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Animal Tracks Habitat Action Pack

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Authors

Rhonda Lucas Donald, Marsha A. Lakes Matyas, Sara Bradley, Cheryl Dixon, Elenor Hodges, Jennifer Kier, Margaret Tunstall, and Charles Wilkinson

Follow the Tracks...

*Animal
Tracks*

Habitat
action pack

...To Action

200
GC
DON
1998



NATIONAL WILDLIFE FEDERATION®





Animal Tracks®

HABITAT

Action Pack

April 7, 1998

NSLC
c/o ETR Associates
4 Carbonero Way
Scotts Valley, CA 95066

Animal Tracks® Habitat Action Pack

Written by Rhonda Lucas Donald

K-2 component written by Marsh A. Lakes Matyas

Edited by Sara Bradley, Cheryl Dixon, Elenor Hodges, Jennifer Kier, Margaret Tunstall, and Charles Wilkinson

Spanish translation by Education Consulting Services

The **National Wildlife Federation** (NWF) unites people of all walks of life to conserve our land, water, and wildlife in our own communities and around the world. Since our beginning in 1936, NWF has believed that educating people about conservation is the best way to encourage them to practice it. We act on this belief with programs that make conservation understandable and accessible to all.

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Other Animal Tracks Action Pack Titles:

Northern Forest

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People and Nature: Our Future is in the Balance

NATIONAL WILDLIFE FEDERATION

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Dear Educator:

Welcome to **Animal Tracks**®, a classroom education program of the National Wildlife Federation focusing on teacher training and environmental education resources. In Animal Tracks materials, the animals and their tracks lead educators and students on an exploration of conservation issues.

Thank you for using this Action Pack, our newest resource. We hope you find the Action Packs useful and because this is a “work-in-progress,” we welcome any comments you might have for improvements. As you turn the page you’ll see our questionnaire. Please take a minute to fill it out and put it in the mail. We’ll include you on our mailing list and you’ll get invitations to any Animal Tracks educator workshops that we hold in your area as well as the latest information on Animal Tracks programs and materials.

Animal Tracks Workshops are a large part of the Animal Tracks program. The Action Pack series was originally developed as our teacher training module. The workshops are designed to help teachers easily fit environmental and conservation issues into their lesson plans across the curriculum. Animal Tracks workshops emphasize learning by doing and include an interactive discussion of how to successfully incorporate action projects into learning.

Animal Tracks has educator materials and information available **online** at <http://www.nwf.org/atracks> including the Water and Habitat Action Packs, Current Events Hotline, information about NWF’s EarthTomorrow® program for Detroit area schools, Environmental Education Online Conference, Animal Tracks Workshop schedule, and Animal Tracks Online classroom activities. There are also Animal Tracks kids’ pages at <http://www.nwf.org/nwf/kids/> with our *Cool Tour of the Environment*, Ranger Rick® site, resources in *Spanish*, games, and more fun.

The next pages of the Action Pack are a questionnaire and an explanation about how to effectively use the Animal Tracks Action Packs. Again, we hope you find this a valuable resource and be sure to check out all the Animal Tracks Action Pack titles!

Sincerely,
The Animal Tracks Staff

Welcome to the Animal Tracks Action Pack!!!

Each action pack is specifically designed to be an introductory unit for educators that work with students in grades K-8. The Animal Tracks theme of *Follow the Tracks to Action* is reflected in each Action Pack as the section works together to compliment the learning process. Students are taken from *Discovery* of the topic to *Awareness* of the issues related to the topic and then encouraged to take individual *Action* to positively impact the environment. To maximize comprehension of the topic, we recommend using the Action Pack as a unit, but activities can also be used separately to enhance other units.

Following is a description of each section of the Action Pack and suggestions for using the sections together as a unit.

Discovery section - provides a *quick look* at the background information surrounding the topic. It also contains *fun facts* to engage the interest of your students. The learning objectives contained in the discovery section help you include the activities of the Action Pack into the curriculum.

Awareness section - contains several indoor and outdoor activities for students in grades K-8 which can be used consecutively in a unit or individually to enhance other units. These activities illustrate key environmental concepts through fun-filled and challenging cross-curricular lessons. A ready-to-copy Kids' Page is included for individual student work. As a special bonus all student pages, including the Kids' Page, are translated into Spanish for content accessible to ESL students or foreign language classes.

Action section - uses step by step guidelines for environmental action and service learning projects to help students go the next step in understanding complex issues. This section contains worksheets for students to plan their action projects. A case study features an action project implemented by students to heighten community awareness of their environment. Also included, are a number of ideas for projects to help get groups started.

Appendices section - provides educators with quick references and resources to help in the planning of the unit. These appendices include a glossary, guide to additional activities, resources for teachers and children, related organizations and web sites, opportunities for getting recognized, and information on other NWF education programs.

Special Features:

- ▶ Special activities just for early elementary (K-2) students
- ▶ Kids' Pages with "self guided" activities and information for students
- ▶ Assessment activities with extensions/modifications ideas
- ▶ Student pages in English and Spanish
- ▶ Resources for further reading for teachers and students
- ▶ Additional related activities from other NWF resources referenced by grade level

Let us hear from you!

The Animal Tracks staff is committed to serving you and other educators. Write, call, or e-mail us your thoughts and comments on how you used the Action Pack and what you would like to see in its next revision. Refer to the following "Send Your Comments" questionnaire.

Animal Tracks

Questionnaire

Name: _____

Address: _____

Email: _____ Phone: _____ Fax: _____

I am a(n): Teacher Parent Home Schooler Other

Grade(s): _____ Subject Specialty _____

How did you find out about Animal Tracks Action Packs?

Animal Tracks Brochure NWF's Website Workshop Conference Other _____

Please make any comments on the different sections of the Action Pack below.

Discovery:

Awareness:

Action:

Appendices:

Suggested Topics for future Animal Tracks Action Packs:

Place
Stamp
Here

Animal Tracks
National Wildlife Federation
8925 Leesburg Pike
Vienna, VA 22184

**Thank You for Your
Thoughts and Comments!**

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Discovery Notes...





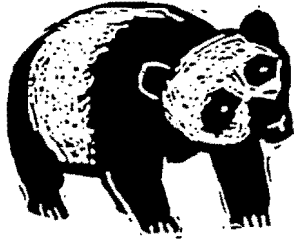
DISCOVERY

**“That which is not good for the beehive
cannot be good for the bees.”**

**- Marcus Aurelius
Roman Emperor, Philosopher**

Fun Facts

The giant panda eats mostly bamboo. Loss of bamboo forests in China has made pandas an endangered species.



The Devil's Hole pupfish lives in only one small pool in Death Valley.



Prairie potholes—shallow freshwater marshes found in the Midwest and parts of Canada—serve as the hatching grounds for more than half the ducklings in North America. There used to be approximately 69 million square kilometers of prairie potholes in the United States. Now scientists estimate that there are only 21.5 million square kilometers left, and that 133,500 square kilometers disappear each year.

Habitat for the blue whale is an entire ocean, but the tiny Symbion pandora lives on lobster's lips! It clings to the lobster's mouth and eats its host's leftovers!

Galapagos Island cormorants have evolved to have wings so tiny that



the bird is flightless. But the small wings make the birds' bodies more streamlined when they swim and dive for fish.

A Quick Look

It's a duck's pond. It's a woodlouse's rotting log. It's a pigeon's city park. That "it" is habitat—the place that contains all the nutrients, water, shelter, and space that a plant or animal needs to survive and raise young.

As you explore the many aspects of habitat presented in this Animal Tracks Action Pack, you'll find plenty of information to help you lead fun, multi-disciplinary activities, and you'll learn lots of ways to get children involved in real habitat-helping projects.

This Action Pack will help you answer the following *habitat* questions:

- ✓ What is a habitat, and how does it fit into an ecosystem?
- ✓ What is an example of a habitat?
- ✓ What is a food chain and what are the key players within a food chain?
- ✓ How are the organisms in an ecosystem connected?
- ✓ How does a food cycle work?
- ✓ What is habitat loss, and how does it relate to threatened and endangered species?
- ✓ What are some ways you and your students can help preserve, restore, and create habitats?

Background

Most habitats are home to many species of plants and animals, and these species are dependent on each other. The interaction of living and nonliving things in different habitats creates an ecosystem. In an ecosystem, all living things exist in a balance that helps support the entire community of life.

For example, an oak tree can be a habitat for many creatures and an important part of an ecosystem. In order to live, the tree needs soil, water, and sunlight. All the while the tree is living and growing, it is also providing a home to animals such as voles that may burrow beneath the tree's roots, squirrels and birds that live in its branches, and insects that live on the branches or beneath the bark. Squirrels and other animals eat the tree's acorns, and insects eat its bark and wood. Some birds, such as chickadees, warblers, and vireos help the tree by eating the insects that feed on the tree. Foxes, hawks, and other predators prey on the squirrels and birds living in the tree. Although squirrels eat a lot of the tree's seeds, they also help plant new seedlings by burying acorns.

It's All Connected

The interactions of plants and animals in a habitat form a complex web of life. Every plant and animal plays an important role in this web, with each participant relying on others for survival. Were any one of the components of the ecosystem to be disturbed or removed, the entire web may suffer. If someone were to spray insecticides on an oak tree, the chemicals might kill the insects that harm the tree. But the insecticide might also poison the birds and predators that naturally keep the insects in check, and the loss of a food source might reduce the number of birds that could live in the area. Once the pesticide washes away, the leaf-eating insects reproduce fairly quickly and might rebound to the point that they could kill the tree if the birds—their natural predators—were not there to control their numbers.

The Food Chain

The plants and animals making up the oak tree habitat are also part of a food chain. Life is really about transferring energy, and a food chain shows how that transfer works.

The sun is the source of energy for most living things. Plants—producers in a food chain—use energy from sunlight to produce food. Animals called primary consumers gain energy by eating the plants. Animals that eat only plants are called herbivores. Secondary consumers are predators (animals that eat other animals), and they eat the primary consumers. At the highest level of the food chain are top predators. Top predators may prey upon primary consumers, secondary consumers, and even producers, but generally they are not prey for other animals.

If we look back at the oak tree habitat, the primary producer is the tree itself, including the leaves, pollen, seeds, and bark it provides to consuming plants and animals. Primary consumers are the insects and small mammals such as squirrels that feed from the tree. Secondary consumers are the birds that eat the insects. A top predator would be a hawk that would feed on the insect-eating birds or the squirrels. This example is simplified. In reality, food chains are food webs, with consumers feeding on several different food sources at different levels of the chain.

As with many things in nature, the food chain is really a food cycle without a beginning or end. How is that? Although the top predator may not be prey for other animals, its remains enrich the soil when it dies. Scavengers like insects and some types of birds feed upon a dead animal, producing droppings that feed trees and other plants with their nutrients, thus continuing the cycle.

Habitat Loss

Without the right habitat, living things just can't survive. That's why many plants and animals are endangered. If you take away a habitat by building on it, draining its water, or polluting it, then you take away the things that keep the plants and animals there alive. Take away enough of any habitat, and the living things will have nowhere to go, causing them to die out or become extinct. The dusky seaside sparrow became extinct in 1987 largely because the birds' habitat had been degraded and fragmented to the point that the sparrows had no habitat left. This same problem is facing thousands of other species today. With more and more people developing land, using natural resources, and moving into wild areas, plants and animals are losing habitat rapidly. Habitat preservation and restoration may be the most critical factor in saving many threatened or endangered species.

AWARENESS

"In the end, we will conserve only what we love. We will love only what we understand. We will understand only what we are taught."

- Baba Dioum, Senegal

Awareness Notes...



A series of horizontal lines for writing, consisting of 20 parallel lines spaced evenly down the page.



Habitat For Sale

SUMMARY: Students will write classified ads for animal homes and habitats and draw habitat pictures.

GRADE LEVEL: 3-8, adaptations for K-2

TIME ⌚: 60 minutes

SUBJECTS: Science, Language Arts, Art, Social Studies

MATERIALS:

- Reference books on animals
- Paper and pencils
- Construction paper
- Crayons/markers
- Real estate ads

For younger students (K-2):

- Bulletin board supplies
- Tempera paints and brushes
- Markers, crayons, or colored pencils

HANDOUTS:



- Forest Animal Pages (pp. 11-14)

LEARNING OBJECTIVES: Completing this activity will allow students to:

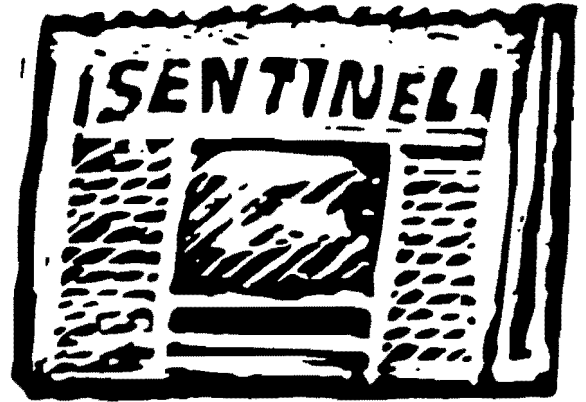
- ✓ understand the concept of habitat and what living things need to survive
- ✓ creatively conceptualize and describe different habitats
- ✓ describe the ways living things adapt to certain habitats

BACKGROUND:

An animal's habitat is the place in which it lives. All animals' habitats must have four things for the animal to survive -- food, water, cover, and a place to raise young. In some urban and suburban settings, habitats are disturbed when commercial and residential developments take place. Habitat loss is the greatest threat to biodiversity. The term **biodiversity** refers to the wide variety of living things on Earth. People everywhere can do things to make animal-friendly habitats, such as planting trees, providing water sources for animals, and hanging bird houses. By understanding the importance of protecting the habitats of all living things, we can make a difference in restoring the biodiversity that has been lost in many of our cities.

PROCEDURE:

1. Start by introducing the word "habitat" to your group. Explain that an animal's habitat provides the food, water, shelter and space it needs to survive. You might ask your kids to tell you what they need to survive, so that they can see that they have habitat needs too. Ask the kids to name different habitats, such as fields, forests, oceans, deserts, streams, or rain forests. Then ask the kids to name some of the animals that live in each habitat.



2. Next, explain that some animals build special homes in their habitats. Some examples are beaver lodges, bird nests, fox dens, and prairie dog holes. The homes provide shelter from weather, protection from predators, and places to raise young. Point out that many animals—such as lions and deer—do not build special homes.

3. Now ask if anyone knows what a classified ad is. Read some real estate ads from a newspaper and then read these make-believe examples and ask the kids to guess which animals might want each type of habitat:

Great Grasslands: Prime grassland available in Africa. Loaded with antelope, springboks, zebras and other tasty prey. Close to refreshing water holes and shady clumps of acacia trees. Lots of wide-open territory. Great for a new pride. Call before this great buy is snatched up. (Answer: lion.)

Underground Castle: Lots of great soil available in the Smith family's backyard. Easy tunneling. Home to juicy earthworms, grubs, and other tasty creatures. No pesky cats in the neighborhood. This super backyard buy is available immediately. (Answer: mole.)

4. Now explain that each person will get a chance to write a classified ad that describes an animal's habitat and/or home. Afterward, everyone will play a game to match the classified ads with the right animals.

5. Write animal names on slips of paper. Some suggestions: flying squirrel, hedgehog, orangutan, vampire bat, bison, rat, blue whale, dingo, llama, aardvark, snake, walrus, leopard, dolphin, duck, weasel, camel, wart hog, grizzly bear, elephant, ant, salamander, woodpecker, earthworm, spider, trout, eagle, wolf, fox, cricket, crab.

6. Then have each person pick one slip of paper, keeping the animal's identity secret. Provide reference books and ask each person to write a classified ad for a habitat that would appeal to his or her animal. Where does it live? What type of food does it eat? What sort of material does it need, if any, to build its home? Does it like cold, hot, dry, or wet habitat? How about special requirements? Tell each student to make sure to find and keep handy a picture of his or her assigned animal. Tell students that all ads must include a description of where the animal finds food, water, shelter, and cover for raising young.

7. When everyone is finished, collect the classified ads. Then distribute copies of a list of all the animals (or you might put them on the chalkboard while the students are designing their ads). Read the animal list out loud and ask the students to hold up the appropriate pictures when you read the names. Now read the ads out loud, without identifying the animals. Ask the students to guess which animal goes with which ad. Explain that some ads might fit more than one animal. If you distribute a list of animals, you can give each a number when you read it and have the kids write down the appropriate numbers next to each animal's name. If you wish, you can finish the activity by having each child draw the habitat he or she described, including the appropriate animal.

PROCEDURE FOR YOUNGER STUDENTS (K-2): "The Living Tree"

1. Create a large tree on a bulletin board or felt board. Students can contribute to the construction of the tree by painting the trunk, background, or leaves, and/or by cutting out construction paper leaves.
2. Using enlarged copies of the pictures on the student handout, provide each student with at least one animal. Students should color and cut out their animals and add them to the area in or around the tree where they think the animal lives.
3. For each animal, the teacher should review the components of habitat for that animal, that is, what it would eat, where it would find water, shelter, and whether the tree would be a good habitat for it. Students may decide whether they want to add other things to the bulletin board to create a better habitat for the animals there (e.g., a stream or pond, or other trees).
4. The same bulletin board can be used for the next activity, "The Web of Life."

MODIFICATIONS AND ADAPTATIONS:

- ❖ For younger students - Read some sample habitat ads, complete and incomplete, to the students and have them determine if the location would be a good place to live. Does it have all the components of habitat for a particular animal?

EXTENSIONS AND ASSESSMENTS: (** extensions can also be used to assess the students' mastery of the learning objectives.)

- ** After students have mastered writing an ad for a single habitat, have them extend the ad to include an entire ecosystem.
- ** Have the students individually or in small groups create a brochure to sell a habitat. Include a discussion of the characteristics (shelter, food, water, cover) that should be represented in the brochure.
- * Build a terrarium habitat in your classroom.
- ** Walk around your school grounds or neighborhood and identify areas that have all the components of habitat (shelter, food, water, cover) for different animals.
- * Create a habitat for birds, butterflies, earthworms, bats, or other small mammals at your school.

