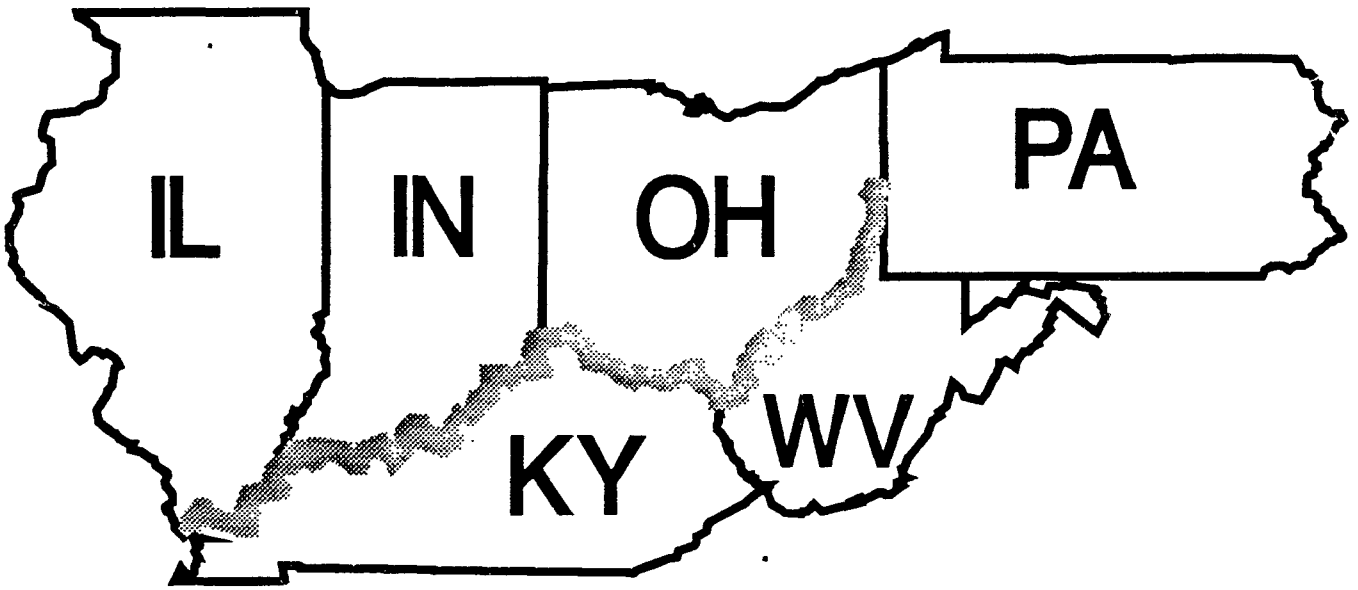
EPA/600/K-92/004

tection | Office of the Senior Official for Research and Development | Andrew W. Breidenbach Environmental Research Center Cincinnati, OH | EPA/600/K-92/004 July 1991

EPA Always A River Activity Booklet



Foreword

Dear Leader:

Cincinnati has the privilege of being a part of a very special celebration this summer. We are one of several cities that will welcome a floating barge exhibition entitled "Always a River", between July 15 and 22, 1991.

Once aboard the barge you will enter the magic and mystery as you discover the many facets of life along the majestic Ohio River. Divided into eleven exhibits, feel the river come to life as you travel through and experience opportunities to explore new environments and hands-on activities.

"Always a River" brings together the experiences of the past, the opportunities of the present, and the hopes of the future afforded to us by "La Belle Riviere".

The materials provided are designed to be used as both pre and post barge visit activities. There are many activities from which to choose. Feel free to adapt activities from all sections to meet the needs of the young people in your program. We expect this interdisciplinary study to enrich the lives of many young people and help make them more knowledgeable of the ecological and environmental impact that the Ohio River exerts on their lives.

Thelma B. Johnson

Thelma B. Johnson, Director
Center for Environmental Learning
U.S. Environmental Protection Agency

Shirley White

Shirley White, Coordinator
Cincinnati Public Schools

Acknowledgements

This publication was made possible by the U.S. Environmental Protection Agency, Office of Research and Development, Center for Environmental Learning, and the following Always a River Advisory and Committee members:

Advisory Members:
Charles Nuckolls, Chairman, Cincinnati Landing Always A River, Inc.
Dean Moore, Supervisor, Social Studies, Cincinnati Public Schools
Thelma Johnson, Director, Center for Environmental Learning
U.S. Environmental Protection Agency
Steven Lutkenhoff, Director, Office of the Senior Official for
Research and Development
U.S. Environmental Protection Agency

Committee Members
Iris Leuthardt, Cincinnati Public Schools
Martha Lohman-Pinkerton, Cincinnati Public Schools
Christopher Proffit, Cincinnati Public Schools
John Thompson, Cincinnati Public Schools
Shirley White, Cincinnati Public Schools
Jennie Doddy, U.S. Environmental Protection Agency
Helen Fischer, U.S. Environmental Protection Agency
Joseph Gorman, DreamSand Video & Print
James Hutton, DreamSand Video & Print

Reprinted 1992

Table of Contents

Always a Significant River

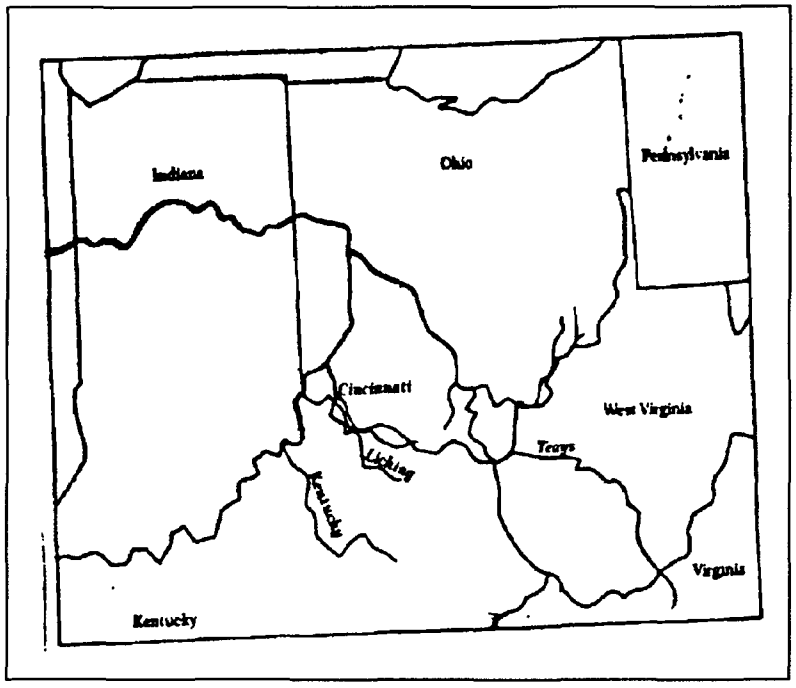
(The River and Tributaries)

The activities in this section lead children to locate the Ohio River, its source, tributaries and its route from the confluence at the Monongahela and Allegheny Rivers in Pittsburgh to where it spills into the mighty Mississippi at Cairo, Illinois.

Children should become familiar with vocabulary associated with the physical aspects of the river and identify the physical process of a watershed system. The length of the Ohio River covers 981 miles.

Teays Drainage

Two million years ago, before the glaciers came into our area, the land surface was a gently rolling plain called the Lexington Peneplain. The principal drainage was to the north, to a westward-flowing master stream called the Teays River.



Diagrams and maps by Reid Martin

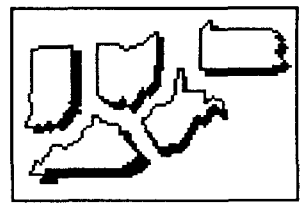
On the Banks of the Ohio

PURPOSE: To provide a visual concept of the geographic location of the Ohio River and its tributaries.

MATERIALS:
- Map of the Ohio River
- Crayons/markers/colored pencils

PREPARATION: Run off copies of the map for each child. Explain the use of a color key on the map and how it will be used.

PROCEDURE: Give each child a copy of the map. Have them locate each state by name. Ask them to locate the Ohio River and to trace its path using their finger. Tell them the smaller rivers that flow from the Ohio are called tributaries. Have them use the map key on the map to color the rivers and states appropriately.



ADDITIONAL ACTIVITIES: Take a field trip to the Cincinnati Historical Society to see some original maps of the Ohio River and to learn more about the process and product of the art of cartography (map making).

Map of the Ohio River

Color the States:

Illinois - Red
Indiana - Orange
Ohio - Yellow
Pennsylvania - Green
Kentucky - Brown
West Virginia - Purple

Color the Ohio River blue.

Wave Machine

PURPOSE:

To exemplify river currents.

MATERIALS:

- A clear water tight container (2 liter plastic bottle)
- Mineral Oil
- Blue food coloring
- Water

PREPARATION:

Explain to children that it was the "current" which first brought flatboats down the Ohio. It is also the current which tries to keep the river clean — washing away pollution as it flows. The current is also responsible for erosion.

Ask children their ideas about the river current — can they see it? Can they judge how fast it is running?

PROCEDURE:

Fill a container 2/3 full of water. Add a few drops of blue food coloring. Fill 1/3 with mineral oil. Be careful, try not to get any air bubbles. Seal securely. Observe. Discuss your observations.

How Rivers Are Formed

PURPOSE: Children will understand how rivers and streams are formed.

MATERIALS:
- Sand table/sand box
- Water

PREPARATION: Define tributary, river, stream, lake, pond, and delta . Show pictures of maps and point out the water areas.

PROCEDURE: Mound some sand into a small hill. Pour water slowly onto the sand. Have children observe what happens. Explain, that major "rivers", small tributaries. lakes, etc., are formed. Have children identify the source and the "mouth" (where the river begins) of the river. Ask, how is a "delta" formed?

ADDITIONAL ACTIVITY: Using a map, have children identify and trace the path of the Ohio River and its tributaries.

River Scenes

PURPOSE: Children will express themselves artistically through drawing.

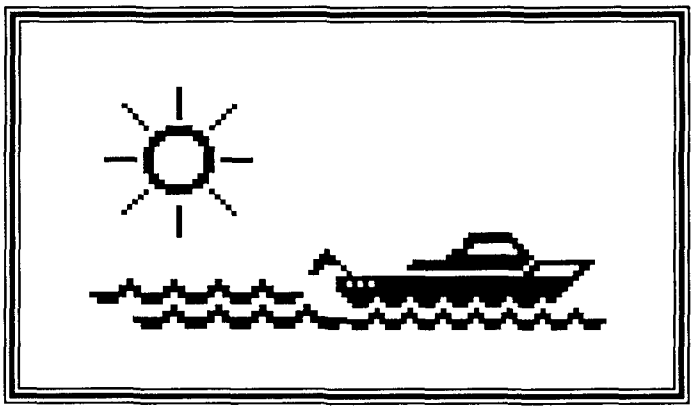
MATERIALS:

- Paper (manila, construction/sketching)
- Crayons/markers/pastel colored pencils
- Postcards/pictures of Ohio River scenes

PREPARATION: Show pictures of river scenes to children or take children to scenic areas, for example, Eden Park, Sawyer Point, Dixie Terminal Building , the Carew Tower, etc.. Ask children, what they see — what colors? Are all the lines straight? Do they see people? Boats?

You may wish to have children work cooperatively on a mural depicting an Ohio River Scene.

PROCEDURE: Have children choose a scene to draw or sketch. Mount on construction paper and display



Most Basic Basin

PURPOSE:

To develop an awareness of the population, land area, and economic importance of the Ohio Basin

MATERIALS:

- Individual copies of the ORSANCO maps "Ohio Basin" and "Principal Cities; Ohio River Basin" (reprinted courtesy of ORSANCO — Ohio River Valley Sanitation Commission)
- Crayons or colored pencils

PREPARATION:

PROCEDURE:

Pass out the maps of the Ohio River Basin. Review and discuss the importance of the following list of Ohio River facts.

Ohio River Facts:

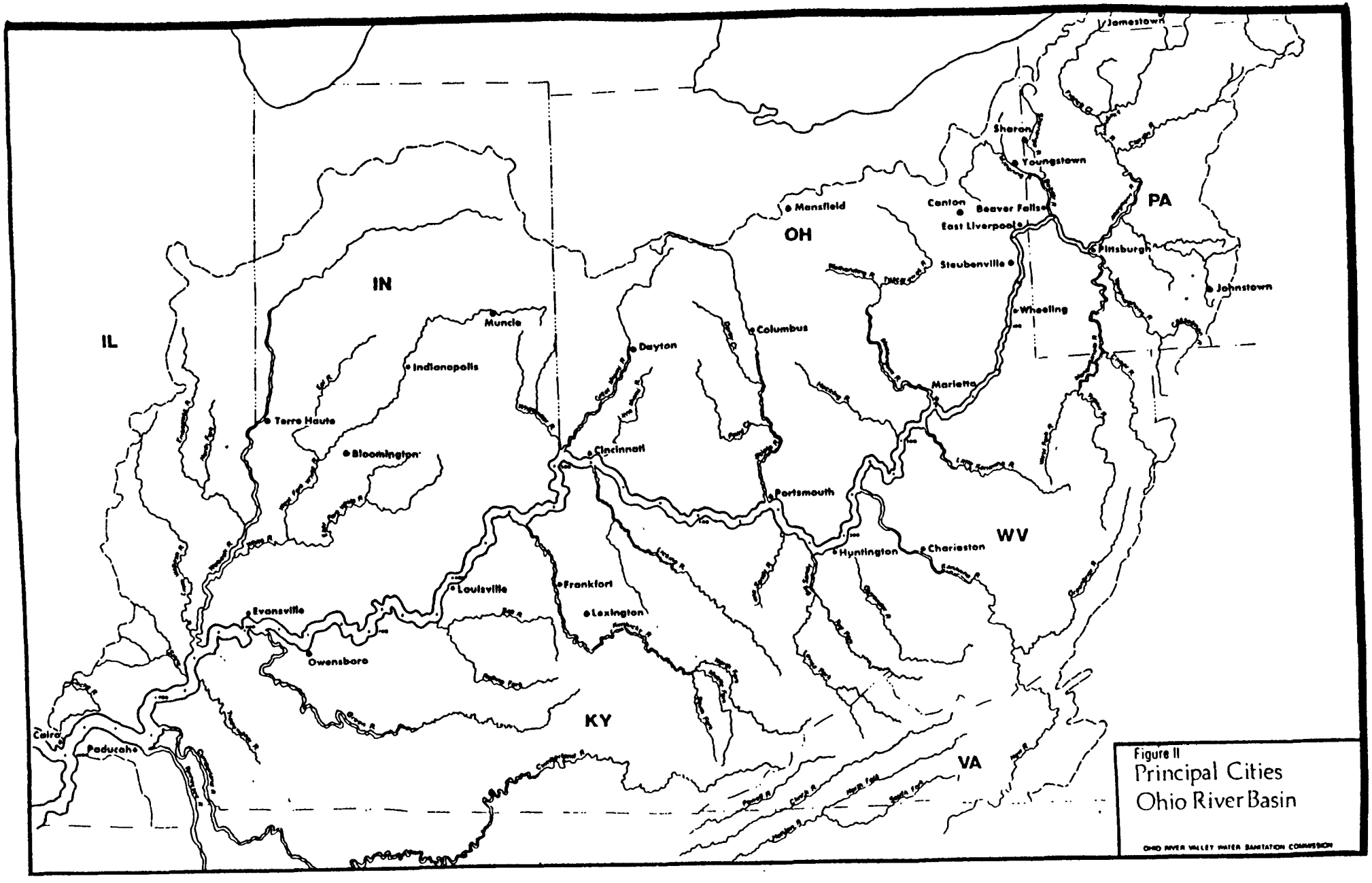
- The Ohio River is 981 miles long
- The river drains an area 204,000 square miles.
- The largest category of land use in the Ohio Basin is agriculture.
- The population of the Ohio River Basin is over 25 million.
- 2.7 million people get their drinking water from the Ohio River (Cincinnati does).
- The drop in elevation of the Ohio River from Pittsburgh, Pennsylvania to Cairo, Illinois is 408 feet.
- The elevation of the Cincinnati pool is 455 feet.
- The Ohio River Basin occupies approximately one tenth the land area of the United States.
- Approximately one-fifth of the nation's total Gross National Product is produced in the Ohio River Basin.
- About 58% of all freight moved in the Ohio Valley moves by water.
- Approximately one-fourth of all the freight tonnage moved each year in the U.S. moves through the Ohio River System.
- Freight can be moved by river barge for about one-third the cost of rail transport and almost one-twelfth the cost of truck transport.
- Each year the locks and dams of the Ohio River system move more freight tonnage than the locks and dams of the Panama Canal.

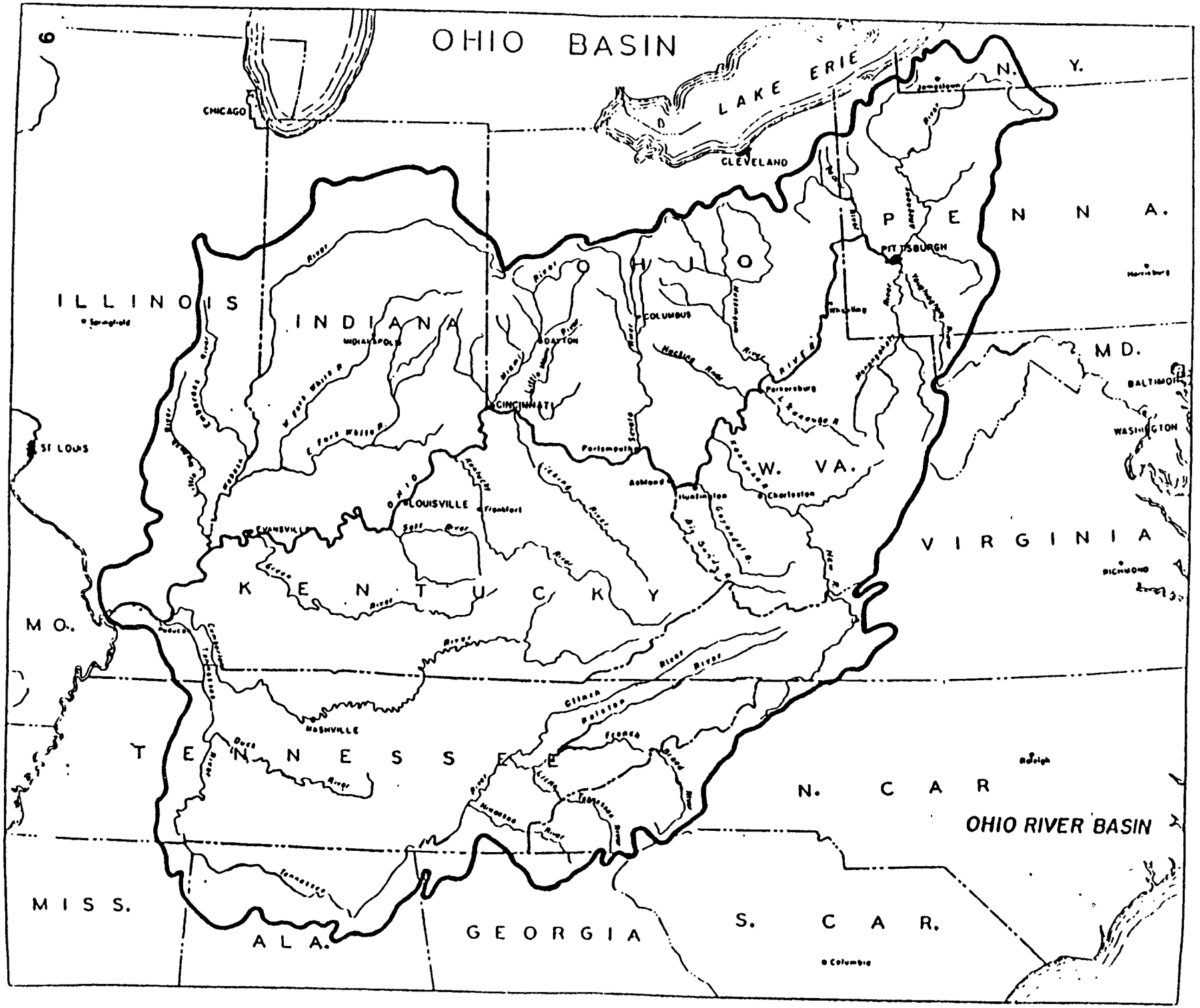
ADDITIONAL ACTIVITY:

Color both maps. For full effect, color the river and its tributaries blue.

Questions for discussion:

1. In river miles, what is the distance from Pittsburgh, Pa. to Cairo, Ill?
2. Water from how many states drains into the Ohio River?
3. How could a land fill (garbage dump) in Wheeling, West Virginia affect the water you drink?
4. How does a toxic waste dump in Cincinnati affect the drinking water in Louisville Kentucky?
5. Why are most of the major cities in the area located along the river and its tributaries?

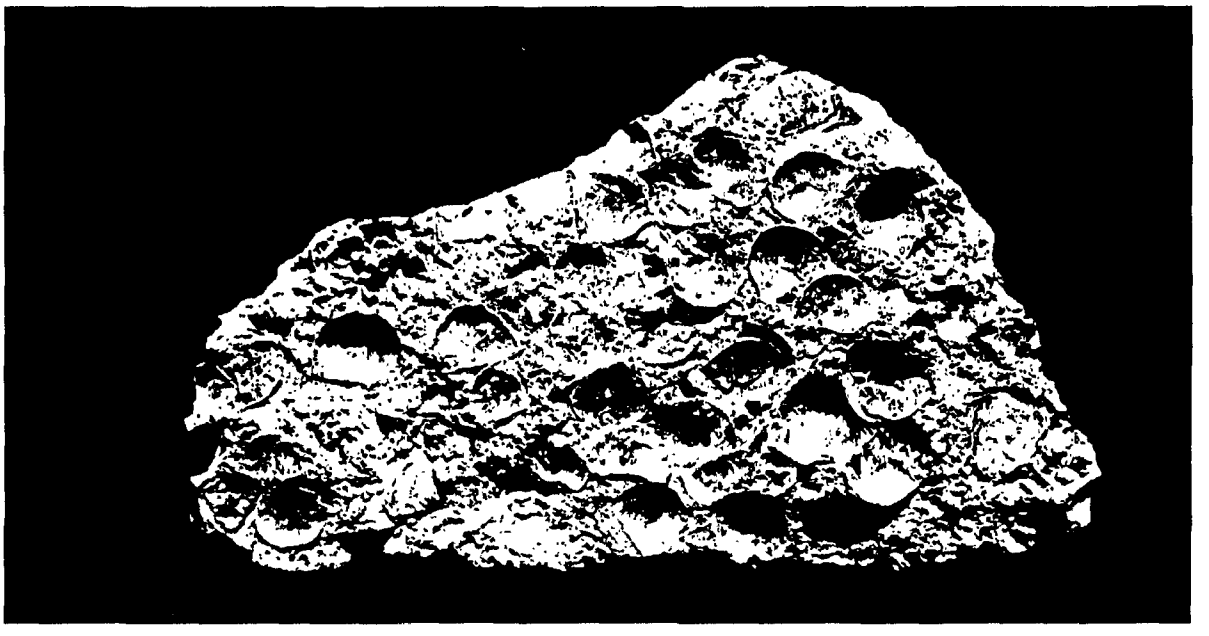

Jamestown
Sharon
Youngstown
Canton
Beaver Falls
East Liverpool
Mansfield
OH
PA
Pittsburgh
Steubenville
Johnstown
Wheeling
IN
IL
Muncie
Columbus
Dayton
Indianapolis
Marietta
Terre Haute
Bloomington
Cincinnati
Portsmouth
WV
Huntington
Charleston
Louisville
Frankfort
Evansville
Lexington
Owensboro
KY
Cairo
Paducah
VA
Figure II
Principal Cities
Ohio River Basin
OHIO RIVER VALLEY WATER SANITATION COMMISSION


6
OHIO BASIN
LAKE ERIE
N. Y.
CHICAGO
CLEVELAND
PENNA.
PITTSBURGH
ILLINOIS
INDIANA
OHIO
COLUMBUS
DAYTON
CINCINNATI
MD.
BALTIMORE
WASHINGTON
ST LOUIS
W. VA.
LOUISVILLE
VIRGINIA
KENTUCKY
MO.
NASHVILLE
TENNESSEE
N. CAR
OHIO RIVER BASIN
MISS.
ALA.
GEORGIA
S. CAR.

