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AUTHOR Canning, Maureen; Dunlevy, Margie
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ABSTRACT

This elementary school teaching unit was developed as a part of a series of teaching units that deal with Lake Erie. This unit was developed to enable children to: (1) name the different parts of a fish; (2) assemble a fish using overlapping overheads to reinforce fish parts; (3) build a fish to scale using jumbo fish puzzle parts; (4) classify fish according to various characteristics; (5) name ways animals protect themselves; (6) be familiar with vocabulary words associated with fish; and (7) name different types of fish. The document contains a unit outline, background information for the teacher, reproducible worksheets, overhead transparency masters, card games, puzzles, identification cards, book and song lists, art activities, and a bingo game. The last 12 pages are designed to be removed, laminated, and put together into 4 posters. (TW)
Take Erie...

Build a Fish — to scale!
Lake Erie unit has been developed especially for teachers and children in the Elementary grades

by Maureen Canning and Margie Dunlevy, teachers at: Garfield School
13114 Detroit Ave.
Lakewood, Ohio 44107

Ohio Sea Grant Education Program
The Ohio State University
059 Rameyer Hall
29 W. Woodruff Avenue
Columbus, Ohio 43210

Rosanne Fortner, Editor
UNIT 2
BUILD A FISH TO SCALE

OBJECTIVES: The children will be able to

1. Name the different parts of a fish.
2. Assemble a fish using overlapping overheads to reinforce fish parts.
3. Build a fish to scale using jumbo fish puzzle parts.
4. Classify fish according to various fish characteristics.
5. Name ways animals protect themselves.
6. Be familiar with vocabulary words associated with fish.
7. Name different types of fish.

I. Parts of a fish
   A. Fins - Dorsal, Pectoral, Pelvic, Anal, Adipose,
   B. Tail (Caudal fin) - round, forked
   C. Mouth - sucker, barbels, top, bottom
   D. Body Shapes - wide, narrow, slender, fat
   E. Spines - present, absent
   F. Markings - spots, stripes
   G. Lateral Lines

H. Activities and Idea Guides
   1. Japanese fish prints
   2. Paper mache fish
   3. Stuffed fish
   4. Take apart fish ditto
   5. Connect dot-to-dot by 2's or 5's
   6. Cut and paste fins
   7. Bingo with fish pictures
   8. Create new creative fish
   10. Addition facts hidden fish
   11. ABC order
   12. Classify by all 7 parts - tails, fins, mouths, body shapes, and markings
       a. Use pictures
       b. Use real stuffed fish
       c. Use fish prints
       d. Use overheads of fish
       e. Create charts
       f. Create bulletin board with fish classified and labeled

II. Overlapping overhead fish parts
   A. Idea Guide
   B. Possibility for fish parts worksheets

III. Jumbo fish puzzle parts with Idea Guide
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TEACHER INFORMATION ON PARTS OF A FISH

1. TEETH
   Not all fish have teeth. Some fish swallow their food whole. Those that do have teeth exhibit a wide variety...some with big sharp teeth to catch and hold prey, others with bristly teeth to scrape off algae, or flat and heavy teeth for crushing hard-shelled animals.

2. MOUTHS
   There are big mouths, tublar mouths, flexible mouths, mouths that point up and mouths that point down...all with special functions for that fish, depending on its environment, the food it eats and how it protects itself.

3. NOSTRILS
   Yes, fish do have noses. They are used to smell chemicals in the water, not for breathing. Some fish have one nostril (a blind sac) on each side of their face. Others have two nostrils on each side, forming a tub through which the water circulates. Some fish are able to smell things located miles away.

4. EYES
   Size and color vary from fish to fish. Most fish lack eyelids since their eyes are constantly bathed in water. (Some sharks are the exception.) Fish lack sharp vision...they're nearsighted, and some cave fish lack eyes completely.

5. GILL COVER or OPERCULUM
   This flap covers and protects the delicate red gills found underneath. Fish get their oxygen from air dissolved in the water. This can be compared with mammals such as seals and dolphins which must surface periodically to breathe.

6 & 7. DORSAL FIN(S)
   Some fish have one, some have two, some have none at all. There is a great variety in fins and their uses in fish. Mammals that live in the water do not have fins, but have modified legs referred to as flukes or flippers.

8. CAUDAL FIN
   This is the fish's tail. Some fish move their bodies by thrusting the tail back and forth. For other fish, the tail serves as a rudder or a stabilizer, with propulsion coming from body movements or other fin movements.

9. ANAL FIN
   This fin is sometimes armed with sharp projections. When these supporting rods in the fins are soft, they are called rays. When they are hard and stiff, they are called spines.

10. PELVIC FINS
    These fins are analagous to our legs. They are primarily used for fine adjustment of the fish's movements but may be modified for special functions, such as crawling along the bottom, holding or grasping.

11. PECTORAL FINS
    These are analagous to our arms and are also used for fine movements. They may be modified for special functions, or in some fishes, absent.

12. SCALES
    Although most fish have scales, certain kinds either lack them or have such small scales that they are not noticeable, such as with the catfishes and moray eels. Scales are modified skin cells and help protect the fish from abrasion and skin diseases.

13. LATERAL LINE
    The water fishes live in is sometimes turbid, usually in motion and often dark. Therefore, some fish don't depend on sight. Instead, they use a special sense organ, the lateral line. This is a series of pits in the skin that looks like a dotted line. The nerve cells in these pits are sensitive to changes in pressure and tell the fish how deep it is and what sounds are present. It's also sensitive to chemicals dissolved in the water. Sometimes it's even sensitive to electrical fields, and works as a sort of radar.