Adapted from NatureScope, Amazing Mammals, Part I published by the National Wildlife Federation®



FOREST ANIMAL PAGE



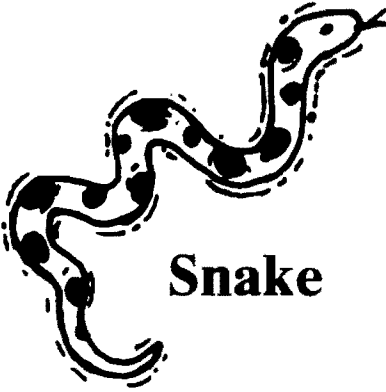
Woodpecker



Fern



Owl



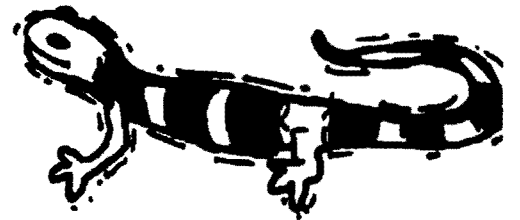
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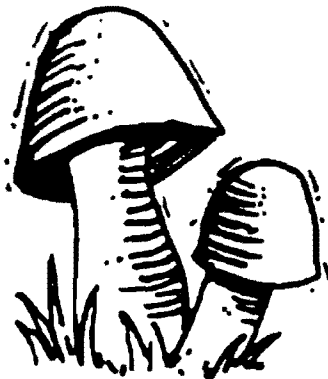
Caterpillar



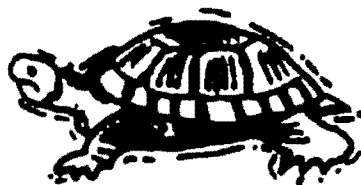
Beetle



Salamander



Mushroom



Turtle



Squirrel

FOREST ANIMAL PAGE



Nuthatch



Hawk



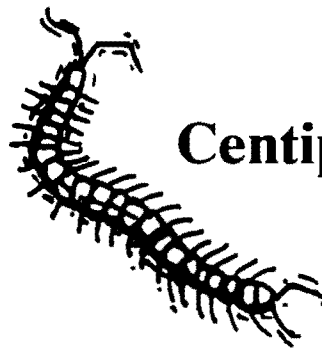
Berries



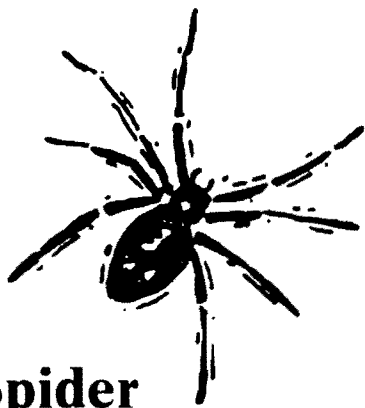
Wasp



Earthworm



Centipede



Spider



Acorns



Chipmunk

PÁGINA DE VIDA SILVESTRE



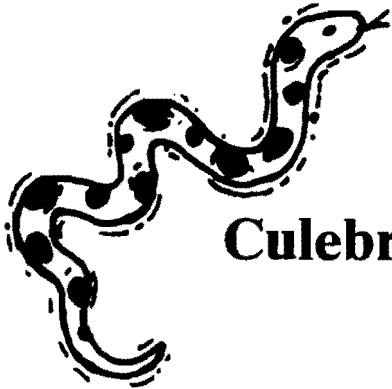
Pájaro Carpintero



Helecho



Buho



Culebra/Serpiente



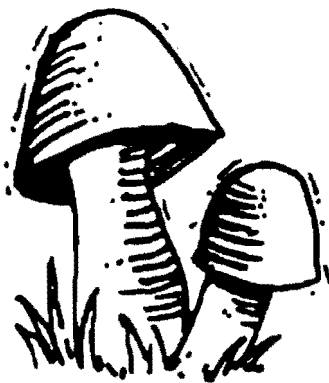
Oruga



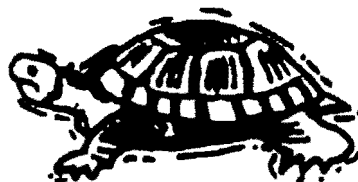
Escarabajo



Salamandra



Hongo



Tortuga



Ardilla

PÁGINA DE VIDA SILVESTRE



Trepatroncos sítido



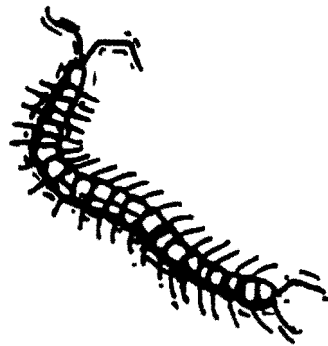
Halcón



Bayas/Moras



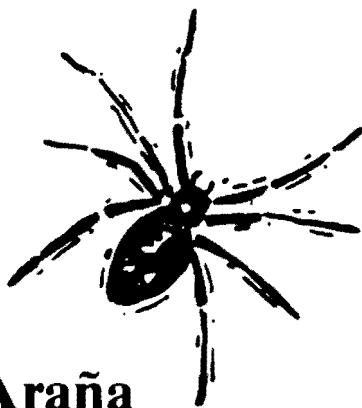
Avispa



Cienpiés/Cientopiés



Lombriz/Gusano de tierra



Araña



Bellotas




Ardilla Listada

The Web of Life

SUMMARY: Play a game to understand the interconnectedness of organisms in a food web.

GRADE LEVEL: 3-6, adaptations for K-2

TIME : 20 to 30 minutes

SUBJECT: Science, Environmental Science, Language Arts, Art

MATERIALS:

- Ball of yarn
- Index cards

LEARNING OBJECTIVES: Completing this activity will allow students to:

- ✓ use creativity and imagination to make connections among living things
- ✓ apply ecological concepts in an activity
- ✓ observe the effect of pesticides on the food web

BACKGROUND:

A food “chain” is a simple progression of organisms eating other organisms, but a food “web” is defined as the network or web of interconnected organisms through which energy is transferred. As energy comes to Earth from the sun, it’s converted to food energy by plants. All other organisms on earth get their food energy from plants. This food web activity illustrates the interconnectedness of all living things. This concept is especially important with regard to pesticides and fertilizers, whose effects are often subtle and difficult to understand. Learning that all living things interact with one another is a good way to start.

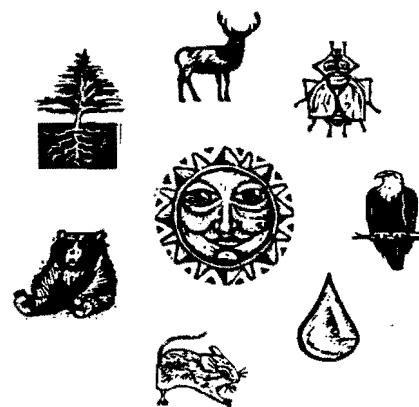
PROCEDURE:

1. Prepare some food web cards as described below, and laminate them ahead of time. This activity is based on the network of food chains that interact in an ecosystem. Write the name of each element of a full food web on 5-inch x 7-inch cards. To really illustrate each element in the web, glue its picture on the card. Attach both ends of each card to a string so that a card can hang around the neck of each student (the cards may be pinned onto the students’ clothing instead of being hung around their necks.) These cards are reusable and can last for years. Suggestion: Make cards with plants and animals found in your region or a region you are studying.

An example of a typical food web is as follows:

Forest Food Web:

- Sun
- Five plants: Examples include moss, wildflower, poison ivy, oak tree, pine tree
- Five insects/spiders: Examples include ladybug, bumblebee, wasp, earwig, spider, butterfly
- Three reptiles or amphibians: Examples include lizard, frog, snake, turtle, salamander
- Two fish: Examples include trout, salmon, sunfish, shiner, darter, dace
- Three songbirds: Examples include robin, sparrow, finch, warbler, blackbird
- Two raptors: Examples include kestrel, hawk, eagle, kite, vulture



- Three herbivorous (vegetarian) mammals: Examples include mole, rabbit, wood rat, deer, elk, moose
- Three carnivorous (meat-eating) mammals: Examples include otter, weasel, bobcat, mountain lion, shrew
- Three decomposers: Examples include fungus, earthworm, dung beetle
- Non-living components of the food web: Examples include water, air, soil

You can add other animals or plants to this food web so that everyone in the class participates.

2. To start this activity, begin a discussion of the food web.

3. Hand out a food web card to each student. You may choose to have one big group or use a small group as the example and then divide the class into three groups of eight to ten students.

4. The person who has the Sun card starts the activity. The Sun holds the end of the ball of yarn and throws or rolls it to someone else in the circle, explaining the connection—"The Sun gives energy to the grass." The next person holds onto the yarn and throws the ball, explaining the connection—"The aphid feeds on the grass." Each time the yarn is thrown, the individual throwing holds onto his or her end, so that a web is formed by the yarn in the center of the circle. Examples of other connections include: "The ladybug eats the aphid;" then, "The bird eats the ladybug;" then, "The fruit tree is home to the bird;" then, "The bird is eaten by the hawk." This goes on until everyone holds a piece of the yarn. Make sure the yarn is long enough. The tension on the yarn must be tight to illustrate the interconnectedness of all aspects, but be sure the kids don't wind the string around their fingers or wrists.

5. Something happens. The teacher points to one individual and announces that this organism is killed by a predator or by some other change either natural or caused by the human population. As that plant or animal drops out of the food web and lets go of the yarn, each person who feels the slack of the yarn lets go. Soon, the entire food web has fallen to the ground all because one member of the food chain was killed.

6. This game will be different every time, because animals and plants interact with each other in many different ways. Your students may wish to try this activity more than once.

7. Be sure to ask your students what they learned from the activity. Ask them what they think would happen if more than one organism in the food web was killed by pesticides. Conversely, what if one organism went out of control? What if there were too many carnivores and very few herbivores? What would the carnivores eat? What might happen to the food web?

PROCEDURE FOR YOUNGER STUDENTS (K-2):

1. In this activity, you will use the Living Tree bulletin board created in Habitat for Sale activity (p. 8)

2. Ask students what each animal in your tree eats. To each piece of yarn, add a 3x5 card with the word, "eats," and add an arrow below the word to show which animal eats the other (for example, beetles and caterpillars eat leaves; caterpillars, beetles, birds, wasps, and squirrels eat fruit and nuts; birds eat beetles; and bobcats eat birds and squirrels). Encourage students to make as many connections as possible.

MODIFICATIONS AND ADAPTATIONS:

- ❖ For more directional control, students can sit in a circle and roll the ball of yarn from person to person.
- ❖ Use different color yarn to demonstrate different food chains within the web. Start with the sun going to a plant, primary consumer, secondary consumer, then start over at the sun with a different color yarn.
- ❖ After creating one web, use a different color yarn to create a different web, showing multiple webs within one ecosystem.

EXTENSIONS AND ASSESSMENTS: (extensions can also be used to assess the students' mastery of the learning objectives.)**

- * Write a story from the perspective of a caterpillar or beetle or the tree (e.g., "My Day as a Caterpillar" or "If a Tree Could Talk.")
- ** Have students work in groups to draw the web of life for a different habitat. Habitats could include ocean, desert, wetland, meadow, rainforest, or city. The students should research which animals live in the habitat and then determine the relationships between them and draw them in a web format.


Adapted from the Animal Tracks Activity Guide published by the National Wildlife Federation®



Deadly Links

SUMMARY: Students will recognize the consequences of accumulation of some pesticides in the environment; in particular, the effect on the food chain.

GRADE LEVEL: 4-9

TIME : 30-45 minutes

SUBJECTS: Social Studies, Science, Physical Education

MATERIALS:

• White and colored drinking straws, pipe cleaners, poker chips, or any other material that students can easily pick up (30 pieces per student in a proportion of 2/3 white to 1/3 colored)

LEARNING OBJECTIVES: Completing this activity will allow students to...

- ✓ give examples of ways in which pesticides enter food chains.
- ✓ describe possible consequences of pesticides entering food chains.

BACKGROUND:

People develop pesticides to control unwanted organisms. Herbicides are used to control plants; insecticides are used to control insects, etc. These pesticides involve the use of poisons and the poisons frequently end up going where they are not wanted. Many toxic chemicals become concentrated in undesirable places -- from food and water supplies to wildlife and people.

A pesticide called DDT used to be applied regularly to crops as a means of controlling insects that were damaging plants. Then it was discovered that DDT entered the food chain with damaging results. For example, fish ate insects that were sprayed by the chemical, and when hawks, eagles, and pelicans ate the fish they died. Over time, concentration of DDT in the birds resulted in egg shells so thin that the eggs would not hatch or were crushed by the parents in the nesting process. Use of DDT has now been outlawed in the United States; however, at least one temporary waiver was granted in recent years to allow its limited use. DDT use is not prohibited worldwide. Even after the application of DDT is stopped, DDT and its by-products can impact the environment for decades.

Damaging chemical fertilizers as well as pesticides are used by many farmers and can also produce dangerous side effects for the environment. When pesticides are sprayed on a crop, they may stay on the crop or on the soil until they are washed away by rain or irrigation into other water sources like groundwater, lakes, streams, rivers, and oceans. Waterfowl, fish, and other species may be negatively affected. When people and wildlife eat contaminated fish or waterfowl, for example, the pesticides accumulate in their bodies over time.

Public pressure continues to be a factor in reducing the availability, toxicity, and use of pesticides. There is now growing interest in integrated pest management. This approach can include using a pest's predators as well as other biological controls to reduce crop damage. Integrated pest management can also include the selective use of naturally-occurring and synthetic pesticides as well as habitat manipulations.

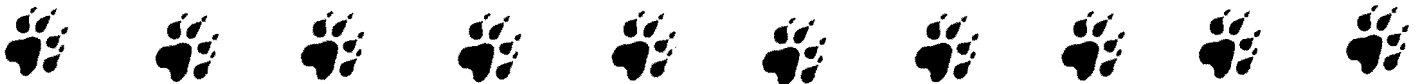
PROCEDURE:

1. Discuss with students examples of food chains and how a food pyramid is formed.
2. Divide the students into three groups. In a class of 26 students there would be two "hawks," six "shrews," and 18 "grasshoppers." OPTIONAL: Have grasshoppers, hawks, and shrews labeled so they can be easily identified; e.g., green arm ties for grasshoppers, red bandannas for hawks, and brown arm ties for shrews.
3. Evenly distribute the food tokens around the floor or ground of a large open space.
4. Each of the "animals" will have a chance to gather food. The grasshoppers are the first to collect food and are to pick up the food tokens for 30 seconds. The hawks and shrews are to sit quietly on the sidelines watching the grasshoppers. The grasshoppers have to move quickly to gather food.
5. After 30 seconds, the shrews are allowed to hunt the grasshoppers by taking them by the arm. The hawks are still on the sidelines watching. Each shrew should have time to catch one or more of the grasshoppers. Any grasshopper caught by a shrew must give its food tokens to the shrew and then sit on the sidelines.
6. The next time period (approximately 30 seconds) is time for the hawks to hunt food. The same rules follow. Any shrews still alive may hunt for grasshoppers; grasshoppers that haven't been caught are hunting for the food chips that represent corn or other plants; and the hawks are hunting for the shrews. If a hawk catches a shrew, the hawk gets the shrew's food and the shrew goes to the sidelines. At the end of the designated time period, ask all the students to come together in a circle, bringing whatever food they have with them.
7. Next ask the hawks to lay their food out on the floor where they can count the number of food pieces they have. They should count the total number of white food pieces and total number of multi-colored food pieces they have. Any remaining grasshoppers and shrews should also count their total numbers of white and multi-colored food pieces.
8. Inform the students that there is something called a "pesticide" in the environment. This pesticide was sprayed onto the crop the grasshoppers were eating in order to prevent a lot of damage by the grasshoppers. This pesticide is poisonous, accumulates in food chains, and stays in the environment for a long time. In this activity, all of the multi-colored food pieces represent the pesticide. If any of the remaining grasshoppers have multi-colored food pieces, they are now dead. Any shrew for which half or more of its food supply is multi-colored pieces are now dead also. The one hawk with the highest number of multi-colored food pieces will not die at this time: however, it has accumulated so much of the pesticide in its body that the egg shells it produces during the next nesting season will be so thin that the eggs will not hatch successfully. The other hawk is not visibly affected at this time.
9. Discuss what they just experienced in the activity. Ask them for their observations about how the food chain seems to work, and how toxic substances can enter the food chain, with a variety of results. The students may be able to give examples of animals affected by the pesticide in this activity beyond those of the grasshopper -- shrew -- hawk food chain.

EXTENSIONS AND ASSESSMENTS: (** extensions can also be used to assess the students' mastery of the learning objectives.)

- * Consider and discuss possible reasons for use of such chemicals. What are some of the trade-offs? What are some of the consequences?
- * Offer and discuss possible alternatives to uses of such chemicals in instances where it seems the negative consequences outweigh the benefits. For example, some farmers are successfully using organic techniques (sprays of organic, non-toxic substances; crop rotation; companion planting), biological controls (predatory and parasitic insects), and genetic approaches (releasing sterile male insects of the pest species) in efforts to minimize damages to their crops.
- * Check newspapers for relevant local, national, or international examples of such issues.
- * Conduct the activity using different examples; e.g., people, shellfish.
- ** Have students draw a food pyramid and calculate the amount of toxins transferred to the top of the pyramid. Assign each item in bottom level of the pyramid a toxic amount.

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Migration Headache

SUMMARY: Students role-play migrating water birds and the hazards they encounter on their journeys.

GRADE LEVEL: 4-8, adaptations for K-2

TIME : 45 minutes

SUBJECTS: Science, Language Arts, Math, Social Studies, Physical Education

MATERIALS:

- Large playing field or gymnasium
- Two paper plates, carpet samples, or hoola hoops for every three students

For K-2 adaptation:

- 1 copy of a Goose Picture (p. 27) per student
- 1 wooden craft stick per student
- glue/markers/crayons/scissors
- 3 small snacks (small pieces of fruit, small crackers, or pieces of rice cakes)

HANDOUTS:

- Goose Template (p. 27)

LEARNING OBJECTIVES: Completing this activity will allow students to:

- ✓ list limiting factors affecting populations of migrating water birds.
- ✓ predict the effects of such limiting factors.
- ✓ describe the effects of habitat loss and degradation on populations of migrating water birds.
- ✓ understand the importance of suitable habitat for migrating water birds.
- ✓ understand the process of migration for migratory birds.

