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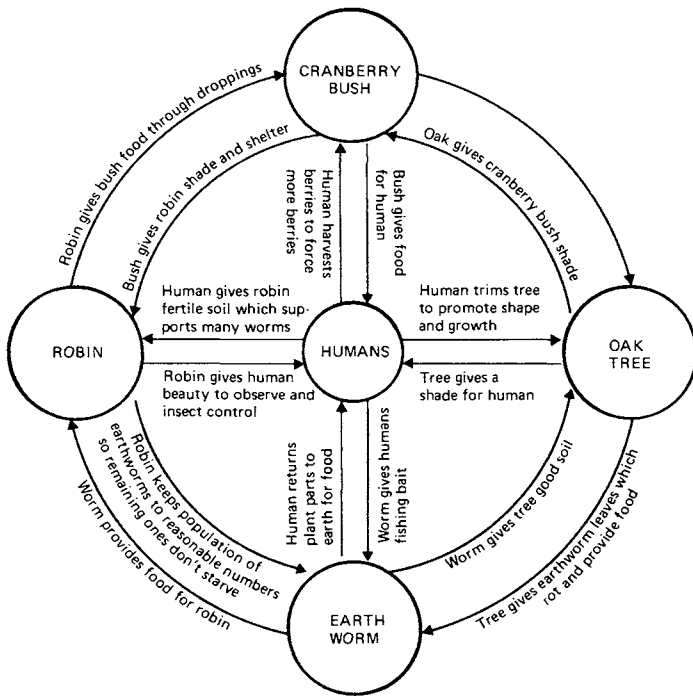
Exploring the Environment

Conservation Members' Manual

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AGRICULTURAL EXTENSION SERVICE, UNIVERSITY OF MINNESOTA

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Introduction

Today the sun came up. People all around the world opened their eyes to a new day of life! There is life growing all around us. Some of this we can see very easily, such as people talking and laughing. Other life is not so easily seen, is slightly mysterious — grass growing, trees blooming, flowers opening their petals to the warm sun.

We know that all these mysterious things take place, but don't always stop to take the time to think "why." Why is it important that we understand them? Because people are a part of the environment. People are the only beings that can understand the life of growing things around them. Therefore, we can have the greatest positive effect on these things.

To understand the mysteries of new life and growth, you must first understand the meaning of "ecosystem." Ecosystem is the total relationship existing between and among people, plants, animals, soils, climate, and water of the forests, fields, and streams. We must have a great respect for the delicate and changing balance that goes on among the complex parts of the ecosystem.

It is important to understand how all of these parts of nature fit together to complete a total "balance" of our environment. Which parts of our environment do you understand? Which parts are still a "mystery" to you? This project will help you discover and understand these mysteries a little better.

The "Exploring The Environment" Project is designed for 9- to-11-year olds as an introduction to other projects such as forestry, geology, plant and soil science, and entomology. These may follow later from interests developed on hikes, trips, and activities done in this project. We suggest that you do the following minimal things in preparing for these experiences:

First Year — Take one or more trips or hikes to a forest, field, or stream. Also, select one "additional activity" from the lists provided.

Second Year — Take at least one trip of each kind — forest, field, or stream. Also select two to five additional activities from the lists provided.

Third Year — Take one or more trips of each kind — forest, field, or stream, but at a different season of the year than you did before. Also select five to ten additional activities from the lists provided.

Forest and Field Lore

Your common sense and your ability to use it are the most important items in your outdoors kit.

Here are some ways "field folk" use common sense:

Practice Safety — You can prevent accidents. Use your common sense to avoid dangerous situations. These include horseplay and foolish tricks.

— Be prepared for accidents. Know how to use your first aid kit; practice the simple rules of first aid.

— If it begins to storm and lightning occurs, try to take cover in a dry, protected place — **NOT UNDER A TREE.**

— Some fruits and nuts are poisonous. **IF YOU DON'T KNOW IT, DON'T TOUCH IT!**

Don't Get Lost — Don't go into strange areas unless you are with a person who knows the country. Always know where you are.

— If you go into a woods near your home, let your parents know.

— If you do get lost, keep a clear head. If you can't retrace your steps, find a high spot and/or climb a tree to get a look at the countryside to regain your bearings.

— Know how to use a compass and practice using this valuable instrument.

Protect Yourself Against Insects — Wasps, gnats, flies, bees, and mosquitoes are the worst insect enemies outdoors. You can keep mosquitoes away from your head and arms by using an insect repellent according to the directions on the bottle.

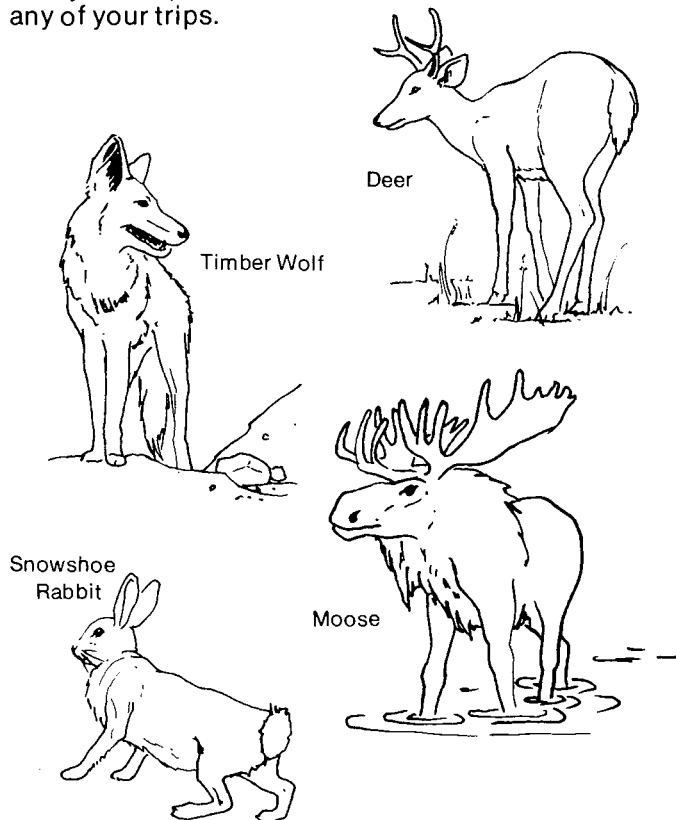
— Wear long trousers of stout cloth tucked into your boot tops and a "T" shirt worn under a long-sleeved shirt to protect your body.

— You can make your trousers brush-and-bramble resistant by sewing an extra layer of cloth on the front of the legs from below the knee to slightly above the bottoms of the pockets.

Know The Animals In Your Area — Here are some points to keep in mind:

- Do not threaten to harm them.
- Beware of cornered or frightened animals. They will fight.
- Beware of animals which seem tame. They may be diseased or once have been a pet. They might be dangerous; they're not predictable.

Study these pictures of animals that you may see on any of your trips.



The Demon Plant — Poison ivy is the only demon plant in Minnesota. The only way to beat it is to know and avoid it.

Poison ivy is a shrub or vine that grows anywhere. Its leaves are arranged in groups of three and have a shiny surface pebbled with sickly-looking warts. (See illustration) The plant has white berries. It grows most commonly as shrubs in Minnesota and very rarely in vine form.

POISON IVY



If you come in contact with poison ivy, wash the affected parts of your body with naphtha soap as soon as possible. Treat mild cases with baking soda or a drug store remedy. See a doctor for serious cases.

What rules will you follow for safety in the outdoors? Write your list here.

A SPECIAL NOTE TO THE LEADER OR MEMBER

The following is one that was given to us by many nature lovers involved in adventures and exploration of nature. This is one proven recipe that has never failed. You can alter the ingredients as much as you want, and the results or finished product are still the same — a great delight for all who are involved.

"THE NATURE LOVER'S DELIGHT"

Combine the following in an area of forest, field, or stream:

- any number of enthusiastic nature lovers or explorers.

Blend together with this some interest and/or knowledge of the outdoors.

Sift together and stir in:

- a first aid kit
- special equipment or tools for testing, measuring, and/or collecting. These will include the following:

stream sampler	dip net
assorted small containers	bottom rake
forceps	plankton net
	thermometer

Fold in these ingredients:

- a bathing suit
- a pair of tennis shoes (or waders)
- a life preserver
- a pocket knife — (have someone show you how to keep it sharp and the rules for using it correctly)
- insect repellent
- a large bandana — (you may need this to protect your neck and face or as a sling)
- a light raincoat
- a small box of raisins or a chocolate bar
- a small magnifying glass

- a canteen to carry water
- a camera, pencil and notebook
- field books on flowers, birds, trees, insects
- a compass
- a shoulder bag (for carrying all of your outdoor equipment)

Sprinkle with help from:

- your parents or older friends and neighbors who know much about the outdoors.
- a conservation officer, game biologist, farm forester, your county extension agent.

