LPL-301

LPL 301

North Lakeland Elementary School Fall Lakes Project 1996

K-7th Grades

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Ideas for a Lakes Theme in a Kindergarten Classroom

Carolyn Kovar

* many of these suggestions can be used in classrooms beyond Kindergarten

Math

Weigh things that are dry and then wet - compare the differences.

Fit geometric forms (pattern blocks), together to make fish.

Play color and shape fishing. Materials are a 3 ft. stick with a string attached and a magnet at the other end. Fish are made of construction paper with paper clips on them.

Measure fish with unifex cubes.

Count things in and around the lakes.

Fredericka & the Big Bad Biting Bee - hands on math with the frog, Fredericka

Science

Lakes theme center display - Colorful pictures of lakes, animals in, on, and around lakes, people using lakes for fishing, canoeing, swimming, etc. Include many books with nice pictures also.

Talk about the characteristics of water, do some water experiments.

Demonstrate the 3 forms of water and how a lake looks in the 3 forms.

Show the shapes water can take with various bottles and containers and talk about the many shapes that lakes can have.

Use the Is It Floating? big book for a discussion on what is floating in our lakes, and do some sink and float experimenting in the classroo

Take a specific animal that lives in, or around a lake and study it closer. Do progects, learn facts about fish, a loon, ducks, frogs, et

Learn about the water cycle.

Reading Readiness

Play ABC fishing - refer to mateials needed in math fishing, each fish has a letter of the alphabet on it.

Look at the non-fiction books together, encourage discussion.

Read some of the fiction books, encourage discussion, sequencing events, use them as a take off for a picture or progect. Ex: If a Wish Fish granted 3 wishes, what would you wish for?

Art

Make an underwater lake box. Paint the inside of cardboard box blue, and put it on it's side. Children make plants and animals that we would find in a lake and hang them in the box, or tape on the sides.

Make diving masks to wear out of construction paper to see the things underwater better.

Make a big mural that children make things to put on the water's edge or in the water - plant and animal life.

Going to a beach picture using real sand to glue on and water color wash for the water.

Do fish prints with real fish.

Social Studies

Make a list of things that people do in and around lakes, what they use them for.

Make a lakes book. Each child contributes a page depicting something they do in or by a lake. Could use a blue watercolor wash for water.

Discussion using pictures as props of ways people may be harming or polluting lakes.

Follow up discussion on how people can help keep our lakes clean and safe.

Lake Books

The Hidden Life of The Pond - David M. Schwartz (LMC 574.5)

Life in Ponds and Streams - William H. Amos (LMC 591.5)

Pond Life - Barbara Taylor (LMC 591.92)

Loon Magic For Kids - Tom Klein

Raccoons For Kids - Jeff Fair

Busy Beavers - Lydia Dubcovich

Fish Story - Robert Tallon

The Little Fish That Got Away - Bernadine Cook

Wish Again, Big Bear - Richard Margolis

Who Lives Here?, Book 1, Rivers, Lakes, & Ponds - Dawn Baumann Brunke Mary A. Shafer

Who Lives Here?, Book 4, Wetlands & Woodlands - Dawn Baumann Brunke & Mary A. Shafer

In The Small, Small Pond - Denise Fleming

Big Books

A Beaver Tale - Rebel Williams

Is It Floating? - Fred & Jeanne Biddulph

Lake Songs

Row, Row, Row, Your Boat

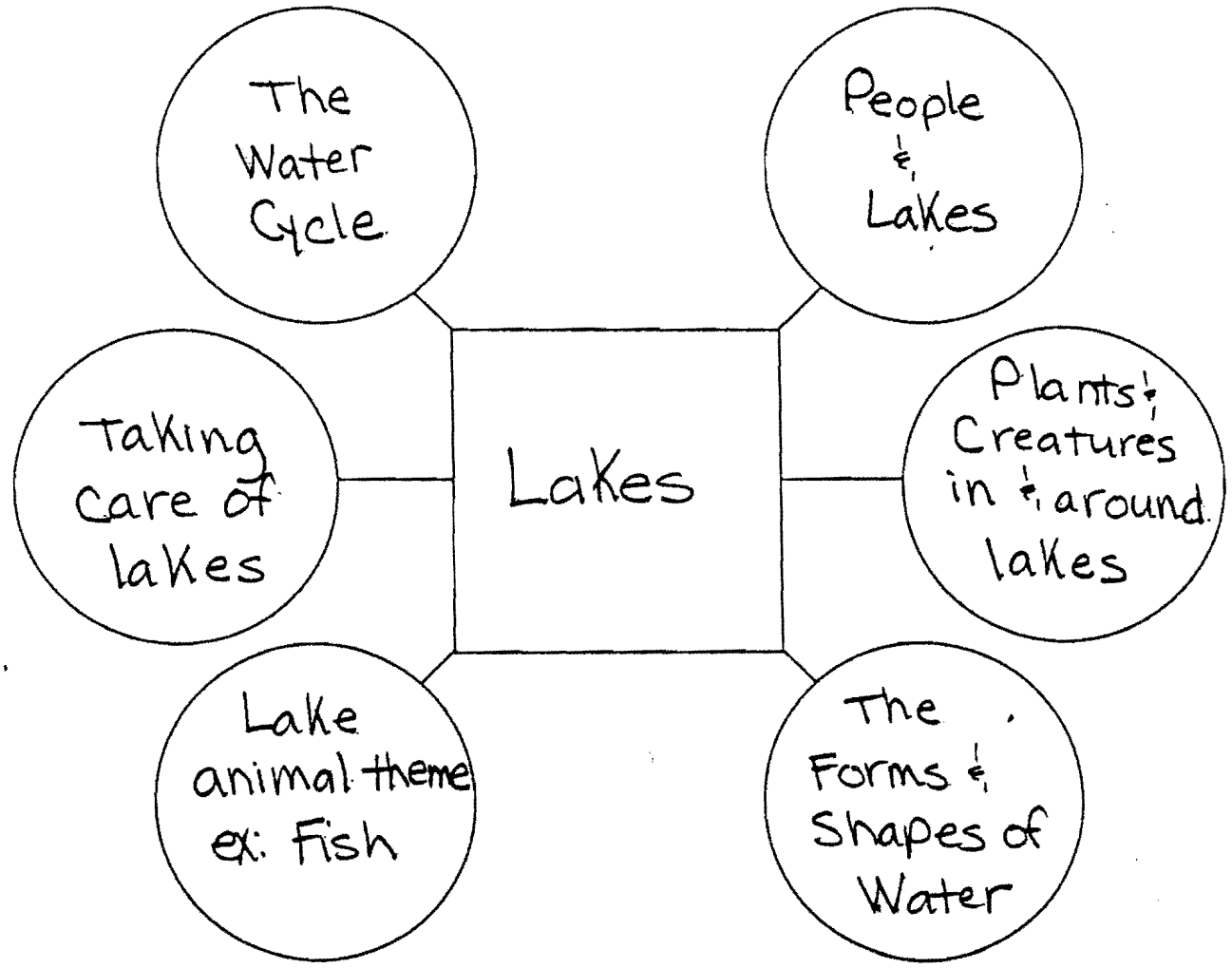
Three Green Speckled Frogs

I'm a Little Fishy

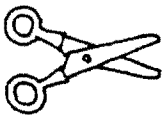
Make a Wish

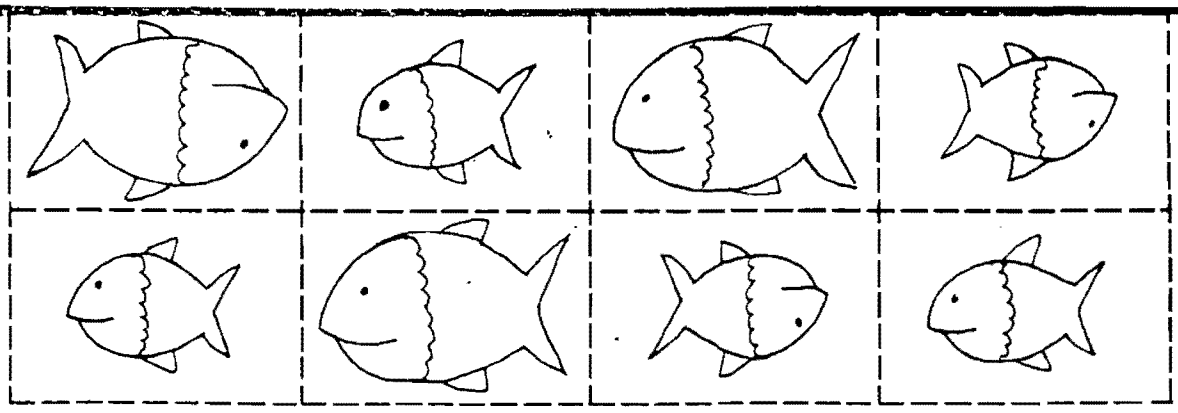
▶ THINK BACK: RE-DESIGN ◀

Think back to units you've just done and, as an interdisciplinary team (or a grade level team), see if you can find a theme that might have worked for all of you.

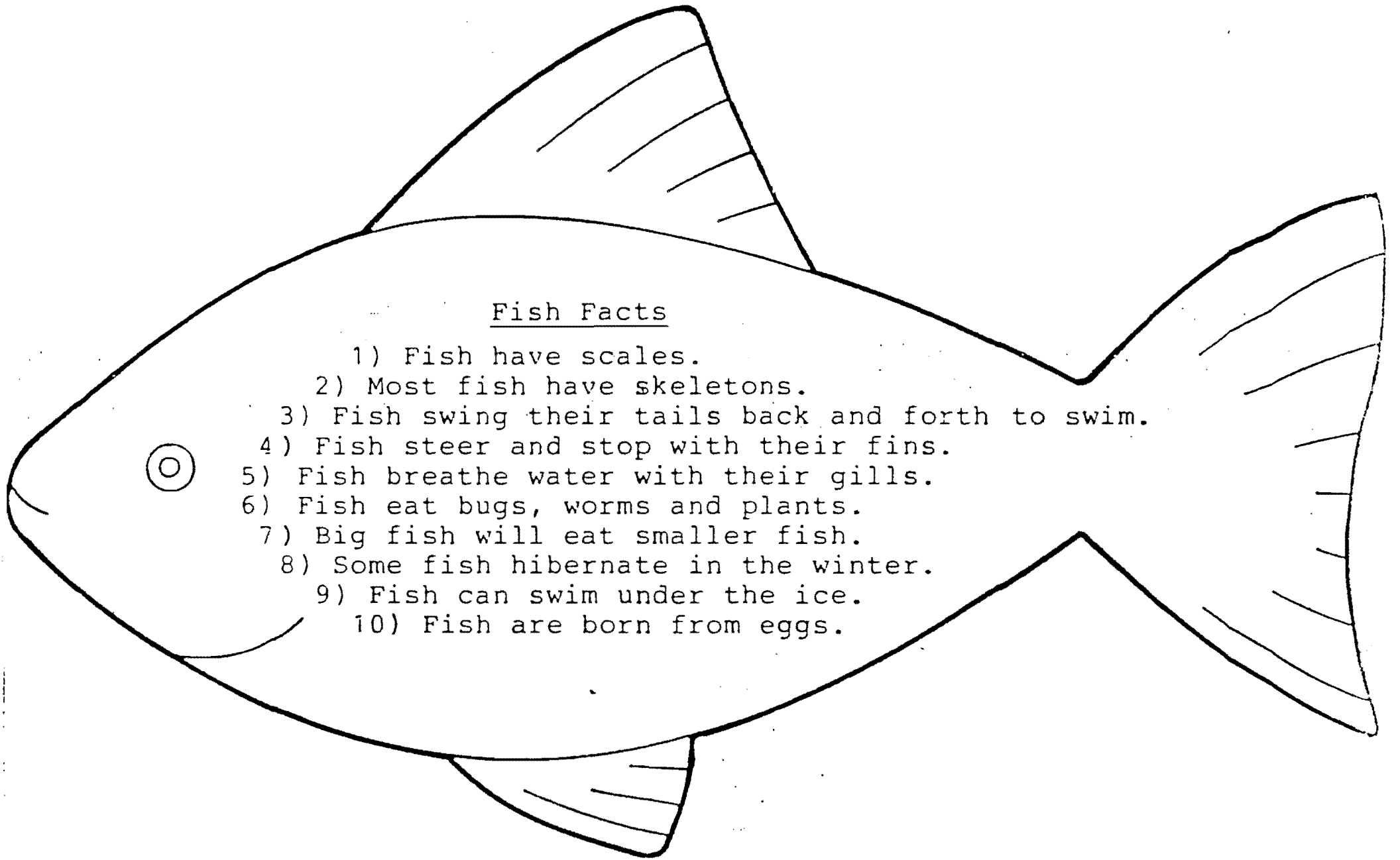


Notes & Reflections





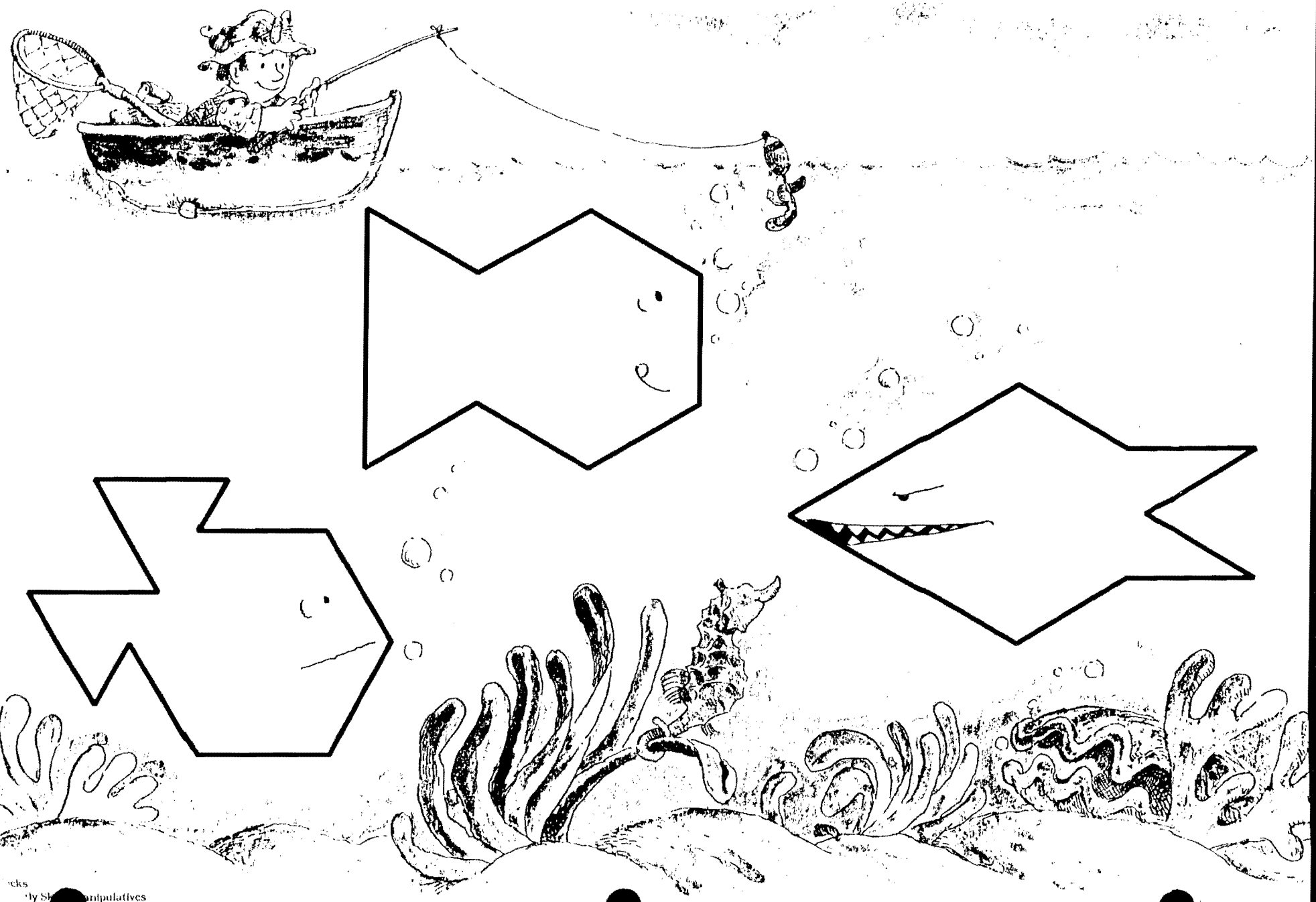
(K) PROBLEM SOLVING—CLASSIFYING BY COMPARISON
Cut out the fish. Put the fish in the right basket.



