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ABSTRACT

This activity packet, designed for elementary grades 2-4, provides educators with a series on hands-on interdisciplinary classroom and outdoor education activities that focus on aquatic life at Lake James State Park, North Carolina. The packet was designed to meet established curriculum objectives of the North Carolina Department of Public Instruction's Standard Course of Study. Three types of activities are included: (1) pre-visit classroom activities provide background and vocabulary development; (2) on-site activities conducted at the park; and (3) post-visit classroom activities to reinforce concepts, skills, and vocabulary. This learning experience exposes students to the major concepts of aquatic animals, aquatic animal diversity, environmental awareness, and stewardship of natural resources. The packet contains an introduction to Lake James State Park; an activity summary; pre-visit, on-site, and post-visit activity objectives and instructions; a glossary; a list of 27 references; a scheduling worksheet, program evaluation, and a parental permission form. (LZ)

AQUATIC

CRITTERS

Lake James State Park

An Environmental Education Learning Experience

Designed for Grades 2-4

"Without life, there would still be water. Without water no life."

- David Quammen,
Natural Acts, A Sidelong View of Science and Nature.

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CP&L

This Environmental Education Learning Experience
was developed by

Earl J. Weaver
Lead Interpretation and Education Ranger
Lake James State Park

N.C. Division of Parks and Recreation
Department of Environment, Health and Natural Resources

James B. Hunt, Jr.
Governor

Jonathan B. Howes
Secretary

Other Contributors . . .

Park volunteers;

Christine Weaver;

The N.C. Department of Public Instruction;

The N.C. Division of Water Resources;

The N.C. Department of Environment, Health and Natural Resources;

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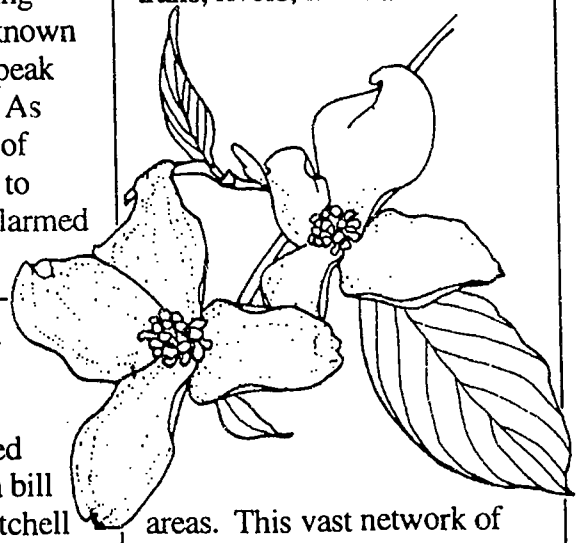
Table of Contents

Introduction to the North Carolina State Parks System

Preserving and protecting North Carolina's natural resources is actually a relatively new idea. The seeds of the conservation movement were planted early in the 20th century when citizens were alerted to the devastation of Mount Mitchell. Logging was destroying a well-known landmark - the highest peak east of the Mississippi. As the magnificent forests of this mile-high peak fell to the lumbermen's axe, alarmed citizens began to voice their objections. Governor Locke Craig joined them in their efforts to save Mount Mitchell. Together they convinced the legislature to pass a bill establishing Mount Mitchell as the first state park of North Carolina. That was in 1915.

The North Carolina State Parks System has now been established for more than three quarters of a century. What started out as one small plot of public land has grown into 59 properties across the state, including parks, recreation areas, trails, rivers, lakes and natural areas. This vast network of land boasts some of the most beautiful scenery in the world and offers endless recreation opportunities. But our state parks system offers much more than scenery and recreation. Our lands and waters contain unique and valuable archaeological, geological and biological resources that are important parts of our natural heritage.



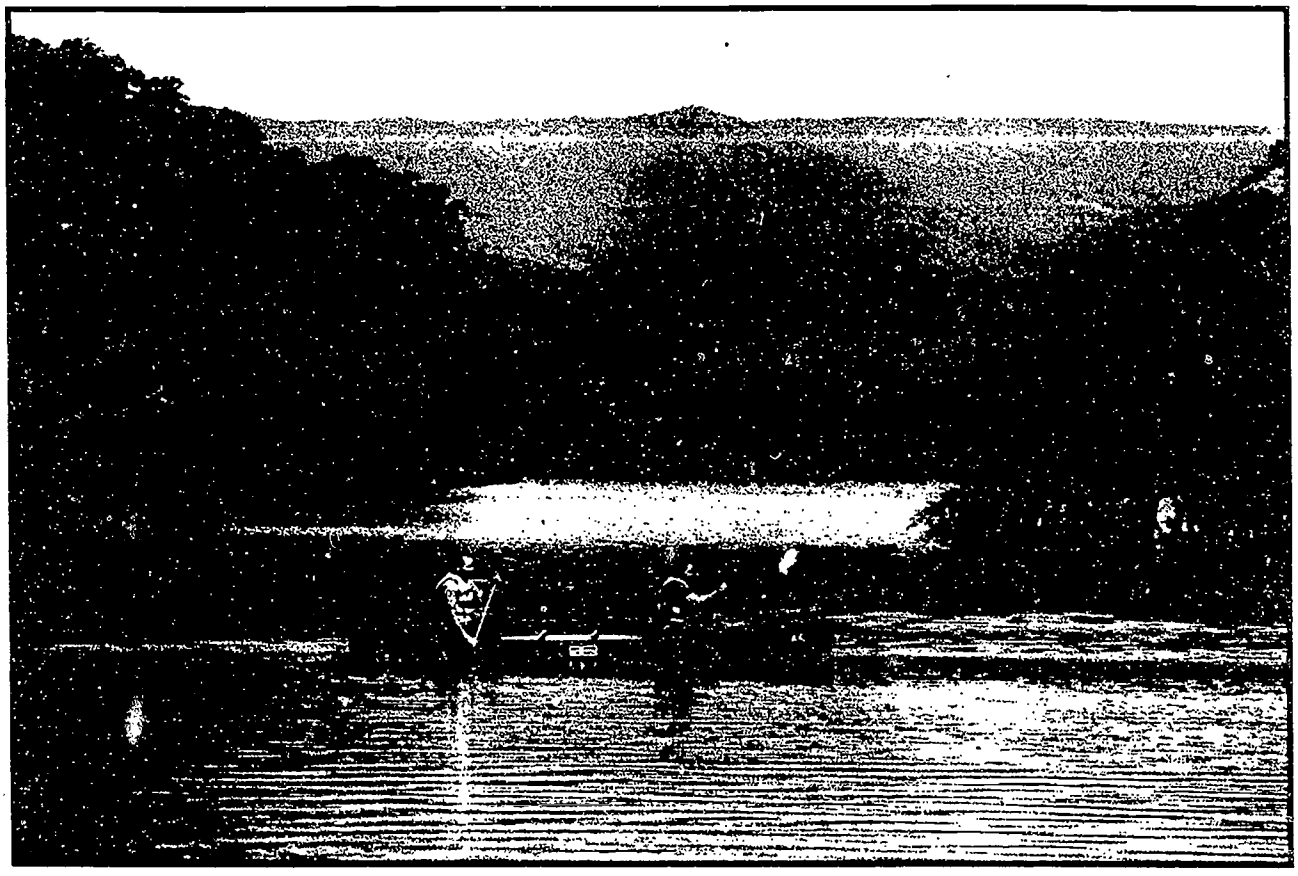
As one of North Carolina's principal conservation agencies, the Division of Parks and Recreation is responsible for the more than 125,000 acres that make up our state parks system. The Division manages these resources for the safe enjoyment of the public and protects and preserves them as a part of the heritage we will pass on to generations to come.

An important component of our stewardship of these lands is education. Through our interpretation and environmental education services, the Division of Parks and Recreation strives to offer enlightening programs which lead to an understanding and appreciation of our natural resources. The goal of our environmental education program is to generate an awareness in all individuals which cultivates responsible stewardship of the earth.

For more information contact:

N.C. Division of Parks and Recreation
P.O. Box 27687
Raleigh, NC 27611-7687
919/ 733-4181

Introduction to Lake James State Park



Lake James State Park, one of the newest parks in the North Carolina State Parks System, is located on the shores of Lake James. Named after James B. Duke, founder of Duke Power Company, the lake was created between 1916 and 1923 by the construction of three dams along the Catawba River, Paddy's Creek and the Linville River.

Lake James State Park contains a variety of diverse ecosystems, ranging from forest communities to wetlands to lake shore. These areas offer the student and nature enthusiast a perfect setting for informative and educational activities.

The wetlands and lake shore ecosystems at Lake James State Park were enhanced by the damming of the Catawba River. After the river was dammed and the lake created, the old Catawba riverbed became a diverse wetland ecosystem containing many species of plants and animals that would otherwise not be found in the park. Wetlands are often destroyed by human influence, but in this case a wetland was created from a free flowing river.

The Park as an Outdoor Classroom:

Lake James State Park abounds with natural history and is an excellent place to teach ecology, biology, conservation, earth science, math and recreation. In addition, the park is rich with cultural resources and provides a wonderful outdoor classroom for learning about the history of Lake James, literature and environmental issue.

Groups are encouraged to visit the park during all seasons of the year for hikes, exploration, nature study and other activities. Leaders may

choose to design and conduct their own activities, or to make use of the park's environmental education activity packet. A park ranger will be happy to meet with your group upon arrival to welcome the students, answer any questions they may have, and present a short talk. Park staff will make every effort to accommodate persons with disabilities. Please contact the park office at least two weeks in advance to make arrangements for a class visit.

Park Facilities

The park has numerous facilities available for visitors.

Restrooms: Restrooms, which provide access for persons with physical disabilities, are available at the park office.

Picnic Area: A picnic area with tables and grills is located near the park office. There is also a picnic shelter which is available on a first-come basis, or may be reserved for a fee.

Family Camping: Twenty family campsites are available from March 15 to November 30 on a first-come basis. There are no electric or water hookups.

Scheduling a Trip

1. Please contact the park at least two weeks in advance to make a reservation.

2. Complete the Scheduling Worksheet located on page 8.1, and return it to the park as soon as possible.

3. Research activity permits may be required for sampling activities. If your group plans to collect any plant, animal or mineral within the park, please contact the park office at least 30 days in advance to obtain a permit application.

Before the Trip

1. Complete the pre-visit activity in the Environmental Education Learning Experience.

2. The group leader should visit the park without the participants prior to the group trip. This will enable you to become familiar with the facilities and park staff, and to identify any potential problems.

3. The group leader should discuss park rules and behavior expectations with adult leaders and participants. Safety should be stressed.

4. Everyone should wear a name tag. Please establish and keep a buddy system.

5. Activities that take place outdoors may expose participants to insects and seasonal weather conditions. Be prepared by dressing accordingly and wearing sunscreen and insect repellent, if necessary. Comfortable walking shoes should also be worn.

6. *The group leader is responsible for obtaining a parental permission form from each participant, including a list of any health considerations and medical needs.* A sample of this form is on page 8.2.

7. *If you will be late or need to cancel your trip, please notify the park as far in advance as possible.*

While at the Park

Please obey the following rules:

1. To help you get the most out of the experience and increase your chance of observing wildlife, be as quiet as possible while in the park.

2. On hikes, walk behind the leader at all times. Running is not permitted.

3. All plants and animals within the park are protected. Breaking plants and harming animals are prohibited in all state parks. This allows future visitors the same opportunity

to enjoy our natural resources.

4. Picnic in designated picnic areas only. Help keep the park clean and natural; do not litter.

5. In case of accident or emergency, contact park staff immediately.

Following the Trip

1. Complete the post-visit activity in the Environmental Education Learning Experience packet.

2. Build upon the field experience and encourage participants to seek answers to questions and problems encountered at the park.

3. Relate the experience to classroom activities and curriculum through reports, projects, demonstrations, displays and presentations.

4. Give tests or evaluations, if appropriate, to determine if students have gained the desired information from the experience.

5. File a written evaluation of the experience with the park. Evaluation forms are available in the activity packet on page 8.3.

Park Information:

Address:

Lake James State Park
P. O. Box 340
Nebo, NC 28761
Tel/FAX: (704) 652-5047

Hours of Operation:

Nov - Feb	8:00 a.m. - 6:00 p.m.
Mar, Oct	8:00 a.m. - 7:00 p.m.
Apr, May, Sep	8:00 a.m. - 8:00 p.m.
Jun - Aug	8:00 a.m. - 9:00 p.m.

Office Hours:

Mon - Fri	8:00 a.m. - 5:00 p.m.

Introduction to the Activity Packet for Lake James State Park

The Environmental Education Learning Experience, *Aquatic Critters*, was developed to provide environmental education through a series of hands-on activities for the classroom and the outdoor setting of Lake James State Park. This activity packet, designed for elementary school grades 2-4, meets established curriculum objectives of the North Carolina Department of Public Instruction's Standard Course of Study. Three types of activities are included:

1) pre-visit activity
2) on-site activity
3) post-visit activity

The on-site activity will be conducted at the park, while pre-visit and post-visit activities are designed for the classroom. Pre-visit activities should be introduced prior to the park visit so that students will have the necessary background and vocabulary for the on-site activities. We encourage you to use the post-visit activities to reinforce concepts, skills and vocabulary learned in the pre-visit and on-site activities. These activities may be performed independently, however, they have been designed to be done in a series to build upon the students' newly gained knowledge and experiences.

The Environmental Education Learning Experience, *Aquatic Critters*, will expose the students to the following major concepts:

- **Aquatic Animals**
- **Aquatic Animal Diversity**
- **Environmental Awareness**
- **Stewardship of Natural Resources**

The first occurrence of vocabulary words used in these activities is indicated in **bold type**. Their definitions are listed in the back of the activity packet. A list of the reference materials used in developing the activities follows the vocabulary list.

This document was designed to be reproduced. in part or entirety, for use in North Carolina classrooms. If you wish to photocopy or adapt it for other uses, please credit the N.C. Division of Parks and Recreation.

Note:
The on-site activity will require hiking which could expose the students to hot or cold conditions and ticks and other insects. Accessibility to some of these areas may be difficult for persons with disabilities. When conducting the on-site activity, please remember that collecting specimens of any kind in the park is prohibited.

