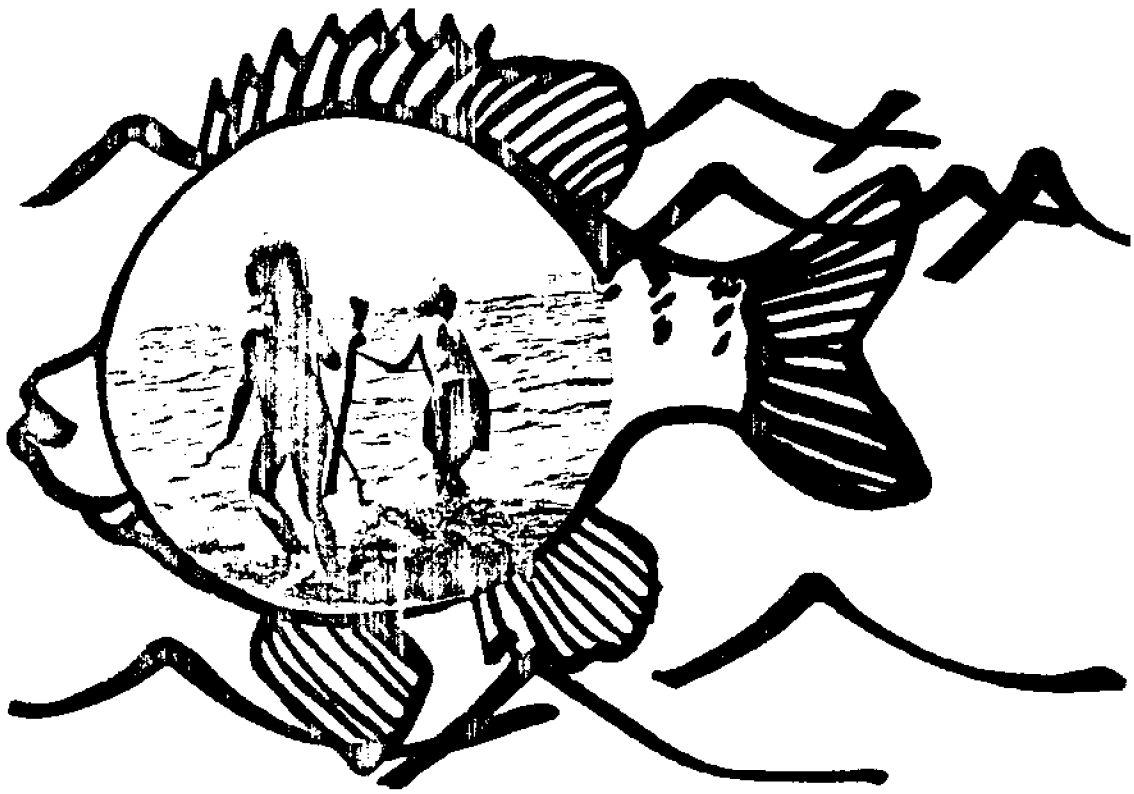
EP-32

Lake Erie...

Build a Fish

— to scale!

this Lake Erie unit has been developed especially for Teachers and Children in the Elementary grades



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The Ohio State University
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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
     9. Follow directions about fins ditto
     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.

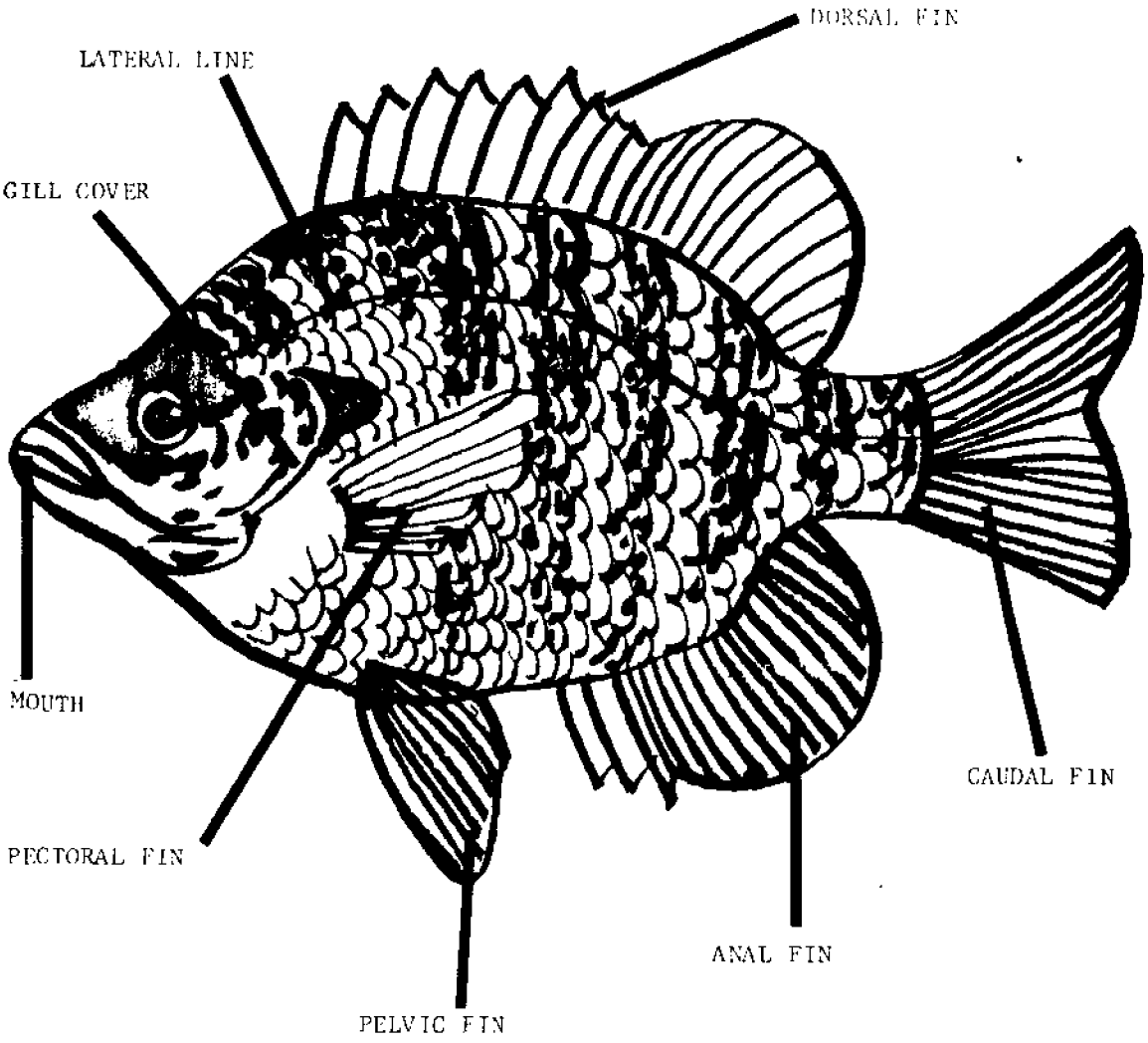
12. SCALES
Although most fish have scales, certain kinds either lack them or have such small scales that they are not noticeable, such as with the catfishes and moray eels. Scales are modified skin cells and help protect the fish from abrasion and skin diseases.

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.

LAKE TROUT

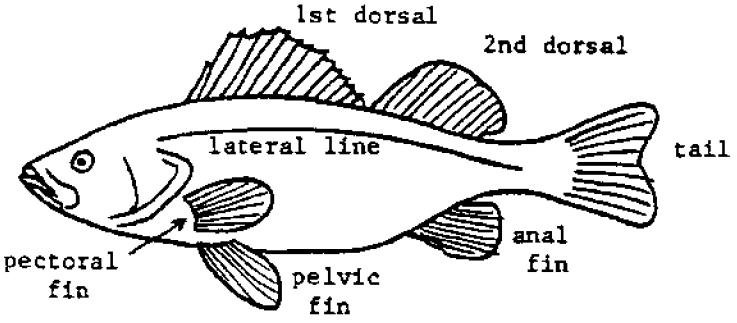
BLUEGILL



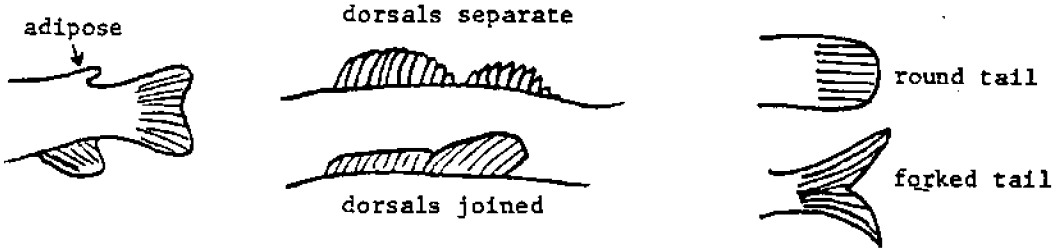
This page has been designed to assist in the assembly of the take-apart bluegill build-a-fish puzzle.

Fish Characteristics

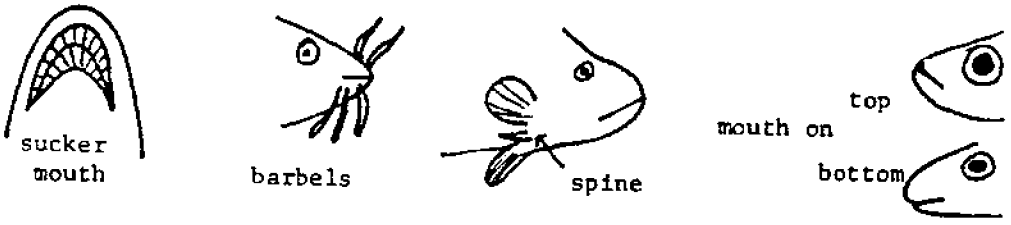
Where the fins are:



Fin types:



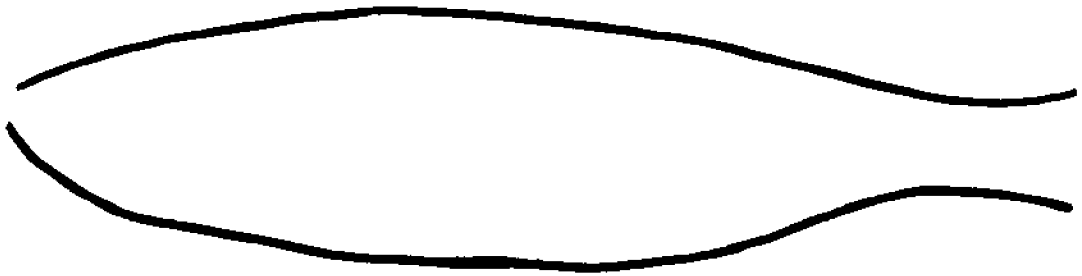
Head features:



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

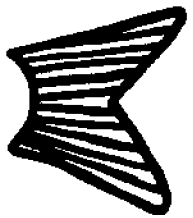
narrow slender body



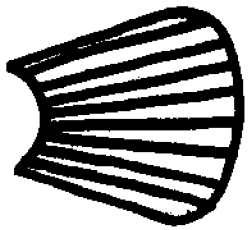
bottom mouth

top mouth

caudal fin (tail) forked



caudal fin (tail) round



dorsal fins separate front rear

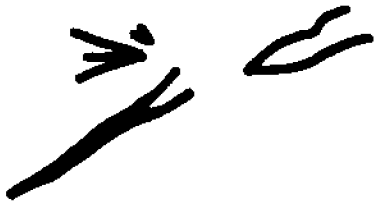
dorsal fin

anal fin

pectoral fin

pelvic fin

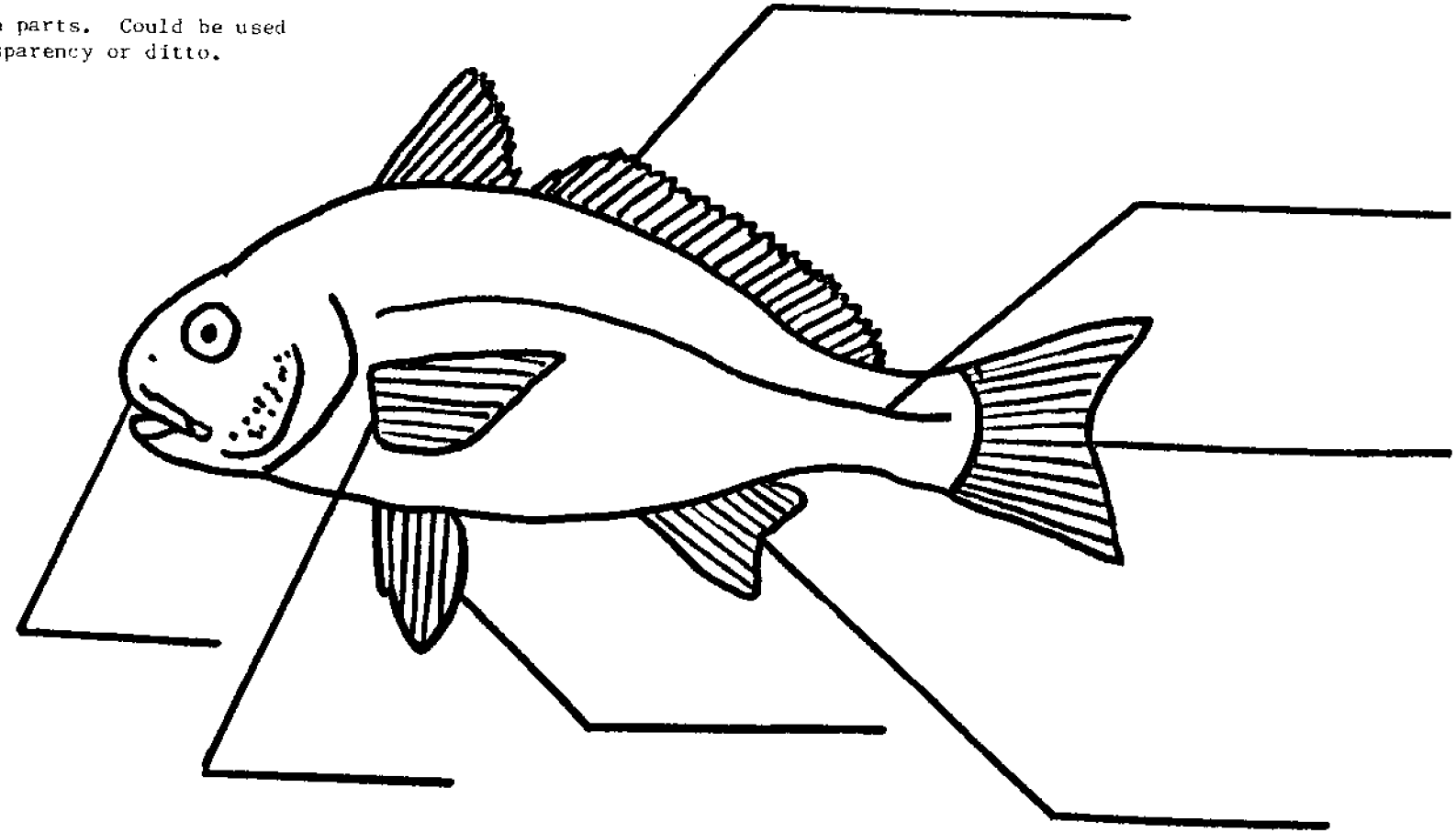
adipose fin



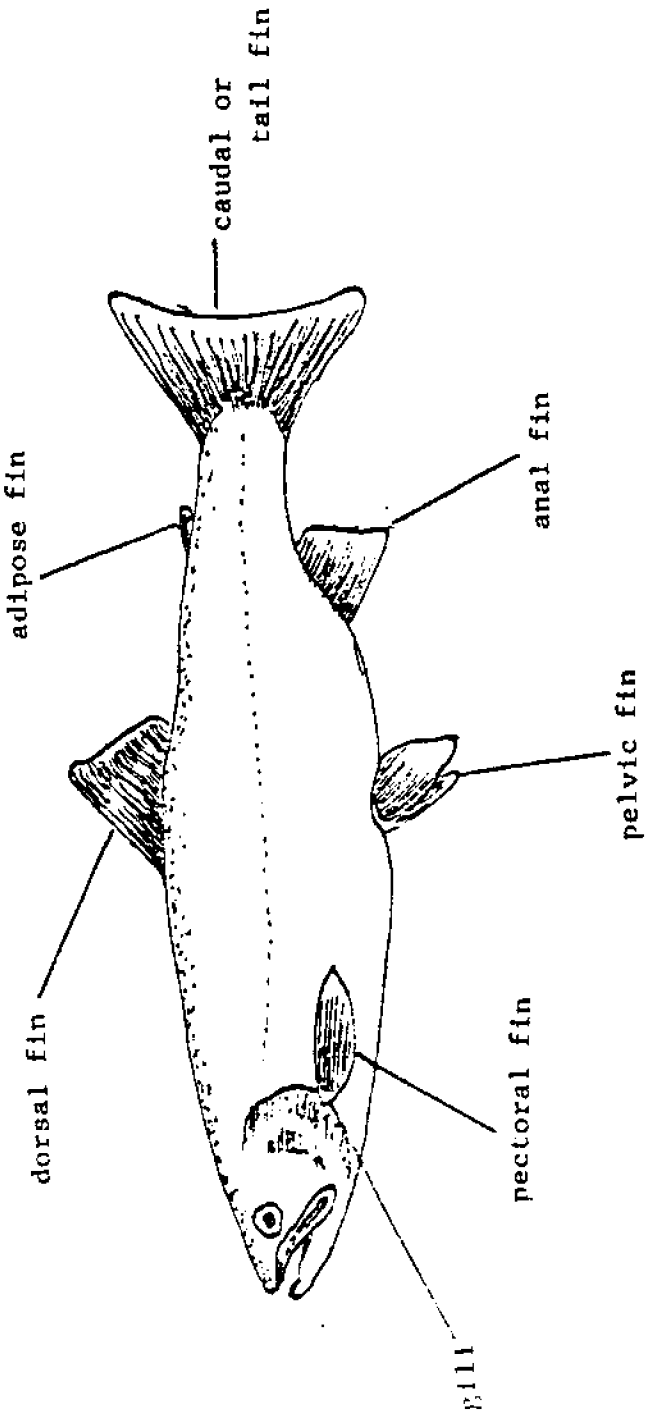
barbels

lateral lines

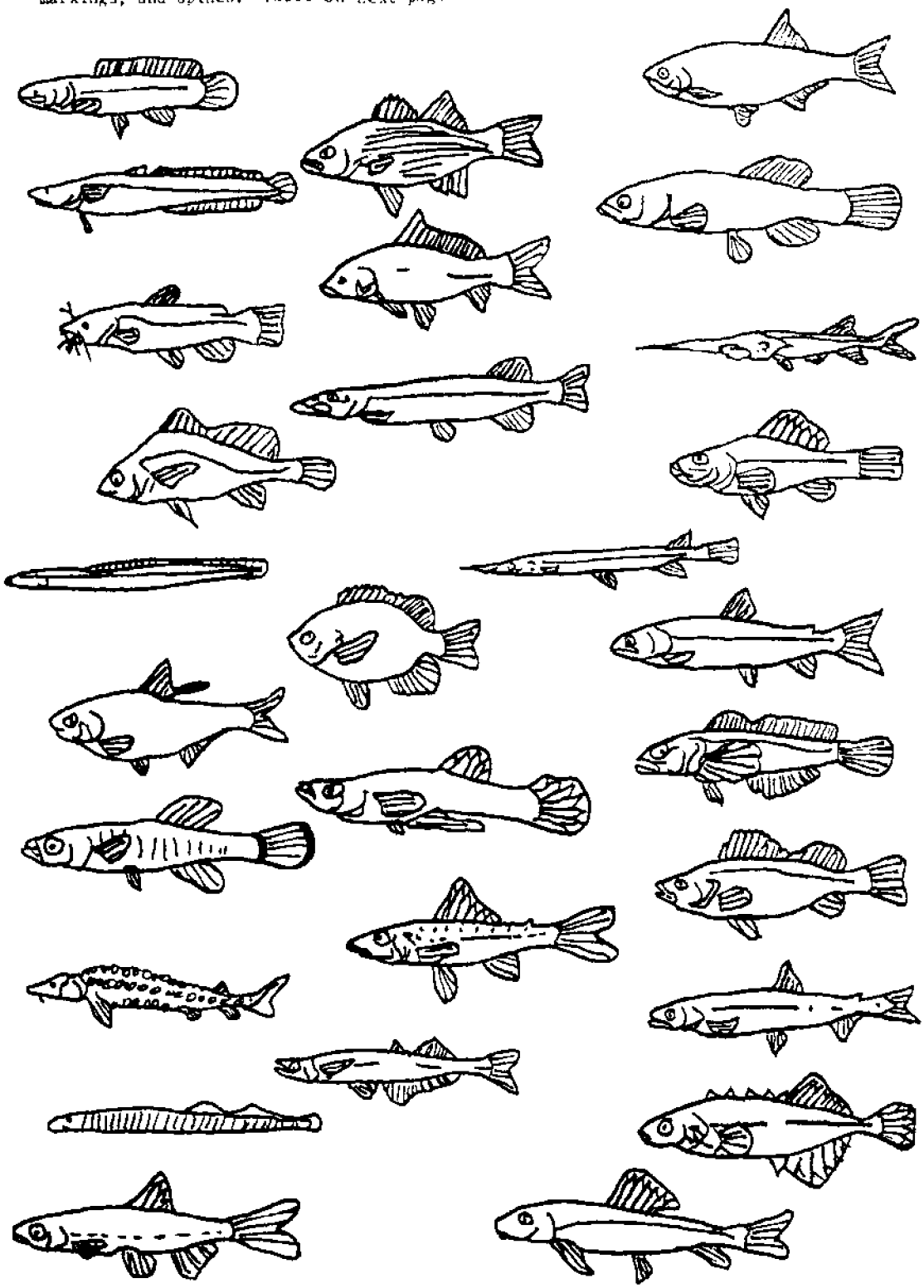
Label fish parts. Could be used as a transparency or ditto.



Transparency



Cut out fish. Classify fish according to the tails, fins, body shapes, mouths, markings, and spines. Paste on next page in correct classification.



Classify	Dorsal	Pectoral	Pelvic	Anal	Adipose	round Caudal	forked Caudal	Barbels	Classify

Fish Parts	top mouth	bottom mouth	wide body	narrow body	spines	stripes	lateral lines	spots	Fish Parts

CLASSIFY Lake Erie Fish

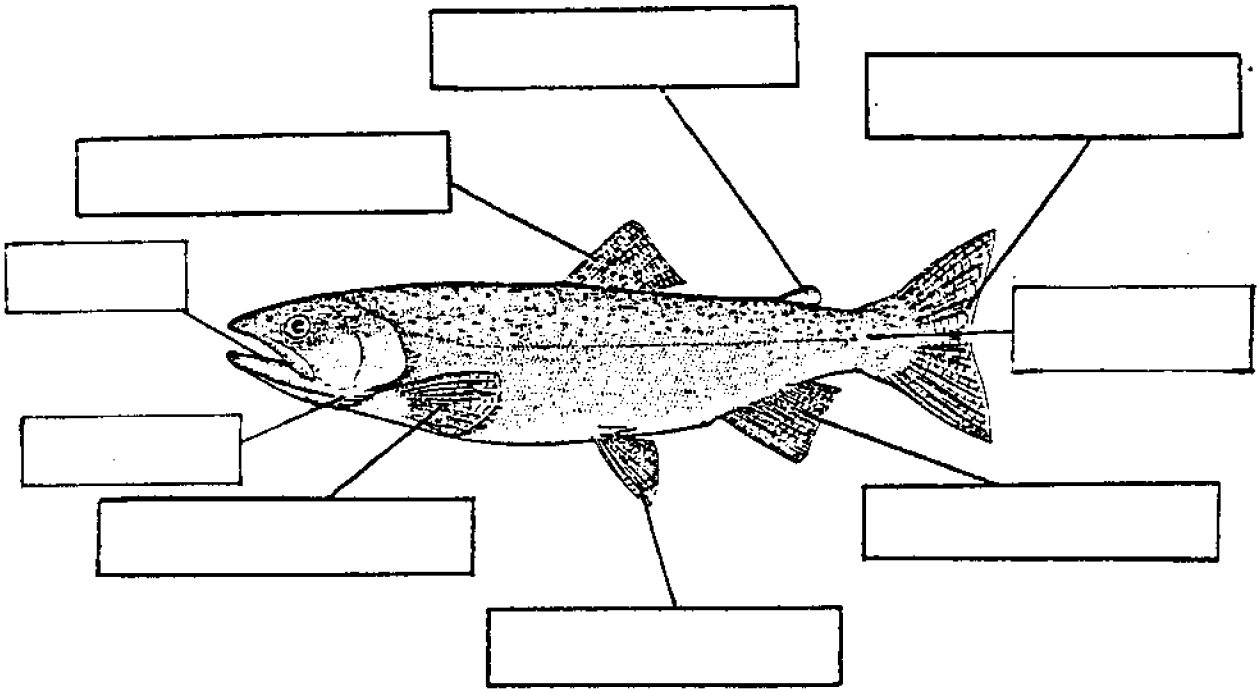
Spines	Round Tails	Top Mouth	Lateral Lines	Body Fat	Two Dorsal Fins	Markings/Spots

No Spines	Forked Tails	Bottom Mouth	No Lateral Lines	Body/Slender	One Dorsal Fin	Other Markings

Name _____

FINS

Label the fins on the fish below. Use the boxes at the bottom of the page.



ADIPOSE FIN	ANAL FIN	DORSAL FIN
CAUDAL FIN	PELVIC FIN	PECTORAL FIN
MOUTH	LATERAL LINE	GILL COVER

From Marine Science Center. Poulsbo, Washington. James A. Kolb, author/editor.

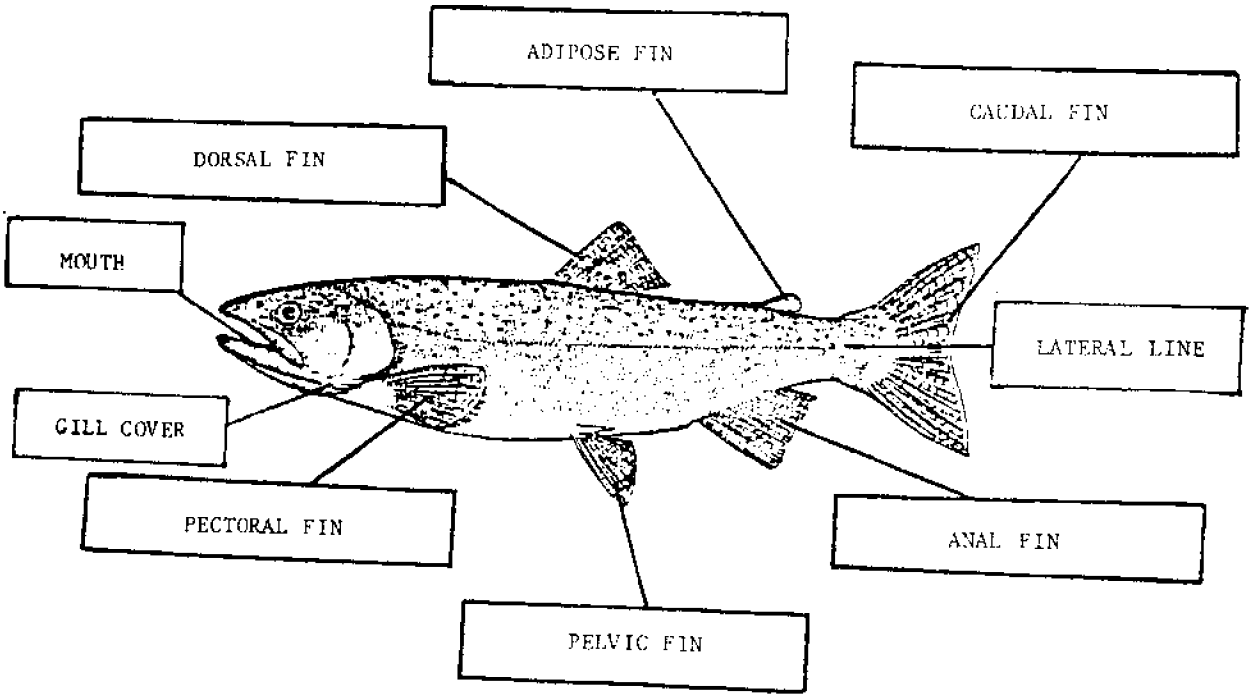
TEACHER BACKGROUND - Fins

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.

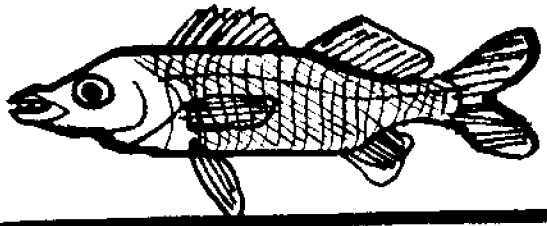
Reserve a few minutes to discuss the basic concepts covered and to provide the correct answers. Use this opportunity to relate the function of the fin to its structure and location.

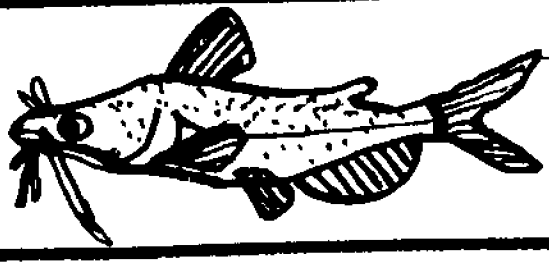


From Marine Science Center; Poulsbo, Washington; James A. Kolb, author/editor

Protect me!

Name one way these animals protect themselves from harm.





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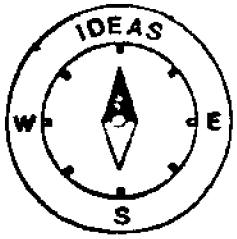


IDEA GUIDE FOR TEACHERS:

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.

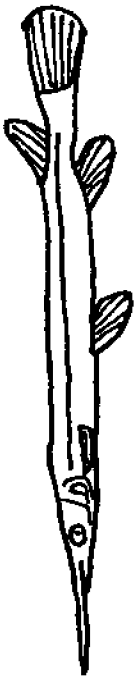
2. CONCENTRATION
   Place face down, fourteen cards (less, if desired) on left and fourteen on right. Player turns card over on left and turns one over on right. If he/she can tell one fish part they have in common and point out on each card, he/she keeps the pair. If incorrect, turn cards back over.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

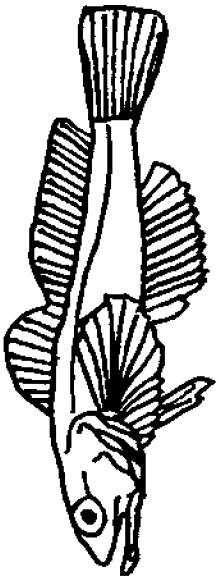
3. FISH
   Two to six players. Deal four cards down to all players. Spread remaining cards face down in the center of the table to make up the pond. Each player arranges his/her cards, placing all matching fish part cards in a pile face up in front of [illegible]. The dealer asks a player for a specific 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-rodeos are held to capture them with wire snares. The gar feed on all kinds of fishes, living and dead. The gars have sharp, strong teeth.

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.

Paddlefish

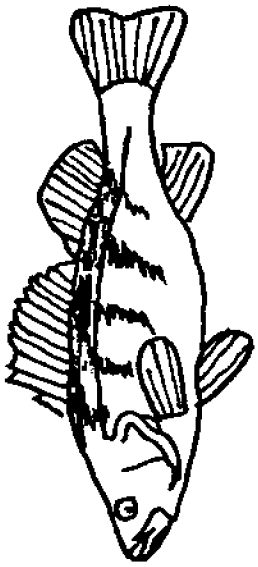
Paddlefish - Polydontidae

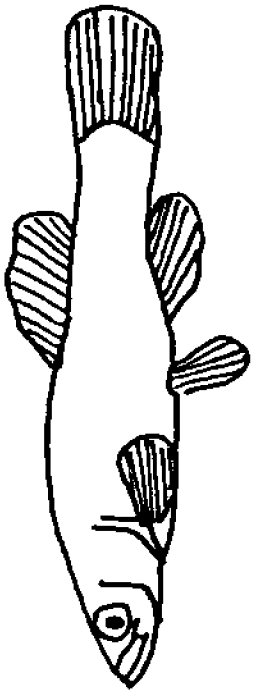
The paddlefish swims with its mouth open. It is a filter feeder. It is found in silty rivers and oxbows and flood plain lakes. It may grow to be 6 feet long and weigh 150 lbs. It has a strongly upturned tail.

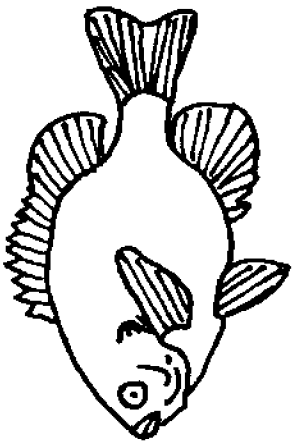
Sculpin

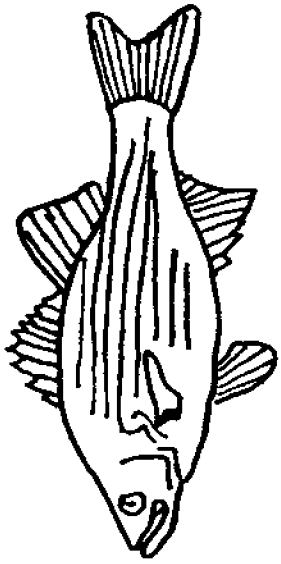
Sculpin Family - Cottidae

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 yellos 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 ardy and makes a good bait.