Fish Facts

1) Fish have scales.
2) Most fish have skeletons.
3) Fish swing their tails back and forth to swim.
4) Fish steer and stop with their fins.
5) Fish breathe water with their gills.
6) Fish eat bugs, worms and plants.
7) Big fish will eat smaller fish.
8) Some fish hibernate in the winter.
9) Fish can swim under the ice.
10) Fish are born from eggs.

Use blocks to make the fish.



Multi-Age Classroom

Jon Berg, Sherry Wuest & Joanie Byram

Lake Activity

Multi-Age Classroom
September 1st, 1995

Objective: To help students become aware of all water uses and concerns.

Activity: Use an open discussion format to brainstorm uses of water and concerns about Lake use. Student's also looked at maps of area lakes to determine which Lake they would like to adopt. Teacher's helped student's locate a lake that would fit the criteria for Lakes study. Rest Lake was chosen.

From Multiage

September 29, 1995

Our News

We went to Rest lake. We had a pontoon ride over to Fox's Island. We ate lunch. We did Monet paintings and looked in the lake for water creatures. We found:

crayfish
leeches
a water snake
minnows
snails
worms that we could see through
water spiders
water beetles
water bugs
and little green worms.

We found Dr. Fox's roof and Theo found a deer bone. We used our water scopes to search for water critters.

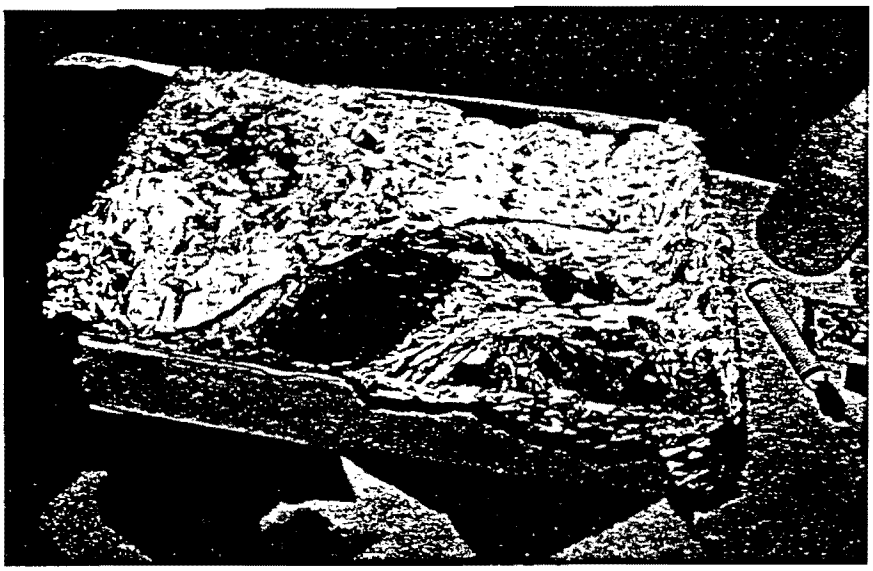
We put down our secchi disks to test how clean the water was. Tory and Theo lost theirs on the bottom of the lake.

Mr. Byram, Mr. Theisen, Mr. Colasacco, and Mrs. Hraychuck went with us. She is a nurse and we're glad we had her for Tory.

WATERSHED IN A BOX

DESCRIPTION:

You and your group will build a simple runoff model and use it to demonstrate how nonpoint source pollution can affect surface water. Whether you live in a city, town or rural area, nonpoint source pollution can be a problem.



OBJECTIVES

By building a runoff model, you and your group will:

1. Define a watershed.
2. Use powdered drink mix to represent nonpoint source pollution and demonstrate how this pollution affects surface water.
3. Design a community that will try to minimize the effects of pollution on surface water.

TIME

The runoff model is very easy to build and takes approximately 10 minutes to construct. This activity would work well at a club meeting.

AGE

This activity is appropriate for ages 8 and up.

COST

All supplies for the watershed model can be found in grocery stores, craft stores or your home.

YOU WILL NEED:

For each model:

- A box cover or other shallow box that is 12" x 12" or larger
- Foam pieces, styrofoam®, or paper
- Heavy-duty aluminum foil
- Permanent markers
- Spray bottle
- Cup of water
- Powdered, unsweetened drink mix–2 or 3 different colors
- Bucket

BACKGROUND

No matter where you live, the water quality in rivers and streams is determined by what happens on the land around them. The land around a stream or river is called a **watershed.**

One watershed is separated from another watershed by a low rise, the crest of a hill or a mountain chain. Rain or snow that falls on opposite sides of the higher land causes water to flow into different watersheds.

Not all watersheds are the same. Some watersheds are hilly, while other watersheds are flat plains. In all cases, precipitation that falls on the watershed flows over land to reach the lowest point–a lake, river or stream.

As water flows over land, it picks up soil, chemicals and other pollutants and carries them to lakes, rivers or streams. This water transportation system is called **runoff.**

In rural or agricultural areas, runoff water carries a wide variety of materials, including pesticides, soil and animal wastes, directly into waterways.

In urban areas, hard surfaces such as driveways, sidewalks, roof-tops and roadways prevent water from soaking into the ground. As a result, the runoff water, which can be contaminated with road salt, heavy metals, or automobile fluids, flushes quickly into storm drains that dump directly into streams and rivers. These kinds of pollutants do not have a single source, so they are called **nonpoint source pollution.** This pollution originates from many different places.

Everyone lives in a watershed. We may not realize that what happens somewhere in the watershed will eventually have an impact on the lowest point in the watershed–a lake, a river, or a stream.

HOW TO MAKE THE MODEL

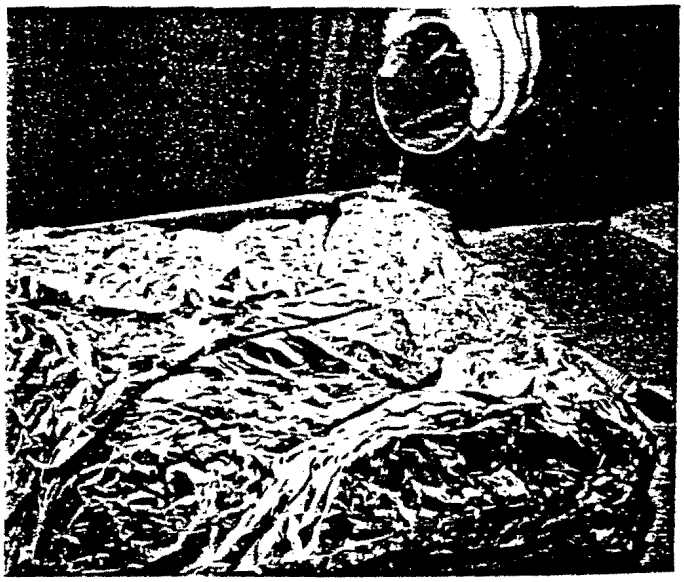
1. **Get a box.**
Use a box cover or a shallow box to contain the runoff model.

2. **Create land forms.**
Arrange pieces of foam or crumpled paper to represent hills and land forms in the bottom of the box. Encourage your group to be creative. Remember, the highest points should be near the box walls. Leave a gully or valley in the middle of the box to represent a stream or river.

3. **Cover the land forms.**
Cover the land forms with a large piece of aluminum foil, shiny side up. Start in the middle of the box and gently press the foil into all of the hills and valleys, working your way towards the box walls. Push the edges of the foil up along the walls of the box and fold the foil over the edge of the box. Be careful not to tear the foil.

4. **Create a community.**
With a permanent marker, draw on the foil to outline the streams or rivers in your model. Next, draw houses, roads, farm fields, feed lots, stores or anything else that you want in your community.

5. **Create a waterbody.**
Gently pour a little water in the river or stream valleys for special effects.



6. Add some pollution.
Sprinkle different colors of powdered drink mix onto the model. The colors represent different kinds of pollution. For example:

- Use red powder to represent yard care chemicals and sprinkle it around the houses.
- Use green powder to represent salt on the roads or automobile waste and sprinkle it along roadways or in a parking lot.
- Use brown powder to represent exposed soil at a farm field or a construction site.
- Use blue powder to represent human or animal waste and leave little piles of powder near homes and farms.

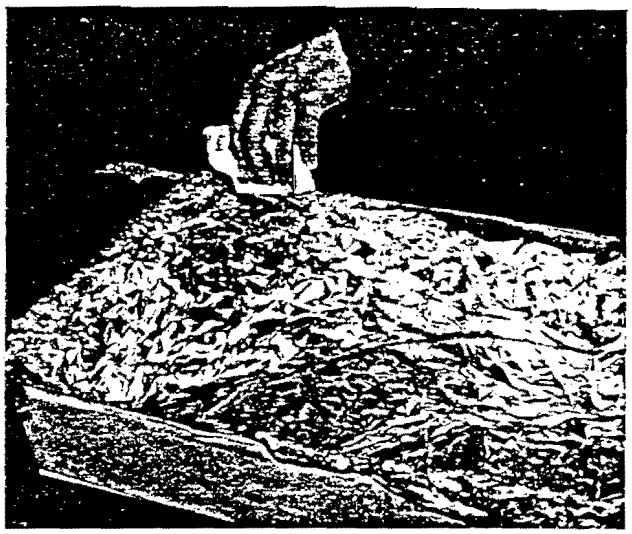
When sprinkling the powder, be careful not to contaminate your stream or river.

7. Ask what will happen.
Ask the group what they think would happen if it rained.

8. Make it rain.
Using the spray bottle to represent a rain storm, spray water on the hillsides. Watch the water flow towards the rivers and streams.

9. Follow up.
Ask the group to tell you what happened. Then ask the group how they would redesign the community to prevent water pollution..

10. Try it again.
Dump the water from the model into a bucket. Remove the foil from the model and set it aside. Place a new piece of foil on the watershed. Ask the group to redesign the community to prevent water pollution (for ideas, see Storm Sewers (insert).



Sprinkle powdered drink mix in the appropriate areas. Let it rain. Was there an improvement?

MORE FUN WATERSHED ACTIVITIES

Long-lasting models

Try building a more permanent runoff model made of modeling clay or paper maché (a mixture of 1 part glue, 3 parts water, and shredded office paper) covered with enamel paint. When the model is complete, use powdered drink mix to represent possible pollutants that can be washed into surface waters.

The *Enviroscape,* which is a runoff model, can be borrowed from the Environmental Resources Center in Madison. The Enviroscape *cannot* be mailed. This model can be reserved and picked up by contacting:

Suzanne Wade
Southern Wisconsin Area Water Quality Specialist
216 Agriculture Hall
1450 Linden Drive
Madison, WI 53706-1562
(608)265-3257

A demonstration

This demonstration shows common runoff pollutants that can enter our streams and rivers. The demonstration will take about 10 minutes, and it is appropriate for kindergarten to second grade.

In a container out of sight, place the following common runoff pollutants: soil, leaves, small model cow and dog (representing farm animal wastes and pet wastes), a can of oil or brake fluid, and small containers of fertilizer and pesticide.

Ask the group what kinds of pollution could be washed into a storm drain and end up in a stream or river. As the different items are mentioned, place the item in full view of the group.

Watershed survey

This project is much bigger than a stream or river survey! You can investigate an entire watershed to identify nonpoint source pollution sites that may be harmful to water resources.

Look for pollutant sources such as auto graveyards, landfills, fuel storage sites, construction sites, mining and quarry operations, animal feed lots, overgrazed pastures, places where a lot of fertilizers and insecticides are used to maintain turf, and industrial complexes.

Contest

Hold a community-wide contest that illustrates the importance of pollution prevention. Try using different categories for poetry, story writing, song writing, dance, photo essays and painting. Be creative with themes; for example, the four seasons.

RESOURCES

For more information about nonpoint source pollution, and resources specific to this unit, see the *Resources* unit.

The Water Action Volunteers program is a cooperative effort between the University of Wisconsin-Extension (UWEX) and the Wisconsin Department of Natural Resources (DNR). For more information about the program, please contact: Pam Packer, Water Action Volunteers Coordinator

AT:
WR/2
P.O. Box 7921
Madison, WI 53707
(608) 264-8948

OR:
Environmental Resources Center
216 Agriculture Hall,
1450 Linden Drive
Madison, WI 53706-1562
(608) 262-0020

