UNIT THREE: WHAT IS A FOREST?

UNIT THREE DISCOVERIES

Students will be introduced to a forest and start to explore how all the living things that are a part of it (plant, animal, people, etc.) relate to each other. For background see the Introduction and Chapters Two, Three, and Four in *Where Are All The Trees? A Minnesota Primer.*

KEY

- P — Primary Students
- I — Intermediate Students
- A — Advanced Students

Living things on their own have a natural life cycle. Grouped together, they become part of an intricate, connected web that also has a delicate cycle of its own. A forest, whether in the city park or covering acres of the countryside, is a unique group of living and non-living things that are interdependent. To learn more about this forest ecosystem, find a safe forested area near you. Get permission to be there if it is private land, check it out first before you bring the children and let's go...

> "If you would know strength and patience, welcome the company of trees."
>
> —Hal Borland

Activity 1: Into the Woods

P I A

There is nothing like walking out of the sunlight into the instant shade and coolness of a wooded area: the smell of damp earth, the sound of the wind in the leaves above, the animal sounds. Just let the children SENSE for a while and start to drink in the differences between this forest home and the home they just came from. What lives here?

Observe the trees. What kinds of trees are there? (Call up the identification skills practiced in Unit Two.) How big are the trees—are they old or young? Are the trees healthy, sick, or dead?

Look at the understory—what kinds of saplings are present? Are there flowers or bushes? How thick is the undercover?

Can you tell if the forest developed by itself? Or is there evidence that people have planted it, harvested it, or changed it in any way?

> Editor's note: Due to travel restrictions or availability, it may not be possible to actually take the children to a forested area. Don't let that stop you from introducing them to this wonderful environment. Use any of the books in the bibliography to take them on an "imaginary" hike.

Back home or in the classroom, have the children jot down their observations and speculations about what they saw. Then contact a naturalist or park ranger for the area or your local extension or forestry office. Find out the real story about the forest you are studying.

Activity 2: Rock Bottom Story

P I A

Unless you are observing a reforested area, the vegetation took a long time to develop to its present state and was influenced by many factors. Our part of the country, like any other, has a unique "base" story. The stones and rock (for example, sandstone, limestone, granite) formed so long ago provide the contour base upon which the soil and vegetation exist. Their shape and height (dish, mound, smooth, jagged) dictate their ability to hold stable vegetation groups. Again, go back to your forest to get the rock bottom story.

Walk the area. Is there high ground, low areas? Note the different plants that grow in the different areas. Are there areas of bare rock? Are there areas (for example, a river bank, cut away hillside or roadside) where you can find out how far below the surface soil the bedrock is?

Take different shaped objects (shallow and deep dishes, plastic glasses, toy pails). Try putting soil into them or around the outside of them. What holds the soil in place? How can you get the soil to stick to the sides of the artificial "hills" you have made?

Activity 3: Hold That Soil!

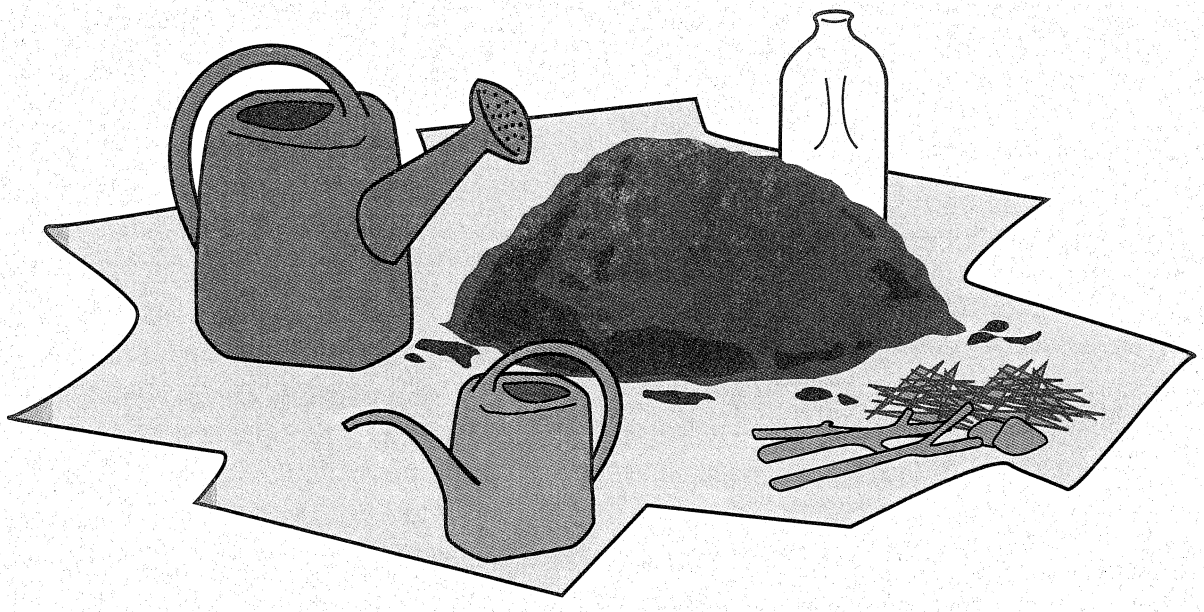
P I A

Gather soil, a large pan, and watering cans. Spread newspaper or a large piece of plastic. In the pan make a mound of soil or just a graded slope. Using different watering cans, (gentle spray, heavy downpour) water the pan and watch what happens to the soil. Does it wash away? Do gullies form?

Remake the hill or slope. (Have enough soil to do each experiment with fresh, dry soil.) This time, add grass, net, sticks, etc., to form ground cover. Repeat the watering procedure and see what happens when there is something to break the water's force and hold the soil.

For older groups, vary and mix the soil types (sandy, humus or organic, clay) to add another variable to the experiment. Which types are affected the most by runoff?