Sunfish

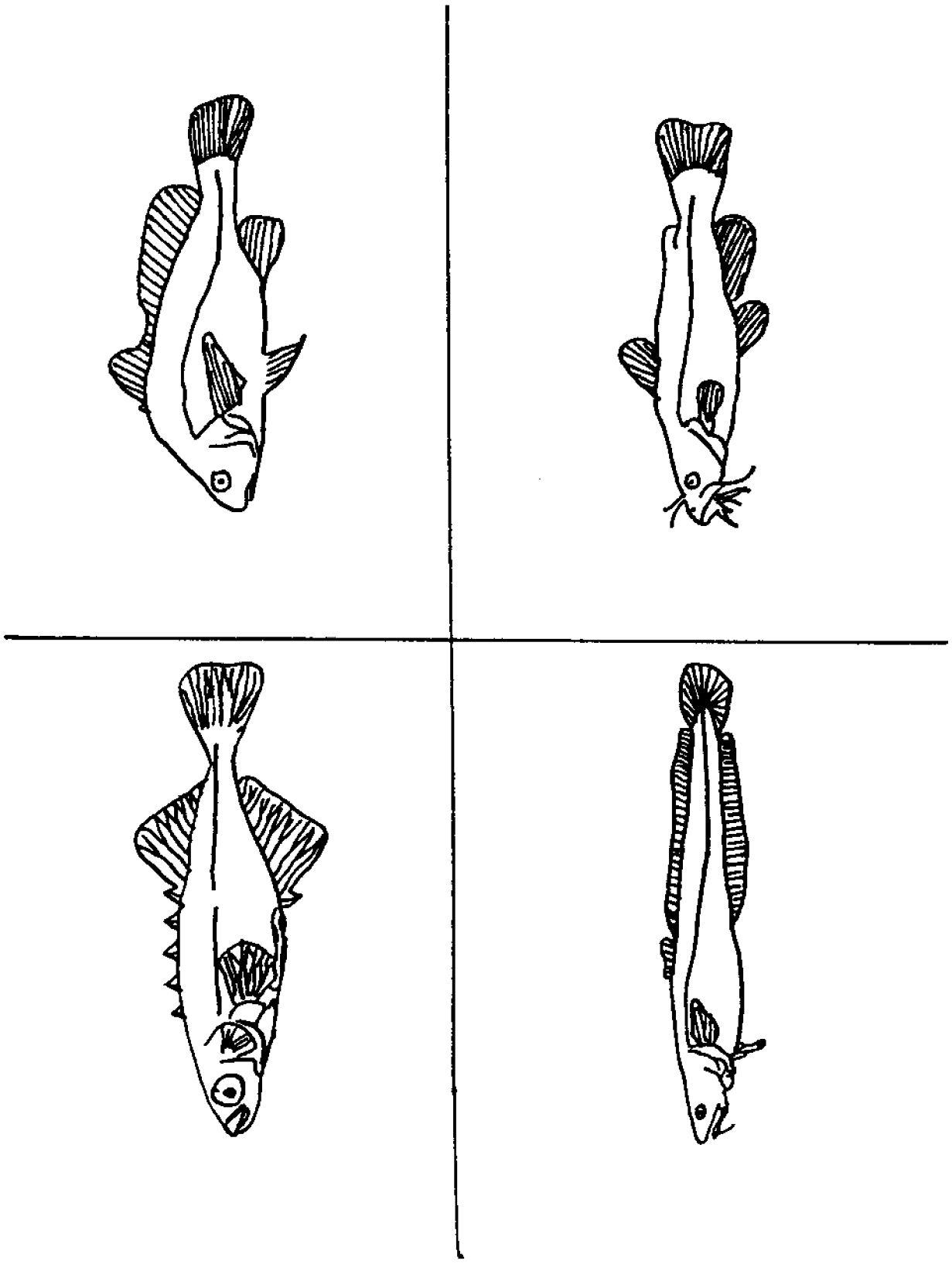
Sunfish Family = Centrarchidae

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 fisherman 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 painful wound.

Stickleback

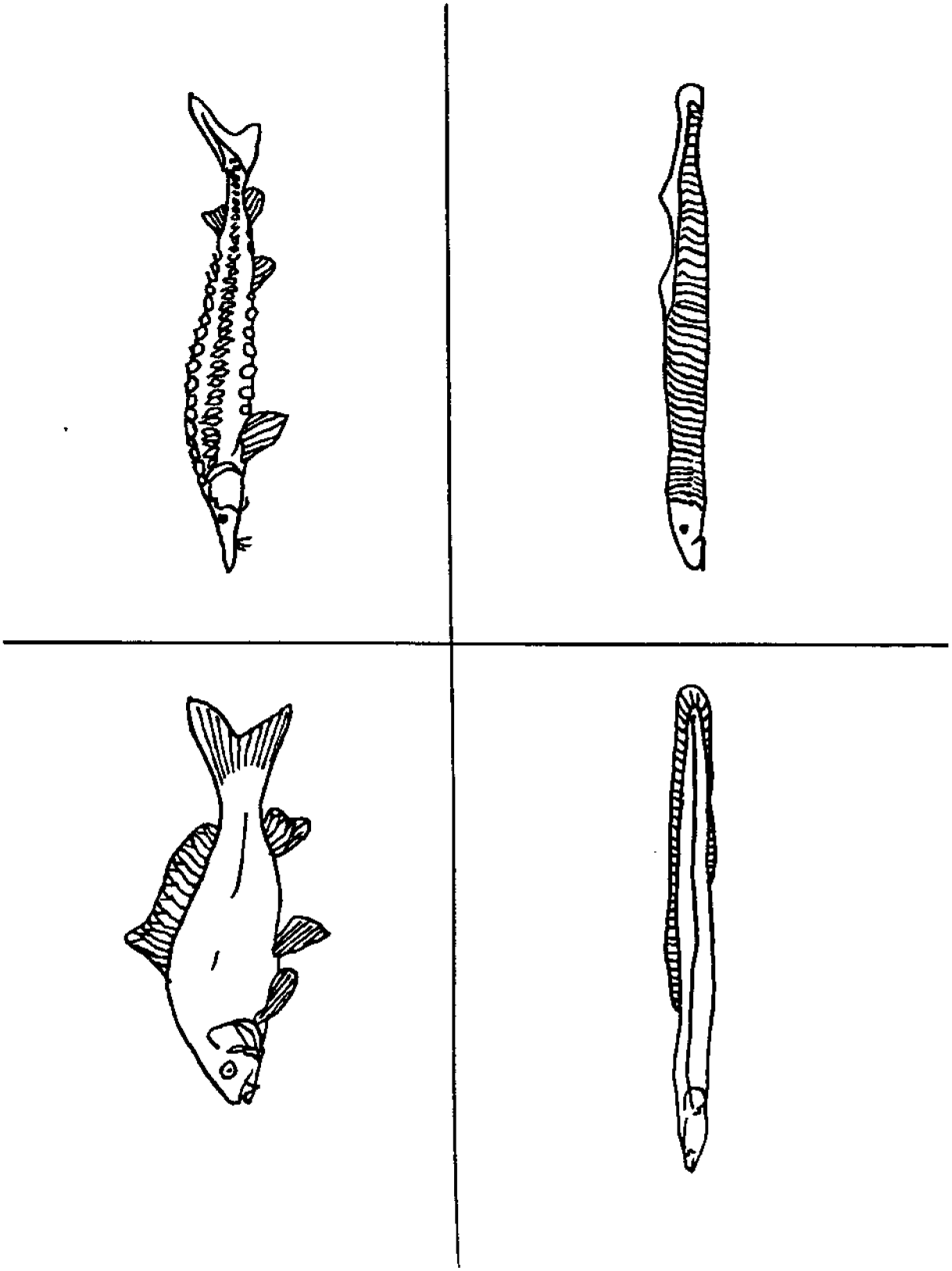
Stickleback Family - Gasterosteidae

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 - Petromysontidae

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

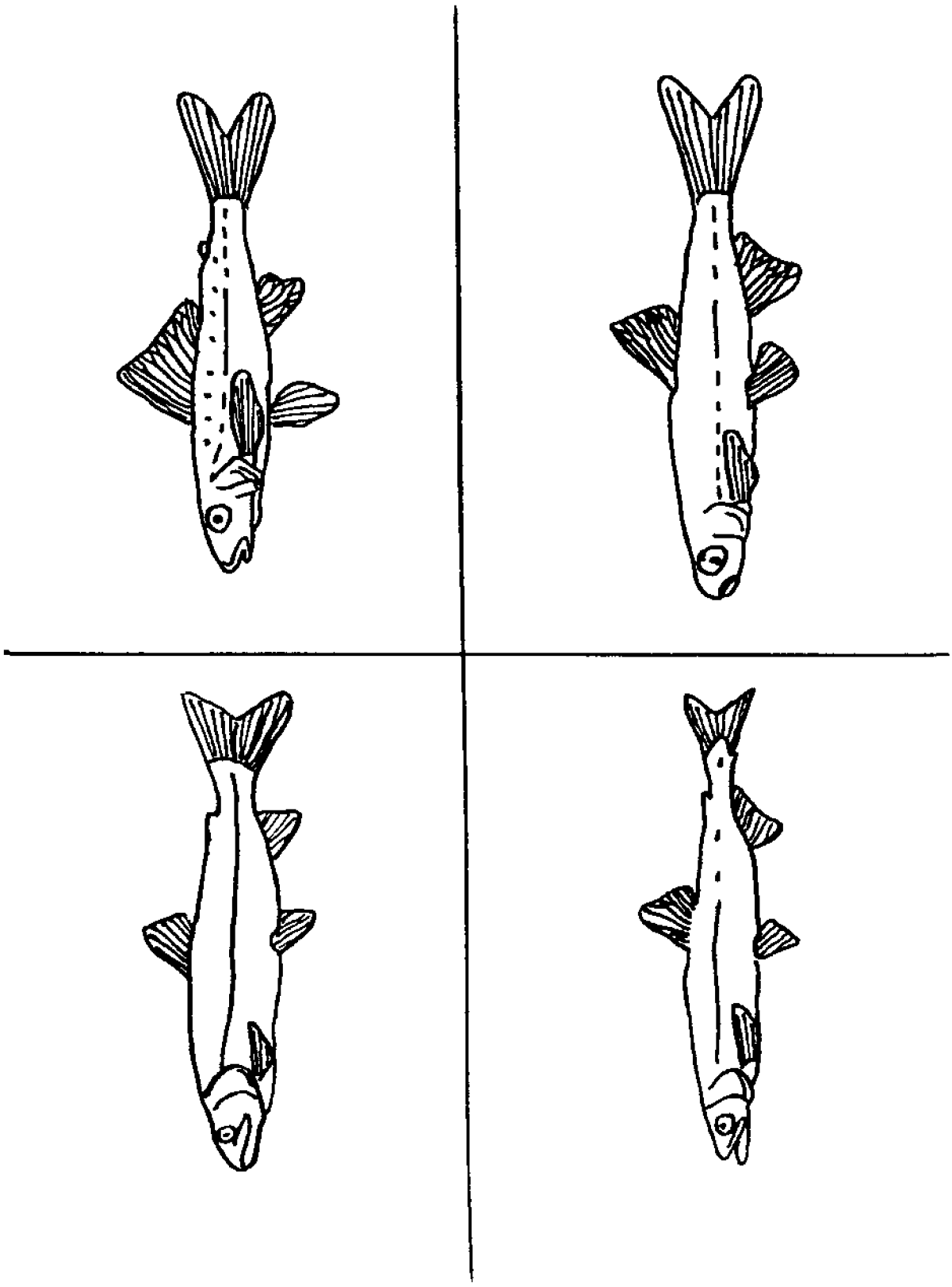
Minnow Family - Cyprinidae

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

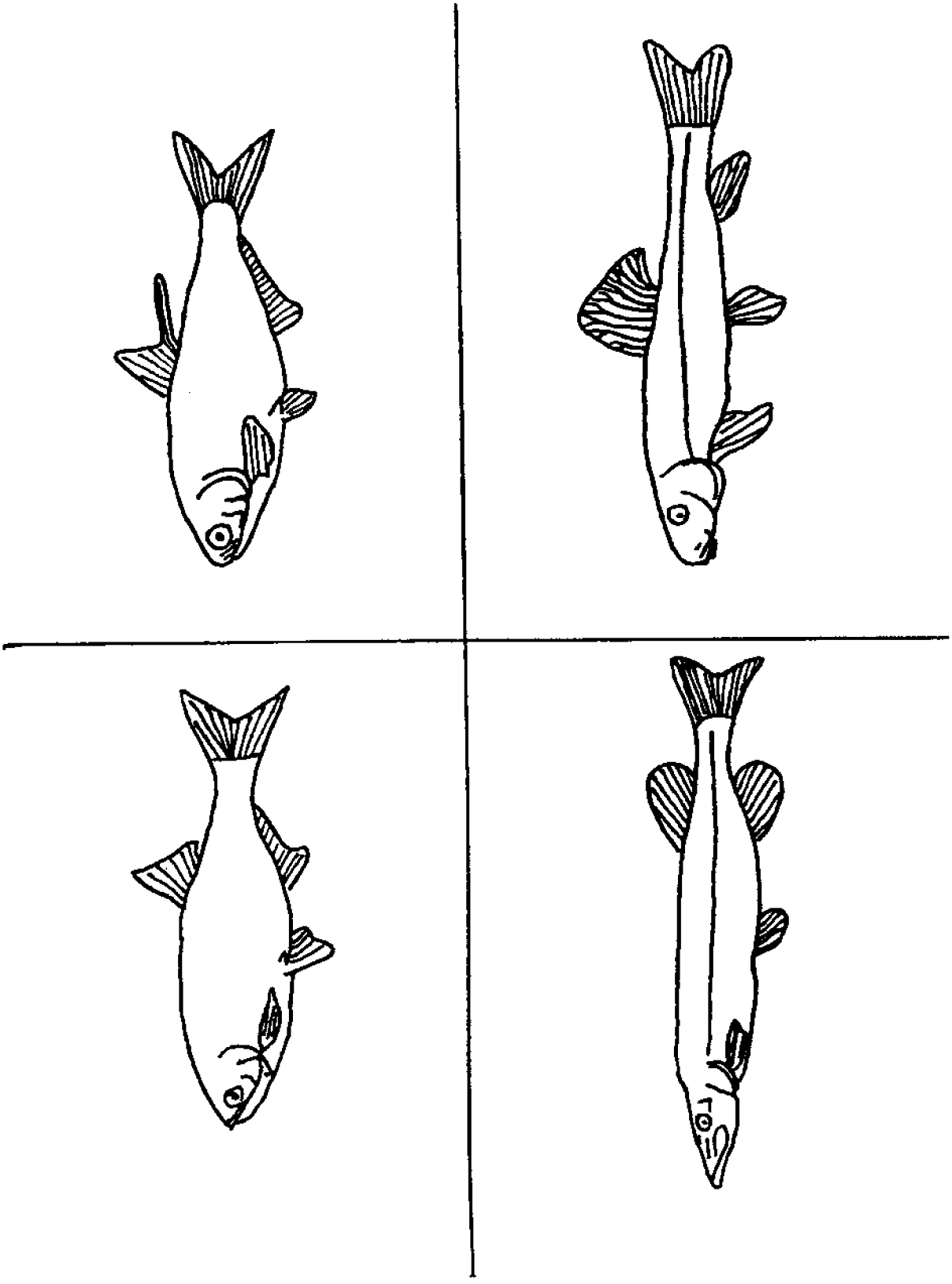
Trout and Salmon Family - Salmonidae

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 - Omeridae

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 - Hiodontidae

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

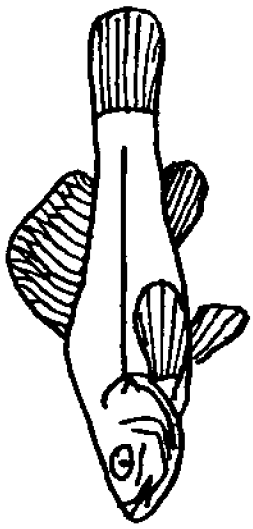
Sucker Family - Catostomidae

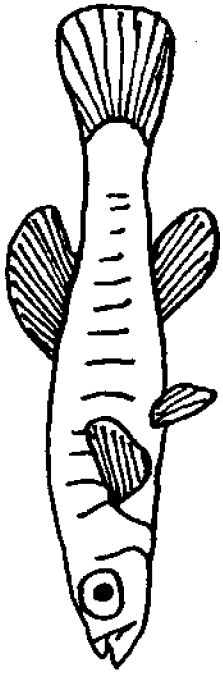
These fish live on the bottom of lakes, ponds and streams. They have an extendible sucking mouth, and feed by suction on bottom organisms. One sucker, the bigmouth buffalo, may grow to be 65 pounds, 4 feet long. Suckers are a significant part of the commercial and sport fishery.