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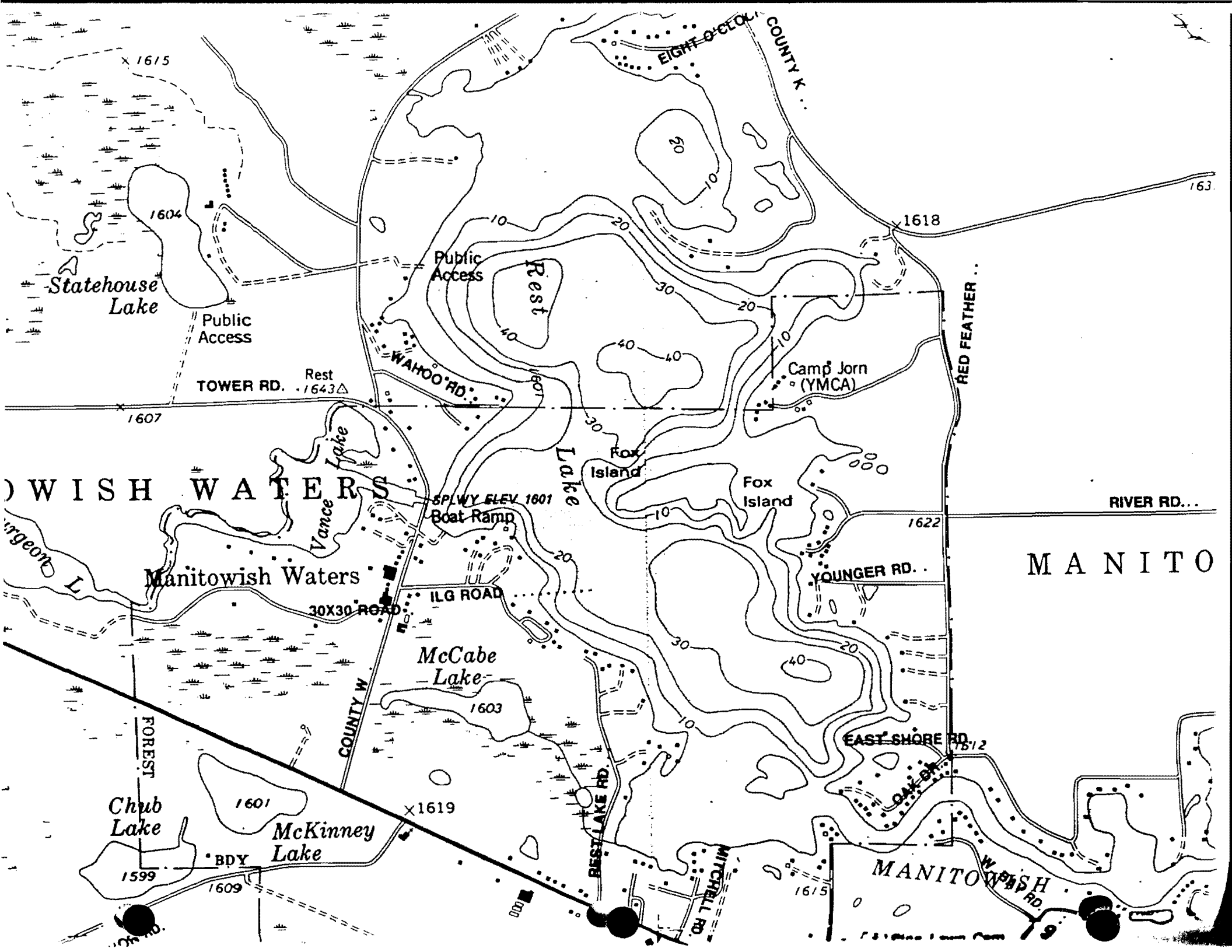
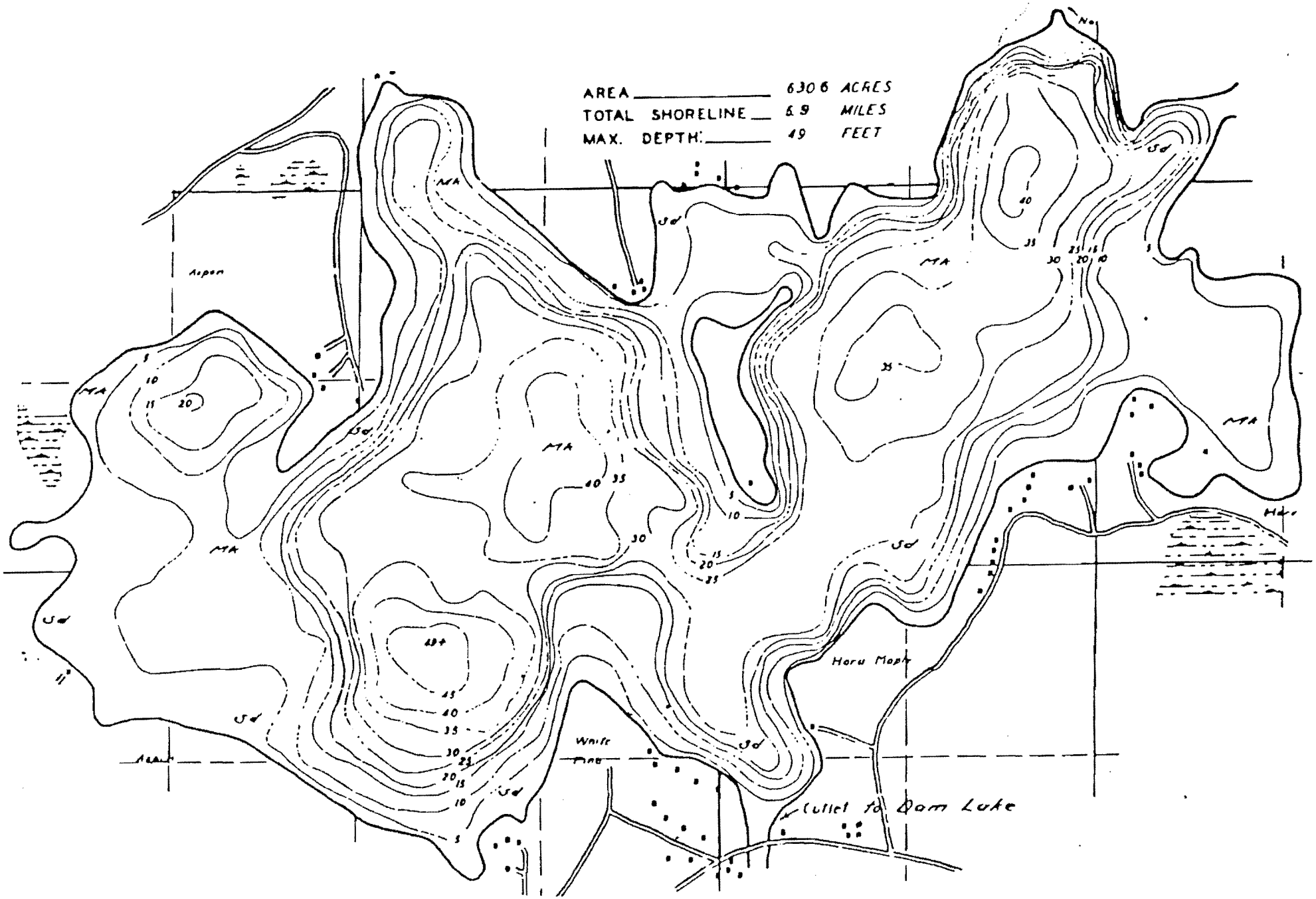

EIGHT O'CLOCK
COUNTY K
1615
1604
1618
Statehouse Lake
Public Access
Public Access
Rest
TOWER RD.
Rest
1643
WAHOO RD.
1607
1601
Camp Jorn (YMCA)
RED FEATHER
Vance Lake
Lake
Fox Island
Fox Island
SPLWY ELEV 1601
Boat Ramp
RIVER RD.
1622
MANITO
Manitowish Waters
YOUNGER RD.
ILG ROAD
30X30 ROAD
McCabe Lake
1603
COUNTY W
EAST SHORE RD.
1612
OAK DR.
FOREST
Chub Lake
1601
McKinney Lake
1619
BDY
1599
1609
BEST LAKE RD.
MITCHELL RD.
MANITOWISH RD.
1615

Rest Lake

Rest



Grade K-4

Dan Markofski

Lake Music Blues

*Teach the students the words to the six songs

*After students learn the words to the songs - sing them as a group

*Teacher uses their judgement as to when to split up in rounds and when to include dancing

TIME: 60 minutes

MATERIALS: tape - spiral notebook of songs - tape deck

OBJECTIVE: students will learn songs dealing with lake issues and concerns

To the Tune Row, Row, Row....

1) Water, water, everywhere
Flowing from the hills;
Tumbling, moving toward
the lake;
Life without would kill.

People, people, everywhere
Helping out the lakes;
Cleaning, learning,
Showing concern;
Making life just great!

To the Tune Michael Row the Boat Ashore

1)Lakes and streams
Are our life and blood;
HALLELUIAH! (repeat)
Brother let's keep
Our lakes clean;
HALLELUIAH!
Keep the water's edge
Serene;
HALLELUIAH!
Sister let's stop pollution;
HALLELUIAH!
Be part of the solution;
HALLELUIAH!
Let's increase habitat;
HALLELUIAH!
Can you all imagine that?!
HALLELUIAH!

To the Tune I've Been Working on the Railroad

1)I've been living by the lake,
All my live-long life;
I've living by the lake,
Just to watch the wildlife.

Can't you hear the loon a-calling,
Yodeling so early in the morning;
Can't you see the fish a-jumping'
For the water bugs.

Plants and ducks and fish,
Loons and crayfish;
Herons, beavers, minnows,
Swish-swish-swish.

Plants and ducks and fish,
Loons and crayfish;
Minnows swimming,
Swish-swish-swish.

I need to care for the wildlife,
I need to care I know oh-oh-oh;
I need to care for the wildlife,
So they won't die. Oh no!

Keep singing,
Fish love to swim in the lake,
Turtles love to swim in the lake;
I love to swim in the lake,
So keeping it clean is great!

To the Tune She'll Be Comin' round the Mountain

1)They'll be canoeing
Round the lakes at dawn.

They'll be drifting past
the island on the lake.

They'll be catching frogs
and crawdads from the lake.

To the Tune Are You Sleeping?

1)Are you littering?
Are you littering?

In the lakes?
In the lakes?

Keep them clean and healthy,
Keep them clean and healthy;

Everyday!
Everyday!

To the Tune Camptown Races

1)Deep cold springs they
form our lakes;
Do-Da, Do-Da!
Rain and snow they
also take;
Do-Da, Do-Da!

Rain it forms up in the cloud;
Do-Da, Do-Da!
Thunderstorms are vey loud;
Oh-Do-Da-Day!

Water from above,
Water from below;
The earth makes water everyday,
We need to help go!

2nd Grade

Sue Kern

I. All life depends upon water in some way.

A. Discuss a variety of ways and reasons why water is important to people and wildlife.

B. Look at pictures

1. Brainstorm words

II. Explain they will be writing Haikus. Originated with the Japanese. consists of 3 lines with 5,7, & 5 syllables each. Shouldn't be concerned with rhyming words. Most haiku poems refer to some element of nature. They express a moment of beauty which keeps you thinking or feeling.

A. discuss syllables (word parts, clap)

B. Read examples from chart:

Gentle raindrops fall.
Reflected in the puddles,
thirsty flowers drink.

The big hungry frog
resting on a lily pad
dreams of careless flies.

Tiny hummingbirds
dart from flower to flower.
Rainbows in motion.

In freezing weather,
Little snowflakes start falling.
Catch them on your tongue.

One sparkling spring day
I saw a tiny spider
spin a web of silk.

C. Read examples of Haiku from "My Own Rhythm" by Ann Atwood (spring on the river, spring in the river, reeds, dark canoe, stream)

III. Pass out p. 33 -- "Write a Haiku" -- a pattern for haiku writing.

A. Write a sample

1. Topic -- fish

2. Brainstorm words or phrases that describe object and tell how you feel about it. swims, leaps for a minnow, feel excited, heart beats.

3. Write a sentence using ideas you wrote: A fish swam by me, leaped for a minnow, and made me feel excited.

4. Adjust the syllables & words to fit the haiku pattern:

The trout swam by me.
It leaped to catch a minnow.
My heart beat faster.

IV. Read the guided imagery. Have "The Babbling Brook" tape on in the background. Remind children to listen for words that can be used in their haiku; i.e. -- babbling brook, river, stream, lake, pond, shore, fish, frog, etc.

A. Groups will do a rough draft on p. 33 & then rewrite on paper provided. If time, they will illustrate their haikus.

B. Share haikus with group.

NOTE: Reproduce these steps for students to
(These steps follow the traditional haiku pattern of 5 syllables, 7 syllables, 5 syllables.)

Write a Haiku

1. Decide on your topic. (You may use a picture or object to help you get started.)

2. Write several phrases or sentences describing an action or feeling about your topic. Remember to refer to nature or the season.

3. Choose the phrases or sentence that you like the best. Work to make them fit the correct haiku form.

   5 syllables
   7 syllables
   5 syllables

NOTE: You may reproduce this form for students to use when writing haiku following the traditional haiku pattern of 5 syllables, 7 syllables, 5 syllables.

Write a Haiku

1. Select a topic. (You may want to use an object or picture to help you get started.) Write your topic here.

_____

2. Think about your topic. Write a list of words or phrases that describes the object or picture and words or phrases that tell how you feel about it.

_____

_____

_____

3. Write a sentence using the ideas you wrote in step two. Write your sentence here.

_____

_____

_____

4. Adjust the syllables and words to fit the haiku pattern. Write your haiku here.

_____

5 syllables _____

7 syllables _____

5 syllables _____

Procedure

1. OPTIONAL: If at all possible, the students should visit a real stream, pond, lake, river, or beach. Try to choose one where human-made sounds are at a minimum. If possible and not dangerous, allow the students to touch the water during the part of this activity where they are being led through a guided imagery. Consider the possibility of taking battery-operated tape recorders on the field trip to tape some of the natural sounds the students experience for later playing once the students are back in the classroom.

2. OPTIONAL: If the field trip is not possible, then try to use a tape player with recordings of natural ecosystems; the sounds of oceans, rivers, streams, swamps, or brooks are often available on tape from bookstores, music stores, and shops that specialize in nature. Classical music can be substituted. "La Mer," "The Pines," and "Fountains of Rome" are examples. Any of a number of selections of "new age" music are also excellent. You can also make your own tape recordings.

3. Ask the students to sit or rest quietly in a comfortable position. Begin the guided imagery. OPTIONAL: If available, invite the students to relax and listen carefully to the water and/or musical sounds. These sounds are simply background for the ideas you are going to ask them to visualize in their minds.

NOTE: Please modify the water images in the text of this guided imagery as needed to adapt to your location. Also you may want to read the section about guided imagery that appears in the appendices to this activity guide for additional suggestions concerning use of this instructional strategy with students.

"You are to try to imagine the things you will hear me describing. Sit comfortably and close your eyes. . . Relax, and do your best to imagine what I am describing. . .You are sitting on the edge of a stream (lake, ocean, etc.). . . .Your bare feet are swinging in clean, clear water. . .The water feels good, but it is cool. . .You feel a current washing over your feet, pulling at them. . . Think about the water flowing past your feet until it reaches a larger stream. . .The water connects you with the larger stream. . .Feel its more powerful flow. . .See the green ribbon of trees and plant life on the banks. . .The larger stream carries the water past flat farmlands, cities, factories, and forests until it eventually reaches the sea. . . .Through your feet and the continuous currents of water you can imagine that you feel the sea. . .Now stretch your mind and realize that you interconnect with all the world's oceans. . .You are now touching one single body of water that stretches all around the world. . .Your own body contains water that is part of this system. . .Your touch laps against the shores of the Pacific Ocean, it flows under the Golden Gate bridge in San Francisco's bay, it leaps and plunges around oil drilling platforms in the North Atlantic. . .It pours from the sky as a storm rages dark and gray. . .It drenches an Alaskan native who shivers on the Arctic shores before her parka begins to warm her. . .It glistens on the back of a Greek boy who tugs fiercely on fishing nets in the warm Mediterranean Sea. . .Water connects your feet with every stream flowing into the oceans around the world. . .You can reach up the rivers to the hearts of continents. . .You can feel the tremor of the hippopotamus that just dove into an African river. . .You can feel an alligator silently sliding toward a heron in the Florida Everglades. . .You can feel beavers busily building a dam on a stream in Europe. . .You can see water, thousands of tons of it, in great drifting fleets of heavy white clouds. . .Your reach embraces all the whales, all the porpoises, all the sharks. . . You are connected with the mythic creatures, living only in the minds of people in the past—mermaids, citizens of Atlantis, and the mythic monsters that swim in Loch Ness. . .Your feet feel the flow of the current of the miles-wide Amazon River in South America, the ancient Nile River pushing north through Africa, the Colorado River thundering with a boatful of river rafters through the Grand Canyon. . .Your watery embrace wraps all around the Earth. . .And, of course, the water flowing over your feet connects you with everyone else who is now sitting, with feet dangling in a stream, wondering where the water goes. . .It is time to come back. . . Bring the limits of your senses back from the world's rivers and oceans. . . back to the surfaces of your feet. . . back to where you are. . .When you feel ready, you may open your eyes."

4. Once the imagery is complete, ask the students to open their eyes. Tell them that they each had their own private journey even though they all heard the same words. Tell them that in a moment you will ask them to close their eyes again to find one place on the journey through the world's waters that was their favorite—and you will ask them to try to remember what that image was like.

5. Ask them to relax again and have them try to re-create the picture in their minds. Tell them to look at the detail, the colors, the plants and animals, and to try to capture it all in one scene. Have them pay particular attention to the role of water in the lives of people, plants, and animals.

6. When you feel they have had enough time, ask them to open their eyes. Provide the art materials and ask them to each get paint sets and paper and to quietly paint the image of their favorite place. OPTIONAL: You may provide an opportunity at this time for some or all of the students to talk briefly about their favorite places.

NOTE: If you choose the field trip instead of the classroom option, try to take water-based paints to the field so the actual water of the site can be used to paint the images. If you remain in the classroom, you might mention how some of the waters of their journey will now be used to help them paint their image.

7. Once the images are complete, ask the students to write various short forms of poetry that express some of their feelings about water and its importance. Here are a few examples of poetic forms which can be used.

Haiku Haiku, originated by the Japanese, consists of three lines of five, seven, and five syllables each. The emphasis is syllabic, not rhyming. For example:

The fish swam by me
Nothing left in the shimmer
My heart beat faster

Cinquain Cinquain is derived from the French and Spanish words for five. This form of poetry is also based on syllables—or may be based on number of words—but there are five lines. Each line has a mandatory purpose and number of syllables or words. These are: 1) the title in two syllables (or two words); 2) a description of the title in four syllables (or words); 3) a description of action in six syllables (or words); 4) a description of a feeling in eight syllables (or words); and 5) another word for the title in two syllables (or words). Here are two examples, the first using syllables and the second using words.