Add:

a generous amount of fun, good humor, and a pinch of good manners.

Mix generously with:

one area of a forest, field, or stream.

"Turn Out" any day of the week and let stand until activated. (This usually takes a very short time.)

When activated:

Let the mixture do whatever it wants for a couple of hours.

The "delight" is done when new knowledge, thoughts, perspectives, and ideas spring back to you from the outdoors.

Serve often.



Your Trip to the Woods

Are you ready for your first trip? Be sure you know about all the safety measures we have talked about such as protecting yourself against different kinds of weather, poisonous plants, and animals. Finally, but just as important, remember woodland manners. Do not abuse anything. We are "guests" of the forest.

It's a good idea and much more fun if you and one or two of your "buddies" go together on this trip. Also, if junior leaders, an advisor, or your parents go along they may be able to help guide you in understanding these new and different kinds of experiences.

Woods and forests are communities of plants, animals, and non-living things just as towns or cities are communities of people, plants, and non-living things. The forest community is one example of an ecological system, or what we call "ecosystem." In other words, it is a system in which the organisms and their environment depend on and react completely with each other. No living thing of the forest can exist without other living things. We can think of the forest as a combination of soil, water, plants, and animals that are all closely related to and dependent on each other. Plants depend on the soil; soil depends partly on the plants growing in it. Animals need plants for food, and both plants and animals need water.

Make a list of some of the living things that you might see in the woods.

Can you see any non-living things? List them.

PLANTS

As you walk into the forest, look at the trees. Do you know what a tree is? A tree is a woody plant that is at least 20 feet tall when fully grown. It usually has only one stem or trunk with branches at the top. Some trees are tall and slim, others are

short and squatty. Woody plants that have several stems growing up from the ground and grow less than 20 feet tall are not trees, they are shrubs.

Let's look at the parts of a tree. They are the:

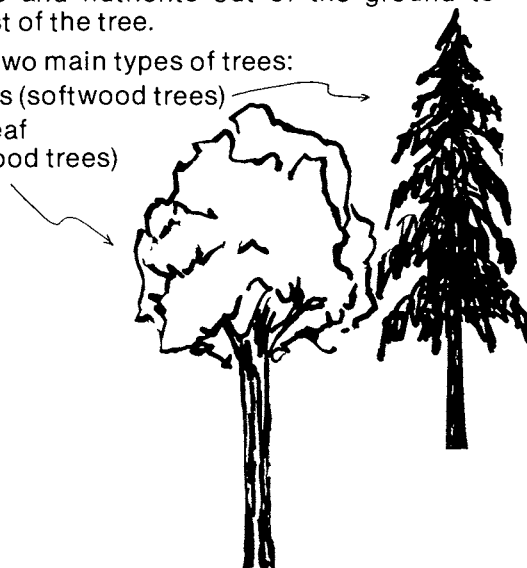
CROWN — which contains the branches.

TRUNK — which holds the tree upright and supplies moisture and nutrients to the leaves.

ROOTS — which anchor the tree in place and take moisture and nutrients out of the ground to give to the rest of the tree.

There are two main types of trees:

1. Conifers (softwood trees)
2. Broadleaf (hardwood trees)



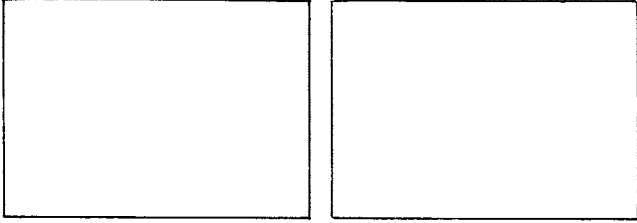
Conifer means "cone-bearing" and has slender, pointed needle-like leaves that are on the tree all year round. Once in awhile there is an exception like the tamarack which does lose its needles in the fall. Do you see any trees that are conifers? _____

Hardwoods are trees with broad leaves. Because they lose their leaves each fall they are called deciduous. Most do not have cones. Do you see any broadleaf trees? _____ Try to find each type of tree and answer the following questions.

Conifer Broadleaf

1. What is the shape of the leaves? _____
2. Find and draw a leaf of each.

3. What color are the leaves? _____
4. Will they stay this color all year round? _____
5. Find and draw the seed or fruit of each.



6. What is the texture of the bark like? Smooth, rough, etc. _____
7. Is the bark the same thickness and color along the entire length of the trunk? _____
8. Does this tree have cones on it? _____
9. Does this tree have buds on it? _____

Look at the drawings on the next page and then do the following exercises.

FIND SOME TREES WHOSE LEAVES ARE NOT SHOWN
Draw Them.

Find and draw a simple leaf which has lobed edges.*

Find and draw or mount a simple leaf with toothed edges.*

Find and draw another leaf about which you would like to know.

Find and draw a compound leaf.*

Find and draw the seed (or fruit) and leaf of a deciduous tree.

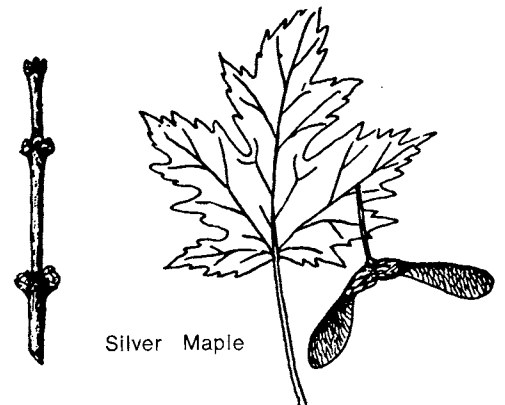
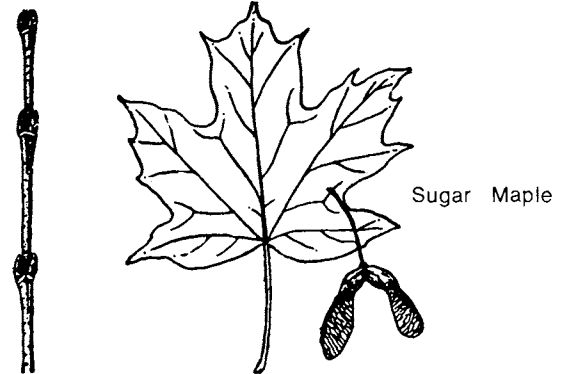
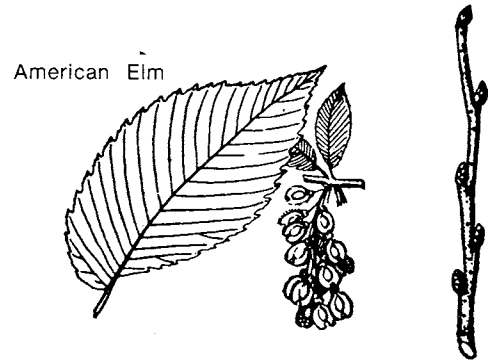
Find and draw the seed (or fruit) and leaf of a coniferous tree.

*See pages 6 & 7 for illustrations.

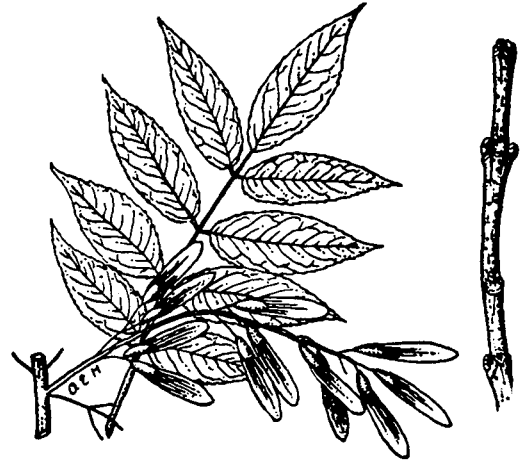
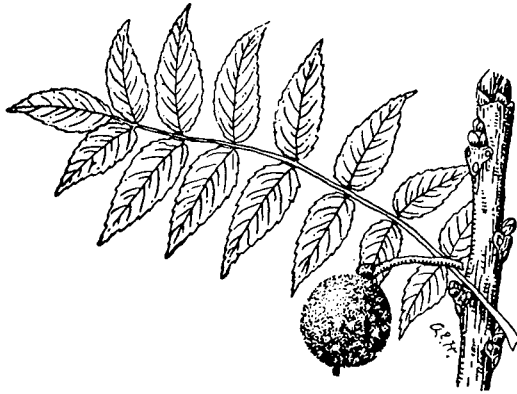
Study the trees in the forest. Do they live alone? _____ Are other trees of the same kind there? _____ Each species has different requirements for air, light, minerals, moisture, and temperature. Plants have adapted themselves to thrive in their environments. The competition of all plants determines which will live and die in this struggle for survival. Balsam fir, for example, can grow in dense shade; Norway (Red) pine needs open sunlight and mineral soil to survive. What type of plants do you find in a more shaded area, such as under a tree?