BACKGROUND:

Migration is a mysterious topic. How do birds, fish, mammals, and insects travel the immense distances they do with such exactness? Some travel at night, some during the day, some in the skies, some on land, and others deep within the sea, yet without fail they locate habitats suitable for producing young and “wintering”. Scientists have proposed that they use the stars, the sun, visual clues on Earth, sounds, smells, and even the earth’s magnetic field for guidance. It is most likely that migrating species use more than one means to guide their journeys.

There are a variety of remarkable migrating water birds. Many migrating birds -- ducks, geese, swans, cranes, ibises, herons, rails, egrets, gulls, terns, and shorebirds, for example -- require the presence of wetlands in their breeding habitat and on their wintering grounds. Since these two regions are often thousands of miles apart, they also need wetlands to provide them with food and rest in between.

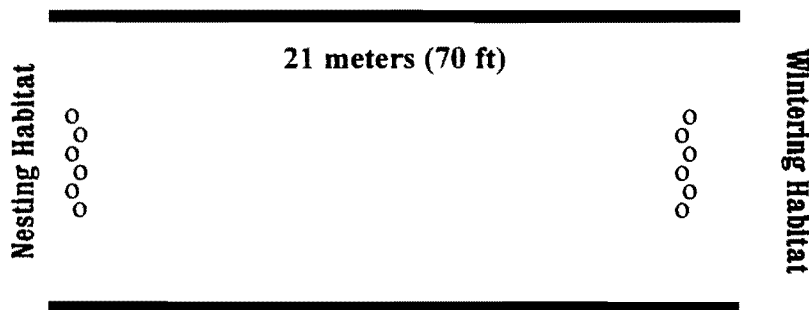
The populations of some species of water birds are healthy; however, populations of many water birds are steadily declining. Some healthy populations of migrating species are the snow goose, ruddy duck, and green-winged teal. Examples of species that have experienced some decline but are now increasing are the wood duck, sand hill crane, pintail duck, and tundra swan. Species that are declining are the emperor goose, American bittern, black duck, and canvasback duck. Among the species listed by the U.S. Fish and Wildlife Service as endangered are the piping plover, wood stork, whooping crane, and Eskimo curlew.

The primary threat to the survival of many kinds of migrating birds is the disappearance and degradation of wetlands. Millions of acres of wetlands have been purchased and protected to preserve and actively restore habitat for local wildlife and the many migratory birds. There are also international treaties and national laws affecting migratory birds. State wildlife agencies and the U.S. Fish and Wildlife Service share responsibility for protecting migratory animals. However, millions of acres of wetlands along ancient migratory routes have been lost due to development.

Today, the journeys of water birds take them over lands which are increasingly influenced by humans. Agriculture, development, and industry are all reducing the quality and availability of natural wetlands. Pollution, in the form of pesticides and fertilizers, also takes its toll. New evidence suggests that acid rain may be affecting insect populations, which in turn affects the birds that depend on insects for food. Furthermore, natural conditions such as weather, predators, disease, and fire can influence animal populations and their habitats.

PREPARATION:

Select a large playing area about 21 meters (70ft) in length. Place the paper plates in two patches on the playing field as shown below.



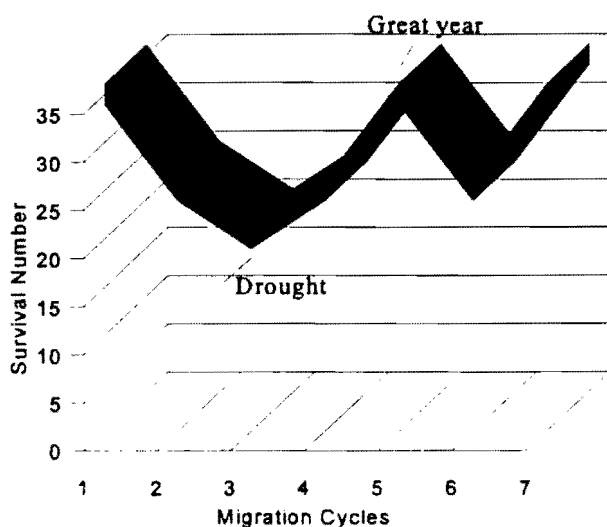
Choose the number of plates so that you have one plate for each three students at each end of the field.

PROCEDURE:

1. Designate one of the areas that you made in the preparation stage the "wintering habitat" and the other the "nesting habitat."
2. Explain to the students that they are water birds and will migrate between these two areas. Tell them that the paper plates represent "wetlands." These wetlands provide suitable habitat for water birds. At the end of each journey, the students will have to have one foot on a paper plate in order to be allowed to continue. If a student cannot get his/her foot on a plate, that means he/she has not found suitable habitat and is now "dead." In this case, the student moves to the sideline to watch. Tell students that in this activity only three water birds can occupy a paper plate at any one time.

3. Explain to the students that many factors will limit the survival of populations of migrating water birds. There will be times of abundant food, water, shelter, and space, but there will also be times when these things are lacking.

4. Begin the activity with all the students at the wintering habitat. Announce the start of the first migration. Have the students migrate in slow motion until they become familiar with the process. On the first try, all the birds will successfully migrate to the nesting habitat. Explain that there has been no loss in the area of available habitat this time. Therefore, a successful nesting season is at hand. Before the students migrate back toward the wintering habitat, remove one plate from the wintering region. Explain that a large wetland area has been drained and used for agricultural purposes. Announce the start of the second migration and send the birds to the wintering habitat. Tell the three "dead birds" that they can come back as surviving hatchlings when favorable conditions prevail and there is habitat available in the nesting ground.



NOTE: The series of migration cycles can be graphed as shown below. Many teachers have chosen this method to record the cycles.

5. Before the next migration, remove four more plates in the nesting habitat. Tell the students that this is the result of an oil spill in the local river, severely damaging shoreline habitat. Announce the third migration.

6. Repeat this process for eight or ten migration cycles to illustrate changes in habitat conditions with resulting effects on the birds. Remember to provide sidelined students with chances for re-entry by returning some of the paper

plates periodically, signifying an improvement in habitat conditions. Below are some examples that might influence the birds' survival.

Factors Limiting Survival of Populations of Migratory Birds

wetland drainage, drought, pollution and contamination of water, erection of tall towers, severe weather, urban expansion, conversion of wetlands to farm land, conversion of natural waterways to canals, lead shot in food supply, disease

Factors Favoring Survival of Populations of Migratory Birds

preservation of wetlands, high rainfall, restoration of habitat, dynamic balance with predators, regulation of hunting and human predation

7. In discussion, ask the students to identify the apparent causes of the birds' population decline from year to year. Ask them to try to identify the major factors contributing to habitat loss. Begin by thinking about local habitats and what affects them. Ask them to make predictions about the effects of these factors. Distinguish between short-term and long-term effects and also between catastrophic events

and gradual changes. Ask the students to support their hypotheses with evidence, seeking additional information through research if necessary.

8. Ask the students to summarize what they have learned about some of the many factors that affect the success of aquatic bird migration. List and discuss human-caused factors and natural factors. Compare similarities and differences between these limiting factors. Highlight those which the students identify as posing the most significant long-term threat to the survival of migrating water birds.

9. What kinds of things can and should be done to protect and restore habitats for migrating water bird populations? What can students do themselves? Discuss potential trade-offs related to any recommendations.

PROCEDURE FOR YOUNGER STUDENTS (K-2):

1. Have students color and cut out a Goose Picture and glue the picture onto a craft stick to create a stick puppet.

2. Create three areas to represent “wetlands” using carpet squares, yarn, or chalk outlines (if done outdoors). If possible, the first wetland should be on the north side of the room or playground, the second should be somewhere in the middle, and the third should be on the southern end of the room/area. If desired, the teacher can show students how a compass can be used to tell north from south and later pointing out that migratory birds must also be able to tell directions, but that they use a built-in compass.

3. At each “wetlands” place a bowl of small snacks.

4. Students start out with their puppets at the most northern site. This is their summer home. The teacher should read the “Beginning Migration” part of the story (p.) as the students/puppets pretend to be geese and eat a piece of snack food. After the teacher finishes reading, students will then begin their trip and “fly” to the second “wetland.” Teachers may want to designate some students as “mothers and fathers” that other students follow.

5. After “landing” at the second wetland, the teacher will read the “Resting Place” part of the story. After the teacher finishes reading, he/she will encourage students to describe what the geese would need to find at the wetlands -- food, water, shelter, space.

6. After “feeding” on the snack and “sleeping” for a few minutes, students will “fly” to the final wetlands, their southern home. Teachers will then read the “Arrival to Winter Home” part of the story.

7. Students will “feed” and “rest” again while the teacher discusses the following questions with them: How will the geese find their way if we fill in the wetlands that they are using during their migration? What would happen if the mother and father geese didn’t migrate one winter...would their children or their grandchildren know how to find their winter home in the south?

MODIFICATIONS AND ADAPTATIONS:

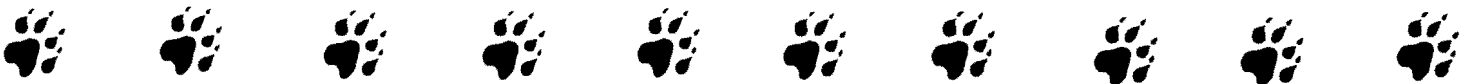
- ❖ Migration success depends on wetland stops between winter and summer habitat, not just the quality of the end destination. To simulate the importance of these resting areas, do the activity as written but this time add wetland resting stops between the nesting habitat and winter habitat.

- ❖ For Younger Students: Draw a large-sized hopscotch course with at least nine squares. Have the students line up at the beginning of the course and tell them that they are birds starting their journey north. Students should jump from square to square using only one foot per square. Before the next migration, put an "X" in two of the squares and tell students that you have just drained the wetlands and built condos, parking lots, etc. Students cannot jump in the squares that have an "X." Repeat this each time until students fail to make the migration.
Adapted from a project used at the Environmental Schools, Ocean Park, Maine.

EXTENSIONS AND ASSESSMENTS: (** extensions can also be used to assess the students' mastery of the learning objectives.)

- ** Have students draw maps showing the migration route of a specific bird. Include the location where the bird starts from, the stops it makes along the way, places where habitat has been destroyed or polluted, and the location where the bird finishes.
- ** Explore the major factors affecting habitat loss and degradation, or gain and restoration, in your area. Research the causes for long-term habitat loss, as well as any major efforts underway to prevent these increasing losses.
- * There are national laws and international treaties protecting migratory species. Find out about some of these. What is their history? Are they effective? Are there problems enforcing them? What migrating species, if any, are unprotected by such laws?
- * Find out how wetlands have changed or remained the same in your community throughout the last 100 years. Are there wetlands regulations or zoning laws in your community?
- ** For Younger Students: Have students write a story as if they were a mother or father goose, telling their children (goslings) how the family will migrate for the winter.

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Migration Story for K-2 Adaptation

Part I: Beginning Migration

We are migratory geese. We were hatched last Spring from eggs and we are getting ready for our long trip south. We have to eat well now to build up our muscles and fat for the long migratory trip ahead. The days are getting shorter now...winter will come soon. We'll go on a long journey, flying south to spend the cold winter months in a warmer place. How do we find our way? Our mothers and fathers will show us the way to our home in the warm south lands, just as their mothers and fathers showed them.

Part II: Resting Place

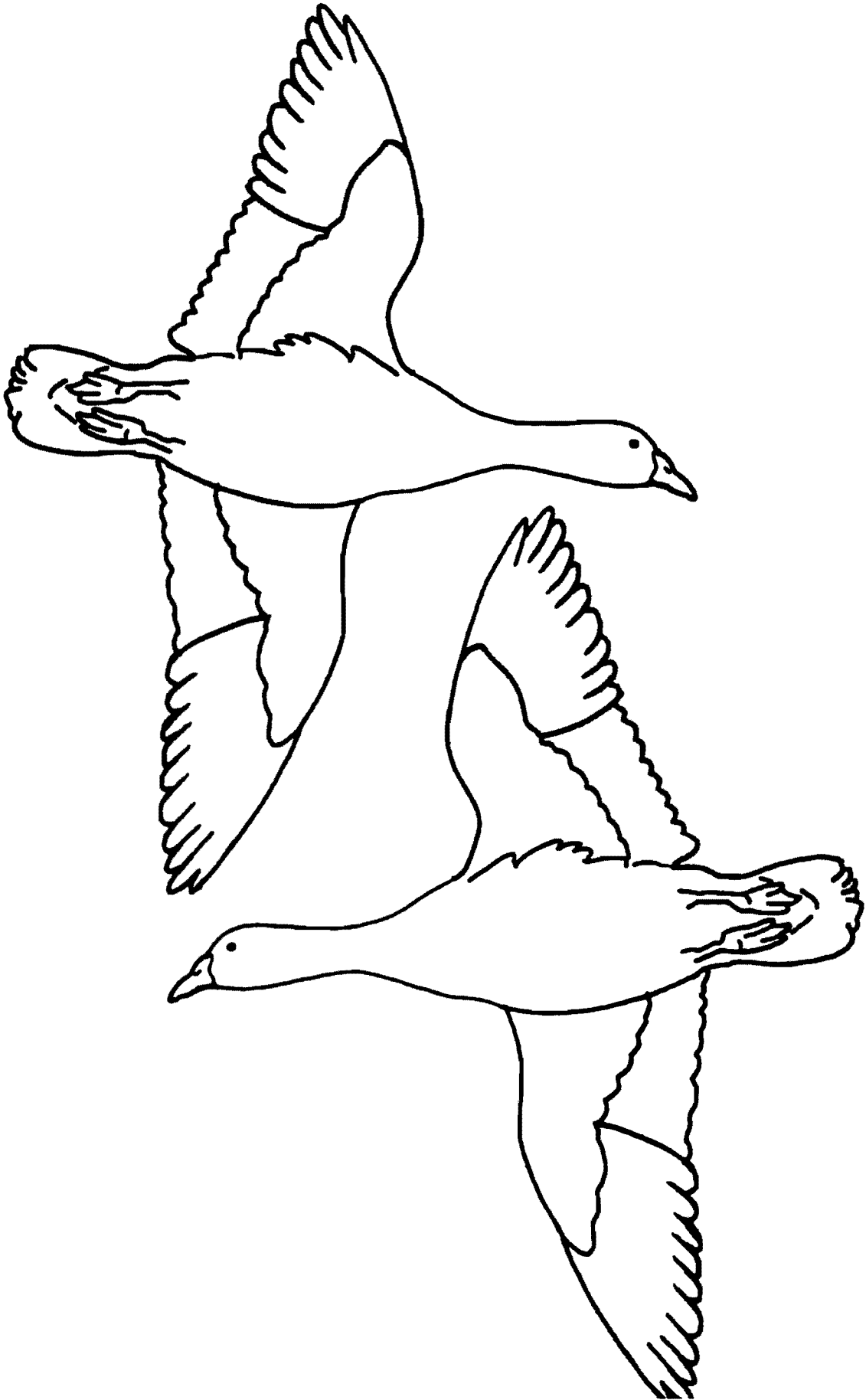
We can't fly all the way to our winter home in one day. We have to have a safe place to stop and rest and eat and sleep. Our mothers and fathers remember this place. I'm so glad it's still here. Sometimes people decide to drain the wetlands and put up buildings. Then we have a hard time finding a place to rest. This will be our habitat, our home, for tonight. What kinds of things do we need for our habitat?

Part III: Arrival at Winter Home

Finally we are here at our winter home in the south lands. Here we will find food, water, shelter, and space to live in for the winter. When Spring comes, we will fly back north, lay our eggs, and hatch our little goslings. Then it will be our turn to teach them to find our winter home.




GOOSE TEMPLATE PAGE



What to Do With an Empty Lot

SUMMARY: Role Play the parts of different groups in deciding how to best use a vacant lot for the entire community.

GRADE LEVEL: 4-12

TIME : One or more class periods, depending on how the activity is conducted

SUBJECT: Science, Math, Social Studies, Economics, Health, Ethics

MATERIALS:

- Pencils and paper for students

HANDOUTS: 

- Role-play activity sheets (pp. 31-33)
Role-play activity sheets *in Spanish* (pp. 34-36)
- Map of empty lot (p. 37)

LEARNING OBJECTIVES: Completing this activity will allow students to:

- ✓ understand issues through role-play.
- ✓ experience the difficulty of making decisions about complex issues.
- ✓ observe the ways one decision can affect the environment, the people, the economy, and the financial interests of many people.

BACKGROUND:

Open space is plot of land that is in its natural state and has not been developed. Open space is a valuable asset to any community. It provides an aesthetic rest for the eye, and often is home to a wide variety of organisms. Land has economic value, too, and open spaces are disappearing throughout the world as owners develop their land. Owning and maintaining land is costly; owners must pay a variety of taxes and fees for their land.

Developing the land is one way to generate funds to cover the costs of ownership. Selling the land after property values have risen is a common way to make money in our economy. This role-play activity presents a simplified version of what occurs every day, as property owners make decisions about what to do with their land.

In assigning roles to your students, be sure to divide them into diverse groups with varied interests. Part of the effectiveness of this activity comes when a person is required to play a role that he or she does not initially like. The result can be greater understanding of divergent sides of an issue. To add emphasis to this approach, you may want to tell the students they will be graded on the strength of their arguments for the issues they have been assigned. Leave time after the role play for a discussion of the way the students felt when they presented their cases, and how they felt when the proposal they represented was not selected.

PROCEDURE:

1. Explain the activity to students. The first handout is a map of an open space in town. The space is about 91 meters x 274 meters (100 yards x 300 yards), and has a natural stream running along one edge of it. The owner of the land has been approached by different groups who have expressed interest in using the land.

Using the role-play handouts provided on pp. 38-40, break your class into interest groups and assign their roles. Depending on how much time you want to use for this lesson, you may want your students to conduct more research on their topics. Or, give them about ten minutes to read their handouts and develop a strategy for their argument. Have them write their points on the handouts so that they have a written strategy to present to the class. Help students write their strategies and answer questions they may have.

Owners: While the rest of the groups are developing their strategies, have the owners do the math questions. Also, tell them to develop the criteria they will use for making their decision, before they hear the others' arguments. Tell them that they must pay attention to all the arguments, and that they must vote at the end of the period on the plan they will accept for their land. They will be able to choose only one of the options presented.

Conglomerate: This company has been cited for illegally dumping chemical waste in the past. **None of the other groups knows this.** Tell the group they can decide whether they want to inform the Owners about this or not. If they do not make the announcement themselves, inform them that at some point, you (the teacher) will act as "whistle blower" and inform the Owners of this fact.