Activity Summary

The following outline provides a brief summary of each activity, the major concepts introduced and the objectives met by completion of the activity.

I. Pre-Visit Activity

#1 Are You Me? (page 3.1.1)

The students will match pictures of baby and adult aquatic animals.

Major concepts:

- Growth and change in animals
- Metamorphosis
- Diversity of aquatic life forms

Objectives:

- Match pictures of the juvenile and adult forms of 15 aquatic animals.
- Describe the difference between complete and incomplete metamorphosis.

II. On-Site Activity

#1 Who's Who In the Water (page 4.1.1)

Get wet, have fun, and learn while doing it. Students will use different methods to collect and identify aquatic organisms.

Major Concepts:

- Water quality
- Aquatic sampling
- Aquatic habitats
- Basic anatomy
- Adaptations
- Species identification
- Human influence on water quality

Objectives:

- Use a picture key to identify three aquatic animals.
- List three or more ways humans affect aquatic life.

III. Post-Visit Activity

#1 Who Lives Here? (page 5.1.1)

This board game is a fun way for students to review the concepts of the pre-visit and on-site activities. They will also learn what they can do to help preserve aquatic habitats.

Major concepts:

- Identification of aquatic plants and animals
- Pollution problems
- Environmental responsibility

Objectives:

- Identify four animals found in a wetland.
- Identify two plants found in a wetland.
- Describe two ways humans can help aquatic life.
- Describe two ways humans cause water pollution and two ways they can reduce pollution.

Pre-Visit Activity #1 — Are You Me?

Curriculum Objectives:
Grade 2
- Guidance: group interaction
- Science: animals around us
- Social Studies: participate in classroom activities in a positive way, participate in class activities with confidence, work cooperatively in large and small groups, collect information by listening and viewing pictures

Grade 3
- Social Studies: work cooperatively in groups, use reference books and sources

Grade 4
- Communication Skills: listening, reading, vocabulary and viewing comprehension
- Science: living things - animals
- Social Studies: analyze information and draw conclusions, participate effectively in groups

Location: Classroom

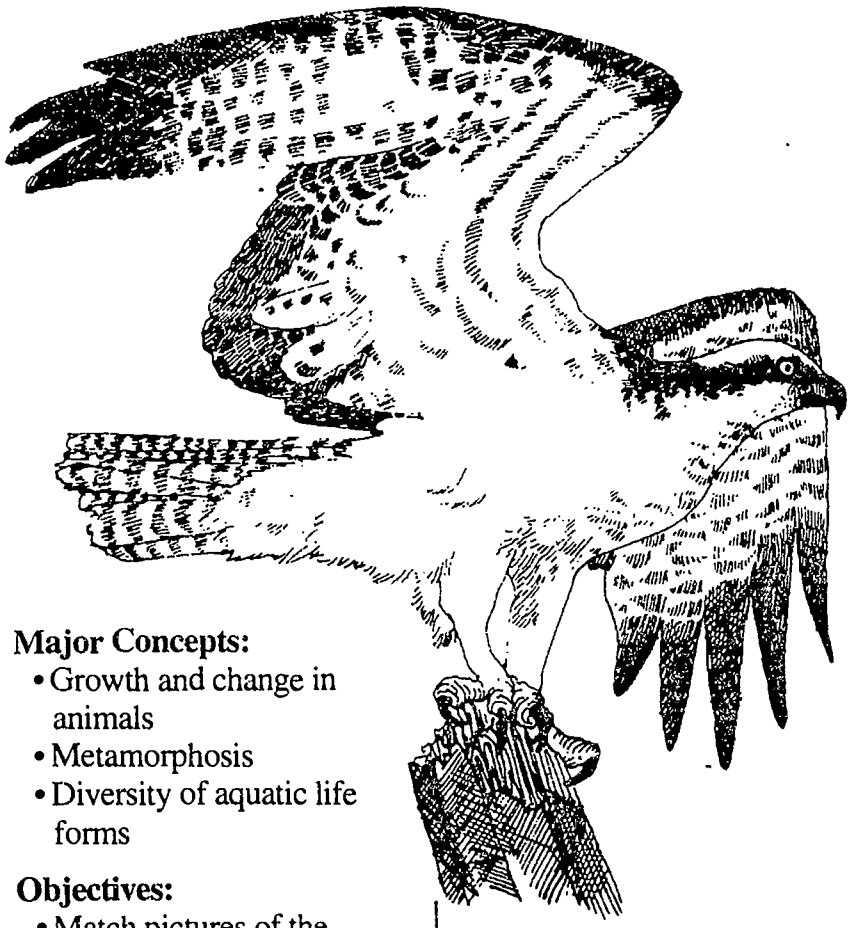
Group Size:
30 students, class size, in groups of three to four students

Estimated Time:
One or two 20 minute periods

Appropriate Season: Any

Credits:
This activity was adapted with permission from the Aquatic Project WILD activity, *Are You Me?*

Materials:
Provided by the educator:
"Animal Matching Cards," cardboard, glue, hole punch, yarn



Major Concepts:
- Growth and change in animals
- Metamorphosis
- Diversity of aquatic life forms

Objectives:
- Match pictures of the juvenile and adult forms of 15 aquatic animals.
- Describe the difference between complete and incomplete metamorphosis.

Educator's Information:

The purpose of this activity is for students to recognize that there are differences in appearance between the young and the **adult** forms of many **aquatic** animals found at Lake James State Park. Young and adult muskrats look very much alike, whereas tadpoles and frogs look very different. The students will realize that just as they themselves change as they get older, so do the animals in the park. The students will increase their appreciation of the **diversity** of wildlife found in the aquatic **habitats** of the park, as well as their understanding of growth and change in animals.

Instructions:

1. Photocopy the sheets of "Animal Matching Cards," singly, not back-to-back. If possible, laminate the cards for durability and reusability. Cut the cards apart; do not include the name of the animal when cutting out the cards. Attach a loop of yarn to each card so that the card can be worn safely around the neck of a child. (Alternate method: If you laminated the cards, they can be attached to the child with a piece of masking tape rather than the yarn necklace.)

2. Familiarize yourself with the background information for the teacher on the "Metamorphosis Facts" sheet. Depending on the reading ability of your students, you may want them to read the Student's Information on their own or you may read it aloud to the class. If the students will be reading on their own or following along with the teacher, you will need to photocopy the Student's Information page for them. This information sets the stage for the activity.

3. Before giving one "Animal Matching Card" to each student, make sure that there is a corresponding match, adult or juvenile, for each card. If you have an odd number of students playing the game, the teacher may also wear a card and take part in the match game. Tell the students to carefully observe the picture of the animal on their card; then they should wear their card. Instruct them to look at their classmates to find an animal that matches their animal. They could be an adult animal looking for their baby, or they could be the baby looking for their parent.

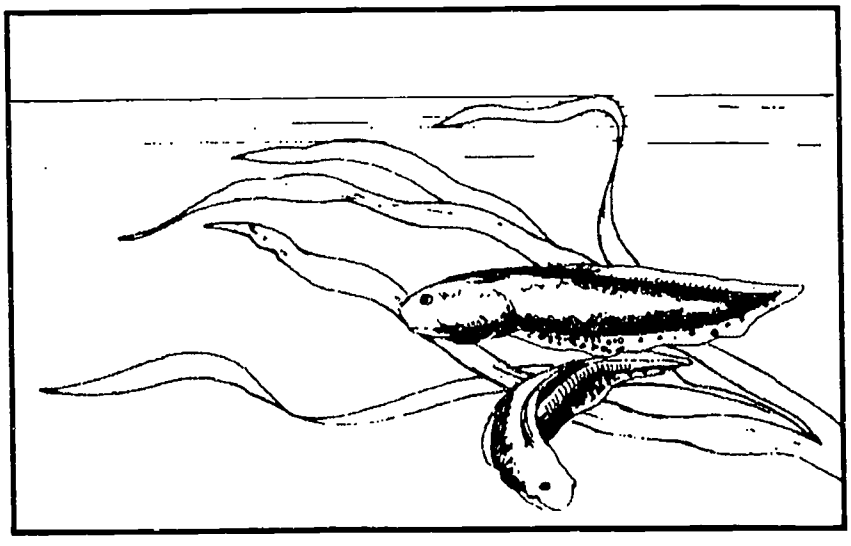
4. When all the students have made their choices, have each pair of matched students take turns standing in front of the class to present their animal. Let the rest of the students vote on whether they think the match is correct. Some matches are more difficult to make than others and there will probably be mistakes in the matches.

5. Correct any mismatches and have the students look at all of the correctly matched pairs. Talk about the similarities and differences in how some aquatic animals grow and change.

6. After the activity is complete, have a short discussion about how the animals sometimes live in different habitats when they are young as compared to when they are adults. An example would be mayfly **nymphs** living in the **water** while the adults fly in the air. Tell the students they will be seeing some of the animals pictured on their cards when they visit Lake James State Park.

NOTE:

This activity can be repeated several times by shuffling animal cards and passing them out to the students again. This will help each student become familiar with a wider array of animals.



Suggested Extensions:

1. Ask the children to bring a baby picture of themselves from home. Place these pictures on a table or attach them to a bulletin board. Number each picture. Have students number a sheet of paper and write the name of the person that they think is shown in each picture. When the students have completed their lists, point to each picture and ask the student pictured to stand up. Discuss how easy or how difficult it was to match the students with their pictures.

2. Divide the students into teams of 3-4 students. Provide each team with a set of Animal Matching Cards. When the teacher says, "Go!" each team tries to match up all the animals in their set by placing adult and the matching juvenile cards side by side. Which team can match all the cards correctly in the shortest amount of time? (Alternate Method: Give all the teams the same amount of time to match the cards and see which team has the greatest number of correct matches.)

3. Grow mosquito larvae! Fill a shallow pan or tray with a couple of inches of water. Place this container outside in a shady area where it will not be disturbed. (Spring is the best time of the school year to do this activity.) Check the pan once a week for mosquito larvae and to make sure it does not dry out. If the weather is warm, you should be able to see small mosquito larvae wiggling around in the water after a couple of weeks.

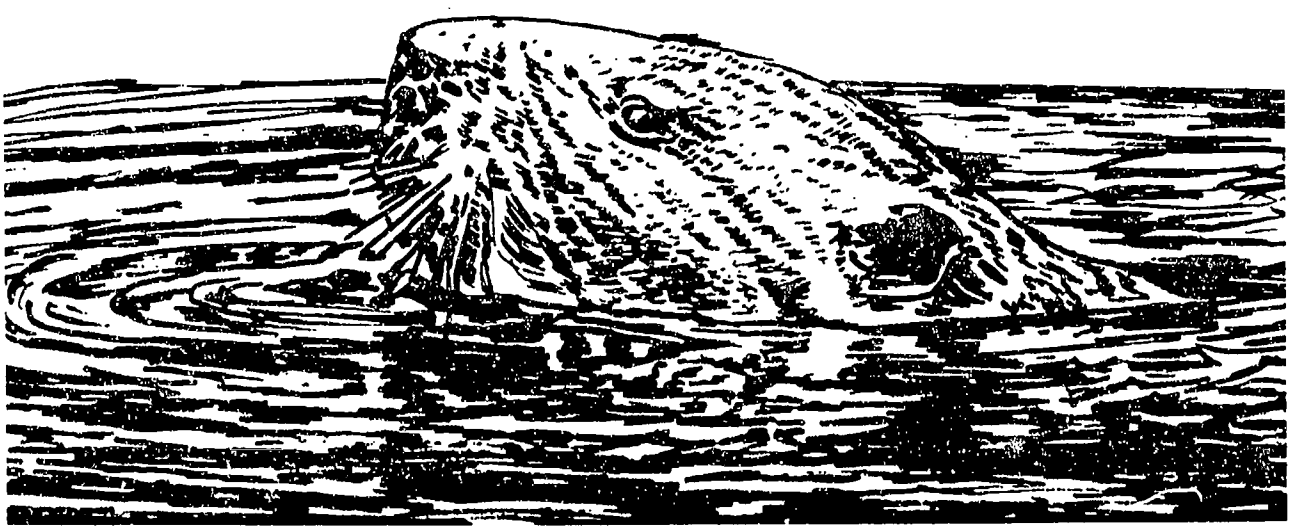
Be sure to empty out your pan after the students have observed the mosquito larvae to avoid having them grow into blood -sucking adults.

You may want to discuss with the students that mosquitoes can carry diseases.

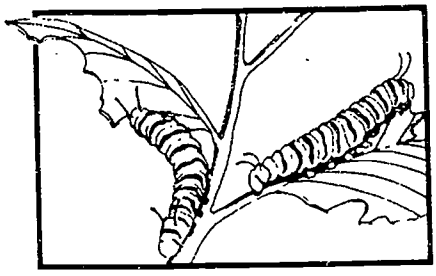
4. Choose a pair of matched animal cards and find out more about the **life cycle** of that animal.

5. Discuss and/or pantomime the concept of metamorphosis. For example, act out the life cycle of a butterfly, from the egg to the larva to the **pupa** in the cocoon to the adult butterfly.

6. Pick any two aquatic animals. Draw a picture of each animal as it looks as an adult and as a juvenile.



Metamorphosis Facts

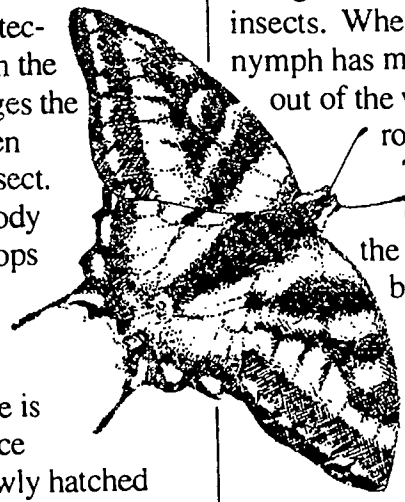


Many animals look very different when they are young than they will look when they become **adults**. This is especially true for **insects**. Insects undergo **metamorphosis**, which means a marked change in appearance and structure during normal growth.