* From Marine Science Center; Poulsbo, Washington; James A. Kolb, author/editor.
This page has been designed to assist in the assembly of the take-apart bluegill build-a-fish puzzle.
Fish Characteristics

Where the fins are:

1st dorsal
2nd dorsal
lateral line
tail
pectoral fin
pelvic fin
anal fin

Fin types:

adipose
dorsals separate
dorsals joined
round tail
forked tail

Head features:

sucker mouth
barbels
spine
mouth on top
mouth on bottom

Also look for differences in:

Body shapes (wide, narrow; slender, fat)
Lateral line (present or absent)
Spines (present or absent, and location)
Spots or stripes
Head shapes
Fin shapes
narrow slender body
bottom mouth
top mouth
caudal fin (tail) forked
caudal fin (tail) round
dorsal fins separate front rear
dorsal fin
aral fin
pectoral fin
pelvic fin
adipose fin
barbels
lateral lines
Label fish parts. Could be used as a transparency or ditto.
Cut out fish. Classify fish according to the tails, fins, body shapes, markings, and spines. Paste on next page in correct classification. Color.
<table>
<thead>
<tr>
<th>Class</th>
<th>Dorsal</th>
<th>Pectoral</th>
<th>Pelvic</th>
<th>Anal</th>
<th>Adipose</th>
<th>Caudal Round</th>
<th>Caudal Forked</th>
<th>Barbels</th>
</tr>
</thead>
<tbody>
<tr>
<td>L Paras</td>
<td>top</td>
<td>bottom</td>
<td>wide</td>
<td>narrow</td>
<td>spines</td>
<td>stripes</td>
<td>lateral lines</td>
<td>spots</td>
</tr>
<tr>
<td>Fish Parts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Classify Lake Erie Fish

<table>
<thead>
<tr>
<th>Spines</th>
<th>Round Tails</th>
<th>Top Mouth</th>
<th>Lateral Lines</th>
<th>Body Fat</th>
<th>Two Dorsal Fins</th>
<th>Markings/Spots</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Spine</td>
<td>Forked Tails</td>
<td>Bottom Mouth</td>
<td>No Lateral Lines</td>
<td>Body/Slender</td>
<td>One Dorsal Fin</td>
<td>Other Markings</td>
</tr>
</tbody>
</table>

[Image of fish]
Labell the fins on the fish below. Use the boxes at the bottom of the page.

<table>
<thead>
<tr>
<th>ADIPOSE FIN</th>
<th>ANAL FIN</th>
<th>DORSAL FIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUDAL FIN</td>
<td>PELVIC FIN</td>
<td>PECTORAL FIN</td>
</tr>
<tr>
<td>MOUTH</td>
<td>LATERAL LINE</td>
<td>GILL COVER</td>
</tr>
</tbody>
</table>

TEACHER BACKGROUND - Fins

This exercise is designed to reinforce some of the vocabulary introduced in the section.

You may choose to have your students write the name of the fin in the box or to cut and paste. Each approach has its merits.

Duplicate the activity. One copy per student is recommended. Students may work independently or in small groups at your discretion.

Reserve a few minutes to discuss the basic concepts covered and to provide the correct answers. Use this opportunity to relate the function of the fin to its structure and location.

From Marine Science Center; Poulsbo, Washington; James A. Kolb, author/editor
Protect me!
Name one way these animals protect themselves from harm.

1. [Crab]
2. [Fish]
3. [Starfish]
4. [Clam]

ADAPTED FROM KOLB, MARINE SCI.CTR
IDEA GUIDE FOR TEACHERS:
FISH PARTS CARD GAMES

The following seven pages of fish pictures are to be mounted on cardboard and cut out so you have twenty-eight fish cards. Then you are ready to have fun playing several games to reinforce fish parts.

1. FISH DOMINOES
   Each of four players gets six cards which have been shuffled. One card is placed in the center. Players can match on any of the four sides - mouths, fins, tails, gill covers, spines, etc. Winner is the person who gets rid of all his/her cards.

2. CONCENTRATION
   Place face down, fourteen cards (less, if desired) on left and fourteen on right. Player turns card over on left and turns one over on right. If he/she can tell one fish part they have in common and point out on each card, he/she keeps the pair. If incorrect, turn cards back over. Player with most pairs wins.

3. FISH
   Two to six players. Deal four cards down to all players. Spread remaining cards face down in the center of the table to make up the pond. Each player arranges his/her cards, placing all matching fish part cards in a pile face up in front of him/her. The dealer asks a player for a specific fish part card. If that player has it, he/she must give it up. If not, dealer draws one from pond. If player uses up all cards, chooses from pond. Player with most matches wins.

4. OLD FISH (MAID)
   Two to six players. Select one fish part to be the "Old Fish" or one card to be the "Old Fish." Show card or tell all players the "Old Fish." Mix up all the cards and deal them, one at a time, face down to all players. Each player looks at his/her cards, matches as many matching fish parts as possible in front of him/her. Then players go to left and draw one card from that person's hand. The game continues until all pairs of cards are matched and one player has the "Old Fish." He/she is the loser.

5. WAR
   Make word cards that tell fish parts or characteristics. Two players. Shuffle cards and give half to each player face down. At the count of three, each turns up the top card in his/her pile. If a word and picture card are turned up - the word card wins but only if the player can read the word. If two word (or two picture) cards are turned up, there is "War." Each player adds a card and each player turns a card. The word card gets all six cards. Play continues till one player has all the cards or the most.

6. MOBILES
   Create fish characteristics mobile.
Gar

Gar Family - Lepisosteidae

The gars are ancient fish, armored and not easily caught. Gar-rodos are held to capture them with wire snare. The gar feed on all kinds of fishes, living and dead. The gars have sharp, strong teeth.