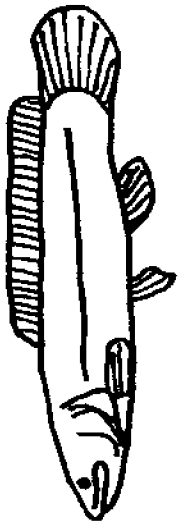
Pike

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).

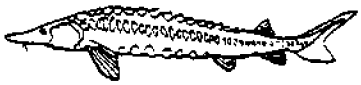
Bowfin

Bowfin family - Amiidae

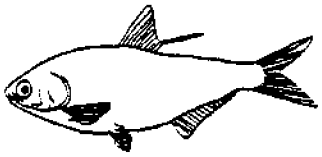
The bowfin lives in quiet water, feeding on fish, amphibians and crayfish. It has a long fin that arches in a bow over most of the length of the back.

Fish Characteristics Bingo

Livebearer

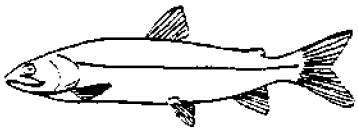


Sturgeon

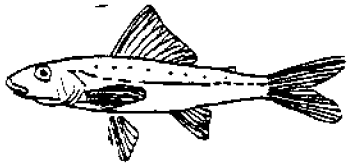


Gizzard shad

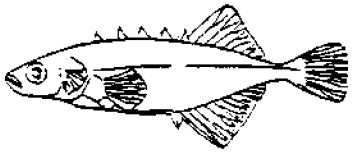
Lamprey



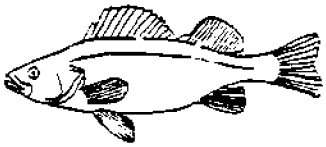
Salmon



Troutperch



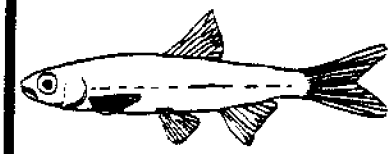
Stickleback



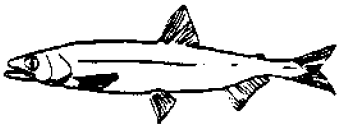
Yellow Perch

Silversides

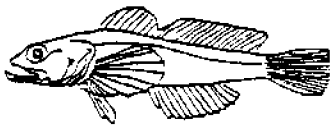
Fish Characteristics Bingo



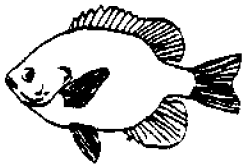
Minnow



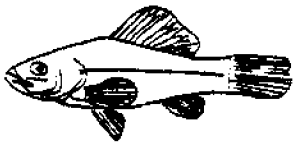
Smelt



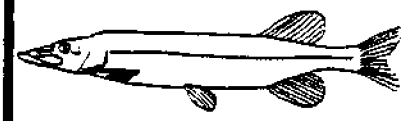
Sculpin



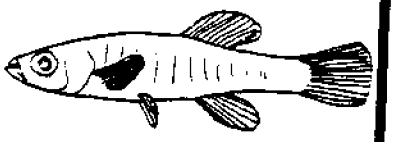
Sunfish



Pirate Perch

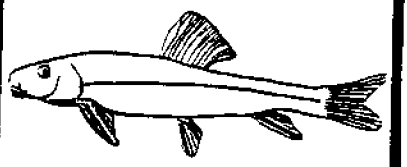


Pike



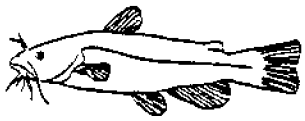
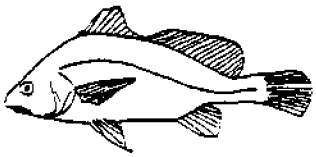
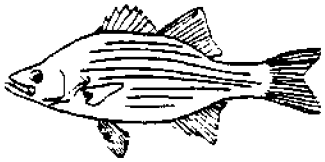
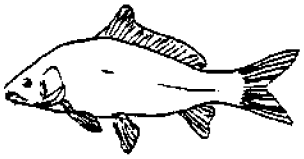
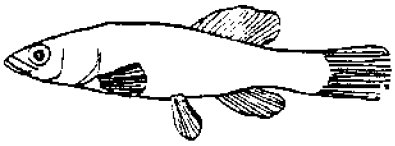
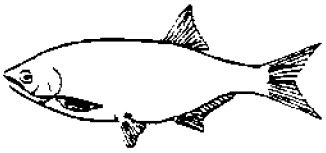
Killifish

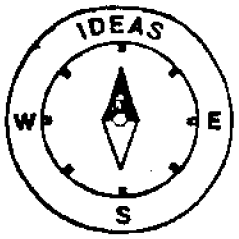
Gar



Sucker

Fish Characteristics Bingo

 Catfish	 Burbot	 Drum
 Bowfin	 White Bass	 Carp
 Paddlefish	 Mudminnow	 Mooneye



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 18.
   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.

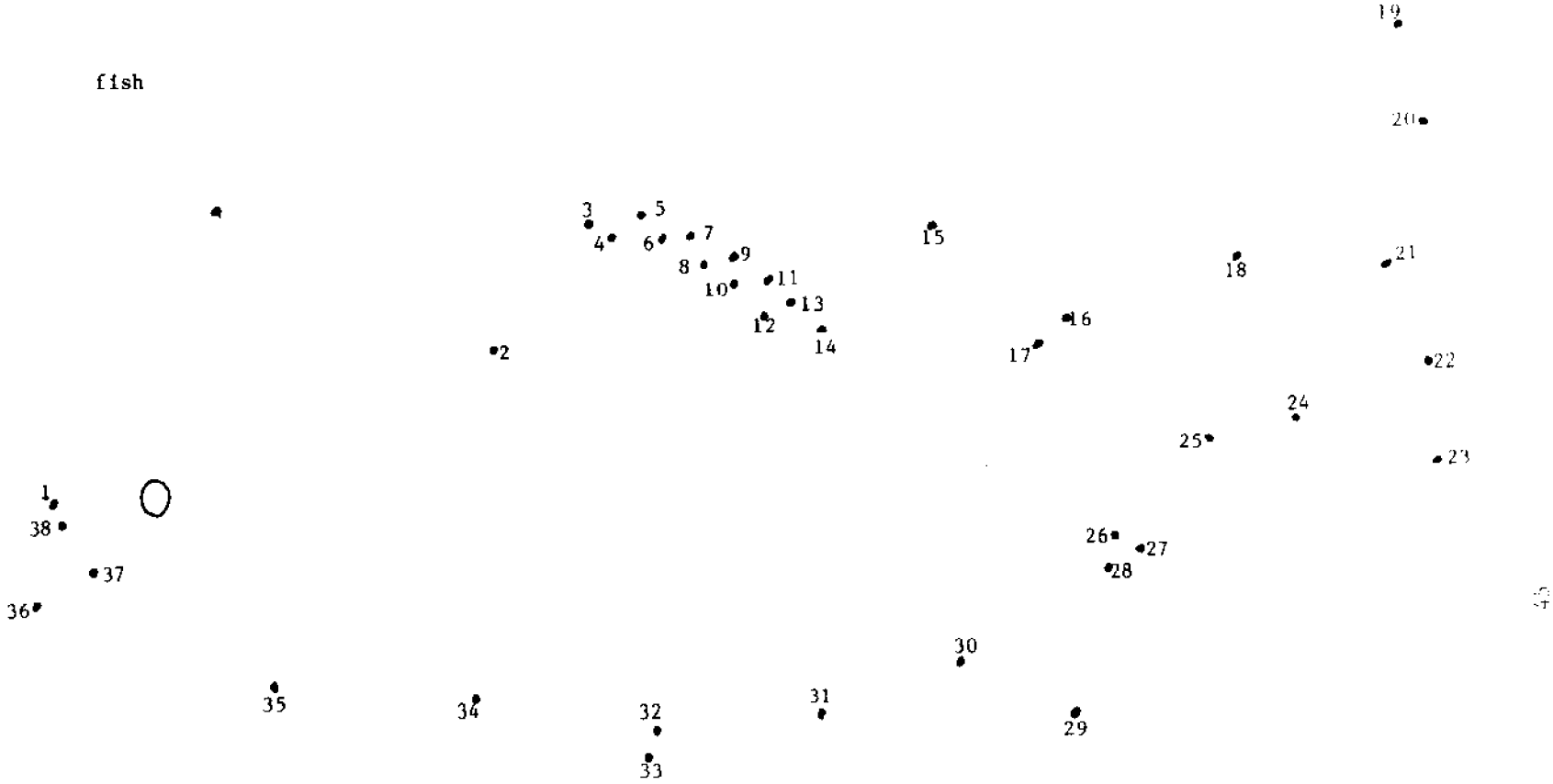
5. LOTS OF FISH IN THE LAKE DITTO

   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 (rhombic) 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.

fish



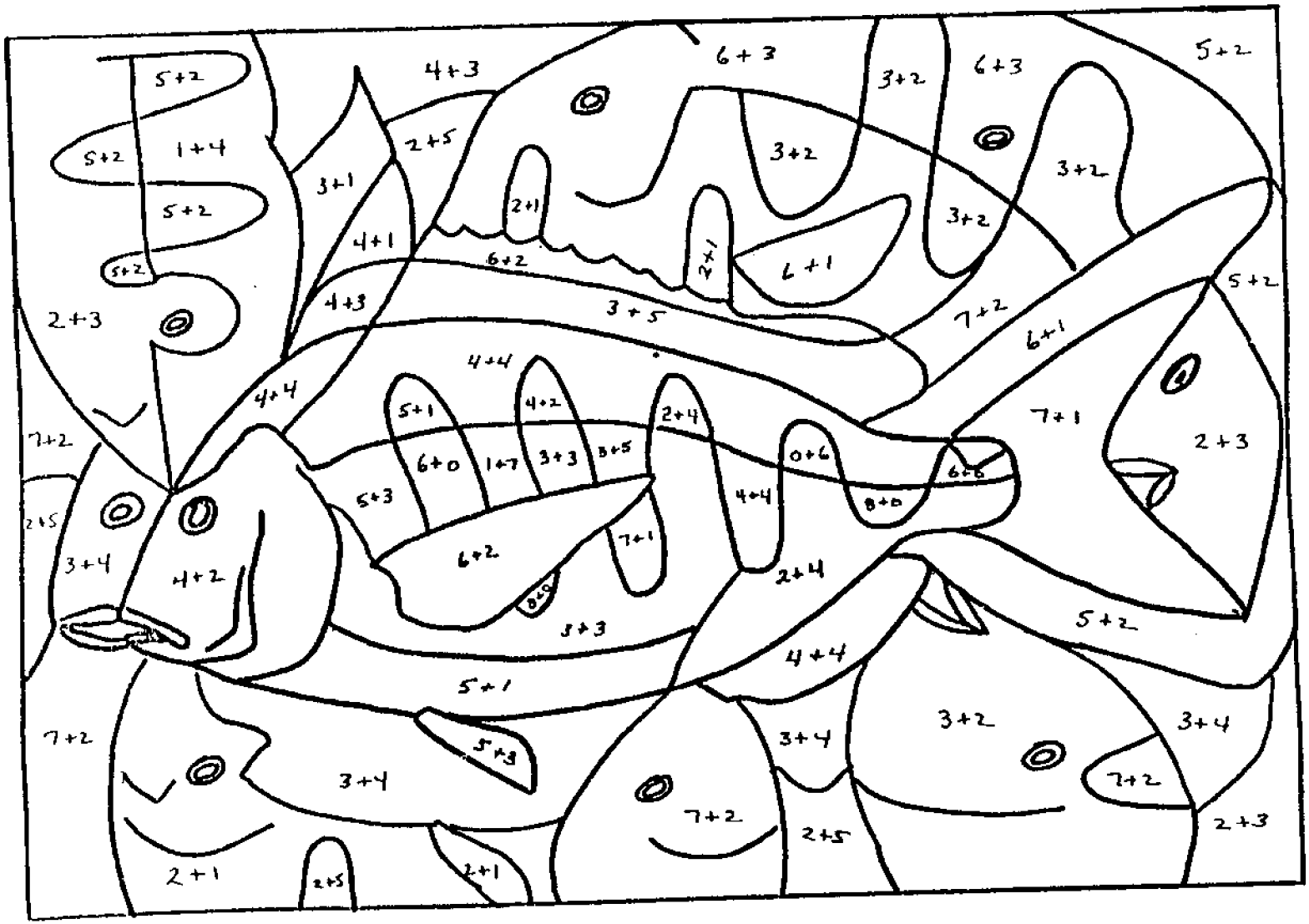
I swim in the ocean. I like to tease baited hooks.

What am I? _____

*From the Wetlands Institute, Cape May Co., New Jersey

Count by 5s and connect the dots.

From Marine Science Center, Poulsbo, Washington. James A. Kolb, author/editor.

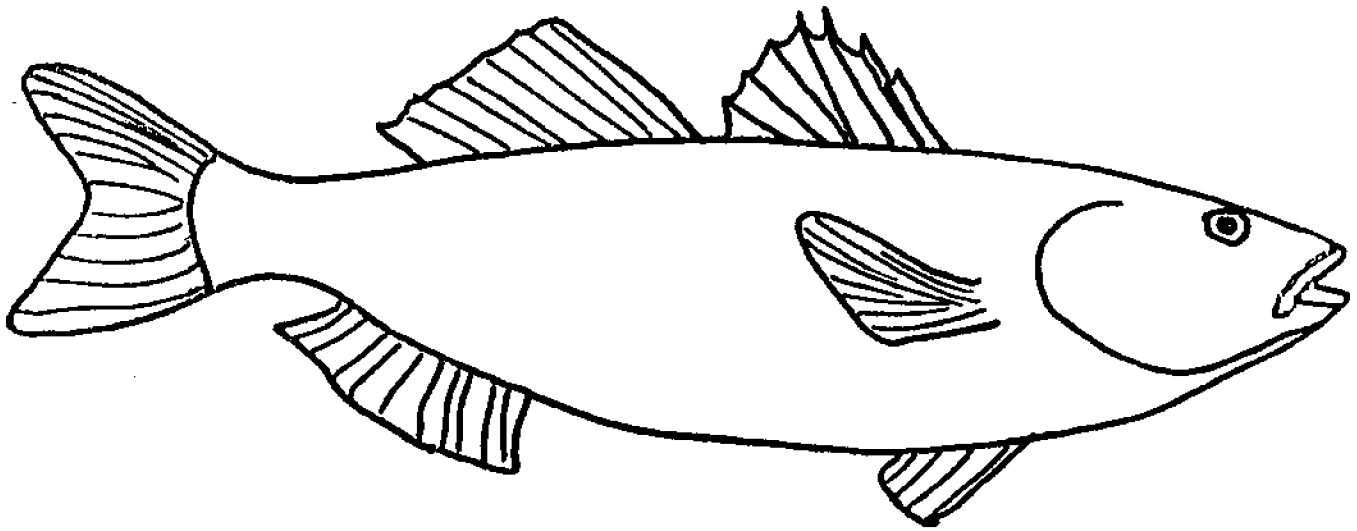


Color green the areas where the sum = 6

Color blue the areas where the sum = 8

From Marine Science Center, Poulsbo, Washington. James A. Kolb, author/editor.

fish

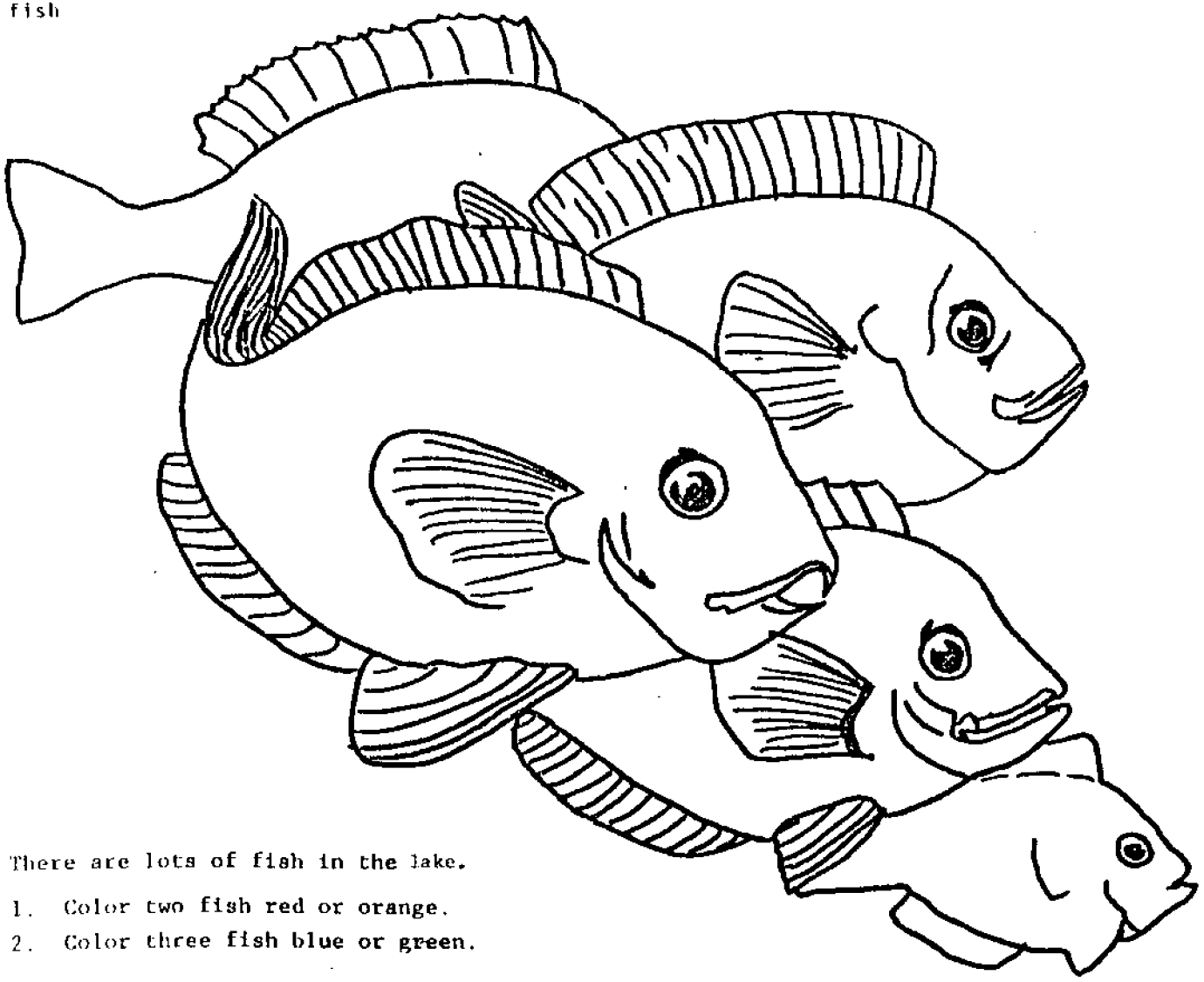


A good swimmer.