Always a Changing River

(Geological Story of the River)

Activities in this section illustrate the geological story of the river. Its early history as a primordial sea is revealed in its fossil remains. These pages will help promote an awareness of the geological changes that have occurred via erosion and deposition of sediment.



A slab of typical Cincinnati rock - loaded with fossils nearly half a billion years old. Contrary to popular opinion, Cincinnati is not a city of hills. It's a city of valleys - valleys carved in a rolling plain formed more than two million years ago.

Pet Rocks

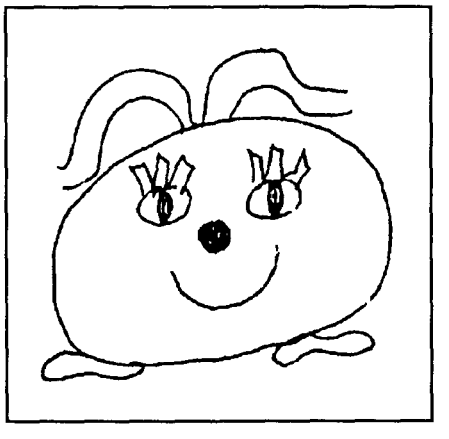
PURPOSE: To create an individualized project using a rock found on the geological dig.

MATERIALS:

- medium size rocks
- epoxy glue
- paint /markers
- assorted scraps of materials, yarn, etc.

PREPARATION: Gather medium size rocks for students to turn into "pets". Assemble small scraps of different materials for decorating. Be sure rocks are clean and dry before using.

PROCEDURE: Use markers or paints to make facial features on the individual rocks. Glue yarn, felt, or other materials on the rocks to personalize them. Let the children name their pet rocks.



Sediment Jar

PURPOSE: To demonstrate how the layers of sediment beneath the Ohio River were formed.

MATERIALS:
- gallon jar
- water
- various sands, soils, pebbles, rocks, etc.

PREPARATION: Locate a rocky bank or field. Using a shovel let an adult dig up an area to expose the layers of soil. Explain to children that there are also layers of sediment (matter that settles at the bottom of a liquid) found at the bottom of the Ohio River. Tell children that you are going to create your own river bed with the sand, soil and rocks that they bring in the next day.

PROCEDURE: Fill the gallon jar about halfway full with tap water. Let the students empty the sands, soils, etc. that they have found at home into the jar. Let them predict which ones will sink to the bottom and which will form the top layers of sediment. Continue to observe the jar throughout the week to see how the layers of sediment form.

ADDITIONAL ACTIVITIES: Let the children keep a picture journal showing the change in the sediment day by day.

Fossil Hunt

PURPOSE: To experience the geological history of the area by finding fossil samples and identifying them.

MATERIALS:

- small zip-lock baggies
- trowels or small shovels
- hand magnifying lenses

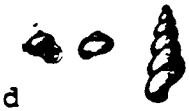
PREPARATION: Books on fossils, worksheets on fossils. Explain to children that the history of Ohio is recorded in the rocks and fossils of the area. Cincinnati's geological history goes back four hundred and fifty million years ago to when it was covered by a shallow sea filled with all types of life forms. Some of the most common types of fossils (remains of dead creatures and plants) are: Trilobites, Crinoids, Nautiloid Cephalopods, Brachiopods and Bryozoa clams.

PROCEDURE: Locate a rocky bank that has limestone and shale rocks. Allow children to explore for fossils. When they do, they are to place their finds in the plastic bags. They can sort them later according to a fossil checklist. The checklist will name the most common fossils and have a column to mark if that type has been located.

ADDITIONAL ACTIVITIES: Visit the Natural History Museum and their fossil collection.

Fossil Chart

If you have found one of these fossils please check (✓) it.

TERM	DISCRIPTION	PICTURE	CHECK ✓
1. Trilobite	Looks like a sowbug		____
2. Crinoid	Flower-like appearance "Sea Lillies"		____
3. Natuiloid Cephalopod	Ancestor of the octopus	 Squid	____
4. Brachiopods	Two valve clams	 	____
5. Bryozoa	Twig, fan, or lumb sized objects with myraid of tiny holes		____
6. Gastropod	Snails		____

IF YOU HAVE FOUND ONE OF THESE IN YOUR FOSSIL HUNT PLEASE

NAME IT!




_____ _____ _____ _____

The Hills of Cincinnati

PURPOSE:

Children will explain how the hills and valleys surrounding Ohio were formed.

MATERIALS:

- Box of ice cream
- Hot water

PREPARATION:

Explain to children that the hills and valleys in the Cincinnati area were formed by glaciers millions of years ago.

Define erosion.

PROCEDURE:

To demonstrate the effects of erosion in forming the hills of Cincinnati. Bring in a box of ice cream. Remove the cardboard packaging from the ice cream. The block of ice cream represents the plains that once covered the area. Pour a trickle of hot water over the ice cream in one spot. Watch the block melt away slowly and finally break apart. In a similar way erosion by water and ice wore away the plain to form the hills and valleys of Cincinnati that exist today.

ADDITIONAL ACTIVITIES:

1. To help children understand the concept of millions of years, *compile a million of something — zeros on a page, beans, etc..*
2. Visit Bicentennial Commons at Sawyer Point and walk along the geologic time line.
3. Find the names of Cincinnati's seven hills.

Left Behind

PURPOSE: Children will identify fossils and make molds of fossils.

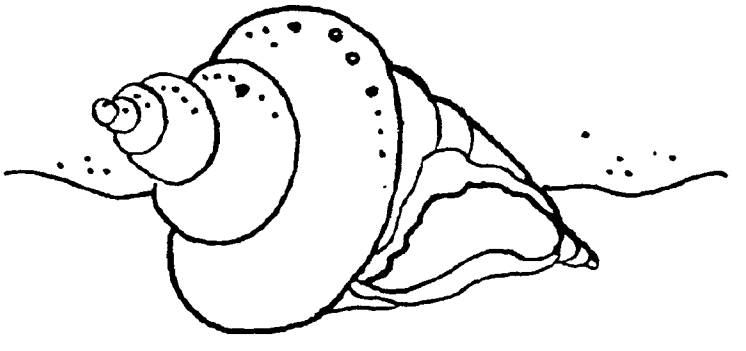
MATERIALS:

- Plaster of Paris
- Petroleum Jelly
- Mixing bowl and stick
- Cardboard
- Spoon
- Assorted objects, such as leaves, bones, twigs, shells...
- Fossil Guide

PREPARATION: Visit the Cincinnati Natural History Museum to observe the fossil exhibit. Explain that fossils are the remains and traces left by dead organisms. Fossils include preserved bodies, parts of bodies, marks, footprints ...

PROCEDURE: Go on a fossil hunt. Walk along the river bank. Look for fossils. Identify the fossils using the fossil guide.

Have children collect assorted objects to be fossilized such as leaves, bones and shells. Have them place a layer of petroleum jelly on each object to be used. Then follow the directions on the Plaster of Paris to make a thick, smooth mixture. Children can then drop spoonfuls of Plaster of Paris mixture onto the cardboard and press a coated object onto each mound. After the plaster hardens, remove the object. A fossilized print should result.



Erosion & Deposition

PURPOSE:

To develop an awareness of the geologic changes that have taken place in the formation of the Ohio River Valley.

MATERIALS:

One copy of The River Book, edited by Joyce V. Cauffield and Carolyn E. Banfield.

PREPARATION:

Pre-teach the background material from the essay, "Land Fit For a Queen: The Geology of Cincinnati" by R. A. Davis (pp. 130-137).

Pre-teach the following terms:
- Teays River • Erosion • Deposition
- Glacial Outwash • Glacial Till

PROCEDURE:

Demonstration

Run a trickle of water down an inclined plane of loose soil (any small dirt pile of 24 inch or greater elevation will do).

Change the angle of inclination and observe what happens to the drainage of the water (The greater the angle of inclination, the straighter and deeper it cuts into the soil).

Observe the pattern created by the soil deposited at the bottom of the inclined plane. How did the pattern of deposition change as the angle of inclination changed?

ADDITIONAL ACTIVITY:

Arrange a field trip to the scenic overlook at Ault Park. From there, take note of the following for observation and follow-up analysis and discussion:

1. The elevation of the surrounding hills is essentially even.
2. The valleys through which the small drainage creeks run are far too great to have been created by such small creeks.
3. The large valleys (broad and deep) that can be seen all run to the northwest, yet there is no great river system there to have created them.

Always a Useful River

(Pre-Historic Dweller's Story)

People arrived in the Ohio Valley at the end of the glaciers. There were a series of prehistoric Indian tribes, each with its own culture. Until the 1750s, the area was peaceful as Indians hunted and traded with the French fur trappers. As British and Americans began to invade the Ohio Valley this tranquility was interrupted. Thus began the struggle for control of this rich land on the Ohio River. The river brought settlers, merchants, and commerce to the Ohio River Valley.

"Always a Useful River" reveals the highly complex societies that existed and vanished prior to white European intervention in the Ohio Valley and the subsequent growth along the Ohio River.

Something's Fishy

PURPOSE: To observe and identify fish native to the Ohio River.

MATERIALS: Books with pictures of Ohio fish.

PREPARATION: Give children some background information. On the Ohio River, fishing is not only a sport but a great commerce. Fish as a food has always been one of the great resources of the river. The annual fish catch is valued at twelve and a half million dollars a year.

The most important fish caught in the Ohio include carp, catfish, fresh water churn, white bass and yellow perch.

PROCEDURE: Pass out books or pictures of fish found in the Ohio River. Let the children observe the pictures, identify them, write a description of them and sketch them on their journal page.

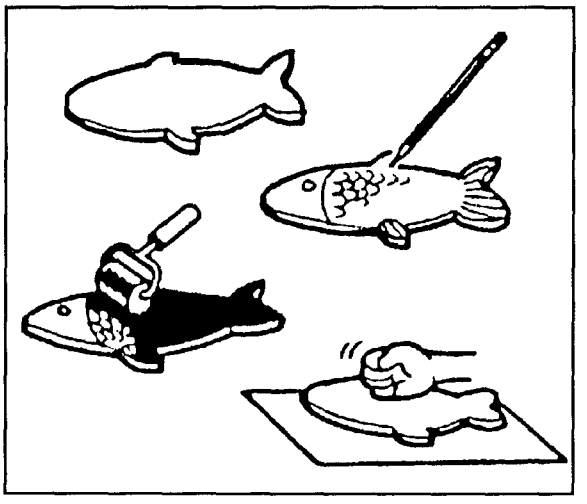
ADDITIONAL ACTIVITIES:

1. Visit the seafood section of your local supermarket or Findlay Market and identify which fish may be found in the Ohio River.
2. Invite a local fisherman to come and show the group his fishing equipment and to talk about his experiences.
3. Have a seafood feast and let the children sample bites of different kinds of fish and seafood.
4. Let the children create a mural depicting the different kinds of plant and animal life in the river.

Fish Prints

Description

Styrofoam printing

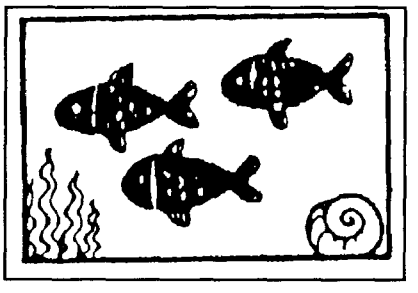


Materials

1. (1) styrofoam meat tray for each child
2. a pencil for each child
3. black water-soluble printing ink
4. 3 or 4 brayers for rolling ink
5. sheets of white construction paper
6. 3 or 4 sheets of plastic or tile
7. drawing materials: crayons or markers
8. scissors

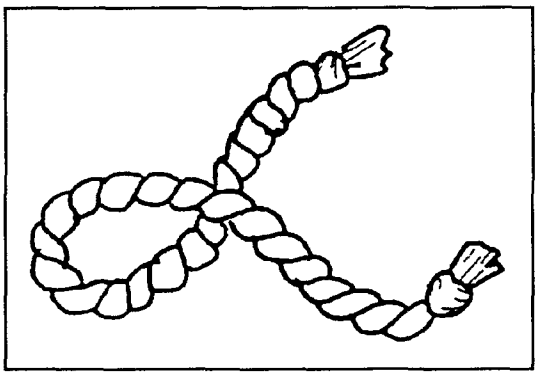
Directions

1. Cut the shape of a fish out of the meat tray.
2. Use a pencil to press in scales, eyes, and any pattern desired.
3. Ink the tray well and press onto the construction paper in the desired location.
4. With a piece of scrap paper in your hand, rub back and forth until the ink has printed onto the paper.
5. Remove the tray, re-ink, and repeat the rubbings until there are several fish prints on the paper.



Nautical Knots

PURPOSE: Children will become familiar with some of the more useful *nautical knots and learn* how to make them.



MATERIALS: Rope/twine

PREPARATION: Children can work in pairs or groups to complete this activity. Be sure you have enough rope or twine available. This activity can take place out of doors using jump ropes to make knots or it can take place indoors using pieces of twine (12 inches in length).

PROCEDURE: Discuss with children the uses of knots. For example, shoe laces, at the end of a piece of thread, etc.

Ask:
Why do you think boat workers might need to know how to make knots? Learning how to make different knots can be a good way to pass the time on the river as well as a useful tool.

Using the following activity sheet demonstrate how to make nautical knots.

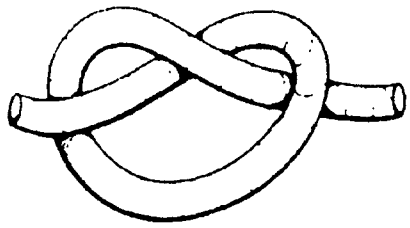
Pass out enough ropes or twine for children to practice making nautical knots.

ADDITIONAL ACTIVITY: You may wish to visit the Inland Waterways Program, housed at Peter Clark Academy to watch river workers use nautical knots.

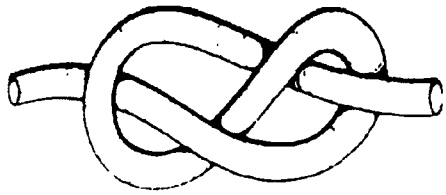
Nautical Knots

Read the description of each knot to learn how it is used on a boat. Then get some rope and practice making them.

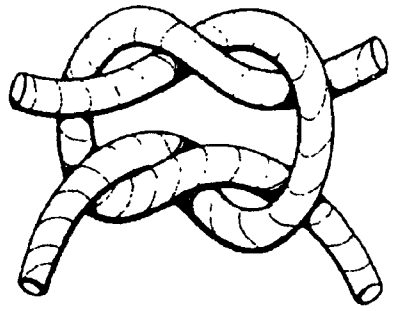
1. *Overhand Knot*
   used to prevent the end of a rope from unraveling; almost impossible to untie



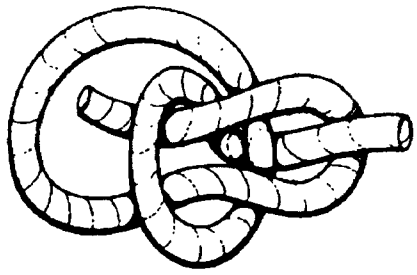
2. *Figure-eight Knot*
   prevents the end of a small line from running through a block; easy to untie



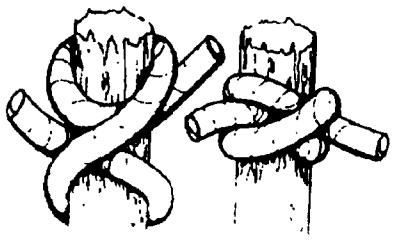
3. *Reef or Square Knot*
   (2 pieces of rope)
   used to tie a bundle; easy to untie when wet



4. *Bowline*
   most useful of all knots used on a boat because it never slips or jams and can always be untied



5. *Clove Hitch*
   used to temporarily tie a line to a post



I Can Dig It!

PURPOSE:

Children will experience an archaeological dig.

MATERIALS:

- Artifacts to bury and find (chicken bones, pieces of broken flower pots, pennies...)
- Dirt and water

PREPARATION:

Explain the work of archaeologists - that they must work carefully and methodically not to ruin artifacts as they are discovered.

Explain that artifacts reveal information about the people that made them. Explain that the Ohio River Valley was a center for prehistoric Indian tribes: the Adena, Hopewell and Fort Ancient. Prehistoric Indian tribes used no written language. Indian mounds were used for burial and ceremonial purposes. Point out that archaeologists know more about the early Indians' burial customs than their daily lives because few village sites have been excavated but many burial sites have been studied.

PROCEDURE:

Define artifacts, excavation customs. Divide the children into two groups each with materials to be buried. Clear a small area out of doors (or use a large dish pan indoors) and have the groups bury their objects. Mix the water with some soil to make mud - have children build burial mounds. Then have the groups "switch," digging up what the others had buried. Have them do this methodically, noting what they uncover on paper. Have the children hypothesize the use of each item.

ADDITIONAL ACTIVITIES:

1. Visit the Cincinnati Museum of Natural History or the Art Museum to see the exhibits on prehistoric cultures.

2. Hold a debate: preservation of archaeological sites versus land development progress.

3. Research information about the Adena, Hopewell and Fort Ancient Indians. You may want to visit Fort Ancient Park.

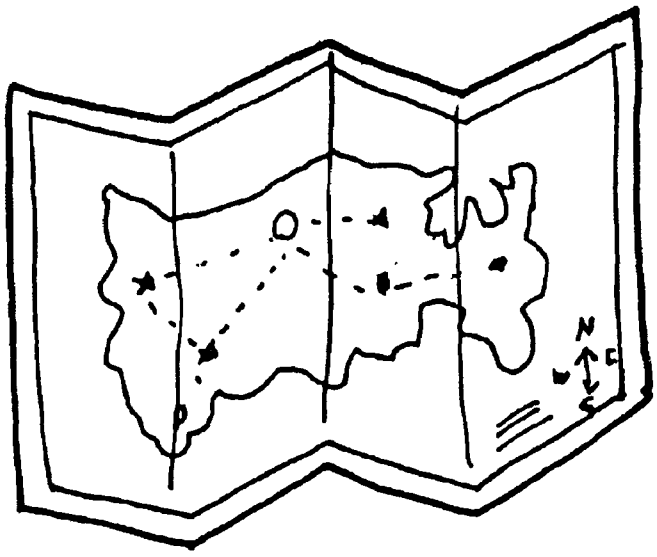
4. Discuss funeral and burial customs today. Compare them the customs of the Adena, Hopewell and Fort Ancient Indians.

Always a Mapped River

(Surveying and Mapping Story)

Activities in this section introduce children to map-making methods and help to develop an awareness of the population, land area and economic importance of the Ohio River Valley.

For additional pages that relate to this theme see also "On the Banks of the Ohio" and "Most Basic Basin" under section titled "Always a Significant River".



Mapping to Scale

PURPOSE: To develop mapping skills.

MATERIALS:

- Map of Cincinnati to use as a model
- Paper to cover LARGE area
- Markers/crayons/colors
- Miscellaneous materials to build scale models of houses, bridges, trees, river boats, etc.

PREPARATION: Looking at the map, discuss where people first settled in Cincinnati. Discuss possible reasons for their choices. Explain that as people began to settle, they had to develop a "plan" as to how and where they would begin to construct their homes.

PROCEDURE: Explain to children the concept of "scale" as a smaller unit of measurement being used as a substitute, or in place of the actual measurements.

Depending on available floor space, cover an area with paper (join by taping to the underside — can later be folded for storage). Have children begin by laying out a simple outline map of Cincinnati. Trace the outline onto the paper. Identify areas where the early settlers may have lived. Children can then fill in these areas with scale models of landmarks. Direct children to think about logical placement of residencies and businesses.

Dear Diary

PURPOSE: To enhance writing ability and self expression.

MATERIALS:

- Paper
- Stapler
- Examples of diary entries

PREPARATION: Ask children how many of them know what a diary is? Ask, how many of them keep a diary? Explain that diary keeping was an important way of preserving and recording information in the past. Explain that much of what we know about early Cincinnati and the experience of the new settlers traveling down the Ohio are from their diaries.

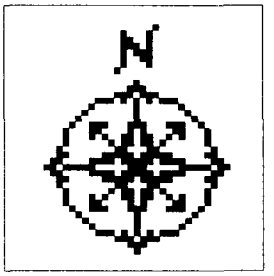
PROCEDURE: Using paper and a stapler assist children with making books or diaries. Direct them to write in it every day. Discuss what "things" they may want to record, then have them do so. For example, the water was choppy.

Compass Treasure Hunt

PURPOSE: Children will learn how to simulate the use of a compass.