These experiments help the children understand the value of ground cover of all kinds. Grass, bushes, and trees all help hold the soil in place over the bedrock, thus performing an invaluable service to themselves and us.



Speaking of soil, where does this stuff come from? Within the living web of the forest, organisms live, die, and decompose. This process of the breakdown of organic matter guarantees the recycling of materials and energy and creates the soil build-up so crucial to sustain the delicate ecosystem. The following activities look at some of those processes and the organisms involved.

Activity 4: Producer-Consumer-Decomposer Game

P

The children are going to become the components of the forest life cycle orchestra. Divide them into three equal groups as follows:

Producers: The producers represent the plant life, the stable base of the food chain. Tell them most of the living things in the forest eat the plant life. Have them put the palms of their hands together in front of them and raise them above their heads, pulling them apart in a fanning motion. While they do this, they can sing or chant: "Produce! Produce!"

Consumers: The consumers are organisms that eat the producers (the plants!). They can move their arms as if they are trying to grab something in front of them while they say: "Consume! Consume!"

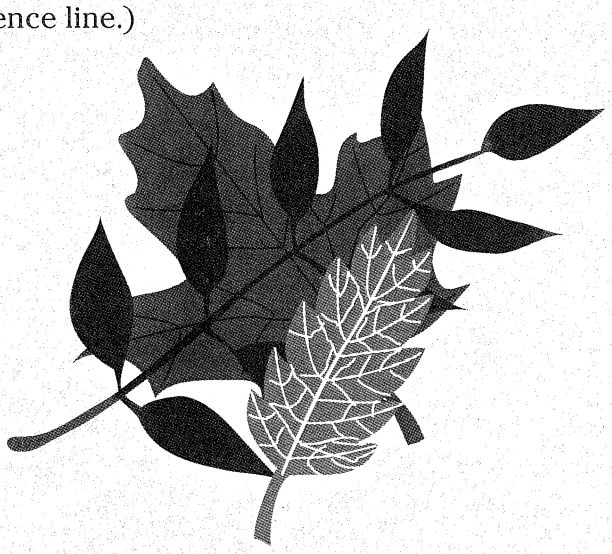
Decomposers: The decomposers are the small microorganisms, bacteria, fungi, and insects that break down the producers and consumers when they die. This process turns them back into soil and releases their nutrients to be used once more. (This is an important job, but it might take some convincing for your little "muncher crunchers.") They are to wiggle their fingers in front of their faces and growl, "Munch-a-crunch, Munch-a-crunch!"

Now you have the whole orchestra in place. Help them practice their parts separately, always explaining how important each is. Then turn them loose together to sound out and act out a busy forest cycle, seeking and using the components they need.

Activity 5: Five-Year-Old "Leaf" Hunt

I A

Take the group to your yard or any area with leaf litter. Send the children out to find a new leaf. (Make sure you remind them to be "Good Naturalists" and get their specimens from the ground.) Next, send them out to find a year-old leaf. (They should be bringing back brown, dry, and partially decomposed leaves. These should be readily available around a fence line.)



Finally, ask them to find a five-year-old leaf. They might bring back the lacy vein skeleton of a leaf that is almost completely decomposed, or any other one that looks really "old." Collect all of these and save for art projects. Lead them to a bare area and pick up a handful of soil. Explain that you are holding many "five-year-old" leaves that have now completely broken down to make new soil.

Activity 6: Lots of Rot!

P I A

Any wooded area will have fallen and rotting logs to explore. Find one in your woods (or use the excellent book, *The Dead Tree* by Alvin Tresselt—see the bibliography). Have the children look at the top of the log, underneath its bark, underneath the log, the ground near by. What living things can they find? What evidence of living organisms can they find (holes made by insects or worms, cocoons or webs, nests or larger homes of larger animals, etc.)? Are there mushrooms or fungi on the log?

> A note of caution: This is a "real life" experiment and experience. The children should be instructed to disturb as little as possible, to not put their hands into any holes, to not harm any of the living organisms they might want to examine (catch and release), and to leave the area as they found it.

Back in the classroom, discuss what is happening to the log. How is each of the organisms they found helping the log to become soil? Have them draw a picture of how the area is going to look three, six, and 12 years from now.

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Activity 7: Getting Down and Dirty

We've made an initial exploration into the forest, looked at the "base" story, learned how soil was made. But, how does all of this add up to making a forest? The process of plant succession—the gradual replacement of one community by another—is a fascinating story. Let's see how we might get down and dirty!

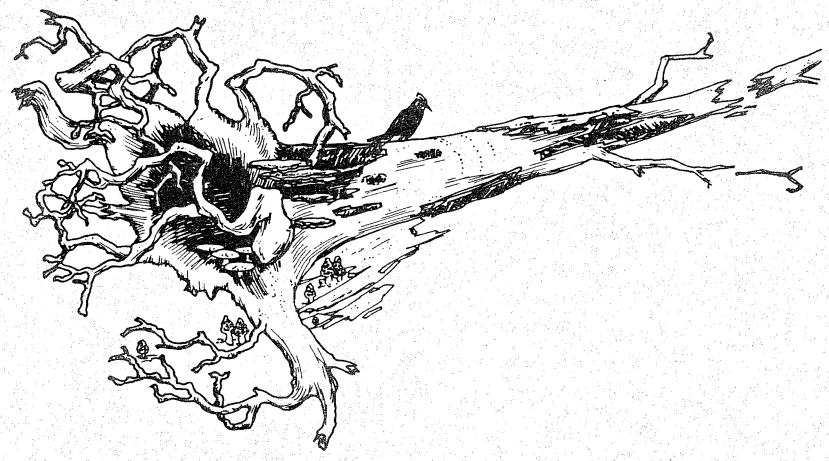
Each tree species has its own special soil needs. Different forest groups grow in certain areas because that environment provides for their special growth needs. That kind of information helps urban and rural foresters decide what trees to plant where. Get buckets and shovels and let's play in the soil.

