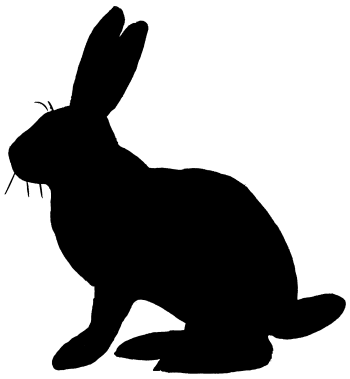
caterpillar

Does this area provide enough food for grouse to survive both summer and winter?

Habitat is the word we use to describe an area that an animal uses to satisfy its basic needs of food, water, and shelter. How does this area rate as habitat for your animal?

Habitat ❑ excellent ❑ good ❑ poor ❑ terrible

Snowshoe Hare

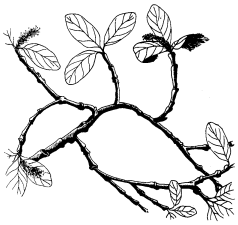


❑ Shelter

Snowshoe hare take shelter in areas with thick undergrowth: wetland areas and riverside thickets. Forests that have been recently disturbed by fire provide both food and protection. In a mixed forest look for the following trees and bushes. Check off any of the following that you can find:

❑ aspen or poplar trees ❑ deadfall (underbrush, etc.) ❑ young spruce or pine trees

❑ willow bushes



❑ wildrose

Does this area meet the shelter needs of Snowshoe Hares? If so, check off the shelter box.

❑ Water

Name one source of water for snowshoe hares that is found in this area.

_____ (check off the water box)

❑ Food

Check off any of the following that you can find *(summer)*:

❑ strawberry ❑ dandelion ❑ clover

Winter

small buds and twigs of the following bushes:

❑ aspen ❑ willow bushes

Does this area meet the food needs of Snowshoe Hares? If so, check off the food box at the top of the page.

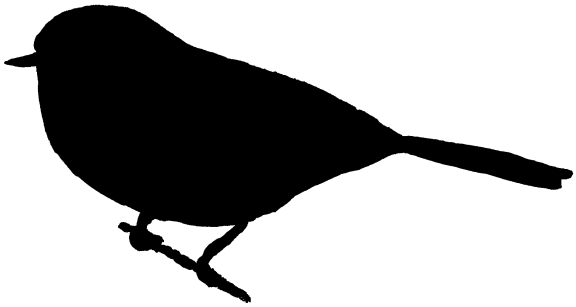
Habitat is the word we use to describe an area that an animal uses to satisfy its basic needs of food, water, and shelter. How does this area rate as habitat for your animal?

Habitat ❑ excellent ❑ good ❑ poor ❑ terrible

Chickadee

As a chickadee, your survival depends on finding one plant stations, all three insect stations, and all three water stations. Each station contains cards that are labelled with a different number. You must pick up only one from each station.

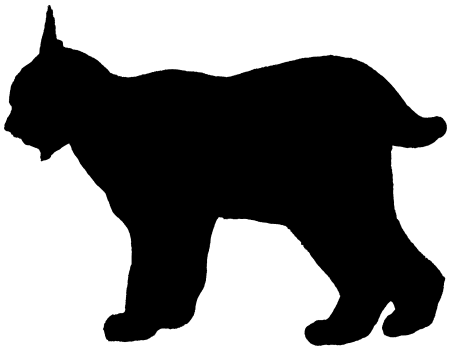
Survival is also dependent on not becoming food for lynx, coyote, or red-tailed hawk. You must also try to avoid disease and famine!



Lynx

As a lynx, your survival depends on capturing at least 10 life cards from the prey species. You must also find all three water stations. Each station contains cards that are labelled with a different number. You must pick up only one from each station.

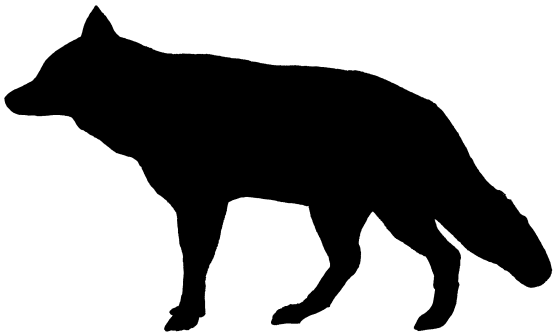
You must also try to avoid disease!