2. After ten minutes, begin the presentations. All other groups must stop talking and listen to the presentations. At the start of each presentation, have the group write its name on the blackboard. Give each group five minutes to present its argument. After the presentation, the students will sit down and the next group will begin.

3. After the presentations have been made, allow the Owners a chance to reach a decision. You may want to supervise them. Give them five minutes to make their decision. During this time, have each student from the other groups write down what he or she thinks should be done with the land, and whether this differs from the views of the group he or she was in. Owners should have the option of accepting an offer with amendments, i.e., accepting the office building if it preserved part of the land.

4. The Owners come back and tell the class what they decided to do and why.

5. Lead a discussion about the way the students felt when they presented their cases, and the way they felt when their proposals were or were not selected.

ADAPTATIONS AND MODIFICATIONS:

- ❖ Use an area on school property as the example and have students decide what should be done with the land. They could even present their results to the school board of directors.
- ❖ Find a vacant lot in your own town, and use the real life scenario in the class. Have your students write down their recommendations and send them to the land owner or city planning office.

EXTENSIONS AND ASSESSMENTS: (** extensions can also be used to assess the students' mastery of the learning objectives.)

- * Invite a city planner to speak to your class. Be sure the planner addresses all the points that are presented in this role play.

- ** Have students present their opinions of a development decision taking place in the community. The subject could be a new highway, revitalization of the downtown area, or the building of a shopping mall, office building, or theme park. Each group of students must present their arguments for what they think should happen and respond to questions from the audience. (Optional: invite parents, grandparents, the principal, or other teachers to the students' presentations.)

- ** Have students draw a concept map following these instructions: Write each term listed below in a bubble. Then draw lines with arrowheads on them between the bubbles to show which terms are related to each other. Write a description on each line to show how the terms are related. Add additional terms in bubbles and descriptions to show more relationships. There are no right answers. Everybody's concept map will look different. (Terms: empty lot, owners, gardeners, environmentalists, parents, office building developers, conglomerate company, kids, wildlife, unemployed, homeless people, money, jobs, pollution, parks, food, public transportation)

*Reprinted from the **Animal Tracks Activity Guide** published by the **National Wildlife Federation**®*





Group 1: Owners

You are the owners of the property. You have been approached by different groups that wish to use your property for their own purposes. You must make a decision about what you will do with your property. Your property is an empty lot in the center of town. As owners, you pay property taxes of \$250 per year. You have owned the property for ten years. You bought the land from the city for \$5,000 ten years ago. The value of the lot is now \$10,000. Write down the total amount you have paid for this lot on the line below:

\$250 per year x 10 years _____
 Original purchase price _____
 TOTAL expenditure for lot _____
 Current value of the lot _____

Since so many people are interested in your lot, you have asked them to attend a meeting where each group will tell you why it wants to use your land. Your group must then make a decision about what to do with the land.

Group 2: Gardeners' Group

You are members of the local gardening group. You want to use the land so that you can grow fresh vegetables and sell them to earn money to start a Student Gardening Corps, where students learn gardening skills and help run the garden. You also want to give vegetables to the homeless kitchen so that they can feed homeless people. You are a non-profit organization, but you are willing to pay the owners \$250 per year to rent the land. This happens to be the same amount that the owners pay in property tax.



What is the name of your organization?

List three reasons why your group should have the lot. These are the reasons you will present to the owners.

- 1.
- 2.
- 3.

How much money are you willing to pay the owners for the lot?





Group 3: Environmentalists

Your group believes the lot should be left as open space. The lot has been wild for ten years, and is the largest piece of open space in town. It's home to several species of birds, small mammals and insects. The stream has fish, frogs and turtles. The land has some native plants growing on it. You want the lot to remain as it has been for the past ten years. Your group does not have any money to buy the lot, nor do you want to own it. You just believe that the Owners should preserve the lot as open space.



What is the name of your organization?

List three reasons your group should have the lot. These are the reasons you will present to the owners.

- 1.
- 2.
- 3.

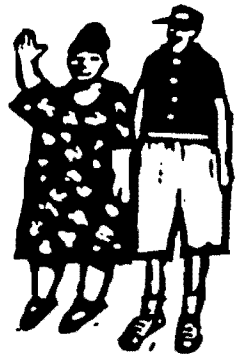


What will you pay the owners for the lot?

What can you propose in terms of management, if you don't want to own the lot yourselves?

Group 4: Parents Group

You think the lot should be made into a park. The native vegetation should be cleared and replaced with grass. Playgrounds and picnic tables should be installed. This park would be closer to many people who have to travel a long way to get to another park. Your group asked the city to purchase the land for the park, and the city has said it would buy back the land for the price it was sold for ten years ago: \$5,000. However, the land is now worth \$10,000.



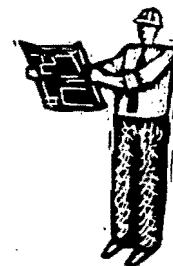
What is the name of your organization?

List three reasons why your group should have the lot. These are the reasons you will present to the owners.

- 1.
- 2.
- 3.



How much money are you willing to pay the owners for the lot?



Group 5: Office Building Developers

You would like to buy the lot and build an office building for your growing company. The building would provide 100 new jobs, so it has economic value. Your company is willing to pay the owners the present property value of \$10,000 for the lot.

What is the name of your organization?

List three reasons why your group should have the lot. These are the reasons you will present to the owners.

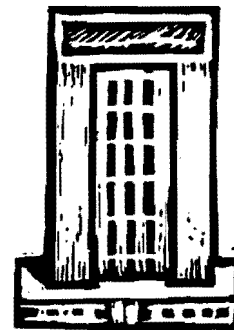
- 1.
- 2.
- 3.

How much money are you willing to pay the owners for the lot?



Group 6: Conglomerate

Your company wants to buy the lot to build a mini-mall. The mall will have a food store, a dry cleaner, a pinball arcade and a photo lab. The mall will create 50 local jobs, so it has an economic value. However, your company has been cited for environmental violations in the past for dumping chemicals into local creeks. You still dump chemicals secretly and pay the fines when you are caught. Your company has a lot of money, and could make a lot of money on the mall. You offer the owners \$20,000 for their lot, which is twice the present value of the property.



What is the name of your organization?

List three reasons why your group should have the lot. These are the reasons you will present to the owners.

- 1.
- 2.
- 3.

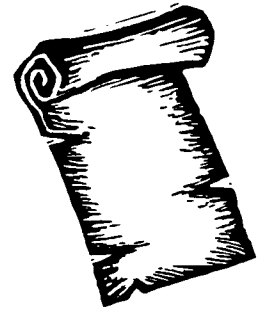
How much money are you willing to pay the owners for the lot?





GRUPO 1: PROPIETARIOS

Ustedes son los dueños de una propiedad y se les han acercado varios grupos que quisieran usarla para sus propios fines. Ustedes tienen que decidir qué quieren hacer con su propiedad.



Su propiedad es un terreno baldío en el centro de la ciudad. Como propietarios, tienen que pagar \$250.00 al año en impuesto predial. Hace diez años que son dueños del terreno. El terreno se lo compraron a la ciudad por \$5,000.00 hace diez años. El valor actual del terreno es de \$10,000.00. Escriban abajo la suma total que han pagado por este terreno:

\$250.00 al año x 10 años	_____
Precio original de compra	_____
TOTAL de gastos por el terreno	_____
 Valor actual del terreno	 _____

Como hay tantas personas interesadas en su terreno, les han pedido que asistan a una reunión donde cada grupo dirá por qué quiere usar su terreno. Después, su grupo tendrá que decidir qué hacer con el terreno.

GRUPO 2: GRUPO DE JARDINEROS

Ustedes son miembros de un grupo local de jardinería. Quieren usar el terreno para cultivar hortalizas frescas y venderlas para ganar dinero y empezar un Cuerpo Estudiantil de Jardinería, donde los estudiantes aprendan jardinería y ayuden con el jardín. También quisieran ayudar a los que se ocupan de dar de comer a la gente que no tiene donde vivir, regalándoles verduras para que los puedan alimentar. Ustedes son una organización sin fines de lucro, pero están dispuestos a pagarle a los propietarios \$250.00 al año por el alquiler del terreno. Esta cantidad resulta ser igual a la suma que pagan los propietarios en impuesto predial.



¿Cómo se llama su organización?

Enumeren tres razones por las cuales se le debe dar este terreno a su grupo. Estas son las razones que presentarán a los propietarios.

- 1.
- 2.
- 3.

¿Cuánto dinero están dispuestos a pagar a los propietarios por el terreno?





GRUPO 3: AMBIENTALISTAS

Su grupo cree que el terreno debería quedar como un espacio abierto. El terreno ha estado silvestre desde hace diez años y es la superficie abierta más grande de la ciudad. Aquí viven varias especies de aves, mamíferos pequeños e insectos. El arroyo tiene peces, sapos (ranas) y tortugas. En el terreno crecen algunas plantas nativas. Ustedes quieren que el terreno permanezca igual a lo que ha estado durante los últimos diez años. Su grupo no tiene dinero para comprar el terreno, ni quiere ser propietario, tan sólo creen que el propietario debería conservarlo como espacio abierto.



¿Cómo se llama su organización?

Enumeren tres razones por las cuales se le debe dar el terreno a su grupo. Estas son las razones que presentarán a los propietarios.

- 1.
- 2.
- 3.

¿Cuánto le pagarán a los propietarios por el terreno?



¿Qué pueden proponer para administrarlo, si ustedes mismos no lo quieren comprar?

GRUPO 4: GRUPO DE PADRES

Ustedes piensan que el terreno se debería convertir en un parque. Se debería desbrozar la vegetación nativa y sembrar césped. Habría que instalar juegos para niños y mesas para días de campo. Este parque le quedaría más cerca a muchas personas que ahora tienen que recorrer una distancia larga para ir a otro parque. Su grupo le pidió a la ciudad que comprara el terreno para el parque y la ciudad ha dicho que recompraría el terreno por el precio al que lo vendió hace diez años: \$5.000.00. Sin embargo, el terreno ahora vale \$10.000.00



¿Cómo se llama su organización?

Enumeren tres razones por las cuales se le debe dar el terreno a su grupo. Estas son las razones que presentarán a los propietarios.

- 1.
- 2.
- 3.

¿Cuánto dinero están dispuestos a pagar a los propietarios por el terreno?





GRUPO 5:

CONSTRUCTORES DE EDIFICIOS DE OFICINAS

Ustedes querían comprar el terreno para construir un edificio de oficinas para su compañía que está creciendo. El edificio crearía 100 empleos nuevos, así que tiene un valor económico. Su compañía está dispuesta a pagarle a los propietarios \$10,000.00 que es lo que la propiedad vale actualmente.



¿Cómo se llama su organización?

Enumeren tres razones por las cuales se le debe dar el terreno a su grupo. Estas son las razones que presentarán a los propietarios.

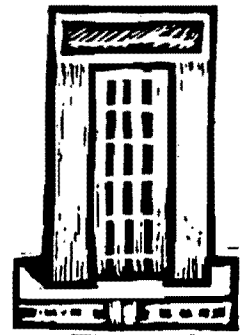
- 1.
- 2.
- 3.



¿Cuánto dinero están dispuestos a pagar a los propietarios por el terreno?

GRUPO 6: CONGLOMERADO

Su compañía quiere comprar el terreno para construir un mini centro comercial. El centro comercial tendría una tienda de alimentos, una tintorería, una sala de juegos mecánicos y un laboratorio de fotografía. El centro comercial crearía 50 empleos locales, así es que tiene un valor económico. Sin embargo, en el pasado su compañía ha sido citada por violaciones ambientales por arrojar sustancias químicas en los arroyos locales. Todavía arrojan sustancias químicas en secreto y pagan las multas cuando los descubren. Su compañía tiene mucho dinero y podría obtener muchas ganancias con el centro comercial. Ustedes le ofrecen a los propietarios \$20,000.00 por el terreno, que es el doble de lo que vale actualmente la propiedad.



¿Cómo se llama su organización?

Enumeren tres razones por las cuales se le debe dar el terreno a su grupo. Estas son las razones que presentarán a los propietarios.

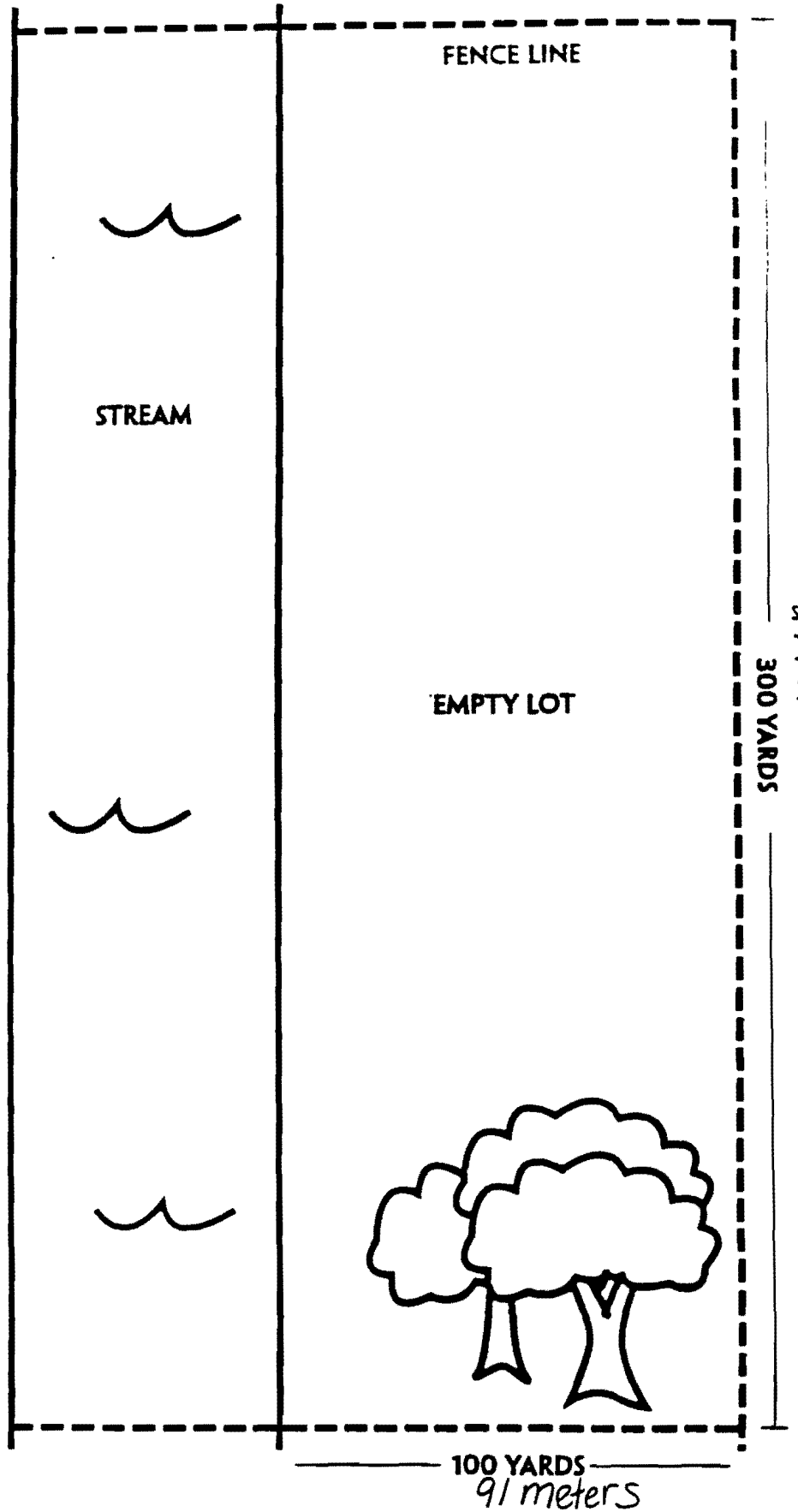
- 1.
- 2.
- 3.

¿Cuánto dinero están dispuestos a pagar a los propietarios por el terreno?





Map of an Empty Lot



FENCE LINE

STREAM

EMPTY LOT

300 YARDS

274 meters

100 YARDS
91 meters

What is a Habitat?

All living things need food. All living things need clean water. All living things need shelter and a place to be safe from danger. And all living things need space to live, move, and grow. The special place where each living thing lives and finds its food, water, shelter, and space is called its habitat. What kind of habitat does a bird need? What kind of **habitat** does a fish need? What kind of habitat does a caterpillar need?



Connect the Food Web

Draw lines connecting the plants and animals that depend on each other.



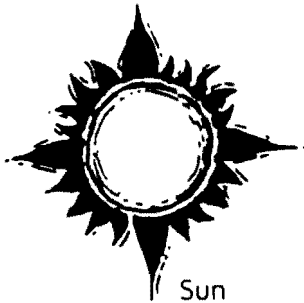
Fox



Eagle



Snake



Sun



Rabbit



Trout



Ladybug



Grass

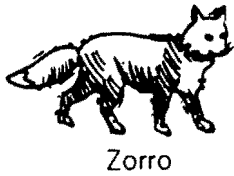
Living things depend on each other. Birds need insects. Insects need plants. Plants need water and soil. The soil is made up of rocks and minerals mixed up with nutrients from dead plants and animals. All living things are links connected in **food chains**. If one of the links disappears, all of the others parts of the food chain are affected. When we protect habitats from destruction and pollution, we are protecting all living things.

The full-color *Animal Tracks* kids' book contains more games, puzzles, information and activities about conservation issues. Order your copy from the National Wildlife Federation. Have an adult call 1-800-822-9919 for more information.



Connecta La Red Vital

Traza líneas entre las distintas partes de esta red vital para demostrar su interdependencia.



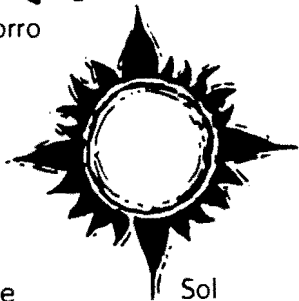
Zorro



Águila



Culebra/serpiente



Sol



Conejo



Trucha



Mariquita



Hierba/césped

¿Qué es un hábitat?

Todos los seres vivos necesitan alimento. Todos los seres vivos necesitan agua pura. Todos los seres vivos necesitan abrigo y un lugar donde puedan resguardarse del peligro. Y todos los seres vivos necesitan espacio para vivir, moverse y crecer. Ese lugar especial donde cada ser vivo encuentra alimento, agua, refugio y espacio para vivir es su **hábitat**. ¿Qué tipo de hábitat necesita un ave? ¿Qué tipo de hábitat necesita un pez? ¿Qué tipo de hábitat necesita una oruga?