P

Collect different soil samples from your yards and park areas. Smell them. Feel them. What color are they? Are they sticky or do they fall apart easily? Do they contain clay, sand, or stones? How much organic matter is in them?

Using baby food jars, place a sample of each kind in one, label it, add water, and shake. Let the jar sit. Every 10 minutes watch the different layers that settle out to the bottom or stay floating.

Take some of the soil samples and plant seeds in them. Watch to see which type of soil provides the best growing medium for your seeds.



I A

As you collect your soil samples, write down what plants are growing in each of the areas sampled.

Test the pH (the acidity or alkalinity) of each sample using pH or litmus paper (available through science catalogs or check with your junior or senior high science teacher). Note that pine-needle underbrush, for example, creates an acid soil not "friendly" to other types of plants.

Do the water-shaker experiment described on the previous page and wait for layers to form. Using a turkey baster or other syringe, siphon off each layer and put through a strainer with a filter in it (coffee filters are a reasonable substitute). When dry, examine the residue.

Mix various combinations of your soil samples and try growing seeds to see which combo provides the best growing conditions.

Using the map on Activity Sheet 4B (Unit Four) and the tree identification sheets in Unit Four, try to place trees in the regions in which they would most likely grow.

Activity 8: Build a Forest on a Rock!

I A

It works well to do this activity outdoors with a large rock. Provide the soil, seeds, and water. For indoors, provide a large rock (make sure it is not smooth), soil, seeds, water, and a large old pan to work in. Ask the students to build a forest on a rock with the materials provided. Let them experiment with different ways of putting the soil and seed on the rock.

When they feel satisfied that the planting is done, announce that there is a sudden rainstorm approaching. Pour water over the rock: the seed and soil will wash away. Let them try again and offer suggestions: put the seeds in holes; make mud and cover the seeds with it. Repeat the "rainstorm" and note the bare rock again.

Talk about the fact that something (nature's "glue") is needed to hold the soil and seed there long enough to get the forest started. Go back outdoors to see what that "something" might be.

In the city, look for deep cracks in the pavement and sidewalk. Given enough time, enough organic matter collects and is sheltered enough to allow plant growth.

In the city and the woods, look for bare areas, sides of rocks, stumps, or wooden fence posts. You are going to find nature's "glue": multi-colored lichens. Lichens are remarkable symbiotic combinations of fungi and algae. The organisms help each other survive and are capable of growing on bare rock.

Continue your treasure hunt to perhaps find moss growing on the lichens. Enough organic matter was able to provide a stronghold for this small plant to start. Search further for the ferns and small plants growing on the mosses. Continue searching for the build-up of enough soil to support the growth of larger plants... and larger plants... and finally the trees. (Wonderful examples of plant succession can be found along the North Shore of Lake Superior.)

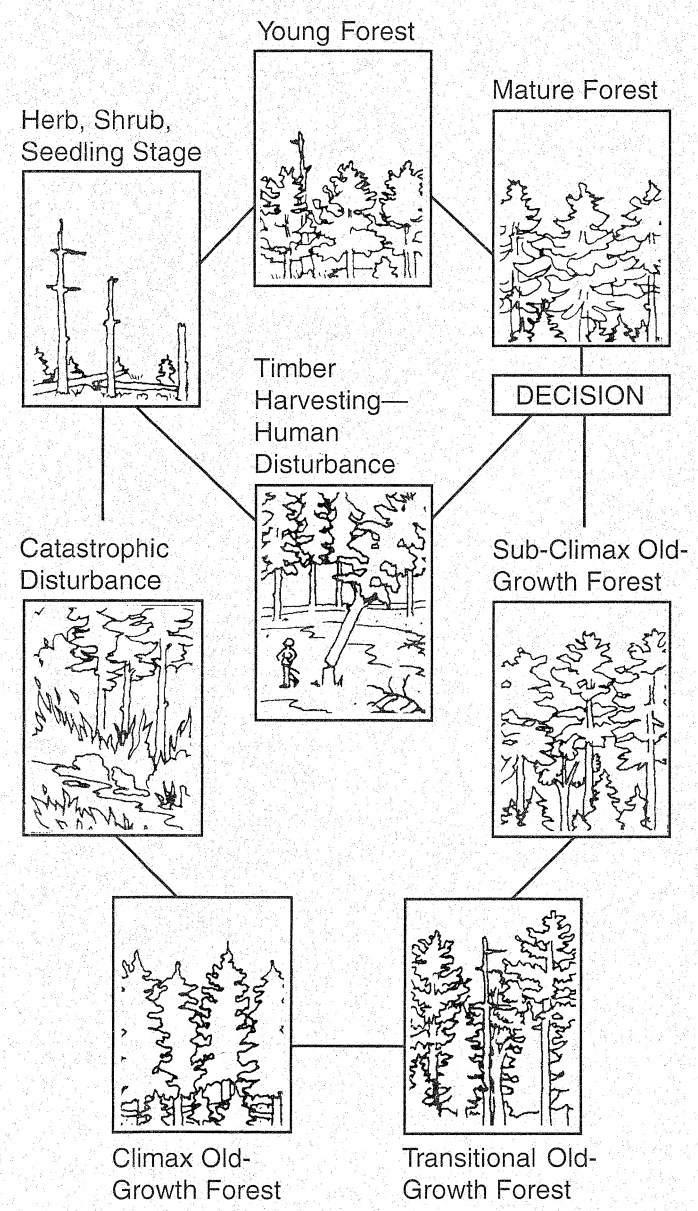
Used with permission from Deb Murphy.

Activity 9: Going Through Stages

I A

Succession doesn't just take place on bare rock. All forests are always growing and changing. At different times, they are going to be new, old, dying, or a combination of all of these. Look at the following diagram of the forest cycle.

FOREST CYCLE



As you can see, both nature and people make changes that bring the cycle back to the beginning. All ages of forests are important. Each stage has its own environmental, social, and economic values. Check out a forested area near you and see what clues you can find to help you decide what stage it is in and how it got there.