Coyote

As a coyote, your survival depends on capturing at least 10 life cards from the prey species. You must also find one plant station and all three water stations. Each station contains cards that are labelled with a different number. You must pick up only one from each station.

You must also try to avoid disease!



Red-tailed hawk

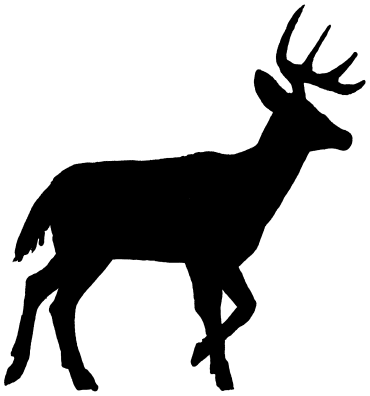
As a red-tailed hawk, your survival depends on capturing at least 10 life cards from the prey species. You must also find all three water stations. Each station contains cards that are labelled with a different number. You must pick up only one from each station.

You must also try to avoid disease!

Deer

As a deer, your survival depends on finding all three plant stations and all three water stations. Each station contains cards that are labelled with a different number. You must pick up only one from each station.

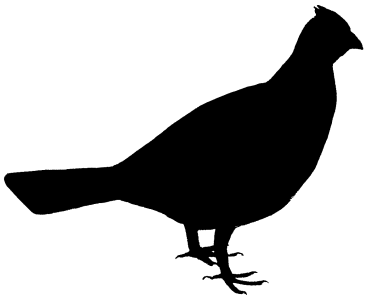
Survival is also dependent on not becoming food for lynx or coyote. You must also try to avoid disease and famine!



Grouse

As a grouse, your survival depends on finding two plant stations, two insect stations, and all three water stations. Each station contains cards that are labelled with a different number. You must pick up only one from each station.

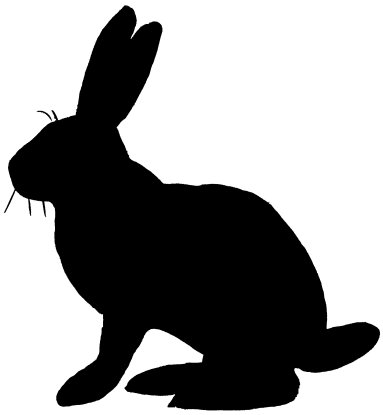
Survival is also dependent on not becoming food for lynx, coyote, or red-tailed hawk. You must also try to avoid disease and famine!



Snowshoe Hare

As a snowshoe hare, your survival depends on finding all three plant stations and all three water stations. Each station contains cards that are labelled with a different number. You must pick up only one from each station.

Survival is also dependent on not becoming food for lynx, coyote, or red-tailed hawk. You must also try to avoid disease and famine!



Squirrel

As a squirrel, your survival depends on finding two plant stations, two insect stations, and all three water stations. Each station contains cards that are labelled with a different number. You must pick up only one from each station.

Survival is also dependent on not becoming food for lynx, coyote, or red-tailed hawk. You must also try to avoid disease and famine!