Some insects experience **complete metamorphosis**, while others undergo **incomplete metamorphosis**. With incomplete metamorphosis, the insect egg hatches into a **nymph**, which has essentially all the features of the **adult insect** except for the wings. An example of an insect that goes through incomplete metamorphosis is the praying mantis. When a young mantis hatches from an egg into the nymph stage, it looks like a miniature version of the adult. As the nymph grows, it will outgrow its skin, or exoskeleton, several times. The nymph simply breaks out of this exoskeleton and grows a larger one. The nymph looks very similar at each stage of growth. An analogy would be children out-growing their clothes and getting new and larger ones.

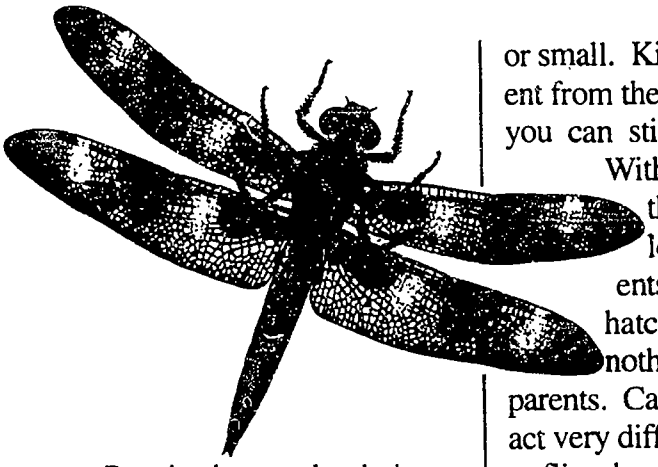
Insects that experience complete metamorphosis emerge from eggs as wingless, worm-like **larvae.** After the newly hatched larva grows, it then changes into a **pupa**. During the pupa stage of metamorphosis, which is just before the adult stage, the insect is encased in a protective cover. From the pupa case emerges the soft-bodied, often pale-colored, insect. The soft, pale body gradually develops firmness and color. With complete metamorphosis, there is little resemblance between the newly hatched insect and the adult insect. An example of an insect that goes through complete metamorphosis is the butterfly. The butterfly hatches from an egg into a wingless, worm-like, larva stage called a caterpillar. Next is the pupa stage, during which the insect changes dramatically while inside its **chrysalis**. A pale, soft-bodied, adult butterfly emerges from the chrysalis. It usually takes 24 hours for the butterfly to expand its wings, dry out, change color, and be able to fly away.

Aquatic insects also go through either incomplete or complete metamorphosis. Many aquatic insects live underwater as nymphs or larvae, then live out of the **water** as adults. An example of an insect that does this is the dragonfly. The female dragonfly hovers over water and lays her eggs by dipping her abdomen just below the water's surface. After the nymph hatches from the egg, it starts catching and eating other small aquatic insects. When the dragonfly nymph has matured, it crawls out of the water onto nearby rocks or plants. The outer skin cracks open along the back, and a soft-bodied form of the adult dragonfly emerges. The dragonfly pumps body fluids through the veins of its soft, wrinkled wings, causing them to expand. The wings and body dry quickly, then off flies the dragonfly.



There are many different kinds of aquatic insects living at Lake James State Park, both above and in the water. Like all insects, those living in the park go through either complete or incomplete metamorphosis. In addition to the aquatic insects there are other animals in the park that spend part or all of their lives in **wetland** areas. Ducks, geese, frogs, muskrats and fish are just some of the animals that live close to, or in, the water.

Student's Information

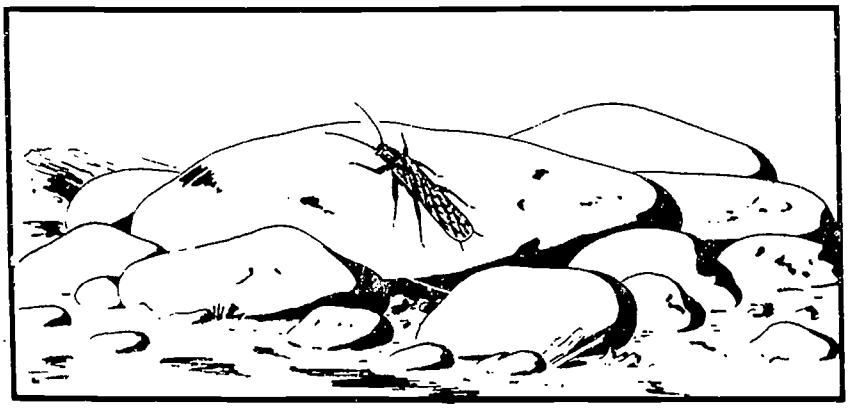


People change slowly in appearance all their lives. Think about how you looked and acted when you were first born. You were very small. You had no teeth. Maybe you didn't have any hair. You could not walk, talk or go to the bathroom by yourself for a long time. Now think about how you are today. Today, you look and act differently. When you become an **adult,** you will look and act differently from what you do today.

Other animals also look and act differently at birth than they do when they are grown up. This difference in looks between babies and adults of the same animal can be large or small. Kittens look different from their mother, but you can still tell they are cats. With some animals the babies do not look like the parents at all. Newly hatched tadpoles look nothing like their frog parents. Caterpillars look and act very different from the butterflies they will become.

When animals change a lot from baby to adulthood, we call this metamorphosis. "Meta" means change, and "morpho" means shape, so metamorphosis means to change shape.

As they grow, all **insects** go through either **complete metamorphosis** or **incomplete metamorphosis**. Complete metamorphosis means that there is a very big change in shape between the babies and the adults. An example of complete metamorphosis would be caterpillars changing into butterflies.



With incomplete metamorphosis there is not a very big change in shape between the babies and the **adult insects**. Grasshoppers are an example of incomplete metamorphosis. When grasshoppers hatch from eggs, they look very much like grown-up grasshoppers, except they are very small and have no wings.

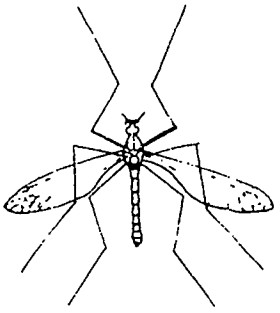
In the game you are about to play, you will try to match up two cards. One card will be a drawing of a baby and another card will be a drawing of an adult of the same animal. Some of the matches will be easy, like when you match baby ducks with grown-up ducks. Other matches will be harder, like when you try and match the drawing of mosquito babies with the adults.