Activity 10: Recipe for a Forest

P

Talk the children through the creation of an "imaginary" forest. What kinds of trees, animals, birds, insects, etc., would they like to live in this place? List what they have chosen on the board, and if possible, provide pictures. Then pass out paper and crayons and let them create their forest home.

> "The woods are silent, dark, and deep."
>
> —Robert Frost

I A

Give each child an imaginary deed for a tract of land. On this land they can create any kind of forest they desire. They can put in whatever trees and plant species they want, and fill it with the animals, birds, and insects they choose. Remind them to use all of the knowledge they have gained from the exercises to make wise and appropriate choices for their forest home. Let them write a story about their imaginary place and draw pictures of it.

Adapted with permission from Joseph Cornell, Sharing Nature with Children.

With the help of Activity Sheet 3D, create a giant mural of the stages of a forest.

Activity 11: Habitat "Sit-in"

P I A

The rocks, soil, plants, and trees are only part of the forest web story. Living in, under, around, and with the trees are all the mammals, birds, insects, people, and other living organisms that make up the rest of the delicate web. The following activities will help children experience and understand some of these interesting interrelationships. Taking just their senses to explore, go once more to the forest or park for a quiet sit-in.

Assign the children each a separate spot. Ask them to quietly observe the living things they find in the tree tops, on the tree trunks, on the ground around them. Allow as much time as their age and ability permit. Back home or in the classroom, ask them to write or draw pictures of the living organisms (plants and animals), including themselves, that were part of the web.

Activity 12: Earth Windows

P I A

Use your judgment as to the readiness and comfort level of your group. A large area is required for this activity. Also, you will need enough grass clippings and/or leaves to cover the students. Make sure a prior safety check of the area is done before starting. Have children lie down and cover them with grass and leaves, making sure that they can breathe comfortably and see out. Tell them to stay still and observe the forest and surrounding area from a "bug's-eye" point of view. Tell them you will signal the group when it is time to "pop" out. (Depending on the age of the group, five to 10 minutes is sufficient.) Make them aware that real insects may come to "explore" them, but that they are safe, should remain still, and just "experience."

Editor's note: Be sensitive to the fact that some children may not be able to handle this experience because of previous bad experiences or built-in fears. Never force an experience and thereby add to the fear. Assign a different activity instead. Example: Have the child pretend to be a watchful robin on a branch, waiting very still for an insect to "pop" up to eat!

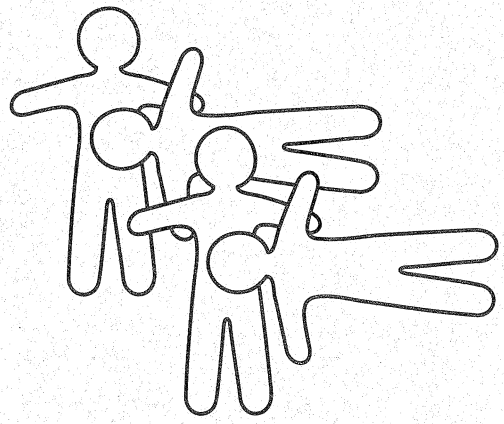
Adapted with permission from Joseph Cornell, Sharing Nature with Children.

Activity 13: Lap Links!

P I A

Divide your group up and assign "parts" of the forest web to everyone: soil, plants, trees, birds, insects, mammals, people.

Have one person lie down and the next one lie down with his/her head on the stomach of the first child. Continue stacking the children this way.



When everyone is "lap-linked," start walking around and affecting different parts of the web.

Find a "soil" and tell him or her that you are going to pour out some old paint that you don't want anymore. Tickle that person and watch the ripple effect as the laughter spreads throughout the link-up. (If you have never

tried this, lie down with the children for a lot of fun—it is impossible NOT to laugh when the stomach you're on is jiggling up and down.)

Find a "tree" and say that he or she is blocking your view to the lake so you are going to cut him or her down. Tickle and watch the ripple.

Those pesky insects just ruin your picnics so you build and put up several bat and martin houses to attract creatures to eat them! Tickle the "insect" and watch the ripple.

Go on to create as many examples as time permits, involving all of the parts of the web. Throughout the game, make sure that you are pointing out how everything is connected and cannot be affected without affecting everything else.

Activity 14: Web of Life

P I A

Arrange the children in a circle. Assign each participant a part of the forest web of life: soil, trees, other plants, insects, mammals, birds, and so on. Hand the first child the end of a ball of yarn and as you go around (and across) the group with the assignments, have each of the children grab the string and hold tight. Continue until all of the children are linked by the web of yarn. Create the same kinds of scenarios as you did in "Lap Link" (above) to affect each of the different parts of the web. As you do something to a part of the forest, have the corresponding child tug on the string. Ask who feels the tug. How many of the parts have been touched by what you did? Go around the group, repeating the exercise to reinforce the concept of the interconnectedness of the web.

Used with permission. Variations of this activity can be found in Project Learning Tree and Joseph Cornell, Sharing Nature with Children.

Activity 15: Assign a Home

P

The children are the local forest real estate agents. After learning about the housing needs of specific animals (rabbits, squirrels, deer, mice, etc.), allow each child to pick an animal. It will be that child's job to find the right forest home for their "client." It must provide for all the animal's needs. Ask the children to draw their home choices.

Using Activity Sheets 3A and 3B make a "peek-a-tree" to show some of the living arrangements that animals have.

I A

Pick a local park or forest area. It is going to be your students' job to populate it with a balanced group of living organisms, including people. Have them walk through the area and list who and what already lives there. What are they going to have to add or take away to complete a healthy web?

See Activity Sheet 3C for help getting started.