MATERIALS:

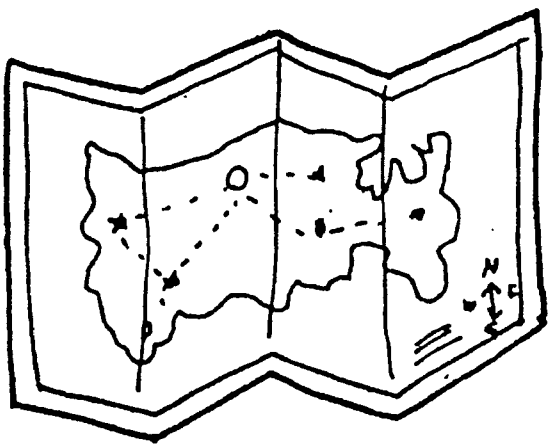
- 1 or 2 compasses
- Picture of a compass (provided)
- Paper/pencil



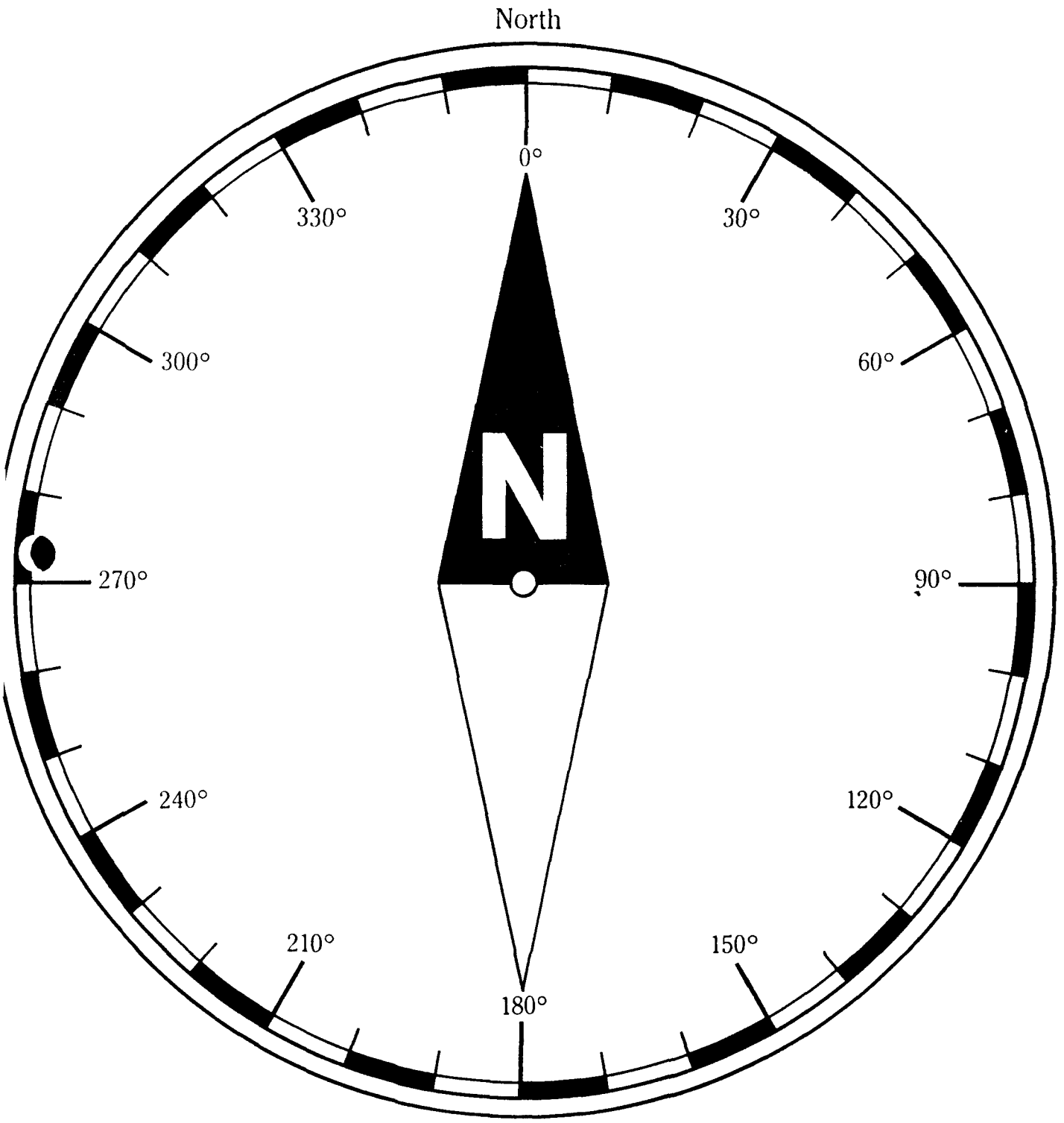
PREPARATION: Show the children a picture of a compass (picture provided). Explain why and how compasses are used.

PROCEDURE: The object of the game is to use a compass to find a hidden treasure. It requires a minimum of two players but can be played in teams. The game can be played indoors or outdoors.

Have **Player B** leave the room or vicinity as **Player A** uses the compass to map out a route to the treasure. Beginning at a designated starting point, have **Player A** use the compass to determine the direction in degrees and the number of steps toward a first station. A player should then write down the direction and distance in steps to Station Two. The note should be placed in a hidden spot at Station One, otherwise **Player B** will be able to identify the station without using the compass. Have **Player A** continue for four or five stations, with the final station containing a treasure. Then have **Player B** re-enter and use the compass to locate each station and, ultimately, the treasure. After the treasure has been found, have **Players A** and **B** reverse roles.



Picture of Compass



Always An Altered River

(Story of Human-made Changes)

The Ohio River was created as a result of change — natural change wrought by the forces of glaciation. Added to these forces of natural change, the Ohio River has undergone extensive man-made changes. Since the age of the Neolithic Revolution, it has been to the benefit of humankind to not only adapt to the environment, but also to change the environment to best meet our needs. Combined, these two dynamic forces of change — nature and the human desire to control nature — have created the Ohio River as it exists today.

The annual cycles of flood and drought that once dominated life along the banks of the Ohio River are largely a thing of the past. Through an intricate system of locks and dams, the Corps of Engineers now maintains a more regular, controlled flow of water down the course of the Ohio River. Improved traffic on the river is followed by improved traffic over the river as an ever-increasing number of bridges are built to span the width of the Ohio River. Additionally, our desire to improve the quality of life in as well as along the river now gives us the technology that can lead to greater filtration and improved purity of the water that is returned to the Ohio River. Finally, as the Ohio River becomes more of a focal point of life in our river town, we have dressed her banks with the ornaments of leisure — restaurants, parks, and stadiums. As these dynamic forces of change continue to work on the Ohio River, it is the responsibility of all to ensure that these are positive changes that add to the quality of life both in and along the "Beautiful Ohio".

Cincinnati Under Water

PURPOSE: Children will identify ways in which life is disrupted during a flood and present methods of flood control.

MATERIALS: Old pictures of Cincinnati during times of flooding (available from the Historical Society)

PREPARATION: Explain that the flood of 1937 was the worst in Cincinnati's history. Local tributaries also flooded. Traffic and city services were disrupted virtually paralyzing the city. The area most damaged by the flood was the Mill Creek Valley. Thousands of Cincinnatians were left homeless.

PROCEDURE: Have children make predictions about what happened during "The Big Flood". Ask if any children have ever experienced being in a flood. Look at old photos of the 1937 flood, and investigate present methods of flood control along the Ohio such as flood walls and gates.

ADDITIONAL ACTIVITIES: Have students listen to the news and chart the river height for one week. Graph the heights the river waters reached during several Ohio River floods. Visit the flood pole at Sawyer Point.

Canals

PURPOSE:

The children will understand that the pioneers learned to alter their environment by the creation of man-made "tributaries" called canals.

MATERIALS:

- Maps of the canals
- Colored pencils or markers

PREPARATION:

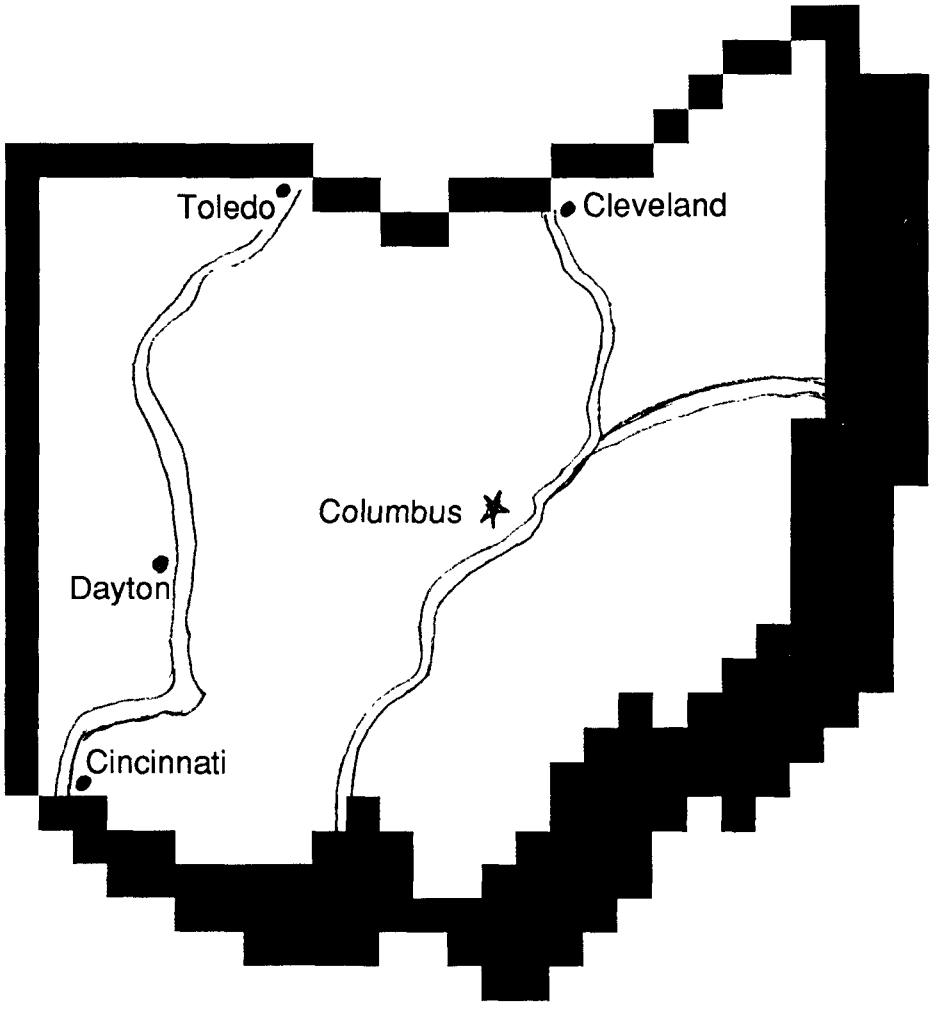
Children will have already learned to use a color key and be aware of tributaries from a previous activity.

Tell the children that with so many tributaries the ingenious people from Ohio created their own man-made waterways to meet their growing need for transportation and commerce - canals. Two major north-south routes were established: The Ohio-Erie Canal between Cleveland and Portsmouth, and the Miami-Erie Canal from Toledo to Cincinnati. An east-west "tributary", the Sandy-Beaver Canal was also formed because of the success of the former two canals. The state's canals became vital transportation links for the 19th century rural and urban pioneers.

PROCEDURE:

The children will color each canal according to the color key provided.

Ohio Map with Canals



Miami and Erie Canal - red
Ohio and Erie Canal - blue
Sandy and Beaver Canal - green

Break the Ice

PURPOSE: Children will introduce themselves to each other.

MATERIALS: Packs of regular multi-flavored life savers.

PREPARATION: Explain to children that during the winter time the Ohio River often freezes over, halting river traffic. It is therefore necessary to "break the ice" or mix it up in order to get the river flowing again. Likewise, a new group needs to be mixed-up — people need to "break the ice" to get to know each other.

PROCEDURE: Distribute one Life Saver candy to each child. Direct the children to put the candy in their mouth, but not to chew it. Have children circulate — tell them to stick out their tongue and find those people with the same color tongue as theirs — together they will go in search of other children with the same color tongue.

Footprints into the Past

PURPOSE: Children will put events into chronological order.

MATERIALS:

- Cardboard
- Crayons
- Magazines
- Scissors
- Glue
- Reference materials

PREPARATION: Have children work in pairs to research the history of the Ohio River. For example, date of completion of the Suspension Bridge, date of the "big flood", date settlers first came to Cincinnati, etc..

Discuss the meaning of chronological order. For example, ask children to tell you when they were born. Put these dates in chronological order.

PROCEDURE: Give each child a piece of cardboard on which they can outline their footprints (both feet — shoes on).

On one foot the child lists the event and the date on which it took place — include a brief description. On the other foot, have children draw or clip pictures from magazines that represent the event.

When finished, the children should combine their "footsteps into the past" in the correct chronological order. You may wish to mount the footsteps on the wall as a time line.

You Can't Get There From Here!

PURPOSE: To develop an understanding of the man-made changes that have altered the flow and fall of the Ohio River

MATERIALS: Copies of The River Book, edited by Joyce V. Cauffield and Carolyn E. Banfield. Use the diagram of the fall of the Ohio River located on page 106.

PREPARATION: Pre-teach the section "Navigation and Flood Control" from The River Book, pp. 105-110.
Review the following Ohio River Facts (also found in the activity, "Most Basic Basin")

Ohio River Facts:
- The Ohio River is 981 miles long
- The river drains an area 204,000 square miles.
- The largest category of land use in the Ohio Basin is agriculture.
- The population of the Ohio River Basin is over 25 million.
- 2.7 million people get their drinking water from the Ohio River (Cincinnati does).
- The drop in elevation of the Ohio River from Pittsburgh, Pennsylvania to Cairo, Illinois is 408 feet.
- The elevation of the Cincinnati pool is 455 feet.
- The Ohio River Basin occupies approximately one tenth the land area of the United States.
- Approximately one fifth of the nation's total Gross National Product is produced in the Ohio River Basin.
- About 58% of all freight moved in the Ohio Valley moves by water.
- Approximately one-fourth of all the freight tonnage moved each year in the U.S. moves through the Ohio River System.
- Freight can be moved by river barge for about one-third the cost of rail transport and almost one-twelfth the cost of truck transport.
- Each year the locks and dams of the Ohio River system move more freight tonnage than the locks and dams of the Panama Canal.

You Can't Get There From Here!

Continued

PROCEDURE:

Pre-teach the principle and purpose of the locks and dams of the Ohio River. It is important to point out that before the locks and dams existed, the Ohio River was not considered a navigable river system all year round. In the Spring and Fall of the year ample rainfall could swell the river to an easily navigated depth. However, late summer drought could often make large sections of the river too shallow for heavy traffic and therefore impassible.

Demonstration:
Run a trickle of water down an inclined plane of loose soil (any small dirt pile of 24 inch or greater elevation will do). The angle of inclination of the plane need not be great. In fact, a low gradient is preferred (The Ohio River falls only 408 feet in its 981 mile course — *an average fall of less than six inches per mile*).

Observe the course of the water trickle down the low gradient. Notice the greater the flow of the water, the deeper the course. By using sticks, stones, mud, or even your hand to block the channel of a low gradient water flow, you can create a dam that forces the water to level off like a "step". A series of dams would create a series of "stepped" pools.

This is exactly what the U.S. Corps of Engineers has done on the Ohio River. (Refer to the chart on page 106 of The River Book.) In this case, the locks can be compared to "floating elevators" that raise and lower the river traffic from one "stepped pool" to the next. The Cincinnati pool of the Ohio River is 95 miles long. It stretches from the Meldahl Dam to the Markland Dam, and maintains a pool depth of 26 feet at the Cincinnati Riverfront.

ADDITIONAL ACTIVITY

Follow-Up :
Arrange a field trip to the Meldahl Dam near New Richmond, Ohio to observe the locks in operation. While there enjoy the ambiance of New Richmond, a town that is undergoing a restoration to its turn-of-the-century river town appearance.

Always a Desirable River

(Story of Settlement)

The story of settlement along the Ohio River is of people hoping for a better life. Feeling Spanish infringement into their original Florida homeland, the Shawnee Indians brought their culture to the Ohio Valley and left their mark on this area's literature and lore. The European settlers who left their eastern settlements to brave the wilderness for the beauty and bounty of the Ohio Valley have also put their cultural stamp on this region. A Germanic migration to this area in the mid-nineteenth century created a culture unique to this region — from brats and beer to Sauerbraten and Victorian architecture. The African Americans who fled bondage and persecution in the Ante Bellum South brought with them their own distinct heritage. During the period between the two World Wars, this region was seen as a land of opportunity to countless families of all races from the rural South and the Appalachian East. These migrations continue to this day as new "settlers" bring the gift of their customs, cultures, and ethnic contributions to this community. For all of these peoples who have, over the centuries, sought settlement in the haven of the Ohio Valley, there is a common thread that binds — hope! Regardless of point of origin, they came here hoping to find freedom, opportunity, and acceptance. They came in hope!

The Settlement of Cincinnati

PURPOSE: To give the children a visual concept of the progression of settlement in Cincinnati.

MATERIALS:

- The drawing depicting the progression of settlement in the city of Cincinnati
- Crayons or markers

PREPARATION: Each child will be given a drawing of the progression of settlement in Cincinnati with an oral explanation of that development as indicated in the background information section.

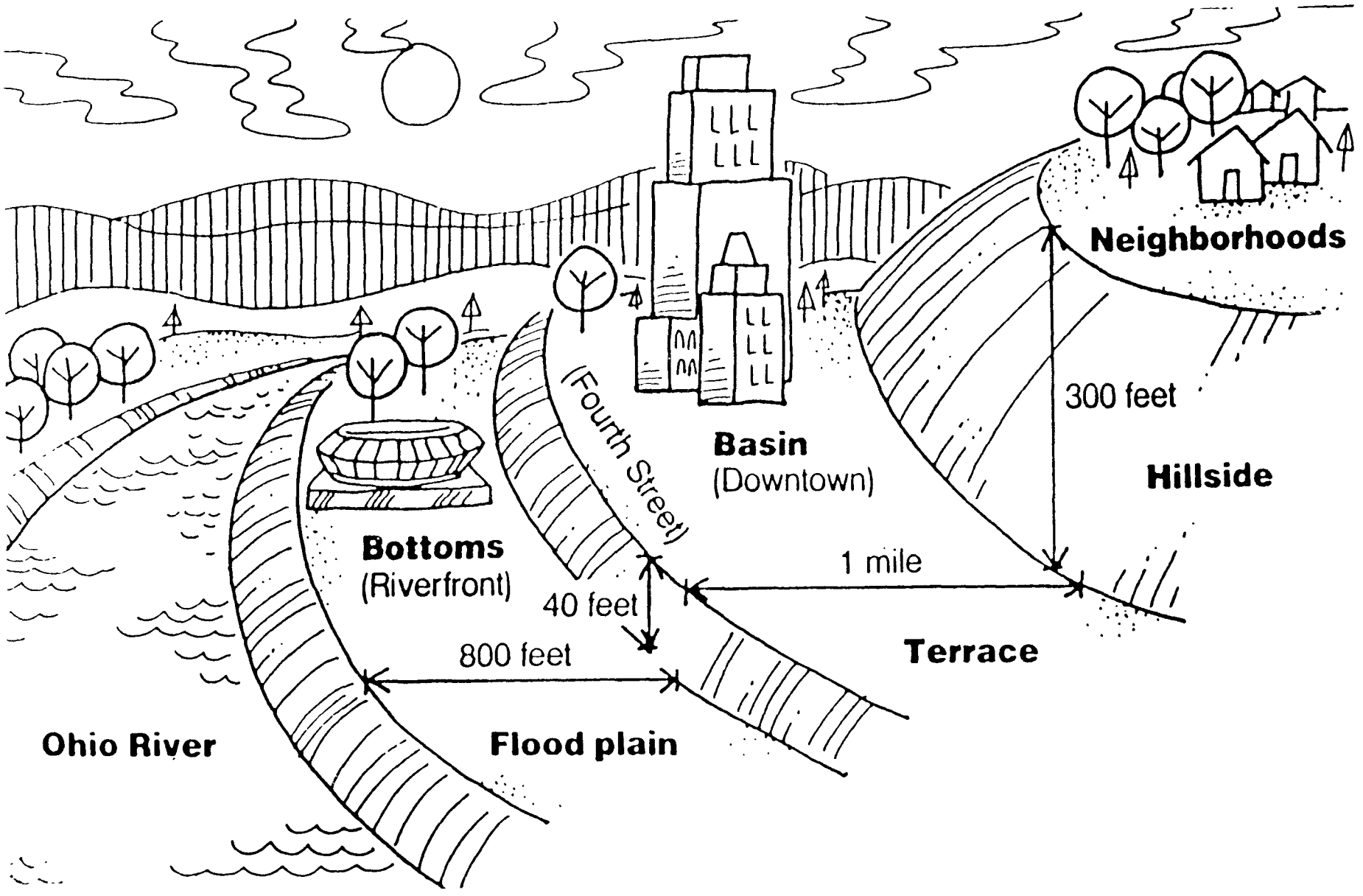
PROCEDURE: The children will color the drawing.

ADDITIONAL ACTIVITIES:

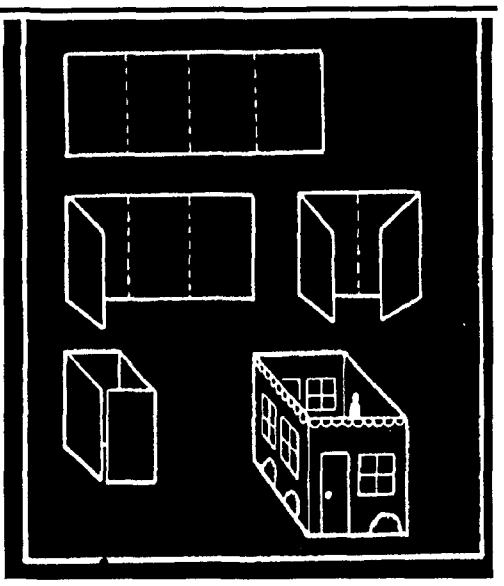
1. Field trips to the Serpentine Wall, Coliseum, Riverfront, etc. (Bottoms), Downtown (Basin), and Mount Adams (Neighborhood) to experience the progression of settlement in the city and their respective areas.

2. Use the pattern on the following page or have children bring in small milk cartons, cereal boxes, etc. to make their own city settlement model.

STAGES OF SETTLEMENT OF THE CITY OF CINCINNATI WERE FIRST BOTTOMS, THEN BASIN, AND FINALLY NEIGHBORHOODS. COLOR THE PICTURE BELOW IN THAT ORDER.



Folded Building



Description

Crayon drawing and cutting

Materials

1. (1) 9" x 24" piece of manila paper for each child
2. crayons
3. scissors

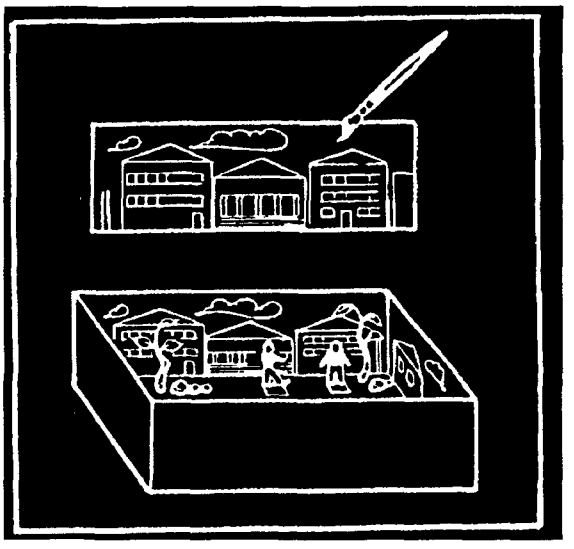
Directions

1. Lead the class in folding the paper step by step, as shown in the illustration on the right.
2. Discuss the project carefully. (See Suggestions for the Teacher below.) Then have the students design and color the interiors and exteriors of their "buildings."