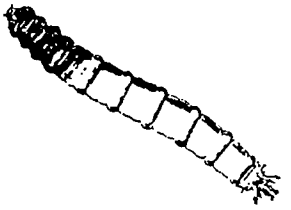
Animal Matching Cards

beaver

young beavers

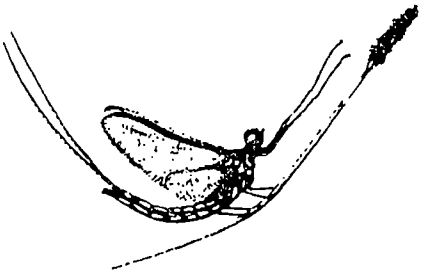
cranefly

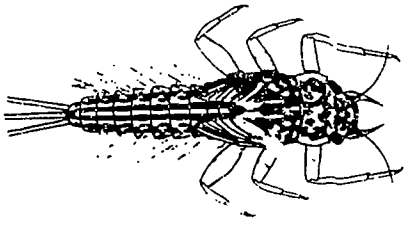




cranefly larva

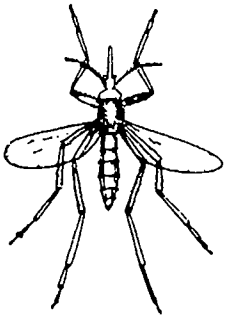
mayfly

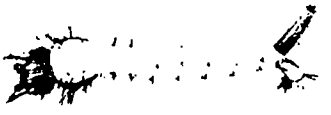




mayfly nymph

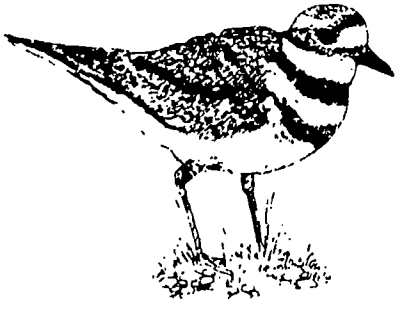
mosquito

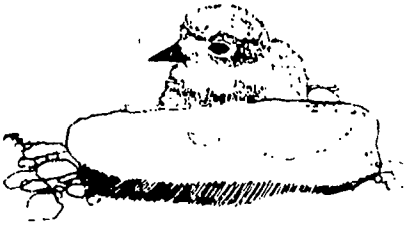




mosquito larva

killdeer

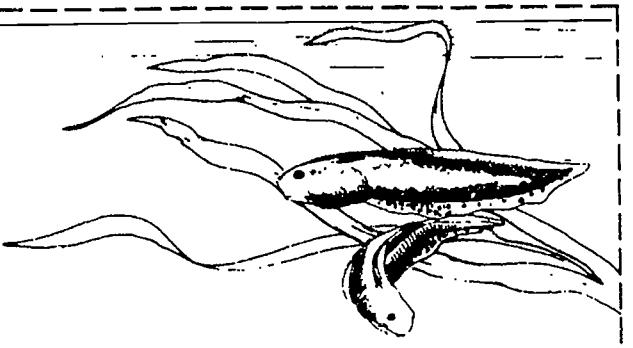




killdeer baby

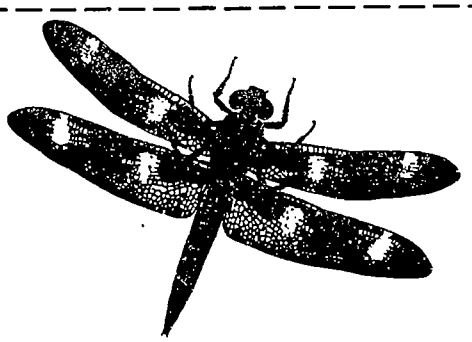
Animal Matching Cards

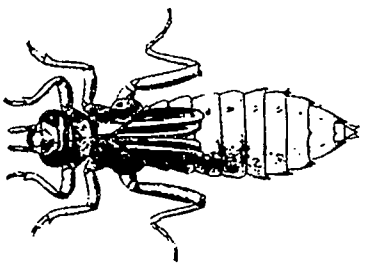
frog



tadpoles

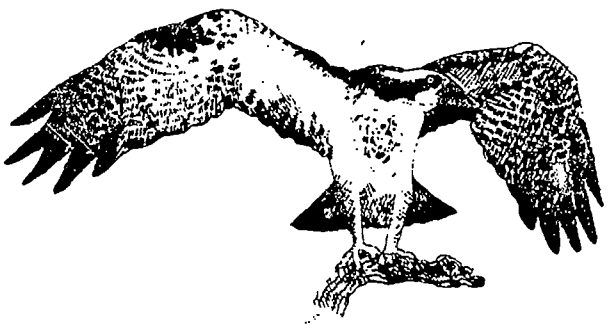
dragonfly

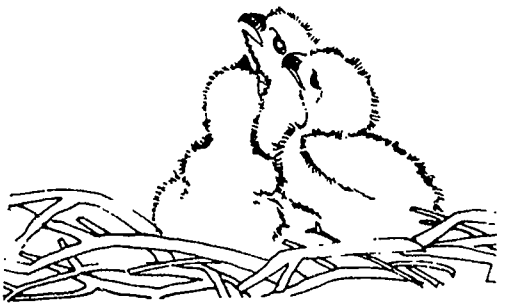




dragonfly nymph

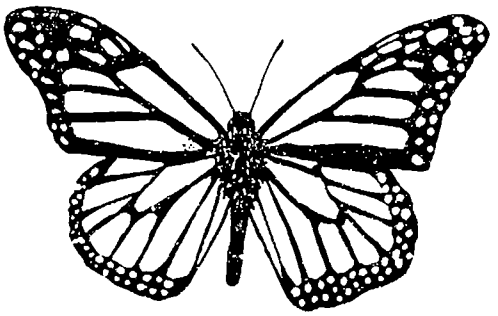
osprey





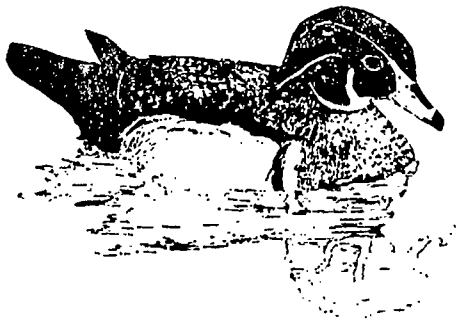
osprey hatchlings

butterfly



caterpillars

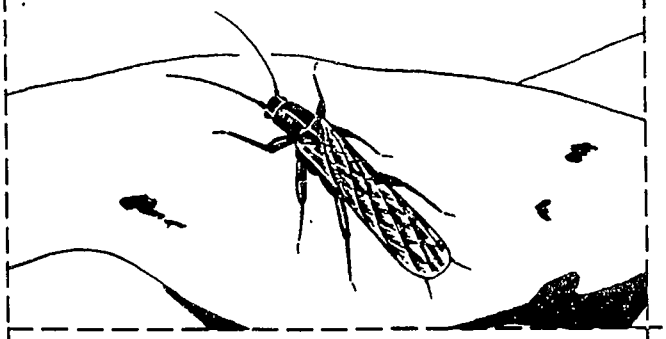
wood duck

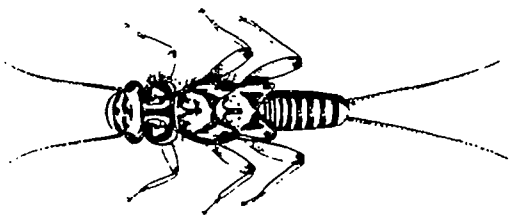


ducklings

Animal Matching Cards

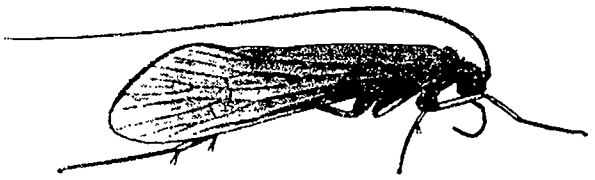
stonefly





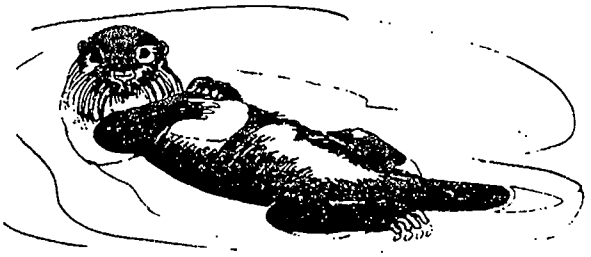
stonefly nymph

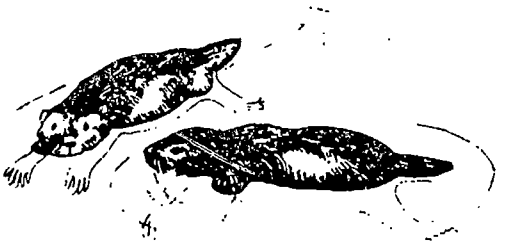
caddisfly



caddisfly larvae

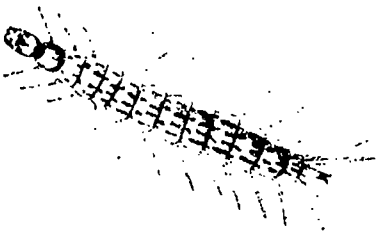
otter





young otters

whirligig beetle



whirligig larva

barn swallow

barn swallow babies

On-Site Activity #1 - Who's Who in the Water

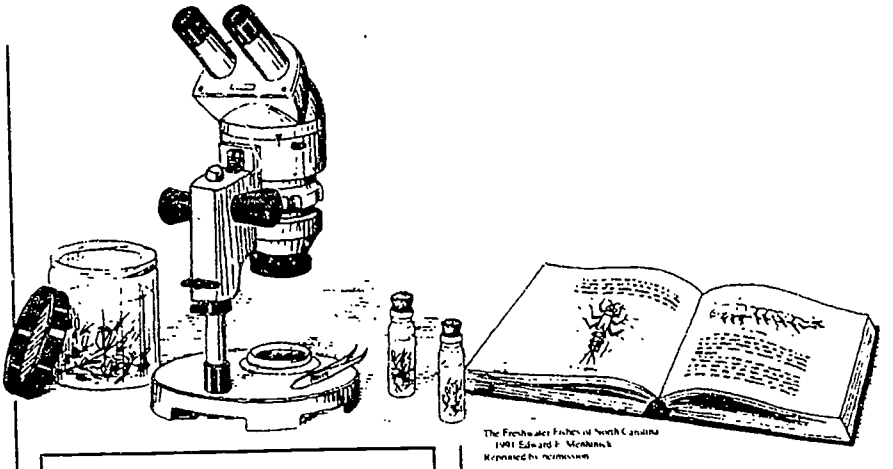
Curriculum Objectives:

Grade 2
- Science: living organisms and their environments, plants and animals
- Social Studies: participate in class activities with confidence, work cooperatively in large and small groups, collect information through field trips and interviews

Grade 3
- Science: living and non-living things, plants and animals, interdependence, environment
- Social Studies: participate confidently in class activities, work cooperatively in large and small groups, collect information through interviews and field trips, natural and man-made environments

Grade 4
- Communications Skills: listening, reading, vocabulary and viewing comprehension, study skills using environmental sources
- Guidance: group interaction
- Library/Media Skills: work independently and creatively in preparing assignments
- Science: living things - animals, adaptation to environment, interdependence of animals
- Social Studies: gather, organize and analyze information, draw conclusions, participate effectively in groups

Location:
Cove with the accessible pier and/or pool below the quarry in the river section of the park



Group Size:
30 students, class size, in groups of 5 or less

Estimated Time:
2 - 2 1/2 hours

Appropriate Season:
Spring, summer, fall

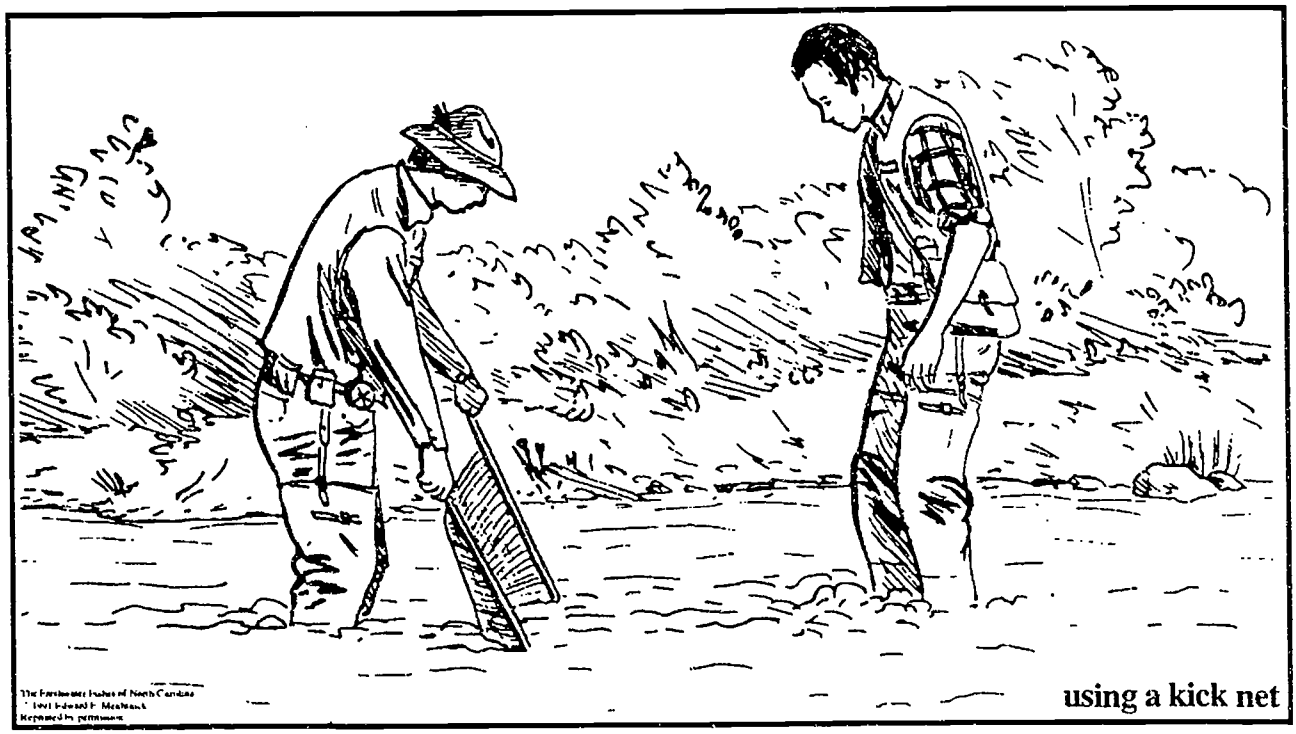
Credits:
Adapted from "A Field Manual for Water Quality Monitoring, an Environmental Education Program for Schools" by Mark K. Mitchell and William B. Stapp

Materials:
Provided by the student:
complete change of clothes
Provided by the educator:
Per group: pencils, clipboard, "Who's Who in the Water" worksheets, "Key to Aquatic Animals of Lake James"
Provided by park:
Per student: life jackets
Per group: kick nets, seine nets, dip nets, plastic cups, aquarium or white tray, dissecting scope, magnifying glass, tweezers or plastic spoons, field guides, table, laminated "Key to Aquatic Animals of Lake James," rubber gloves, extra activity sheets, examples of juvenile and adult macroinvertebrates

Major Concepts:
- Water quality
- Aquatic sampling
- Aquatic habitats
- Basic anatomy
- Adaptations
- Species identification
- Human influence on water quality

Objectives:
- Use a picture key to identify three aquatic animals.
- List three or more ways humans affect aquatic life.

Special Considerations:
Carry a rescue throw rope. All students must wear life jackets during this activity. Students should wear gloves when sorting samples. Handle organisms carefully so that they are not harmed and return them to the water after the activity. Before the activity, advise students of appropriate dress (i.e. old shoes without holes in them, old jeans, etc.) Make sure participants bring a complete change of clothes to change into so they do not have to go back to school wet and dirty.



using a kick net

Educator's Information:

This activity will help the students gain an appreciation of the **diversity** of life in an **aquatic** environment as they use different methods of **water** monitoring. To prepare your students for their visit, we recommend completing the pre-visit activity "Are You Me?"

Water that is able to support a rich and varied range of aquatic creatures is usually a **healthy** environment, whereas water with just a few different **species** usually indicates less healthy conditions. Healthy is used here to indicate an environment supportive of life. **Pollution** generally reduces the **quality** of the environment, and in turn, the diversity of life forms. In some cases the actual biomass, or amount of living material, will increase due to pollution, but the diversity inevitably goes down.

The students will be collecting **macroinvertebrates** in the lake and the river section, and must be dressed appropriately. Life jackets must be worn at all times. A first-aid kit and a rescue throw rope will be available.

Park staff will discuss safety considerations and the educator will assist in seeing that all safety precautions are followed. The students will work in groups of four or five, with at least one adult leader per group.

Instructions:

1. Before going to the park, have the students read, or read to them, the Student's Information. Divide the students into groups and locate at least one adult leader for each group. (The teacher is responsible for getting enough adult volunteers to ensure the safety of the children. A ratio of 1 adult to every 5 children is recommended for upper elementary; a 1 to 3 ratio would be better for lower elementary.) Prepare name tags, or have the students make name tags. The groups could name themselves after one of the aquatic animals they learned about during the "Are You Me?" pre-visit activity.

2. Xerox one copy of "Key to Aquatic Animals of Lake James" for each group. Let the children look at the picture key with their teammates and discuss how they might catch some of the aquatic critters without injuring them. Some students may have stories to tell about the animals; others may find some of the animals frightening! Which ones might bite? What do they look like in different stages of **metamorphosis**? If you have attended an EELE workshop, you can

describe basic water sampling techniques to the students. At the same time, you can emphasize the importance of wearing appropriate clothing for the sampling activity at the park and following the safety rules. If desired, students could be assigned different roles in their groups; for example, critter-catcher, data recorder, animal identifier, animal caretaker, etc.

3. When you arrive at the park, the staff will give a brief introduction to aquatic animals and metamorphosis. The park staff will assist you in demonstrating how to collect bottom samples using dip nets, kick nets, and/or seine nets. (The type of nets used will depend on the grade level and abilities of the students.) The educator and park staff should demonstrate the following procedure:

a. Fill the white trays halfway with clear water.

b. Put on rubber gloves and collect a bottom sample using a kick net or seine net.

c. Allow excess water to drain from the net.

d. Spread the sample out evenly on the net. Keep the seine net at least one inch off the ground whenever there is a sample in it.

e. Carefully pour water over the sample using a plastic cup to wash away silt and debris.

f. Search for the animals. Use magnifying glasses to aid the search.

g. Using tweezers, carefully remove the **organisms** and place them in the white trays for observation/identification.

h. Use the picture key to identify the animals. Tell the students that the key is not complete and they should try to find pictures that look as much like the animals as possible.

i. Complete the worksheet. Write the name of each kind of animal and record the number of each kind.

j. Carefully return all organisms to the lake or river after the research is done.

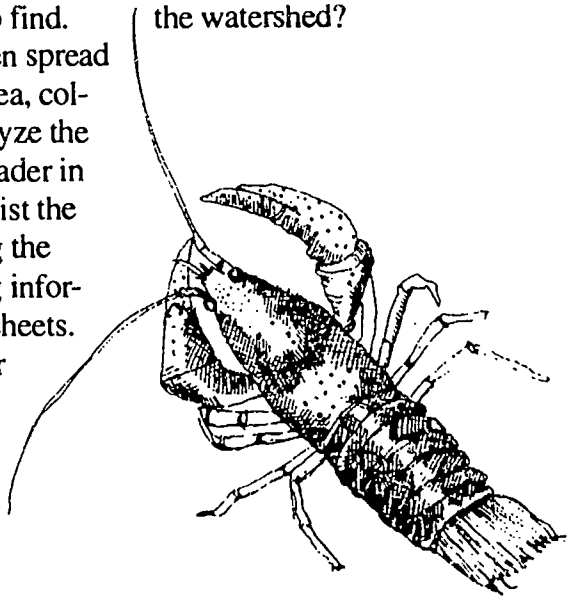
4. Park staff will explain water safety procedures, including the use of life jackets and the rescue throw rope. Ask the students to get into their groups with their adult leader. Have the groups pick up their equipment. Adult leaders could carry the worksheets and pencils for the group. Before collecting their samples, each group should fill in part A of their worksheet by predicting how many different kinds of animals they expect to find. The groups should then spread out in the sampling area, collect samples, and analyze the samples. The adult leader in each group should assist the students in identifying the animals and recording information on their worksheets. There may be time for several collection attempts, depending on students' abilities and behavior.

5. At the end of the activity, ask the groups to pick up all their equipment and return it where they found it. Gather the whole class together and have each group present their findings. The park staff and/or educator can assist the students in determining what their study tells them about the water quality in the sampling area. Note: Students will be reporting their observations and making inferences from these observations during this discussion. The teacher and ranger can also present different scenarios and ask students to predict how the water quality might be affected in each case.

Suggested Extensions:

1. Sample different locations on the lake and river, and compare and contrast the results. (Keep separate worksheets for each sampling area.)

2. Sample different streams that feed into the lake and compare and contrast results. What does this tell you about the watershed?



Student's Information

"**Water**, Water everywhere nor any drop to drink." So says the sailor in Samuel Taylor Coleridge's "Rime of the Ancient Mariner" as their sailing ship is drifting at sea with no wind. Fortunately, in our area, water is everywhere and there seems to be plenty to drink. But that may be changing as Lake James becomes more developed and is used by more people. Let's take a closer look at water and discover what a fragile and sensitive resource it is.

What is water? The dictionary defines water as a clear, odorless liquid occurring on Earth as rivers, lakes, oceans, etc., and falling from the clouds as rain, snow, ice, etc. Water covers more than 70 percent of the Earth's surface, and it makes up about 60 percent of the human body. You may have heard the saying "Water is life." Think about it for a minute. Can you think of any living thing that does not depend on water?

"Water, Water everywhere-nor any drop to drink."

Water comes in many forms. To really appreciate water you need to pick one of its many forms and get to know it well. For your visit to Lake James State Park you need to know more about water in the form of a lake and a river.