Osprey
Fishing eagle
Moves above dark water
With graceful strength it finds its meal
Seeker

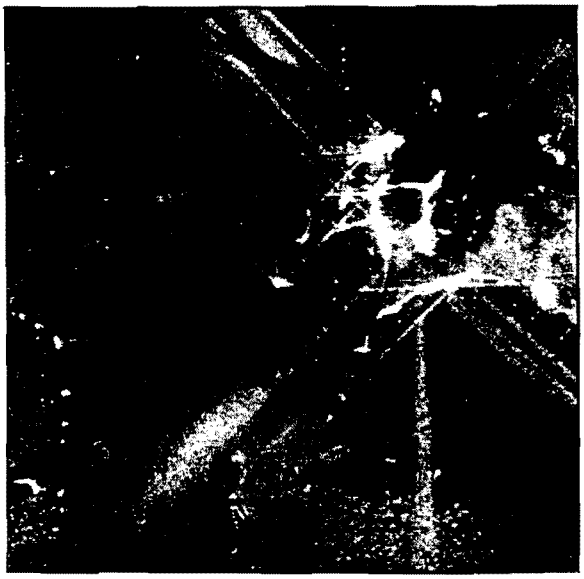
Sea otter
Mammal of living waters
Swimming, sleeping, eating,
diving, basking, playing
Sensitive indicator of the quality
of continuing life
Still here

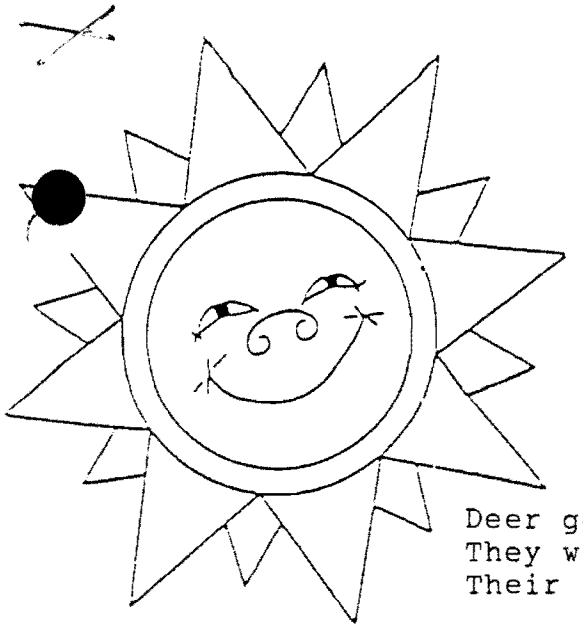
Diamante Diamante is a poem shaped in the form of a diamond. It can be used to show that words are related through shades of meaning from one extreme to an opposite extreme, following a pattern of parts of speech like this:

noun
adjective adjective
participle participle participle
noun noun noun noun
participle participle participle
adjective adjective
noun

For example:

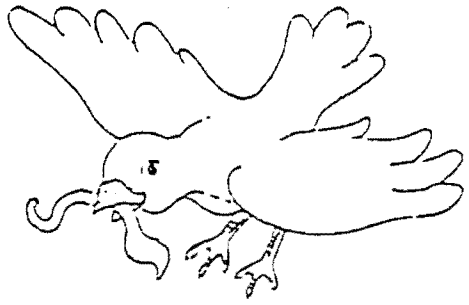
Stream
Small, clear
Rippling, moving, growing
Life, plants, animals, people
Rushing, sustaining, cleansing
Connected, universal
Ocean





OUTDOOR ED

"HAIKUS"



Deer go to the lake.
They will drink clean lake water.
Their fawns are pretty.

by Brigitte, Dustin, Andrew,
Tori and Brittany

Loons swim gracefully.
I hear loon calls on my lake.
They make my heart race.

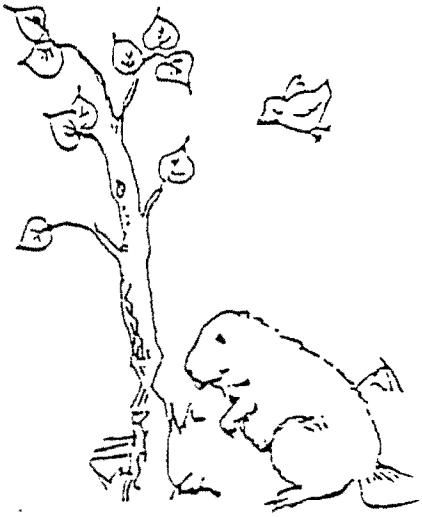
by Danny, Peter, Blake
and Jenny

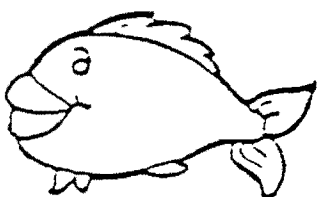
Loons dive to catch trout.
Schockingly it pops back up!
I feel heavenly.

by Clayton, Curtis, Emily
and Ashley

Loons have nice patterns.
Start out flying beautiful,
Dive into water.

by Emily, Alice,
Richard
and Ryan





Grade 1-4

Barb Peck

Lakes Study

Session: "On The Edge"
Grades: 1-4
Background Information: Where the edges of two ecosystems come together and overlap is "where the action is". This area of overlapping ecosystems tends to be more complex than any ecosystem by itself. There is greater diversity in plant and animal life; those common to both are brought together in the overlapping area. Children can look for indirect evidence of this - footprints, scat, feathers, etc. Edges also attract humans - lakeshores, streambanks, ocean beaches, etc. Humans may change the overlapping area (ecotone) - drain marshes, remove trees, dam streams, etc.
Procedure: 1. Discuss what children think of when talking about "the edge" of anything
2. Introduce ecosystem edges by having students in groups of two paint two circles on plain paper - one yellow and one blue (not overlapping). Then have them extend both circles until they do overlap. Discuss the results new color but one made of colors from both circles.
3. Give each group of two students a piece of green yarn and blue yarn The green will represent a forest

and the blue a lake. Then using pattern blocks or some other manipulatives have the students use them to represent trees, animals, fish, etc. in each ecosystem. Then they are to overlap the yarn circles - making sure that one of each animal, etc. is in the overlap area. Do they notice the greater diversity?

4. Discuss where most of the students live and why --- on the edges of lakes.
5. Use the 8½ min. filmstrip "Where Land Meets Water", if time.
6. Walk to lakeshore. Using a paper with a Venn diagrams drawn on it ⊂⊃, have students write names of what they see in each circle and in the overlapping area. Collect lake samples and observe with magnifying glasses.
7. Next visit a bog and repeat the procedure in #6.
8. Wrap-up discussion.

Barb Peck

Art Lakes Project

Mrs. Jensen

Art Lakes Project

Mrs. Jensen

ART PLANS FOR OUTDOOR ED; LAKES PROJECT :IMPRESSIONIST DRAWINGS-PASTEL

Opening: compare Impressionist music with Impressionist art

While listening to Debussy's "La Mer" discuss "water music". Instead of using music according to the old rules, Debussy used it freely, choosing certain chords for effect. His style was similar to the way the Impressionist painters used color. Debussy's ideas set music free and opened the creative door for other composers.

The Impressionist painters also opened up the creative doors for other artists. The Impressionists based their work on the fact that nature changes continually. The Impressionists tried to create paintings that capture the moment --keeping in mind that because of changes in the weather or light nothing stays the same . The lake looks totally different at dawn, at noon and then again at dinnertime.

Claude Monet was a French painter (show prints of Monet's waterlilies and lakes)
(1840-1926)Monet became the leading member of the Impressionists. The Impressionists were painters who tried to show how light effects nature.The name Impressionist refers to the "impressions" of color, beauty and light which celebrate nature.

LESSON PLAN: Grades 1-4: mixed groups of 18 students

While listening to Debussy's water music, think about the beauty of the northwoods and particularly Lake Manitowish. Using a viewfinder select a section of the waterfront to draw in pastels. Sketch the general areas first with a light color and then use overlapping colors to create the effects of light on the water and the surrounding woods and lakefront.

Remember- The Impressionists based their work on the fact that nature changes continually.
Leaves move in the wind.
Light transforms the appearance of things.
Reflections change color and form.
The Impressionists tried to create paintings that capture the moment .

Texture creates depth. Overlapping colors create new colors.

Health Lakes Project

Dan Wohlleber

Health Lakes Project

Mr. Wohleber

Dan Wohlleber

LAKES WEEK

1-4 P.E.
Objective: Have students understand the relationship of mans role in keeping lakes within their normal operating capacity. Increased knowledge and awareness that lakes can only "Take so much."

Activity: Limbo (How far can you go before you succumb to the rope?)

5-7 HEALTH
Objective: Knowledge of how and why lakes are classified the way they are.

Activity: Lecture and discussion on lake classes.

8 HEALTH
Objective: 1) Increased knowledge of area lakes.
2) Increased knowledge of environment in relation with man.

Activity:1) Draw and label contour maps of some area lakes including access, size, depth, fishery, and bottom characteristics.
2) Make a collage of environmental goods and evils.

Social Studies w/ Mr. Anderson

Social Studies Lake Project

Mr. Anderson

Lakes Project Week "Fall"
6th and 7th Grade
Social Studies
Andy Anderson

Each student will "design" their own personal lake-showing the following on their drawings.

a. Shoreline shape (Lake Outline)
b. Contour lines for depth
c. Weed growth and types
d. Sand/Rock bars
e. Islands
f. Inlets
g. Shoreline developments (If any)
h. Any other information that they wish to include.

"MINI-UNIT" FOR GRADES 6, 7 & 8. NAME_____

L A K E S

POINTS TO PONDER. Did you know?

1. 20% of all the world's fresh water is in the Great Lakes?
2. Only 1 % of all fresh water is safe to drink in its natural state?
3. Water QUALITY, world wide, is in shape decline?
4. Vilas County contains over 1300 lakes and is one of the 3 most concentrated lakes regions in the entire world?
5. All natural ground water tables east of the Appalachian Mountains is polluted by some un-natural substances?
6. Much of the decline in water QUALITY is due to one or all of the following:
    a. septic pollution
    b. lawn fertilizer run-off
    c. agricultural fertilizer and other chemical run-off
    d. road salt run-off
    e. silt and erosion from shoreline and riverbank development
    f. gasoline from outboard motors and jet-skis
    g. TOO MANY PEOPLE USING A VERY LIMITED RESOURCE

MATERIALS NEEDED FOR THIS UNIT:

1. a sample lake map 2. notes from the blackboard as we discuss this unit
3. a large sheet of white paper 4. a pencil 5. colored pencils and/or FINE LINEmagic markers

REQUIRED WORK FOR THIS UNIT:

1. Each student will create an imaginary lake map. (A "rough draft" will be created prior to creating your "final" drawing on the large sheet of white paper!!!!!!!)
2. Your imaginary lake map must include the following items:
    a. the outline of the shoreline b. contour lines showing depths at intervals of 10 feet
    c. symbols showing weed growth, both submergent and emergent
    d. symbols showing rock bars e. symbols showing fish shelters (cribs)
    f. all shoreline development, homes, resorts, marinas, etc.
3. Your imaginary lake map must include at least 4 of the following 6 items:
    a. an inlet b. an outlet c. island(s) d. adjoining roads and/or highways
    e. public boat ramp f. public campsites, picnic or beach areas

THIS PROJECT WILL BE WORTH 50 POINTS TOWARDS YOUR SOCIAL STUDIES 9 WEEKS GRADE.

Consumer Education

Consumer Education

Monday- wild rice

Tuesday- household cleaners

Wednesday- "Poison Pump" activity
water-borne illness

Thursday- Journals

Friday- Pictographs, petroglyphs,
shirt decorating

Tried and true recipes for a less hazardous home

Household cleaning is an ancient chore and people tidied up without fancy chemicals for a long time. Simpler times called for simpler cleaners that still work today.

These remedies were drawn fr a number of sources. Although they are usually less hazardous than popular products, should still be used with caution. Their effectiveness has not been tested by formal research or consumer test groups. When trying a new alternative, test it on a small, inconspicuous area first to be sure you'll get the results you want.

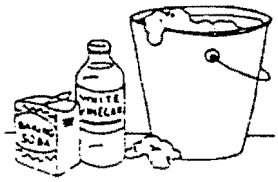
Most jobs can be accomplished with six simple ingredients mixed with water: vinegar, soap, baking soda, washing soda, borax and ammonia. Even so, handle these compounds carefully. Ammonia in particular irritates eyes, nose and lungs. Wear gloves and eye protection when mixing and working with ammonia in these recipes and clearly label the containers of all cleaning solutions you concoct.

ILLUSTRATIONS BY HAWLEY W. WRIGHT

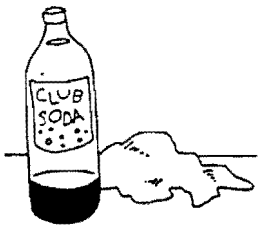
Air freshener: Herbal potpourri or cotton balls soaked in vanilla are sweet-smelling. Also try boiling cinnamon and cloves in a small amount of water. An open box of baking soda absorbs refrigerator odors. Borax sprinkled in the bottom of a garbage can controls odors.

All-purpose cleaner: Mix one gallon hot water and ¼ cup vinegar. This solution is safe for all surfaces and can be rinsed away with water.

Ant control: Ants will avoid lines of powders and sharp crystals. Sprinkle barriers of talcum powder, chalk, bone meal, cayenne pepper or boric acid across their trails. Industrial grade boric acid crystals are especially effective as they have little odor. Keep boric acid away from children and pets.



Bathroom cleaner: Use baking to scrub surfaces clean and wipe surfaces with a solution of ¼ cup vinegar in a gallon of water.

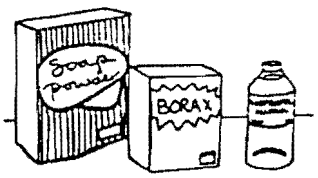


Blood stains: Club soda and cold water will remove fresh blood stains. Blot it up with a clean cloth or paper towel.

Chocolate stains: Blot the stain with club soda.

Cockroach control: Try a light dusting of borax around the refrigerator, stove and duct work. You can also combine sugar, flour and boric acid to poison roaches; they'll carry the powder back to their nests. (Keep pets and children away from these mixtures.)

Copper cleaner: Dip the copper in warm vinegar, then sprinkle salt on the piece and scrub with a soft cloth. Rinse well with clean water.



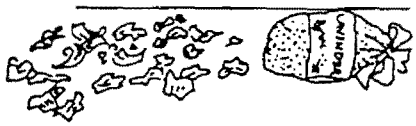
Disinfectant: Mix ½ cup each of soap, borax and isopropyl alcohol.

Drain cleaner: Keep drains open and clean with a plunger or metal snake. As a preventative or if a drain becomes clogged, pour in ¼ cup baking soda, followed by ½ cup vinegar. Close the drain until all the fizzing stops, then flush well with boiling water.

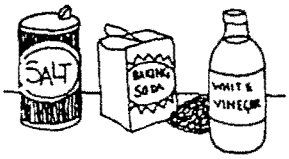
Floors and toilets: A mixture of two to three teaspoons each of borax and liquid dish soap in two quarts of hot water works well on tough jobs like floors and toilet bowls. Adjust the concentration of ingredients to fit the job. Likewise, baking soda and a mild detergent plus a little elbow grease can take the place of powder cleansers. Baking soda mixed with a small amount of bleach is an effective toilet bowl cleaner. (Remember, never mix ammonia with bleach.)

Hand cleaner: To clean hands of paint or grease, massage them with baby oil, mineral oil, margarine or butter. Wipe them dry on a paper towel, then wash your hands with soap and water.

Laundry pre-soak: To remove tough stains, soak the spot in a mixture of ¼ cup borax in two cups of cold water prior to washing. Rub corn meal and water into greasy stains and then rinse the stain with lemon juice before machine washing.



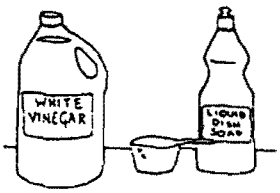
Moth preventer: Cedar chips or lavender can be sprinkled in drawers to discourage moths, or wrap sweaters in newspaper before storage.



Oven cleaner: Dampen the spill and sprinkle salt on it while the oven is still warm. Scrape the spill away when cooled. Greasy spots can be removed with a vinegar-soaked rag. Really tough spots can be removed by dampening the area with water and lightly scrubbing with baking soda and steel wool pads.

Perspiration stains: Weak water solutions of white vinegar, lemon juice or aspirin can be used as a presoak to remove perspiration stains or soak the clothes in a solution of corn meal and water.

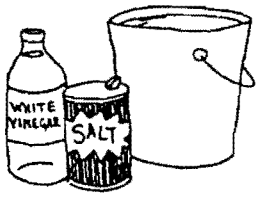
Pest preventer: Clean up the pest's food supply. Repair holes in walls and screens. Caulk cracks and crevices. Add weather stripping to windows and doors. Place vapor barriers beneath buildings. Repair leaks, clean gutters and maintain good soil drainage to reduce dampness that attracts wood-damaging pests.



Pet stains and odors: Try a mixture of ¼ cup vinegar in ¼ cup liquid soap. Rub in the mixture, blot the stain, then rinse with water.