DISEASE

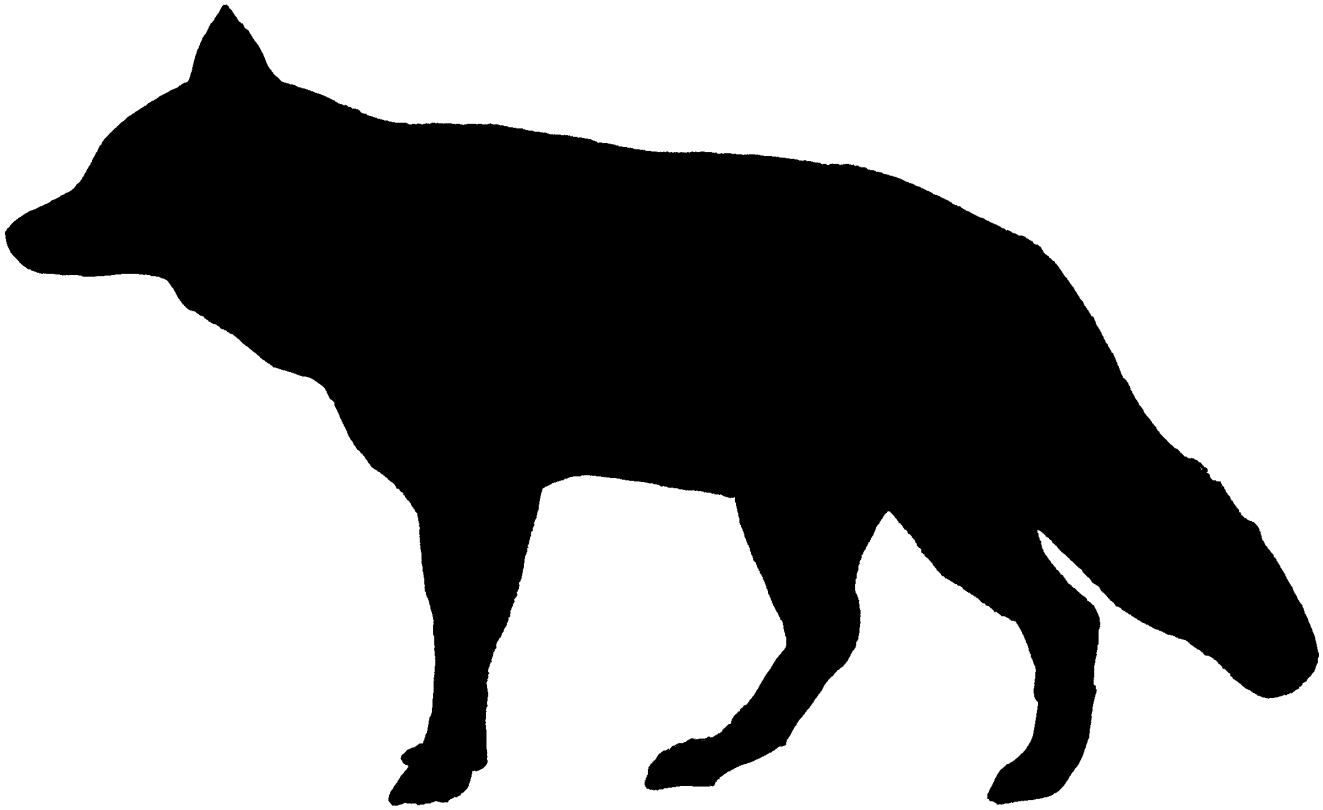
As disease, you have the ability to cripple animals so that they will have difficulty avoiding predators and meeting their food and water requirements. By tagging animals, you cause them to acquire a "disease" that results in them not being able to use their hands. To do this you will tie their hands together with rope in front of their bodies.