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.

fish

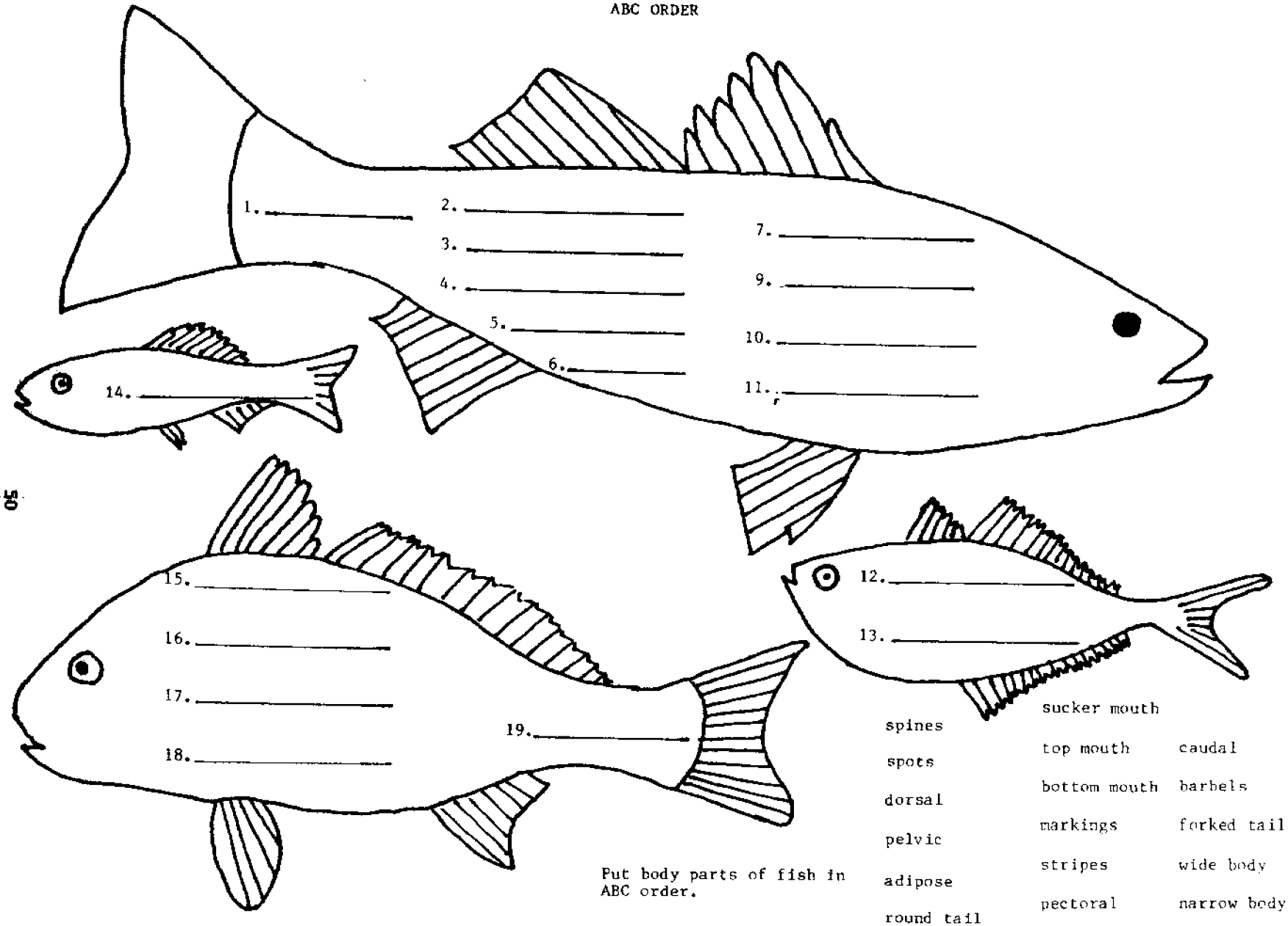


There are lots of fish in the lake.

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

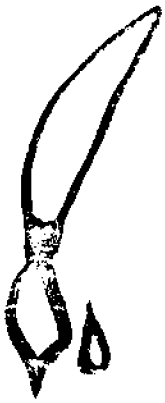
From Marine Science Center, Poulsbo, Washington. James A. Kolb, arthor/editor.

ABC ORDER



Put body parts of fish in ABC order.

spines	sucker mouth	
spots	top mouth	caudal
dorsal	bottom mouth	barbels
pelvic	markings	forked tail
adipose	stripes	wide body
round tail	pectoral	narrow body
	anal	lateral lines



Art Activities!!

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

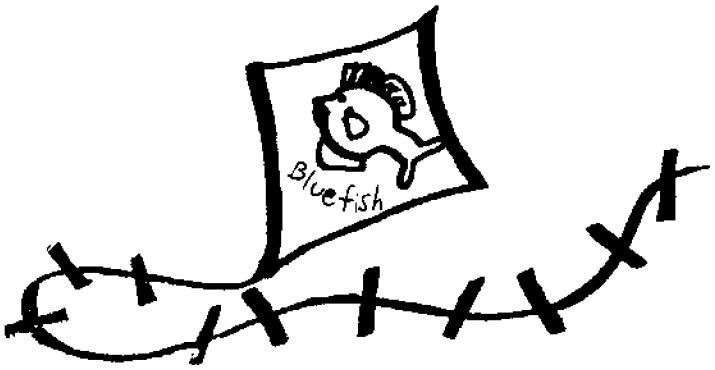
3. Tissue paper and starch over small balloons. Tear tissue in strips, patches, etc. Adhere to balloon with starch mixture (2 parts starch to 1 part water.) Add paper fins, tails, etc.

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

11. Scribble design--etch out fish.

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.

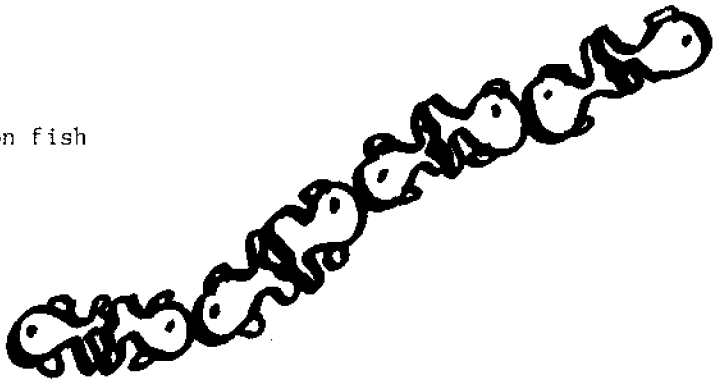
16. Finger paint fish--Use various techniques of finger painting to create fish. Then make a print of this!

17. Stichery fish

18. Paper bag or milk carton fish

19. Fish "sock puppets"

20. Fish "paper doll" style

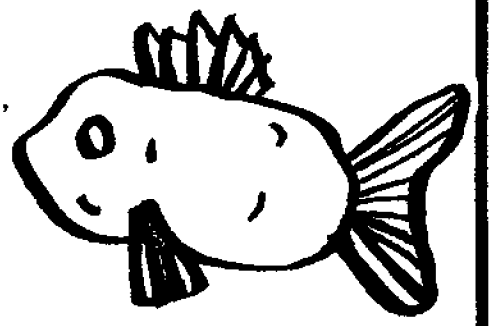


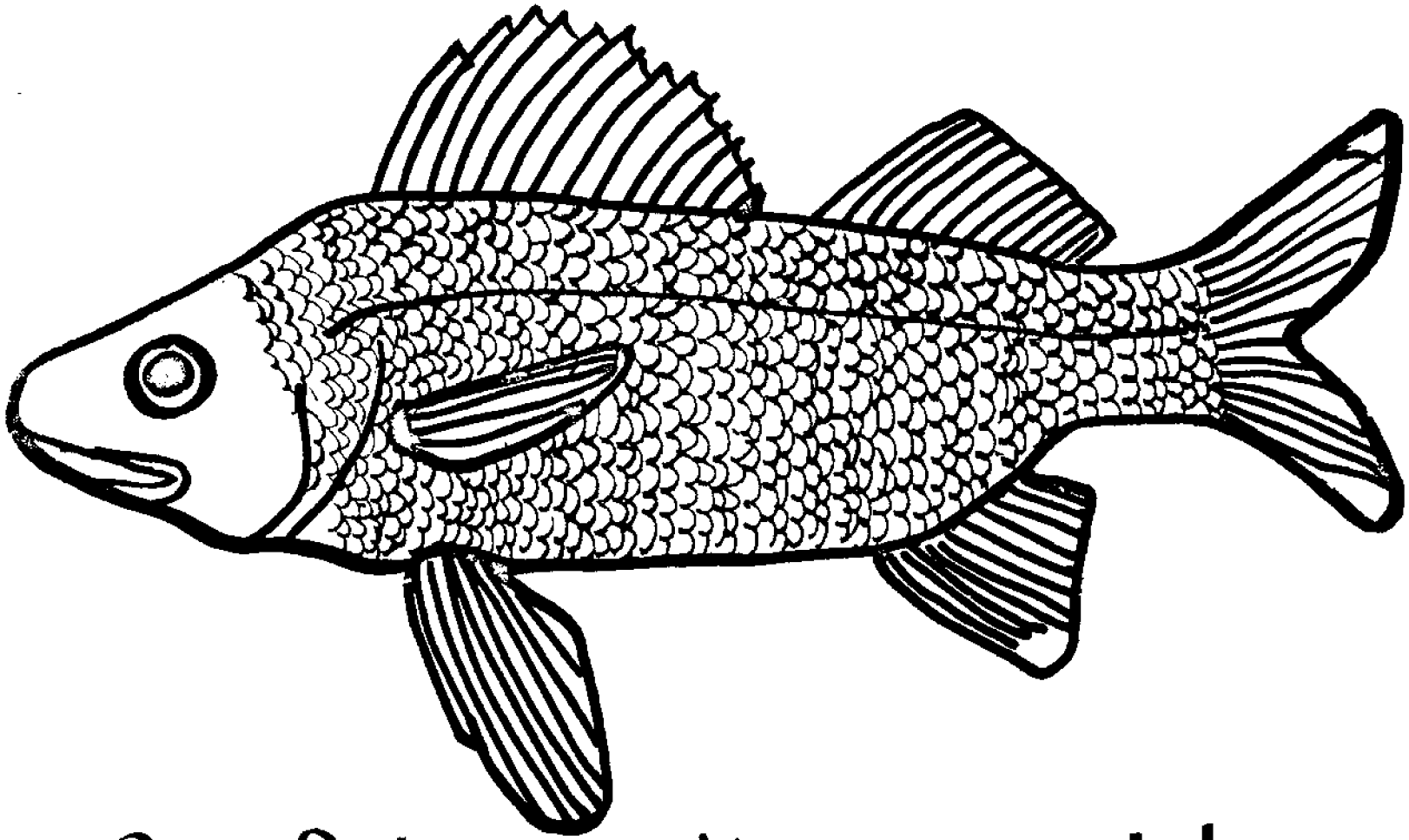
21. Honey comb fish
Purchase honey comb paper. Students draw only on top half.

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 ect. can be substituted for potato.)





Cut fish apart. Make a puzzle!

Name _____

GOING FISHING

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

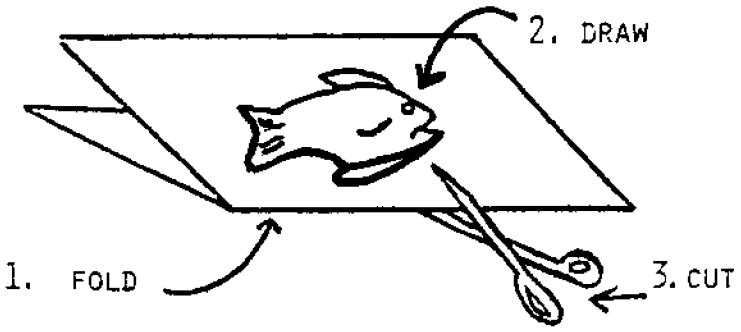
Materials:

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.

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.

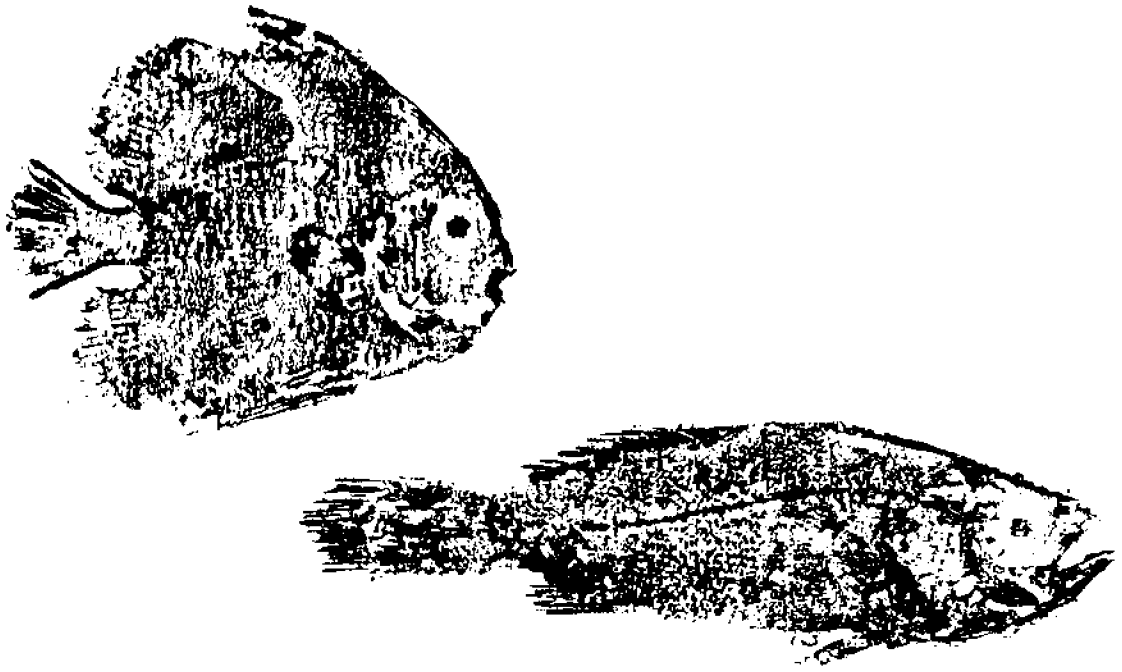
8. Hang by string.

9. Enjoy your creation.

From Marine Science Center. Poulsbo, Washington. James A. Kolb, author/editor.

By Rosanne W. Fortner
Roanoke, Virginia

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.