Paddlefish

Paddlefish - Polydontidae

The paddlefish swims with its mouth open. It is a filter feeder. It is found in silty rivers and oxbows and flood plain lakes. It may grow to be 6 feet long and weigh 150 lbs. It has a strongly upturned tail.

Silversides

Silverside Family - Atherinidae

All are streamlined, and are surface feeders. They are almost transparent. Boaters often see them skip in the air for a short distance.

Sculpin

Sculpin Family - Cottidae

Sculpins have large spiny or armored heads. They live on the bottom, feeding on small fish.
Yellow Perch

Perch Family - Percidae

This group includes the yellow perch and the walleye, both of which are important in sport fishing.

Minnow

Mudminnow Family - Umbridae

The mudminnow is an omnivore. This fish will eat a wide variety of foods. It is very sturdy and makes a good bait.

Sunfish

Sunfish Family - Centrarchidae

The male sunfish guards the eggs. Many of the species in this family, such as largemouth bass, smallmouth bass and bluegills, are important sport fish. Sunfish feed on aquatic invertebrates, fish, and frogs. They are protected from commercial exploitation.

White Bass

Temperate Basses - Percichthidae

The white bass and the white perch are the temperate basses in Lake Erie. They often school near or at the surface. The white bass prefers quiet water over sand and gravel bottoms.
Drum

Drum Family - Sciaenidae

This fish gets its name from the drumming sound it makes. It has a lateral line that extends all the way across the tail fin. It is of some commercial value. Some fishermen call this fish the "sheepshead." Other common names include silver bass, gray bass, and reef bass.

Catfish

Catfish Family - Ictaluridae

These omnivorous fish use their barbels to locate food. Bullheads are small catfish. They live in muddy ponds and survive even when ponds dry up. The male bullhead watches the young. The flathead catfish can be as large as 100 pounds. Fun to fish for, the catfish is a valuable sport and commercial fish. The little madtoms have venom glands at the base of their pectoral fins. They can cause a wound.

Stickleback

Stickleback Family - Gasterosteidae

Sticklebacks get their name from the stiff spines on their backs. They inhabit the quiet waters of streams and boggy situations.

Burbot

Cod Family - Gadidae

Cod have a single prominent barbel on the underside of the chin. Although not commercially valuable, the Great Lakes representative of the cod family is the burbot.


Sturgeon

Sturgeon Family - Acipenseridae

The sturgeon is an ancient fish, covered with bony plates. It has sensitive feelers on the bottom of its mouth. The sucker-like mouth under a long snout is well adapted for working over the bottom and picking up food. The sturgeon sucks animals up through its tube-like mouth. It is a very desirable food fish.

Lamprey

Lamprey Family - Petromyzontidae

This family has some parasitic and some non-parasitic members. The young of both types burrow into stream bottoms and stay there as filter feeders for 3-7 years. When they become adults, the non-parasitic lamprey reproduce and die. The adult parasitic lamprey uses its sucker mouth and rasping teeth to attach itself to another fish that it will feed on as a vampire.

Carp

Minnow Family - Cyprinidae

The minnows provide a major source of food for game and commercial fish. They are also widely used for bait. The carp looks very different from other members of this family.

Eel

Eel Family - Anguillidae

The eel is an omnivore. It has true jaws and a snake-like shape with no scales. It is good to eat. It feeds at night.
Troutperch

Troutperch Family - Percopsidae

The scales of these fish have a rough texture. They resemble both the trout and the perch (adipose fin-trout; spined fins-perch). They forage fish.

Minnow

Minnow Family - Cyprinidae

The minnows provide a major source of food for game and commercial fish. They are also widely used for bait.

Salmon

Salmon Family - Salmonidae

Has extra fatty fin (adipose). The Chinook Salmon can reach 100 pounds. The salmon is a valuable sport fish. They are a native to Lake Ontario but Atlantic salmon were exterminated by man's activities.

Smelt

Smelt Family - Osmeridae

The smelt is about 7-9 inches long. It eats small fish and invertebrates. It has an extra fatty fin (adipose fin) and smooth scales.
Gizzard Shad

Herring Family - Clupeidae

The saw toothed belly sets the herrings apart. They are plankton feeders. They serve as forage for sport and commercial fish. For example, walleyes often eat gizzard shad, a member of this family.

Mooneye

Mooneye Family - Ildontidae

A silver to gold colored fish that is not considered very good to eat. Insects, insect larvae, and small minnows are the major foods of the mooneye.

Sucker

Sucker Family - Catostomidae

These fish live on the bottom of lakes, ponds and streams. They have an extendible sucking mouth, and feed by suction on bottom organisms. One sucker, the bigmouth buffalo, may grow to be 65 pounds, 4 feet long. Suckers are a significant part of the commercial and sport fishery.

Pike

Pike Family - Esocidae

These predaceous fish feed on anything they can seize. They grow to 10-35 pounds, 2-7 feet long. They are a fierce game fish. They like warm, weedy rivers, ponds and lakes.
Pirate Perch

Pirate perch family - Aphredoderidae

These are small fish, 4 inches long. They eat small fish and aquatic insects.

Livebearer

Livebearers family - Poeciliidae

These fish bear their young alive. The "mosquitofish" feeds on the mosquito larvae which attach themselves to the surface film of the water.

Killifish

Killifish family - Cyprinodontidae

The head is flattened on top toward the snout, and the mouth opens along the upper front of the head. The mouth is adapted to feeding at the surface. These fish are of some value as live bait and as forage fish (eaten by larger fish).