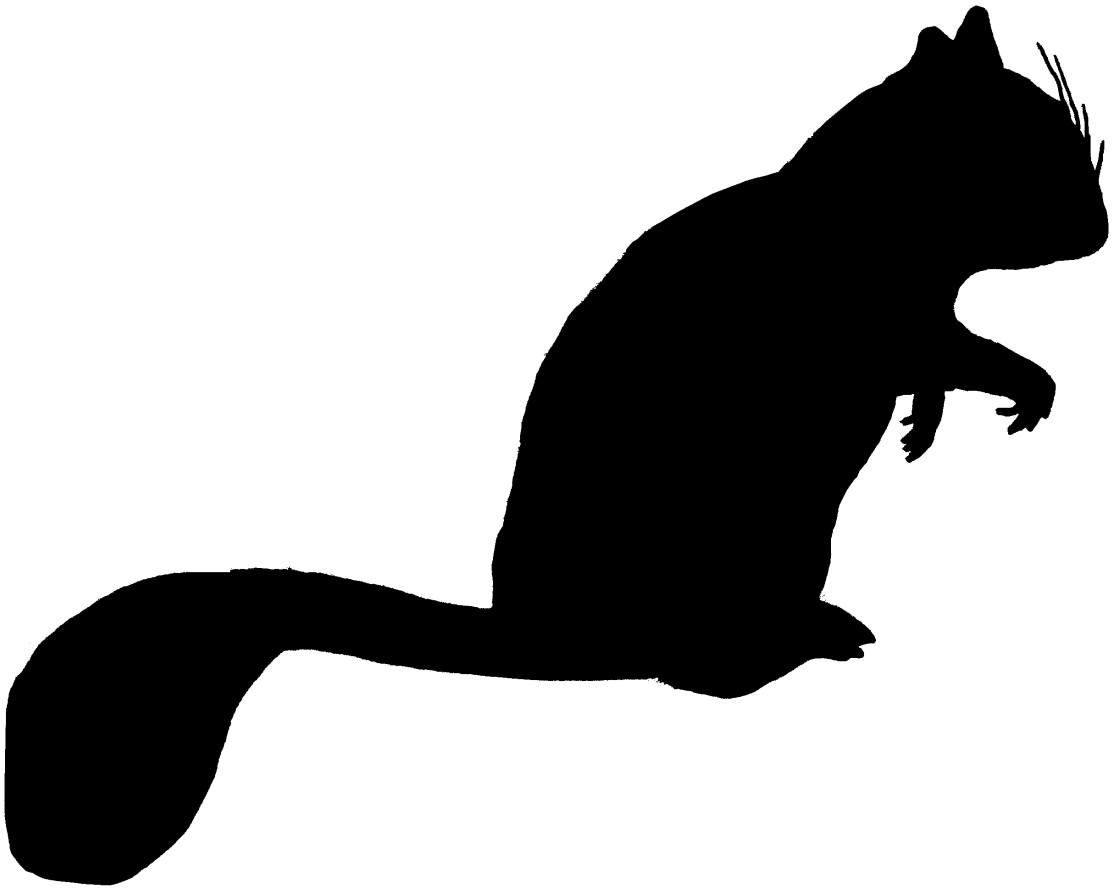
Choose only **one** species of prey (chickadee, grouse, hare, squirrel, or deer) and only **one** species of predator (lynx, coyote, or red-tailed hawk). Try to tag all members of that species. Remember, only you will know which species will fall victim to the dreaded "disease"...