Suggestions for the Teacher

Show the children the folded paper. Ask them to imagine that it is a building. The *outside* of the paper will be the outside of the building, and the *inside* of the shape will be the inside of the building. Have each child choose what kind of a building he/she will design: school, home, firehouse, store, etc. You might want to relate this project to a specific area of study.

Our Town



Description

Watercolor and cut paper

Materials

1. (1) cardboard shoe box for each child
2. white paper to fit inside box (across sides and back)
3. construction paper scrap box
4. glue and scissors
5. watercolors and brushes
6. watercans and newspapers

Directions

1. Cut the white paper so it fits *inside* the shoe box (around all sides).
2. The white paper will be the *interior* of the scene. Use watercolors to paint scenes from "your town" on the paper.
3. Glue it inside the box.
4. Use construction paper scraps to create figures, cars, trees, anything that might be included in the street scene.

Past, Present, Future Self Portrait

PURPOSE: To enhance children's visualization of self.

MATERIALS:

- Paper
- Colors
- Examples of portraits from different time periods.

PREPARATION: Visit the public library. Show children portraits from different time periods. Compare and contrast with today's styles. Note differences — details in dress, hairstyles, background etc..

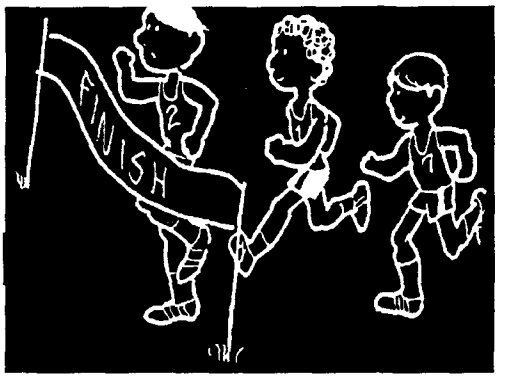
Children may be able to bring in pictures of grandparents from their childhood. If portrait examples are brought in by children ask them to share something about the photo.

PROCEDURE: Have children draw self portraits of themselves in three different time periods:

- As a person from Cincinnati in the 1800s
- As a person from Cincinnati in the 1990s
- As a person from Cincinnati in 2191

Guide children as to authenticity in past portraits. Have children make up a story about their lives in each of their personal portraits. Stories may be in either oral or written form. Then have children share their stories with the group.

Let's Play



PURPOSE: Cooperative play

MATERIALS:
- Children to play the game
- Pictures
- Research materials

PREPARATION: Explain to children that boys and girls who first traveled down the Ohio River to settle in Cincinnati had no VCRs, televisions, radios, records and very few books. There were no shopping malls or multiplex theatres.

Read from any of the Laura Ingles Wilder books about what she did as a young girl living during that time.

PROCEDURE: Discuss with children what boys and girls from the late 1700s might have done for fun. Could they do those things on a flatboat? Research games of the past — sack races, stick and ring toss, corn husking, tag, hop scotch, hoop and stick races, horse shoes, three-legged races, stilts, making and cutting paper dolls....

Play some of the games.

ADDITIONAL ACTIVITY: Hold a Pioneer Day celebration. Children should come dressed as much like settlers as possible.

Flatboats

PURPOSE:

Children will understand where settlers to Cincinnati originated from and by what means these early settlers traveled down the Ohio River.

MATERIALS:

- Popsicle sticks
- Paper
- Glue
- Crayons

PREPARATION:

Explain to the children that the first settlers to the Ohio Valley were from the east. The people who came were farmers and land speculators. Most settlers arrived by flatboats. These boats were flat as their name indicates, much like a raft with a hut built onto it. Describe to the children that families traveled on the flatboats, as well as their livestock. Explain that the flatboat could only float downstream; it did not have a sail or motor. Once the family arrived at their destination, they dismantled their flatboat and used its materials to begin construction of their new home.

PROCEDURE:

Distribute to each child approximately 15 popsicle sticks. Have the children glue them together to make a square then add four sides. Use paper to draw a hut and mount it on top of the flatboat.

ADDITIONAL ACTIVITY:

Discuss with the children the experience of moving to a new place. Ask, how many have moved before? What was it like? How did they feel? Direct questioning to the past — What kinds of things do you think the early settlers brought with them? Guide responses.

Blue Jacket

PURPOSE: To develop an understanding of and appreciation for the cultural diversity and cultural conflict involved in the settlement of the Ohio Valley

MATERIALS: Copies of the book, Blue Jacket, by Allan W. Eckert. (This is a juvenile book and can be read in a matter of a few hours.)

PREPARATION: Read / review the story of Blue Jacket. In this book, the students will get a picture of the sights and sounds of everyday life in the valley of the Ohio River at the time of the first European settlement.

PROCEDURE: Tell the story of Marmaduke Von Swearingen, the Pennsylvania farm boy who, at the age of seventeen, was captured by the Shawnee Indians and adopted into the tribe. As a result of his diligence and personal effort, Marmaduke, now called Blue Jacket, rose to become a famous war chief of the Shawnee.

As war chief of the Shawnee Nation, Blue Jacket led his adopted people in their life and death struggle against European settlement of their lands — this land of the Ohio Valley. Partly responsible for the overwhelming defeats of the armies of Josiah Harmer and Arthur St Clair during the wars of the Miami Confederation, Blue Jacket was in sole command of the forces gathered for the Battle of Fallen Timbers against General "Mad" Anthony Wayne.

ADDITIONAL ACTIVITY:

Optional Activity
Suggest that the students read the book Blue Jacket (multiple copies are available in the public library).

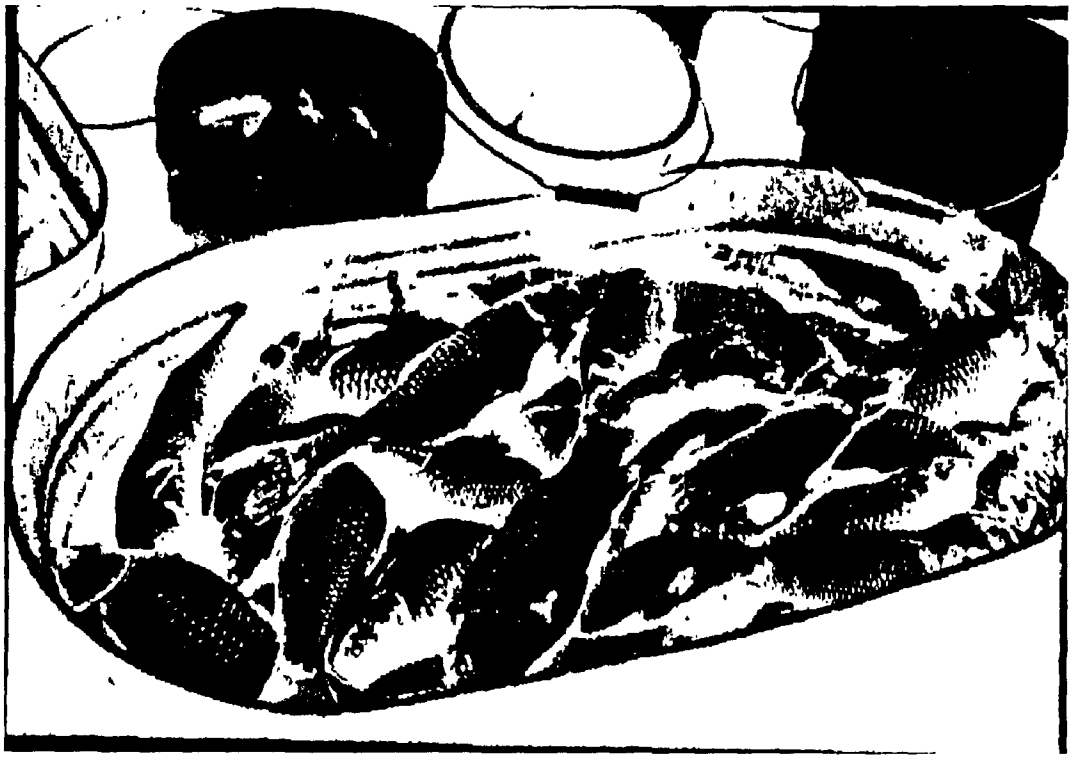
Follow-Up Activity
Arrange a field trip to Shawnee Lookout Park. Ask the park rangers to explain the historical significance of that location as a Shawnee observation point. Also ask about the interesting Shawnee artifacts found in that area.

Always A Living River

(Story of Environment and Ecosystem)

Scientists argue that all life as we know it had its origins in water and depends on water for its continued existence. Yet, of all the water on earth, only 1% is freshwater available for human use. 97% of all the water on earth is saltwater. 2% of the earth's water is frozen at the North and South Poles. To be reckless with this limited supply of the planet's most vital resource is perhaps the greatest human folly. Thus, it can and should be argued that the story of the Ohio River is a story of life, itself.

Ours is a living river. Its life exists in the numerous recreations it provides our community. From Riverbend to river boating to Riverfest, the river adds joy and quality to the life of this community. The life of this river also exists in its commercial value. As a primary trade artery it brings in the raw materials and takes out the finished products that provide jobs and thereby further add to the quality of life in this community. Finally, the river is alive. The importance of this fact cannot be emphasized enough. This river sustains life — including our own. The river is an ecosystem and any act of carelessness and abuse that threatens one part of that system threatens the whole system. Thus, as we work to maintain river quality, we are in fact working to maintain the quality of life in this community.



Wind Force

PURPOSE: To make children aware of wind as a force that moves things. To teach children to record changes of wind force.

MATERIALS:
- Journal page
- Pencil

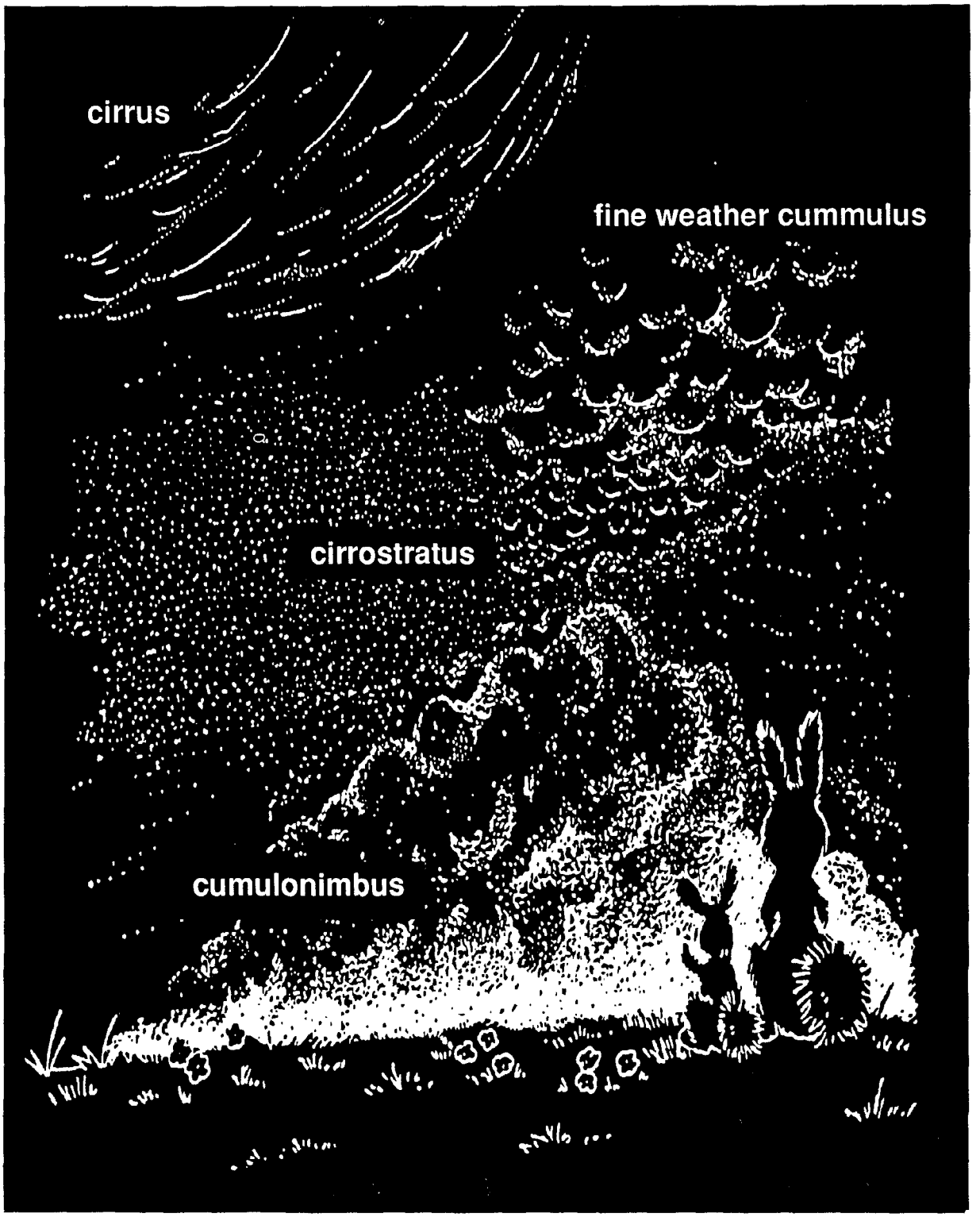
PREPARATION: Provide concept that moving air is called wind. The wind can move things. Wind moves things by pushing them. The wind pushes things in a direction and with speed. Teach the following vocabulary: calm, gentle breeze, strong breeze, gale (very strong wind).

PROCEDURE: Take the children outside and have them look around. Ask them to name things that are moved by the wind. Determine if the wind at that time is calm, gentle, strong, or gale force. Have the students record it on their journal sheet. Check the wind later that day and throughout the week. Record any observations and changes.

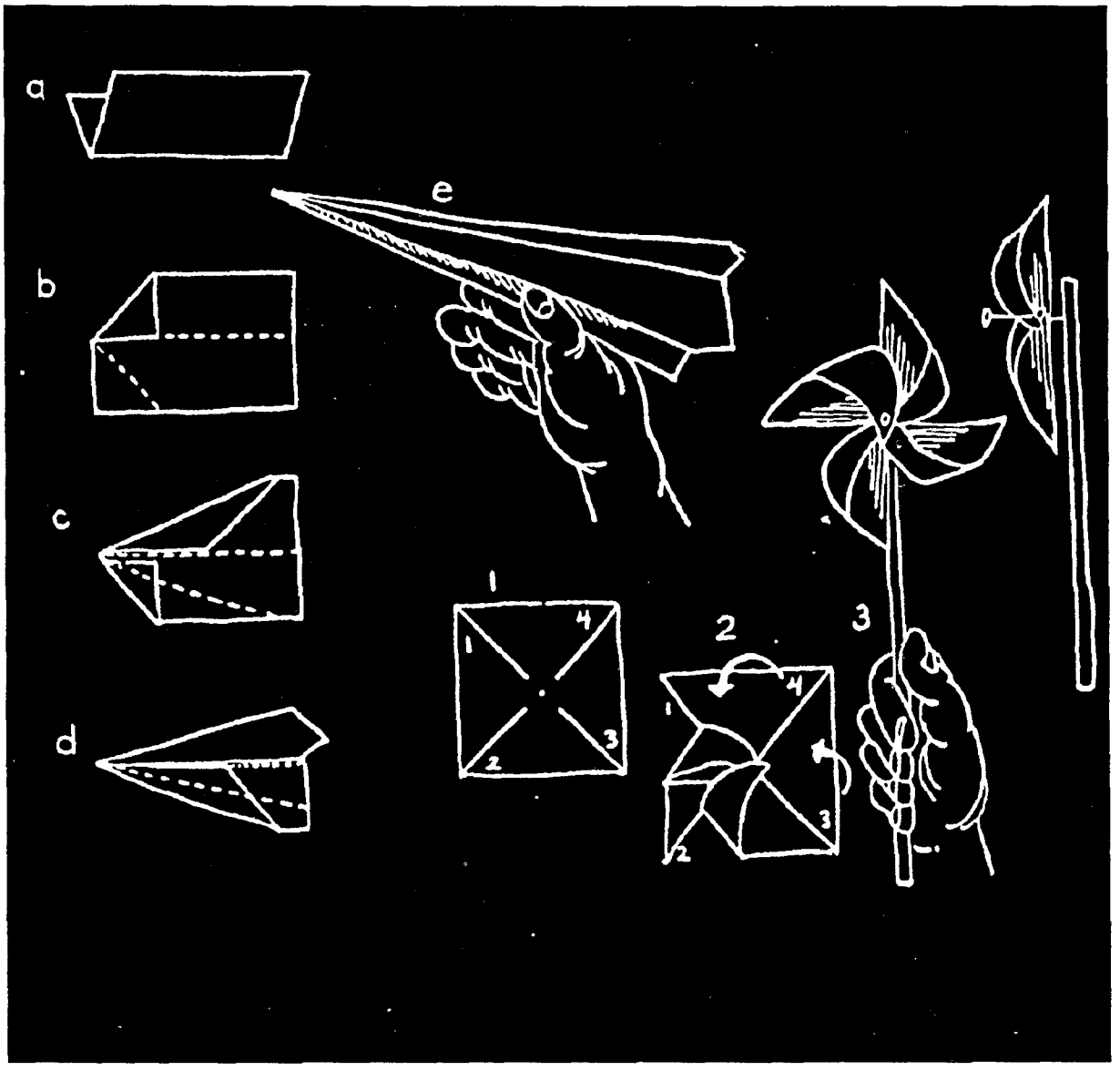
ADDITIONAL ACTIVITIES:

1. Use the same sort of activity to record observations of and changes in cloud formations. Teach the four main types of clouds illustrated on the following page. Let the children record their observations about the clouds and predict the weather using what they know about those clouds.
2. Use cotton to show the different kinds of clouds.
3. Draw a picture of the different kinds of wind or clouds and draw a picture to illustrate how they will affect the things around them.
4. Visit a local weather station to see how they make predictions for the daily weather report.

Clouds



Here's how to make a paper airplane and a pinwheel.



The Water Cycle

PURPOSE: To make children aware of the water cycle.

MATERIALS:

- water cycle page
- paper
- scissors
- cardboard
- crayons
- glue

PREPARATION: Show the picture of the water cycle to the children to give a total visual concept of its parts and their interaction. Discuss each step of the process and how they work together.

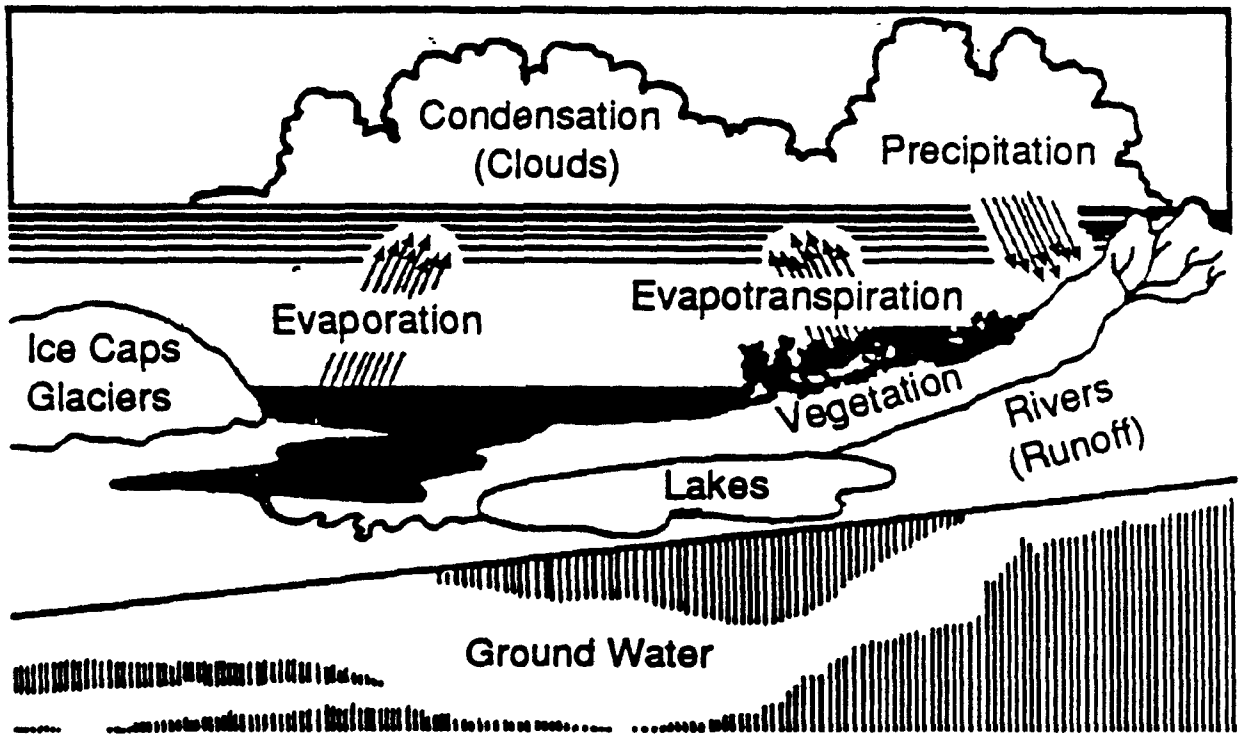
PROCEDURE: Have the children draw a picture of clouds, rain, a lake and land. Glue a piece of light cardboard or posterboard behind the entire picture. Color and then cut out the sections of clouds, rain, lake and land. Have the students reconstruct their puzzle or that of another child.

ADDITIONAL ACTIVITYIES:

1. Make your own water cycle. Set an open jar of water in a sunny windowsill and leave for awhile. When the sides of the jar begin to bead, let the students note observations and let them explain it in terms of their knowledge of the water cycle.
2. **Concrete Poetry** - Think of symbols for parts of the water cycle process (i.e. sun = radiating circle, rain drops, etc.) Create a poem about one of the parts of the cycle. Write the poem to fit into its symbolic shape.

3. **Reverse Pictures:** Select a nature scene you have observed. Use one piece of drawing paper. On one side, however, color it sunny and bright with fluffy clouds. On the other side color it rainy and stormy with threatening clouds. Explain the process that occurred between the sunny and stormy scenes.