Bowfin

Bowfin family - Amiidae

The bowfin lives in quiet water, feeding on fish, amphibians and crayfish. It has a long fin that arches in a bow over most of the length of the back.
Fish Characteristics Bingo

Livebearer
Sturgeon
Gizzard shad

Lamprey
Salmon
Troutperch

Stickleback
Yellow Perch
Silversides
<table>
<thead>
<tr>
<th>Minnow</th>
<th>Smelt</th>
<th>Sculpin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunfish</td>
<td>Pirate Perch</td>
<td>Pike</td>
</tr>
<tr>
<td>Killifish</td>
<td>Gar</td>
<td>Sucker</td>
</tr>
<tr>
<td>Catfish</td>
<td>Burbot</td>
<td>Drum</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>Bowfin</td>
<td>White Bass</td>
<td>Carp</td>
</tr>
<tr>
<td>Paddlefish</td>
<td>Mudminnow</td>
<td>Mooneye</td>
</tr>
</tbody>
</table>
IDEA GUIDE FOR TEACHERS:

WAYS TO ADAPT DITTOS

The following ideas are ways you could change the next six dittos.

1. COUNT BY ONES - FISH
   A. Start with 38.
   B. Count backwards.

2. COUNT BY FIVES - DOT TO DOT
   A. Count by tens, hundreds, or thousands.
   B. Count backwards by twos, beginning with 58.
   C. Skip count by threes starting with 23.

3. ADDITION SUMS OF SIX AND EIGHT
   A. Add a tens digit before each ones digit - with or without grouping.
   B. Add a tens and hundreds digit before each ones digit - with or without grouping.

4. A GOOD SWIMMER "FIN" DITTO
   A. Make the directions more complicated - color each fin a specific color.
   B. Give directions to add a habitat.
   C. Add directions to draw other lake creatures.
   D. Write a creative story.
      1. What will I do today?
      2. How can I get off this hook?
      3. Create a funny fish such as a butterfish and tell about it.
   E. Write directions to add a fishing pole, water, and a hook caught in the fish's mouth.

5. LOTS OF FISH IN THE LAKE DITTO
   A. Label all fins on fish A, B, C, D, and E.
   B. Tell which fins are missing from which fish.
   C. One red fish with eight (parallel) stripes.
      One orange fish with five (equilateral) triangles.
      One blue fish with six (rhombid) rectangles.
      One green fish with fourteen circles - seven small, three medium, four large.
   D. Create the habitat for these fish.
   E. Write creative story - where are the fish going and why.

6. FISH ABC ORDER
   A. Use reverse ABC order.
   B. Using the same beginning consonant think up an adjective or adverb for each word. For example, tooth top mouth, shiny spots, dominant dorsal.
I swim in the ocean. I like to tease baited hooks.
What am I? __________________________

*From the Wetlands Institute, Cape May Co., New Jersey
Count by 5s and connect the dots

Color green the areas where the sum = 6
Color blue the areas where the sum = 8

A good swimmer.

1. Put an X on the caudal fin.
2. Put a □ around the pectoral fin.
3. Put a ○ around the anal fin.
4. Color your fish.

From Marine Science Center; Poulsbo, Washington; James A. Kolb, author/editor.
There are lots of fish in the lake.

1. Color two fish red or orange.
2. Color three fish blue or green.

Put body parts of fish in ABC order.

1. Spines
d. Spots
d. Dorsal
4. Pelvic
5. Adipose
6. Round tail
7. Sucker mouth
8. Top mouth
9. Caudal
10. Bottom mouth
11. Barbels
12. Markings
13. Forked tail
14. Stripes
15. Wide body
16. Pectoral
17. Narrow body
18. Anal
19. Lateral lines
1. Lake Erie "Background"
   (Sponge paint or water color, wet-on-wet, wet-on-dry background)
   Then either draw or paste fish (solid or outline form) on "Lake Erie."

2. Stuffed Lake Erie paper fish

3. Tissue paper and starch over small balloons. Tear tissue in strips, patches, etc. Adhere to balloon with starch mixture (2 parts starch to 1 part water.) Add paper fins, tails, etc.

4. Origami fish

5. Fish mobiles

6. Fish kites

7. Fish mural

8. Fish prints—styrofoam, real fish, sponge, positive/negative

9. Paper craft fish
   Use varied cut paper skills: fringing, curling, scoring, etc.

10. Create a lake scene with crayons then use water based paint to "wash" it.

12. Melt crayons between wax paper to create Lake Erie fish silhouette. (Outline with marker.)

13. Torn paper fish scene.

14. Plaster of Paris prints in wet sand. (Use real fish.)

15. Sandpaper print scenes, draw on sandpaper with crayon. Press hard for a bright picture. Turn over onto regular white paper. Iron over back side of sandpaper to make print.

16. Finger paint fish—Use various techniques of finger painting to create fish. Then make a print of this!

17. Stichery fish

18. Paper bag or milk carton fish

19. Fish "sock puppets"

20. Fish "paper doll" style

21. Honey comb fish
   Purchase honey comb paper. Students draw only on top half.
   When they correctly open up the honey comb, the entire fish will appear.

22. Fish pennants

23. Potato fish
   Use potato as fish body. Cut out fins, mouth and eyes and attach to fish body with straight pins.
   (Cucumber, sweet potato etc. can be substituted for potato.)
Cut fish apart. Make a puzzle!
GOING FISHING

Now that you know about fish, let's make one! Here are the things you will need.

Materials:
- paper - butcher, or construction paper
- waste or newspaper
- crayons or paint
- glue
- construction paper - scrap
- stapler
- string
- scissors

Here is how you do it.