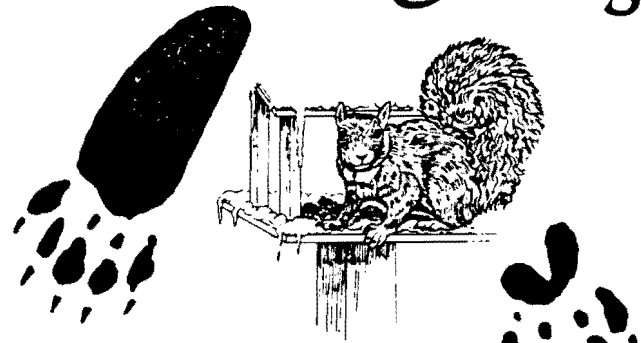
Los seres vivos dependen los unos de los otros. Las aves necesitan de los insectos. Los insectos necesitan de las plantas. Las plantas necesitan agua y tierra. La tierra está compuesta de piedras y minerales mezclados con nutrientes derivados de las plantas y los animales muertos. Los seres vivos son todos eslabones de una **cadena alimentaria**. Basta que desaparezca un eslabón para que todas las otras partes de la cadena alimentaria se vean afectadas. Cuando protegemos a los hábitats de la destrucción y la contaminación, estamos protegiendo a todos los seres vivos

El nuevo libro a colores de Animal Tracks contiene más juegos, rompecabezas, información y actividades sobre cuestiones de protección ambiental. Pide tu copia a la National Wildlife Federation. La llamada la debe hacer un adulto al: 1-800-477-5560 ÍTEM #79929

Animal Tracks Kids' Page

Welcome to Animal Tracks!

By following the tracks, you can learn more about the environment and what you can do to make a difference.

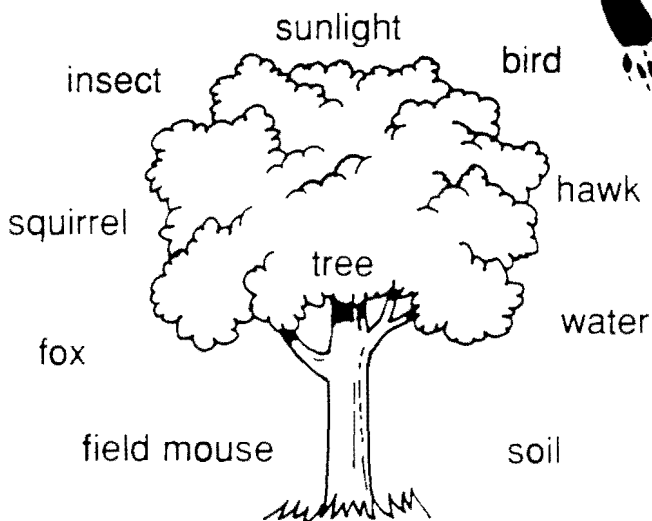


Just follow the tracks...



Connect the Web of Life

Draw lines between the parts of this web of life to show how the different parts depend on each other. For example the bird eats the insects, drinks the water, lives in the tree, and is eaten by the fox. Draw lines between the bird and the insects, the water, the tree, and the fox.



Habitats

It's a duck's pond. It's a woodlouse's rotting log. It's a blue whale's ocean. That "it" is habitat—the place that contains all the nutrients, water, shelter, and space that a plant or animal needs to survive and raise their young. Most habitats are home to many species, and these species are dependent on each other. The interaction of these species forms a complex web of life. Every plant and animal plays an important role, with each participant relying on the others for survival. If any of the components of the web are disturbed or removed, the entire web suffers.

For example, an oak tree can be a habitat for many creatures. The tree needs soil, water, and sunlight in order to live. The tree provides a home to many animals, including field mice, squirrels, birds, and insects. The squirrels eat the tree's acorns and insects eat the tree's leaves, bark and wood. The birds help the tree by eating the insects that feed on the tree. In turn, squirrels and birds are eaten by predators like foxes and hawks.

Things You Can Do

- Find out as much as possible about habitats nearby. What habitats exist near your home? Write down the types of trees, plants and animals you see.
- Clean up streams, lakes, and beaches in your area. Every time you pick up a piece of litter, you help the habitat. Work with a school, community or church group to sponsor a stream, lake or beach cleanup.
- Avoid using substances that can pollute waterways and habitats. Pesticides, motor oil, and other pollutants can harm soil, groundwater and waterways, and harm plants and animals. If you must use these products, dispose of them properly.
- Start your own habitat by creating a natural area in a courtyard, backyard, or schoolyard. For information write to Schoolyard Habitats Program, NWF, 8925 Leesburg Pike, Vienna, VA 22184-0001.

The new full-color Animal Tracks book contains more games, puzzles, information and activities about conservation issues. Order your copy from the National Wildlife Federation. Have an adult call 1-800-477-5560.

Animal Tracks®

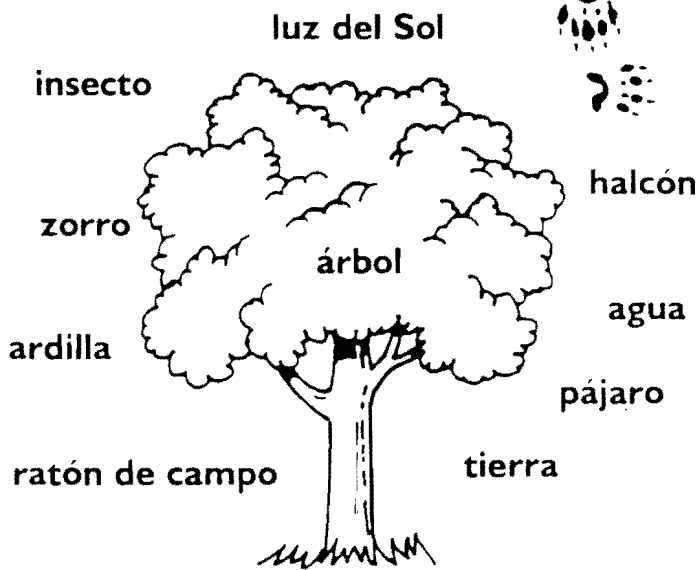
Para Niños ¡Bienvenidos a Animal Tracks!



Sigue la pista...

Conecta La Red Vital

Traza líneas entre las distintas partes de esta red vital para demostrar su interdependencia. Por ejemplo, los pájaros se comen los insectos, beben agua, viven en el árbol y se los come el zorro. Traza líneas entre los pájaros y los insectos, el agua, el árbol y el zorro.



Sigue la pista y verás como vas a aprender mucho más sobre el medio ambiente y lo que tú puedes hacer para mejorarlo.

HÁBITATS

Para los patos es una laguna. Para una cochinilla es un tronco podrido. Para una ballena azul es el océano. Ese «es» se refiere al hábitat — el lugar que contiene todos los nutrientes, el agua, el abrigo y el espacio que una planta o un animal y sus crías necesitan para sobrevivir. La mayoría de los hábitats albergan a muchas especies y estas especies dependen la una de la otra. La interacción de estas especies crea una compleja red vital. Cada planta, cada animal, desempeña un papel importante en la supervivencia de los demás. De alterarse o desaparecer cualquiera de los componentes de esta red vital, toda la red sufre.

Por ejemplo, un roble puede ser el hábitat de muchas criaturas. El árbol necesita tierra, agua y luz del Sol para poder vivir. El árbol sirve de refugio a muchos animales, incluido el ratón de campo, las ardillas, los pájaros y los insectos. Las ardillas se comen las bellotas, y los insectos, las hojas del árbol. Los pájaros ayudan al árbol comiéndose los insectos que se alimentan del árbol. A su vez, los depredadores como los zorros y los halcones se comen las ardillas y los pájaros.

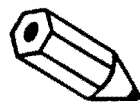
Cosas que puedes hacer

- Averigua todo lo que puedas sobre hábitats que te queden cerca. ¿Qué hábitats existen cerca de tu casa? Apunta los nombres de los árboles, plantas y animales que veas.
- Limpia los arroyos, lagos y playas de tu zona. Cada vez que recoges basuras estas ayudando al hábitat. Ponte de acuerdo con una escuela, comunidad o grupo de una iglesia para adoptar un arroyo, un lago o para limpiar una playa.
- No uses sustancias que puedan contaminar los ríos, los lagos o los hábitats. Los pesticidas, el aceite para lubricar motores, y otros contaminantes, pueden deteriorar el suelo, las aguas subterráneas y vías fluviales, además de hacerle daño a las plantas y los animales. Si usas estos productos, deshazte de ellos con cuidado.
- Empieza tu propio hábitat creando una zona natural en un patio, jardín o en el área de recreo de tu escuela. Si necesitas información, escribe a: Schoolyard Habitats Program, NWF, 8925 Leesburg Pike, Vienna, VA 22184-0001.

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Adaptado por Eleanor Hodges usando la publicación de National Wildlife Federation 1996 *Animal Tracks Habitat Action Pack*. Animal Tracks es un nombre registrado por la National Wildlife Federation.

Awareness Notes...



A series of 18 horizontal lines for writing, spaced evenly down the page.

Action Notes...



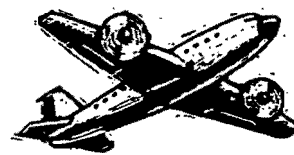
Handwriting practice area consisting of 18 horizontal lines.

ACTION

“We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.”

**- Aldo Leopold
American writer and conservationist**

Taking Action



Getting Started

Participating in student-driven action projects is an important means of helping students develop a strong connection to the environment. An action project that focuses on improving the local environment will let students experience first-hand how they can make a difference. By accomplishing something tangible that addresses a community concern, students gain both a capacity for action and citizenship skills. An added benefit is the many connections between action projects and the curriculum. Environmental issues and project organizing skills can be connected to many subject areas, often enhancing the requirements by providing real-world examples and integrated lessons that cross disciplines.

Two important keys to success are **focusing on your local community and involving students in every aspect of the process**. Directing your efforts to a problem in the local area will make students active participants in the future of their communities. The benefits of a local project can be more easily seen and understood. By allowing students to direct the project and determine the focus of their efforts, they gain a sense of ownership of the project and its outcomes.

Determining how to get started on a project is often the hardest part. The following information provides a basic guideline for steps involved in organizing a project, as well as some tools for accomplishing each step. Please refer to the resources section for other references with details on project organizing.



Role of the Teacher

Let your students take charge of their own projects: Projects will be less effective if the teacher alone chooses the focus of the project. Instead, encourage your students to become involved and use their creativity to develop a project plan that works for everyone. This will both develop student leadership skills and encourage your students to take part in the project using their own unique abilities. In this role, you will be serving more as a mentor, guiding and assisting your students participation in the project.

There are many ways to approach action projects: Most projects can be done at many levels: from very simple to quite involved. To make the projects as beneficial as possible, tie the projects into the curriculum and set learner outcome goals for your students involvement in an action project. For example, by stating a goal of learning how to identify plants, a garden activity will expand students' horizons beyond just learning how to plant vegetables.

Think broadly about how the project will fit into your curriculum: Action projects can touch on a wide range of student skills including language arts skills like oral communication and report writing; math skills like mapping, estimating, and problem solving; and science skills like modeling, observing, and predicting. Specific subject areas can also be tied into the action project as appropriate, so student

knowledge can be developed using local issues. When meeting your requirements through the more hands-on approach of an action project, the level of student interest and motivation will help to increase learning.

Keep the project moving: Perhaps the most important role of the teacher is to help students overcome obstacles. The scope of an action project should be realistic—sometimes you may need to keep your students open to other options in case their initial strategy doesn't work. Refer to the steps in the "Implement Plan" stage for more guidance.

Follow the Tracks to Action



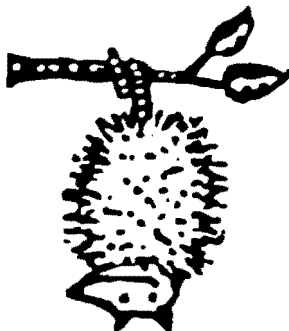
Taking part in an action project is a creative process, unique to each situation. The steps below are designed to give guidance on how the process might work, but the process will differ from project to project. The steps include information on how to determine what is needed in your community, how to bring out diverse skills in your students and get them involved, and how to make an action plan.

By involving students in the planning steps, they are engaged from the start. This up-front preparation process can serve as a lesson for students in itself, focusing on skills such as interviewing, making time lines, budgeting, and organizing. Also, remember that investing time in planning is critical to project success.

There are four stages to taking action in your community:

- Take Inventory
- Make a Plan
- Implement Plan
- Reflect and Evaluate

Going through these stages in sequence will help your group tackle an environmental concern in your community and learn from the process while meeting your curriculum requirements. In each stage, there are steps and tools to help you implement the plan. These steps and tools are offered as guidance and can be used however they work best for your particular group's needs.



Stage I - Take Inventory

Identify concerns in your community that indicate an environmental problem and determine resources to which you have access both among students and within the community.

This will involve:

1. Determining a project area
2. Finding local community resources
3. Conducting a needs inventory
4. Identifying student skills

1. Determining project area: Identify a place to focus your efforts.

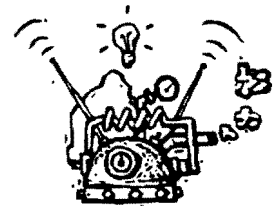
✳ Use a map of your community and students' knowledge of the area to find possible project locations that are nearby in the community. In addition to your school campus, possible locations include parks, churches, community centers, and natural areas such as rivers, streams, and wetlands.



✳ Make sure the place is convenient, accessible, and safe. The place should also offer some opportunities for improvement. If your community is fairly small, you may want to look more broadly and decide to focus on the community as a whole. It's still important to define the boundaries of the area you want to investigate more closely.

✳ Share your educational objectives with your students, then have them visit each location and vote on the one they like best.

2. Finding local community resources: Brainstorm—list all the people and organizations within the community who may help with the project.



✳ Have students list everyone to whom they have access since it's difficult to anticipate what sorts of resources you will be able to use with your project. Don't worry now about how to use these resources. You can take advantage of what you've identified in your community during the project implementation. *Examples of local community resources:* a local university's Department of Ecology, the hardware store next to the school, a parent who works for the Chamber of Commerce, and the 4H club.

✳ Find people and groups with knowledge that might relate to your project, sources of materials, and sources of labor.

✳ Get parents and other key community members on board. Explain what you are doing beforehand in order to secure their support for involving students in action projects.

* Remember that connecting with local community resources will be an ongoing process. Start discovering who is available locally to help your group now and continue throughout the process. A wide network of community support will help your group complete a successful project.

3. Conducting a needs inventory: Take some time to get to know your project area.

* Have students draw maps of the area identifying key locations and things to investigate. Depending on your location, things to identify are natural areas, signs of wildlife, places where people meet for work or play, evidence of pollution, and special landmarks.



* Once you have mapped your project area, determine what issues to focus on and then brainstorm questions to use in the inventory for each issue. See the ⇒**Sample Inventory Questions**⇐ on p. 55 and the ⇒**Sample Project Inventory Checklist**⇐ on p. 56 to get your group started. Complete one ⇒**Project Inventory Checklist**⇐ on p. 57 for each issue you choose to assess what is happening in the area that needs attention.

* Set aside some time when students can investigate the inventory questions, taking note of what they find out and possible solutions.

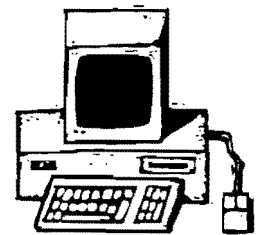
* Some questions may require surveying local residents. Figure out what you want to know more about and write three to five questions to use in a survey.

* For questions where more information is needed, allow follow up time to answer questions. Other sources of information include the archives of the local newspaper, the local library, and members of the community. Remember the community resources you found in step number two!

* Once all the questions are answered, rank each item by its importance as an issue that needs attention. The projects identified as high priorities in each category are your community's needs, which will later be narrowed down to a project for your group.

4. Identifying student skills: Work with your students to make a list of student skills.

* List all the things the students can do that might be needed in an action project. *Examples of student skills:* drawing, performing, working on a computer, giving speeches, writing letters, gardening, organizing people, researching, building models, sewing, cooking, etc...



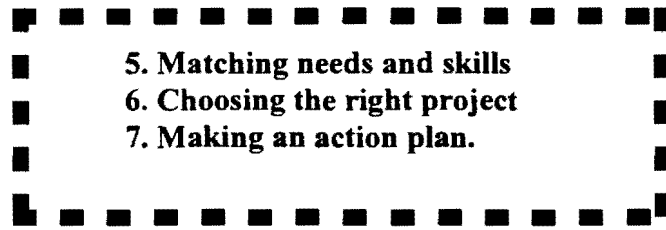
* Include skills students use in school as well as hobbies or after-school activities.

* Encourage all students to offer something.

* This list will be used later with the **Choose a Project** chart on p. 59.

Stage II - Make a Plan

Choose a project based on the needs of the community, the skills of the group, and community resources. Then make a plan for implementing the project. This will involve:



5. Matching needs and skills: Use the charts and sample charts (pp. 55-62) to help plan your project.

✳ Follow the instructions on the ⇒**Project Inventory Checklist**⇐ (p. 57) to identify needs in your community.

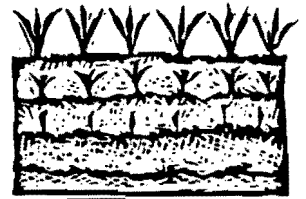
✳ Next, follow the instructions on the ⇒**Choose a Project**⇐ chart (p. 59) to match the skills you identified (in Step 4) with the needs of your defined project area. This will involve listing all the skills identified by students and matching them with the priority environmental needs identified in the needs inventory step. Don't forget to consider the skills of your community resources when matching needs and skills.

✳ After you have completed the chart and identified a final list of possible projects, use the information in the next step to choose a project.

6. Choosing the right project: There are a few things to consider when choosing a project.

✳ Have your students think about which of their final project choices most meets the needs of the community. One way to determine this is interviewing residents of the community near your project area to see what they think is most important. You can also take a look at the issues people are talking about or are being covered in the newspapers.

✳ Another way of evaluating projects is by measuring each project's level of impact. Look at how many people you will reach or how greatly the wildlife of the area will be affected.