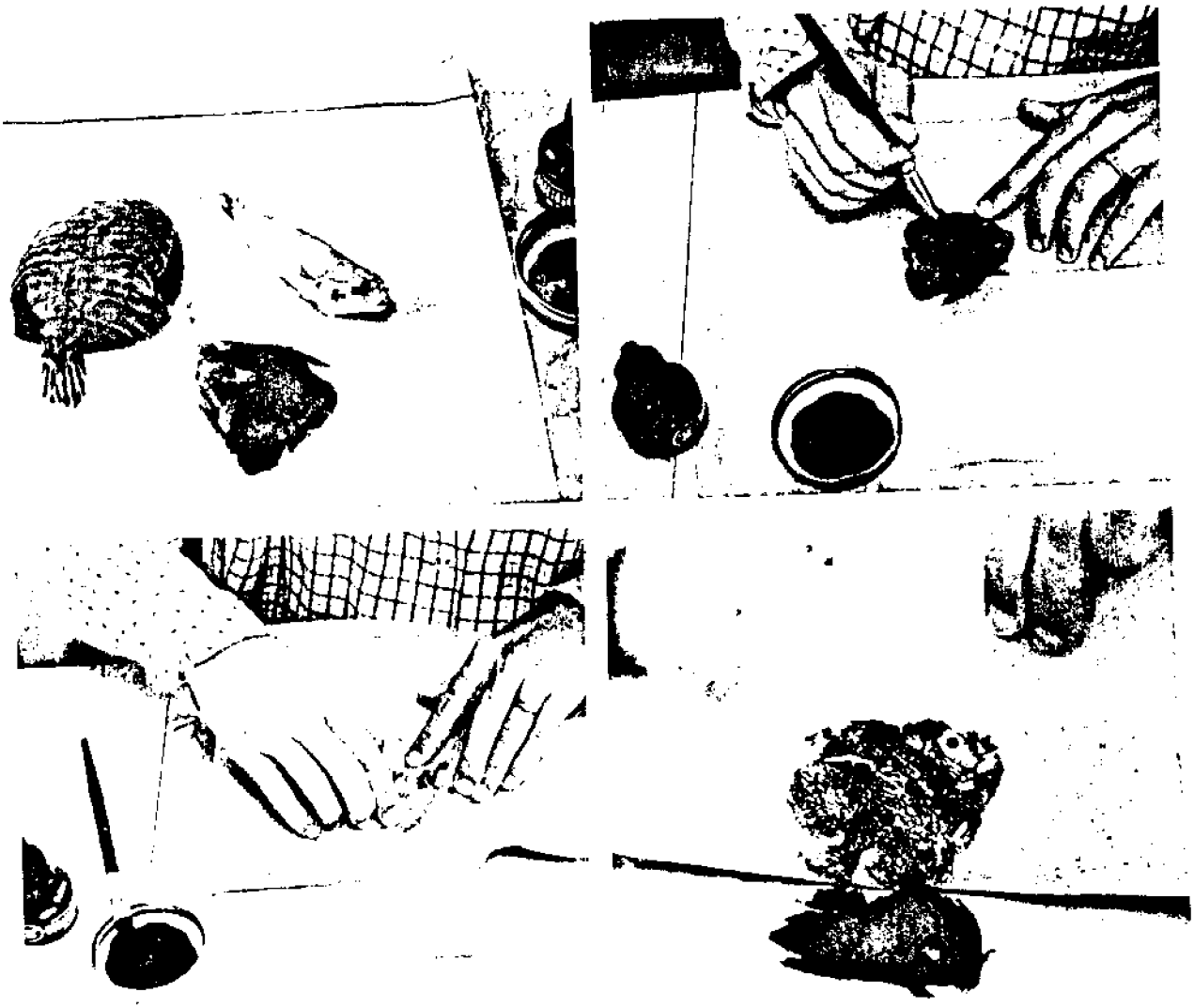
Students thoroughly enjoy gyotaku as an arts-and-science activity. Some become experts and proceed to print other types of animals with great success.

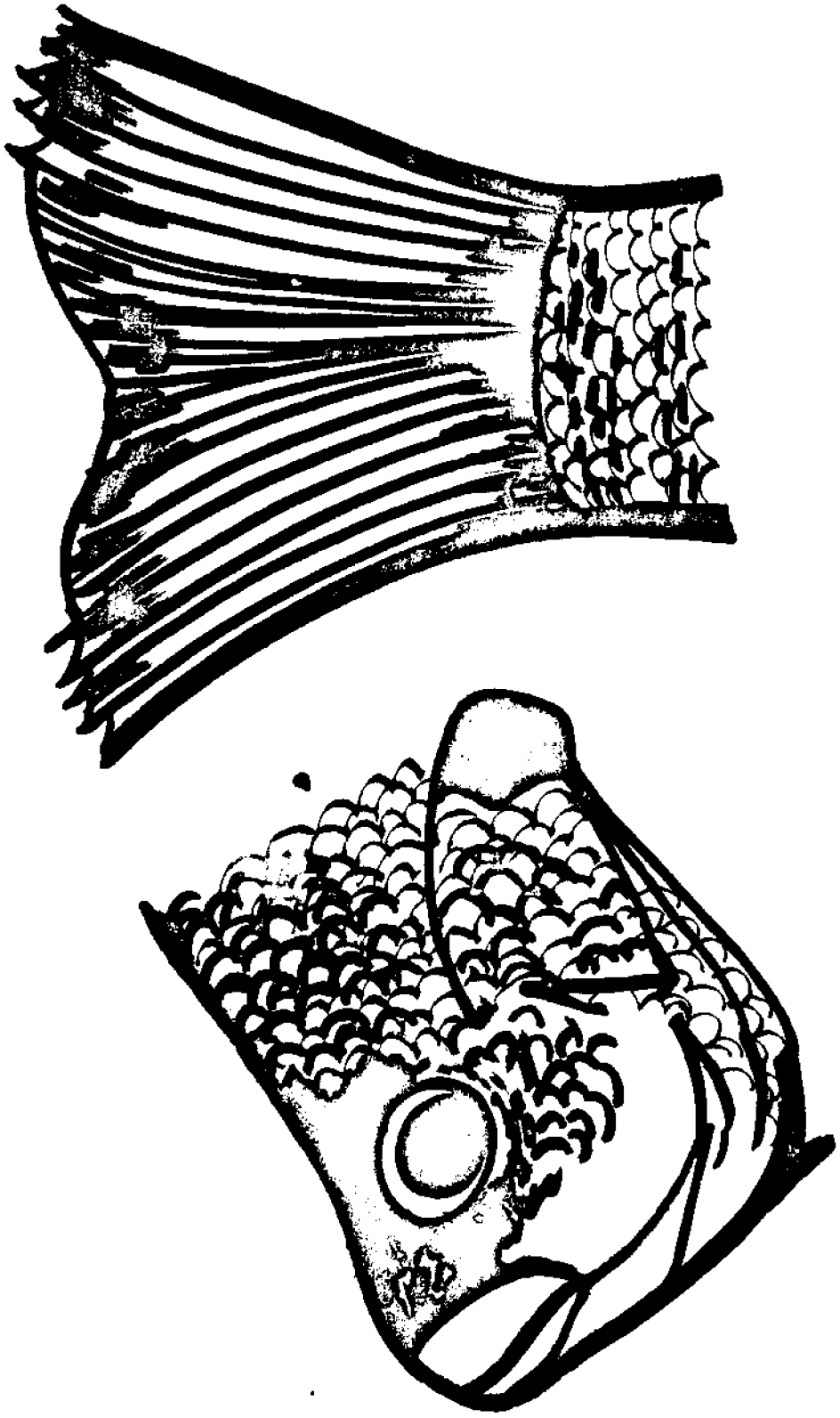
The next step? Write some haiku to go with your gyotaku!

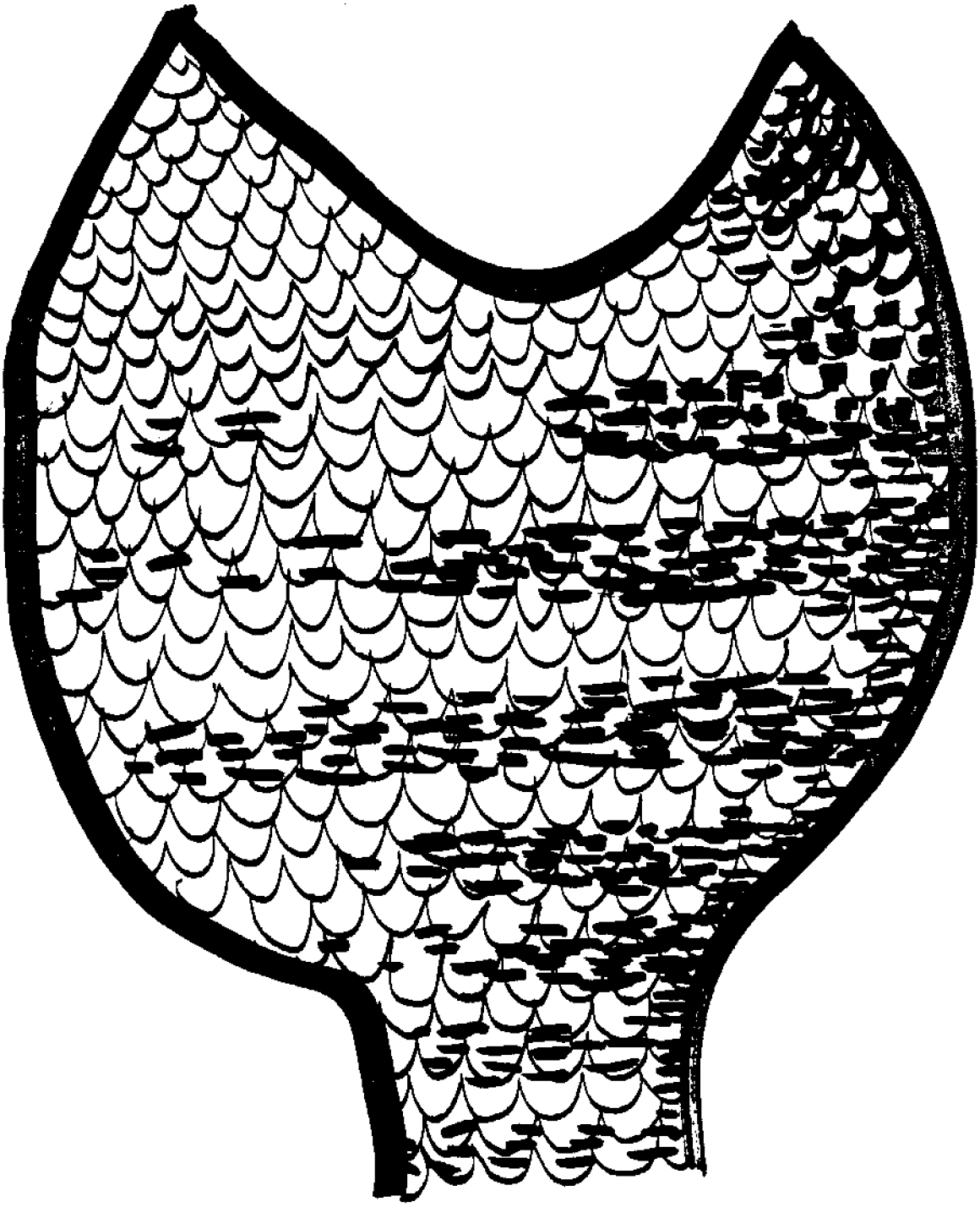
Reference: Dorothy Goodwin, "Picture the Fish," Natural History, p. 440-442, October, 1956.

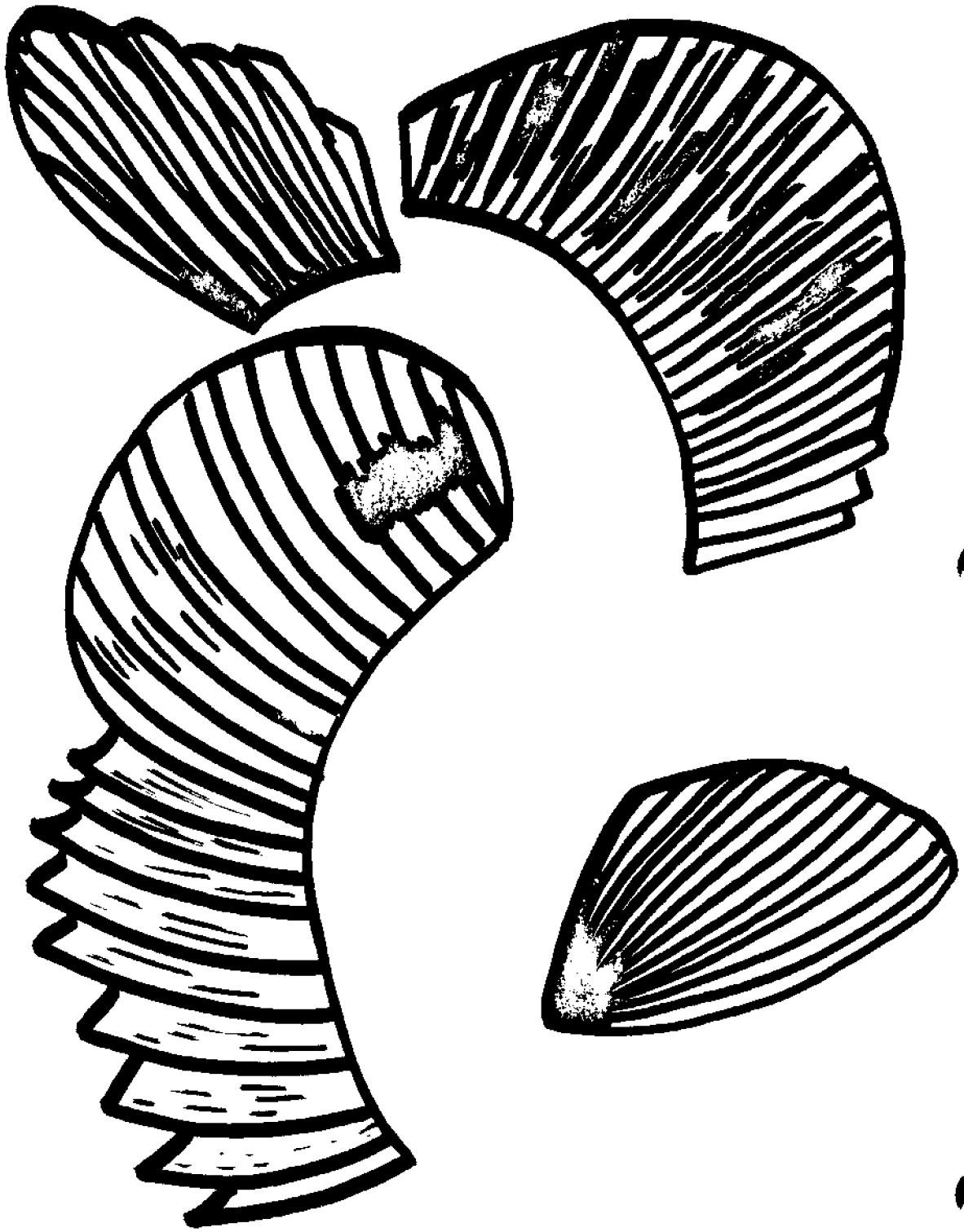
The author is indebted to Will Hon, Education Director University of Georgia's Marine Extension Center, Skiddaway Island, for introducing her to this technique.

□









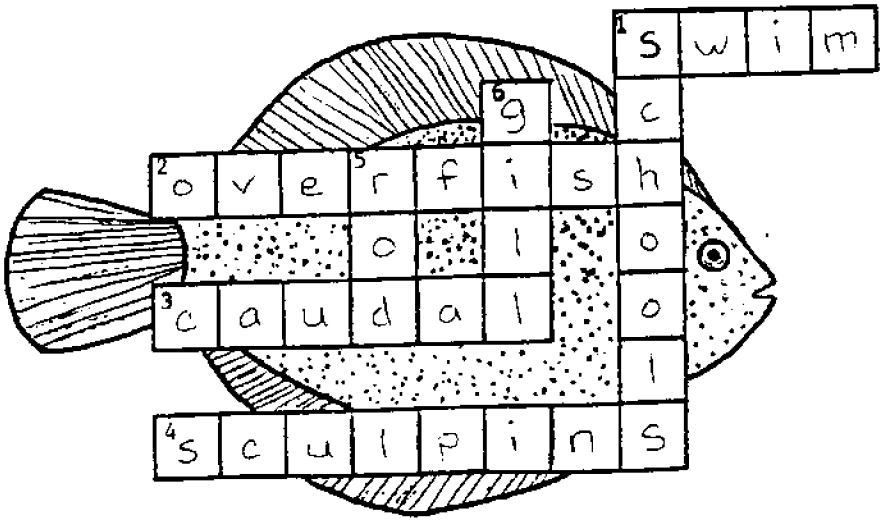
TEACHER BACKGROUND - Fishwich Crossword Puzzle

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

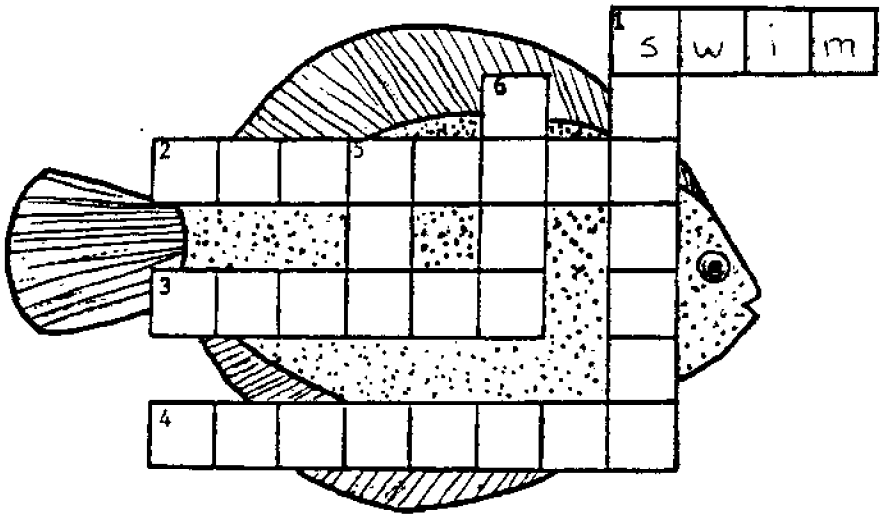


From Marine Science Center. Poulsbo, Washington. James A. Kolb, author/editor.