The Water Cycle



The Ecosystem - Fauna

PURPOSE:

Children will observe the variety of animal life (fauna) in the Ohio River Valley by using methods of observation such as: tracking, observation post, following sounds.

MATERIALS:

- Journal
- Sketchpad
- Pencil
- Crayons

PREPARATION:

Explain that there are different ways to experience animal life in the forests and wooded lands along the banks of the Ohio River. One way is to observe the tracks often found around sources of water where animals come to drink. Another way is to listen to the noises they make - on the ground, in the trees or in the sky. A third way is to find a comfortable spot and sit perfectly still and wait patiently. Familiarize children with charts and pictures of birds, mammals, snakes, and amphibians that are native to the area so they can identify them when spotted.

PROCEDURE:

Take a field trip to Cincinnati Nature Center, California Woods, or another nature area. Let each child select one of the three methods of observations: tracking, observation post or noises. All of them will record their observations in their journals. They may also sketch the animals from their tracks.

ADDITIONAL ACTIVITIES:

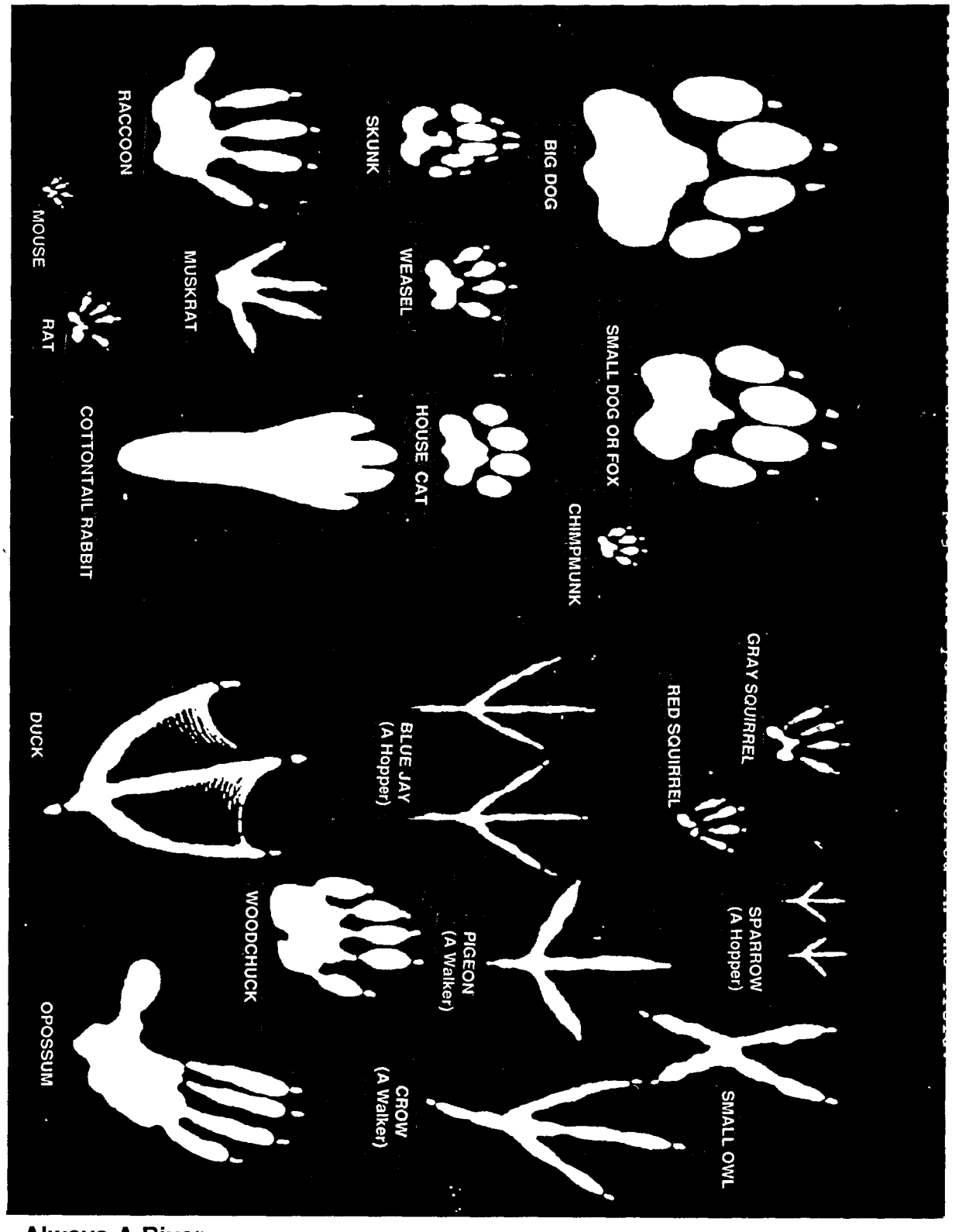
The trackers will complete a summary animal track sheet by circling those tracks observed in the field. Noise and animal matching sheet will be completed by those who have used that method. Drawings of your favorite animal will be completed by those who have used that method. Do similar activities observing the flora (plant life) of the area. Create an ecosystem alphabet. As a group, think of all the things that you encountered (both flora and fauna) our journey. Let the leader write the name of something beginning with each letter of the alphabet and have the child illustrate the other side of the card. Completed card sets may be used to play a "go fish" style card game matching flora and fauna.

Ecosystem Alphabet

A	B	C
D	E	F
G	H	I
J	K	L
M	N	O
P	Q	R
S	T	U
V	W	XYZ

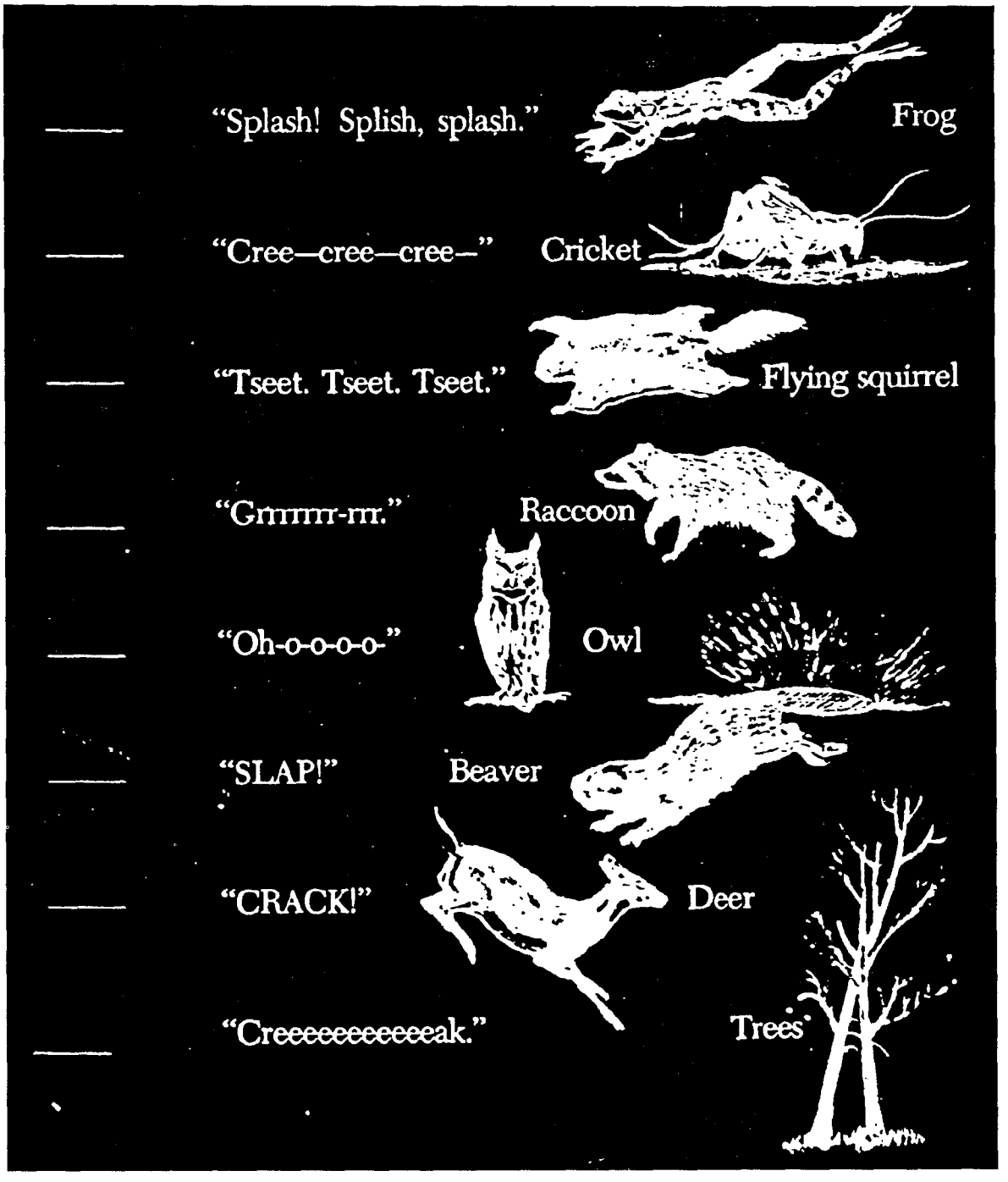
Animal Tracks

Circle all the animal tracks on this page that you have observed in the field.



Noises

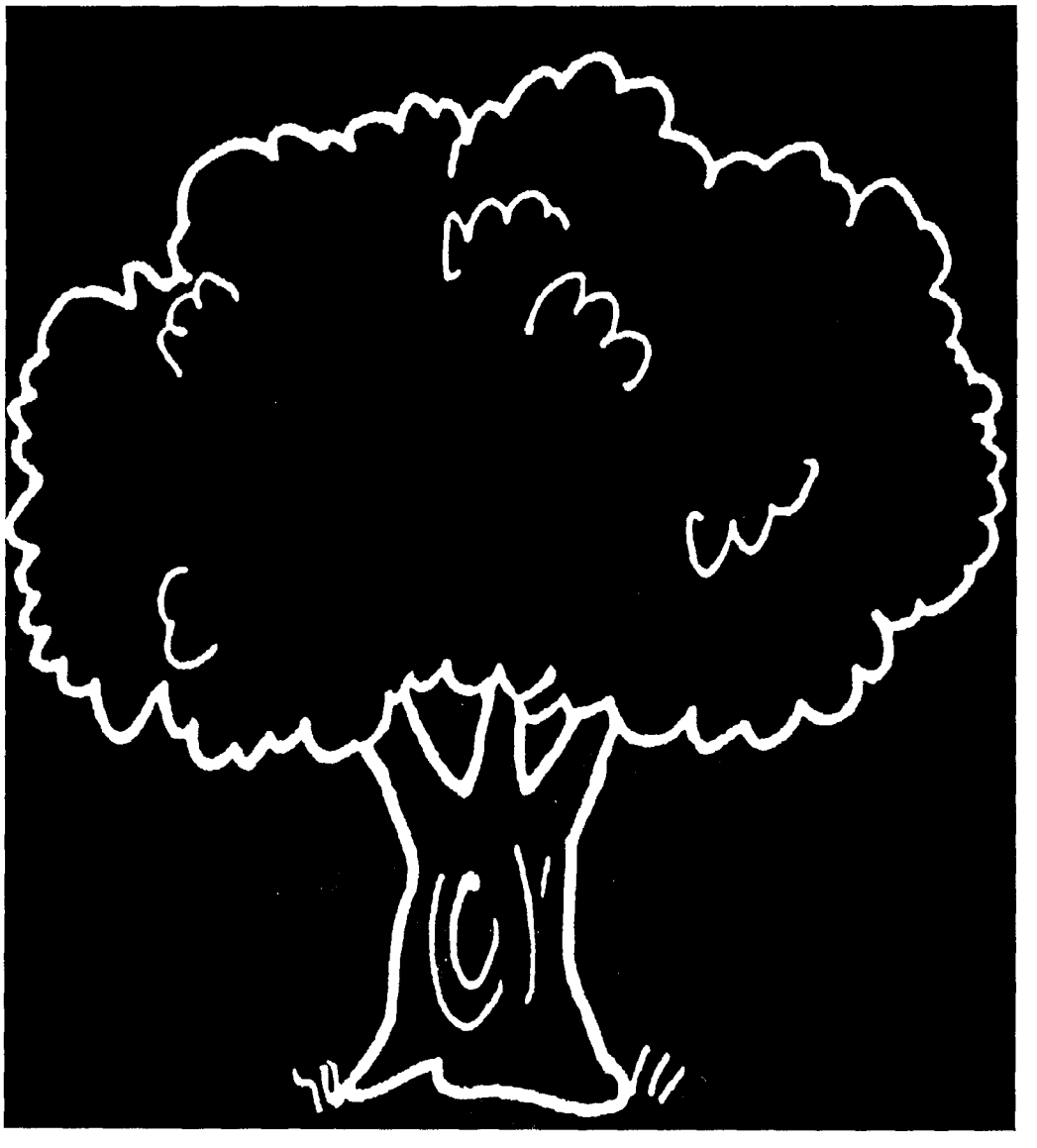
If you have heard any of these noises on your exploration through the woods, please place a check next to it.



List any other noises that you have heard in the woods.

Animals That Live in a Tree

Select one tree and get to know it thoroughly by: Touching the bark, smelling the tree, circling it several times, checking to see if the roots are exposed, looking at where the branches come out and finding out its scientific name. Now draw all the animals that live in the tree.



Animals Along The River

PURPOSE: To identify the river as an integral part of an ecosystem.

MATERIALS:

- Pictures of animals
- Plaster of Paris
- Baking tins

PREPARATION: Explain to children that just as the Ohio River is **our** source of drinking water, it is also the source for many animals.

PROCEDURE: Using pictures of animals ask children, which animals might drink from the Ohio River: A deer? A racoon? An elephant? Explain that an elephant would not drink from the Ohio River because they are not naturally found along the Ohio River Bank. You may want to ask, where can we find elephants other than in the zoo or in a circus? On what continent do they live and near what rivers?

Explain that animals often leave tracks in the mud near the river bank. Have the children make castings of their hands just as they might if they found an imprint along the river.

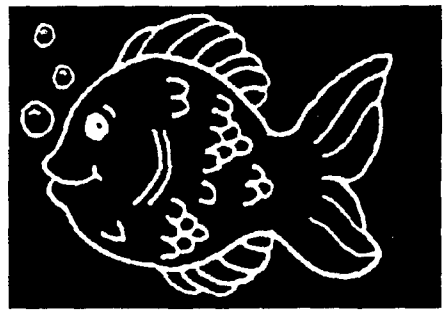
Mix plaster of paris, pour into baking (pie) tins. Allow each child to make his own. Have the child put his hand into the mixture to make an imprint. Allow to dry.

Rocky Bottom

PURPOSE: Children will learn about animals that live near or in the river.

MATERIALS:

- Large sheet of mural paper
- Paint/brushes
- Drawing paper
- Markers
- Paste/glue
- Scissors
- Reference books/magazines



PREPARATION: Visit the public library. Research animals that live near or in the Ohio River and what features enable them to live there.

Look through magazines (National Geographic is a good source) for pictures of animals that live near or in the river.

PROCEDURE: Have the entire class participate in a mural project to illustrate the sandy, rocky and muddy bottom environments of the river and the river bank. Divide the class into groups, with each group responsible for a certain part of the mural. For example, one group might be responsible for the background, another the river bank, etc. Children may draw or cut out replicas of the animals they find and paste them on the appropriate place on the mural.

Water Cycle

PURPOSE:

To demonstrate the never-ending nature of the water cycle.
To demonstrate the ecological principle of a closed system.

MATERIALS:

- One two-litre pop bottle
- Potting soil
- Small plant/moss

PREPARATION:

Pre-teach the following terms:

water cycle: the endless movement of water through the earth's biosphere (life layer) by the processes of evaporation, condensation, transpiration, and precipitation

evaporation: the process by which water changes to water vapor in the atmosphere

transpiration: the process by which plants give off water vapor into the atmosphere.

condensation: the process by which water changes from gaseous to liquid state

precipitation: the process by which water returns to the earth's surface in the form of rain, sleet, hail, snow, dew, fog, etc.

PROCEDURE:

Have each of the students create a closed ecosystem (terrarium) duplicating the processes of the water cycle. First, cut the conical top from a two-litre pop bottle, creating an open ended cylinder. Second, remove the hard dark plastic bottom from the bottle (this will be the terrarium planter). Fill the hard dark plastic bottom with potting soil. Plant with mosses and other moisture-loving plants. Water lightly. Invert the clear plastic cylinder and insert the open end into the dark plastic base, thus forming an enclosed terrarium.

Observe what happens to the moisture in the closed system of the terrium as a result of changing temperatures and atmospheric conditions. Discuss ways in which the closed system of the terrarium can be compared to the closed system of the earth's biosphere.

Water Facts

- The amount of water on the earth is essentially the same as it was billions of years ago.
- Only about 1% of the earth's water is freshwater available for us to use. 97% is saltwater and 2% is frozen in glacial ice.
- The human body is 70% water. Blood is 83% water.
- Scientists believe all life on this earth originated in water.
- All life as we know it must have water to survive.

ADDITIONAL ACTIVITY:

Keep a log of your observations of ways in which people waste, abuse, and pollute water. Based upon these observations, prepare a list of suggestions for wise water use and conservation.

What's the Point?

PURPOSE: To define and identify the problem of non-point pollution.

MATERIALS: Printed materials on nonpoint source pollution

PREPARATION: Review the materials on nonpoint source pollution.

PROCEDURE: Pre-teach the printed materials on nonpoint pollution. Be sure to stress the definition and the severity of the problem in urban areas like Cincinnati.

Take a field trip walking tour of your neighborhood looking for examples of nonpoint pollution of the water supply.

Examples:
(1) Petroleum product spills on roadway, gas stations, parking lots, etc.
(2) Decayed organic matter in gutters
(3) Household chemicals and pesticides
(4) Lawn treatment services
(5) Land erosion

ADDITIONAL ACTIVITY:

Option
You may wish to make a game of this by awarding prizes for the individual or team compiling the longest list, or most hazardous list, or most observant / creative list.

What is Nonpoint Source Pollution

Nonpoint source pollution is pollution which does not come from a specific location (such as a single pipe) but rather results from such land uses as agriculture, mining, forestry, and urban activity. Rainfall moving over and through the ground picks up pollutants from these areas and carries them into lakes, rivers, and groundwater. Because of its diffuser nature, nonpoint source pollution is difficult to regulate.

Why a Problem?

Although many of us associate water pollution with industrial and sewage discharges, recent studies show that nonpoint sources actually contribute the largest amount of pollution to the nation's surface waters.

In part, this is due to the success with which point source discharges have been controlled over the last 20 years. Within the Ohio River Basin alone, control of domestic waste discharges has improved from providing treatment to only 39% of the sewered population in 1951 to providing at least secondary treatment to 95% of the sewered population in 1988. There have also been similar improvements in industrial wastewater treatment.

ORSANCO is an interstate agency created to administer a compact among the states of Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Virginia, and West Virginia, to control present pollution and prevent further degradation of the waters of the Ohio River Basin. Established in 1948, ORSANCO works with these eight states as well as the federal government to implement water pollution control and abatement programs.

Nonpoint source pollution can contribute levels of toxic substances to streams which exceed the established standards set by water pollution control agencies. This type of pollution can interfere with the designated uses of a water body, although it does not necessarily make the water "unsafe".

Recent studies show that nonpoint sources actually contribute the largest amount of pollution to the nation's surface waters

Parts of the Ohio River are moderately impaired for such uses as recreation, drinking water, and warm water aquatic life habitat.

For example, fish tissue studies conducted by the Ohio River Valley Water Sanitation Commission (ORSANCO) suggest nonpoint sources contribute toxic substances such as polychlorinated biphenyls;henyls (PCBs) and chlordane, which bioaccumulate in fish tissue. Fish in some parts of the river contain levels of these substances that surpass the action levels for human consumption set by the U.S. Food and Drug Administration, causing some states to issue advisories against eating certain types of fish.

• Nonpoint Source Pollution

Most industries and municipal treatment plants along the Ohio River have successfully controlled their waste water discharges. Today, the greatest contribution of pollution occurs from nonpoint sources. These sources include agriculture, resource extraction, and urban runoff. Figure 4 shows nonpoint source pollution causes over half of the use impairment in the Ohio River. Figure 5 provides a breakdown of individual nonpoint sources.

Because nonpoint source pollution is a watershed problem and is not based on political boundaries, a basin-wide approach will insure basin-wide progress. The Commission is well-suited to develop such an approach.