✳ See who else is working on projects in your area and try to join forces.

✳ Which project are students most excited about? A beginning level of excitement will keep the momentum going so you can complete your project.

✳ If there are projects that you are interested in that require skills that your group doesn't have, figure out how to find help in these areas from community resources. Local companies are often able to donate large equipment and supplies that would make some project more attainable.

✳ After weighing each option, have students vote on the project they like best.

- * Make sure each the project chosen will comply with local regulations.

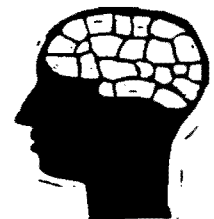
7. Making an action plan:

* Follow the instructions on the ⇒**Action Plan Worksheet**⇐ (p. 61). This will involve determining a name for your group, the project goal, and the start and end dates of the project. You will then break down the overall goal into smaller tasks, deciding completion dates, people responsible for each task, and what materials and funding are needed.

* When brainstorming what your students hope to accomplish with their project, be sure to guide students toward a project that can be realistically accomplished.

* For the project time line, remember that some tasks can be done simultaneously. If time is short and you have an absolute deadline for completion of the project, it may help to work backwards from your completion date.

* Consider the community resources you identified earlier for help with labor, materials, and funding for the project.



Stage III - Implement Plan

Now that you have chosen your project and made a plan for how to get it done, you can get started. While you are moving forward, take time out to keep track of what's happening and make sure students are still interested and excited about the project.

- 8. Communicating project progress
- 9. Keeping project moving forward
- 10. Publicizing the success of the group

This will involve:

8. Communicating project progress: Sharing what's happening with all the group members will help the group stay organized and enthusiastic.

- * Get together regularly for updates on the project.

* Keep track of who's working on what, what's been accomplished, and outside people or organizations who have contributed to the project. Make sure everyone is doing what they're responsible for and that you aren't duplicating efforts.

- * Get student volunteers to act as project managers and keep track of progress.

- * Encourage students to work together on tasks so they can support each other.

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9. Keeping project moving forward: Don't worry if things happen differently from how you planned. Unforeseen events are common when working on a big project and students may have to do some creative problem solving to overcome encountered obstacles. It's all part of the learning process.

- * Your action plan should not be considered a rigid document. It should be used as a guidance tool to help manage the project, not control the project.

- * Take stock periodically and modify the project plan if necessary. Being flexible will enable your group to keep moving forward.

- * Don't give up! Try something else if your first idea doesn't work.

- * It is possible to get past problems. Turn to your community contacts for skills and resources your group needs. Seek help from higher sources like the principal or someone in the local government to help with bigger challenges.



10. Publicizing success of group: It's important to document and highlight your group's successes throughout the project.

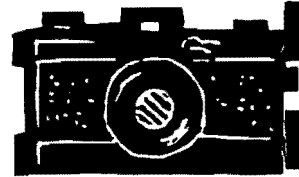
- * Network with lots of people and organizations to get ongoing project support.

- * Show off what the group accomplishes each step of the way. You are more likely to get support and publicity once you have initial successes. Other people may also get interested in your work and want to help out.

- * Use numbers as an impressive way to show off what you've done. Instead of "our group picked up trash," say "our group picked up 47 bags of trash." Try to find out things like how many people you reached, how much water/energy (or the quantity of other resources) you saved, or how many hours your group worked. Determining these figures make excellent math problems.

- * Take photographs or videos in the beginning, middle, and end of your work.

- * Give tours of your project area to the community highlighting your visible achievements.



- * Get letters of support from people you work with on the project.

- * Alert the radio, television, and newspaper media of exciting project events through press releases or public service announcements. Many local media outlets will cover student activities (including cable TV that often has community access channels for such projects).

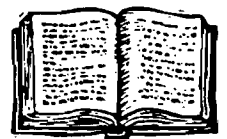
- * Keep a project journal as a record of what you did, and a scrapbook with all the memorabilia collected along the way.

Stage IV - Reflect and Evaluate

Completing a successful project is something to celebrate. It's important to end the student's experience with a chance to reflect on and evaluate what happened. Take advantage of your accomplishments and get some recognition for your students and school. This will involve:

- ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
- **11. Reflecting on the project** ■
- **12. Evaluating the project** ■
- **13. Getting recognized** ■
- ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

11. Reflecting on project: In order to enhance the students' understanding of what they accomplished, take time to get together as a group and process what happened. Use the ⇒ **Sample Reflection Questions** ⇐ sheet on p. 62 to guide your discussions.



- * Schedule discussions throughout the project as well as at the end of the project. You should also encourage students to document their thoughts in a journal.

- * Having a group discussion will give students the opportunity to listen to other thoughts on the experience, perhaps hearing a new perspective.

- * Focus on how students changed their thinking or behavior as a result of the project. Often students will be surprised at things they learned or changes in themselves.

- * Make sure everyone has a chance to share and allow students multiple options for sharing their experiences. Public speaking, journal writing, hands-on activities, and performing arts are some examples of approaches. These reflection activities will allow you to assess your students' performance as well.

- * Allow students time to respond to the questions. This will give them a chance to organize their thoughts.

12. Evaluating the project: In addition to processing the project on an experiential level, it is probably a good time to assess what happened, what your students learned, and possible improvements for the future.

- * Have students evaluate each step of the project. Discuss how to give constructive feedback and focus the discussions on how well your group accomplished the original project objectives.

- * Use journals, videos, photos, or other materials collected during the project as a springboard for discussions on the environmental issue your group worked to improve. Talk about what the students learned and how their thinking has changed during the project process.

* Ask community members who were involved with the project to evaluate the group's project. Initiate discussions by sharing videos or scrapbooks from the project. Another option is to develop a form or survey questions to assess what worked and didn't work.

* Spend time to determine how to keep the project going. Keep up your network of community contacts to maintain a successful project that will last into the future.

* Discuss what else your group can accomplish. Now that you have a team mobilized with a variety of skills and contacts, it should be easy to build on your initial project.

13. Getting recognized: You did it! Wrap up the project by getting more recognition for your final project.

* Use the information you gathered previously (statistics, photographs, letters) to tell everyone you can about what the group accomplished.

* Send a press release to the local newspaper or television station, hold an awards ceremony for the participating students, and publish in-print and on-line the story of what happened.

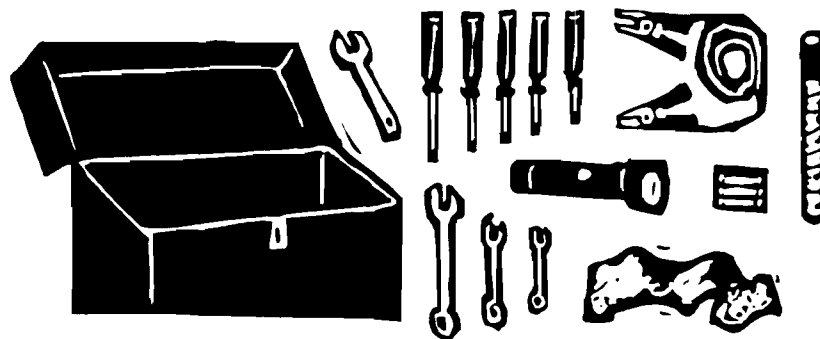
* Get in touch with nationwide awards programs that recognize environmental projects. (See page 77)



Action Tools

The following pages contain the action tools referenced in the action steps. Each tool is designed to be copied and distributed to your students.

➤ Sample Inventory Questions	Page 55
➤ Sample Project Inventory Checklist	Page 56
➤ Project Inventory Checklist	Page 57
➤ Sample Choose a Project	Page 57
➤ Choose a Project	Page 59
➤ Sample Action Plan	Page 60
➤ Action Plan Worksheet	Page 61
➤ Sample Reflection Questions	Page 62



Sample Inventory Questions

Note: Many of these questions will require brainstorming to determine strategies for finding the answers.

I. Water Quality

- How many concrete or blacktop surfaces such as playgrounds or parking lots that allow water to run off into the street and storm sewers are in your community?
- How are construction or other bare areas managed to prevent soil from being washed down storm sewers? Are erosion control measures required on construction sites in your area?
- Has local drinking water been tested? For what contaminants (lead, bacteria)?
- What is the maintenance plan for parks or gardens in the area in terms of the amount of pesticides and fertilizers used?

II. Preserving Natural Areas

- What impact do people have on natural areas when used for recreation purposes such as hiking, biking, boating, or picnicking?
- Does your community protect and preserve wildlife habitat such as wetlands, forests, or prairies?
 - Does the community have a land-use plan which specifies which areas will be kept natural or as greenways?
 - Do more areas need to be added? Get more information from the office of permits/inspections/building/planning or the conservation district office on these questions.
- How extensive is the use of native trees, shrubs and grasses on community and school grounds? Do these areas use landscaping that provides food, water, and shelter to attract wildlife?

III. Water and Energy Conservation

- How are homes and businesses insulated and weatherproofed to keep energy consumption at a minimum? What energy conserving techniques are people using (i.e. turning off appliances when they're not being used and adjusting the thermostat for the air conditioner up and heat down when people aren't around)?
- Is watering of lawns, parks, or gardens being done in ways that ensure water isn't wasted?
- What water conservation techniques do homes/businesses use (i.e. low-flow shower heads and aerators on the faucets)?

IV. Air Quality

- What forms of alternative transportation are available in your community?
- Are there areas that have been cleared of trees for construction projects? What tree planting efforts occur in the community?

V. Waste Reduction

- Are there locations where people can recycle (aluminum, plastic, glass, newspapers, oil)? Are these easy to find and use?
- What products made from recyclable materials do stores in the area sell?
- Does your community/school buy materials made with recycled content? Can these efforts be increased?

VI. Environmental Awareness

- Does your community educate citizens about conservation in the home and yard? How can this be improved?
- Is environmental education incorporated into your school?
 - Are environmental topics covered in your classes?
 - Are there environmental clubs at school?
 - Do you have a school nature area where you can do experiments and study and enjoy nature?
- How does your school or community celebrate Earth Day, National Wildlife Week, Arbor Day, National Drinking Water Week, Wetlands Month, National Beach Clean-up Day, or other environmental awareness days?

Sample Project Inventory Checklist

Issue: Waste Reduction

1. Question: Are there locations where people can recycle (aluminum, plastic, glass, newspapers, motor oil)? Are they easy to find and use?

What we found out: *Recycling bins for glass, aluminum, and plastic in the cafeteria. Paper recycling in the hallways. No place to recycle newspapers.*

Possible solutions: *Set up bins for newspaper.*

We need more information about: *Does recycling company collect newspaper?*

Priority ① 2 3

2. Question: Does school store sell products made from recyclable materials?

What we found out: *Store only sells recycled notebooks.*

Possible solutions: *Could sell recycled folders, notebook paper, rulers, and pencils.*

We need more information about: *Prices of recycled products.*

Priority 1 ② 3

3. Question: Does your school have a policy of buying materials with recycled content?

What we found out: *All paper for copy machine is recycled--this is county policy.*

Possible solutions:

We need more information about:

Priority 1 2 ③

4. Question: _____

What we found out:

Possible solutions:

We need more information about:

Priority 1 2 3



Project Inventory Checklist

Instructions: Pick the issues you want to focus your investigation on. For each issue you choose, brainstorm inventory questions—use the list of sample questions to get you started. Prepare the inventory checklists by filling in the issue and the questions. Then work in groups to answer the questions for each issue. For each question, note what your group found out and possible solutions. If your group can't answer the question completely, check the box indicating that "we need more information" and list ideas for further investigation. Continue for all of the questions until completed. Then for each issue, rank the items by their importance as an issue that needs attention with "1" indicating the most pressing problems and "3" indicating the least important ones.

Issue: _____

1. Question: _____
What we found out:

Possible solutions:

We need more information about:

Priority 1 2 3

2. Question: _____
What we found out:

Possible solutions:

We need more information about:

Priority 1 2 3

3. Question: _____
What we found out:

Possible solutions:

We need more information about:

Priority 1 2 3

4. Question: _____
What we found out:

Possible solutions:

We need more information about:

Priority 1 2 3

Sample Choose a Project

What We Know How To Do (Skills and community resources)	Priority Environmental Needs (identified problems)				
	Set up recycling bins in park	Organize an alternative transportation day	Build bat boxes		
drawing	X				
using Internet	X	X	X		
riding bikes		X			
talking on phone	X		X		
working in woodshop			X		
watching backyard wildlife			X		
sewing					
reading	X	X	X		
driving bus (Wyatt's dad)		X			
hardware store (David's mom)			X		

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Choose a Project

Instructions: List all the skills and community resources you identified earlier in the column "What We Know How to Do" on the left side of the chart. Then, take the problems identified as priorities in each category of the Project Inventory Checklist and write them along the top of the chart in "Priority Environmental Needs". See where the student and community skills and resources in "What We Know How to Do" match up with the "Priority Environmental Needs" and put an "X" in the box. *Example: if a priority environmental need is creating an educational display and one of the student skills is art, put an "X" in the box where the two things meet.* The projects that have the most "X's" in their columns are the ones that best match your students' skills.

What We Know How To Do (Skills and community resources)	Priority Environmental Needs (identified problems)				

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Sample Action Plan

Environmental Project: Building bat boxes.

Group Name: Room for Bats

Project Goal: Build bat boxes to encourage bats to nest on school campus.

Project Start Date: 2/1/98

End Date: 4/20/98

Specific Project Tasks	Completion Date	People Responsible	Materials/Funding Needed
Choose a site.	2/15/98	Elenor, Jean, and Linda	None.
Research bats and how to make bat boxes.	2/28/98	Sara and Joe	Library. Postage for letters.
Map site and determine location of bat boxes.	2/28/98	Joe, Margaret, and David	Art supplies for map.
Get materials and tools to build bat boxes.	3/15/98	Mitchell and Jennifer	Wood, nails, and tools. Estimate \$75 with borrowed tools.
Build boxes.	4/1/98	Everyone	None.
Put boxes up.	4/8/98	Cheryl, Ronald, and Mr. Nelson	Nails and ladder. Estimate \$5 with borrowed ladder.
Watch and record data about bats using boxes.	ongoing	Everyone	None.



Action Plan Worksheet

Instructions: Write down the name of your project and the name of your group on the worksheet. List your main goal next to "Project Goal." Document when you can start on the project and the end date when the project needs to be completed. Break down the overall goal into smaller tasks and organize the tasks by priority, with what needs to be done soonest first. List each of the tasks in order on the "Specific Project Task" column. Go through the list of tasks and write a target completion date for each one. For each task determine who will be responsible for which task and what materials and funding are needed and list this information in the appropriate columns of the worksheet.

Environmental Project:

Group Name:

Project Goal:

Project Start Date:

End Date:

Specific Project Tasks	Completion Date	People Responsible	Materials/Funding Needed

Sample Reflection Questions

Reflection questions are usually open-ended. For example....

- ☺ What happened when...?
- ☺ How did people respond to you?
- ☺ What did it feel like when?
- ☺ What did you feel good about?
- ☺ What did you learn as a result of...?
- ☺ How can you use what you've learned?
- ☺ What academic skills or information did you use?
- ☺ What would you like to know more about?
- ☺ Where is this situation likely to occur in the future?
- ☺ What would you do differently?
- ☺ What advice can you pass on to others?
- ☺ What was your biggest challenge?
- ☺ How did you solve a problem?
- ☺ Why was there a need for your service?
- ☺ What could be done to solve the problem permanently?

Sample reflection questions were adapted from Learning by Giving, from the National Youth Leadership Council, St. Paul, MN 55113. For more information call 612-631-3672.

Project Ideas

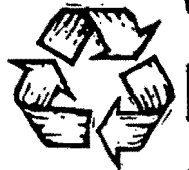
❖ **Find out** as much as possible about habitats nearby. A great way to begin is to go for a walk outside. What habitats exist near your school grounds? In a nearby park or courtyard? Write down the types of trees, plants, and animals you see. If you can't identify them, go to a library and use field guides to help. The librarian may also be able to point you to books that show you ways you can help habitats in your community.

❖ **Clean up and fix up.** Every time you pick up a piece of litter, you help a habitat. Sponsoring a stream, lake, or beach cleanup is a great way to clean up waterways, and picking up litter can help beautify and preserve natural areas. Maybe a park fence needs mending or a bench needs repainting to remove graffiti. Sprucing up a natural area makes people enjoy being there and will encourage them to protect it.



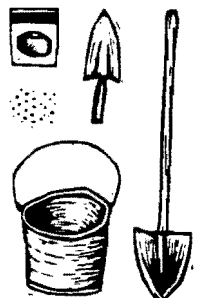
❖ **Avoid** using substances that can pollute waterways and habitats. Pesticides, motor oil, caustic cleaning products, and other pollutants can harm soil, groundwater, and waterways; they also harm plants and animals directly. Avoid using such products if you can. If you must use them, dispose of them properly. Never toss such things into the trash, where the chemicals can leak into the ground and pollute soil and groundwater. Take toxic trash to special trash sites or find out when such things will be safely collected. Your local department of solid waste or a local landfill will be able to tell you how to dispose of toxic trash. Kids can help get this message out to others by making and distributing fliers or organizing an information booth at a shopping center or community event.

❖ **Conserve resources** by reducing, reusing, and recycling. If we consume fewer resources, we help preserve habitat and create less waste for landfills. Try to reduce the amount of trash you throw away. Start by replacing throw-away things with reusable ones. Use an insulated bottle for drinks instead of individually packaged ones. Use washable cloth napkins and towels, not paper. Reuse or repair items when you can, and recycle everything possible. Kids can be great helpers with school and community recycling projects. Contact your department of solid waste to find out what types of materials can be recycled in your community and how they are collected. Some materials such as aluminum are valuable. An aluminum can drive can help fund other environmental projects.



❖ Recycling only works if there are useful products made from the recycled materials. **Sponsor a contest** for people to come up with innovative and useful products made from items that would otherwise end up in landfills. Find out what products containing recycled materials are already available in your area and launch an information campaign to promote them.

❖ **Plant native trees and other native plants,** or start a new habitat by creating a natural area in a courtyard, backyard, or schoolyard. Even a single tree can be an important habitat to many animals. Trees also help clean the air and prevent soil erosion, and their shade can help lower fuel costs of air conditioning. Select a location for tree planting, then contact a state extension service office for advice on the type of tree or other plants that would work well in your location. It is important to plant native species. Native species are those that occur naturally in your area and won't harm the ecosystem. Then get busy planting! See the next section, "How To Create a Schoolyard Habitat," for ways to go about establishing a habitat at your school.