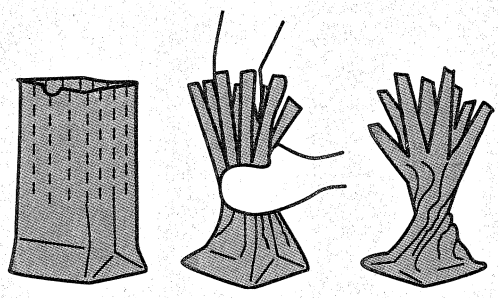
Compare the maps of past and present day vegetation areas found on Activity Sheets 4A and 4B (Unit Four). Divide the group and give each section a different area of the state. Ask each section to draw or write about plants, animals, and human involvement in the area based on the past vegetation and present vegetation.

How did the changes in forest composition affect who and what lived and worked in each area at the different times?

ARTS AND CRAFTS

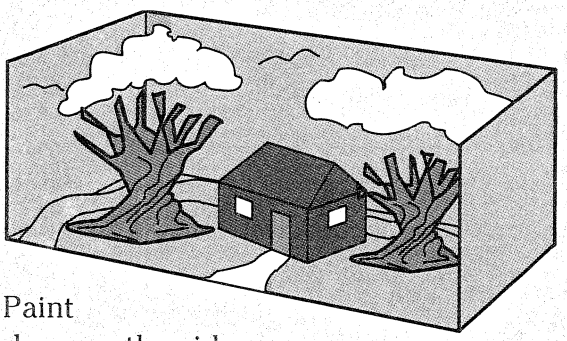
"BAGGING" A FOREST! (3-D TREES)

Take a brown paper lunch bag (or for variety, use several sizes of smaller brown bags). Have the children rip several sizes and lengths of strips at the top of the bag.



Now have them open the bag and put their hand in and twist the bag around it. Remove hand and twist the bag on its base to give the "trunk" texture and create a flat base to stand on. Now twist and separate the "branches" at the top and finish your tree. With all the trees made, create a forest or city diorama on a table top or in a large box.

A diorama is a 3-D collection of art objects, paintings, and natural objects that are put together to create a very realistic scene. Take a large box and remove the top and one side, leaving a three-sided open "stage" for your diorama.



Paint or draw on the sides and back, scenes to complement the set you are creating (sky, sun, hills, houses, trees or forest, stream or lake, etc.). Then, in the foreground on the base add dirt, grass, twigs, paper bag trees, animals, birds, houses, streets, etc.

FREEZY SUN CATCHERS

Here's one for a cold winter day. Use a pie tin or small cake tin. Lay a piece of rope around the perimeter of the inside bottom of the pan to form a frame and let the end hang out. Add sticks, leaves, seeds, acorns, etc., to the middle of the pan. Pour one to two inches of water in and freeze (outside or in the freezer). To remove the sun catcher, submerge the bottom of the pan briefly in warm water. Slide the sun catcher out and hang outside by the end of the rope. Watch it sparkle in the sunlight and have fun watching it melt!

NATURE HOUSE

Obtain a large box (washer or dryer is a good size) from an appliance store. Cut out windows and a door. Have the children glue or tape the items collected from their nature walks onto their "outdoor/indoor" house. This project will have a tendency to "shed" as it dries so it will continually need renewal and cleaning. The house and its upkeep and continued reconstruction will help the children understand what the animals go through to maintain their homes.

SPIDER WEB PICTURES

Find four, 1/2-inch diameter branches or wood strips. Make a frame by lashing them together at the corners. (If the wood isn't available, a 14-inch wooden quilting hoop can be used.) Wrap twine or string around the frame, crossing the center space to form a web. (If the frame is too smooth to hold the string in place, use tape to secure it.) Now hang leaves, twigs, seeds, etc., in the web to form your picture.

TREE TISSUE SILHOUETTES

Cut out colored tissue paper silhouettes of trees. Overlap them on drawing paper and attach with liquid starch.

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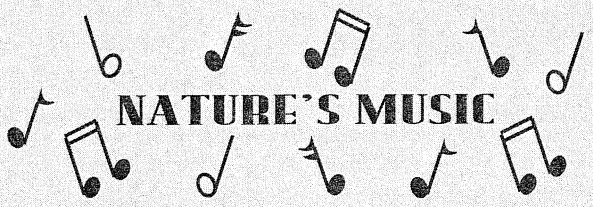

The following list of songs is from the 1993 *A Teachers' Guide to Arbor Month,* Minnesota Arbor Month Partnership. Used with permission.

Listen, sing along, dance, and enjoy!

"Maple Leaf Rag"—Traditional

"Tie a Yellow Ribbon Round the Old Oak Tree" by Tony Orlando & Dawn

"This Land is Your Land" by Woody Guthrie

"Tapestry" by Don McLean

"Scarborough Fair" by Simon and Garfunkel

"Norwegian Wood" by The Beatles

"Different Drummer" by Stone Ponies

"Dog and Butterfly" by Heart

"East of Ginger Trees" by Seals and Croft

"Rocky Mountain High" by John Denver

"Annie's Song" by John Denver

"Forest Lawn" by Tom Paxton

"Backstreets" by Bruce Springsteen

"Down in the Willow Garden"—Traditional

"Lullabye of Byrdland"—Traditional

"Trees" by Rush

"On Top of Old Smokey"—Traditional

"Don't Sit Under the Apple Tree" by The Andrews Sisters

"Willow Weep for Me"