SOME MINNESOTA TREES — CIRCLE THE ONES ON THESE 2 PAGES WHICH YOU FOUND ON YOUR HIKE IN THE WOODS. TO HELP IDENTIFY THEM LOOK FOR DIFFERENCES IN LEAVES, TWIGS, FRUIT, AND BARK.

THESE ARE SIMPLE LEAVES.

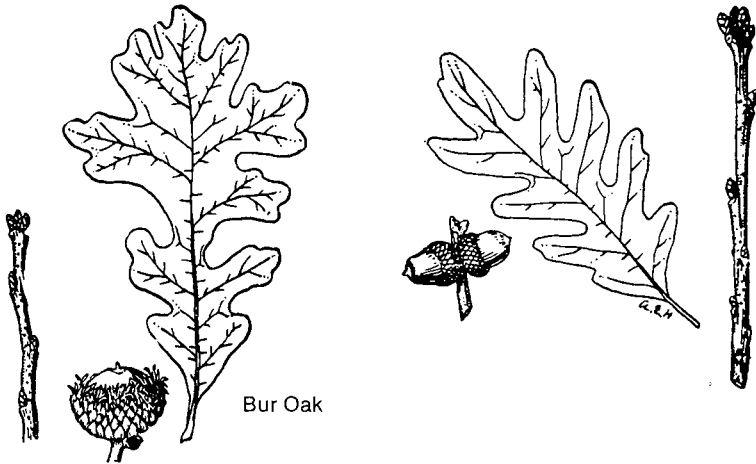


THESE ARE COMPOUND LEAVES.



THESE SIMPLE LEAVES HAVE LOBED EDGES.

THIS LEAF HAS SMOOTH EDGES.



Bur Oak



Box Elder

THIS LEAF HAS TOOTHED EDGES.

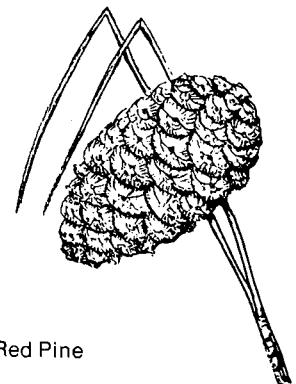
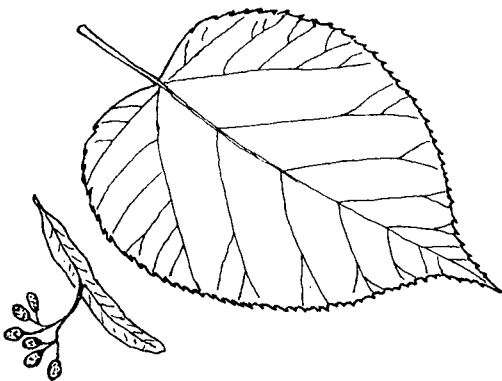
FIVE-NEEDLE PINE

TWO-NEEDLE PINE

Basswood

White Pine

Red Pine



What types of plants are found in a more open space with direct sunlight? _____

Try to find some animals that use trees as their homes. Make a list of all the animals that live on or in a tree or visit it in some way.

Another kind of plant that's found in the woods is a herbaceous plant. This is not a woody plant. A new plant grows each year. An example of this is a wildflower.

These types of plants have . . .

STEMS — which may be a slender vine like a morning glory or a tall thick stem of a milkweed.

LEAVES — are usually flat, generally grow with one side turned toward the sky and the other toward the ground.

FLOWERS — are produced at some time in a plant's growth and from these come seeds.

FRUIT OR SEEDS — may be very tiny and can't be seen, while others are larger.

ROOTS — may be thick and grow straight down, or some are thin, fibrous, and near the surface.

Remember that some plants are poisonous to people such as poison ivy. Become familiar with this plant.

Look at some of the plants that you found and circle the answers that describe them.

Find any stems?

Are they: hard, soft, thick, thin, long, short?

Can you: wear them, make paper out of them, bend them, snap them in two?

Pick up a leaf. Watch for poison ivy!

Is it: round, long, small, large, needle-like, leaf-like?

Does it have "teeth", hair, an odor, a sticky sap?

Examine a root.

Is it: almost invisible, a thick one, impossible to pull?

Can you find any flowers?

Are they: very large, so tiny you can hardly see them, on trees, growing from the ground?

Do they: have an odor or smell? Are they one color or many colors?

Can you find a seed?

Can you: eat it (but don't try), use it for decoration?

Does it: feel smooth or rough? Is it flat, round?

Did you find any fern plants? _____ If so, look at both sides of the fern leaves. What is the difference between the two sides? _____

Did you find any mosses? _____ If so, what color were they? _____

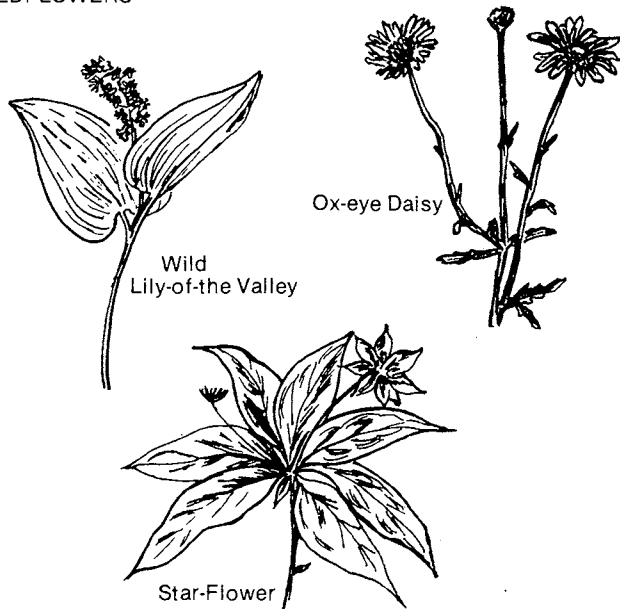
Do they have roots? _____ Leaves? _____

Stems? _____ How does moss feel? _____

As you walk around you may be lucky enough to find some of the following wildflowers:

Name	Color	Season
Vetch	purple	midsummer
Ox-eye daisy	white petals, yellow center	June-August
Fireweed	pinkish purple	July-September
Starflower	white	May-June
Marsh Marigold	yellow	April-June
Lily of the Valley	white	early spring
Wild Rose	pink	August

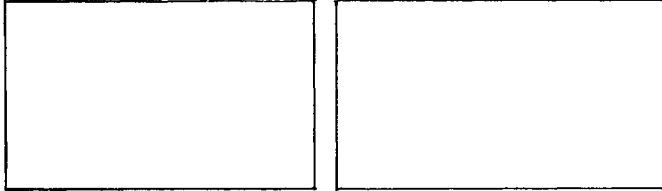
WILDFLOWERS



If you found any flowers, look at them closely. Are there any insects on them? _____ Are insects harmful to flowers? _____ One of the purposes of flowers is to produce seeds that can live through the winter and grow into plants the next year. Most flowers are pollinated by insects; a few, such as ragweed, are pollinated by the wind only. Some insects are attracted by the color of the petals, some by the scent of the flower.

INSECTS

Insects play a very important part in the ecosystem of the woods. Some are harmful enemies to the trees and plants; others are friends. Try to find an insect that is smaller than a quarter. (Hint: If you have a magnifying glass you'll be able to see several.) What color is the insect? _____
How is it shaped? (Try to draw it.)



How many legs does it have? _____
Does it have wings? _____ Does it have eyes? _____
List the kinds of insects that you can see.

Is there any evidence of insects living in the forest even when you can't see any? _____
What evidence? _____

THE GROUND

The ground you are on is the most important part of the woods — it is called soil. Dig into this "floor of the woods" and look at its contents.

If this is a thriving woods there should be a deep layer of leaves or needles on the ground. The top layer is fresh leaves. What do the leaves underneath look like? _____

What is happening to these leaves? _____

Do you find any animals or insects in this layer? _____
Which of these animals did you find?