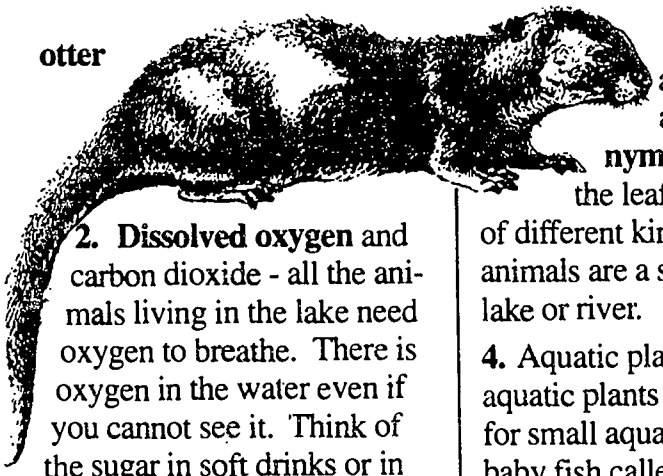
What is a lake? A lake is defined as a large inland body of fresh or salt water. Lake James is the first in a series of man-made reservoirs located along the Catawba River. The river is the result of springs, streams and creeks joining together. These smaller bodies of water are called **tributaries**. The land that a river and its tributaries flow through is called a **watershed**. A **healthy** river must have a well protected watershed because any kind of change to the watershed has an effect on the river and the lake into which it flows.

Life in a Lake and River

A lake or a river can be compared to a good stew or soup. Usually the more good things you add, the better the stew. The same is true for a lake or river. A stew also needs small amounts of spices to make it taste just right. If you try to make a stew from only one thing, or if you leave out an important spice, your stew or soup is not going to be good.

Here is a recipe for a fine, healthy lake and river.

1. Some sunlight - just enough for **aquatic** plants to grow. (Too much sun heats up the water too much.)



otter

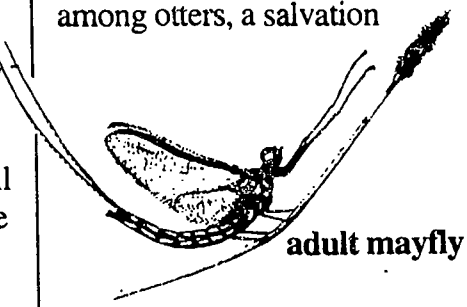
2. Dissolved oxygen and carbon dioxide - all the animals living in the lake need oxygen to breathe. There is oxygen in the water even if you cannot see it. Think of the sugar in soft drinks or in sweet tea. The sugar is there, but you cannot see it because it is dissolved, however, you can taste it. The oxygen that fish and aquatic **insects** breathe is dissolved in the water. These same animals breathe out carbon dioxide which is essential for aquatic plants. These plants in turn take in the carbon dioxide and give off oxygen which the animals living in the water need.

3. Fallen leaves - they provide the main source of food for animals living in the river and the lake. In the fall, leaves drift down from the trees into the water where they sink to the bottom. **Bacteria** and **fungi** begin to eat the leaves causing them to decay, or break down into smaller pieces. The half-eaten leaves, along with the bacteria and fungi, provide food for many other aquatic animals living in the river and in the lake, such as baby stone-flies, mayflies, and caddisflies. These animals break down the leaves even more.

Other aquatic animals such as dragonfly **nymphs**, prey on the leaf eaters. Lots of different kinds of aquatic animals are a sign of a healthy lake or river.

4. Aquatic plants and animals - aquatic plants provide cover for small aquatic insects and baby fish called minnows. All the aquatic animals in the lake provide food for each other and non-aquatic animals in a complex food web. Just like the different strands in a spider's web are all connected, so are all the plants and animals in a **habitat**, such as a lake or river.

These are just a few of the things needed for a healthy lake or river. Now mind you, a lake or river needs only natural ingredients. Unnatural things, such as oil, soap and other pollutants can have a bad effect on a river or lake. David Quammen sums up what makes a healthy lake or river when he talks about a trout stream. "A good trout stream must first be an excellent insect stream, a superior haven for algae and fungi and bacteria, a prime dumping ground for dead leaves, a surpassing reservoir of oxygen and calcium. It will then also, and thereby, be a good osprey stream, a favorite among otters, a salvation



adult mayfly

to dippers and kingfishers and bank swallows and heron, mergansers and Canada geese and water shrews, mink and muskrat and beaver. Not to mention the occasional grizzly bear. And who knows but that, sometime, a human might want to drink."

If there are large numbers of many different **species** of plants and animals in a lake, then the lake is healthy. Collecting and counting these aquatic plants and animals is a good way to find out the water **quality** of a lake or river.

belted kingfisher

Key to Aquatic

Aquatic Animals

with shells

double shell

shell attached to submerged objects

*Zebra mussel (T)

shell unattached

shell oblong

Native freshwater mussel (I)

shell triangular

*Asian clam (T)

single shell

obvious legs

three pairs of legs

two pairs of wings

chewing mouth parts, front wings thick (beetles)

hind legs short swims on surface)

Whirligig beetle Adult (M)

hind legs long

hind legs paddle-like (swims rapidly)

Predaceous diving beetle (M)

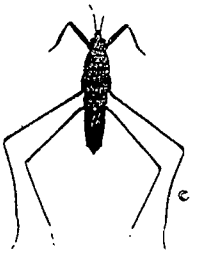
hind legs not paddle-like (crawls on submerged objects)

Riffle beetle adult (M)

sucking mouth parts (true bugs)

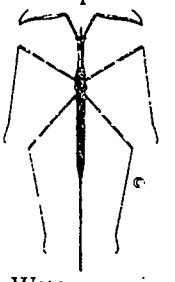
thin body, long spider-like legs

skates on water surface



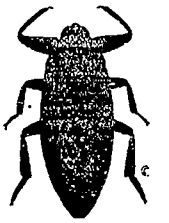
Water strider adult (M)

walks on bottom near plants



Water scorpion adult (M)

thick body, up to 3" long



Giant water bug adult (M)

no wings, some undeveloped wing pads

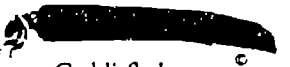
entire body soft except head and thorax

dark brown to black body, prominent pinching jaws

Hellgramite, Dobsonfly (M)

white to greenish body, with or without portable case

Caddisfly larva (I)



Caddisfly larva with case (I)

** Non-native nuisance species. The Zebra mussel is not yet known from North Carolina. It is moving into the southern states. Report its occurrence to Park or Wildlife authorities.*

Animals of Lake James

LEGEND	
Pollution Tolerance	**Index Value**
(I) – Intolerant	Group 1
(M) – Moderate	Group 2
(T) – Tolerant	Group 3

without shells

no obvious legs

more than three pair of legs (crustacea)

small claws on front legs

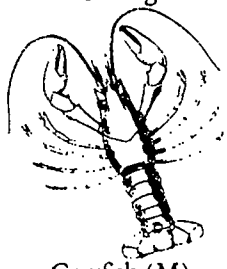
body flattened side to side

Anphipod scud (M)

body flattened top to bottom

Isopod, Sowbug (M)

large claws on front legs

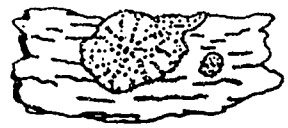


Crayfish (M)

worm-like

sponge or jelly-like, grows on submerged objects

usually a flattened pad



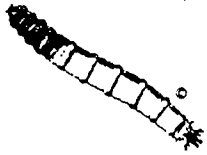
Freshwater sponge (M)

ball-like

Bryozoa (M)

small appendages

no obvious head (lives on submerged leaves and moss)



Cranefly larva (M)

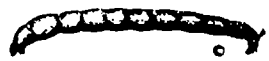
obvious head

rounded abdomen (attached to rocks and sticks, lives in groups)

Black fly larva (M)

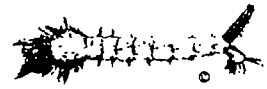
slender abdomen

bright red body (lives on submerged objects)



Chronomid midge (T)

small hairs on body (lives in stagnant water)



Mosquito larva (T)

no appendages

flattened, gray to black color

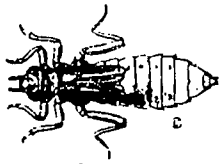
Leech (T)

cylindrical, red color

Aquatic worm (T)

entire body exoskeleton hardened, flattened

no obvious tail



Dragonfly nymph (M)

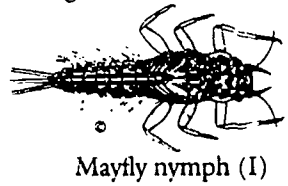
obvious tail

three tails

tails broad, leaf-like

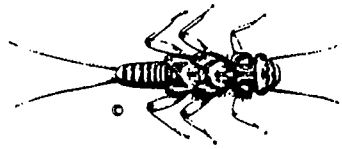
Damselfly nymph (I)

tails slender, gills on abdomen



Mayfly nymph (I)

two tails, no gills on abdomen



Stonefly nymph (I)

Who's Who in the Water Worksheet

Group Name:_____ Date:_____

Location:_____

_____

Weather:_____

A. Predict how many different kinds of aquatic animals you expect to find in Lake James or the Catawba River section of the park._____

B. Instructions:

1. Use key or picture charts to identify aquatic animals you find.

2. Record the types of aquatic animals on the chart below.

Animal Name	How Many? (#)
example: Mayfly	~~HHH~~ /

Total # of different kinds of animals = ☐

Post-Visit Activity #1 – Who Lives Here?

Curriculum Objectives:
Grade 2
- Science: living organisms, adaptation
- Social Studies: participate in classroom activities, collect information by reading, listening, and viewing pictures and films, identify ways children and adults can participate responsibly in the community, suggest possible consequences of various courses of action

Grade 3
- Social Studies: participate confidently in class activities, determine possible consequences of various courses of action, identify ways children and adults can participate responsibly in the community

Grade 4
- Guidance: group interaction
- Science: living things - animals, adaptation to environment, interdependence of animals
- Social Studies: participate effectively in groups

Location: Classroom

Group Size:
30 students, class size

Estimated Time:
30 to 40 minutes

Appropriate Season: Any

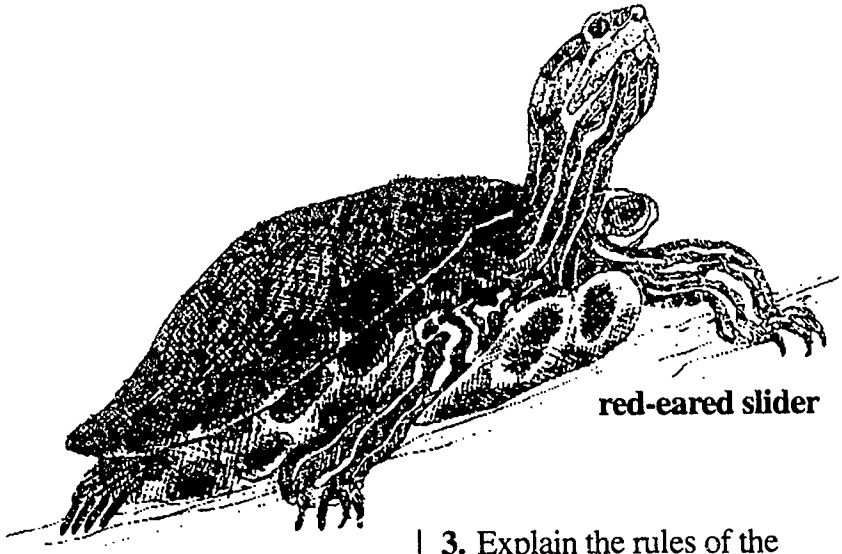
Materials:
Provided by the educator:
Per group: game board, game cards, buttons or other objects to be used as game pieces, dice
Per student: 1 copy of Student's Information sheet

Major Concepts:
- Identification of aquatic plants and animals
- Pollution problems
- Environmental responsibility

Objectives:
- Identify four animals found in a wetland.
- Identify two plants found in a wetland.
- Describe two ways humans can help aquatic life.
- Describe two ways humans can cause water pollution and two ways they can reduce pollution.

Educator's Information:

This post-visit activity is intended to be both a review of pre-visit and on-site activities, as well as a lesson on how students can be environmentally responsible. There are two versions of the activity: a game board approach for upper elementary and a card game for lower elementary. The object of both games is for students to identify plants and animals that live in **aquatic habitats,** recognize how human actions can help or harm wildlife, and recognize common examples of water **pollution.**



red-eared slider

Instructions – Upper Elementary:

In this board game the students will try to earn cards by correctly answering questions about plants and animals that live in aquatic areas, how pollution harms wildlife, and how human actions can help or hurt wildlife.

1. Make one copy of the Student's Information for each student. Read and discuss this information with the class. Make enough copies of the game board and playing cards so that students can play in groups of four or five.

2. Divide students into groups of four or five. Distribute the game materials to each team. Place the cards on the proper areas of the game board, question side down. Have the students choose a marker and place it on any space they choose (there are no start or end points on the game board).

3. Explain the rules of the game. Do a guided practice if necessary. To determine who goes first, each player rolls the dice. The player rolling the highest number starts the game by rolling the dice again and moving the game marker that many spaces in any direction. The person to the left of the first player is the next to play. Play continues in a clockwise direction.

4. After moving, the player will either pick the correct type of card from the top of the pile and answer the question, or do whatever the text on the space says. When a player must answer a question, another student should read the question on the back of the card while holding the picture side up for the player to see. The reader should be careful not to read the answer or to give any clues. If the question is answered correctly, the player keeps the card. If the question is not answered correctly, the correct answer should be shared aloud and the card placed on the bottom of the pile (picture side up), so that it can be used again. Remember, players can move in either direction on the game board.