"Lemon Tree" by Trini Lopez

"Appalachian Spring" by Aaron Copland

"The Little Nut Tree"—Traditional

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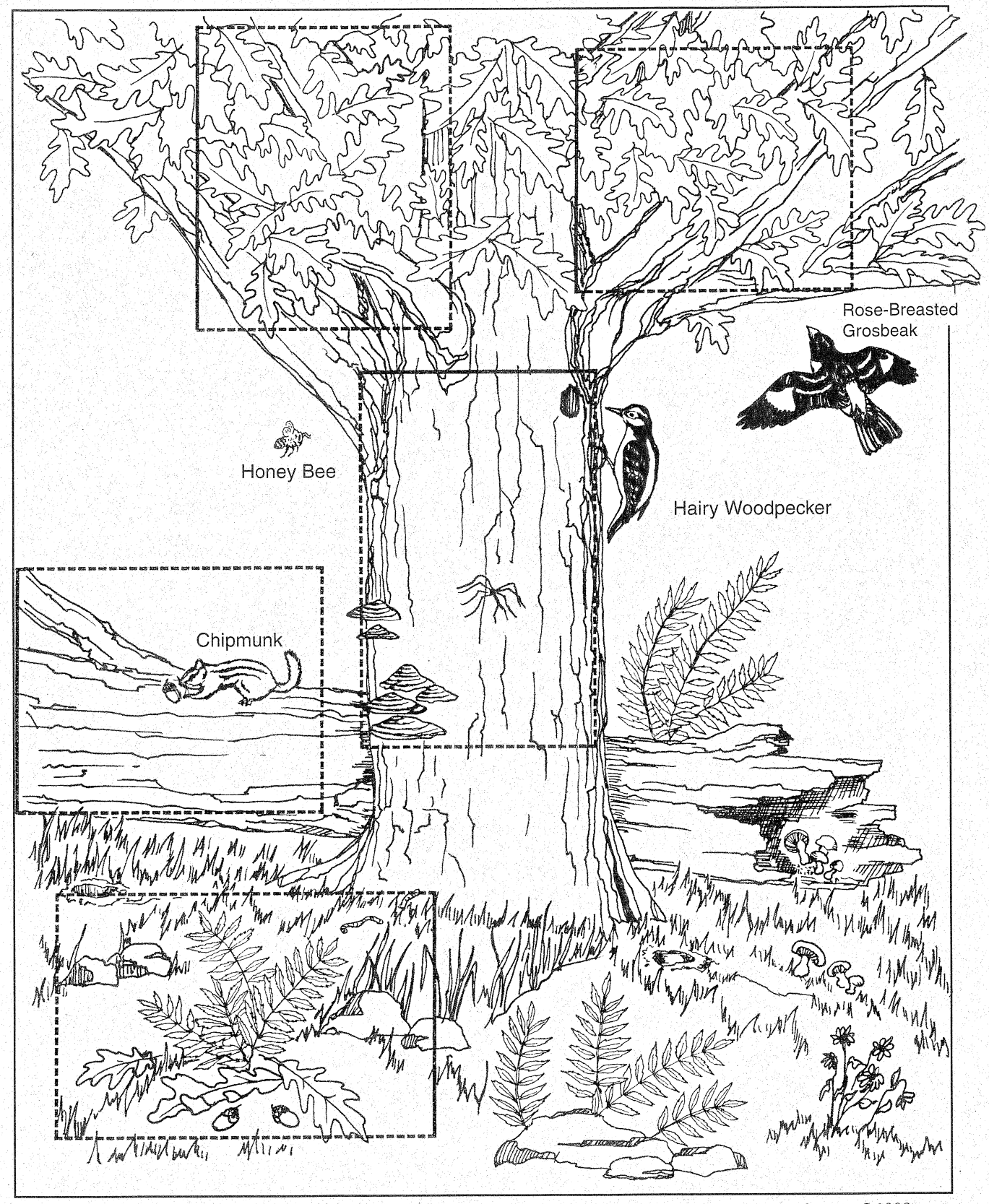
ACTIVITY SHEET 3A

UNDER COVER!