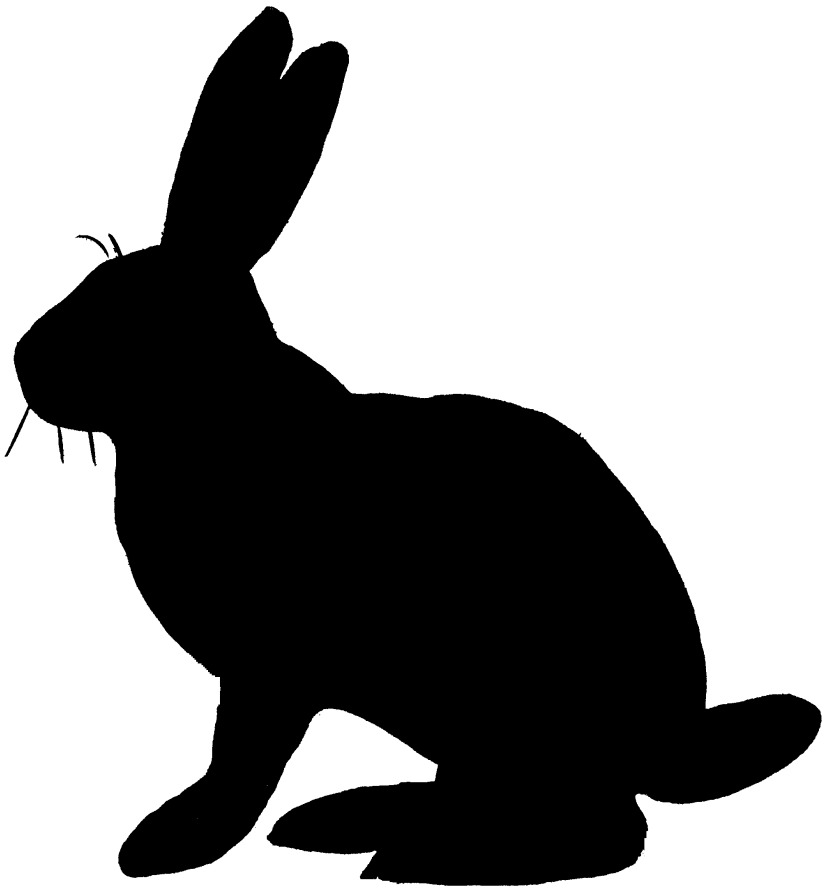
FAMINE

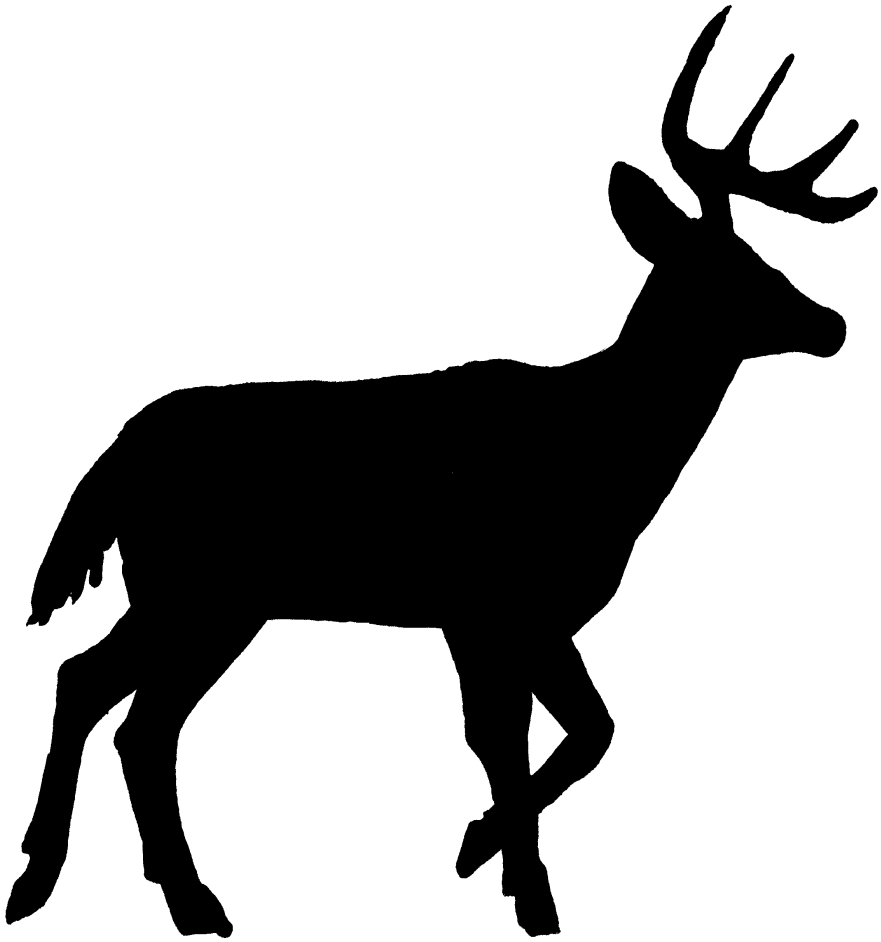
As famine, you have the ability to eliminate prey animal species due to starvation. Choose **two** species of prey (chickadee, grouse, hare, squirrel, or deer) and try to tag all of the members of these two species. By tagging animals, you cause them to be affected by a famine and you may take away all of the food cards that they have acquired (green plant cards or brown insect cards).