Rust remover: Vinegar's weak acid works wonders on rust stains. Warmed vinegar coupled with some scrubbing will remove rust from dishes, sinks and your teapot.

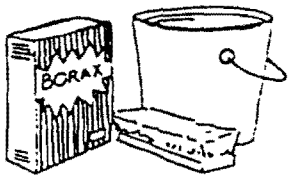
Silver cleaning: Baking soda and water or buttermilk make fine silver-soaking solutions. The fine abrasives in toothpaste will also brighten your silver jewelry with mild brushing. Also try boiling silver for two to three minutes in a mixture of one cup water, one teaspoon baking soda, one teaspoon salt and a piece of aluminum foil. Rinse pieces well in water and dry with a soft cloth.



Sinks and countertops: Use vinegar mixed with water and salt.

Window cleaner: Use newspaper dipped in vinegar to scrub windows. A mix of one quart water, a few drops dishwashing detergent and two tablespoons of sudsy ammonia works well.

Spot removers: To remove grease from garage floors, sprinkle the spot with dry cement or fresh cat litter. Let stand for a few hours, then sweep it up. Grease is absorbed by the dry clay or cement.



Stains: General household stains can be cleaned and disinfected with borax solutions.

Wood furniture polish: Look for products containing pure oils like lemon oil, tung oil or almond oil without petroleum distillates. You can also make furniture polishes with a mixture of one part lemon juice to two parts mineral oil or other oil. Don't use vegetable oils to preserve wood because the oils eventually turn rancid and emit foul odors. Be aware that mineral oil is flammable and mineral spirits should not be used.

Wood cleaning: Try Murphy's Oil Soap.

Wood scratches: Mix one teaspoon each lemon juice and mineral oil.

In commercial polishes, look for products containing lemon oil or beeswax in a mineral oil base.

Finally, clean lightly, but more frequently to avoid the need for stronger cleaners. Use preventative strategies at home. Check your home for small spaces where pests can gain access. Learn about pest habits so you can apply the least hazardous alternative when pests are most vulnerable. And remember that your household can still be considered clean without a shiny, "spanking clean" look every day.

Elaine Andrews is a University of Wisconsin Extension environmental education specialist. Liz Wessel is a toxics use reduction specialist for Citizens for a Better Environment.

LESS TOXIC

RECIPES

INSTEAD OF:	*TRY:*
All Purpose Household Cleaner	1 tsp oil soap, 1 tsp borax (*). 1 quart warm water
Ammonia	Vinegar, water
Ants and Roaches	1 cup flour. 2 cups borax (*): sprinkle around house foundation. doorsills. or baseboards
Bleach	Borax (*)
Disinfectant	½ cup borax (*). 1 galion water
Drain Cleaner	Pour ½ cup baking soda. followed by ½ cup vinegar down the drain. Wait 5 minutes, then rinse with boiling water.
Flea & Tick Remover	Mix brewers east or garlic in your pets food; sprinkle fennel. rue. rosemary or eucalyptus around animals sleeping area.
Odors	Soak a cotton ball in pure vanilla (*).
Oven Cleaner	Sprinkle salt on fresh spills and lift off with spatula when oven cools. For general cleaning: layer water and baking soda. then rub w/ very fine steel wool.
Plant Sprays	Wipe leaves with mild soap and water and rinse.
Silver Polish	Soak 5-10 min. in 1 quart warm water. 1 tsp baking soda. 1 tsp salt with a small piece of aluminum foil.
Window Cleaner	½ tsp oil soap. 3 Tbsp vinegar. 2 cups warm water.

*These ingredients are safer but still toxic.

Brought to you by e Toxic Freeze Coalition
823 N. Cass St., Milwaukee, WI 53202 414/273-0373

ALTERNATIVES TO HAZARDOUS HOUSEHOLD PRODUCTS

PRODUCTS	HAZARD PROPERTIES	HAZARDOUS INGREDIENTS	ALTERNATIVE
Cleaners			
Silver Polish	Causes burns, toxic	Acidified thiourea, sulfuric acid	Soak in boiling water, baking soda, salt, and a piece of aluminum foil
Oven Cleaner	Causes burns, toxic	Potassium hydroxide, sodium hydroxide, ammonia	Baking soda and water; salt; a quarter cup of ammonia overnight
Toilet Cleaner	Irritant, causes burns, toxic	Muriatic (hydrochloric) or oxalic acid, paradichlorobenzene, calcium hypochlorite	Toilet brush and baking soda or mild detergent
Disinfectants	Causes burns, toxic	Diethylene or methylene glycol, sodium hypochlorite, phenols	One-half cup of borax in 1 gallon of water
Drain Cleaner	Causes burns, toxic	Sodium or potassium hydroxide, sodium hypochlorite, hydrochloric acid, petroleum distillates	Plunger; metal snake; flush with one-fourth cup baking soda and boiling water; 2 oz. vinegar
Rug and Upholstery Cleaners	Irritant, causes burns, toxic	Napthalene, perchloroethylene, oxalic acid, diethylene glycol	Dry cornstarch sprinkled on rug and vacuumed
Floor and Furniture Polishes	Flammable, toxic	Diethylene glycol, petroleum distillates, nitrobenzene	One part lemon juice with two parts olive or vegetable oil; mineral oil with lemon oil or Carnauba wax
Bleach Cleaners	Causes burns, strong oxidizer	Sodium or potassium hydroxide, hydrogen peroxide, sodium or calcium hypochlorite	Use powdered, not liquid, bleach
Mothballs	Toxic	Napthalenes, paradichlorobenzene	Cedar chips; newspapers; lavender flowers
Pool Chemicals	Causes burns, toxic	Muriatic acid, sodium hypochlorite, algicide	Unknown
Ammonia-based Cleaners	Irritant, causes burns, toxic	Ammonia, ethanol	Vinegar, salt and water mixture for surfaces; baking soda and water for the bathroom
Powder or Abrasive Cleaners	Causes burns, irritant, toxic	Trisodiumphosphate, ammonia, ethanol	Rub area with half a lemon dipped in borax and rinse; baking soda and mild detergent; elbow grease
Spot Removers	Toxic, flammable	Solvents	Club soda; immediate cold water; corn meal and water soak; lemon juice
Window cleaners	Toxic	Solvents	Rub windows with newspapers; vinegar and water
Automotive Products			
Antifreeze	Toxic	Ethylene glycol	Unknown
Transmission Fluid	Flammable, toxic	Hydrocarbons, mineral oils	Unknown
[redacted]ake Fluid	Flammable, toxic	Glycol ethers, heavy metals	Unknown
Used Motor Oil	Combustible, toxic	Hydrocarbons including benzene, heavy metals	Unknown

Poison Pump

■ **Grade Level:**
Middle School

■ **Subject Areas:**
History, Life Science, Health

■ **Duration:**
Preparation time: 30 minutes
Activity time: 50 minutes

■ **Setting:** Classroom

■ **Skills:**
Analyzing (identifying patterns); Interpreting (identifying cause and effect)

■ **Charting the Course**
Students should understand that water is a shared resource ("Common Water"). Students may wish to continue to learn about other waterborne diseases ("Super Sleuths"). Students are introduced to ways humans can prevent the spread of disease in "No Bellyachers."

■ **Vocabulary**
epidemic, waterborne, bacteria, pathogen

A killer has swept through the streets of London; hundreds are dead! Would you believe that an accomplice to this terrible crime is something you use everyday?

Summary

Through a series of clues, students solve a mystery to discover that water can also produce negative effects for people.

Objectives

Students will:

- apply investigative methods used by epidemiologists to trace the source of contagious diseases.

Materials

Each group of students will need the following:

- *Student activity sheet,* ***Broad Street Area Map*** (The map is a fictionalized representation of London streets in 1854.)
- *Copies of Victim Cards*
- *Colored marking pens*
- *Copies of* Clue Cards

Making Connections

Of the world's leading diseases, over half depend on water for their transmission. These diseases often occur in catastrophic proportions. Epidemics of the past and present intrigue many students. Through following the clues used by scientists in the past, students use investigative and analytic skills to locate the source of a killer disease.

Background

Cholera is a disease caused by the *Vibrio cholerae* bacterium. The bacterium travels through untreated water contaminated by human or animal feces. Cholera is spread by sharing contaminated water or by eating contaminated food. Since the body does not produce lasting immunity against the bacterium, the disease can be contracted more than once.

Cholera is characterized by rapid dehydration resulting from simultaneous vomiting, diarrhea, and profuse perspiration. As victims dehydrate, their skin darkens, shrivels, and loses its elasticity. Depending on general health, body mass, age, and amount of ingested bacteria, cholera victims may suffer only mild symptoms or can die in less than an hour.

In 1854, hundreds of people living in London died during a cholera epidemic. The disease spread from India to London on ships that carried contaminated drinking water. If a ship was known to carry disease, the London port authorities refused to grant docking privileges. Rather than lose money on their cargo, some ship captains deceived the authorities by dumping contaminated water overboard into the Thames River, London's water source.

London was served by competing water companies in 1854. At least one, in an effort to cut costs, failed to filter adequately the river water being pumped into the city. While upper- and most middle-class citizens had indoor plumbing, the poor of London relied on public pumps for their water needs.

Dr. John Snow, considered the father of epidemiology, is credited with tracking and identifying the source and transmission agent of the 1854 cholera epidemic. The agent for spread of the disease was found to be the Broad Street public pump.

Today, most people understand that unclean water carries organisms that cause disease. In the mid-nineteenth century, the idea of waterborne disease

an unpopular and frightening [illegible]. Many people believed that the poor suffered as a result of their shiftlessness and sinful living and deserved retribution in the form of catastrophic disease.

Even though many people doubted and disapproved of Snow's contaminated water theory, Dr. Snow persuaded the authorities to remove the Broad Street pump handle. This simple act saved the lives of many people and marked the beginning of the end of a tragic situation.

We now know that people can avoid cholera infection by making sure their water supplies are clean. Unfortunately, in developing countries where only 35 percent of the population has access to clean water, cholera epidemics continue.

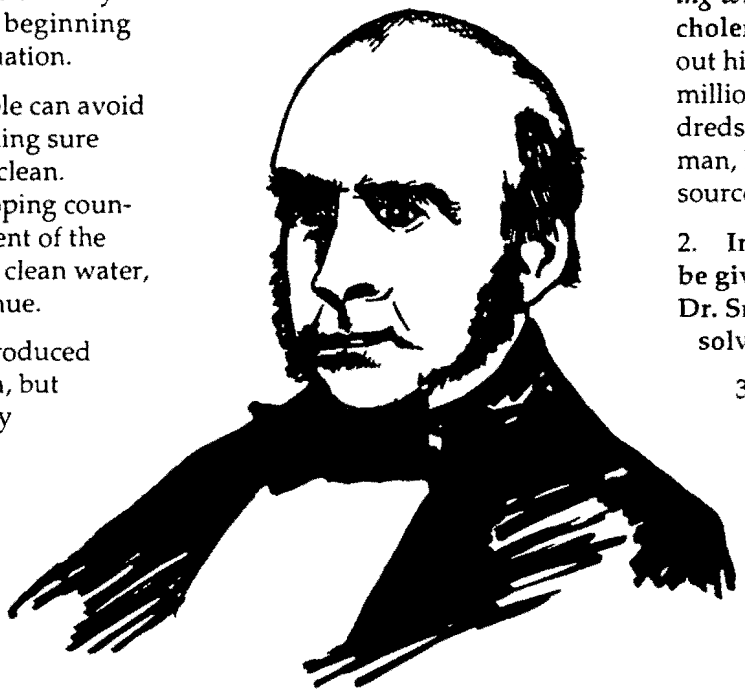
Modern medicine has produced a vaccine against cholera, but it must be repeated every [illegible] to twelve months because the antibodies are short lived. Too often, though, citizens of impoverished nations do not have the funds to procure the vaccine. Used for centuries in India, the most effective treatment is to provide the victim with copious amounts of liquids and rehydration salts. This method replaces lost body fluids and electrolytes and flushes out the bacteria. After the pathogen has been purged from the body, antibiotics can promote the victim's recovery.

Cholera has been absent from the Western Hemisphere for most of this century. Nonetheless, health officials warn that the United States could experience outbreaks of cholera and other waterborne diseases. As population increases, more waste products are generated, a situation that can strain the abilities of municipalities to maintain plentiful and clean water supplies.

Procedure

▼ *Warm Up*

Ask students to share mysteries they have read or seen on television. Discuss how detectives solve crimes in general: they identify the crime, determine the method or weapon used, seek and question eyewitnesses, search for clues, etc.



Dr. John Snow is considered to be the father of epidemiology.

Narrow the discussion to serial crimes, such as a series of burglaries. How do investigators track the culprit? Have students list what they would look for. Students may have seen television shows in which detectives post a map of an area and mark the location of each crime, looking for a pattern. The detectives then try to determine if the crimes occurred within similar time frames and if the victims shared common characteristics.

Explain that scientists, particularly epidemiologists, identify, trace, and arrest diseases in the same manner that detectives solve crimes.

▼ *The Activity*

1. **Tell students that in 1854 a cholera epidemic broke out in the slums of London. *Without mentioning water* describe the symptoms of cholera.** Tell the class that throughout history this disease has killed millions of people, and that hundreds died in the 1854 epidemic. One man, Dr. John Snow, discovered the source and stopped the epidemic.

2. **Inform the class that they will be given the same information that Dr. Snow possessed and will try to solve the mysterious epidemic.**

3. **Divide students into groups and give each group a *Broad Street Area Map*, a set of *Victim Cards*, and a marking pen.** (If after five minutes, any group has not begun to mark the location of victims on the map, suggest this as a logical strategy.)

4. **Allow the class 20 minutes to fill out the map, study the *Victim Cards*, and write down all common characteristics.**

5. **Ask if any group has located the source of the epidemic.** Without telling the groups whether they are right or wrong, ask how they arrived at their conclusions.

6. **One at a time, have different students read the *Clue Cards* aloud.** The cards reveal additional information uncovered by Dr. Snow. As more information is given, students will either confirm or revise their conclusions.

Wrap Up and Action

Have students discuss how water from the pump became contaminated. Tell them that the disease broke out in India prior to the London epidemic. Point out that since ships travel to many countries, they often transport diseases.

Discuss with students why most North Americans need not worry about becoming infected with cholera. Some students who have traveled abroad may have received a cholera vaccination. Why was this necessary?

Have students research how pathogens are prevented from entering their water supplies. Students can make a poster of water diseases that have occurred in their community and how people can avoid contracting them.

Assessment

Have students:

- use investigative skills to trace the source of a waterborne disease (steps 4, 5, and 6).

Notes ▼

Extensions

Students can research recent outbreaks of waterborne epidemics in the United States (e.g., Alabama–1991; Milwaukee–1993).

Have students study their community's water resources. Obtain a map of the water system. Visit a water treatment plant. Talk with community water managers and determine the methods and frequency of water testing. How would water suppliers and health department officials manage outbreaks of disease?

By visiting local museums and reading old diaries and newspapers, students may research the history of waterborne diseases and epidemics in their community, region, and/or state. A host of other diseases depend on water-breeding insects to survive. These include malaria, yellow fever, dengue fever, and encephalitis. Malaria alone infects 800 million people annually and over 1 million die each year.

Have students research diseases that directly result from water scarcity—trachoma, leprosy, conjunctivitis, and scabies. Cholera, typhus, infectious hepatitis, diarrhea, and dysentery occur because of poor water quality. Diarrhea and dysentery kill tens of thousands of children around the world each year.

Resources

Balows, Albert, and William J. Hausler, et al. 1991. *Manual of Clinical Microbiology*, 5th ed. Washington, D.C.: American Society for Microbiology.