5. To win the game, a player needs to collect the following cards by answering the questions correctly:

1 Help or Harm card

1 Pollution Pointer card

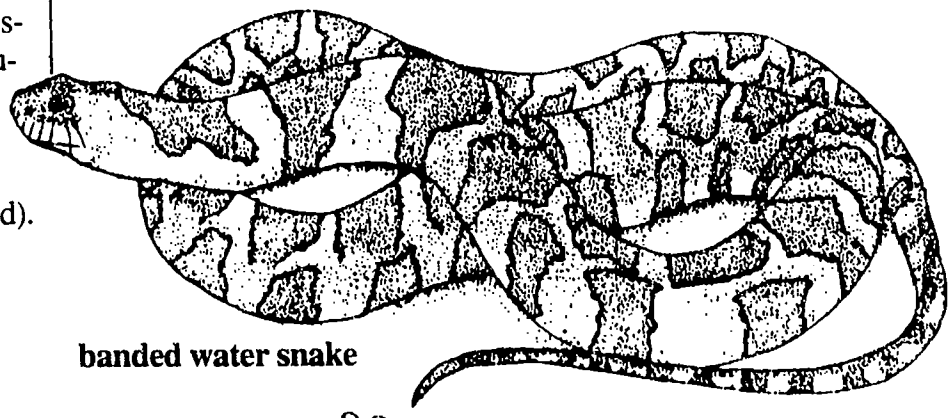
2 Plant Identification cards

4 Animal Identification cards

The first player to earn all these cards wins the game.

Suggested Extension:

Have the students look up additional information on such topics as aquatic animals, pollution, and ways people can help preserve wetlands and other aquatic resources.



banded water snake

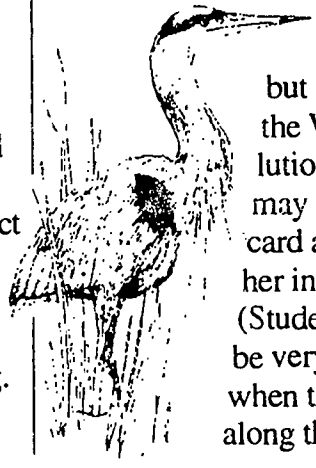
Instructions - Lower Elementary:

1. Read the Student's Information to the class so that the students have some background information on using our water resources responsibly.

2. Divide the students into groups of 3-4 players. Prepare a deck of cards for each group. To do this, xerox <u>two</u> copies of each of the master sheets marked "Cards – Lower Elementary." For durability, xerox the cards on heavy card stock and/or laminate. Xerox these sheets singly, not back-to-back. (The back of each of these playing cards will be blank.) Cut the cards on the dashed lines and shuffle them. Throw away one of the cards marked "Water Pollution" so that there is just one Water Pollution card per deck. Also prepare a pack of "Bonus Cards" for each group by xeroxing, back-to back, the **Pollution Pointer** cards and **Help or Harm?** cards from the master sheets marked "Playing Cards – Upper Elementary." Place the playing cards face down on the table and the Bonus Cards face up (picture side up) on the table.

3. Explain to the students that the Lake James card game is similar to "Go Fish" and "Old Maid" card games they may have played before. The object of the game is to get as many matches as possible without keeping the Water Pollution card in your hand for too long. Students will try to match aquatic animals and aquatic plants that live at Lake James. (All the pictures depict mature animals or plants.) The Water Pollution card functions like the "Old Maid" card. If you get stuck with the Water Pollution card at the end of the game, you lose because water pollution can kill all aquatic plants and animals. Fortunately, there is only one Water Pollution card in each deck.

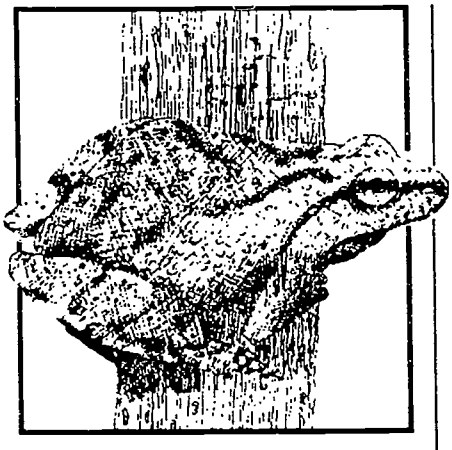
4.The dealer should give each student 5 cards to begin the game. Any remaining cards should be placed face down in the center of the table to make the "Go Fish" pile. If the students have any matches, they should remove them from their hand and place them face down on the table. Play starts with the student to the left of the dealer. This student must ask one other person for a card that will match one of the cards in her hand. (If she is not able to read the name of the plant or animal on the card, she may show the card to the other person.) If the person that she calls on has the card, he must give her the card. However, if he does not have the card she needs, but does have the Water Pollution card, he may pass that card along to her instead! (Students should be very secretive when they pass along the Water Pollution card so that the other players do not know the whereabouts of this card!) If he has neither the card she needs or the Water Pollution card, he tells her to "Go Fish." She will then pick up a card from the "Go Fish" pile. If she is successful in getting a matching card during her turn, she holds the match in her hand until she gets a second match (hopefully during her next turn). Play continues with the player on her left.



5. As soon as a player gets <u>two</u> matches, she can pick a card from the Bonus Pile. The teacher will read the back of the card to the student. If the student answers the question correctly, she will get two bonus points. She will place the Bonus Card in her match pile along with her two matches. If she does not answer the question correctly, she does not lose points. She returns the card to the bottom of the Bonus Pile and puts her two matches in her match pile.

6. The game ends when all the cards have been matched and the "Go Fish" pile is depleted. One player will be left holding the Water Pollution card. The other students in the group should count their matches and add their Bonus Cards. Each match is worth one point; each Bonus Card is worth two points. The student with the most points (and NOT holding the Water Pollution card) is the winner.

Student's Information

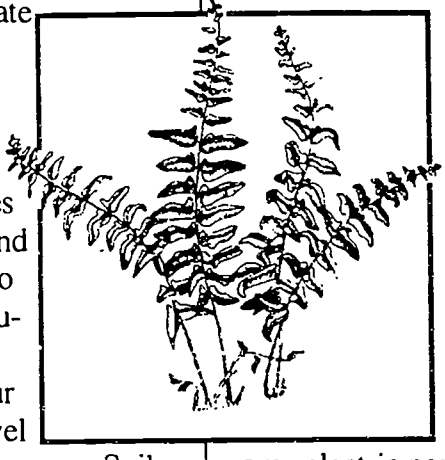


All plants and animals need **water** in order to live. Water is by far the largest component of all living things. You are made up of about 60% water, and so are most other living things. Without water, there would be no life on earth.

Many plants, such as the river birch and tag alder, grow only where they can get plenty of water–along the shores of a lake, or river, **marsh** or **swamp**. Some plants, such as water lilies, can grow only in the water itself. All these types of plants are known as **aquatic** plants because they live in or near the water.

All animals depend on water to live, but some animals need more water than others. Some desert animals get all the water they need from the plants or animals they eat. Other animals, such as fish, live in water.

Water pollution affects all living things. You can probably think of examples where people have directly polluted the water. Did you know that air pollution can also cause water pollution? Gases from cars and from some electric power plants create acid rain in the clouds above us. Acid rain falls from the skies and pollutes lakes and streams. Land pollution can also cause water pollution. Chemicals can leak from our landfills and travel into nearby waterways. Soil that washes off of farm fields or construction sites can enter streams or lakes and become a serious kind of water pollution.



What are some things that you do that might contribute to water pollution? Do you throw trash along the roadside? The trash could wash into a storm drain or drainage ditch and enter a nearby river. Trash can also attract animals to the road where they are killed by cars. Do you recycle your newspapers, glass, and aluminum? Recycling paper can reduce the number of trees that need to be cut. Remember that tree roots hold the soil in place so that it does not wash off the land and into the river. Recycling glass saves electricity which, in turn, reduces the amount of acid rain produced by some electric power plants. Recycling aluminum also saves electricity and slows down the mining of bauxite ore to make the cans. Mining operations can disturb the soil and cause water pollution. Recycling also saves landfill space which means less land is used to bury our trash.

Simple things such as recycling and saving electricity will help keep our air and water clean. We all have a responsibility to care for ourselves and for the plants and animals that share the Earth with us.

Animal Identification Card

Roll Again

Animal Identification Card

Help or Harm Card

Plant Identification Card

trim line

Plant Identification Card

Animal Identification Card

Help or Harm Card

Skip a Turn

Pollution Pointer Card

Animal Identification Card

trim line

Plant Identification Cards

trim line

Animal Identification Card

Pollution Pointer Card

Pick Any Card Category

Plant Identification Card

Animal Identification Card

Help or Harm Card

Roll Again

Plant Identification Card

Animal Identification Card

Animal Identification Card

Pollution Pointer Card

trim line

Animal Identification Cards

trim line

Plant Identification Card

Animal Identification Card

Plant Identification Card

Skip a Turn

Animal Identification Card

Pollution Pointer Card

Animal Identification Card

Plant Identification Card

Animal Identification Card

Roll Again

Help or Harm Card

trim line

Pollution Pointer Cards

trim line

Plant Identification Card

Animal Identification Card

Plant Identification Card

Skip a Turn

Animal Identification Card

Help or Harm Card

Help Or Harm Cards

trim line

Pollution Pointer Card

Animal Identification Card

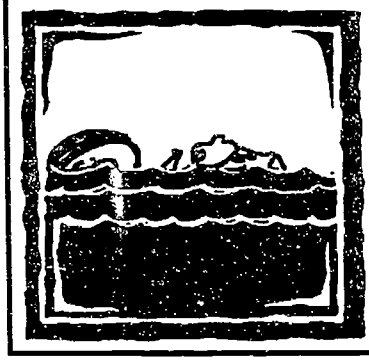
Plant Identification Card

Pick Any Card Category

Animal Identification Card

Playing Cards (Upper Elementary)

Pollution Pointer

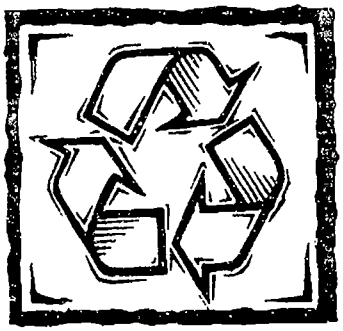


Pollution Pointer

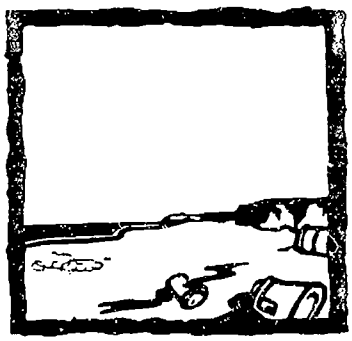
Pollution Pointer

Help Or Harm?

Help Or Harm?



Help Or Harm?



Help Or Harm?

Help Or Harm?

Help Or Harm?

Playing Cards (Upper Elementary)

YOU POUR OLD OIL DOWN A STORM DRAIN OR INTO A STREAM.
How does this cause pollution?

ANSWER: *The oil washes into the lake where it can kill animals & plants.*

YOU TOSS TRASH OUT OF THE CAR.
How does this cause pollution and Harm Wildlife?

ANSWER: *The trash can blow or wash into the lake. It can kill animals or make them sick. It can attract animals to the road where they may be killed by car.*

YOU DUMP TIRES & OTHER JUNK INTO THE WATER.
How does this cause pollution?

ANSWER: *The junk can hurt animals, swimmers & fishermen. The junk has chemicals that can put poisons into the water.*

FISHING LINE & BAIT LEFT BEHIND
You leave old gear at your fishing spot for another fisherman to use.
HELP OR HARM??

ANSWER: ***Harm.*** *Animals can get tangled up in line and they might try to eat other trash.*

RECYCLING TRASH
You recycle your newspaper, cans, glass, and other trash.
HELP OR HARM??

ANSWER: ***Help.*** *The trash is put in recycling bins and does not become litter in or near the lake.*

CATCH & RELEASE
You catch a fish and handle it gently. You return it to the water quickly so it does not die.
HELP OR HARM??

ANSWER: ***Help.*** *The fish is not harmed and more people can enjoy the fish.*

PEOPLE CANOEING
You go canoeing & quietly observe wildlife on the lake.
HELP OR HARM??

ANSWER: ***Help.*** *You are not using a gasoline-powered motor and you are not creating a wake (big waves).*

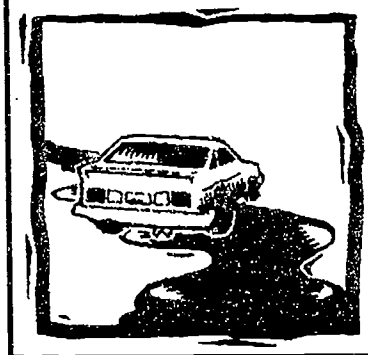
MAKING A WILD ANIMAL YOUR PET
You take an animal out of the wild & bring it home to be your pet.
HELP OR HARM??

ANSWER: ***Harm.*** *Most animals can not live in captivity. The water your give them may have chlorine or other chemicals. They will die.*

MAKE A WOOD DUCK NEST BOX
You make a nest box and put it up in a tree near the lake.
HELP OR HARM??

ANSWER: ***Help.*** *Ducks need a place to nest near the lake that is safe from predators.*

Pollution Pointer

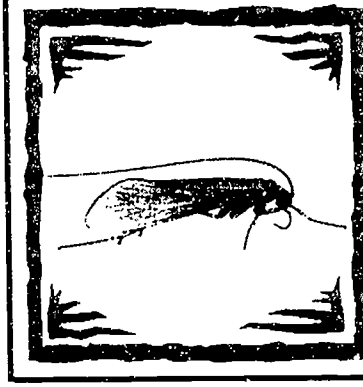


Pollution Pointer

Pollution Pointer

Animal Identification

Animal Identification



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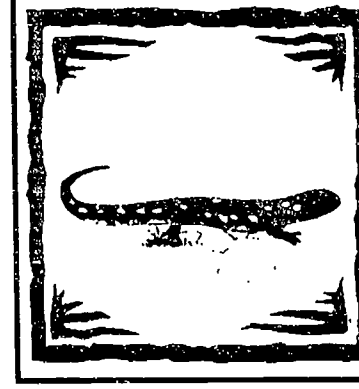

Animal Identification

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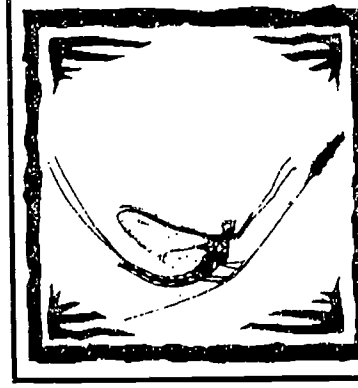


Animal Identification

Playing Cards (Upper Elementary)

A BULLDOZER REMOVES TREES & BUSHES FROM A STREAM BANK.
How does this cause pollution?