Procedure:
1. Fold your piece of paper in half (either lengthwise or widthwise).
2. On one side of the folded paper, make a drawing of your favorite fish.
3. Start at fold and cut out the fish. Cut both sides of the folded paper at once. You will have two fish when you have finished.
4. Color or paint both fish and/or decorate with colored paper. Add fins, tails etc.

Name _____________________________
5. Staple the two pieces together around edge of fish leaving an opening.

6. Stuff fish with waste paper or newspaper.

5. Staple
(Leave opening)

7. Staple opening.

8. Hang by string.

9. Enjoy your creation.

Gyotaku: Preserve it with a Print

When the class has collected some interesting pond life, or when your prize angelfish dies, or when your favorite fisherman catches one THIS BIG, how can you preserve the memory in suitable fashion? You can consign the fish to an ignominious burial in a jar of formalin. You can feed it to the cat or to the family. A taxidermist could mount it on mahogany, or maybe it would make good fertilizer.

For many kinds of fish, the answer lies in a Japanese art form called gyotaku, fish printing. Gyotaku is widely practiced by ichthyologists, who find that this method preserves intact all the intricate details by which fish are identified. This scientific usage developed secondarily to gyotaku as an art, but through it many still discover that the science of life is exceptionally beautiful.

While the making of fish prints is a highly developed art, the basic techniques can be mastered within an hour's time. For a school, gyotaku can provide a permanent record of fish species studied. Minimal space for display, accurate identification, and complete absence of odor make this method a highly desirable one.

What to use

Materials for the process are easily obtained—India ink, paint brushes (No. 8 or ½-inch size), and a fairly absorbent type of thin paper (paper towels or newsprint). The Japanese use rice paper and Sumi ink, but the expense of these products generally makes them impractical for amateur use.

The fish used for the initial effort should be a somewhat flattened one. Any kind of fish will work, but "thicker" fish are more difficult to print successfully, and even the best prints may appear distorted. An expert will tackle anything from a tuna to an octopus, but beginners would be advised to use flounders, sole, spadefish, and the like.
How to do it

1. Take a preserved or freshly dead fish, rinse it off and blot it dry. (Soap and water may help remove the mucus.) Place it on a sheet of dry newspaper or paper toweling.

2. Record on a sketch where various colors are located on the fish. Color can be added to a finished print in the form of finger paints. (If you want the fins to appear erect on the print you should spread the fins and hold them in position by sticking pins through the fins into a piece of clay on the reverse side.)

3. Brush ink onto the specimen from front to back, including all fins. Use a heavier coating on the edges of the fish and less on the center. Paint around the eye, not over it.

4. Cover the fish with the paper on which a print is to be made. Press evenly with fingers over the entire surface, emphasizing the outline.

5. Peel the print off carefully from head to tail. Add a dot for the eye and apply any needed colors or markings.

The first attempts at gyotaku are likely to yield only blackened fingertips and fish silhouettes. Persevere! Experiment with less ink to give sharper details. The same fish can be inked many times before its scales loosen and stick to your brush.

Students thoroughly enjoy gyotaku as an arts-and-science activity. Some become experts and proceed to print other types of animals with great success.

The next step? Write some haiku to go with your gyotaku!


The author is indebted to Will Hon, Education Director University of Georgia's Marine Extension Center, Skiddaway Island, for introducing her to this technique.
TEACHER BACKGROUND - Fishwich Crossword Puzzle

This activity is designed to reinforce vocabulary words introduced in the worksheets. Many of your students may not be familiar with this type of puzzle. Provide as much help as they need to get them started. The puzzle is not complex. The clue words are listed next to the puzzle.

Duplicate the crossword puzzle. One puzzle per student is recommended. Students may do this activity individually or in small groups. Be certain that your students understand how to do a crossword puzzle. You may choose to have them work individually at first, then meet in small groups for mutual aid on problem words. Choose the method best suited to your class.

Allow a few minutes to discuss the basic concepts covered and to provide the correct answers. Use this time to summarize the ideas presented in the section on fish.

KEY - Crossword Answers

FISHWICH CROSSWORD PUZZLE

Each clue describes a word you learned about fish. Figure out each clue word. Write it in the row of boxes that begins with the same number as the clue. Clue number 1 across is done for you.

WORDS
- dorsal
- caudal
- swim
- gill
- schools
- ocean
- lungs
- sculpins
- smelt
- overfish
- pole
- rod

CLUES

ACROSS

1. Fins help a fish to _____________.
2. If we _____________ today, there will be no fish tomorrow.
3. This fin is used for power.
4. These fish lay their eggs on the bottom side of rocks.

DOWN

1. Some fish swim in _____________.
5. You can catch fish with a fishing _____________.
6. This is a fish’s lung.

Help Me Find My Mom

Match the smaller fish with its mom using a piece of string or yarn.

Use this page as an example for a larger game board.

Example:

My Mom is 18 cm long

My Mom is 20 cm long

My Mom is 29 cm long

My Mom is 22 cm long

My Mom is 25 cm long

(Draw Moms in appropriate sizes)
FISH NAMES

Ever wonder how a fish got its name? Was it from how it looks? Where it lives? How it behaves?
Listed below are some common names of Lake Erie fish and ocean animals.