Earthworm Centipede Ants
Grub Spiders

Could they be eating the old leaves? _____
As you dig deeper, do the leaves seem to be turning to soil particles? _____

Pick up a handful. What does it feel like? _____

Is the soil under the leaves black, loose, and spongy or yellow, hard, and compact? _____

Does it stick together or crumble apart? _____

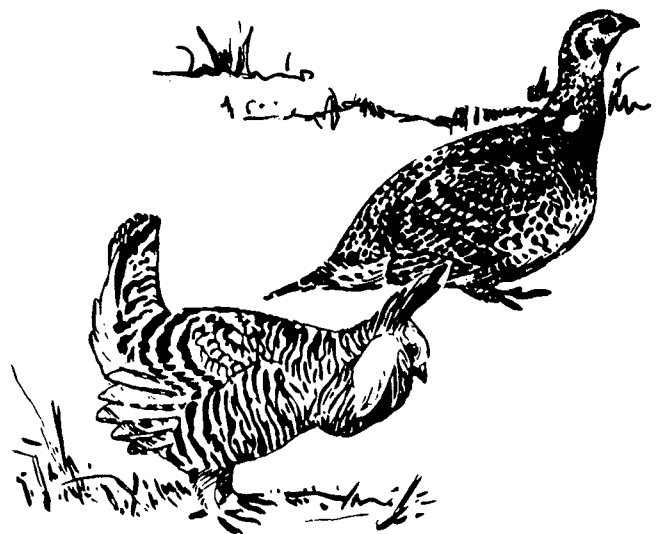
How far down do you have to go before you find soil which looks like the soil in fields nearby? _____

Do you find any rocks? _____

Did you know that almost all soil comes from solid rock? No rock is so hard that it can't, in time, be broken up by forces of nature in a process called weathering. Rain, wind, running water, earthquakes, landslides, glaciers, root growth, freezing, and thawing all cause weathering action. The rock particles of different sizes serve as building blocks to make soil.

WILDLIFE ANIMALS AND BIRDS

All wildlife animals must have food, water, and a place to live. Animals have different needs and habits that determine the places they prefer to live, just as plants are selective as to where they will grow best. They are part of the ecosystem of the woods. Many of our animals have forest homes.



Look for some animal homes in or on the ground and in the trees. Do you find anything that tells you that animals are present? _____

Look for tracks, scratches on trees, evidence of where an animal has eaten. Make a list of the animal signs you found and what animal made it.

Find some other residents of the woods. Have

you ever heard or seen any birds? _____

If you can get close enough, watch two different kinds of birds and answer the following.

Where is it most of the time?

- a. On the top of tall trees
- b. In the shrubs
- c. On the ground

Answer: Bird #1: _____ Bird #2: _____

How does it move on the ground?

- a. By walking
- b. By hopping

Answer: Bird #1: _____ Bird #2: _____

What do these birds look like? Draw pictures and include:

- 1. color
- 2. distinctive markings
- 3. Shape
- 4. Beak

Bird #1

Bird #2

Do you know the names of these birds?

Does its color blend in with its environment? _____
Did you see any birds like the drawings on the next page? Color them in.

Lay back on the floor of the forest. Pick a special place, close your eyes, and listen to nature's symphony of trees rustling, wind blowing, insects whirling, birds calling, water flowing. Think about everything that is taking place around you.

What do you think the future of these forest things is? What will happen to each?

The trees will . . .

The plants will . . .

The wildflowers will . . .

The insects will . . .

The soil will . . .

The animals and birds will . . .

Why is the ecosystem of the woods important to man?

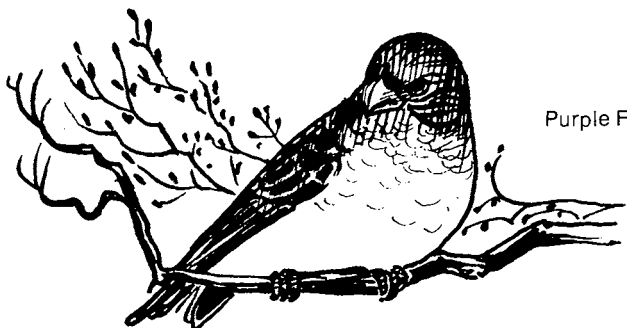
This completes your trip to the woods. You may have some unknown trees, plants, animals, or insects which you will want to look up.

Be sure to come again to the woods, for every time you do, you will see different things in the ever-changing forest.

BIRDS OF TREE TOWN — PUT THE RIGHT COLORS ON THE BIRDS YOU FOUND.

Can you see any of these birds? Try to get close to a bird. Stalk it quietly with as little motion as possible or sit quietly and the birds will come past you.

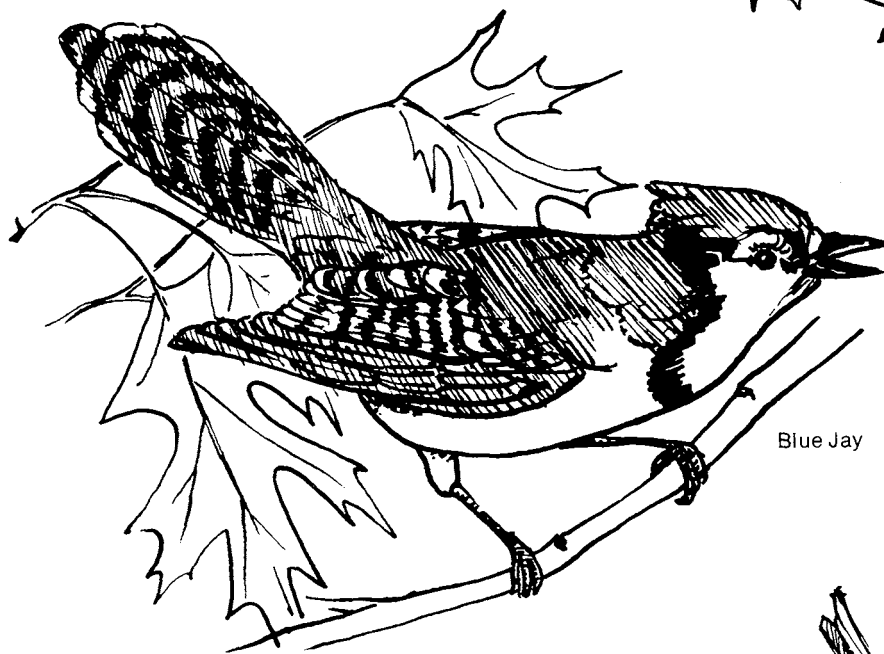
Compare the birds you see with the bird outlines. Note the shape and size, color, song, and habits. List the colors you see on the bird. Later you can color in the outlines of the birds you saw.



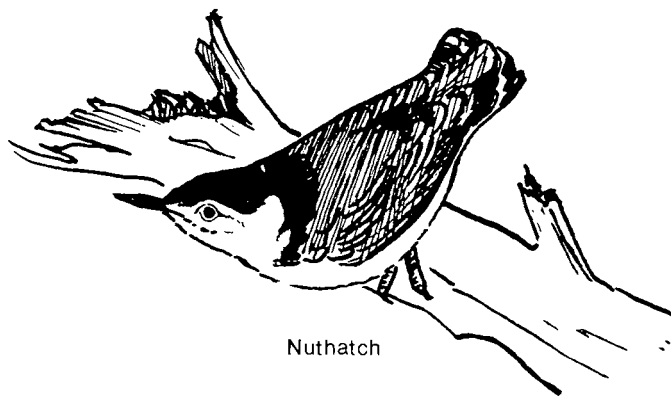
Purple Finch



Screech Owl



Blue Jay



Nuthatch



Rose-breasted Grosbeak

ADDITIONAL "FOREST" ACTIVITIES

1. Keep a diary through an entire season about a "favorite" tree that you have (all four seasons if you wish). This does not have to be a daily diary, but visit your tree at least once a week and write about it. Record any changes you can notice. What date do its buds begin to swell? How long do its flowers last? Did any events take place that hurt, help, or otherwise involve the tree? You will probably find that your tree changes and that much happens to it. Your diary will be an interesting record over a period of time.
2. Find out how a tree grows, how to tell its age, etc.
3. Pick out a living thing in the woods and explain its ecosystem. An example of this would be seeing a bird. You could list the grass and other plants it uses for its nest. You could list the trees or bushes that it builds its nest in, and you could write about the kinds of animal life and plants that it eats for food.
4. Make a leaf collection of conifer and broadleaf trees that are found in the forest.
5. Talk to a forester about the many different kinds of careers in forestry.
6. Examine a dead tree. How does it contribute to the ecosystem of the forest? What does it add to the soil?
7. Mark out a square foot of space on the ground in the forest. Search and list all the living and non-living things found in the square foot.
8. Prepare an exhibit for county fair or achievement day.
9. Prepare and present a demonstration or project talk at a club or project meeting.
10. Other activities are listed in the publications:
Forest Appreciation 4-HB-74
Forest Management 4-HB-87
Your 4-H Entomology Project 4-HB-43
EEA9 Exploring Gray Squirrel Environments
EEA11 Classroom Full of Trees

Your Trip To A Field

Now you are going to explore another kind of community — a farm field. The best time for this trip is in the spring, summer, or fall late in the afternoon, past the heat of the day. Select a corn, wheat, hay, or any other kind of farm field. Bring an insect net, a bottle for collecting insects, and a small trowel or shovel. **IMPORTANT:** Do you have the landowner's permission for this trip into his field? _____ If his

farm is posted, why do you think it is? _____

THE GROUND

The ground or soil you are standing on is the most important part of the field. Soil is necessary for most living things. Plants get nutrients and water from the soil through roots. Plant roots need the air in the soil; they also depend on soil for anchorage or support. Soil is home for many kinds of microscopic organisms and burrowing animals. Runoff water carries minerals from the land to nourish aquatic life-forms in ponds, lakes, streams, and oceans. Soil provides the foundations, minerals,

and construction materials for many of our activities.