ANSWER: *The bare soil along the bank will wash into the stream during the next rainstorm. The extra soil can clog fishes' gills and smother them.*

UNTREATED WATER IS ENTERING THE LAKE.
How does this cause pollution ?

ANSWER: *The water may contain harmful chemicals that can kill plants & animals. Ask an adult to help you report this.*

YOU WASH YOUR CAR IN A STREAM.
How does this cause pollution?

ANSWER: *The soap and oil from your car get into the water where they can kill plants & animals.*

NAME THE ANIMAL:

A. Hellgrammite
B. Salamander
C. Aquatic Worm

ANSWER:
B. Salamander

NAME THE ANIMAL:

A. Kingfisher
B. Water strider
C. Caddisfly

ANSWER:
C. Caddisfly

NAME THE ANIMAL:

A. Whirligig Beetle
B. Mosquito
C. Freshwater Mussel

ANSWER:
A. Whirligig Beetle

NAME THE ANIMAL:

A. Kingfisher
B. Water Strider
C. Great Blue Heron

ANSWER:
C. Great Blue Heron

NAME THE ANIMAL:

A. Mayfly
B. Cranefly
C. Crayfish

ANSWER:
A. Mayfly

NAME THE ANIMAL:

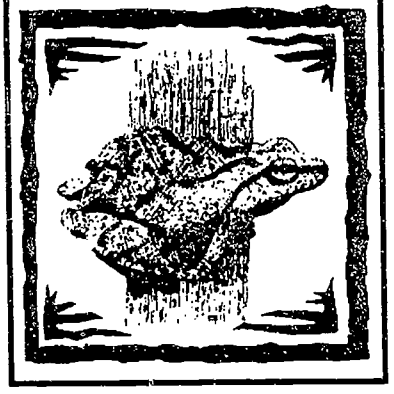
A. Great Blue Heron
B. Osprey
C. Duck

ANSWER:
B. Osprey

Playing Cards (Upper Elementary)

Animal Identification

Animal Identification



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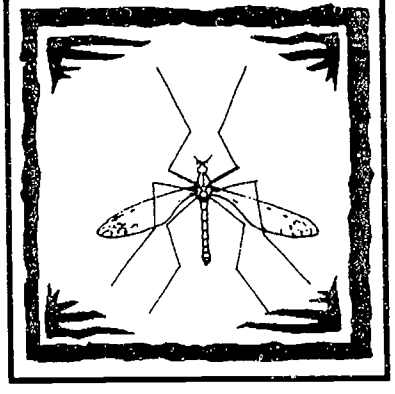

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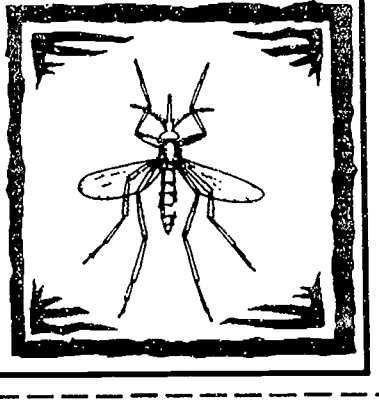

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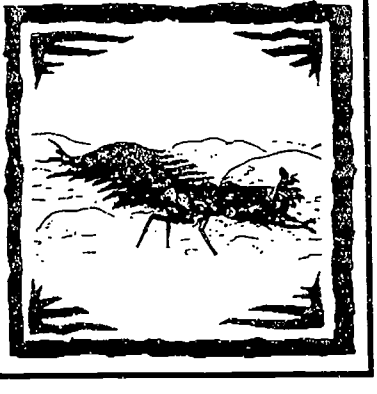

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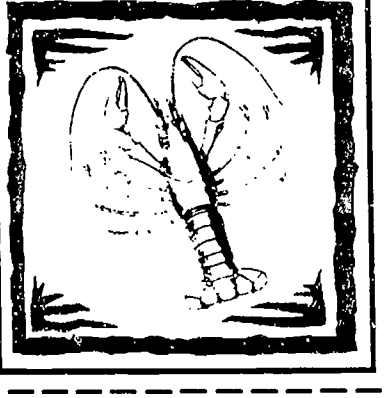

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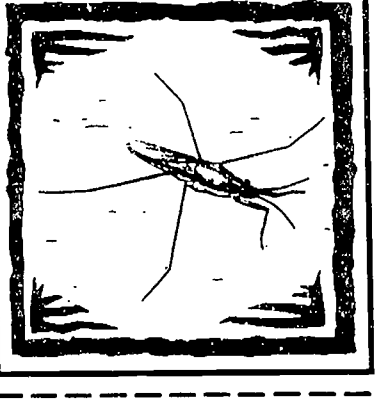
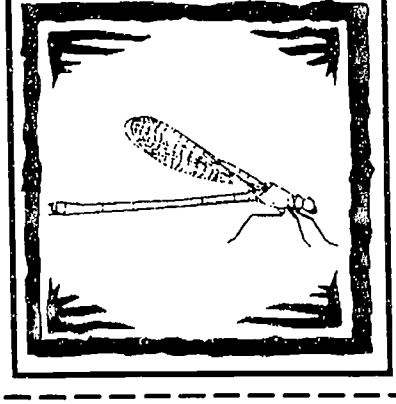


Animal Identification



Playing Cards (Upper Elementary)

NAME THE ANIMAL:

A. Cranefly
B. Water Strider
C. Bluegill

ANSWER:
A. Cranefly

NAME THE ANIMAL:

A. Hellgrammite
B. Salamander
C. Frog

ANSWER:
C. Frog

NAME THE ANIMAL:

A. Beaver
B. Wood Duck
C. Osprey

ANSWER:
B. Wood Duck

NAME THE ANIMAL:

A. Crayfish
B. Hellgrammite
C. Salamander

ANSWER:
B. Hellgrammite

NAME THE ANIMAL:

A. Damselfly
B. Mosquito
C. Cranefly

ANSWER:
B. Mosquito

NAME THE ANIMAL:

A. Beaver
B. Kingfisher
C. Muskrat

ANSWER:
A. Beaver

NAME THE ANIMAL:

A. Damselfly
B. Mosquito
C. Caddisfly

ANSWER:
A. Damselfly

NAME THE ANIMAL:

A. Whirligig Beetle
B. Water Strider
C. Muskrat

ANSWER:
B. Water Strider

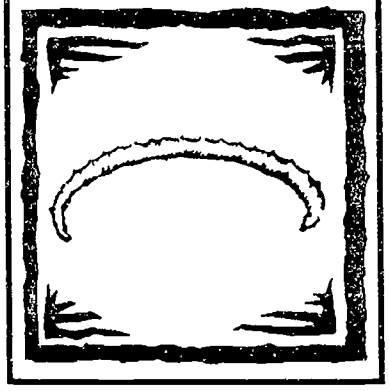
NAME THE ANIMAL:

A. Bass
B. Freshwater Mussel
C. Crayfish

ANSWER:
C. Crayfish

Playing Cards (Upper Elementary)

Animal Identification



Animal Identification

Animal Identification

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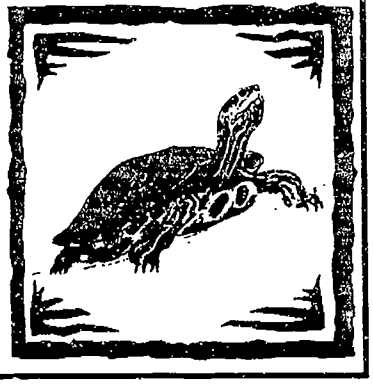

Animal Identification

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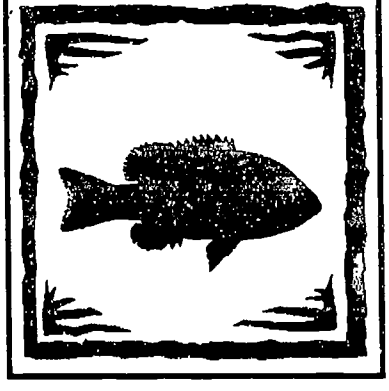
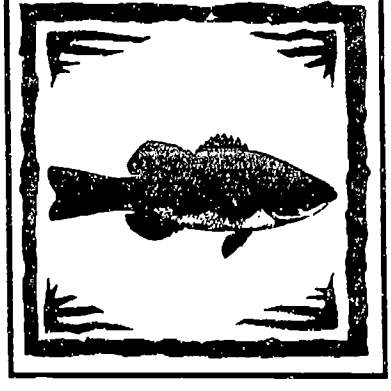


Animal Identification



Playing Cards (Upper Elementary)

NAME THE ANIMAL:

A. Muskrat
B. Raccoon
C. Beaver

ANSWER:
B. Raccoon

NAME THE ANIMAL:

A. Water Strider
B. Freshwater Mussel
C. Turtle

ANSWER:
B. Freshwater Mussel

NAME THE ANIMAL:

A. Freshwater Mussel
B. Hellgrammite
C. Aquatic Worm

ANSWER:
C. Aquatic Worm

NAME THE ANIMAL:

A. Aquatic Worm
B. Banded Water Snake
C. Bass

ANSWER:
B. Banded Water Snake

NAME THE ANIMAL:

A. Banded Water Snake
B. Crayfish
C. Turtle

ANSWER:
C. Turtle

NAME THE ANIMAL:

A. Muskrat
B. Osprey
C. Raccoon

ANSWER:
A. Muskrat

NAME THE ANIMAL:

A. Bass
B. Hellgrammite
C. Kingfisher

ANSWER:
A. Bass

NAME THE ANIMAL:

A. Turtle
B. Crayfish
C. Bluegill

ANSWER:
C. Bluegill

NAME THE ANIMAL:

A. Kingfisher
B. Duck
C. Salamander

ANSWER:
A. Kingfisher

Playing Cards (Upper Elementary)

Plant Identification

Plant Identification

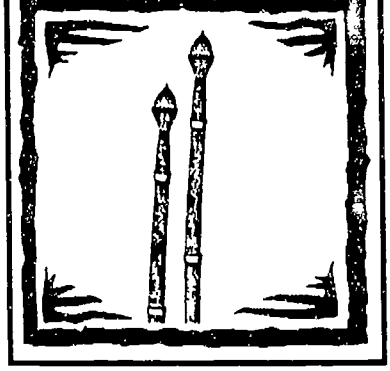
Plant Identification

Plant Identification

Plant Identification

Plant Identification

Plant Identification



Plant Identification

Plant Identification

Playing Cards (Upper Elementary)

NAME THE PLANT:

A. Tag Alder Shrub
B. Water Lily
C. Arrowhead Weed

ANSWER:
A. Tag Alder Shrub

NAME THE PLANT:

A. Jewelweed
B. Cattail
C. River Birch Tree

ANSWER:
C. River Birch Tree

NAME THE PLANT:

A. Horsetail
B. Sedge
C. River Birch Tree

ANSWER:
B. Sedge

NAME THE PLANT:

A. Arrowhead Weed
B. Button Bush
C. River Birch Tree

ANSWER:
B. Button Bush

NAME THE PLANT:

A. Button Bush
B. Pickerel Weed
C. Sweet Gum Tree

ANSWER:
C. Sweet Gum Tree

NAME THE PLANT:

A. Fern
B. Cattail
C. Sweet Gum Tree

ANSWER:
B. Cattail

NAME THE PLANT:

A. Cattail
B. Sweet Gum Tree
C. Jewelweed

ANSWER:
C. Jewelweed

NAME THE PLANT:

A. Fern
B. Water Lily
C. River Birch Tree

ANSWER:
A. Fern

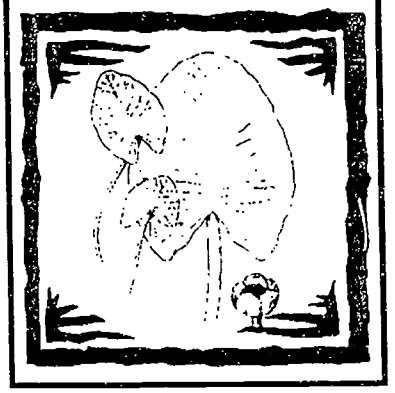
NAME THE PLANT:

A. Horsetail
B. Water Lily
C. Tag Alder Shrub

ANSWER:
A. Horsetail

Playing Cards (Upper Elementary)

Plant Identification



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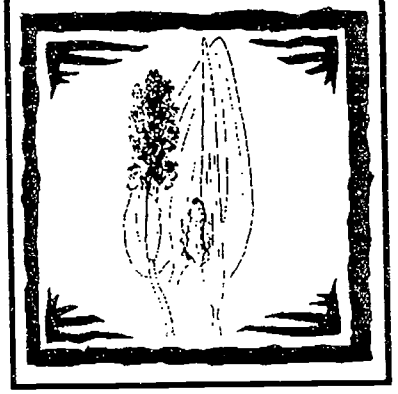

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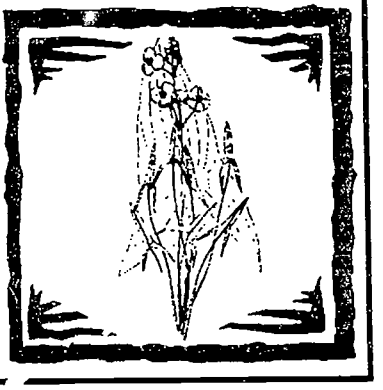


Playing Cards (Upper Elementary)

NAME THE PLANT:

A. Fern
B. Sedge
C. Arrowhead Weed

ANSWER:
C. Arrowhead Weed

NAME THE PLANT:

A. Pickerel Weed
B. Horsetail
C. Button Bush

ANSWER:
A. Pickerel Weed

NAME THE PLANT:

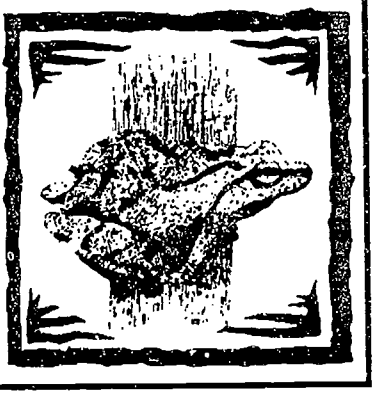
A. Fern
B. Water Lily
C. Tag Alder Shrub