Name _____

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

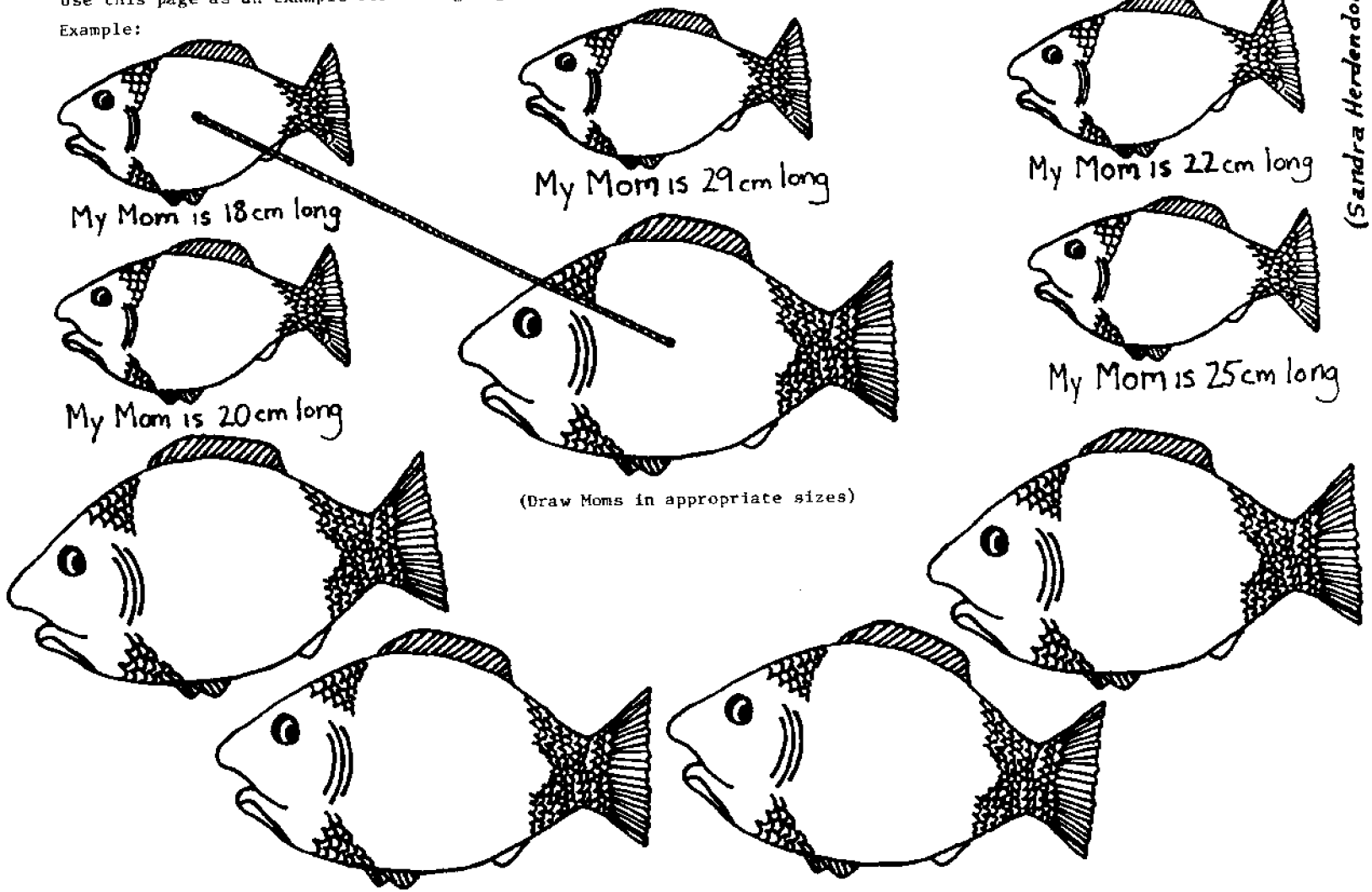
1. Some fish swim in _____.
5. You can catch fish with a fishing _____.
6. This is a fish's lung.

From Marine Science Center, Poulsbo, Washington. James A. Kolb, author/editor.

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:



(Draw Moms in appropriate sizes)

(Sandra Herdendorf, C

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.

LAKE ERIE FISH

1. Freshwater drum
2. Madtom
3. Datfish
4. Mudminnow
5. Walleye
6. Pirate-perch
7. Sunfish
8. Paddlefish (Endangered species)
9. Mooneye (Endangered species)
10. Bigmouth buffalo
11. Silverside
12. Bullhead
13. Mosquitofish

OCEAN ANIMALS

1. Hammerhead shark
2. Hatchetfish
3. Swordfish
4. Dogfish
5. Starfish
6. Pipefish
7. Jellyfish
8. Parrotfish
9. Queen triggerfish
10. Porcupinefish
11. Sea robin
12. Toadfish
13. Clownfish

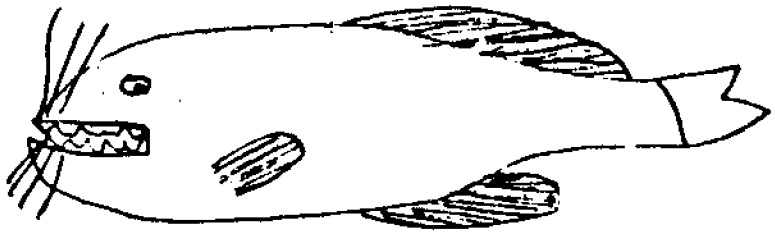
DIRECTIONS:

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

AND/OR

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

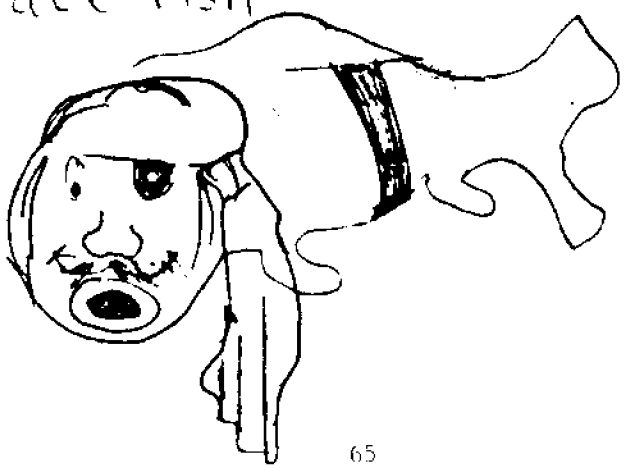
EXAMPLE OF FISH NAMES ARTWORK



catfish

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

pirate fish



fin	caudal
dorsal	barbels
pectoral	spines
pelvic	lateral lines
anal	gills
adipose	gill cover

stripes	spots
mouth	markings

CHILD'S BOOKLET

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.

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.....Life
In a Running Brook.....Lubell, Winifred
The Fishes.....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 Stange 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 Scratchy 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

Song	Composer	Source
All the Fish Are Swimming in The Water	American Folk	MSGO
All the Little Birds (Fish)	French Folk	SBM-K
Allee Allee O, The	American Folk	DMT-EC
At the Harbor	McLaughlin	SaS
Bell Buoy	Wood	MSF
Billowing Sails	Wood	MSF
Buying Fish	Yiddish Folk	SBM-III
Canoe Song	American Indian	EM-III
Cargo Workers	Sea Chantey	SBM-III
Come Boating With Me	Italian Folk	EM-III
Crowded Hole, The	American Folk	SGO
Don't Go Near the Water	American Folk	MYA-III
El barco chiquitito (The Little Boat)	Mexican Folk	MYA-III
Faithful Lighthouse	Wood	MSF
Ferry Boat	Buttolph	MIM
Ferryboat	Schubert	MSF
Ferryboat Is Coming	Wood	MSF
Fishpole Song	Southern Singing Game	SBM-II
Floating Down the River	Singing Game	SBM-K
Flounder, The	Broudy	D
Fog, The	Smith	MYA-III
Fog Horn, The	Haynie	EM-I
Freddy the Frog	Wright	TT
Frog, The	Broudy	D

Song	Composer	Source
Frog and the Mouse, The	American Folk	SGO
Frog in the Well, The	Appalachian	SBM-III
Frog Song, The	Traditional	SBM-II
Frog Went a-Courtin'	Virginia	AFSC
Haul on the Bowline	Sea Chantey	SBM-III
I Saw Three Ships	English Carol	EM-III
I Want To Go To the Beach This Summer	Wright	TT
I'd Like To Be a Lighthouse	Frankenpohl	EM-I
Imagination of Grand Sea	Japanese Folk	SBM-III
Jackfish, The	Appalachian	SBM-I
Land of the Silver Birch	Canadian Folk	EM-III
Let's Build a Boat	O'Leary	ADLS
Let's Go to the Sea	Guatemala Folk	SBM-1
Little Mister Polliwog	Wilkins	NDM-K
Little White Duck	Zaritsy	EM-I
Lonely Little Sailboat	Wood	MSF
Michael, Row Your Boat	American Folk	EM-III
My Boat	Hawaiian Folk	TIM-3
On, Roll On (En Roulant Ma Boule)	French Folk	MSGO
Over the Deep Blue Sea	Traditional	MSF
Picture a World	Riposo	SSS
Roll, Wave, Roll	O'Leary	ADLS
Row, Row, Row Your Boat	Traditional Round	EM-III
Sailboats	Buttolph	MIM
Sailing	Marks	MYA-III
Sailing Song	Sea Chantey	SaS

Song	Composer	Source
Seashell, The	Wood	SaS
Seashore	Traditional	MSF
Ship A-Sailing	English Folk	EM-III
Ships	Buttolph	MIM
Shore	Miller	NDM-K
Six Little Ducks	American Folk	EM-I
Stop the Poison	Donough	SCS
Ten Little Frogs	Pavelko	SF
There Was An Old Fish	American Folk	MSGO
Tug Boat	Buttolph	MIM
Voyageur, Le (The Voyager)	Canadian Folk	LM
Water Wheel, The	Japanese Game Song	SBM-II

Key To Books

ADLS	All Day Long Songs. Shawnee Press, Inc.
AFSC	American Folk Songs for Children. Ruth Crawford Seeger. Doubleday & Co.
BMS-2	Birchard Music Series - Book Two. Summy-Birchard Co.
BMS-3	Birchard Music Series - Book Three. Summy-Birchard Co.
D	Discovery! M. Whitmark & Sons.
DMT-EC	Discovering Music Together - Early Childhood. Follett Publishing Co.
EM-I	Exploring Music I. Holt, Rinehart & Winston.
EM-III	Exploring Music III. Holt, Rinehart & Winston.
LM	Literature and Music. Tooze and Krone. Prentice-Hall, Inc.
MIM	Music Is Motion. Edna Buttolph. Willis Music Co.
MSF	More Singing Fun. McGraw-Hill Book Co.
MSGO	More Songs to Grow On. Edw. B. Marks Music Corp. Beatrice Landeck.
MYA-III	More for Young Americans - III. American Book Company.
NDM-K	New Dimensions in Music - Kindergarten. American Book Company.
SSS	Sesame Street Songbook. Warner Bros. Publishing Co.
SCS	Sierra Club Songbook. World Around Songs.
SaS	Sing a Song. Roberta McLaughlin & Lucille Wood. Prentice-Hall, Inc.
SBM-K	Silver Burdett Music - Kindergarten Book. Silver Burdett Co.
SBM-I	Silver Burdett Music - Book I. Silver Burdett Co.
SBM-II	Silver Burdett Music - Book II. Silver Burdett Co.
SBM-III	Silver Burdett Music - Book III. Silver Burdett Co.
SF	Singing Fun. McGraw-Hill Book Co.
SGO	Songs to Grow On. Beatrice Landeck. Edw. B. Marks Music Corp.
TIM-3	This Is Music - 3rd Grade Book. Allyn & Bacon.
TT	Tickle Tunes-Songs for Little People. Choristers Guild.

RECORDS FOR RHYTHMIC ACTIVITIES

RECORD	COMPOSER
Barcarolle	Rubenstein
Boating on the Lake	Kullack
Boat Rhythms (Creative Rhythms) - Rowboat - Sailboat - Tugs and Liners	Phoebe James
Dance-a-Story - At the Beach - Little Duck	Barlin
En Bateau (In a Boat)	Debussy
To a Water Lily	MacDowell

Activities: Sway, rock, swing, push and pull, row, skate, haul anchor.

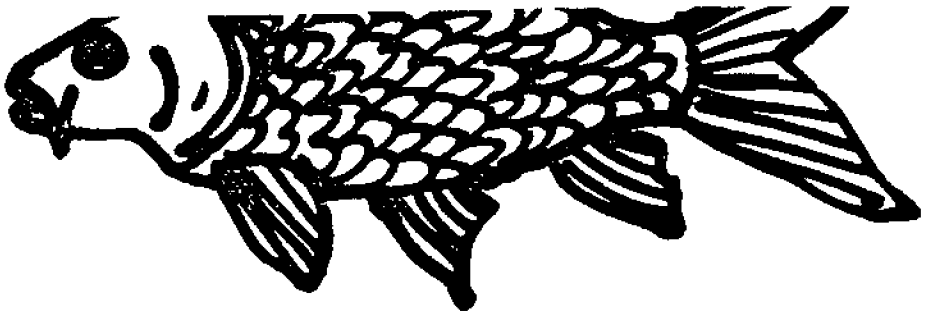
RECORDS FOR LISTENING

RECORD	COMPOSER
Children's Games - Leap Frog	Bizet
La Mer - Play of the Waves	Debussy
"Trout" Quintet - Fourth Movement	Schubert
Water Music - Air - Hornpipe	Handel

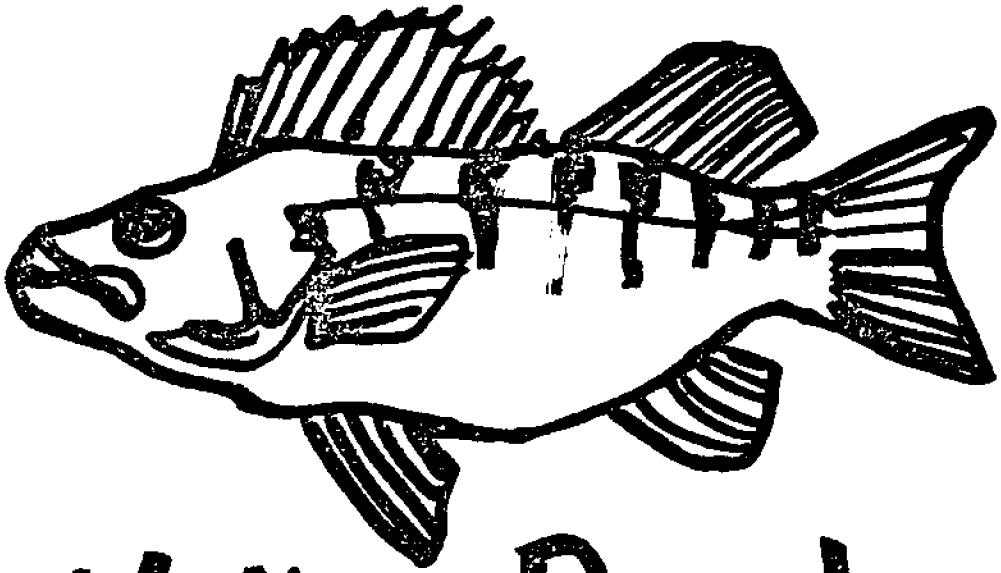
Records available in LRC in most schools

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.