Dig into the soil and look at some of its features. First, look at the soil. Color is an easily noticeable characteristic of the soil. What is the color of the soil that you are standing on?



Is it light or dark in color? _____

The darker the color, the more organic matter there is in the soil. This organic matter could be such things as rotted or decayed straw, manure, roots, leaves, etc. It is referred to as humus.

Soil structure refers to how soil is put together or the natural arrangement of individual particles in the soil. Most soils are a mixture of different kinds of soil particles plus humus. Soil that contains large amounts of organic matter will not erode (erosion can be caused by rain beating on bare soil which loosens soil particles and then washes them away) as easily as soil that does not have this matter.

Now, feel the soil. A very important, but less obvious, feature of soil is its texture. Texture is the fineness or coarseness of the soil. This texture can greatly influence the growth of plants. Plant roots need both water and air. Fine-textured soils can hold much water but may contain very little air. Coarse-textured soils can hold a lot of air but very little water. Medium-textured soils are the best for most of our gardens, trees, and farm crops. Pick up a handful of soil and rub it between your fingers. What does this soil feel like (texture)? _____

Did you find that it was sandy, gritty, smooth, or sticky? _____ Does it crumble? _____ Is it hard? _____ If organic matter is in this handful of soil, it acts like a sponge and will allow it to hold more water.

Our bodies need food to live; so do plants. Plants get their food from the organic matter and minerals in the soil. How does a farmer "feed" the plants he grows? _____

The soil is alive; both seen and unseen life is in it. Did you know that a ball of soil the size of your fist may contain as many bacteria (small animals too small to be seen by the eye alone) as there are people in the world? Do you find any animals or insects in the soil? _____ If so, circle any of the following that you found.



Did you find anything else besides insects or animals? _____ Look for and circle any of the following that you did find.

- Insect cocoons
- plant roots
- worm tunnels
- pebbles
- rocks
- leaves and stems

People can change the soil. What have people done to the soil that you are standing on? _____

How have they done this? _____

Why have they done this? _____

PLANTS

Examine some of the plants in the field. Plants serve us in many ways. They give us our food either directly or by providing food for other animals. Plants provide most of the material for our shelter, supply much of the material for our clothing, and protect our environment by holding the soil in place and preventing rapid water runoff. Following are just a few examples of the many uses people make of plants. People use plants for:

FOOD

<i>Leaves</i>	<i>Stems</i>	<i>Roots</i>	<i>Flowers</i>
Beet greens	Asparagus	Carrot	Broccoli
Lettuce	Sugar cane	Radish	Cauliflower
Spinach		Beet	Artichoke
<i>Seeds</i>	<i>Fruits</i>		
Beans	Oranges		
Peas	Pears		
Wheat	Bananas		
	Apples		

BEAUTY

- Annual flowers — petunia, marigold
- Biennial flowers — hollyhock, pansy
- Perennials — peony, aster, grass
- Shrubs — lilac, forsythia, azalea
- Vines — bittersweet, morning glory
- Trees — apple, maple, pine
- Cut flowers — rose, violet, carnation

MEDICINE

<i>Plant</i>	<i>Plant Derivative</i>
Yam	Cortisone
Autumn crocus	Colchicine
Foxglove.....	Digitalis
Quinine tree	Quinine

FLAVORING

<i>Plant</i>	<i>Plant Derivative</i>
Crocus	Saffron
Sasparilla, wintergreen roots.....	Root beer
Lilacs, gardenia	Perfume
Ginger, pepper	Spices
Orchid plant	Vanilla
Birch tree.....	Birch beer

CLOTHING

Flax	Cotton	Dyes
Hemp	Paper clothing	

SHELTER

Lumber	Plywood
Wood	Veneer wood

DRINK

Tea	Coffee	Wine
Root beer	Fruit juices	

PAPER

Writing paper	Wall paper
---------------	------------

FUEL

Wood	Coal	Oil
------	------	-----

Look at the plants around you. How many different kinds do you find? _____

Some plants are only for us to enjoy. Do you see any plants like this? _____

As you have seen, plants serve us in many ways. Make a list of plants you found in the field that may be used for beauty, food, and utility (other uses such as medicine, clothing, shelter, fuel, etc.).

<i>Beauty</i>	<i>Food</i>	<i>Utility</i>
_____	_____	_____
_____	_____	_____
_____	_____	_____

Beauty

Food

Utility

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

What do you think a plant needs in order to live and grow? _____

How do you think soil affects a plant's growth?

How does water affect a plant's growth?

How does air affect a plant's growth?

How does sun affect a plant's growth?

Plants have many enemies such as people, animals, fire, disease, insects, and weather. Did you find any plants showing damage from any of these

enemies? _____ What kind of damage?

Kind of Damage

People —	_____
Animals —	_____
Fire —	_____
Disease —	_____
Insects —	_____
Weather —	_____

Some plants grow in places where people do not want them. Did you see any plants of this kind? _____ Such plants are called weeds. Why and how are

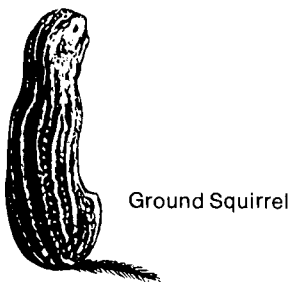
weeds controlled? _____

ANIMALS

All animals must have food, water, and a place to live. Each kind needs different food and shelter. Some live in water; others absorb it or drink it. Some live in the ground, on the ground, in grass, in shrubs, in trees, or in the air. Each animal must have sufficient food, water, and shelter throughout the year. All animal life is dependent upon plants for survival.

Do you see any animals in the field? _____
 If so, list them.

Circle the following pictures of animals that you saw in the field.



Did you find anything that would tell you that animals had been present? _____ What?

Look for tracks or evidence of where an animal has eaten. Make a list of the animal signs that you found and what animals you think may have made them.

Animal Sign

Animal

--	--

--	--

--	--

Find some birds. Are there as many as in the woods? _____ Do you find any of the same birds

as in the woods? _____ Can you find any of the birds shown on page 11? Circle the birds you find and write in their colors so you can color them.

WATER

Soils, plants, and animals are all interrelated with water. Soils must have the proper amount of water. If soil has too much water it is called "saturated." If soil has too little water it cannot support plant growth. Water is also used by plants. Plants take moisture from the soil and use it in their leaves during a process called photosynthesis. All life depends on water; therefore, animals and people need it to survive.

How would water affect the soil that you are standing on? _____

How would water affect the plants that you have seen in the field? _____

How would water affect the animals that live in the field? _____

How would plants and animals affect the water? _____

AIR

Listen for the movement of air or wind. Is there a difference between air moving in a forest as compared to the field? _____

Why is air needed? _____

How do plants affect the air? _____

WHAT HAVE YOU LEARNED

Now that you have been to both a field and a forest, what differences did you find?