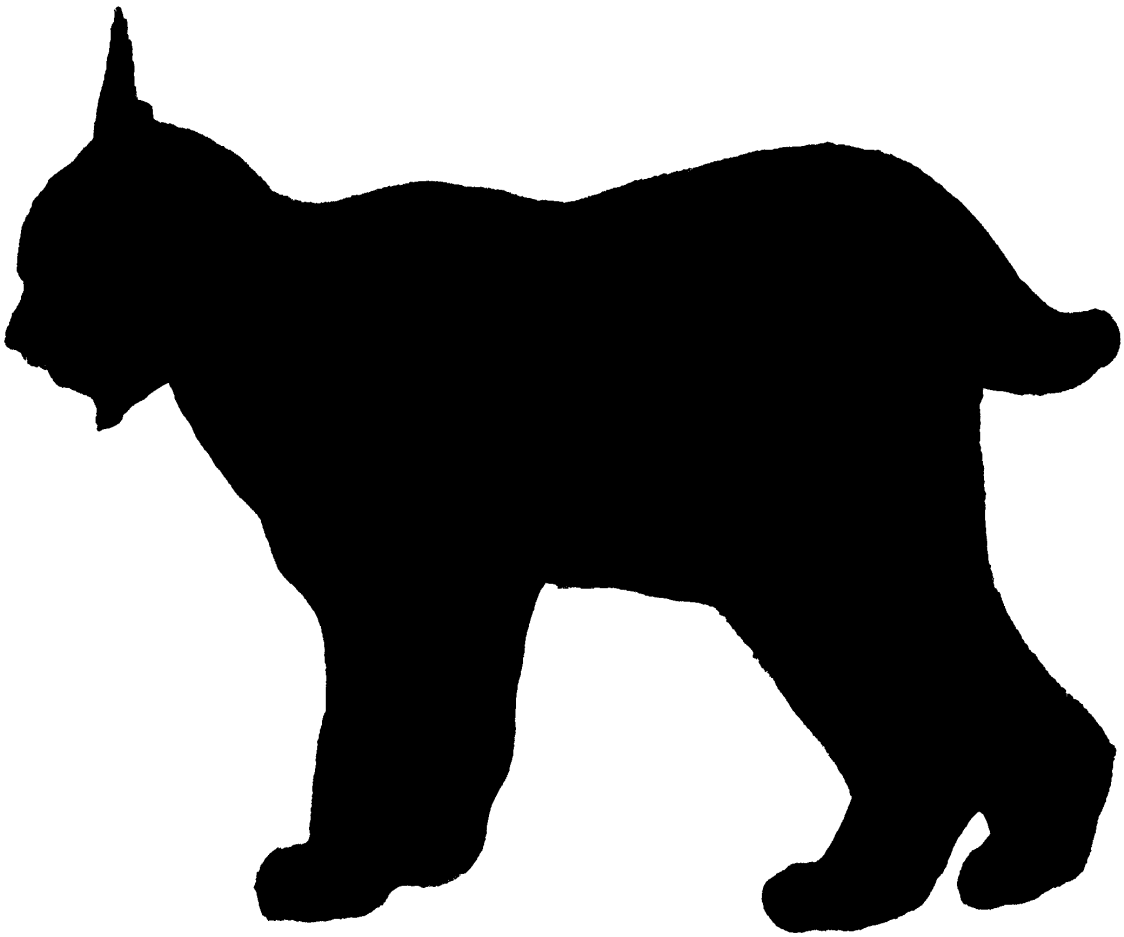
As you collect these cards, bring them to the box marked "recycled cards" every five minutes. This box is located in the "bone pit". Good luck in trying to keep two prey species as hungry as possible!