❖ **Join forces** with local or national groups on projects that benefit habitats. Environmental organizations, nature centers, and parks are likely to know about projects that would benefit habitats and the

environment, and these groups will probably be glad to get some assistance from eager students. Many communities have an office that helps place volunteers with local nonprofit organizations. Check with your city or county government.

❖ **Raise some money** for the cause. Fund-raising projects such as selling environmentally inspired crafts, potted plants, or baked goods not only raise money for habitat projects, they also increase awareness of the issues for everyone who buys something.



❖ **Work to keep wild areas wild.** Be aware of natural areas nearby and of any plans that may affect them. Read newspapers, listen to the radio, and look for announcements of public meetings to keep informed. If you hear of issues affecting habitats in your area, research the issue, then express your concern or support by drafting letters to newspaper editors and/or attending any meetings about the land so you can voice your opinion.

❖ **Educate others** about the importance of habitats and how they can help, too. Lead youth activities that will let others know about the importance of helping habitats. Kids can design posters and fliers, create bulletin boards for school, or displays for local businesses. A play about preserving habitat is a great way to spread the word. Participate in school or community parades by building a pro-habitat float.



Case Study: Inner City School Transforms a Vacant Lot Into a Butterfly Haven

To look at the butterfly garden at Boise/Eliot Elementary in Portland, Oregon, you'd never guess that it was once an eyesore consisting mainly of unkempt shrubbery and a large electrical box. Now the lot is home to numerous species of native wildflowers and trees and features a sitting area where students can come to study the ecosystem they've helped create.

Parent volunteer Jane Biehl was involved with the project from its inception in the spring of 1996. "It really wasn't a difficult thing to get going," she recalls. "The students began planning the garden in March, and by April we were beginning to work in the yard." Sixth- and seventh-grade students were responsible for planning the garden, which made for a genuine multi-disciplinary learning experience. "The kids researched which native plants butterflies would eat and which ones they needed to lay eggs on," Biehl said. Math skills came into play in determining how many cubic feet of wood chips or soil the area needed. Younger children pitched in to do the actual gardening, and so did a lot of community volunteers.

Donations of both money and time came from Pacific Power and the National Wildlife Federation's Western Natural Resource Center in Portland. Dannon Yogurt gave money for supplies. Everyone's efforts have resulted in a natural area that features not only the butterfly garden, but also a small wetland area and a wooded area under a fire escape where undergrowth will be allowed to develop. Teachers are busy planning ways to use the garden in their lessons.

"It's been such a positive experience for everyone," said Biehl. "It really has been great to watch the older kids work together with the younger children and take ownership in this project. The garden has become theirs, and they are very proud of it."

How To Create a Schoolyard Habitat

Whether your school is in the suburbs or in the city, and regardless of whether it is large or small, you can get a natural area growing. Schools that have land around them are great for establishing habitats, but you don't need a lot of space to create a habitat that will attract wildlife and educate children firsthand about all of the concepts presented in this Action Pack. Habitat-creating plants can be planted around playgrounds, or you might consider removing some of the cement from a courtyard to make room for plants to grow. You can grow small trees and other plants in containers, or put in raised beds around sidewalks for flowers. There are lots of possibilities.

Here are some tips for establishing a schoolyard habitat:

1.1. **Don't go it alone.** You'll need the help of others to make your habitat successful. Creating a schoolyard habitat is easiest and most successful if you involve the entire school and community. It involves work, but it will also bring everyone together to achieve a common goal.

- Remember to include your students. Take them outside to assess your site in the beginning and include them in the discovery and decision making processes throughout.

- The principal and school administration, as well as the maintenance staff responsible for the grounds, will help develop and support the project and keep it growing.

- Fellow teachers can coordinate volunteers and students.
- Students and community volunteers can dig and plant and tend the habitat.
- Community businesses can donate money, volunteer time, and gifts in kind—donations of items you might need, such as garden tools, signs or benches.
- Parents can help transport kids and work in the habitat.

2. **It's all in the planning.** Form a committee made up of the principal, teachers, students, school staff, parents, and local talent such as gardeners or landscape planners to help plan your habitat. Evaluate your school grounds for good planting areas and places that will foster outdoor learning activities. Make a site plan, develop a budget and timetable, and identify specific needs that will require fund-raising or volunteer help.

3. **Form community partnerships.** Many schools have benefited from donations of money, supplies, and time from local businesses and community groups. A schoolyard habitat is an investment in the children's education as well as in the community, and many people are glad to help.

4. **Start small.** To get everyone in the spirit, begin your habitat with small projects that don't cost much but provide fast results. After the holidays, have people bring their Christmas trees to the school to make brush piles for wild animals to nest and hide in. Rock piles will attract reptiles, amphibians, and insects. Putting out feeders, houses, and water for drinking is a sure way to attract birds. Plant flowers that attract butterflies or hummingbirds—they don't usually require a lot of space. Most garden centers can advise you on what plants work well.

5. **Build on your successes.** What you do with your habitat is really up to you, your school, and your community. You might consider a nature trail, a reforestation project, composting, seeding a wildflower meadow, or putting in a pond. The key to establishing a schoolyard habitat is that you can add to it gradually, as funds and time are available. And even the simplest habitat-enhancing projects afford great learning opportunities.

6. **Certify your schoolyard habitat** with the National Wildlife Federation. The Schoolyard Habitats "How-To" Planning Guide and a pre-paid Application for Certification (item #79948) are \$18. Call 1-410-516-6583 or write to National Wildlife Federation, P.O. Box 50281, Hampden Station, Baltimore, MD 21211.

Habitat Wrap-up

A great culminating activity that brings all the concepts of habitat together in a fun way is to have children plan model communities. After all, people need a habitat, too. Consider having a city or land planner come to your class and talk about his or her work. Then let the kids research and design their ideal communities. Specify that each community must contain housing, businesses, transportation, and recreational opportunities. Make sure they think about what will happen to the waste and pollution that are produced. Their goal is to design a community that provides for all of the people's needs and still preserves as much wildlife habitat as possible. Kids can make their models out of recyclable items such as boxes, milk cartons, etc. Have the kids specify the kinds of wildlife that will be able to live in their model world.

Notes...



A series of 21 horizontal lines spanning the width of the page, intended for writing notes. The lines are evenly spaced and extend from the left margin to the right margin.





APPENDICES

Glossary

- adaptation** —a physical or behavioral trait that helps a plant or animal survive in its particular habitat.
- bioaccumulation** —the process by which the amount of toxins increase as they travel up the food chain.
- biodiversity** —the wide variety of genes, species, and ecosystems that exist on Earth.
- carnivore** —an animal that eats other animals.
- ecosystem** —the interaction of living and nonliving things in a habitat.
- endangered species** —a species that is in immediate danger of becoming extinct. The tiger is an endangered species.
- extinction** —When all of the members of a species die off, the species becomes extinct and is gone forever. The passenger pigeon and all species of dinosaurs are extinct.
- food chain** —a representation of the relationship between organisms in an ecosystem. Each organism is a link in the food chain. A simple food chain goes like this: The sun produces energy that grass uses to produce food energy. Grass produces seeds that mice eat. Snakes feed on mice, and hawks feed on snakes.
- food cycle** —the completed food chain. When animals die they decay, which feeds plants by enriching the soil. Insects and other decomposers feed on dead animals, which is part of the decaying process.
- food pyramid** —a visual representation of a food chain showing the quantity at each level that it takes to support the next level.
- food web** —a complex relationship formed by interconnecting and overlapping food chains.
- habitat** —a place that contains all the nutrients, water, shelter, and space that a living thing needs to survive.
- herbivore** —an animal that eats plants.
- native species** —a living thing that occurs naturally in an area.
- omnivore**—an animal that eats plants and other animals.
- organism** —a living thing.
- predator** —an animal that kills and eats other animals to survive.
- primary consumers** —animals in a food chain that eat plants.
- producers** —the name for plants in a food chain.
- prey** —an animal that a predator hunts for food.
- secondary consumers** —animals in a food chain that eat primary consumers.
- species** —a group of living things that all share the same physical characteristics.
- threatened species** —a species whose numbers are low or declining. A threatened species is not in immediate danger of extinction, but it is likely to become endangered if it isn't protected.
- top predator** —the pinnacle of a food chain. Top predators may eat both secondary and primary consumers, but usually are not themselves prey for other animals.

Guide to Habitat Activities

Looking for more activities for your class? The following chart lists National Wildlife Federation activities from the *Animal Tracks Activity Guide* and the *NatureScope* series that apply to habitat studies. For easy cross-reference, each activity is listed by grade level and subject.

Activity Name/Source	Specific Grades	Science	Math	Language Arts	Social Studies	Art	Summary
A Walk in the Woods NS Trees p. 40	K-2	X					Listen to a rhyming story to discover how the animals in a forest use trees.
An Ant's View of Life AT p. 7	K-3	X		X		X	Pretend to be an ant and write about or draw pictures of the experience.
Insect Bingo NS Insects p. 28	K-5	X					Play a Bingo game to learn about insect habitat.
The Desert Scramble NS Deserts p. 38	K-5	X					Play a running game to learn about competition in the desert.
Habitats for Sale NS Mammals p. 42	3-5	X				X	Write classified ads for mammal habitats. Draw habitat pictures.
Dipping for Aquatic Insects NS Insects p. 30	3-5	X					Examine aquatic insects to learn how they are adapted to water.
Building Bird and Squirrel Feeders AT p. 8	3-6	X				X	Make simple feeders out of recycled materials.
Wild Animals in the Soil AT p. 115	3-6	X		X		X	Learn about animals living in soil.
The Web of Life AT p. 132	3-6	X		X		X	Play a game to understand the interconnectedness of organisms in a food web.
What Happened to Mr. Johnson's Fruit Trees AT p. 137	3-6	X	X	X			Put on a play that illustrates the concept of bioaccumulation.
Fantasy Island NS Pollution p. 64	3-8	X		X			Read about a tropical island and describe birds that might live there.
Homing in on Habitat NS Birds p. 35	3-8	X			X		Discuss the importance of habitat to birds and other wildlife.
A Web on the Wall NS Oceans p. 26	3-8	X				X	Develop a habitat area for wildlife in the schoolyard.

Activity Name/Source	Specific Grades	Science	Math	Language Arts	Social Studies	Art	Summary
Forests of the Sea NS Oceans p. 43	3-8	X				X	Compare a kelp forest and its inhabitants with a forest habitat on land. Build a model kelp forest.
The Spreading Desert NS Deserts p. 52	3-8	X			X		Make a chart to show how land use affects deserts.
Adopt a Water Friend AT p. 58	4-8	X		X	X		Study a water habitat over time and take steps to preserve it.
What to Do with an Empty Lot? AT p. 10	4-12	X	X	X	X		Role play the parts of different interest groups in deciding how to best use a vacant lot for the entire community.
A Rottin' Place to Live NS Trees p. 41	K-8	X				X	Examine a decomposing log and make a log mural.
Invent an Insect NS Insects p. 29	K-8	X		X		X	Write about and draw fantasy insects and describe their habitats.

Key

AT= *Animal Tracks Activity Guide for Educators Grades 4 to 6* (Item 10)

NS Oceans=*NatureScope, Diving into Oceans* (Item 75042)

NS Birds=*NatureScope, Birds, Birds, Birds* (Item 75004)

NS Deserts=*NatureScope, Discovering Deserts* (Item 75005)

NS Insects=*NatureScope, Incredible Insects* (Item 75001)

NS Mammals=*NatureScope, Amazing Mammals 1* (Item 75023)

NS Trees=*NatureScope, Trees are Terrific!* (Item 75021)

All available from the National Wildlife Federation, 8925 Leesburg Pike, Vienna, VA 22184. 1-703-790-4100.

Resources

FOR TEACHERS

Background Information

The Backyard Naturalist by Craig Tufts (National Wildlife Federation, 1993). Available through National Wildlife Federation, 8925 Leesburg Pike, Vienna, VA 22184, (703) 790-4434.

An informative collection of simple changes to make in your own backyard to attract wildlife and create a natural area.

Eyewitness Science: Ecology by Steve Pollock (Dorling-Kindersley, 1993). Available through Houghton Mifflin Co., Wayside Road, Burlington, MA 01803, (617) 272-1500 or (800) 225-3362.

Clear and informative text, accompanied by extraordinary photographs, examines the ways in which plants, animals, energy, and matter are linked together in habitats.

The Natural Habitat Garden by Ken Druse and Margaret Roach (Clarkson Potter, 1994). Available through Random House, Inc., 400 Hahn Road, Westminster, MD 21157, (800) 733-3000.

The award-winning author of *The Natural Garden* introduces readers to 35 gardens -- from a cactus-filled one in Arizona to a little prairie on a rooftop -- that recreate the naturally balanced plant communities found in each of the four main botanical habitats: grasslands, wetlands, drylands, and woodlands.

Activity/Curriculum Guides

Animal Tracks Activity Guide for Educators Grades 4-6 (National Wildlife Federation, 1995). Available through National Wildlife Federation, 8925 Leesburg Pike, Vienna, VA 22184, (703) 790-4100.

This activity guide contains over 40 hands-on activities which have been fully tested in the classroom. The activities are cross-curricular, addressing science, math, art, social studies, geography, and more.

Backyard Wildlife Habitat Information Packet (National Wildlife Federation). Available through National Wildlife Federation, P.O. Box 50281, Hampden Station, Baltimore, MD 21211, (410) 516-6583.

This packet contains information on how to start your own backyard habitat, plus an application to certify your backyard once your habitat area is complete.

Schoolyard Habitats Information Kit (National Wildlife Federation). Available through National Wildlife Federation, P.O. Box 50281, Hampden Station, Baltimore, MD 21211.

This kit contains a planning guide for creating a wildlife habitat on your own school grounds. Also included is an application to certify your habitat area with the National Wildlife Federation.

Georgia Schoolyard Wildlife Habitat Planning Guide and video. Available through the Georgia Wildlife Federation, 1930 Iris Dr., Conyers, GA 30207.

The 32-page guide is filled with information to help get a schoolyard habitat up and growing. A 14-minute video shows how others have done similar projects.

Peterson First Guides (Houghton Mifflin). Available through Houghton Mifflin, Wayside Road, Burlington, MA 01803, (617) 272-1500 or (800) 225-3362.

These books offer simplified guides to plants and animals commonly seen by new observers. The guides make it easy and enjoyable to become a wildlife observer.

STAR Ecology Lab and *STAR Habitat Lab* (Reading Is Fundamental). Grades 3-6. Available through Kendall-Hunt Publishing, 4050 Westmark Drive, P.O. Box 1840, Dubuque, IA 52004, (319) 589-1000 or (800) 228-0810.

Each lab, from the Science, Technology And Reading (STAR) series, contains background, science and interdisciplinary activities, and literature tie-ins.

Taking Action: An Educator's Guide To Involving Students In Environmental Action Projects. Available through Project WILD, 5430 Grosvenor Lane, Bethesda, MD 20814, (301) 493-5447.

This guide contains ideas and models for conducting environmental projects in the classroom.

WILD School Sites. Available through Project WILD, WILD School Sites, 5430 Grosvenor Lane, Bethesda, MD 20814, (301) 493-5447.

<http://eelink.umich.edu/wild/wildhome.html>

This 56-page guide is Project WILD's guide to improving habitats on school grounds. It tells how to begin a project and lists activities from Project WILD, the environmental activity guide, that tie in.

BOOKS AND MAGAZINES FOR KIDS

Animal Tracks (National Wildlife Federation, 1995). Grades 4-6. Available through National Wildlife Federation, 8925 Leesburg Pike, Vienna, VA 22184, (703) 790-4100.

The companion student workbook to the *Animal Tracks Activity Guide* makes environmental conservation learning fun with puzzles, poems, games, and fun facts.

Ranger Rick magazine (National Wildlife Federation). Ages 7 and up. Available through National Wildlife Federation, P.O. Box 777, Mount Morris, IL 61054-8276, (800) 588-1650.

This award winning kids' magazine features exciting photographs from the wild, easy-to-understand articles, and the opportunity for kids to have their questions published and answered by Ranger Rick and Scarlet Fox.

Your Big Backyard magazine (National Wildlife Federation). Ages 3-6. Available through National Wildlife Federation, P.O. Box 777, Mount Morris, IL 61054-8276, (800) 588-1650.

This fun and colorful monthly magazine features simple information and stories about animals, an activity guide for parents and educators, and photographs that kids are sure to love.

The Empty Lot by Dale Fife and Jim Arnosky (Illustrator) (Sierra Club Books, 1996). Grades K-4.

Available through Random House, Inc., 1400 Hahn Road, Westminster, MD 21157, (410) 848-1900 or (800) 733-3000.

Colorful illustrations help tell the story of Harry, a man who is about to sell his partially wooded lot. As he inspects the property he finds it occupied by birds, insects, and other small animals.

Endangered Habitats (Our Fragile Planet) by Jenny Tesar (Facts On File, 1992). Grades 6 and up.

Available through Infobase Holdings, Inc., 11 Penn Plaza, New York, NY 10001, (212) 967-8800 or (800) 322-8755.

Examines the various types of Earth's habitats, the complex relationships of plants and animals found in them, and how man's activities can upset or destroy fragile ecological balance.

The Ever-living Tree: The Life and Times of a Coast Redwood by Linda Vieira (Walker & Co., 1996). Grades 2–4. Available through Walker and Co., 435 Hudson St., New York, NY 10014, (212) 727-8300 or (800) 289-2553.

This story plots the march of time as major events in history unfold next to the growth of an ever-living Sequoia.

A Gift of a Tree/ Book & Tree Starter Kit by Greg Henry Quinn and Rhonda Krum (Illustrator) (Scholastic Trade, 1994). Grades K–3. Available through Penguin USA, P.O. Box 120, Bergenfield, NJ 07621, (201) 387-0600 or (800) 526-0275.

This kit comes complete with seeds, propagation soil, container, directions, and a description of all the wonderful gifts that trees give to life. Full-color illustrations throughout.

The Great Kapok Tree: A Tale of the Amazon Rain Forest by Lynne Cherry (Harcourt Brace, 1990). Grades K–3. Available through Harcourt Brace and Company, Order Fulfillment Department, 6277 Sea Harbor Drive, Orlando, FL 32887, (619) 699-6707 or (800) 543-1918.