	<i>Forest</i>	<i>Field</i>
1. Soil	_____	_____
	_____	_____
	_____	_____

2. Plants	_____	_____
	_____	_____

3. Insects

_____	_____
_____	_____
_____	_____

4. Birds

_____	_____
_____	_____
_____	_____

5. Animals

_____	_____
_____	_____
_____	_____

6. Water

_____	_____
_____	_____
_____	_____

7. Air

_____	_____
_____	_____
_____	_____

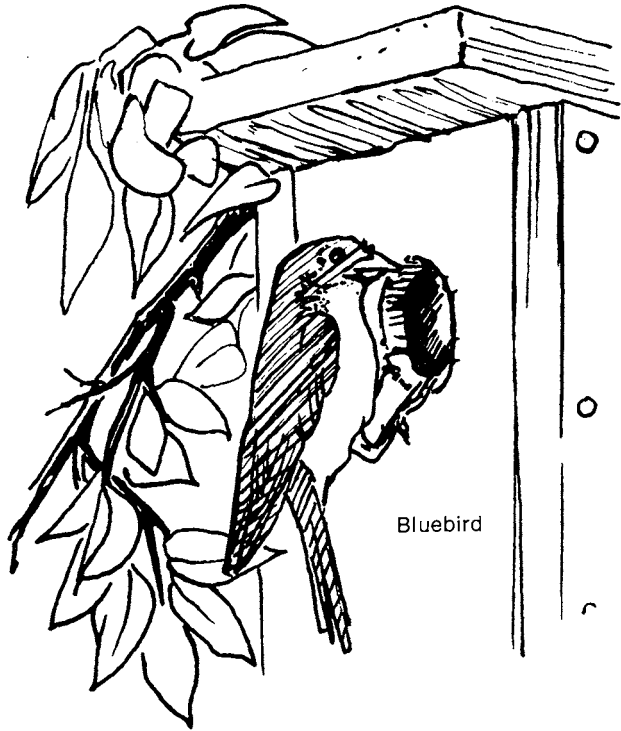
8. Rocks

_____	_____
_____	_____
_____	_____

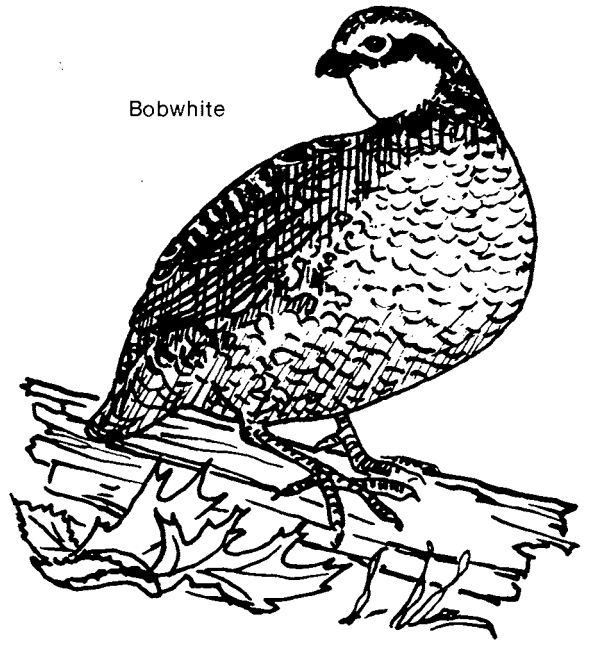
Did you find any animals, birds, or insects that were the same in both environments?

Of the above animals, why would they need both the forest and the field to survive?

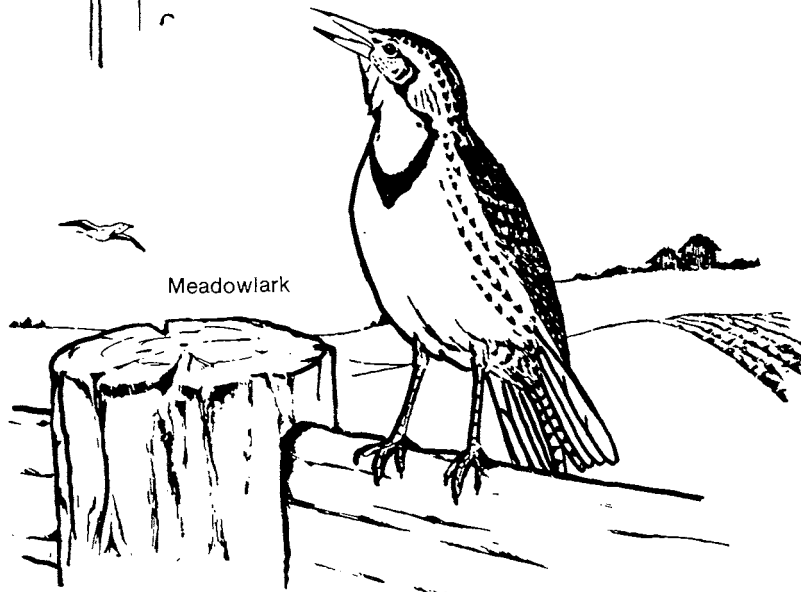
BIRDS OF THE FIELD — COLOR THE BIRDS YOU FOUND.



Bluebird



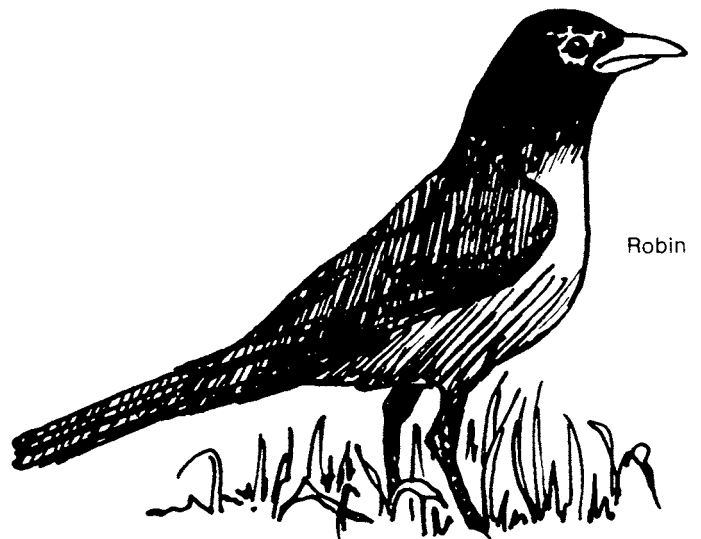
Bobwhite



Meadowlark



Song Sparrow



Robin

**BIRDS OF THE FIELD — MAKE DRAWINGS OF OTHER
FIELD BIRDS HERE, NAME THEM AND COLOR THEM WITH
THE RIGHT COLORS.**

If you see birds not shown on page 17, describe them or draw pictures of them on this page. Look them up in your bird guide and note such things as the food they eat, their nesting habits, their need for protection or safety. Does this explain why they are in the field or in the forest or both?

ADDITIONAL "FIELD" ACTIVITIES

1. Make a collection of wildflowers that you found growing in a field. How do wildflowers reproduce? What are the different parts of a flower? Some species are "protected" and it is illegal to pick them.
2. Make a collection of insects that you found in a field(s). What are the different methods of preserving insects?
3. Start either a vegetable and/or flower garden. Read different books for some background information on this subject.
4. Find out how weeds are controlled in a field through different herbicides that are used in spraying, different methods of spraying, etc.
5. Do a bird study. In your study you could include such things as eyes, eyelids, beak, size, shape, tail, wings, feathers, locomotion, feet or toes, color, song, flight, bird eggs, and hatching.
6. Talk to your county extension agent or some of the farmers in your area to find out more about the agricultural use of a field.
7. Make a collection of different plants grown in your community for human food, for animal feed, for food for wildlife.
8. Prepare an exhibit for county fair or achievement day.
9. Prepare and present a demonstration or project talk at a club or project meeting.
10. Other activities are listed in the publications:
 - 4-H Plant and Soil Science series on:
 - Plant Reproduction — Unit IIA
 - Soils — Unit IIB
 - Growing Factors — Unit IIC
 - Plant Characteristics — Unit IID
 - Growing and Using Plants — Unit IIE
 - Plant Growth and Food Production — Unit III
 - Plant Disease Specimen Collection — 4-HM122
 - Cold Soil Seed Test — 4-HM-143
 - Flower Gardening — 4-HB-62
 - Indoor Gardening — 4-HB-61
 - Vegetable Gardening — 4-HB-63
 - Lawns and Landscape Design — 4-HB-60
 - Rocks and Minerals — 4-HM-234
 - Geology — Land Farms — 4-HM-228
 - Exploring the Prairie and Forest — EEA7
 - Scouting Homes for Ruffed Grouse — EEA13
 - Building a New Town — EEA5
 - The Great Runoff Race — EEA4
 - Selecting Suitable Uses for Land — EEA1
 - Studying Soil Erosion and Its Control — EEA10
 - Studying Soil Texture and Its Influence — EEA12
 - Exploring the Soil — EEA8

Your Water Trip

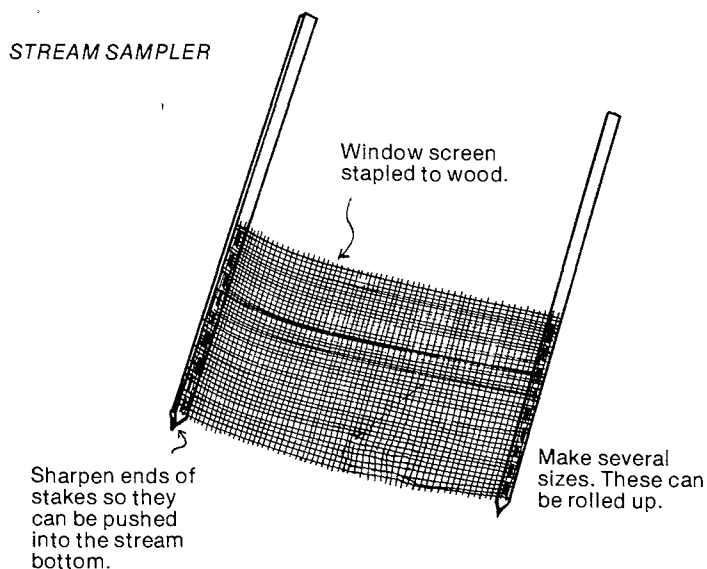
Take off your shoes and wade into the mystical world of life in the pond, stream, or along the lake-shore. You'll be amazed at the numbers and varieties of "creepy crawlies" darting about or floating in the water, clinging to the vegetation, hiding on the rocks, and buried in the bottom. For this reason, you need some special tools for this trip.