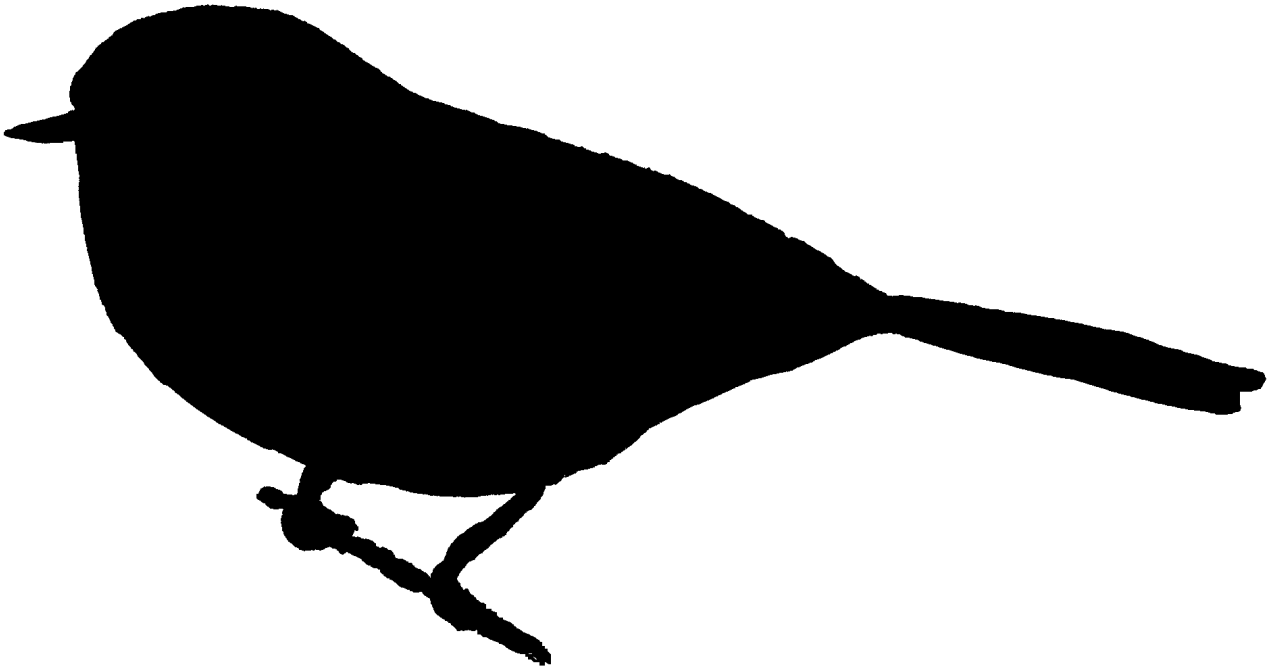


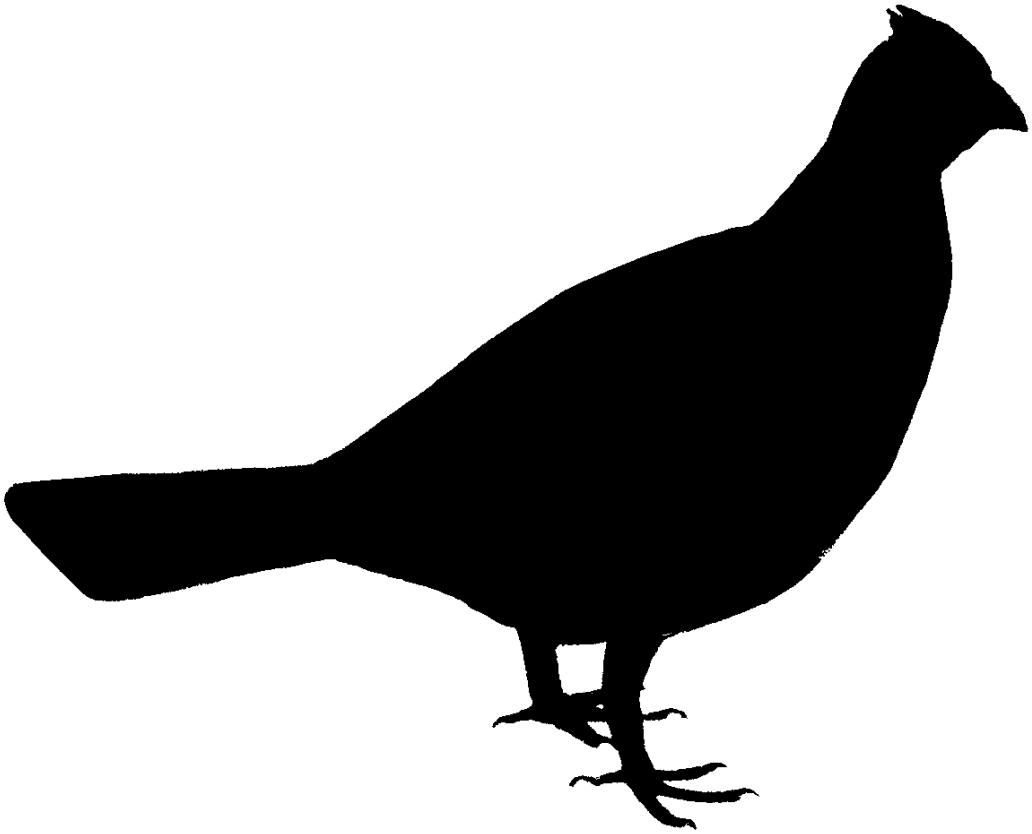




DISEASE

FAMINE





APPENDIX IV: GAMES RULES FOR "EAT OR BE EATEN"

a. The game lasts 30 minutes.

b. Each student should have one Animal Role card and two food cards for the game.

c. Each student must wear the labeled Animal Figure card given to him/her.

d. Each student must explain his/her water and food requirements based on their Animal Role card.

e. When a predator tags a prey, the prey must give up one of his/her food cards to the predator. The prey can not struggle, put up a fight.

f. If a prey animal loses its food cards, that animal must go to the bone pile and wait release by two animals of the same species.

g. An animal can only pair with another if both animals have food and water requirements. The way animals pair is by finding another animal of the same species that has food and water requirements. The two animals then can proceed to the bone pile and release an animal of the same species.

h. When two animals release their animal from the bone pile, all three must leave their food and water cards in the container marked *Recycled*.

i. If a predator and prey animal are within the same area, they must struggle for food. If struggling fails, the prey must give up one of its food cards.

j. If an integrator animal, the animal must give up all its food cards (grown in the green plant cards).