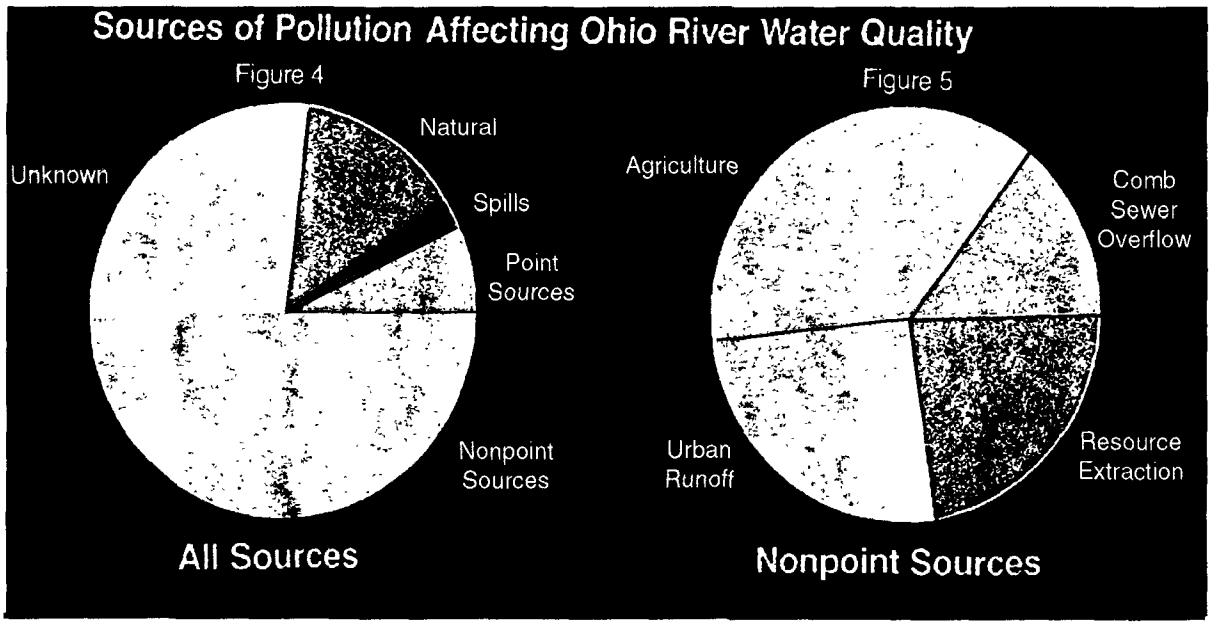
In May 1990, the Commission adopted a framework for the control of nonpoint source pollution to the Ohio River. The program includes plans to:

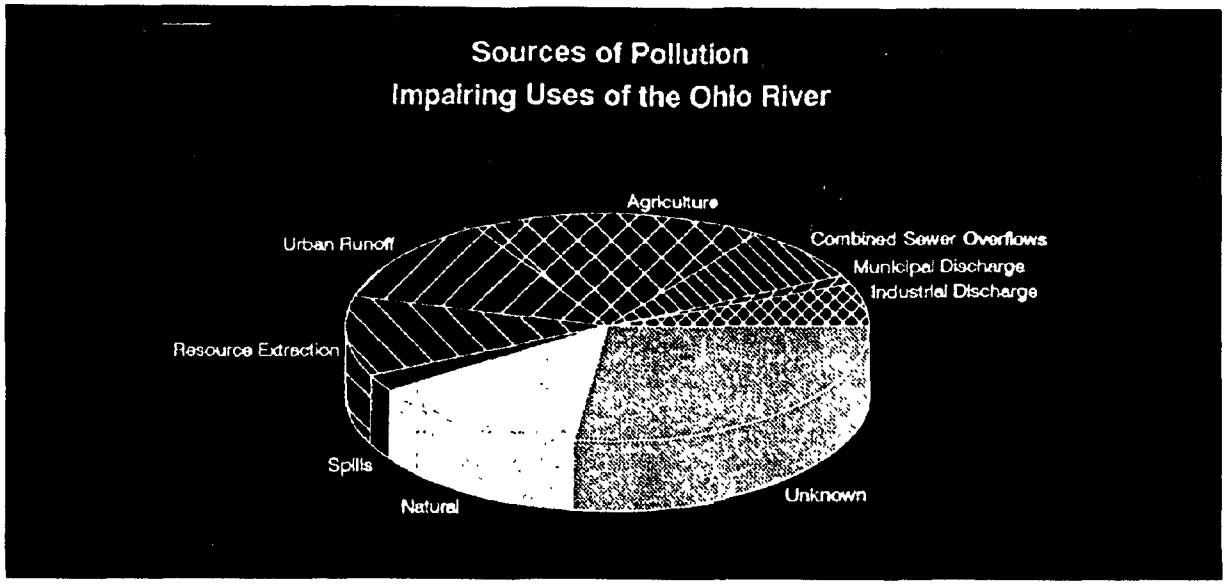
I. Establish goals for reducing loads of nonpoint source pollutants to the Ohio River.
II. Coordinate efforts among basin states to insure achievement of goals.
III. Consult with other basin organizations.
IV. Modify current monitoring efforts to better characterize nonpoint source pollution.

Successful implementation of this program will require commitment from member states, federal agencies, and the Commission. While control of nonpoint sources has received increased attention on a national level, a greater resource commitment is needed to achieve results.

The national emphasis is towards control of agricultural and urban runoff. Although these are important, the Ohio Valley is also plagued with the effects of resource extraction (which includes mining and oil and gas drilling). Of the stream miles affected by resource extraction activities in the United States, over 50% are in the Ohio River Valley. Development and implementation of practical and cost effective treatment technologies are needed. The establishment of goals for the reduction of pollutants from nonpoint sources will focus attention on this problem.

Another nonpoint source pollution concern is the contribution of toxic substances to surface water from contaminated ground water associated with industrial development. Current Commission efforts include the study of individual sites to estimate the contribution of pollutants to the Ohio River from ground water.





Major Causes in the Ohio River Valley

ORSANCO has identified three major land uses that contribute the greatest amount of nonpoint source pollution to Ohio Valley waterways: agriculture, mining, and urban activity. Figure 1 shows the proportion of nonpoint source pollution which affects the water quality of the Ohio River.

Agriculture (both crop and livestock production) is generally considered to be the most pervasive cause of nonpoint source pollution. This is due to such intensive activities as plowing and tilling, and the extensive amount of land used for agricultural purposes (approximately 48%) in the Ohio River Basin.

The largest contribution of nonpoint source pollution from agricultural land is sediment, which is carried off with overland runoff. Each year, 7-10 tons of soil per acre are lost from cultivated cropland. This sediment carries with it any residual fertilizers, pesticides, and herbicides applied to the land.

The imp;acts of mining operations include surface runoff from disturbed areas and discharge from inactive mining areas. The most serious impact from coal mining is acid mine drainage. Acidic wastes can render streams biologically dead. While the amount of land used for mining is not extensive, the effects on water quality can be more harmful than those of agriculture.

Each year, 7-10 tons of soil per acre are lost from cultivated cropland.

Urban areas, due to their high percentage of impervious surfaces (roof tops, parking lots, etc.), allow a greater proportion of rainfall to run off and not be absorbed. This, coupled with the intensity of human activity in urban areas, can contribute significant sediment loadings to waterways. Construction, household hazardous waste, road salt, and synthetic pesticides and fertilizers all contribute to nonpoint source pollution.

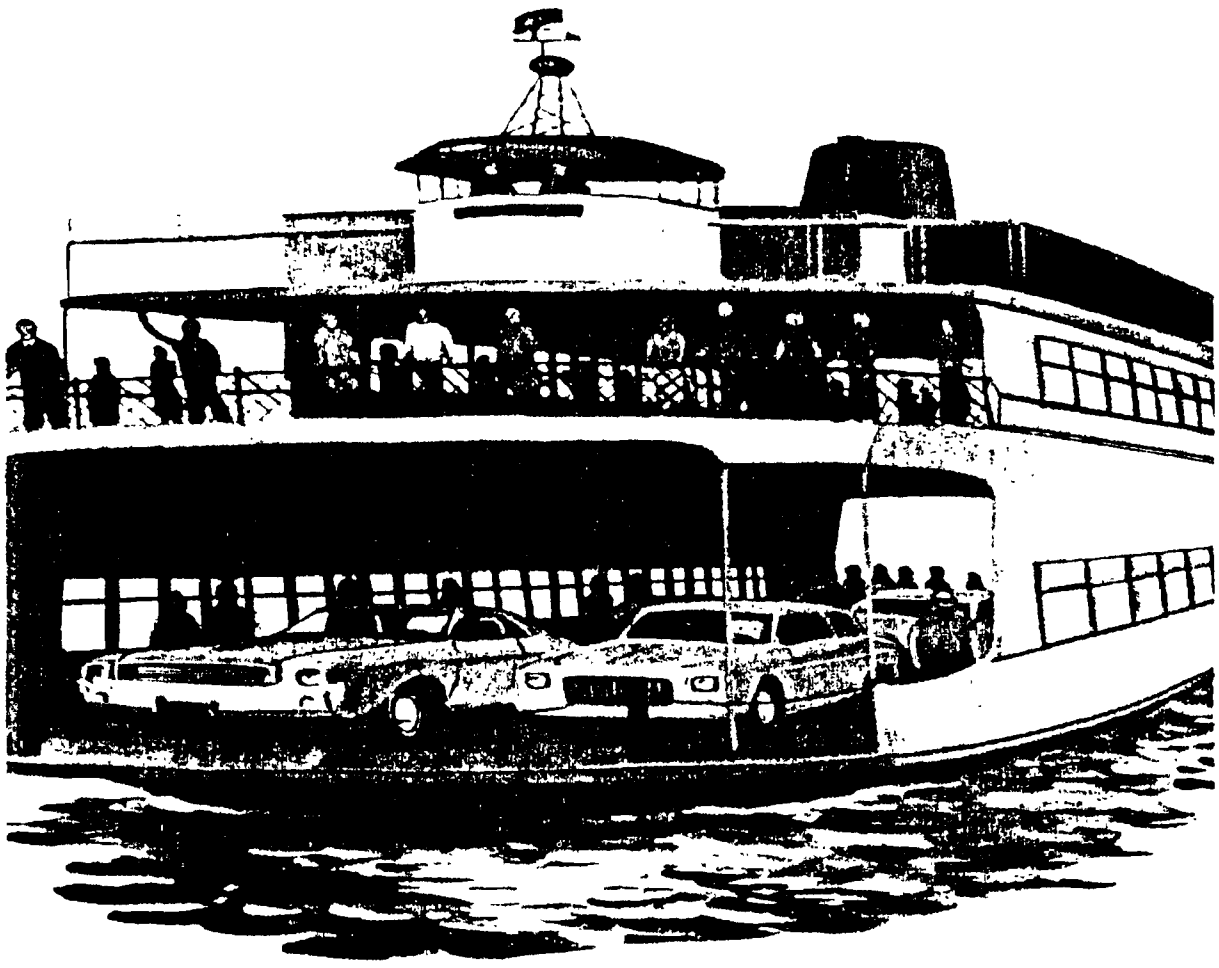
The high percentage of unknown sources in Figure 1 is attributed to the large number of fish contaminated with PCBs and chlordane in parts of the river which are not near urban areas. Since no point sources of these contaminants have been identified, it is strongly suggested that they originate from nonpoint sources.

Always A Busy River

(Story of Commerce, Navigation and Industry)

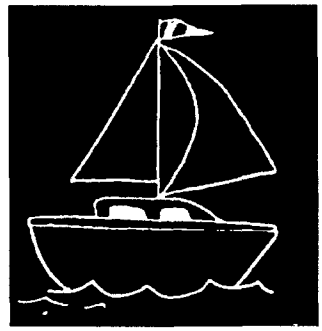
The settlement and ultimate success of this region was directly related to and dependent upon the flow of the Ohio River. As crude flat boats made their one-way voyages down the river, they brought a precious cargo of human resources. Towns were founded and flourished, according to their accessibility to river traffic and their protection from the river's ravaging floods.

Today, the Ohio River is a primary artery of trade and commerce in the nation's inland waterways. With its annual cycles of flood and drought now controlled by a system of locks and dams, it now permits more extensive development of the riverfront areas along its course. These same locks and dams also maintain the river stage at a consistently navigable depth. Never falling below the minimum depth of nine feet required to maintain freight traffic, the Ohio River System today carries more annual freight tonnage than the Panama Canal, thus providing the raw materials and moving the finished products in one of the most productive regions in the United States. Without this busy river, this region would not have developed as it did.



Transportation

PURPOSE: To become aware of the forms of water transportation on the Ohio River.



MATERIALS:

- Journal
- Sketchbook
- Pencil

PREPARATION: Expose the children to history books that depict the various types and development of modes of transportation on the Ohio. The children should be able to identify: log, raft, dug out canoe, row boat, sailboat, keelboat, barge, towboat, paddle boat, steamboat, ferry and motor boats.

PROCEDURE: Show the children the pictures of the different kinds of boats found on the Ohio throughout history (found in the back of the guide under resources or you may buy picture sets of early river transportation from the Historical Society). Identify them by name and discuss what each boat might be used for and which boats they have seen. The children should also be able to draw, on their sketch pad, their favorite river boat.

ADDITIONAL ACTIVITIES:

1. Design a boat that floats. Materials will be self-selected and variable. Through their experiments, the children will discover this principle: When something solid, like a boat, is put into a liquid, like water, the solid pushes some of the liquid aside. If the solid weighs more than the liquid it pushes aside, it will sink. If it weighs less, it will float.

2. **Group Project:** Mural of the water transportation vehicles on the Ohio River. Children may color or cut out boats to place on a large background of the Ohio River.

3. Visit the Public Library to look at books and stories about boats.

Row the Boat

PURPOSE: The children will sing a song about being in a rowboat.

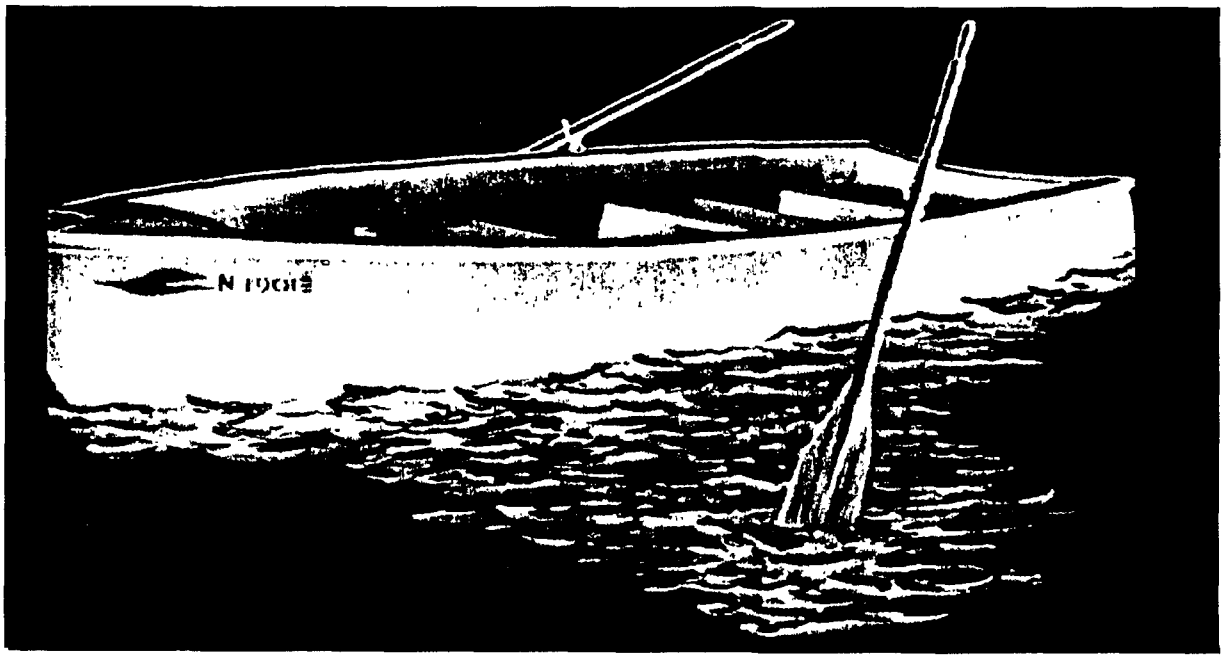
MATERIALS:

- Words to Row, Row, Row Your Boat
- Pictures of rowboats
- Sailor's hats (may be made out of newspaper)
- Oars (brooms, sticks or made from cardboard)

PREPARATION:

PROCEDURE: Show pictures of rowboats and discuss the idea of a rowboat with the children. Explain how the rowboat is small and moves through the water powered only by a person or persons pulling on a pair of oars.

Have the children simulate getting into a rowboat (use whatever props you can to enhance the mood of being in a rowboat) Have the children sing Row, Row, Row Your Boat while sitting in the boat. Tell the children to move and sway to the rhythm of the music. You may wish to teach the song as a "round".



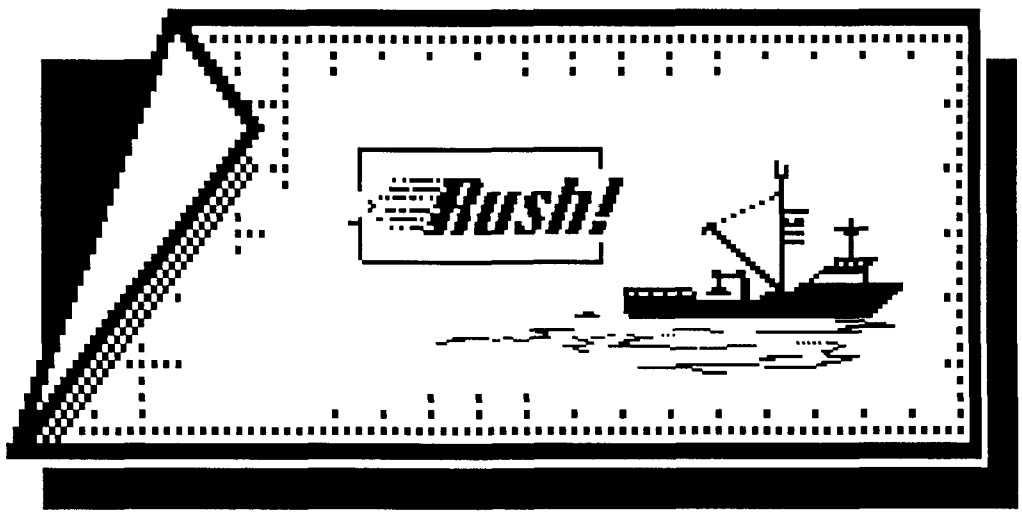
Packet Boats

PURPOSE: Children will gain some understanding of "commerce" and advertising.

MATERIALS:
- Travel brochures/posters to use as examples of advertising
- Markers/crayons/paints
- Large sheets of drawing paper

PREPARATION: Explain to children that a "Packet Boat" was a boat which carried mail, passengers and other goods. These boats had fixed sailing days.

PROCEDURE: Have children make travel posters advertising packet boat service on the Ohio River in the 1790s. Encourage children to be creative.



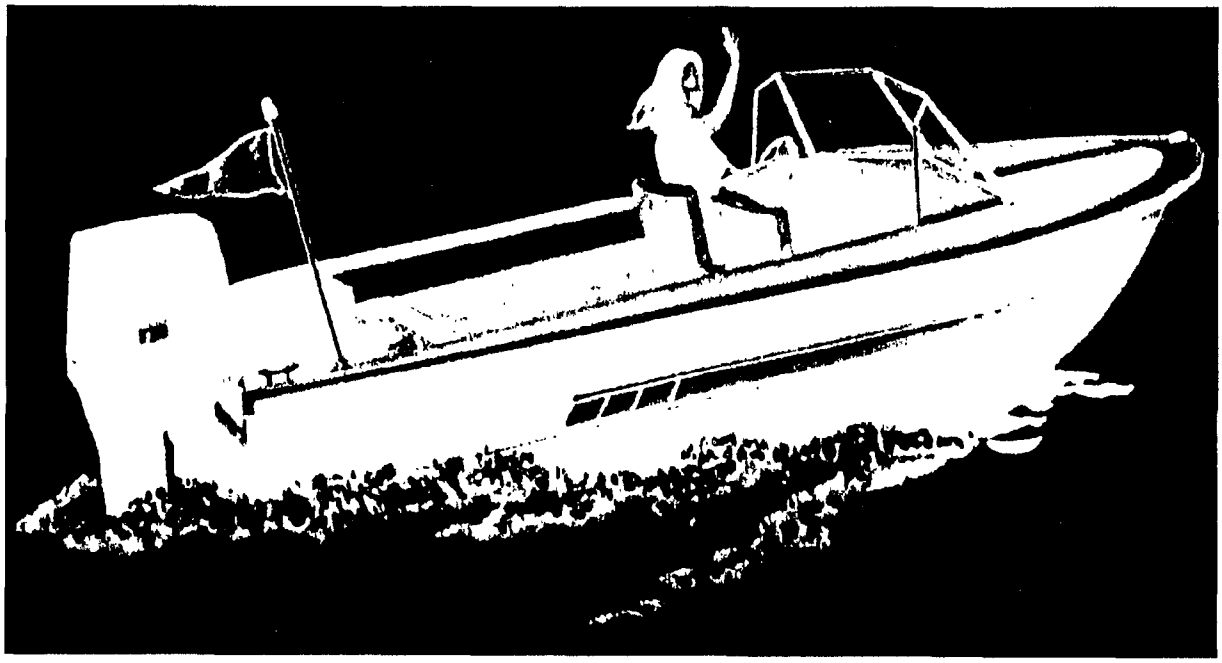
Boats Float

PURPOSE: Children will identify different types of watercraft that may be seen on the Ohio River.

MATERIALS: Set of water transportation picture cards. (See appendix)

PREPARATION: Gather pictures of various types of boats seen on the Ohio River. Provide magazines or leaflets from a travel agency for children to find pictures of watercraft. Travel & Leisure and National Geographic are excellent sources for pictures.

PROCEDURE: Ask children which type of boat they might see on the Ohio River. What is its use? How many people will it carry? What type of cargo (define cargo) will it carry? Why wouldn't they see some types of boats on the Ohio River? Ask children to identify the names of the boats illustrated in the various pictures.



Archimedes

PURPOSE: To demonstrate the Archimedean principle of water displacement.

MATERIALS:

- One 2-litre clear plastic pop bottle with the top cut off to form a cylinder
- One apple
- One lab balance (or one clearly graduated kitchen scale)
- One aluminum pie plate

PREPARATION: Remove the top from the two-litre pop bottle to form a cylinder. Make a small hole in the side of the bottle about two inches down from the top opening. Fill the cylinder with water to the level of the hole. Be sure to keep the pie plate under the pop container in order to trap all water that spills out during the demonstration.

PROCEDURE: Introduce the topic by asking the question, "What would happen to a rock or a lump of coal that was thrown into the river?" After allowing time to describe the obvious conclusion, ask the follow-up question, "If a lump of coal sinks right to the bottom, Why does a river barge heaped high with coal float?" Allow adequate time for discussion of possible reasons.

Demonstration:

Float an apple on top of the container of water. Make note of the water that spills out the hole in the side of the container as the apple is floated on top. Allow time to analyze why the water spilled out. Explain that the water was "displaced" by the apple.

Use a pencil to completely submerge the apple below the surface

Archimedes (Continued)

of the water (again being sure to trap all water that is displaced by the submerged apple). Allow time to analyze the observations.

- How much water was displaced by the floated apple?
- How much water was displaced by the submerged apple?
- When the apple was allowed to float again after being submerged, what happened to the level of the water in the container?

Conclusion:
Use the balance or scale to weigh both the apple and the displaced water. Explain that the mass of the apple is equal to the mass of the water it displaced, but the weight of the water is greater than the weight of the apple. This is why the apple floats and the coal sinks. Thus a barge full of coal will float only so long as the weight of the coal in the barge is less than the weight of the water displaced by the barge.

ADDITIONAL ACTIVITIES:

Follow-Up :

1. Arrange a field trip to Sawyer Point, the Public Landing, the Serpentine Wall, or some other place from which to observe river traffic. Have the students prepare and compare lists of the great variety of goods transported along the Ohio River.