<table>
<thead>
<tr>
<th>LAKE ERIE FISH</th>
<th>OCEAN ANIMALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Freshwater drum</td>
<td>1. Hammerhead shark</td>
</tr>
<tr>
<td>2. Madtom</td>
<td>2. Hatchetfish</td>
</tr>
<tr>
<td>3. Datfish</td>
<td>3. Swordfish</td>
</tr>
<tr>
<td>4. Mudminnow</td>
<td>4. Dogfish</td>
</tr>
<tr>
<td>5. Walleye</td>
<td>5. Starfish</td>
</tr>
<tr>
<td>6. Pirate-perch</td>
<td>6. Pipefish</td>
</tr>
<tr>
<td>7. Sunfish</td>
<td>7. Jellyfish</td>
</tr>
<tr>
<td>8. Paddlefish (Endangered species)</td>
<td>8. Parrotfish</td>
</tr>
<tr>
<td>9. Mooneye (Endangered species)</td>
<td>9. Queen triggerfish</td>
</tr>
<tr>
<td>11. Silverside</td>
<td>11. Sea robin</td>
</tr>
<tr>
<td>12. Bullhead</td>
<td>12. Toadfish</td>
</tr>
</tbody>
</table>

DIRECTIONS:

1. Choose a name from either list and draw a picture (funny?!!!) which shows what you think that fish would look like based on its name. Include some basic fish characteristics: pair of eyes, tailfins, mouth, and some normal fin arrangements

2. Write a short story (1 or 2 paragraphs) or a poem which tells how you think the fish you chose got its name.
EXAMPLE OF FISH NAMES ARTWORK

It got its name by me, one day I got mad and threw my cat in the water. About two weeks later I went fishing, I caught this funny looking fish, it looked like a fish with a cat head on it. I threw it back in the water, all the sudden I was saw catching all those fishes. I decided to name it a catfish. Then I decided to change my name to Catfish Hunter.

pirate fish
<table>
<thead>
<tr>
<th>fin</th>
<th>caudal</th>
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<tbody>
<tr>
<td>dorsal</td>
<td>barbels</td>
</tr>
<tr>
<td>pectoral</td>
<td>spines</td>
</tr>
<tr>
<td>pelvic</td>
<td>lateral lines</td>
</tr>
<tr>
<td>anal</td>
<td>gills</td>
</tr>
<tr>
<td>adipose</td>
<td>gill cover</td>
</tr>
<tr>
<td>stripes</td>
<td>spots</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>mouth</td>
<td>markings</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Children learn and retain more about any subject when they are actively involved and personalizing the unit. Having your students make their own booklets helps to accomplish this.

On the following page, you will find a cover for a child's booklet. Fasten each student's completed dittos, experiments, artwork, or other unit projects together with a copy of this cover page to make a booklet for each child.

You may want to use the booklets as a student evaluation of each day's work. Have your students draw or write about something they learned during the day, then include these responses in the children's booklets.
I look at Lake Erie

name

---
Library Books

The following books are likely to be found in your school library:

**Ships - Boats**
- Ships of the Great Lakes
  - Buehr, Waller
- Boat Book
  - Gibbons, Gail

**Ohio**
- Ohio's Natural Heritage
  - Lafferty, Mike B.

**Rivers**
- Rivers and Lakes
  - Updegraff, Imelda and Robert

**Fish**
- The Life of the Seashore
  - Amos, William Hopkins
- The First Book of Fishes
  - Bendick, Jeanne
- Along the Seashore
  - Buck, Margaret W.
- In Ponds and Streams
  - Buck, Margaret W.
- Fins and Tails
  - Campbell, Elizabeth A.
- Tide Pools and Beaches
  - Clemons, Elizabeth
- Fishes
  - Fichter, George S.
- Fishes, and How They Live
  - Fichter, George S.
- A Trip to the Pond
  - Hofmann, Melita
- The Fishes
  - Lubell, Winifred
- In a Running Brook
  - Ommanney, Francis Downes
- What is a Fish
  - Darby, Gene
- The Sunlit Sea
  - Goldin, Augusta R.
- Brian Wildsmith's Fishes
  - Wildsmith, Brian
- Fish is Fish
  - Lionni, Leo
- Fishy
  - Lionni, Leo
- The Science-Hobby Book of Fishing
  - Shoemaker, Hurst
- My Learn to Fish Book
  - Denham, Ken
- Pets From the Pond
  - Buck, Margaret
- Fish Do the Strangest Things
  - Hornblow, Leonora and Arthur
- Fishes
  - Wildsmith, Brian
- Some of Us Walk, Some Fly, Some Swim
  - Frith, Michael
- Adaptations
  - Bindick, Jeanne
- Fins and Tails: A Story of Strange Fish
  - Campbell, Elizabeth A.

**Food**
- Eating and Cooking Around the World
  - Berry, Erick
- Eating Places
  - Zim, Herbert S.
Animals
The True Book of Animals of Small Pond...Erickson, Phoebe
First Book of the Seashore..............Blassingam, Wyatt
Seashore- Seashore Creatures...........Jackson, Paul

Water Pollution
Our Dirty Water..........................Elliott, Sarah M.
Rivers and Watersheds in
America's Future........................Helfman, Elizabeth S.
The Wildlife of North America...........Mason, George F.
Junior Science Book of Water...........Peterson, Otis
Clean Air, Sparkling Water; The Fight
Against Pollution....................Shuttleworth, Dorothy E.
The Life of Rivers and Streams...........Usinger, Robert Leslie
Ecology and Pollution/Water...........Gutnik, Martin J.

Erosion
The Wind Has Scrathy Fingers..........Rosenberg, Ethel C.