A Seine or Stream Sampler — This could be a 4x8 foot minnow seine, or you can use a window screen stapled between two pieces of wood.

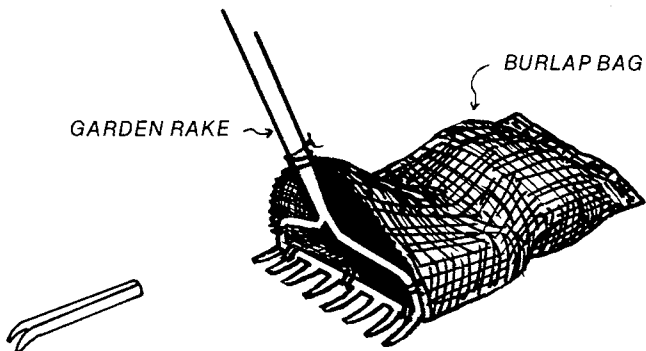
Assorted small containers — peanut butter and baby food jars are ideal.

Dip Net — Large kitchen strainers are ideal dip nets. Extend your reach by tying them to broom handles.

STREAM SAMPLER



A Bottom Rake or Bottom Sampler — Tie a burlap bag behind a garden rake as shown. (Note: this rake does not work well where there are many aquatic plants.)

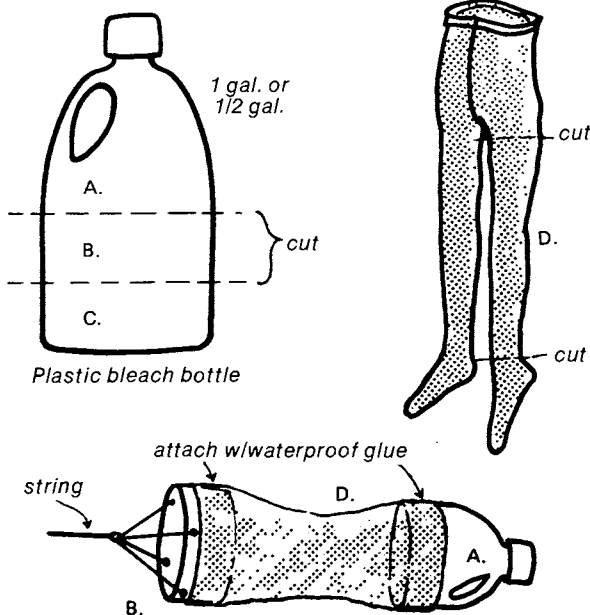


SOFT FORCEPS

Make forceps by bending soft metal (like stovepipe metal). You can pick up soft-bodied aquatic insects with them.

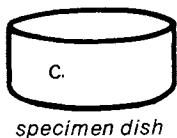
A Plankton Net — This can be made from an empty plastic bottle and an old pair of pantyhose as shown.

IMPROVISING A PLANKTON NET



Directions:

1. Cut bottle as shown with scissors.
2. Cut pantyhose, keeping section D. If using hose, just cut off the foot.
3. Seal section D to section A as shown.
4. Insert B (middle section of the plastic bottle) into the top of the old hose and attach with waterproof glue.
5. Retain C for examining the captured plankton.



Miscellaneous Items

You can also bring a thermometer. Shorts or a bathing suit can be worn on this trip, and it's also a good idea to bring an old pair of tennis shoes with you.

REMEMBER: Always wear a life preserver when in the water; you never know where there might be a dropoff.

It would be best if several explorers could work together on this trip since it requires several tools. A junior leader or club leader should go along to help with the tools.

SELECT A POND, STREAM, OR SECTION OF LAKESHORE

When you select a spot, be sure it is free of underwater hazards such as dropoffs and soft bottoms. Pick one person (a junior leader or adult) to probe the area with a pole in order to discover any hazards. Stay away from large streams and deep holes unless you are with responsible adults. If you choose a stream, for best results you should pick a time when it is not swollen or muddy. Beware of broken glass and rusty nails.

Before you begin looking for any plants or water-life, use your thermometer to test the temperature of the water. Is there a difference between surface and bottom temperature? _____ Record your readings for four different areas in the water.

Surface Temp. Bottom Temp.

Moving Water

Non-Moving Water

Shady

Sunny

Revisit the areas three months later and note any changes.

The temperature and speed of the water are two of the factors that determine how much oxygen the water will have. In general, cold waters contain more oxygen than warm, and fast-moving water has more oxygen than still water. Why is this true? _____

The oxygen levels and temperature are two things that determine what kind of life you will find in the water.

The water you are looking at has qualities that make it a favorable place for certain plants and animals. First, though it is not as transparent as air, it still admits enough light so that aquatic plants are able to get enough sunlight to live. Second, water is heavier than air and therefore has more supporting power. Because of this, many aquatic plants have no stiff supporting structures and could not stand up on land. Third, the organisms are truly living in a "nutrient soup" where the minerals and nutrients used as food float in the same medium as the plant or animal that eats them.

PLANTS

Let's start the water trip by looking for some plant life. Remember that plants were the most abundant kinds of life found on the other trips. There are four types of plants that can be found in a pond, stream or lakeshore:

1. free-floating, unrooted plants.
2. plants that are rooted to the bottom and are totally underneath the surface.
3. plants that are rooted to the bottom but have leaves and flowers on the surface.
4. plants that are rooted to the bottom and whose stems and leaves project above the surface.

Can you find any plants in the pond? _____
 stream? _____ lakeshore? _____

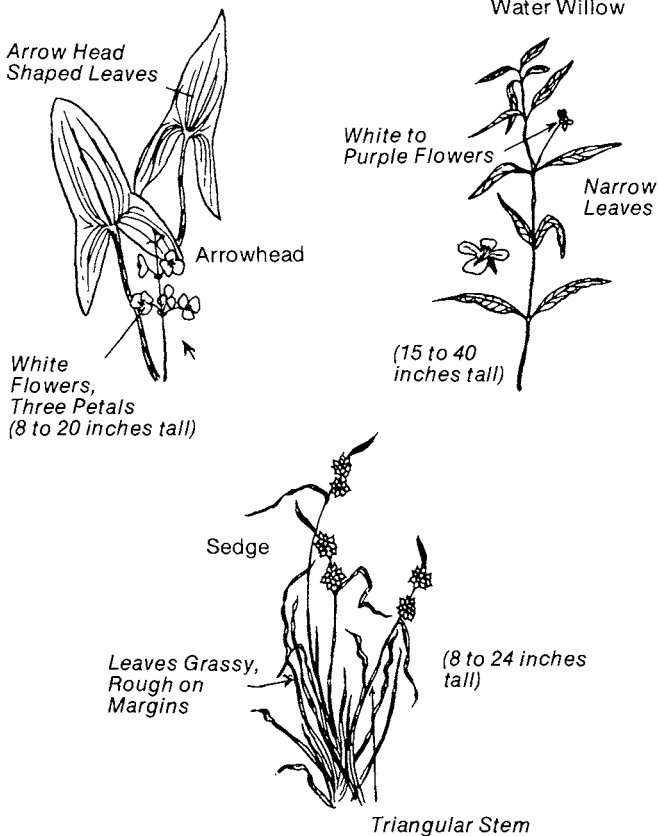
Which of the four types of plants did you find and where?

Pond Stream Lakeshore

- Type 1.
- Type 2.
- Type 3.
- Type 4.

Examine the following.

STREAM LIFE-PLANTS



Did you find any of these plants? _____
 If you found some plants that you can't identify, you may want to draw pictures of them to look up later.

Can you find a plant attached to rocks or plant stems in shallow water? It looks like a mass of green thread. Pick some up and see if you can find the threads. This is a kind of algae. Did you find any? _____

If you visited a stream, did you find as many plants growing in it as you did in the pond? _____

Why or why not? _____

INSECTS AND WATER LIFE

In still water, seine for the tiny life of the pond or lakeshore. Animals in the water are of four types:

1. plant eaters — snails, tadpoles, some fish, etc.
2. animal eaters — dragonflies, frogs, fish, etc.
3. scavengers — snails, water sowbug, etc.
4. decomposers — (bacteria)

The water might also contain adult insects, turtles, frogs, and fish.

If you are in a pond or lake, walk out into knee-deep water. Keep the seine at an angle touching the bottom; rapidly walk back to shore. Lift the seine quickly out of the water. Did you "catch" anything? _____

If so, which of these three types of water life do you see?