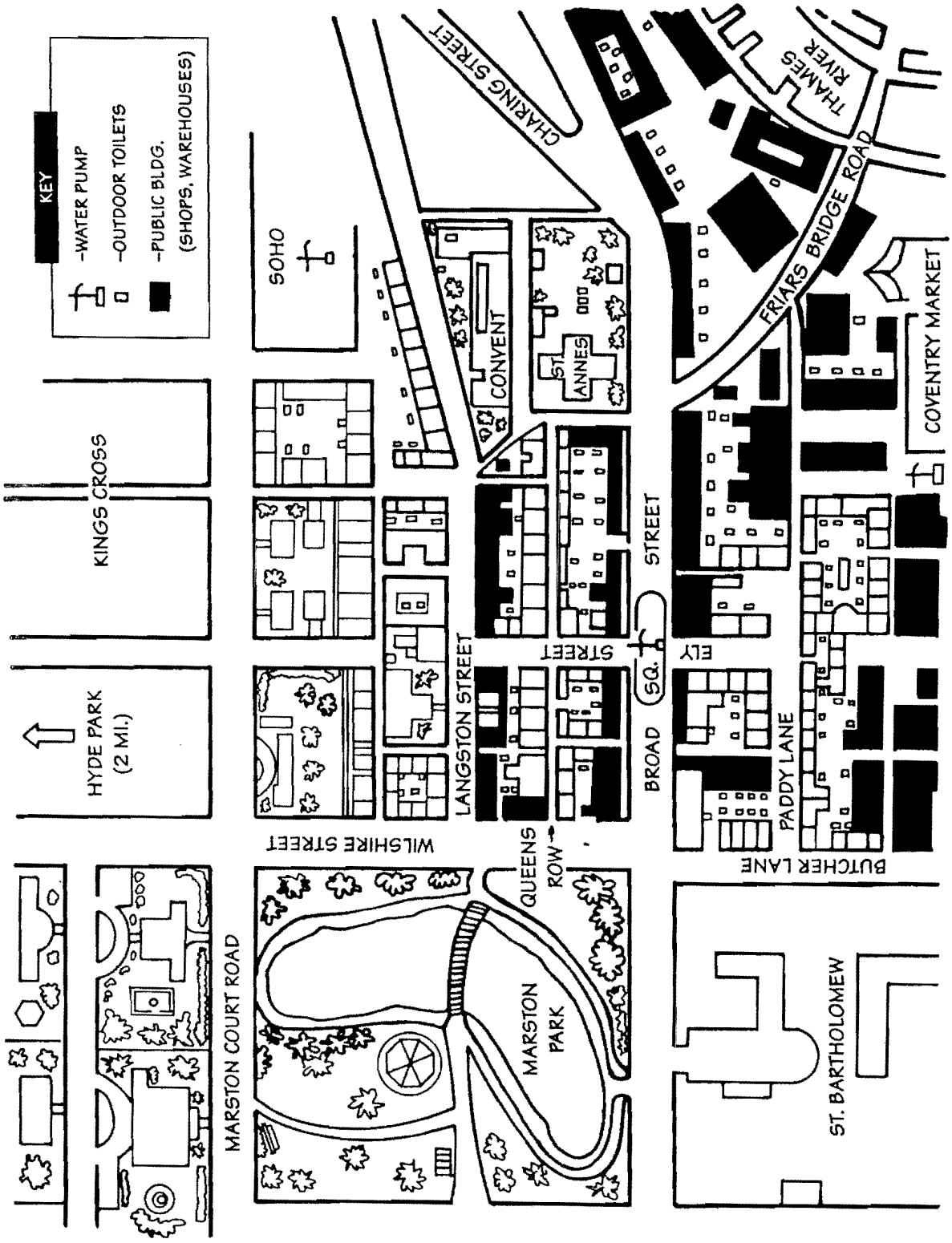
Baron, Finegold, and Peterson. 1994. *Diagnostic Microbiology*, 9th ed. St. Louis, Mo.: Mosby Publishing Co.

Howard, Barbara J., ed. 1994. *Clinical and Pathogenic Microbiology*, 2nd ed. St. Louis, Mo.: Mosby Publishing Co.

Snow, John, M.D. 1965. *Snow on Cholera*, New York, N.Y.: Hafner Publishing Co.

Broad Street Area Map

Name: _____ Date: _____



Victim Cards

THOMAS SUTTERFIELD, ESQUIRE, lawyer:

- Lives in Hyde Park with wife and two children.
- Only member of his immediate family to contract cholera.
- Won most recent case, defending a Broad Street butcher accused of selling spoiled meat.
- Recovering.

MATILDA WRIGHT, wealthy 90-year-old spinster:

- Lived alone (with her three servants) in the family mansion in Marston Court.
- Great-aunt of Thomas Sutterfield.
- Only member of the household to contract cholera.
- Died in a matter of hours.

TOLLY MARTIN, 10 years old, professional pick-pocket:

- Homeless orphan who slept in doorways around Soho Square.
- Occasionally roamed quite far from Soho, looking for wealthier citizens to rob.
- Died of cholera two days after a fist fight with another boy at Broad Street Square.

OWEN AND OBEDIENCE TURNER and their three children:

- Lived on Paddy Lane behind butcher shop on Broad Street.
- Owen Turner, who was lame, earned small change cleaning up the day's slops at the butcher shop.
- Entire family died of cholera.

Nine families on Butcher Lane:

37 individuals dead; 8 recovering

Twelve families on Ely Street:

60 individuals dead; 10 recovering

SLYE CHILDREN, ages 7, 8, and 10:

- Three of the eight children of Gideon and Lucy Slye.
- Gideon Slye is a Broad Street butcher accused of selling spoiled meat.
- Slye family recently moved to Kings Cross from Broad Street and now have indoor plumbing.
- When not in school, three of the Slye children often accompanied their father to work and played on Broad Street Square.
- These three are the only family members to contract cholera.
- Two died; one recovering.

MUCKY JOHNSON, 18, delivery boy from Coventry Circle:

- Delivered fresh seafood from Coventry Market to wealthy homes in Marston Court.
- Often stopped to eat lunch and talk to people on Broad Street Square; said the water from the Broad Street pump was the best in the city.
- Died of cholera.

JOHN AND MARY CANTY, tinkers from Soho:

- Pulled their cart through wealthy neighborhoods, mending pots and pans for the well-to-do.
- Often stopped to visit John's ailing mother who lived on Butcher Lane.
- Both died of cholera.

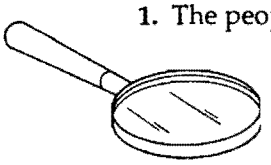
Twenty-five families on Queens Row:

89 individuals dead; 31 recovering

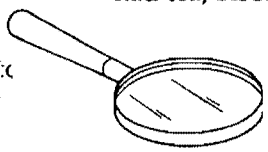
Eighteen families on Paddy Lane:

83 individuals dead; 7 recovering

Clue Cards



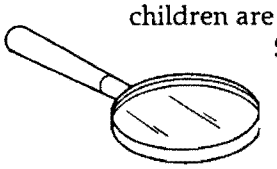
1. The people living around Broad Street are poor. Large families are crowded into one- and two-room apartments. None has indoor plumbing; residents use outdoor toilets and haul their water from the nearest public pump.



2. Thomas Sutterfield fell ill two hours after stopping off to visit his great-aunt "Tilda." He had tea, biscuits, and sausages with his great-aunt. It was a hot day and he took a drink of cool water before leaving.

3. Following his fight with another boy, Tolly Martin washed the blood off his mouth at the Broad Street pump and ran off with a sausage stolen from the butcher shop.

4. Matilda Wright refused to drink water from the faucets in her home. She would only drink the sweet-tasting water that her gardener hauled from the Broad Street pump.



5. Ausley and Marthy Brown and their two children are the only people on Ely Street who haven't gotten cholera. Marthy's family lives in Soho. The Browns haul their water from the Soho pump, which allows them to visit their relatives.

Carlin Lake Survey

Objective: The purpose of this activity is to familiarize students with the topography and development that is currently taking place on Carlin Lake.

Activity: Student's will mark on their map the following features and will then identify two possible environmental problem on the lake. Using the map of Carlin Lake indicate the following features using the Letter before each word to indicate what type of feature you have located. Outline a portion on your map to indicate how much land is covered by this feature.

Critical Areas:

W Wetland
SS Steep Slopes
ES Erodible shorelines/soils
NAP Native Aquatic Plant beds
SH Species Habitat (spawning areas, endangered species habitat, eagle, loon nesting area, frogs, beavers)
PA Public Areas (Lodges, Restaurants, Gas Stations, Marinas)
D High Density water development
H Hazardous spill sites, landfills, storage tanks
NPS Significant non point pollution sources

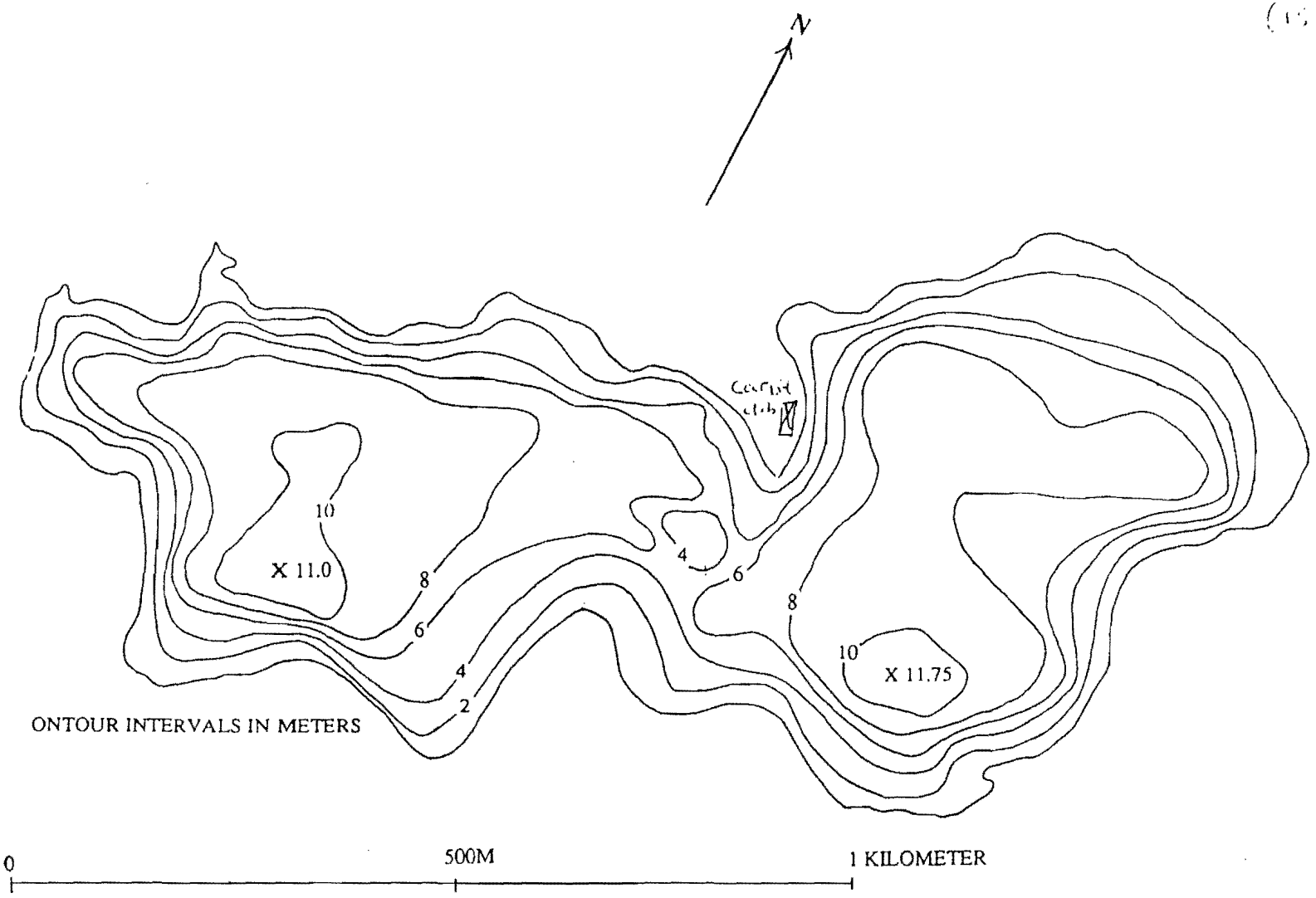
Current Land Use:

R Residential
C Commercial
A Agriculture
I Industrial
F Forestry
I Institutional
TU Transportation or Utility Corridors

Indicate any other item of interest and if you have time feel free to actually draw houses, garages, roads etc. on you map. List two conflict areas at the bottom of your map.

CARLIN LAKE

VILAS COUNTY, WI
C. 17, 19, 20 T. 43 N. R. 6 E.



Choosing a Survey

The objectives of lake studies may be either aesthetically or scientifically oriented, or both. However, two objectives of surveying a lake should be to (1) determine present-day characteristics (e.g. biological, physical, and/or chemical) and (2) monitor the lake over time to determine if it is improving, remaining the same, or getting worse. There are three basic types of surveys that can be used: 1) the visual survey; 2) the physical/chemical survey; and 3) the biological survey.

• Visual Survey

The visual survey is the easiest of the survey types, and a lot of information about the lake can be learned if it is conducted correctly. This survey requires very little equipment: a clip board, pencils, data sheets (see attached), field guides, and USGS lake maps. Hip boots, cameras and binoculars are always good to have along, but not required. For safety reasons, the visual survey should be conducted by more than one individual. Having a "buddy system" or doing a group survey will also help to do a better job describing the characteristics of the lake.

During the initial visual survey, draw a map of (or locate on a USGS map) that portion of the lake to be surveyed. The map does not have to be a perfect likeness of the area, but it should include the major habitat types, locations of discharge pipes, dumps, and other visual characteristics mentioned in the survey itself. A camera is useful in documenting the various natural or unnatural lake characteristics. Be sure to label all pictures with the proper location, date, time, and photographers names. It may be helpful to have photographic stations where pictures are taken at various times of the year and over a period of several years. These pictures will create a visual record, making subtle changes over time more evident.

If your lake survey group has access to boats, you may want to conduct your visual survey with some people walking the shoreline and others following along in boats. This will provide more information on the extent of shallow areas and vegetation. If the boat has a depth/fish finder, you can prepare a bottom-depth map of the lake.

• Physical/Chemical Survey

Because of their size and depth, lakes can be sampled at different depths and in different zones. Consequently, the techniques (and time) required to conduct physical/chemical (and biological) surveys in lakes can be extensive. Nevertheless, a lot can be learned by doing some simple tests at your lake site, without much investment of time or money. Your group will have to decide what is feasible, given your interests and access to the needed equipment.

• Biological Survey

An analysis of aquatic organisms provides valuable water quality information. Chemical and physical measurements generally catch only one moment of a lake's history. The diversity of species, particularly aquatic plants and animals, and their numbers are important to any lake study because: 1) they are an indication of water qualitiy in the lake; 2) they are crucial to various food chains. In particular, aquatic macroinvertebrates have proven to be excellent organisms for water quality analysis.

Many macroinvertebrates, or aquatic insects, can be seen on the surface, in the bottom substrate, or swimming in the water. You can usually find a lot of macroinvertebrates using a simple dip net, but some kinds may be harder to locate and examine, especially in the daytime. It takes a keen eye and some patience to be a "Critter Catchin' Supersleuth!" Often they hide on or under aquatic vegetation. You can find many of them by turning over floating leaves like lily pads or by closely examining the stems and bodies of emergent and submerged plants. You'll be amazed at the variety and numbers you can find!

Water Clarity

Objective: To become aware of the range and types of instruments limnologists use to determine the "health" of a body of water. Students will be able to do simple water quality tests and understand the importance of those test. They will graph results.

Activity: Students will be given previously collected data on water clarity for their lake, as well as, previous water chemistry information. They will then go to four different spots on the lake and collect water clarity information using a secchi disk. Students will also take water temperature and will complete PH tests. Simple water chemistry will be done time/equipment permitting. Students will then graph results and put it in their journal. Discuss what type of a lake is this?

Read/Discussion: In the interactive Lake Ecology student handbook, review the section on "Testing a Lake."

Discussion Question: What type of a lake are we testing? Can you think of any other lakes in the area which fit into the other two categories? Give your reasons.

Eutrophic: classification of a lake that is characterized by high nutrient levels leading to high populations of algae and aquatic weed.

Oligotrophic: If a lake possesses high levels of dissolved oxygen, an extremely high transparency and has sparse vegetation and low levels of plankton growth.

Mesotrophic: A lake that falls between the two extremes of eutrophic and oligotrophic.