Pollution
Dinosaur....................................Hoff, Syd
Chane and Time............................Podendorf, Illa
The Wump World.........................Peet, Bill

Ecology
Ecology - The Circle of Life...........Hungerford, Harold
### Songs About Bodies of Water, Fish, Fishing, Pollution, Ships, Sailing

<table>
<thead>
<tr>
<th>Song</th>
<th>Composer</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>All the Fish Are Swimming in The Water</td>
<td>American Folk</td>
<td>MSGO</td>
</tr>
<tr>
<td>All the Little Birds (Fish)</td>
<td>French Folk</td>
<td>SBM-K</td>
</tr>
<tr>
<td>Allee Alee O, The</td>
<td>American Folk</td>
<td>DMT-EC</td>
</tr>
<tr>
<td>At the Harbor</td>
<td>McLaughlin</td>
<td>SaS</td>
</tr>
<tr>
<td>Bell Buoy</td>
<td>Wood</td>
<td>MSF</td>
</tr>
<tr>
<td>Billowing Sails</td>
<td>Wood</td>
<td>MSF</td>
</tr>
<tr>
<td>Buying Fish</td>
<td>Yiddish Folk</td>
<td>SBM-III</td>
</tr>
<tr>
<td>Canoe Song</td>
<td>American Indian</td>
<td>EM-III</td>
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<tr>
<td>Cargo Workers</td>
<td>Sea Chantey</td>
<td>SBM-III</td>
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<tr>
<td>Come Boating With Me</td>
<td>Italian Folk</td>
<td>EM-III</td>
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<tr>
<td>Crowded Hole, The</td>
<td>American Folk</td>
<td>SGO</td>
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<td>Don’t Go Near the Water</td>
<td>Mexican Folk</td>
<td>MYA-III</td>
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<tr>
<td>El barco chiquitito (The Little Boat)</td>
<td>Faithful Lighthouse</td>
<td>MYA-III</td>
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<tr>
<td>Ferry Boat</td>
<td>Wood</td>
<td>MSF</td>
</tr>
<tr>
<td>Ferryboat</td>
<td>Buttolph</td>
<td>MIM</td>
</tr>
<tr>
<td>Ferryboat</td>
<td>Schubert</td>
<td>MSF</td>
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<td>Ferryboat Is Coming</td>
<td>Wood</td>
<td>MSF</td>
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<td>Fishpole Song</td>
<td>Southern Singing Game</td>
<td>SBM-II</td>
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<td>Floating Down the River</td>
<td>Singing Game</td>
<td>SBM-K</td>
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<td>Flounder, The</td>
<td>Broudy</td>
<td>D</td>
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<td>Smith</td>
<td>MYA-III</td>
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<td>Fog Horn, The</td>
<td>Haynie</td>
<td>EM-I</td>
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<td>Freddy the Frog</td>
<td>Wright</td>
<td>TT</td>
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<tr>
<td>Frog, The</td>
<td>Broudy</td>
<td>D</td>
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<tr>
<td>Song</td>
<td>Composer</td>
<td>Source</td>
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<td>Frog and the Mouse, The</td>
<td>American Folk</td>
<td>SGO</td>
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<tr>
<td>Frog in the Well, The</td>
<td>Appalachian</td>
<td>SBM-III</td>
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<td>Frog Song, The</td>
<td>Traditional</td>
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<td>Frog Went a-Courting'</td>
<td>Virginia</td>
<td>AFSC</td>
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<td>Haul on the Bowline</td>
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<td>I Saw Three Ships</td>
<td>English Carol</td>
<td>EM-III</td>
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<tr>
<td>I Want To Go To the Beach This Summer</td>
<td>Wright</td>
<td>TT</td>
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<tr>
<td>I'd Like To Be a Lighthouse</td>
<td>Frankenpohl</td>
<td>EM-I</td>
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<tr>
<td>Imagination of Grand Sea</td>
<td>Japanese Folk</td>
<td>SBM-III</td>
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<td>Jackfish, The</td>
<td>Appalachian</td>
<td>SBM-I</td>
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<td>Land of the Silver Birch</td>
<td>Canadian Folk</td>
<td>EM-III</td>
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<td>Let's Build a Boat</td>
<td>O'Leary</td>
<td>ADLS</td>
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<tr>
<td>Let's Go to the Sea</td>
<td>Guatemala Folk</td>
<td>SBM-I</td>
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<tr>
<td>Little Mister Polliwog</td>
<td>Wilkins</td>
<td>NOM-K</td>
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<tr>
<td>Little White Duck</td>
<td>Zaritsy</td>
<td>EM-I</td>
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<tr>
<td>Lonely Little Sailboat</td>
<td>Wood</td>
<td>MSF</td>
</tr>
<tr>
<td>Michael, Row Your Boat</td>
<td>American Folk</td>
<td>EM-III</td>
</tr>
<tr>
<td>My Boat</td>
<td>Hawaiian Folk</td>
<td>TIM-3</td>
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<td>On, Roll On (En Roulant Ma Boule)</td>
<td>French Folk</td>
<td>MSGO</td>
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<td>Over the Deep Blue Sea</td>
<td>Traditional</td>
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<tr>
<td>Picture a World</td>
<td>Riposo</td>
<td>SSS</td>
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<td>Roll, Wave, Roll</td>
<td>O'Leary</td>
<td>ADLS</td>
</tr>
<tr>
<td>Row, Row, Row Your Boat</td>
<td>Traditional Round</td>
<td>EM-'II</td>
</tr>
<tr>
<td>Sailboats</td>
<td>Buttolph</td>
<td>MIM</td>
</tr>
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<td>Sailing</td>
<td>Marks</td>
<td>MYA-III</td>
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<tr>
<td>Sailing Song</td>
<td>Sea Chantey</td>
<td>SaS</td>
</tr>
<tr>
<td>Song</td>
<td>Composer</td>
<td>Source</td>
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<tr>
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<tr>
<td>Seashell, The</td>
<td>Wood</td>
<td>SaS</td>
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<tr>
<td>Seashore'</td>
<td>Traditional</td>
<td>MSF</td>
</tr>
<tr>
<td>Ship A-Sailing</td>
<td>English Folk</td>
<td>EM-III</td>
</tr>
<tr>
<td>Ships'</td>
<td>Buttolph</td>
<td>MIM</td>
</tr>
<tr>
<td>Shore</td>
<td>Miller</td>
<td>NDM-K</td>
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<td>Six Little Ducks</td>
<td>American Folk</td>
<td>EH-I</td>
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<tr>
<td>Stop the Poison</td>
<td>Donough</td>
<td>SCS</td>
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<tr>
<td>Ten Little Frogs</td>
<td>Pavelko</td>
<td>SF</td>
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<td>There Was An Old Fish</td>
<td>American Folk</td>
<td>MSGO</td>
</tr>
<tr>
<td>Tug Boat</td>
<td>Buttolph</td>
<td>MIM</td>
</tr>
<tr>
<td>Voyageur, Le (The Voyager)</td>
<td>Canadian Folk</td>
<td>LM</td>
</tr>
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<td>Water Wheel, The</td>
<td>Japanese Game Song</td>
<td>SBM-II</td>
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<tr>
<td>ADLS</td>
<td>All Day Long Songs</td>
<td>Shawnee Press, Inc.</td>
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<td>BMS-3</td>
<td>Birchard Music Series - Book Three</td>
<td>Summy-Birchard Co.</td>
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<td>D</td>
<td>Discovery!</td>
<td>M. Whitmark &amp; Sons.</td>
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<tr>
<td>LM</td>
<td>Literature and Music</td>
<td>Tooz &amp; Krone.</td>
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<tr>
<td>MIN</td>
<td>Music Is Motion</td>
<td>Edna Buttolph.</td>
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<tr>
<td>MSGO</td>
<td>More Songs to Grow On</td>
<td>Edw. B. Marks Music Corp.</td>
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<tr>
<td>MYA-III</td>
<td>More for Young Americans - III</td>
<td>American Book Company.</td>
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<td>SSS</td>
<td>Sesame Street Songbook</td>
<td>Warner Bros. Publishing Co.</td>
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<td>SCS</td>
<td>Sierra Club Songbook</td>
<td>World Around Songs.</td>
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<tr>
<td>SaS</td>
<td>Sing a Song</td>
<td>Roberta McLaughlin &amp; Lucille Wood.</td>
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<tr>
<td>SBM-K</td>
<td>Silver Burdett Music - Kindergarten Book</td>
<td>Silver Burdett Co.</td>
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<tr>
<td>SBM-I</td>
<td>Silver Burdett Music - Book I</td>
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<tr>
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<td>Silver Burdett Music - Book II</td>
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<td>Silver Burdett Music - Book III</td>
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<td>SGO</td>
<td>Songs to Grow On</td>
<td>Beatrice Landeck.</td>
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<td>TIM-3</td>
<td>This Is Music - 3rd Grade Book</td>
<td>Allyn &amp; Bacon.</td>
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<tr>
<td>TT</td>
<td>Tickle Tunes-Songs for Little People</td>
<td>Choristers Guild.</td>
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### RECORDS FOR RHYTHMIC ACTIVITIES