ANSWER:
B. Water Lily

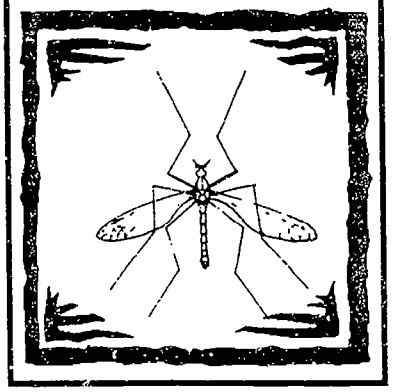
Playing Cards (Lower Elementary)

Wood Duck

Frog

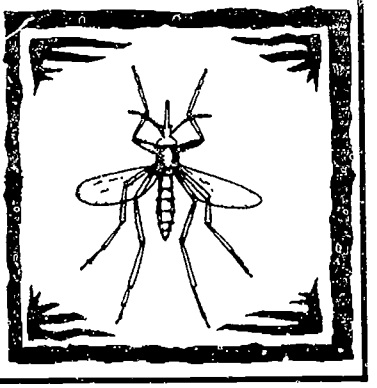


Cranefly



Beaver

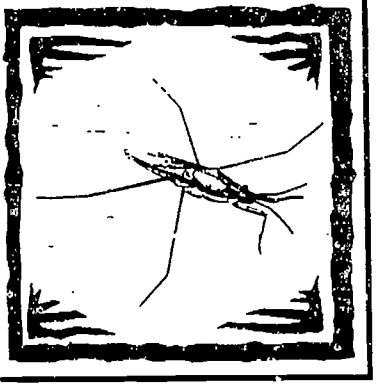
Mosquito



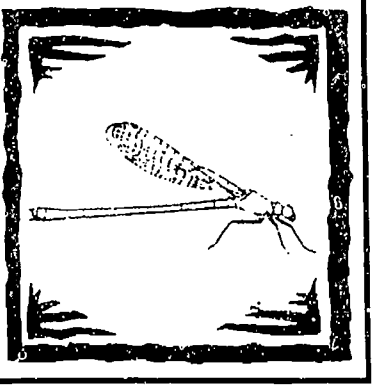
Water Pollution

Crayfish

Water Strider

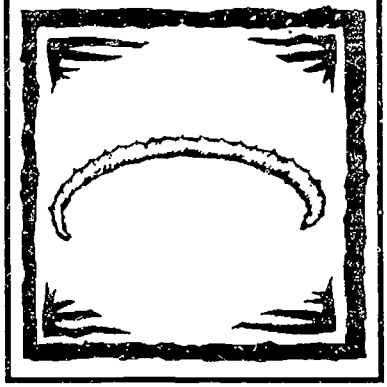


Damselfly



Playing Cards (Lower Elementary)

Aquatic Worm

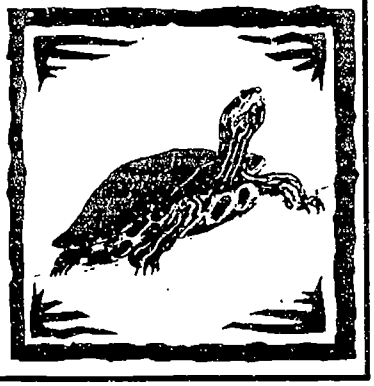


Freshwater Mussel

Raccoon

Muskrat

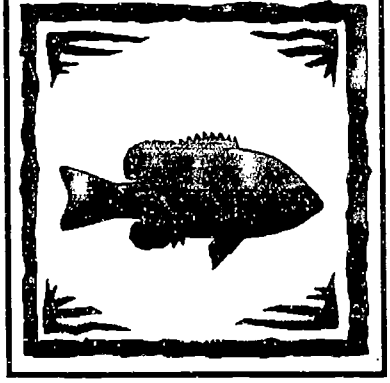
Turtle



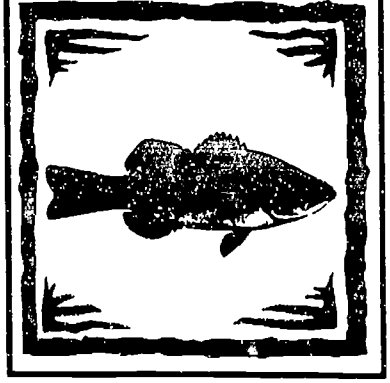
Banded Water Snake

Kingfisher

Bluegill



Bass



Playing Cards (Lower Elementary)

Sedge

River Birch Tree

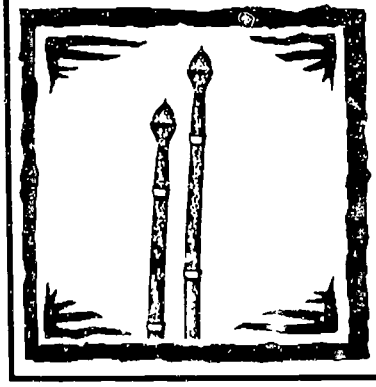
Tag Alder Shrub

Cattail

Sweet Gum Tree

Button Bush

Horsetail



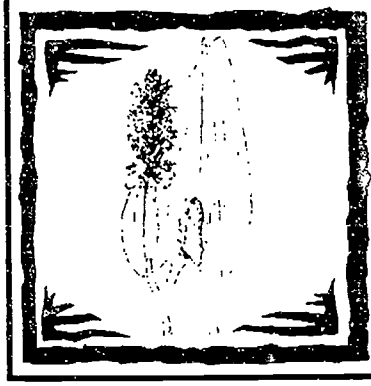
Fern

Jewelweed

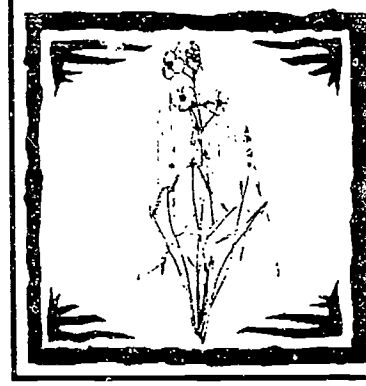
Playing Cards (Lower Elementary)

Water Lily

Pickeral Weed

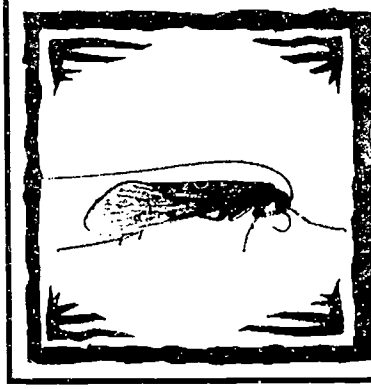


Arrowhead Weed

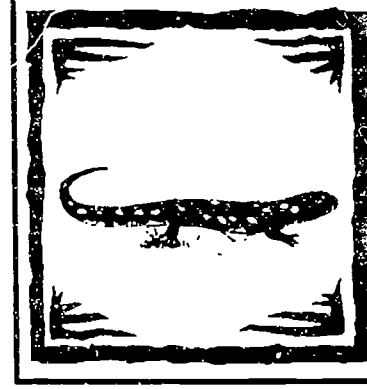


Whirligig

Caddisfly

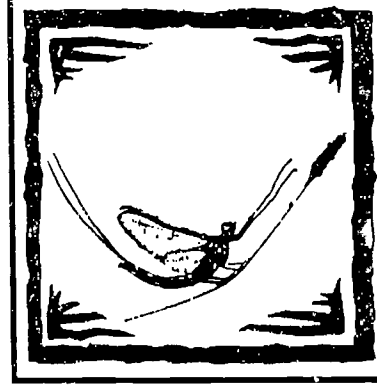


Salamander



Osprey

Mayfly



Great Blue Heron

VOCABULARY

Adult - Fully grown.

Adult insect - An insect that is fully developed, usually having wings.

Aquatic - Growing, living or taking place in or on water.

Bacteria - Microscopic organisms that can aid in pollution control by breaking down organic matter in sewage, oil spills and other pollutants. However, some bacteria in soil, water or air can cause human, animal and plant health problems.

Chrysalis (kris-a-lis) - The stage in the development of a butterfly, during which it is enclosed in a firm case.

Complete metamorphosis - Insect life cycle characterized by eggs hatching into larvae, then growing and changing into pupae, then becoming an adult. In complete metamorphosis the young insects do not resemble the adult. An example would be a butterfly. (See Metamorphosis.)

Dissolved oxygen - Oxygen gas molecules dissolved in water. Fish and other aquatic organisms are dependent upon dissolved oxygen for respiration.

Diversity - In the context of these activities, it refers to a variety of species of plants and animals.

Fungi - group of plants lacking chlorophyll some grow in soil, others attach themselves to decaying trees and other plants where the obtain nutrients. Examples are molds, mildews, yeasts, mushrooms and puffballs.

Habitat - The place or type of site where a particular plant or animal naturally or normally lives and grows.

Healthy - In this context, the cleanliness or purity of the stream water.

Incomplete metamorphosis - Insect life cycle characterized by eggs hatching into nymphs. Nymphs look like adult insects, only smaller. An example would be milkweed bugs. (See Metamorphosis.)

Insect - An animal having a head, thorax (middle) and abdomen (body), with three pairs of legs on the thorax. They usually have one or two pairs of wings attached to the thorax.

Juvenile - Not fully developed; not yet an adult.

Key - An ordered list of significant characteristics of a group of organisms used to identify unknown species.

Larva (plural, larvae) - The immature form of an animal that changes when it becomes an adult, usually by complete metamorphosis.

Life cycle - The changes in an organism from birth through adulthood.

Macroinvertebrate -"Macro" meaning large, "invertebrate" meaning without a backbone. An invertebrate usually large enough to be seen without the aid of magnification.

Marsh - An open wetland that occurs along rivers, lakes and in many other areas. Sedges, reeds, rushes and grasses are the dominant plants.

Metamorphosis (met-a-mor-fo-sis) - "Meta" meaning change, "morpho" meaning shape. A change in shape, structure or function as a result of development. A physical transformation undergone by various animals during development from larval stage to the adult form.

Nymph - In biology, the young of an insect that undergoes incomplete metamorphosis, differing from the adult primarily in size and structural proportions.

Organism - A plant or animal.

Pollution - Harmful substances deposited in the air, water or land, which have undesirable effects on the environment.

Pupa (plural pupae) - An insect in the stage of development between the larva and adult. Pupae are usually enclosed in a cell or cocoon.

Quality - A degree of excellence.

Species - A biological classification of organisms. All organisms of a single, distinct kind, that are very similar and can mate and produce fertile offspring.

Swamp - A lowland region saturated with water; marsh.

Tributary - A stream or river flowing into a larger stream or river.

Water - A clear, colorless, nearly odorless and tasteless liquid, H_2O, essential for most plant and animal life.

Watershed - The total land area that drains directly or indirectly into a particular stream or river.

Wetland - An area that, at least periodically, has waterlogged soils or is covered with a relatively shallow layer of water. Wetlands support plants and animals that are adapted to living in a watery environment. Bogs, freshwater and saltwater marshes, and freshwater and saltwater swamps are examples of wetlands.

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SCHEDULING WORKSHEET

For office use only:
Date request received_____ Request received by_____

1) Name of group (school) _____

2) Contact person _____ _____
name phone (work) (home)

_____
address

3) Day/date/time of requested program _____

4) Program desired and program length _____

5) Meeting place _____

6) Time of arrival at park _____ Time of departure from park _____

7) Number of students _____ Age range (grade) _____
(Note: A maximum of 30 participants is recommended.)

8) Number of chaperones _____
(Note: One adult for every 10 students is recommended.)

9) Areas of special emphasis _____

10) Special considerations of group (e.g. allergies, health concerns, physical limitations)_____
_____

11) Have you or your group participated in park programs before? If yes, please indicate previous programs attended: _____
_____

12) Are parental permission forms required? _____ If yes, please use the Parental Permission form on page 8.2.

I, _____, have read the entire Environmental Education Learning Experience and understand and agree to all the conditions within it.

Return to: Lake James State Park
P.O. Box 340
Nebo, NC 28761

Fax: (704) 652-5047

PARENTAL PERMISSION FORM

Dear Parent:

Your child will soon be involved in an exciting learning adventure - an environmental education experience at **Lake James State Park**. Studies have shown that "hands-on" learning improves children's attitudes and performance in a broad range of school subjects.

In order to make your child's visit to "nature's classroom" as safe as possible, we ask that you provide the following information and sign at the bottom. Please note that insects, poison ivy and other potential risks are a natural part of any outdoor setting. We advise that children bring appropriate clothing (long pants, rain gear, sturdy shoes) for their planned activities.

Child's name _____

Does your child:

- Have an allergy to bee stings or insect bites?_____
  If so, please have them bring their medication and stress that they, or the group leader, be able to administer it.

- Have other allergies? _____

- Have any other health problems we should be aware of?_____
  _____

- In case of an emergency, I give permission for my child to be treated by the attending physician. I understand that I would be notified as soon as possible.

_____ _____
Parent's signature date

Parent's name _____ Home phone _____
(please print) Work phone _____

Family Physician's name_____ phone _____

Alternate Emergency Contact

Name_____ phone _____

NORTH CAROLINA PARKS & RECREATION
PROGRAM EVALUATION

Please take a few moments to evaluate the program(s) you received. This will help us improve our service to you in the future.

1. Program title(s) _____ Date _____
   Program leader(s) _____

2. What part of the program(s) did you find the most interesting and useful? _____
   _____

3. What part(s) did you find the least interesting and useful? _____
   _____

4. What can we do to improve the program(s)? _____
   _____
   _____

5. General comments _____
   _____
   _____
   _____

LEADERS OF SCHOOL GROUPS AND OTHER ORGANIZED YOUTH GROUPS
PLEASE ANSWER THESE ADDITIONAL QUESTIONS:

6. Group (school) name _____

7. Did the program(s) meet the stated objectives or curriculum needs? _____
   If not, why? _____
   _____

Please return the completed form to park staff. Thank you.

Lake James State Park
P.O. Box 340
Nebo, NC 28761
Fax: (704) 652-5047