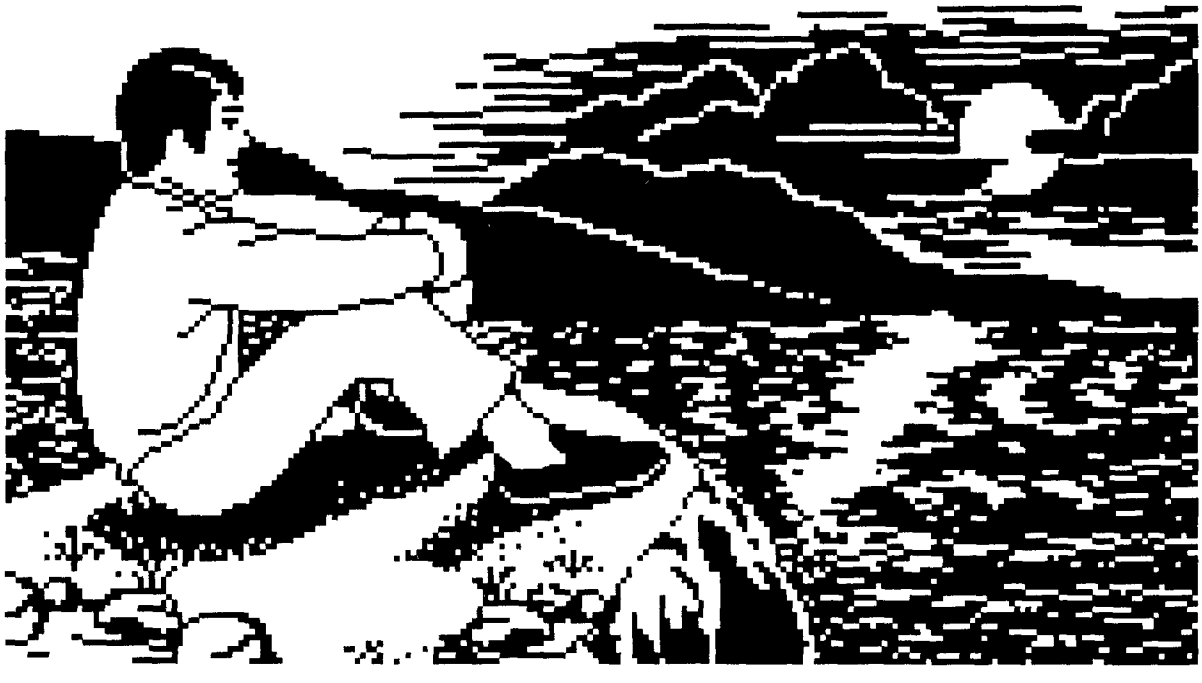
2. Tell the story of Archimedes (287-212 B.C.), the Greek philosopher who discovered this principle of water displacement. According to legend, he first discovered this principle when he observed what happened to a bath tub of water when he stepped into it. The story goes on to say that he became so excited about his discovery that he ran naked through the streets of his native city of Syracuse, Sicily shouting "Eureka!" ("I have found it!").

Always An Entertaining River

(Story of Imagination and the River)

The Ohio River has provided much material in the area of the arts and entertainment. Songs about the river, poetry, and memorable sagas about life on the river are just a few of the things that were fueled by the mighty Ohio. One of the most memorable scenes in the book Uncle Tom's Cabin is Eliza's escape across the ice laden river between the shore of Kentucky and freedom ahead in Cincinnati.

Let the activities herein be just a beginning to let your imagination loose using the river as your inspiration.



Fish Tales

PURPOSE: Creative use of imagination. The child will define the terms "tall tale" and "fish tale".

MATERIALS: A story collection of Tall Tales available from the library.

PREPARATION: Read to the children several examples of tall tales and ask children what is similar in each story (the truth is exaggerated). Tell them that fishermen often stretch the truth when talking about the size of the fish they catch, thus the term "fish tale" meaning an untrue or exaggerated story.

PROCEDURE: Let the children work individually or in pairs to write and read to the group their own fish tale.

ADDITIONAL ACTIVITY: Have the children illustrate their "fish tale".

Where Do Boats Go?

PURPOSE: Children will listen to and enjoy a wonderful poem about boats.

MATERIALS: Words to "Where Go The Boats" by Robert Louis Stevenson.

PREPARATION: Pre-read the poem "Where Go The Boats?"

PROCEDURE: Establish a relaxed atmosphere for poetry reading. Read the poem with expression. Ask the children to make pictures in their minds of the words as you read the poem again. You may wish to play soft music in the background.

Where Go The Boats?

Dark brown is the river,
Golden is the sand.
It flows along forever,
With trees on either hand.

Green leaves a-floating,
Castles of the foam.
Boats of mine a-boating—
Where will all come home.

On goes the river
And out past the mill,
Away down the valley,
Away down the hill.

Away down the river,
A hundred miles or more,
Other little children
Shall bring my boat ashore.

Ask the children questions about the poem after the second reading. Ask what other images were you able to see in your mind?

ADDITIONAL ACTIVITY: Have children write their own story about the river. Use the poem as a stimulus for a painting in which the colors mentioned in the poem are used.

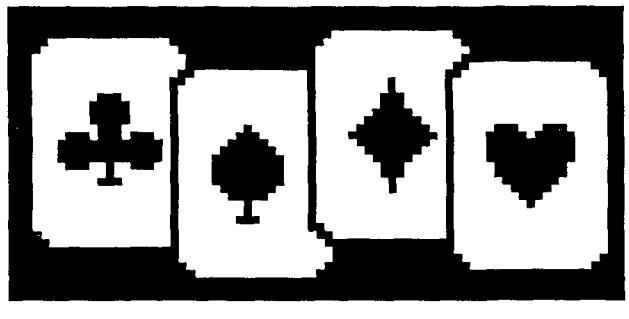
All On Deck

PURPOSE: To have children introduce themselves to each other.

MATERIALS: Deck of playing cards.

PREPARATION: Explain to the children that card games were a popular past-time for men working on river boats that went up and down the Ohio River.

PROCEDURE: Separate playing cards into the four different "suits". Distribute cards to the children Children are to search for others who have cards of the same "suit".



Rappin River

PURPOSE: To exercise individual creativity in composing an updated "Rap" version of the theme song of the floating exhibit, "Always a River"

MATERIALS:
- Copies of the words and music for "Beautiful Ohio"
- Pencils and pads of writing paper
- Tape recorders and cassette tapes

PREPARATION: Play, sing, or otherwise pre-teach the song, "Beautiful Ohio"

PROCEDURE: Divide the group into teams (The number of teams to be determined by number of tape recorders and other equipment available. The most desirable situation would be to divide the group into pairs.) After having been pre-taught the song, "Beautiful Ohio", and with copies of the words and music in hand, have the students create their own updated Rap version of the song.

ADDITIONAL ACTIVITY:

Option
Arrange a field trip to Eden Park or Mt Echo so that this activity could be included as a part of a day's outing. Both of these locations are known for their scenic overlooks from which the true beauty of the river can be readily seen.

Beautiful Ohio

Drifting with the current down a moonlit stream
While above the heavens in their glory gleam
And the stars on high, twinkle in the sky

Seeming in a paradise of love divine
Dreaming of a pair of eyes that looked in mine

Beautiful Ohio in dreams again I see
Visions of what used to be.

Lines of Rhyme

PURPOSE: To exercise individual creativity in writing about everyday life along the Ohio River

MATERIALS: Writing materials (pads and pencils)

PREPARATION: Pre-teach the process for writing limericks. A limerick is a five-line humorous poem that is written to find fun in or make fun of everyday things. The rhyme scheme is A,A,B,B,A. The rhythm pattern is :

-'—'—'-
-'—'—'-
-'—'
-'—'
-'—'—'-

Example:
Cute little fish in the river
Beneath shining waters you quiver.
I came here to look,
But if I had a hook,
I bet you'd taste better than liver!

PROCEDURE: After teaching the limerick writing process, arrange a field trip to the Serpentine Wall, to Sawyer Point, or to another similar location along the river. The assigned task for each individual would be to create a limerick about an interesting observation made there. These limericks should be shared orally, but it would be especially effective if they could be collected and duplicated for sharing with the authors' families.

Always An Involving River

(Stories of Organizations and the River)

The Ohio River is a commercial river and it has thousands of organizations which create a variety of river occupations to meet a multitude of human needs. Some of the organizations on the river and their related occupations are:

- **Locks and Dams** are organizations. They have lock masters, lock operators and maintenance men who have related careers.

- The **United States Coast Guard** aids navigation. It is responsible for lights and buoys, maintaining water patrol by inspecting boats for safety, equipment and overloading; investigating boating accidents, issuing licenses to commercial navigators and engineers, and it has jurisdiction over all crafts on the river.

- **River terminals** on the river abound. They employ hundreds of workers to load and unload goods (ie., coal, gasoline, petroleum products, chemicals, steel, salt, etc.) on and off the barges. The **towing and tug industries** service these terminals by picking up, loading and returning barges to long distance towboats.

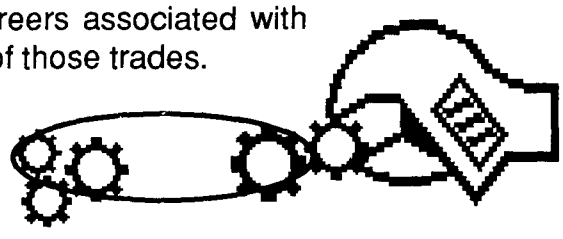
- The **water works plant** purifies water and provides fresh water to many cities along the banks. **Power plants** supply electricity to the cities by using the river water. The **fire department** patrols the river for fires and has a fire boat to meet emergencies. Also many organizations service recreational boaters' needs (ie., **floating restaurants, floating gas stations, repair facilities, marinas, storage areas and boat and equipment sales,** etc.).

- There is even an **instructional barge**, The Marilyn K. McFarland tugboat. This unique program provides vocational education training, and places young men and women in the inland marine industry. It is operated by the Cincinnati Public Schools.

Workers on the River

PURPOSE:

To identify different careers associated with the river and the tools of those trades.



MATERIALS:

- paper
- pencil

PREPARATION:

Prepare children to discuss river workers by visiting or reading about one of the following places.

- Inland Waterways Program (at the Peter Clark Academy)
- Cincinnati Water Works
- Markland Dam

As an alternative you may pick up books from the library or a filmstrip depicting river careers.

Discuss and define the jobs and organizations found in the background information and those seen on your trip. Discuss how these businesses make your life easier.

PROCEDURE:

Pass out journal papers. As a group, have children name as many workers as they can who are associated with the river. have them write the worker's title down then add their job description and what tools they need to carry out that job.

ADDITIONAL ACTIVITY:

1. Let the children work in pairs to draw one kind of occupation for river workers. Put the smaller pictures onto a large background sheet of the river to create a mural of river trades.

2. **Tools of the Trade** - Have the children select a favorite river career. Have them create a tool to represent that career by drawing it or cutting it out of construction paper. Have the children share their tools with the class and allow the other children to guess their career by looking at the tool.

Robert Duncanson's Art

(A View of the River 150 Years Ago)

PURPOSE:

To develop an appreciation for the natural scenic beauty of this area
To develop an appreciation for the contribution of local minority artists.
To develop an awareness of the quality of the local art collections

MATERIALS:

- Art sketch pads, 11 x 17
- Colored pencils

PREPARATION:

Pre-teach the historic background of Robert Duncanson and of his association with Nicholas Longworth (For reference, see Cincinnati Then and Now, by Iola Silberstein, pp 108-110).

PROCEDURE:

Arrange field trips to the Taft Museum and the Cincinnati Art Museum. The collection of Duncanson murals can be seen in the entrance hall of the Taft Museum. The most famous work by Robert Duncanson, his "Blue Hole, Little Miami River" is in the Cincinnati Art Museum.

Questions for Discussion:

1. How has "progress" altered the view of this area's undeveloped land in the past 150 years?
2. Do you think some of these scenic areas should be left in their natural state so that the undeveloped natural beauty can be seen and enjoyed by future generations? How has our community attempted to accomplish this?
3. The development of the areas painted and enjoyed by Robert Duncanson has provided numerous benefits for the citizens of this community. How many of these benefits can you list?
4. How have organizations like the Taft Museum and Cincinnati Art Museum helped to preserve the heritage of our community and our river?

ADDITIONAL ACTIVITY:

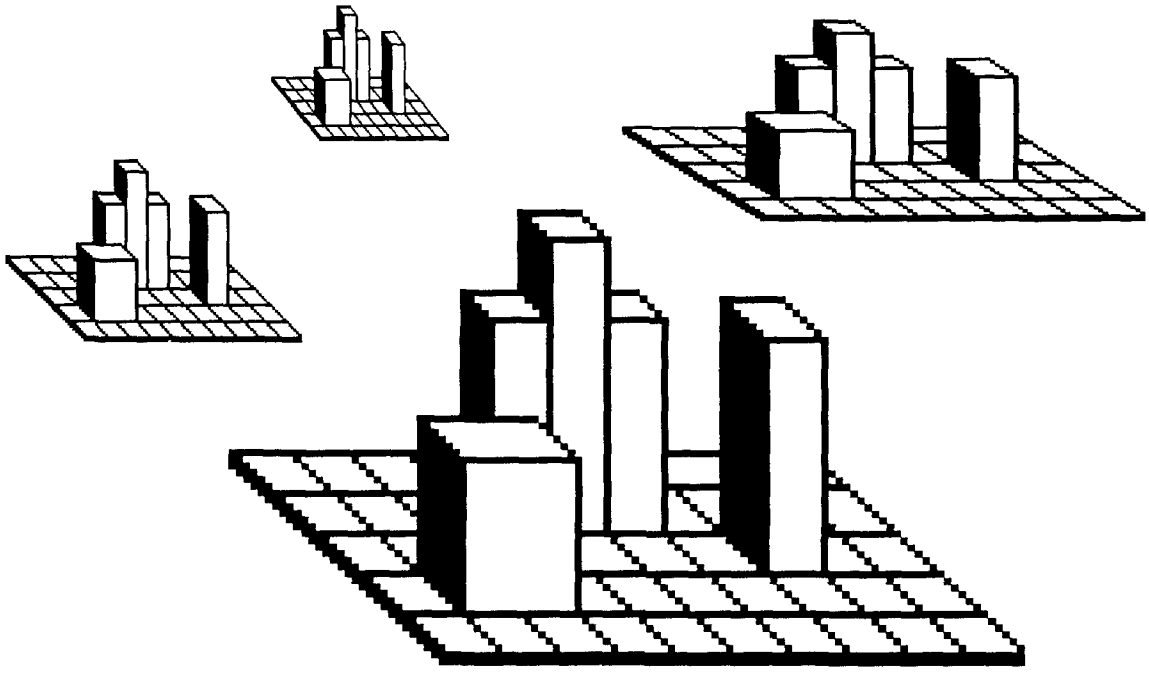
Follow-Up :
Arrange a field trip to Mt Echo or Eden Park scenic overlook. Provide materials for the students to create their own drawings of the natural beauty of the Ohio River Valley. These drawings should be shared and displayed.

Always A Community River

(Stories of the Local Cities and Towns)

After exploring the river, the banks and the woodland, one can truly understand the progression of how the settlers came to this Ohio River Valley and built their homes in what is now Cincinnati. Having arrived by the river, the early pioneers landed on the river banks and settled there. The first settlement in Cincinnati was on the Ohio Flood Plain, also called the Bottoms. Today, the Riverfront Stadium, the Coliseum, and the Bicentennial Commons are in this area. Next, they settled in the Terrace of Basin area which rises about 40 feet above the Bottoms. This was safer from floods and therefore more desirable for homes and businesses. This is now our Downtown area. Finally, in the 1800's, they were able to climb the incline of 300 feet, and were thus able to develop the neighborhood level of settlement. Today this is our residential suburban area.

For another activity under this subject see "The Settlement of Cincinnati" under "Always A Desirable River".



Points of Interest

PURPOSE: Children will learn about other major cities along the Ohio and Mississippi Rivers.

MATERIALS:

- Travel brochures
- Schedules from airlines/AAA
- Large paper
- Colors, ie.; crayons, markers
- Map of the World Atlas
- Paper/Pencil

PREPARATION: Have children locate cities along the Ohio and Mississippi Rivers on a wall map or in an atlas. Children should locate Pittsburgh, St. Louis, New Orleans etc. (these can be your choice)

Investigate points of interest by using the travel brochures. For example, tourist attractions, celebrations, etc.

Children should be encouraged to work cooperatively in groups whenever possible. Three or four children are a manageable group.

PROCEDURE: Have children pretend that they handle public relations for a city of their choice. It is their job to "sell" their city to a person who has never visited there before. They can draw posters, make up jingles about the city, write stories, make a mural, write a song, etc.. Encourage children to be creative.

...And Enough Left Over To Drink!

PURPOSE: To demonstrate the water purification process

MATERIALS:

- Two two-litre clear plastic pop bottles
- One two-litre clear plastic pop bottle with the bottom cut off to form a "deep funnel"
- One coffee filter (auto drip style)
- Clean cotton balls and wadding (enough to form a two inch layer in the bottle)
- Clean white sand (play sand or sandbox sand, but it must be clean)
- Aquarium charcoal (clean and well rinsed)
- Alum or aluminum sulfate (available in the spice section of any grocery store)

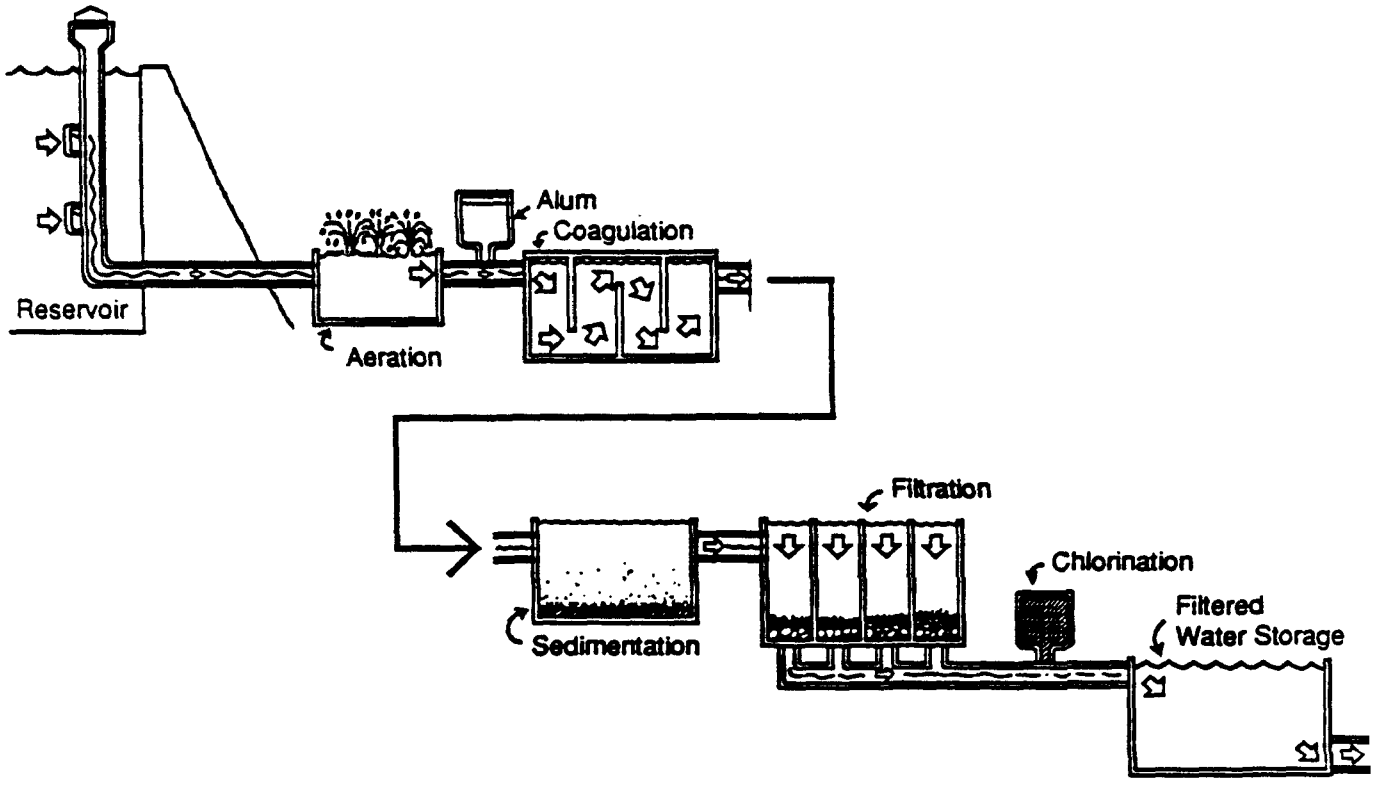
PREPARATION: Place a two inch layer of the cotton wadding inside the coffee filter in the inverted "deep funnel" pop bottle. On top of the wadding, place a half-inch layer of well rinsed aquarium charcoal. On top of the aquarium charcoal place a three inch layer of clean white sand.

PROCEDURE: Fill the other two two-litre pop bottles with a solution of clouded dirty water. Place one tablespoon of alum in one of the bottles and mix well. Mark this bottle. Allow the dirty water solution in both bottles to settle. **Ask:** "Which settled first? Can you explain why?" Allow adequate time for discussion of possibilities. Primary objective here is to identify the alum as a coagulant — a chemical agent that bonds with the impurities in the water and causes them to sink to the bottom.

Pour the water from the alum-marked container slowly through the deep funnel of cotton, charcoal, and sand layered filter and into a clean clear glass. Be careful not to disturb the dirty sediment at the bottom of the container. *Warning! Do not drink this water. It has not been purified.* **Ask:** "How does the water in the glass compare with the untreated water in the other two litre pop bottle?" Allow adequate time for discussion of the possibilities. The process just demonstrated is an oversimplification of the coagulation, flocculation, and filtration processes performed at the California Water Treatment plant intake facility for the Cincinnati Water Works.