<table>
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<tr>
<th>RECORD</th>
<th>COMPOSER</th>
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<tbody>
<tr>
<td>Barcarolle</td>
<td>Rubenstein</td>
</tr>
<tr>
<td>Boating on the Lake</td>
<td>Kullack</td>
</tr>
<tr>
<td>Boat Rhythms (Creative Rhythms)</td>
<td>Phoebe James</td>
</tr>
<tr>
<td>- Rowboat</td>
<td></td>
</tr>
<tr>
<td>- Sailboat</td>
<td></td>
</tr>
<tr>
<td>- Tugs and Liners</td>
<td></td>
</tr>
<tr>
<td>Dance-a-Story</td>
<td>Barlin</td>
</tr>
<tr>
<td>- At the Beach</td>
<td></td>
</tr>
<tr>
<td>- Little Duck</td>
<td></td>
</tr>
<tr>
<td>En Bateau (In a Boat)</td>
<td>Debussy</td>
</tr>
<tr>
<td>To a Water Lily</td>
<td>MacDowell</td>
</tr>
<tr>
<td>Activities: Sway, rock, swing, push and pull, row, skate, haul anchor.</td>
<td></td>
</tr>
</tbody>
</table>

### RECORDS FOR LISTENING

<table>
<thead>
<tr>
<th>RECORD</th>
<th>COMPOSER</th>
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<tbody>
<tr>
<td>Children's Games</td>
<td>Bizet</td>
</tr>
<tr>
<td>- Leap Frog</td>
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<tr>
<td>La Mer</td>
<td>Debussy</td>
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<tr>
<td>- Play of the Waves</td>
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<tr>
<td>&quot;Trout&quot; Quintet</td>
<td>Schubert</td>
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<tr>
<td>- Fourth Movement</td>
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<tr>
<td>Water Music</td>
<td>Handel</td>
</tr>
<tr>
<td>- Air</td>
<td></td>
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<tr>
<td>- Hornpipe</td>
<td></td>
</tr>
</tbody>
</table>

Records available in LRC in most schools
POSTERS FOR YOUR BULLETIN BOARD

The next twelve pages should be removed from the unit and taped or glued together in order in sets of four on poster board. If you laminate the resulting poster, you can have students draw or write on it with watercolor markers.
Carp

Yellow Perch
Coho Salmon

Channel Catfish
Walleye
Bluegill
Smallmouth Bass
Gizzard Shad
Freshwater Drum
(Sheepshead)
White Bass
White Crappie
Dorsal fin

Lateral line
mouth

Pectoral fin
Ohio Sea Grant Program

Charles E. Herdendorf, Program Director
Rosanne W. Fortner, Assistant Director for Education
Victor J. Mayer, Project Director