The many different animals that live in a great Kapok tree in the Brazilian rain forest try to convince a man with an ax of the importance of not cutting down their home.

Kids Garden! The Anytime, Anyplace Guide To Sowing and Growing Fun by Avery Hart, Paul Mantell, Loretta Braren (Illustrator) and Jennie Chien (Illustrator) (Williamson Publishers, 1996). Grades 3–5. Available through Baker and Taylor Books, Somerville Service Center, 50 Kirby Ave., Somerville, NJ 08876-0734, (908) 722-8000 or (800) 775-1500.

Discover the many ways to involve kids ages 4 and older and their families in the gardening process. The attention to urban as well as outdoor gardens makes for a lively and fun focus.

The Look Closer series (Dorling-Kindersley). Grades 3–5. Available through Houghton Mifflin Co., Wayside Road, Burlington, MA 01803, (617) 272-1500 or (800) 225-3362.

This series offers 12 titles, each featuring a different habitat.

Richard Orr's Nature Cross-Sections by Richard Orr and Moira Butterfield (Dorling-Kindersley, 1995). All ages. Available through Houghton Mifflin Co., Wayside Road, Burlington, MA 01803, (617) 272-1500 or (800) 225-3362.

Applying meticulously detailed cross-section illustrations to such objects as a bee nest and a tree, an informative exploration of the natural world explains how animals make their homes and why conservation is important.

The Magic School Bus Hops Home: A Book About Animal Habitats by Patricia Relf and Nancy W. Stevenson (Scholastic Trade, 1995). Grades K–2. Available through Penguin USA, P.O. Box 120, Bergenfield, NJ 07621, (201) 387-0600 or (800) 526-0275.

A teacher takes her class out to find their missing frog. On their trip they learn about the basic elements that comprise a habitat.

WEB SITES FOR KIDS

National Wildlife Federation Kids' Page

<http://www.nwf.org/nwf/kids/>

A Cool Tour of the Environment, Ranger Rick on-line including *Homework Help*, Games, and More Fun!

National Public Radio's Science Friday

<http://www.npr.org/sfkids>

The kids' version of the popular science radio show on a web page. Science Friday explores all kinds of science-related issues. Search by topic and find in-depth information with experiments to try.

Smithsonian

<http://www.si.edu/>

Tap into this great resource and find information on just about anything. Great research tool!

Bill Nye the Science Guy

<http://nyelabs.kcts.org/>

Mini-lessons, experiments, fun facts, and more fun. Based on the award-winning television program.

ORGANIZATIONS/WEB SITES

The National Wildlife Federation®

8925 Leesburg Pike

Vienna, VA 22184

(703) 790-4100

<http://www.nwf.org/>

Home page includes information and resources from the Backyard Wildlife Habitat and Schoolyard Habitats programs, resources for teachers, and activities for students.

The Environmental Education Network

<http://www.envirolink.org/enviroed/>

This Web page lists links to numerous environmental education resources. The site offers numerous videos, CD-ROMs and publications covering many habitat concepts. Order their catalog by calling 1-800-ENV-EDUC.

The Big Help®

A Nickelodeon® program designed to help kids feel more connected to their communities and their world by helping. The Big Help is a year-round grassroots program empowering kids to volunteer in their communities. Each year, Nickelodeon hosts The Big Help-a-thon and promotes Big Help Week, a time when kids can get involved in real activities.

The Big Help

P.O. Box 929

New York, NY 10108

<http://www.nick.com/>

Environmental Organization Web Directory

<http://www.webdirectory.com/>

Links to sites with information about environmental issues.

Living Earth

<http://www.gn.apc.org/LivingEarth/>

International organization that provides environmental education and awards schools for environmental projects.

National Geographic Educational Services

PO Box 10597

Des Moines, IA 50340

(800) 368-2728

<http://www.nationalgeographic.com>

This organization has a large selection of habitat videos, filmstrips, software and classroom materials. Earth's Endangered Environments contains CD-ROMs with user's guide and classroom activities for grades 4–9.

One of the CDS is about rain forests and the other focuses on wetlands. The Let's Explore Series of videos for grades 4–6 looks at five habitats: desert, forest, meadow, seashore, and wetland. STV: Habitats contains video disks and teacher's guide with lesson plans for grades 4–7.

GREEN (Global Rivers Environmental Education Network)

721 East Huron Street

Ann Arbor, MI 48104

(313) 761-8142

<http://www.igc.apc.org/green/green.html>

GREEN's mission is to improve education through a global network that promotes watershed sustainability and is a resource to schools and communities that wish to study their watershed and work to improve their quality of life.

The School Nature Area Project (SNAP)

St. Olaf College

1520 St. Olaf Avenue

Northfield, MN 55057

<http://www.stolaf.edu/other/snap/>

This site is dedicated to school districts interested in establishing outdoor learning sites.

MULTIMEDIA AND OTHER RESOURCES

Discovering Endangered Wildlife. Ages 8 and up. Available through the publisher, LYRIQ, at 1-800-433-4464.

Multimedia CD-ROM from the National Wildlife Federation. Learn about the world of endangered wildlife through puzzles, games, fun facts, and other activities.

Zoo Guides' Life in the Desert and The Rainforest. Advanced. Available through REMedia, (619) 486-5030.

These CD-ROMs explore the web of desert and rainforest life, respectively. Animals and plants are highlighted. Children can view videos, read maps, take quizzes and print out information.

Get Recognized!

Once you've gotten your hands dirty in a habitat project, it's time to recognize your achievement. Throw a party. You've worked hard and should celebrate. Have pizza or "potluck" and invite parents, others in your school, and/or community members to show off the terrific habitat project you've worked on.

Get media coverage. Contact local TV stations and newspapers and tell them about your project. They may be interested in covering you and your habitat.

Apply for recognition. The following award programs offer recognition for environmental projects.....

Schoolyard Habitats

Certification and information program for school habitats.

Prepaid certification kit application fee \$18.00 (Item# 79948)

National Wildlife Federation

P.O. Box 50281

Hampden Station

Baltimore, MD 21211

1-410-516-6583

<http://www.nwf.org/>

Keep America Beautiful

To youth and school groups for environmental improvement. Annual.

Keep America Beautiful

Awards Program Coordinator

9 West Broad Street

Stamford, CT 06902

(203) 323-8987

President's Youth Service Awards

To youths ages 5-22 for community service

President's Youth Service Awards

P.O. Box 310

New Castle, DE 19720

(302) 323-9659

Albert Schweitzer Environmental Youth Award

To youths and youth groups ages 12-18 for environmental change in the community.

Albert Schweitzer Institute for the Humanities

P.O. Box 550

Wallingford, CT 06492-0550

(203) 697-2741

Wildlife Education, Ltd.

Each monthly issue of Zoobooks contains activity pages with a Kid's Corner where kids can get noticed.

Kid's Corner

9820 Willow Creek Road Ste. 300

San Diego, CA 92131

<http://www.zoobooks.com>

National Wildlife Week

Annual event for educators and their students to gain recognition in a variety of ways, including in print and on the NWF web page. Free National Wildlife Week educator kits include contest forms.

National Wildlife Week

National Wildlife Federation

8925 Leesburg Pike

Vienna, VA 22184

(703) 790-4100 or e-mail <wildlife@nwf.org>

Also available on the National Wildlife Federation web page: <http://www.nwf.org/>

Other NWF Education Programs

The National Wildlife Federation has many education programs and resources available. Here's how to find out more about them...

ANIMAL TRACKS®

Animal Tracks® is a classroom education program of the National Wildlife Federation focusing on teacher training and environmental education resources. In Animal Tracks materials, the animals and their tracks lead educators and students on an exploration of conservation issues. For more information call (703)790-4236, e-mail kier@nwf.org, or visit our website at <http://www.nwf.org/atracks/>

NATIONAL WILDLIFE WEEK

During **National Wildlife Week**, National Wildlife Federation distributes over 620,000 kits to teachers across the country. For the 1998 Wildlife Week, April 19 to 25, the theme is "Nature's Web: Caring for the Land." National Wildlife Week Kits are distributed through individual NWF Affiliates. Consult the NWF Conservation Directory or your local library or phone book to find the address of the NWF Affiliate in your state to request a kit, or contact the National Wildlife Federation at (703)790-4100 or wildlife@nwf.org.

SCHOOLYARD HABITATS®PROJECT

Schoolyard Habitats® encourages and assists school communities in establishing habitat-based learning sites. The program emphasizes wildlife habitat conservation on school and learning center grounds, cross-curriculum learning and teaching and community involvement. For more information call (703)790-4100.

RANGER RICK®

Ranger Rick® is a monthly magazine for kids aged 7 and up. Each 48-page issue is loaded with colorful animal photos, funny drawings, and exciting stories that turn kids on to nature, outdoor adventure, and helping the environment. Cartoons, riddles, crafts, games, and far-out animal facts make Ranger Rick fun for everyone. For subscriptions call toll-free 1-800-588-1650 and give the operator source key RRWEB7 or write to Ranger Rick at NWF for more information.

YOUR BIG BACKYARD®

Your Big Backyard® is a monthly magazine for kids aged 3 to 6. Each issue sparks a child's natural curiosity as it introduces them to the wonderful world of nature with charming photos of baby animals, read-to-me stories, poems, riddles, and games. This special magazine combines close-up pictures with simple text to help kids start on the road to reading. Your Big Backyard has a parent and educators guide that includes nature activities, crafts, developmental tips, and nature-related product reviews. For subscriptions call toll-free 1-800-588-1650 and give the operator source key RYWEB7 or mail a check or money order for \$14 (12 issues) to Your Big Backyard, PO Box 775, Mount Morris, IL 61054-8273.

BACKYARD WILDLIFE HABITAT® PROGRAM

The Backyard Wildlife Habitat® program encourages people in all parts of the U.S. and Canada to supply the basic elements that wildlife need to survive: food, water, shelter, and a place to raise young. Anyone with a yard, no matter what size, can easily create a home for wildlife. Once the basic elements are provided, one may apply for certification and join the list of over 18,500 official Backyard Wildlife Habitats. To order an information kit about this program; containing a planting guide, a copy of *The Backyard Naturalist* by NWF's chief naturalist, and an application, call (703)790-4100.

EARTHSAVERS®

EarthSavers® is a club program for kids (ages 6-13) who care about the environment and want to help. Together with their adult leaders -- many of whom are teachers -- EarthSavers club members use the quarterly *EarthSavers* newspaper to learn more about nature and wildlife and to find out what other kids are doing to improve and protect the natural environment in their communities. In addition to the newspaper, each club leader receives free of charge an *EarthSavers Activity Guide* to coincide with each issue, as well as a leader's handbook and membership cards. For more information and a registration form, write to: EarthSavers; National Wildlife Federation; 8925 Leesburg Pike; Vienna, VA 22184.

EARTH TOMORROW®

EARTH TOMORROW® is an innovative environmental education and leadership program for high school teachers and students in the city. It is designed to create an awareness for conserving natural resources and to provide opportunities for action at the individual and community level. Teacher workshops provide training and resources in environmental education to urban educators that are not readily available within the city. Students explore environmental issues, identify, and propose solutions to local areas of concern by attending a residential summer workshop at a local university and going on field trips. On-going support and follow-up is provided as students and teachers form school clubs to implement conservation action projects that are designed to foster coalition building within the community. **EARTH TOMORROW®** is currently being piloted in Detroit, MI, by NWF's Great Lakes Natural Resource Center (GLNRC) in cooperation with the Michigan United Conservation Club (MUCC). For more information, call NWF's GLNRC, (313)769-3351, or visit our web site at: <http://www.greatlakes.nwf.org/educ/earthtom.htm>

CAMPUS ECOLOGY®

Campus Ecology® establishes environmentally sound practices on college campuses by promoting leadership and action within the campus community. By communicating to campus organizers what other students, faculty and administrators, and the broader environmental community have learned, Campus Ecology recognizes the efforts of people who work on outstanding projects by documenting and publishing their accomplishments. For more information, call (703)790-4318.

RANGER RICK'S WILDLIFE CAMP™

Ranger Rick's Wildlife Camp™ is a unique opportunity for camps and youth-serving organizations to partner with NWF and operate an environmental program model on their own site. Complete with an exciting variety of curriculum materials, program manuals and an administrative guide, the model encourages young people to develop an attitude of environmental stewardship through involvement in a series of hands-on- learning activities in an outdoor setting. Whether planning one week or two, at a day or resident camp, nature center or club house--Ranger Rick's Wildlife Camp blends nature discovery with exciting outdoor adventures. For more information about this program, call (703)790-4568/4536.

CONSERVATION SUMMITS®

Conservation Summits® provide unique learning opportunities for teachers, outdoor educators, youth leaders and parents at some of America's most spectacular sites. During these week-long, family-oriented adventures, participants can take advantage of special classes that provide instruction on introducing children and students to the study of nature and the environment. Classes include integrating environmental education into an existing curriculum, teaching techniques for nature study, and an introduction to available environmental education materials. University credit is offered at all locations. For more information, call 1-800-245-5484.

NATURELINK®

NatureLink® is an affordable family outdoor education program designed to engage families in hands-on outdoor learning, while fostering awareness of their environment and encouraging environmentally-responsible lifestyles. Participants work with mentors to learn about outdoor themes and build outdoor skills (e.g., wetland ecology, fishing). Afterwards, they create a Earth Pledge--a statement of their commitment to take action in their homes or community on behalf of the environment. The National Wildlife Federation trains and partners with community organizations to host NatureLink programs across the United States. For more information, please call (703)790-4100.

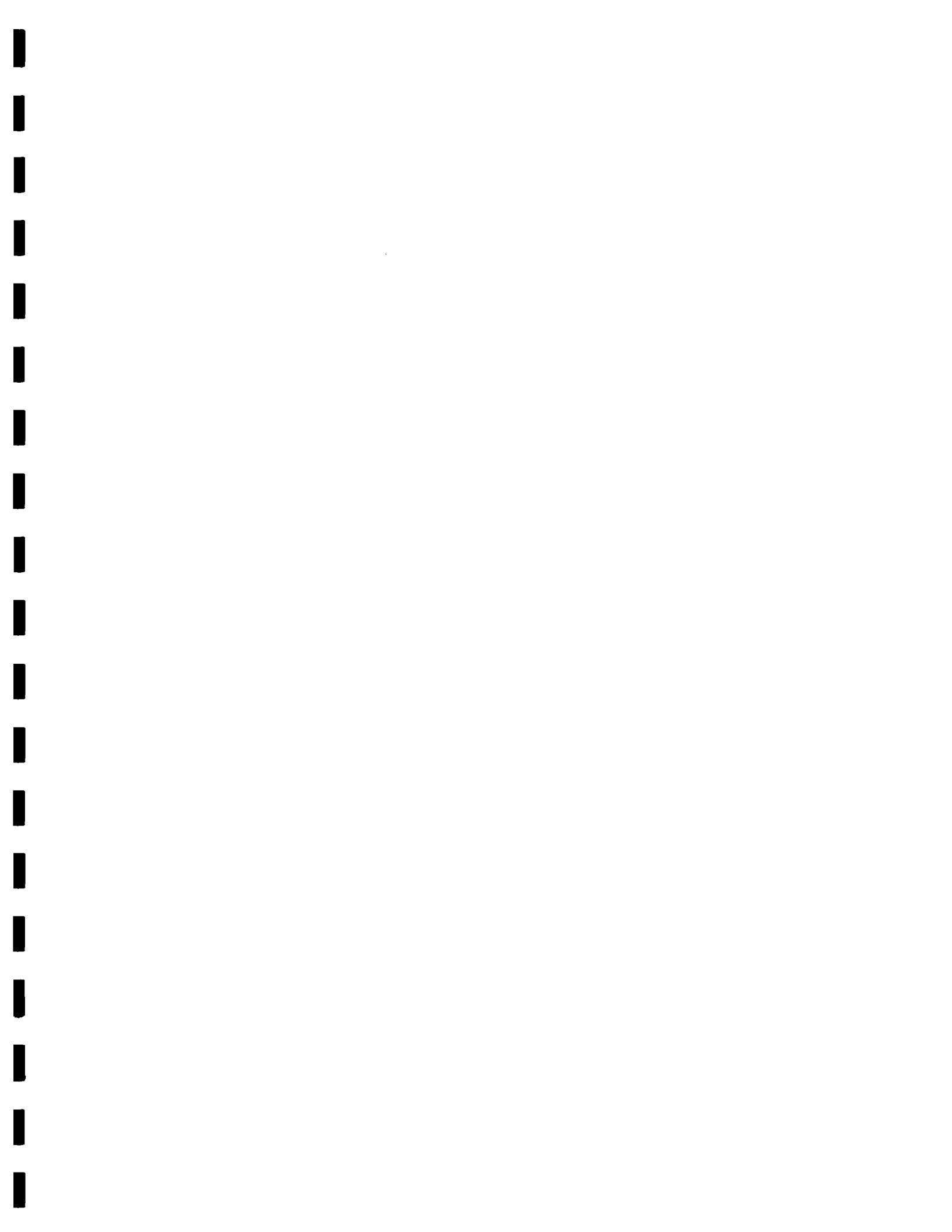
CONSERVATION DIRECTORY

The Conservation Directory is an annual publication of the National Wildlife Federation and continues to be the most complete source for up-to-date detailed information on environmental conservation organizations. The 1998 edition lists over 2000 governmental and non-governmental organizations and personnel involved in conservation work statewide, nationwide and worldwide. The directory may be purchased by calling 1-410-516-6583. The 1998 edition is \$61.00 plus shipping and handling. For more information about getting your organization listed, call (703)790-4402.

NATIONAL WILDLIFE PRODUCTIONS

National Wildlife Productions, Inc. (NWP) is the television, film, and multimedia arm of the NWF. NWP's mission is to produce IMAX® films, television programs, and other media that entertain people while opening their eyes to the importance of conservation. NWP creates original programming for networks such as TBS Superstation, The Disney Channel, Animal Planet, Home & Garden Television, The Travel Channel, The Outdoor Life Network, and public television. Consult our website at www.nwf.org/nwf/nwp for additional program information and the latest programming updates.





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DON

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**ABOUT ANIMAL TRACKS
ACTION PACKS**

Animal Tracks Action Packs are a classroom resource helping educators introduce environmental issues across curriculum through Discovery, Awareness, and Action. Look for Action Pack titles on Northern Forest, Urban Communities, Water, and Wetlands with more topics to come!



NATIONAL
WILDLIFE
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