Lake Site Monitoring Data Sheet

Date: _____ Time: _____

Name of Lake: _____

Group: _____

Number of People in Group: _____

Survey Site Location (include a map of the lake if available): _____

_____

County: _____ Nearest Town: _____

Weather Conditions:

Season: _____ Wind Direction: _____

Air Temperature: _____ Wind Speed: _____

Sky Conditions:

☐ Clear ☐ Cloudy (% cloud cover = _____) ☐ Rain

☐ Other _____

Lake Description (Check type of lake):

☐ Seepage Lake (i.e., no inlet or outlet)

☐ Drainage Lake (i.e., both inlet and outlet)

☐ Groundwater Drainage Lake (i.e., no inlet; fed by groundwater)

☐ Impoundment (i.e., created by damming rivers or streams)

Visual Survey Data

Water Appearance (Check all that apply):

☐ Scum	☐ Foam	☐ Muddy
☐ Milky	☐ Clear/Blue	☐ Brownish
☐ Colored sheen (oily)	☐ Green	☐ Reds/Purples
☐ Other _____	☐ Grey	☐ Blues/Black

Bottom Coating Along Shoreline (Check all that apply):

☐ Orange to Red	☐ Yellowish	☐ Black
☐ Brown	☐ White deposits along bank	☐ None

☐ Other _____

Water Uses:

- ☐ Drinking water withdrawal
- ☐ Industrial water withdrawal
- ☐ Agricultural withdrawal
- ☐ Irrigation
- ☐ Livestock watering
- ☐ Recreation (check all that apply)
  - ☐ Swimming ☐ Boating
  - ☐ Fishing ☐ Other: _____

• **List the number of dams, piers, signs, entry ramps (public and private), shoreline erosion control structures, etc.:**

_____

_____

• **Estimate and note the location of the amount of paper, small trash, cans, bottles, tires, cars, and any other types of litter within your study site area:**

_____

_____

Physical/Chemical Survey Data

Lake Depth:

Maximum Water Depth _____
Average Water Depth _____

Water Clarity: (record to nearest 1/4 foot)

1st measurement _____
2nd measurement _____
Sum of 2 measurements _____
Secchi Disk Visibility Depth (Sum/2) = _____
(= the limit of the visibility of the disk)

Did the Secchi disk hit bottom? ☐ Yes ☐ No

Surface pH:

Value 1: _____
Value 2: _____
Value 3: _____
Average Surface pH (=Value 1+2+3/3) = _____

Lake Bottom (Substrate type):

Organic
- ☐ Plant debris
- ☐ Black mud
- ☐ Other _____

Inorganic
- ☐ Gravel ☐ Pebbles
- ☐ Sand ☐ Other _____

Plant cover in littoral zone (i.e., near shore):

☐ Less than 30% ☐ 30-70% ☐ 70-100%

Plant covering on shoreline (% total):

Trees	_____	Rushes, Sedges, etc.	_____
Shrubs	_____	Exposed Soil	_____
Grass/lawns	_____	Rocks	_____
Other_____	_____		

Land Uses in the Watershed:

Agricultural (%):

Pasture	_____
Crops	_____
Other	_____
(_____)	

Urban (number):

Homes	_____
Factories	_____
Stores	_____
Other	_____
(_____)	

Forestry:
- % land area forested _____
- Number of active logging sites _____

Construction:
- Number of active sites _____

Record all land uses observed in the watershed area and surrounding your sampling site. Indicate whether the following potential land uses have a high (H), moderate (M), or slight (S) potential for impact.

- ___ Housing developments
- ___ Oil/gas drilling
- ___ Public (lake) access
- ___ Marinas
- ___ Utility/Transportation corridors
- ___ Sanitary landfill
- ___ Mining (types:_____)
- ___ Cropland (types:_____)
- ___ Livestock pasture
- ___ Forest
- ___ Logging
- ___ State/County parks
- ___ Public fishing docks
- ___ Urban uses (parking lots)
- ___ Construction
- ___ Refuse dumps
- ___ Fields
- ___ Other _____

Are there any discharging pipes? ☐ No ☐ Yes—how many? _____

What types of pipes are there?
- ☐ Runoff (field or stormwater runoff)
- ☐ Sewage treatment
- ☐ Industrial (list type of industry)_____)

Biological Survey

Plant/Animal Diversity: Where possible, indicate the number and type of organisms observed in and around the lake monitoring site.

Organism	Species (list)	None	Few	Abundant	Date Observed
Fish					
Birds					
Insects					
Mammals					
Reptiles/ Amphibians					
Other					

Plants Observed: Indicate the major types of plants and the percentage of total plants that each makes up. If possible, mark the location of plant beds on a map of the lake.

Macroinvertebrates Observed: List kinds, and the number of each type in parentheses, of different aquatic insects observed in the lake (also indicate how the samples were taken).

Habitats Observed: List any places in and around the lake system where organisms might live.

Additional Comments: List any other observations needed to describe the lake.

Temperature: (Give values for air and surface water. List other values by depth.)

_____

_____

Surface Temperature Reading 1: _____
Surface Temperature Reading 2: _____
Surface Temperature Reading 3: _____
Average Surface Temperature (=Reading 1+2+3/3) _____

Odor: (Sample both the surface water and bottom water if possible; specify which area you are sampling)

Type of Odor	Surface or Bottom Water	Strength of Odor			
		0=no odor	1=weak	2=distinct	3=over-whelming
Rotten egg					
Chlorine					
Oil					
Sewage					
Musky					
Acrid					
Other					
None					

Dissolved Oxygen: (using Hach kit)

$\frac{\text{_____}}{\text{No. of drops}}$ = _____ ppm DO _____ °C Temp.

CARLIN LAKE

VILAS COUNTY, WI
C. 17, 19, 20 T. 43 N. R. 6 E.

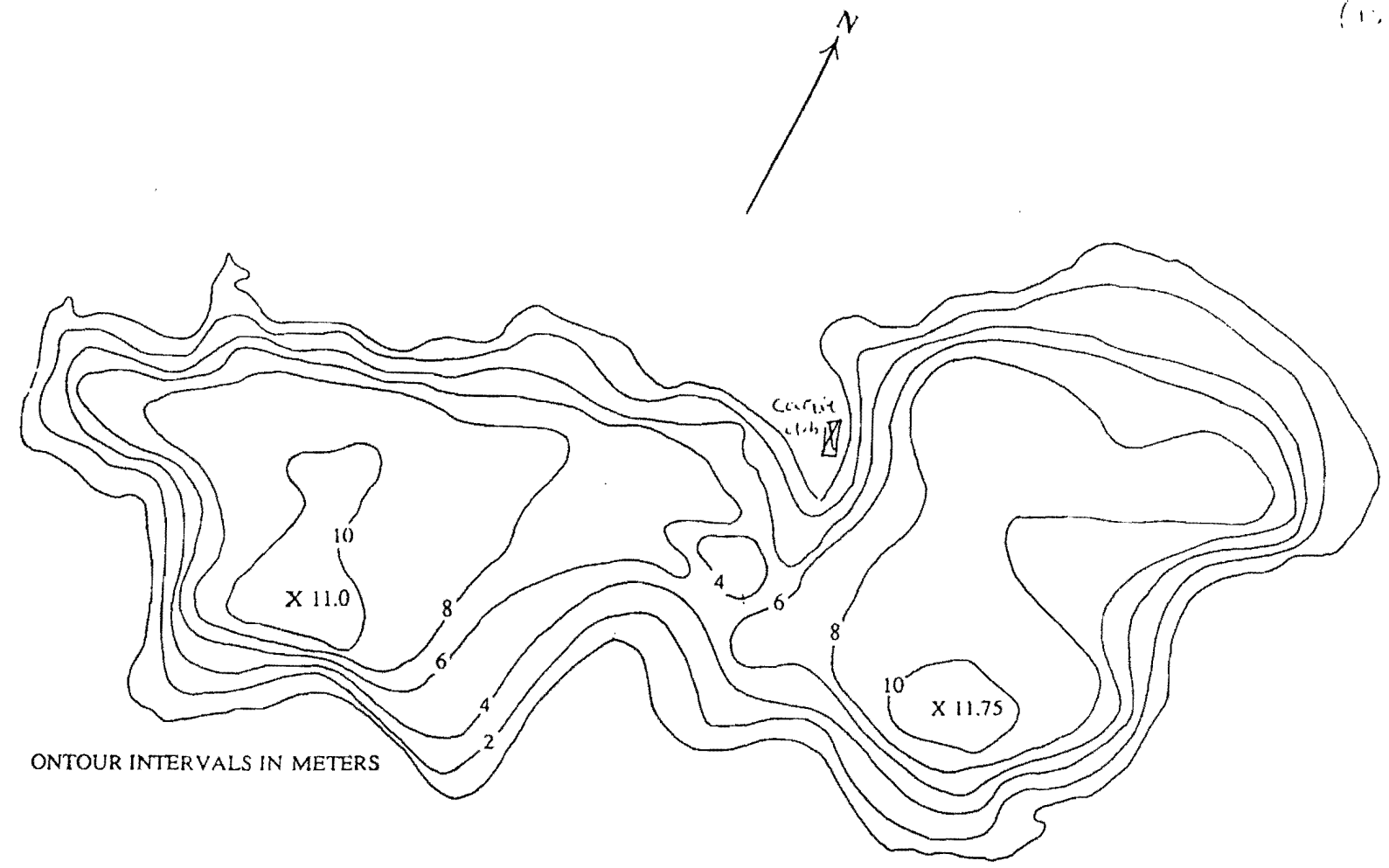
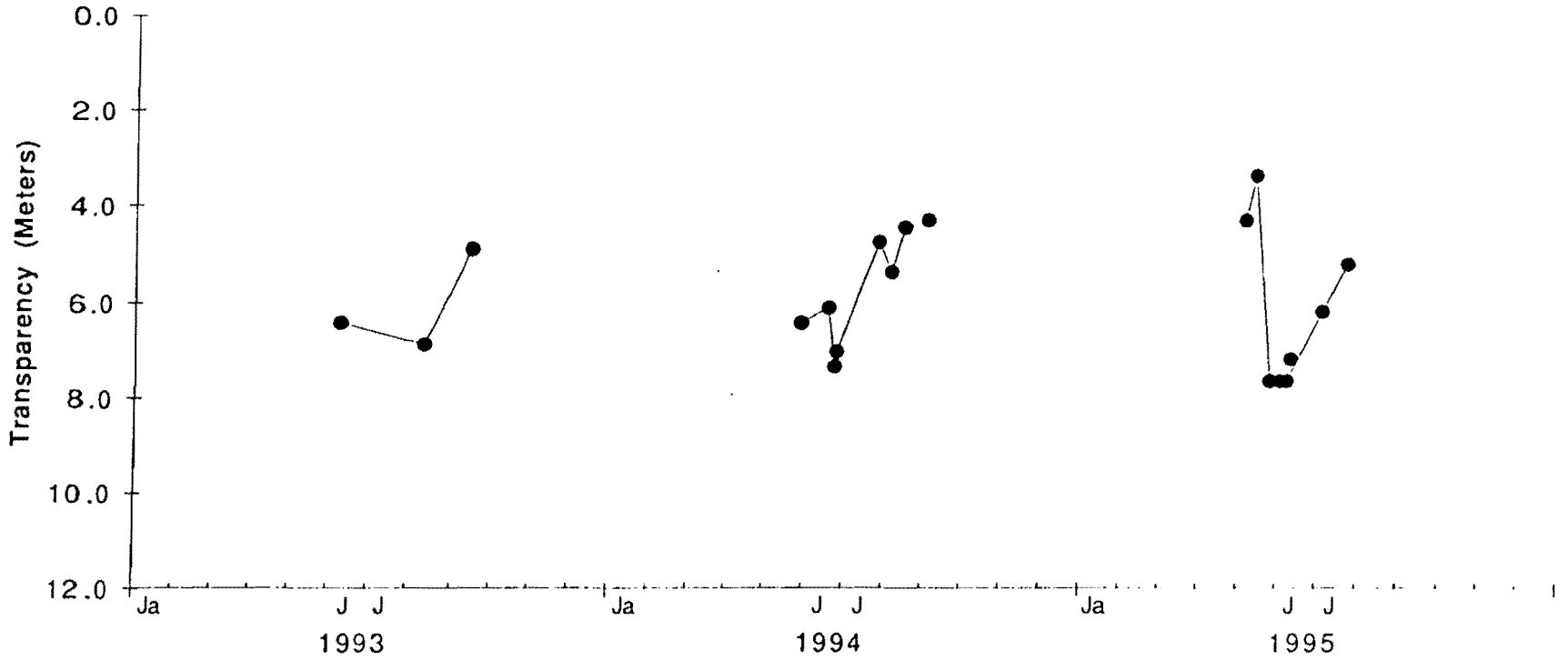


Table 1. Summary of Water Chemistry for Carlin Lake. Samples collected from surface waters during spring (7 May 1993) and Fall (October 1993) during periods when the watercolumn was relatively well mixed. Data are means for the two sampling periods.

Variable	Units	Mean
pH		6.2
Alkalinity	ueq/L	49
Chlorophyll-a	ug/L	2.4
Suspended particulate matter	mg/L	1.4
Dissolved oxygen	mg/L	8.2
Dissolved organic carbon	mg/L	3.1
Dissolved inorganic carbon	mg/L	1.2
Conductivity	uS/cm	16.8
Ca	mg/L	1.3
Mn	mg/L	6
Mg	mg/L	0.4
Na	mg/L	0.4
Fe	ug/L	53
SO4	mg/L	2.6
Cl	mg/L	0.6

Summary: Carlin Lake is a moderately acidic, clearwater seepage lake with low buffering capacity and very high water quality. The chemistry suggests that the lake is fed primarily by rainwater rather than groundwater. The low levels of chlorophyll-a and suspended particulate are characteristic of low to moderately productive waters. Increases in nutrients or acid inputs could have a noticeable effect on water quality.

Secchi Depth Data For Carlin Lake 1993-95



The Importance of Lakes

Lakes are important to the economy of Wisconsin. Many industries in the state rely heavily on our water resources for power, processing, cooling, cleaning, and waste removal. In addition, lakes are at the heart of Wisconsin's hospitality, recreation, and tourism industry. In 1990, this industry generated $5.4 billion in revenue.

Wisconsin's lakes are popular recreation spots, due in part to their inherent beauty. Fishing, swimming, and boating are all popular forms of recreation in Wisconsin. In fact, Wisconsin ranks among the top states in the number of fishing licenses sold. Lakes provide solitude and an opportunity for quiet reflection. Many lake property owners are drawn to Wisconsin's lakes for their aesthetic qualities.

Unfortunately, conflicting uses of Wisconsin's lakes can result in reduced enjoyment of the pleasures that lakes provide. Our actions affect the quality of our lakes and rivers. We must work together to protect lakes to insure that future generations will continue to enjoy the opportunities lakes provide.

There are a number of excellent resources that can help you and your class or club learn more about lakes. This guide includes a section describing resource materials available regarding lakes. Consider using some of these resources to plan your Adopt-A-Lake project.

Interested in learning more about your local lake? Wisconsin Lakes is a handy reference for learning more about the characteristics of lakes in the state. This guide is available from the Wisconsin Department of Natural Resources, P.O. Box 7921, Madison, Wisconsin 53707. PUBL-FM-800 91.

Classifying Wisconsin's Lakes

The word *Wisconsin* may be derived from a Chippewa word meaning "gathering of waters." With roughly 15,000 lakes covering approximately 1,000,000 acres, Wisconsin is truly an appropriate name for our state.

Worldwide, lakes are formed through natural processes such as glacial scouring, meandering rivers, volcanic activity and earthquakes. Most of Wisconsin's lakes were formed in the wake of a retreating glacier over 10,000 years ago. In the southwestern part of the state--the unglaciated "driftless" region--there are fewer natural lakes than in the rest of the state.

Each of Wisconsin's lakes is unique. Physical, chemical, and biological characteristics affect the "personality" of the lake in your community. For example, conditions of lakes can vary based on topography, geology, or land use within the watershed.

Classification systems have been developed to help us better understand differences among lakes. Water sources and type of outflow provide the basis for one means of classifying lakes. For example:

- **Seepage Lakes** are the most common type of lake in Wisconsin. Precipitation, surface runoff, and groundwater flow are the main water sources for these lakes. Seepage lakes have no inlet or outlet. Fluctuations in the depths of seepage lakes can serve as an indicator of groundwater levels.

- **Drainage Lakes** have both an inlet and an outlet. A stream serves as the primary water source. Drainage lakes can be found along most major rivers in Wisconsin.