Plant Eaters Animal Eaters Scavengers

In moving water, walk upstream to where the water is clear. Throw your plankton net into the water and either let the water flow through it or tow it upstream from the bank. After a couple of minutes, haul in the net. Hold it up by a sweeping motion as you reach the shore. Unscrew the cap at the bottom. Pour water through the top, rinsing the contents into one of your jars. The fine mesh of the net has strained the stream water. Are there any insects or animals moving in the jar? _____

Can you see any tiny green plants? _____

Did you notice whether the water in the pond, stream, or lakeshore seemed cloudy? _____

Could this be caused partly by these plants and animals? _____
 How? _____

These tiny plants and animals are called plankton. Why is plankton important? _____

List the types of water life that you "caught" in the stream:

Plant Eaters Animal Eaters Scavengers

Was there a difference between the life that was found in the still water (pond or lake) and the moving water (stream or river)? _____
 What difference? _____

If you were lucky enough to catch a larger fish examine it carefully. What kind of fish is it? _____
 Does it have scales? _____
 Do fish breathe? _____
 If so, how? _____

What would this fish eat? _____

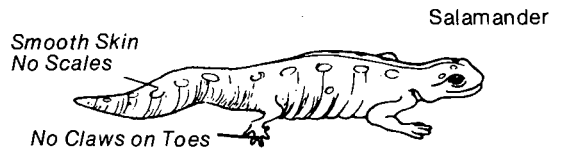
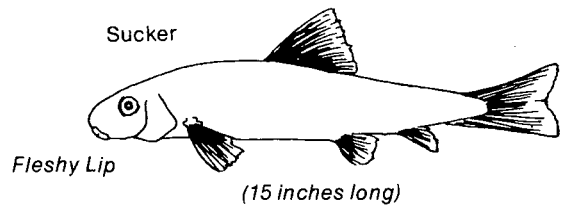
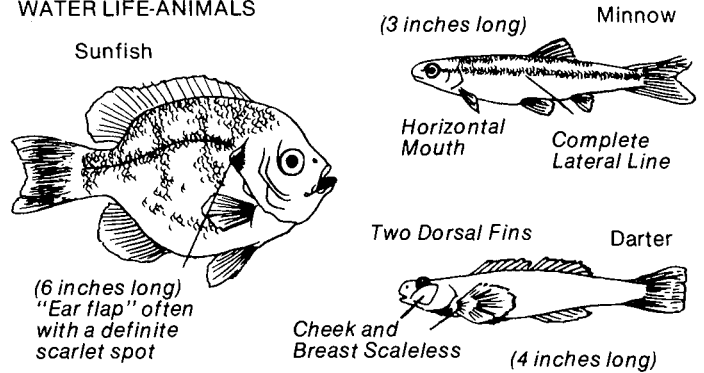
Take a look. What do you find in its stomach? _____

Has it eaten any plants? _____

Insects? _____ Other fish? _____

Circle any of the following pond, stream, or lake-shore animals that you saw.

WATER LIFE-ANIMALS

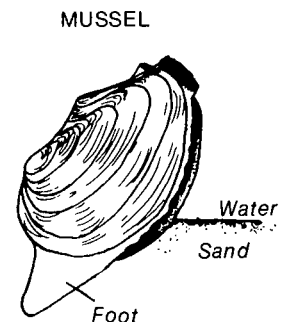
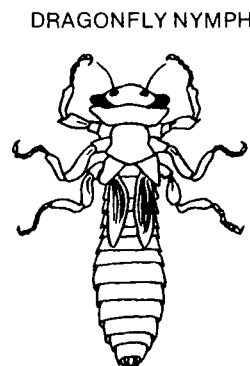


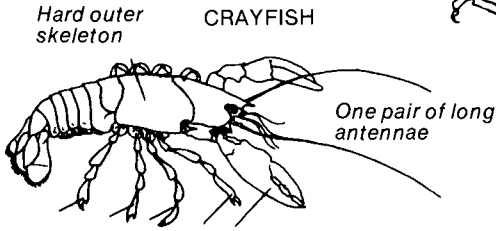
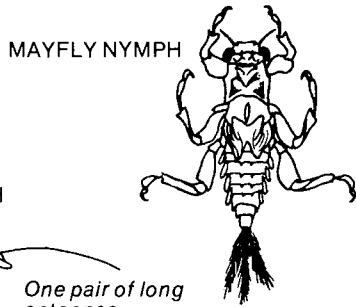
Explore the bottom of the pond, stream, or lake-shore. This is where you will use your bottom rake. Kitchen strainers work well here, too. By raking along the bottom with this dredge, bottom dwellers will be stirred up and caught in the bag.

Examine the muck dredged up. Carefully separate the different things you find into groups. Do any of the strange creatures resemble the following drawings?

Circle any of the following that you found.

BOTTOM CREATURES





Five pairs of "walking legs", first pair with heavy pincers, second and third pair with small pincers, fourth and fifth pair without pincers.

Ponds, streams, and lakeshores are the "cradles" or "nursery" for many insects that do not live in the water as adults, but spend their "childhood" in pond and stream bottoms. An example of these would be mayflies, dragonflies, and mosquitoes.

Turn over some rocks to see the larvae of many insects. Did you find any? _____
 Were there larger animals in the pond than in the stream, or was the reverse true? _____

Why do you think this was so? _____

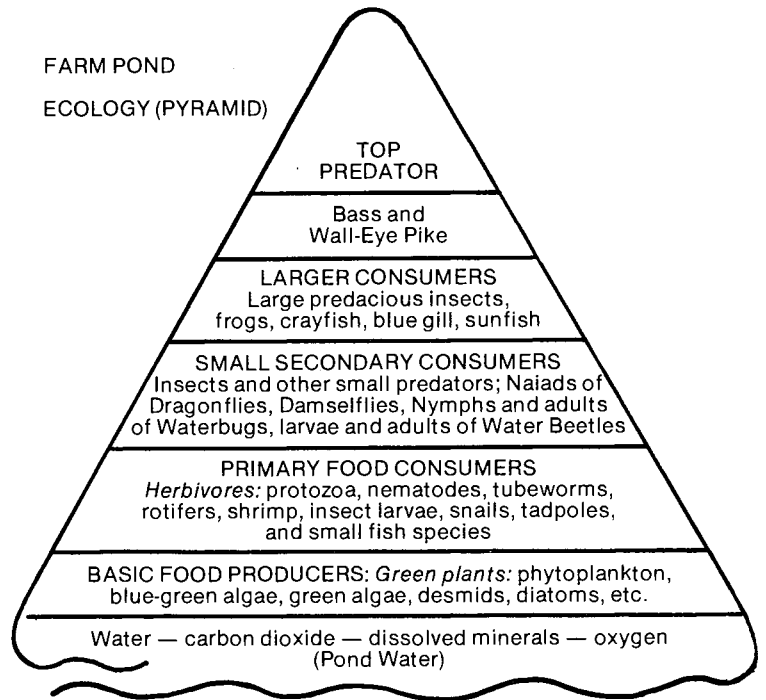
Since flowing water contains more oxygen than standing water, the breathing structures of creatures found in streams are not as advanced as those of animals living in ponds. If possible, examine the breathing structures of some of the animals that you "caught." Do you see any differences between the pond and stream animals? _____

What is the value of a pond, stream, or lakeshore? _____

Do you affect ponds, streams, or lakeshores by walking through them? _____

How? _____

What relationship does the pond, stream, or lakeshore have to organisms that live outside of them? _____



PLANT EATERS
 Rotifers
 Snails
 Mayflies
 Tadpoles
 Protozoans

SCAVENGERS
 Crayfish
 Pond Snails
 Caddisfly
 Nematodes
 Water Sowbug

ANIMAL EATERS
 Dragonfly Naiads
 Damselfly Naiads
 Caddisfly Naiads
 Black Swimmer
 Diving Beetles
 Frogs
 Toads
 Fish Species
 Crayfish

From: N.Y.S.O.E.A. Aquatic Studies Workshop — by John Weeks

ADDITIONAL "STREAM" ACTIVITIES

1. Describe a simplified web and/or food pyramid involving the living things discovered in the water and on the shore of a lake, stream, or pond which you investigated.
2. Do research into the causes of water pollution.
3. Do a study on numbers in nature. Examine objects in nature as to numerical patterns and geometric shapes.
4. Study the tracks (if you saw any) on the shore of a lake, stream, or pond. Try to find out more about what made them. Follow them, if you can, to see where the animal's home is, what it eats, how it raises its young, etc.
5. Make a collection of aquatic plants, insects, or animals.
6. Prepare an exhibit for county fair or achievement day.
7. Prepare and present a demonstration or project talk at your club or project club meeting.
8. Get a copy of EEA7 "Exploring the Pond or Lakeshore" as an additional reference from your County Extension Office.

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