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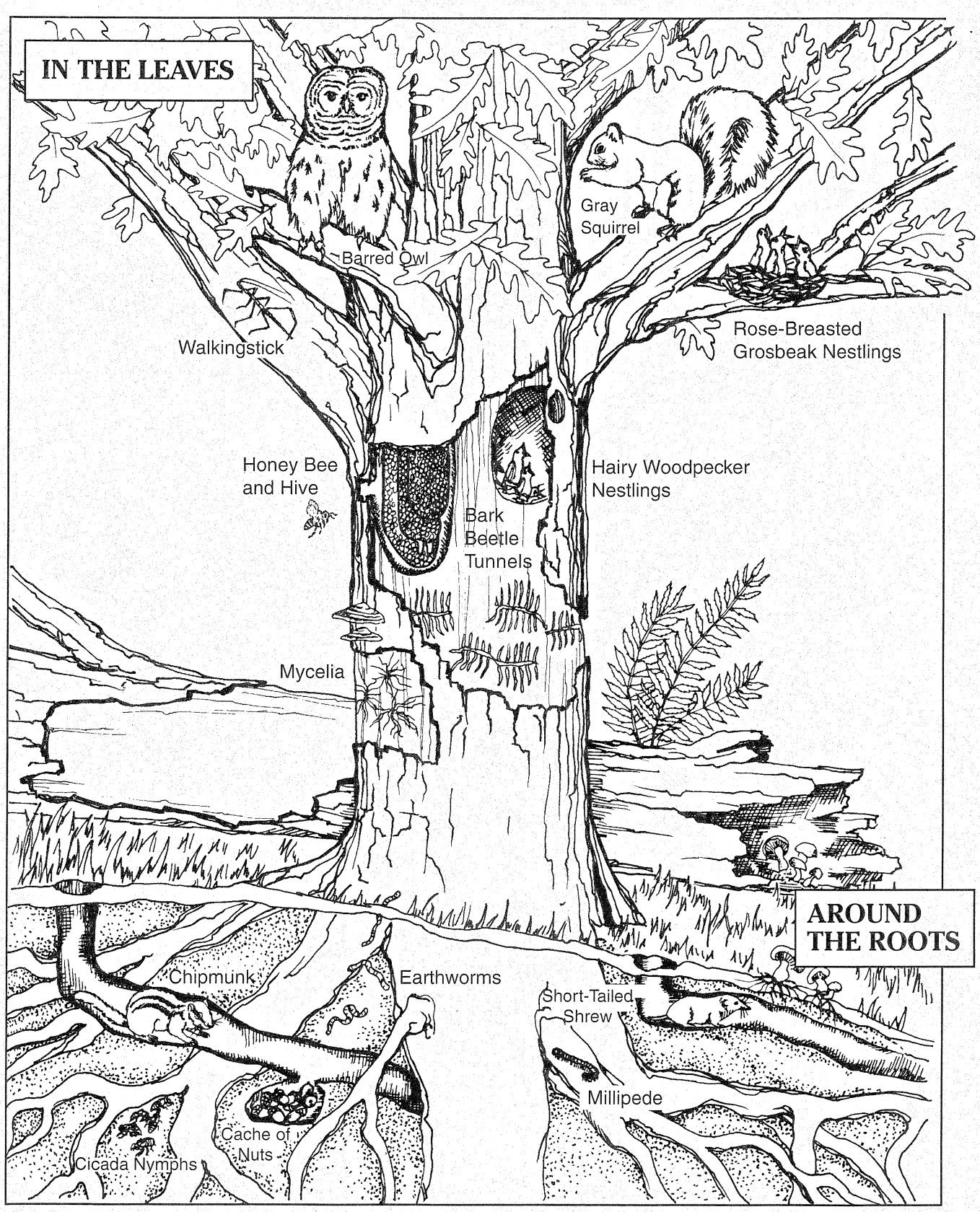
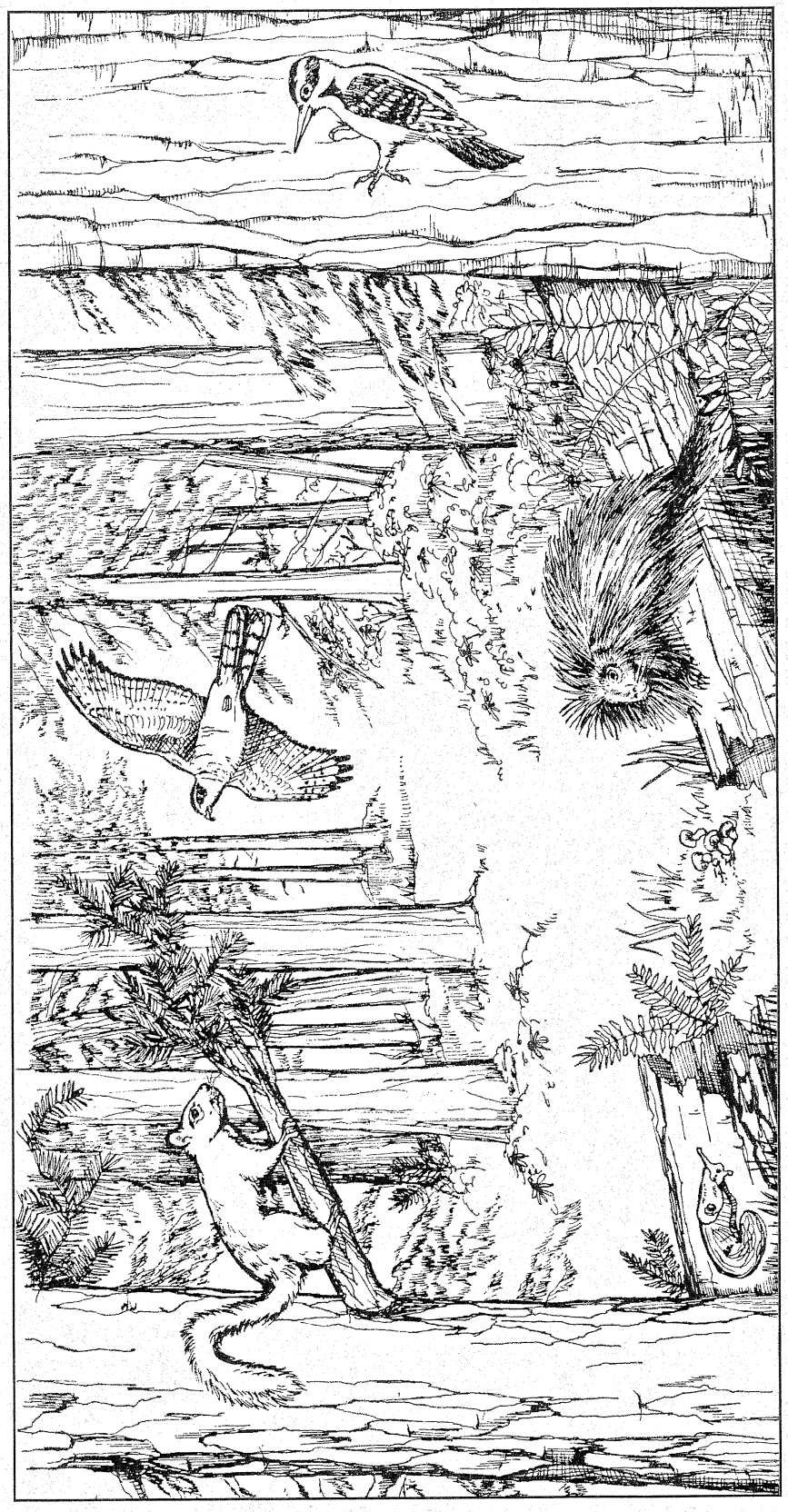
ACTIVITY SHEET 3B

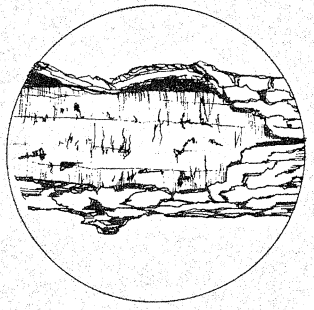
UNDER COVER!