- **Groundwater Drainage Lakes** have no inlet, but are fed by groundwater flow. These lakes do have an outlet. Groundwater drainage lakes, common in northern Wisconsin, are the headwaters of many streams and rivers.

- **Impoundments** are created by damming rivers or streams to provide water power and for flood control. These lakes are also drained by rivers or streams though lake levels are regulated by man-made control structures. Though impoundments account for only 13% of Wisconsin's 15,000 lakes, some impoundments such as the Petenwell Flowage covering over 23,000 acres, are among the larger lakes in the state.

A lake's water source can help determine appropriate lake management practices. For example, leaking septic systems would be a concern for a lake association seeking to protect a groundwater drainage lake. Soil erosion would be a threat to a drainage lake. What is the primary water source for your lake? Does your lake have an inlet or an outlet? Determine the category in which your lake belongs.

Threatened Resources

Wisconsin's lakes are threatened by many different problems. Some of the most serious problems are explained briefly below:

Sedimentation:

Sedimentation is one factor in the natural aging process of lakes. Soil and organic materials are moved by wind and rain into lakes resulting in a decrease in lake depth. Sedimentation alters the conditions of lake bottoms, covering habitat in which fish spawn, even smothering aquatic invertebrates. Certain farming and construction practices can cause increased levels of sedimentation in Wisconsin's lakes.

Cultural Eutrophication:

Another factor in natural lake aging is eutrophication, the enrichment of lakes by nutrients such as nitrates and phosphates. However, cultural eutrophication is caused by human activities. Nutrients from sewage and surface runoff are fed into our lakes. As lakes become over-nourished, they can become choked by algae and plant growth.

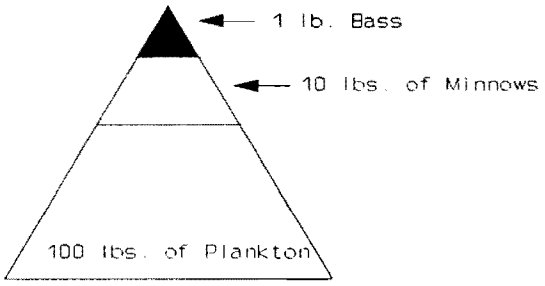
Acid Deposition:

Commonly known as acid rain, acid deposition refers to deposition of acid and acid-forming compounds. What causes acid rain? Power plants and factories emit large quantities of sulfur dioxide and some nitrogen oxides. Automobile emissions contain large quantities of nitrogen oxides. As rainwater falls through air contaminated with these pollutants, sulfuric acid and nitric acid are formed and rainwater becomes more acidic. Acid deposition can make lakes more acidic and harm organisms that live in lakes. Due to the limited buffering capability of the soils and bedrock, lakes in north central Wisconsin are most sensitive to acid rain.

Toxic Contamination:

Toxins are poisons. Industrial and municipal wastes, which may contain toxic substances, are discharged into rivers and eventually reach lakes. Some toxic substances from farming or mining operations enter lakes through surface runoff. The introduction of these hazardous materials into lakes threatens these fragile aquatic communities.

To grow to one-pound, a bass must consume 10 pounds of minnows. Ten pounds of algae and zooplankton are needed to produce one pound of minnows. The diagram below illustrates this food pyramid.



FOOD PYRAMID

Some toxic substances, consumed by a predator when it eats its prey, will remain in the predator's system. Over time, poisons accumulate from very low levels in the water to very high and damaging levels in bass, pike, or eagles. At each "bite" in the food chain, more and more of the toxic substance is accumulated.

For example, mercury, a toxic substance, can enter a lake from the atmosphere and be taken up into the food chain. Mercury levels can accumulate in the fatty tissue of sport fish. Any human or other animal who eats that fish could be consuming considerable amounts of mercury. In large quantities, toxic substances can cause illness or death, alter behavior, and lead to mutations. Some toxins, such as PCBs (Polychlorinated biphenyls) accumulate in living tissue more efficiently than mercury. Toxins can seriously impact predator populations. Bald eagles almost became extinct because they accumulated DDT and were unable to lay healthy eggs.

Exotic Species:

Species that have been introduced--accidentally or intentionally--into habitats in which they had not previously been found are called exotic. Often exotic species have no natural predators to keep their populations in check. As a result, exotic species may displace native species reducing the diversity of species in aquatic communities. Exotic species have even been termed "biological pollutants." The introduction of exotic species, such as Eurasian milfoil, has upset the balanced plant and animal community of Wisconsin's lakes.

Shoreland Development:

Shoreland developments can detract from the natural beauty of the lake--the lake characteristic that is most appreciated by residents and other citizens. Many Wisconsin lakes are now ringed with cottages, homes, boathouses, and piers. This increasing development has resulted in decreased habitat for wildlife. When shoreland buffers are not maintained, increased sedimentation and eutrophication occur. The development of backlot subdivisions can also result in increased number of lake users.

User Conflicts:

User conflicts result in reduced enjoyment and opportunities for lake users. Shoreland development has contributed to the increasing numbers of lake users. Wisconsin's lakes are experiencing expanded variety of uses as well. The size and horsepower of motorboats has increased and so has the number of personal watercraft. Increasingly, power boat traffic often conflicts with anchored fishing boats or unpowered watercraft, such as canoes and sail boards. As the uses of inland lakes grow, conflicts among the users of Wisconsin's waters will continue to grow as well.

Lake Data

Carlin Lake

Van Vliet Lake

Star Lake

Rest Lake

Star Lake
9/21/96
11:00 P.M.
6th Grade

Secchi Depth:	17'
Temperature:	60 Degrees Fahrenheit
PH:	7.82-7.86
TIC:	10.28
TOC:	3.48

Critters: Water Scorpion, Crayfish, Snail, Ball (Water Penny?) , Caddisfly Larva, Perch, Worm (Nematode ?) , Coontail, Algae.

Description of weather: Cold, Cloudy, and Windy. Some snow and rain.

Van Vliet Lake Data
9/21/96
11:00 P.M.
7th Grade

Secchi Depth:	4'
Temperature:	10 Degrees Centigrade
PH:	8.32-8.35
TIC:	16.42
TOC:	6.22

Critters: Mayfly Nyphs, Dobsonfly larva, Caddisfly Larva, Cranefly larva, Stonefly Nymphs, Daselfly nymphs, Dragonfly Nymphs, Scuds, Blackfly Larvae, Midge Larva, Crayfish, Snails (right foot), and some aquatic worms.

Description of weather: Cold, Cloudy and Windy. Some snow and rain.

March 7, 1996
Renn C. Karl

Re: Water Quality Investigations at Van Vliet Lake

Brief: As an attempt to develop a system for establishing water quality of Van Vliet Lake students used a macro invertebrate survey.

Procedure: Collection of macro invertebrates was conducted two ways. The first method of collection required using a long-handled net to loosen the detritus on the surface of the lake floor approximately 3-4 feet from the shoreline. The gathered debris was then emptied into a shallow rectangular pan marked with a grid. Invertebrates were picked from randomly selected squares until 100 had been gathered from that sample or 30 minutes has elapsed. In general each sampling site required two nets of detritus in order to continue gathering for the full 30 minutes. The macro invertebrates were then stored in glass jars and preserved in a mixture of ethanol and glycerin.

The second method of collection involved the placement of a miniature environment developed by several researchers called the "Tuffy Ball". These TB's are placed in groups of five near the net sampling sites in water approximately 1 meter in depth. The TB's rest on the bottom secured by an anchor and tethered to a small float. Each TB is placed about 2 meters apart and parallel with the shore. After a 6 to 7 week placement period the TB's were retrieved. The object was to disturb the TB as little as possible. This can be done by enclosing the TB in a plastic capture container. After capturing the TB, the entire unit was preserved in 95% alcohol solution. This allowed for later dissection at the lab. Five TB's gave a total collection of about 100 macro invertebrates.

Data: Water quality data was based on macro invertebrate studies. Three methods of macro invertebrate study were utilized: family biotic indexing (a method originally adapted for streams), biodiversity indexing and sequence indexing. All techniques produced water quality results rating the lake as "high Quality" water. Students found a preponderance of Mayfly nymphs, Dobsonfly larva, Caddisfly larva, Stonefly nymphs, Damselfly nymphs, Dragonfly nymphs, Cranefly larva, Scuds, Black fly larvae, Midge larva, Crayfish, Snails (right foot), and some aquatic worms.

Carlin Lake
9/21/96
11:00 P.M.
5th Grade

Secchi Depth:	13'
Temperature:	57 Degrees Fahrenheit
PH:	6.49-6.52
TIC:	1.16
TOC:	3.44

Critters: Crayfish, Leech, Frogs, Minnow, Water Strider, Fresh Water Clam, Tadpole, Damsfly Nymph, Snail.

Description of weather: Cloudy, windy, cold. Some snow and rain. We noticed that it looked as thought the lake was turning over because the water clarity had dropped from 13.5' on 9/10 to 13' on 9/21.

TIC= Total Inorganic Carbon
TOC= Total Organic Carbon

Lake Data

Carlin Lake

Van Vliet Lake

Star Lake

Carlin Lake
9/21/96
11:00 P.M.
5th Grade

Secchi Depth:	13'
Temperature:	57 Degrees Fahrenheit
PH:	6.49-6.52
TIC:	1.16
TOC:	3.44

Critters: Crayfish, Leech, Frogs, Minnow, Water Strider, Fresh Water Clam, Tadpole, Damsfly Nymph, Snail.

Description of weather: Cloudy, windy, cold. Some snow and rain. We noticed that it looked as thought the lake was turning over because the water clarity had dropped from 13.5' on 9/10 to 13' on 9/21.

TIC= Total Inorganic Carbon
TOC= Total Organic Carbon

State Laboratory of Hygiene
University of Wisconsin Center for Health Sciences
465 Henry Mall, Madison, WI 53706
R.H. Laessig, Ph.D., Director S.L. Inhorn, M.D., Medical Director

Environmental Science Section (608) 262-3458 DNR LAB ID 113133790
Inorganic chemistry

Id: Point/Well/..: Field #: CARLIN Route:
Collection Date: 09/22/95 Time: 00:00 County: (Unknown)
From: CARLIN LAKE
To: BOB YOUNG
DNR
RHINELANDER
Source: Surface Water
Sample depth: 2.0 Meters
Account number: WR266 Collected by: JODI HOST

Date Received: 09/27/95 Labslip #: IG011422 Reported: 10/17/95

PH, LAB	6.40	SU
ALKALINITY GRAN TECHNIQUE	48.2	UEQ/L
COLOR TRUE PT-CO	10.	SU
CALCIUM, ICP, MICRO LEVEL	1.2	MG/L
IRON, ICP, MICRO LEVEL	0.089	MG/L
MAGNESIUM, ICP, MICRO LEVEL	0.40	MG/L
MANGANESE, ICP, MICRO LEVEL	7.1	UG/L
SODIUM, ICP, MICRO LEVEL	0.43	MG/L
ALUMINUM, ICP, MICRO LEVEL	31.	UG/L
detected between 17 (LOD) and 56 (LOQ) UG/L		
CHLORIDE DISSOLVED, IC, MICRO	0.551	MG/L
NITRATE-N DISSOLVED, IC, MICRO	ND (LOD=0.003 MG/L)	
SULFATE DISSOLVED, IC, MICRO	2.61	MG/L
AMMONIA-N	ND (LOD=0.027 MG/L)	
TOTAL KJELDAHL NITROGEN	0.3	MG/L
detected between 0.21 (LOD) and 1.0 (LOQ) MG/L		
TOTAL PHOSPHORUS, PERSULFATE, LOW LEVEL	0.008	MG/L
detected between 0.007 (LOD) and 0.022 (LOQ) MG/L		
TEMPERATURE	ICED	C

Van Vliet Lake Data
9/21/96
11:00 P.M.
7th Grade

Secchi Depth:	4'
Temperature:	10 Degrees Centigrade
PH:	8.32-8.35
TIC:	16.42
TOC:	6.22

Critters: Mayfly Nyphs, Dobsonfly larva, Caddisfly Larva, Cranefly larva, Stonefly Nymphs, Daselfly nymphs, Dragonfly Nymphs, Scuds, Blackfly Larvae, Midge Larva, Crayfish, Snails (right foot), and some aquatic worms.

Description of weather: Cold, Cloudy and Windy. Some snow and rain.

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Environmental Science Section (608) 262-3458 DNR LAB ID 113133790
Inorganic chemistry

Id: Point/Well/..; Field #: VAN VLIET Route:
Collection Date: 09/22/95 Time: 00:00 County: (Unknown)
From: VAN VLIET
To: BOB YOUNG
DNR
RHINELANDER
Source: Surface Water
Sample depth: 2.0 Meters
Account number: WR266 Collected by: JODI HOST

Date Received: 09/27/95 Labslip #: IG011423 Reported: 10/16/95

PH, LAB	8.14	SU
ALKALINITY GRAN TECHNIQUE	1280.	UEQ/L
COLOR TRUE PT-CO	10.	SU
CALCIUM, ICP, MICRO LEVEL	16.	MG/L
IRON, ICP, MICRO LEVEL	0.17	MG/L
MAGNESIUM, ICP, MICRO LEVEL	4.4	MG/L
MANGANESE, ICP, MICRO LEVEL	73.	UG/L
SODIUM, ICP, MICRO LEVEL	1.7	MG/L
ALUMINUM, ICP, MICRO LEVEL	ND (LOD=17	UG/L)
CHLORIDE DISSOLVED, IC, MICRO	0.806	MG/L
NITRATE-N DISSOLVED, IC, MICRO	ND (LOD=0.003	MG/L)
SULFATE DISSOLVED, IC, MICRO	1.66	MG/L
AMMONIA-N	ND (LOD=0.027	MG/L)
TOTAL KJELDAHL NITROGEN	0.4	MG/L
detected between 0.21 (LOD) and 1.0 (LOQ) MG/L		
TOTAL PHOSPHORUS, PERSULFATE, LOW LEVEL	0.034	MG/L
TEMPERATURE	ICED	C

Star Lake
9/21/96
11:00 P.M.
6th Grade

Secchi Depth:	17'
Temperature:	60 Degrees Fahrenheit
PH:	7.82-7.86
TIC:	10.28
TOC:	3.48

Critters: Water Scorpion, Crayfish, Snail, Ball (Water Penny?) , Caddisfly Larva, Perch, Worm (Nematode ?) , Coontail, Algae.

Description of weather: Cold, Cloudy, and Windy. Some snow and rain.

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Environmental Science Section (608) 262-3458 DNR LAB ID 113133790
Inorganic chemistry

Id: Point/Well/..: Field #: LIT STAR Route: WR70
Collection Date: 10/03/95 Time: 00:00 County: (Unknown)
From: LITTLE STAR LAKE
To: BOB YOUNG
DNR
RHINELANDER
Source: Surface Water
Sample depth: 2.0 Meters
Account number: WR266 Collected by:

Date Received: 10/06/95 Labslip #: IG012498 Reported: 10/24/95

PH, LAB	7.80	SU
ALKALINITY GRAN TECHNIQUE	753.	UEQ/L
COLOR TRUE PT-CO	<5.	SU
CALCIUM, ICP, MICRO LEVEL	11.	MG/L
IRON, ICP, MICRO LEVEL	0.024	MG/L
MAGNESIUM, ICP, MICRO LEVEL	2.6	MG/L
MANGANESE, ICP, MICRO LEVEL	18.	UG/L
SODIUM, ICP, MICRO LEVEL	1.7	MG/L
ALUMINUM, ICP, MICRO LEVEL	ND (LOD=17	UG/L)
CHLORIDE DISSOLVED, IC, MICRO	1.90	MG/L
[illegible]RATE-N DISSOLVED, IC, MICRO	0.013	MG/L
[illegible]FATE DISSOLVED, IC, MICRO	2.88	MG/L
LAB FILTRATION (SINGLE ANALYTE)	FILTERED	
AMMONIA-N	ND (LOD=0.027	MG/L)
TOTAL KJELDAHL NITROGEN	0.2	MG/L
detected between 0.21 (LOD) and 1.0 (LOQ) MG/L		
TOTAL PHOSPHORUS, PERSULFATE, LOW LEVEL	0.011	MG/L
detected between 0.007 (LOD) and 0.022 (LOQ) MG/L		
TEMPERATURE	5	C