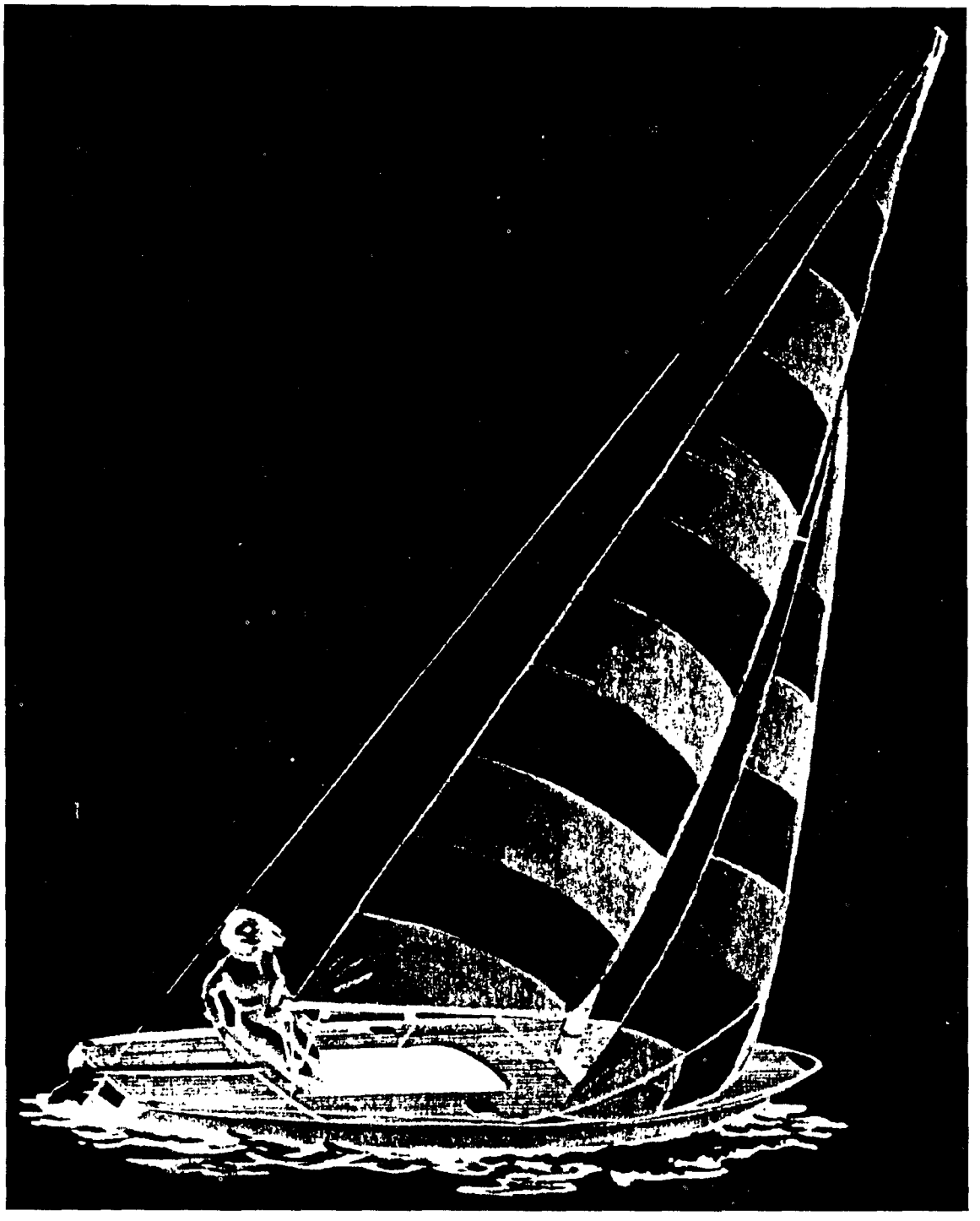
ADDITIONAL ACTIVITY: **Follow-Up:**Arrange a field trip to Cincinnati Water Works' California Water Treatment plant intake facility.

How a Water Treatment System Works

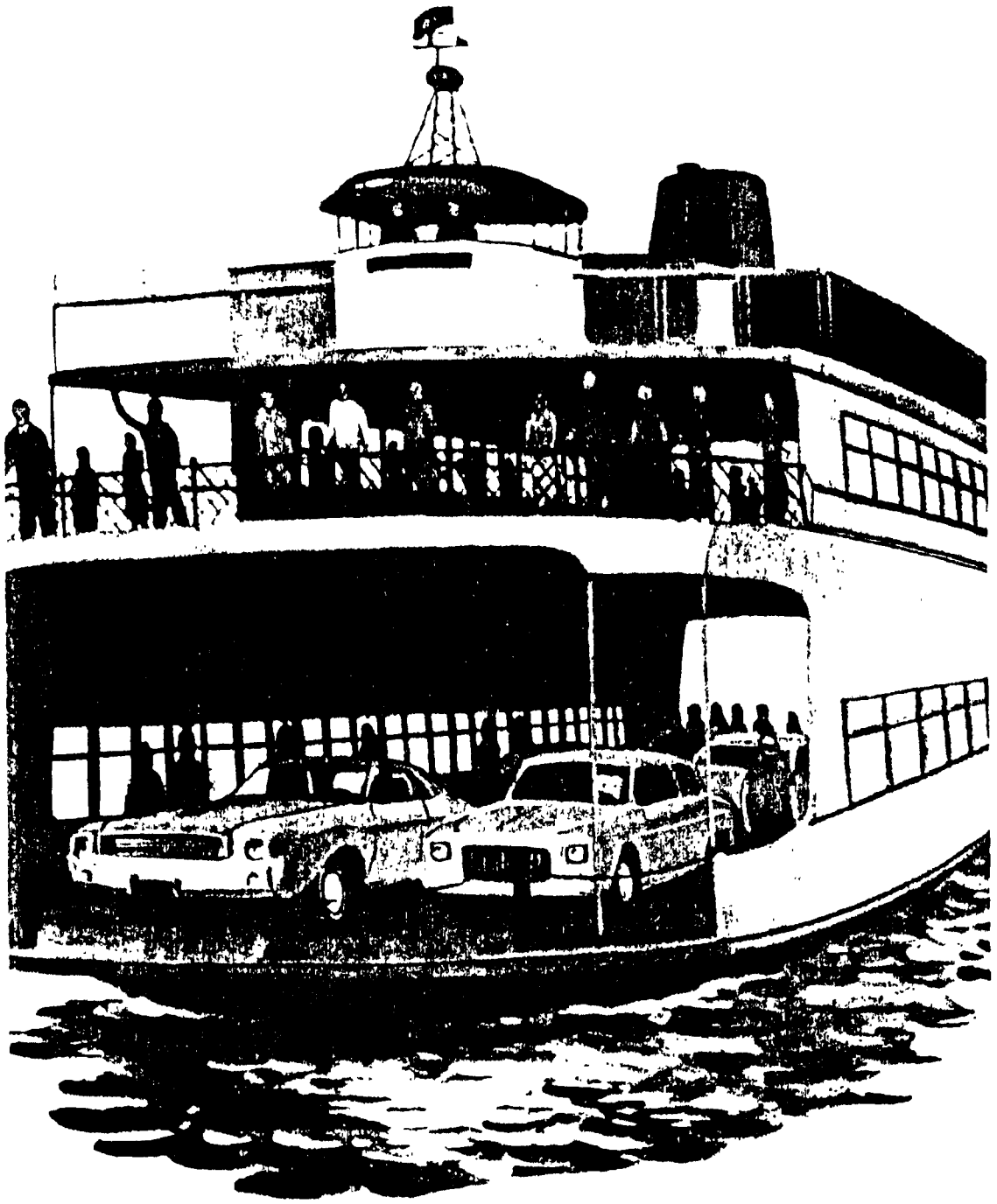


Canoe

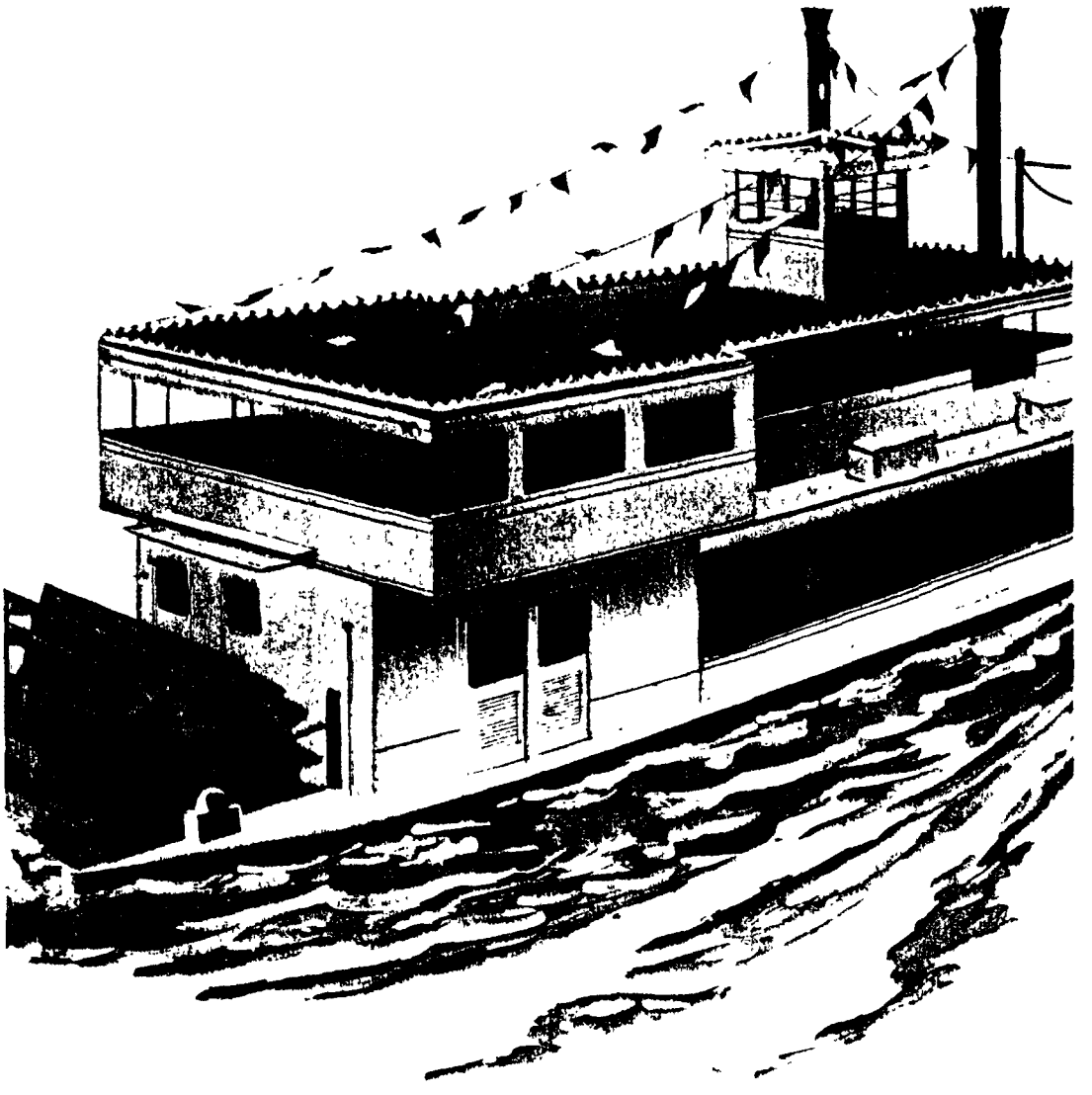
Sailboat



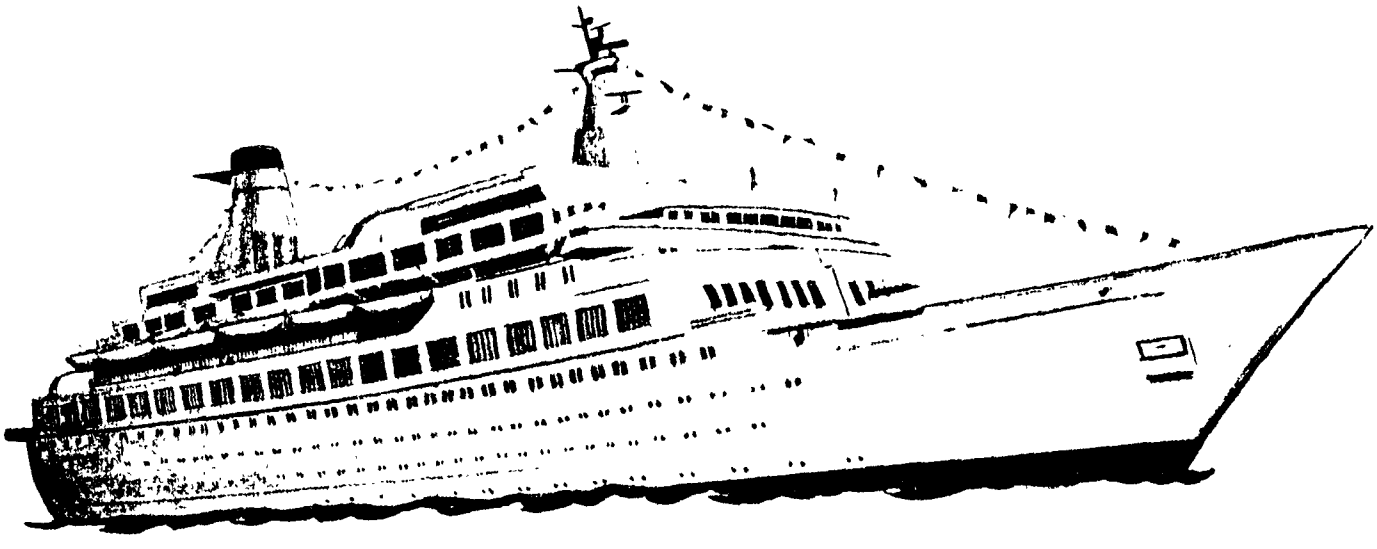
Ferryboat



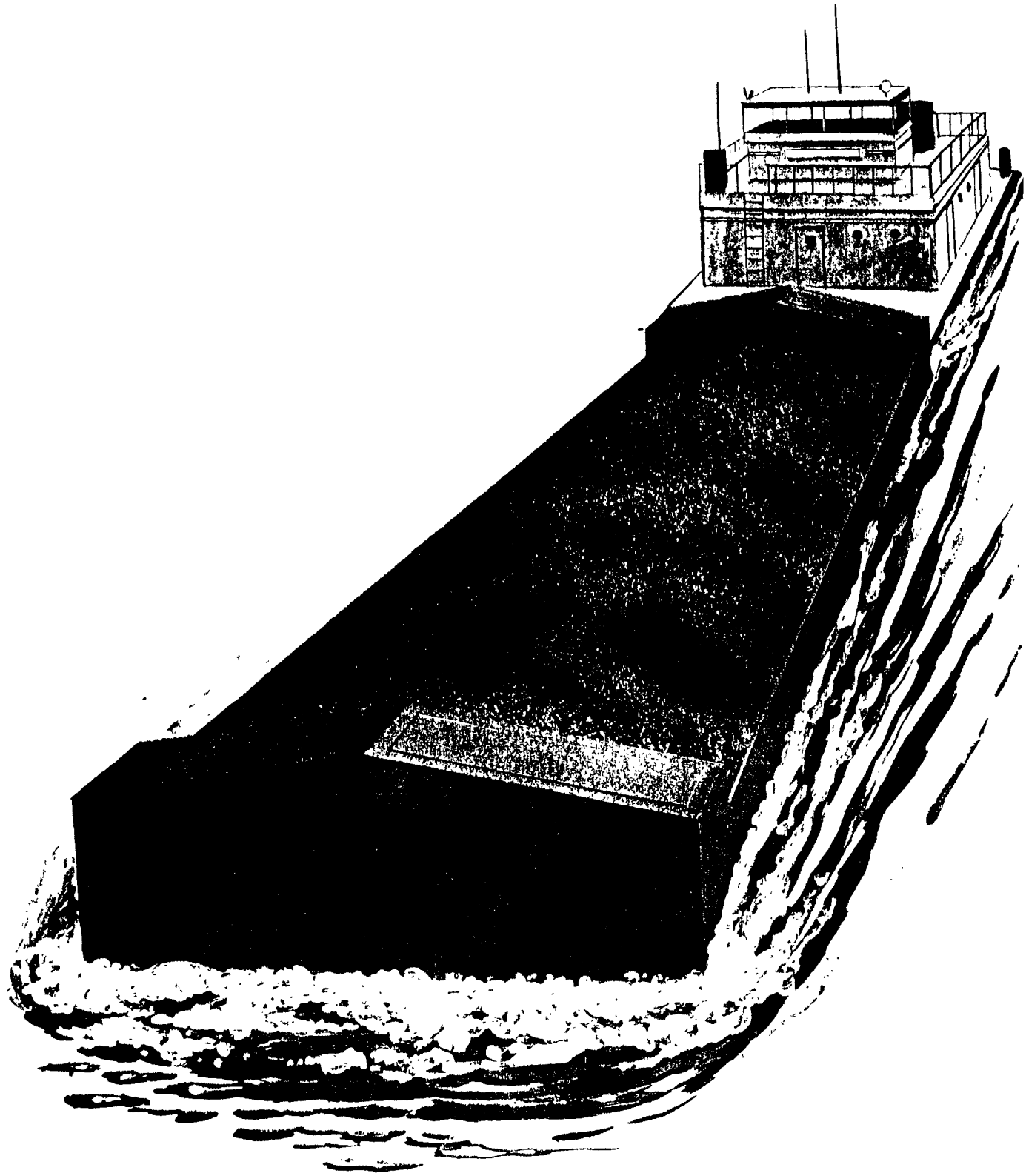
Paddleboat



Cruise Ship

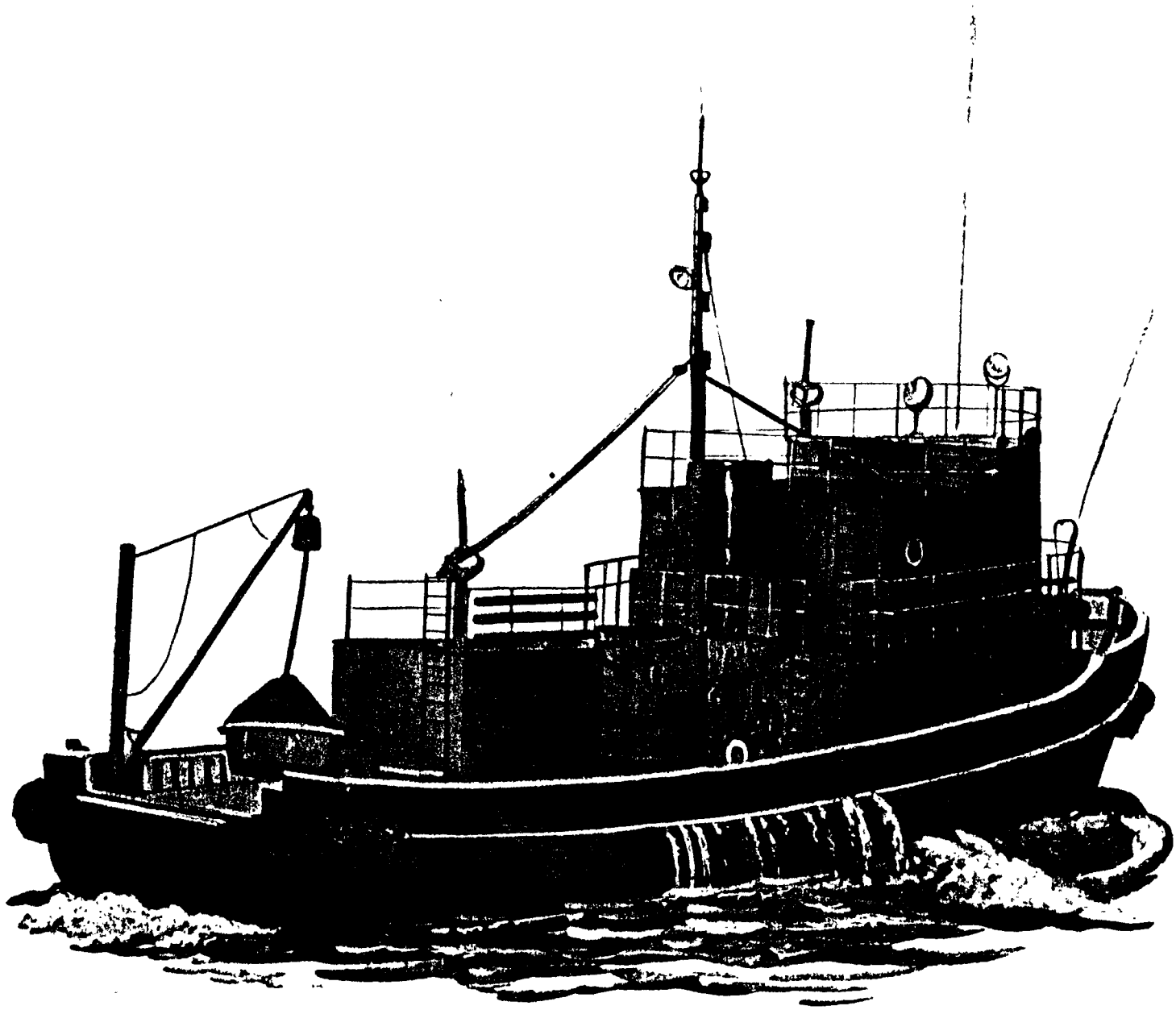


Barge



Motorboat

Fireboat



Resources

You will find the following resources useful for additional activities and information to go along with the leader's guide:

Books

Adventures of Huckleberry Finn, by Samuel Clemens.

Charlie Browns Third Super Book of Questions and Answers, about all kinds of boats, planes, cars, trains, and other things that move, Scholastic Book Services.

Cincinnati: An Urban History, The Cincinnati Historical Society, 1989.

Cincinnati and the Ohio, by Jim Coomer, published by the Program for Cincinnati, 1981.

Cincinnati Fossils, Cincinnati Museum of Natural History, edited by R. A. Davis.

Crinkleroot's Book of Animal Tracking, by Jim Arnosky, Bradbury Press.

The Dinosaurs, by William Stout, edited by Bryon Press.

Folklore in America, selected and edited by Tristam P. Coffin and Hennig Cohen, Doubleday.

The Heritage that is Ohio, Up the Creek Without a Paddle, The Cincinnati and Suburban Bell Company.

Let's Explore a River, National Geographic Society, books for young explorers.

Noises in the Woods, by Judi Friedman, E. P. Dutton.

The River, by David Bellamy, stories for 6 to 10 year olds with environmental and ecological concepts.

Understanding folklore, by Louise Russell, published by J. Weston Walch.

Water in the Air, Holt Science, published by Holt, Rinehart and Winston.

Poetry

Fishing in the Lake and My Tree, Choral Speaking by Rita Bryan, Fearon Book.

Poetry Place Anthology, Instructor Books

Resources (Continued)

Cricket Song by Elsie Strachan
Cricket Song by Solveig Paulson Russell
In the Shade of a Tree by Thelma Ireland
The Insect's World by Ethel Jacobson
Mr. Owls by Edna Hamilton]
Skyscrapers by Rowena Bennett
Spider Webs by James S. Tippett
Squirrels by Winifred C. Marshall

Time for Poetry, edited by Mary Hill Arbuthnot, published by Scott Foresman.

Boats by Rowena Bennett
Ferry-Boats by James S. Tippett
Some Fishy Nonsense by Laura E. Richards

Music

Drifting Clouds, Music by William Gillock, Solos, Willis Music Co.

Erie Canal, American Folk Song, Adult at the Piano, Schaum.

Six Magical Folk Tales, From Ireland, Greece, Mexico, Norway, Russia and American Indians. Columbia Children's Library of Recorded Books.

Who Has Seen the Wind, words by Christine Rossetti,k Melody by Zion's Harp, from Song for Joy.

World of Music Series, Silver, Burdett & Ginn.

Canoe Song, words and music by Margaret E. McGhee.
Down by the Riverside, black Spiritual
A Friend of Mine, A Song for the River, words and music by Lorre Wyatt
Peace Like a River, arranged by Eisman
Rain, words by Annie W. McCullough, music by Paul Hindemith, (Water Story, and activity sheet that goes with the music shows the sounds related to parts of the water cycle.
Waters Ripple Flow, a Song of Freedom, Slovakian Folk Song.

Art

Unique Art Activities - card set published by Educational Insights.

★U.S. GOVERNMENT PRINTING OFFICE 1993 .750 .002/ 60172