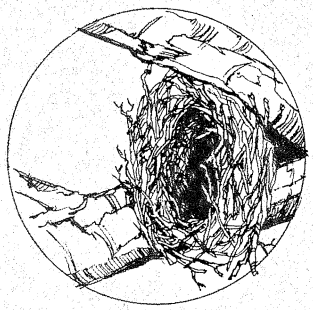
ACTIVITY SHEET 3C

A WALK IN THE WOODS

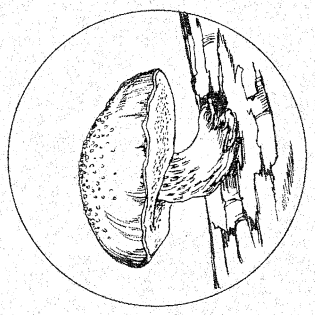




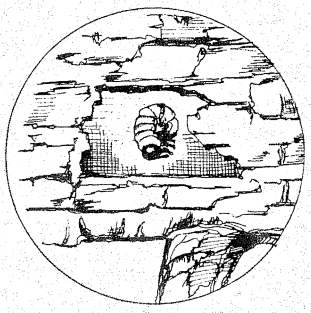
BARK



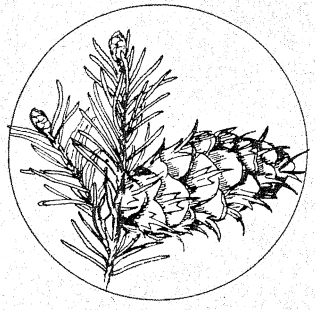
NEST



MUSHROOM



BEETLE GRUB

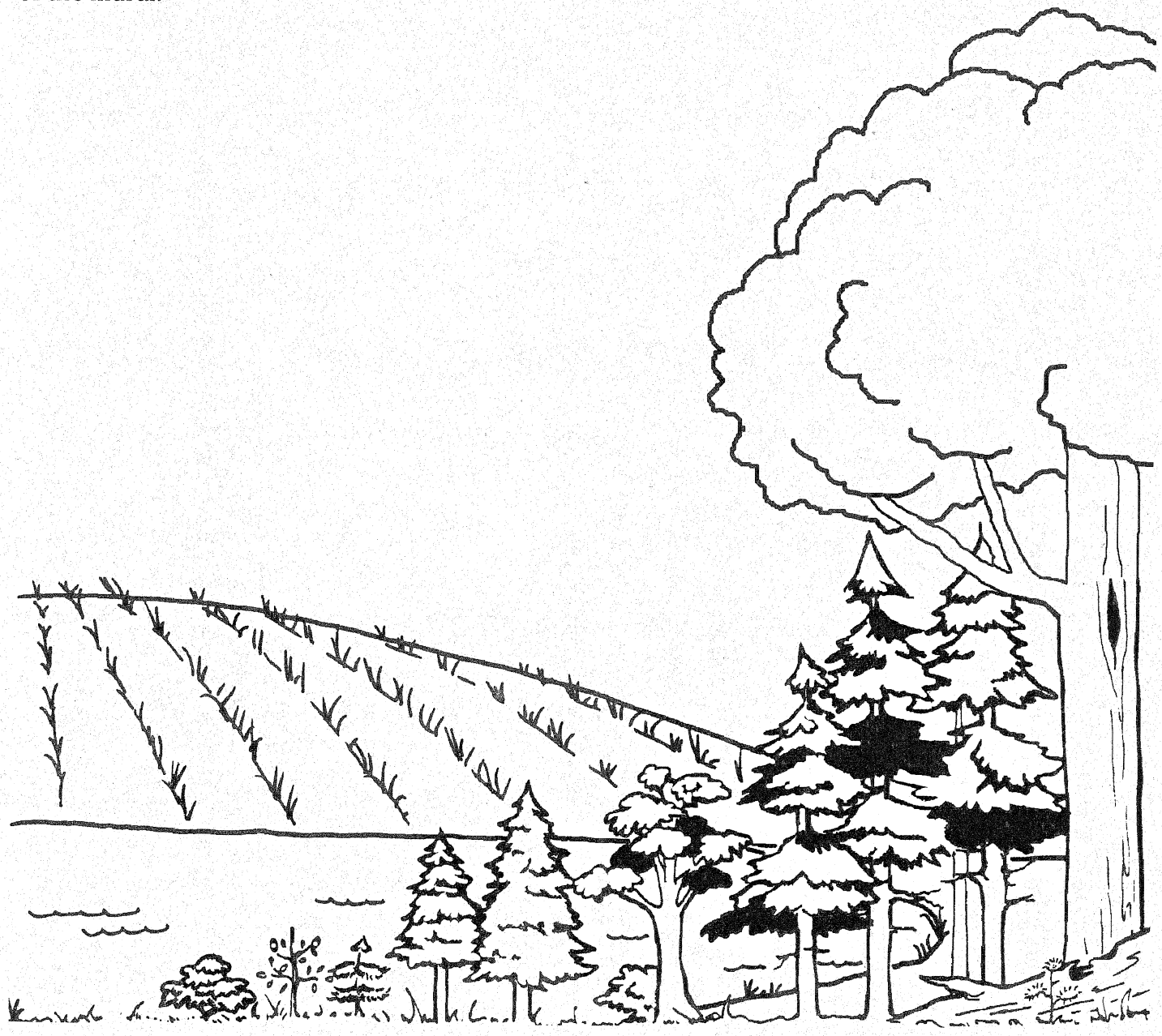


FIR CONE

ACTIVITY SHEET 3D

STAGES OF A FOREST

Students participate by drawing and painting the stages of a forest. Include an oat field and water as part of the background scenery. After the painting is finished, students draw and paint animals to fit in the scene in the appropriate places on the mural. Make them removable so students can take them off and put them back on again. Some animals may appear in more than one place. Example: Pheasants feed in meadows or cornfields and nest in brush in woods. Hints for a happy fit: Talk about proportion and relative sizes of animals before starting this part of the mural.



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