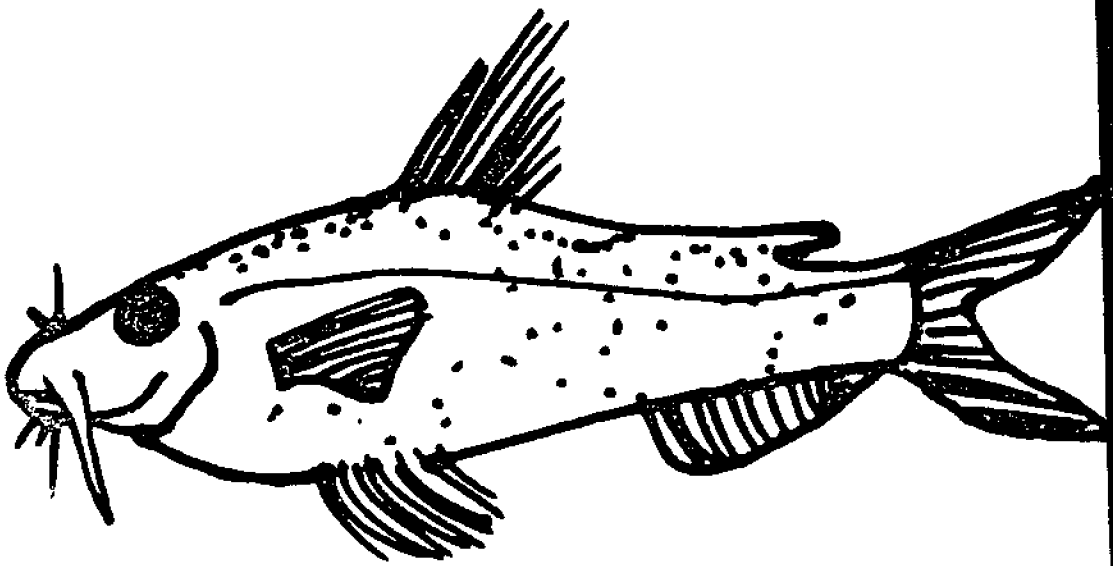


Carp

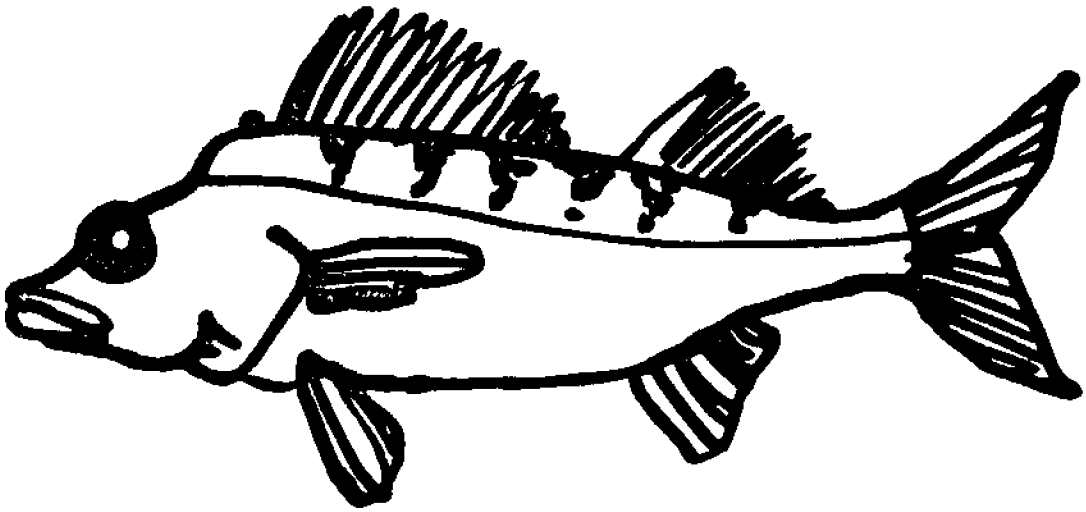


Yellow Perch

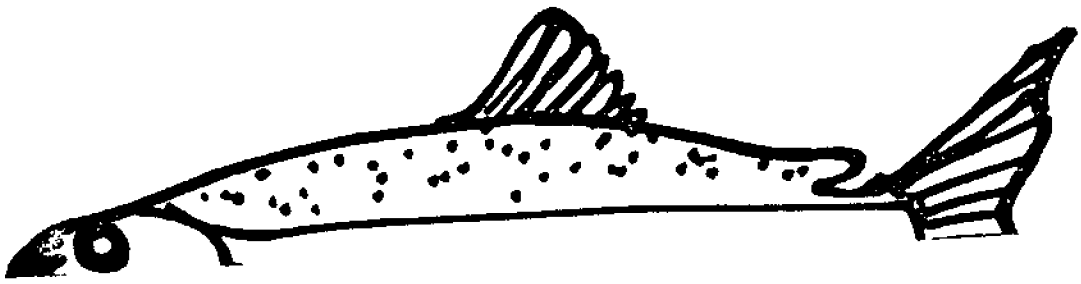
Coho Salmon

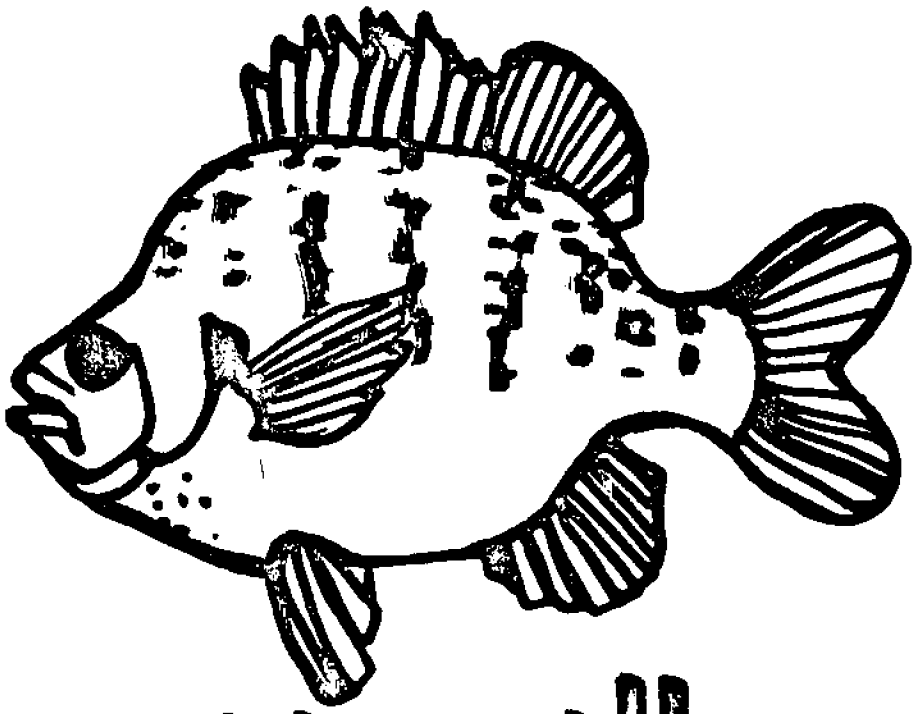


Channel Catfish

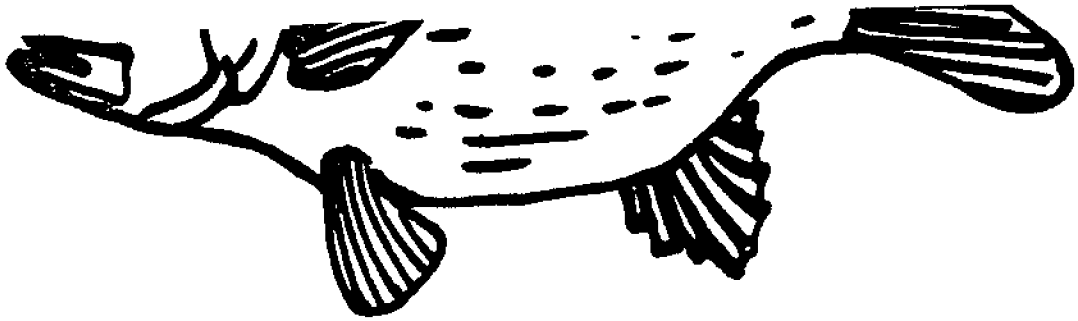


Walleye

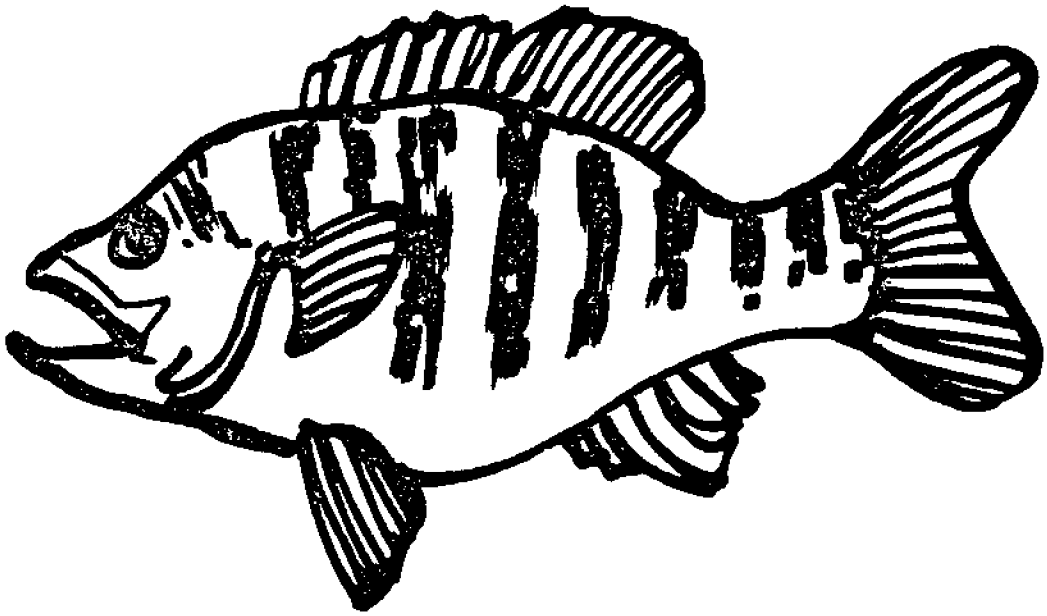


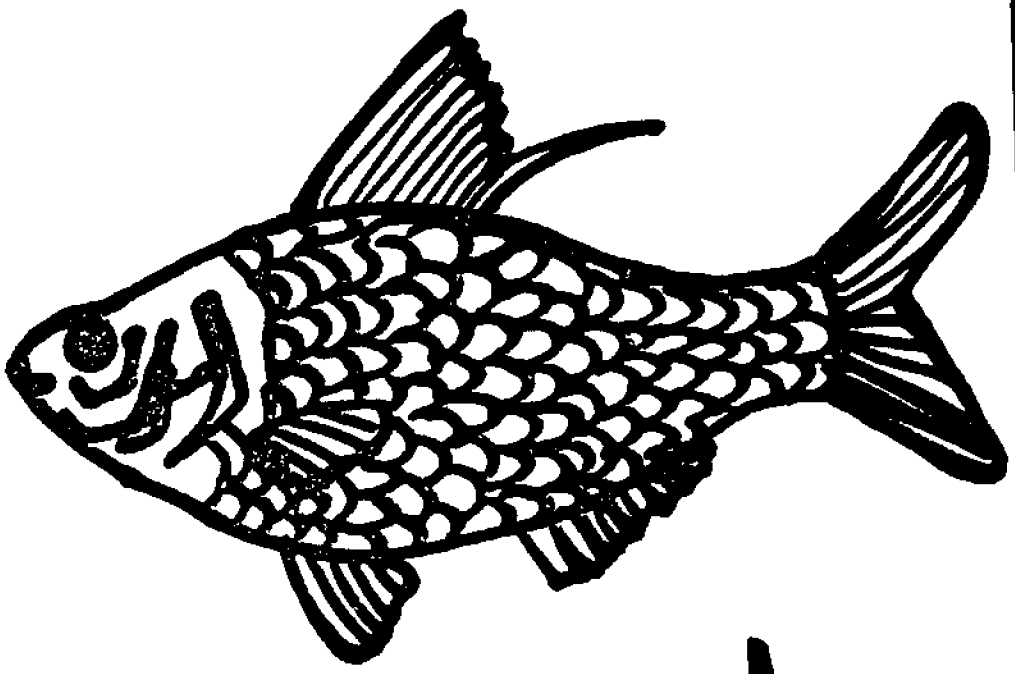


Bluegill



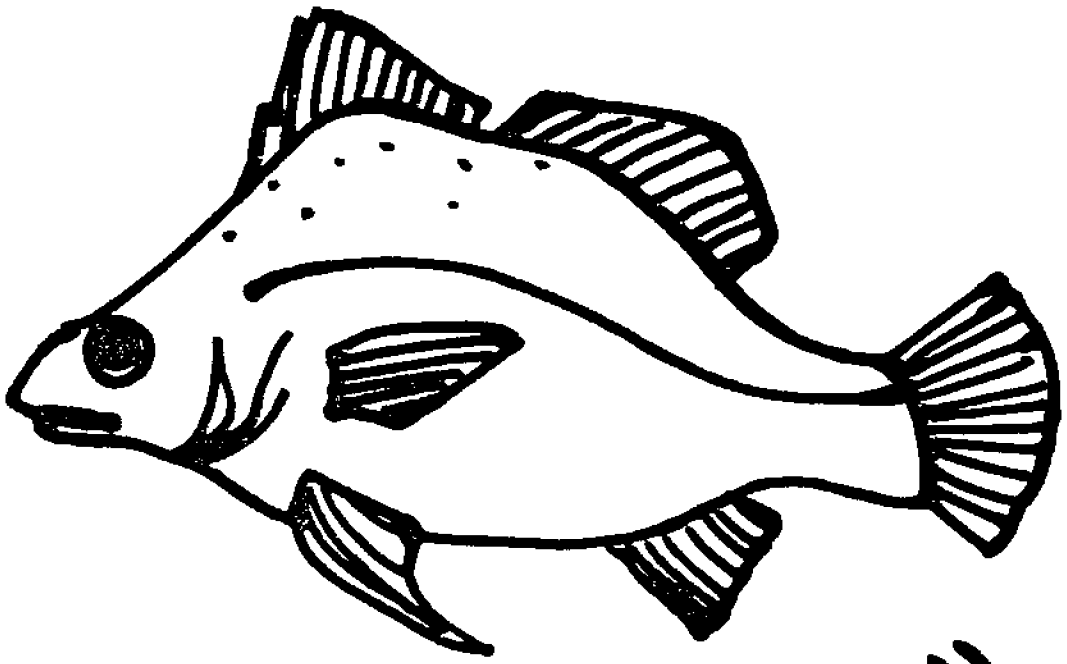
Smallmouth Bass





Gizzard Shad

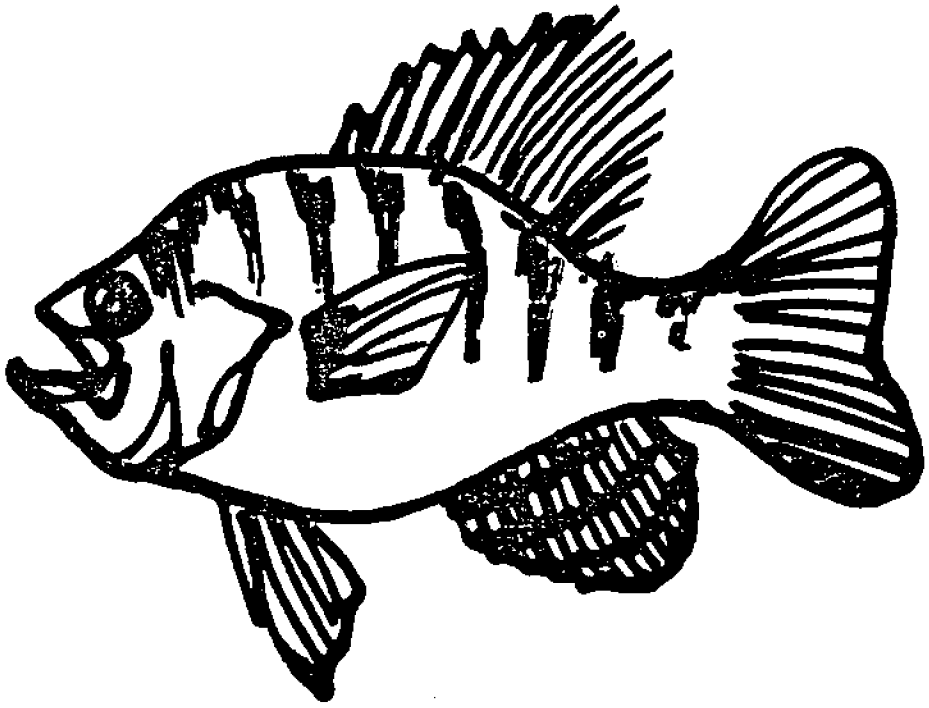
Freshwater Drum

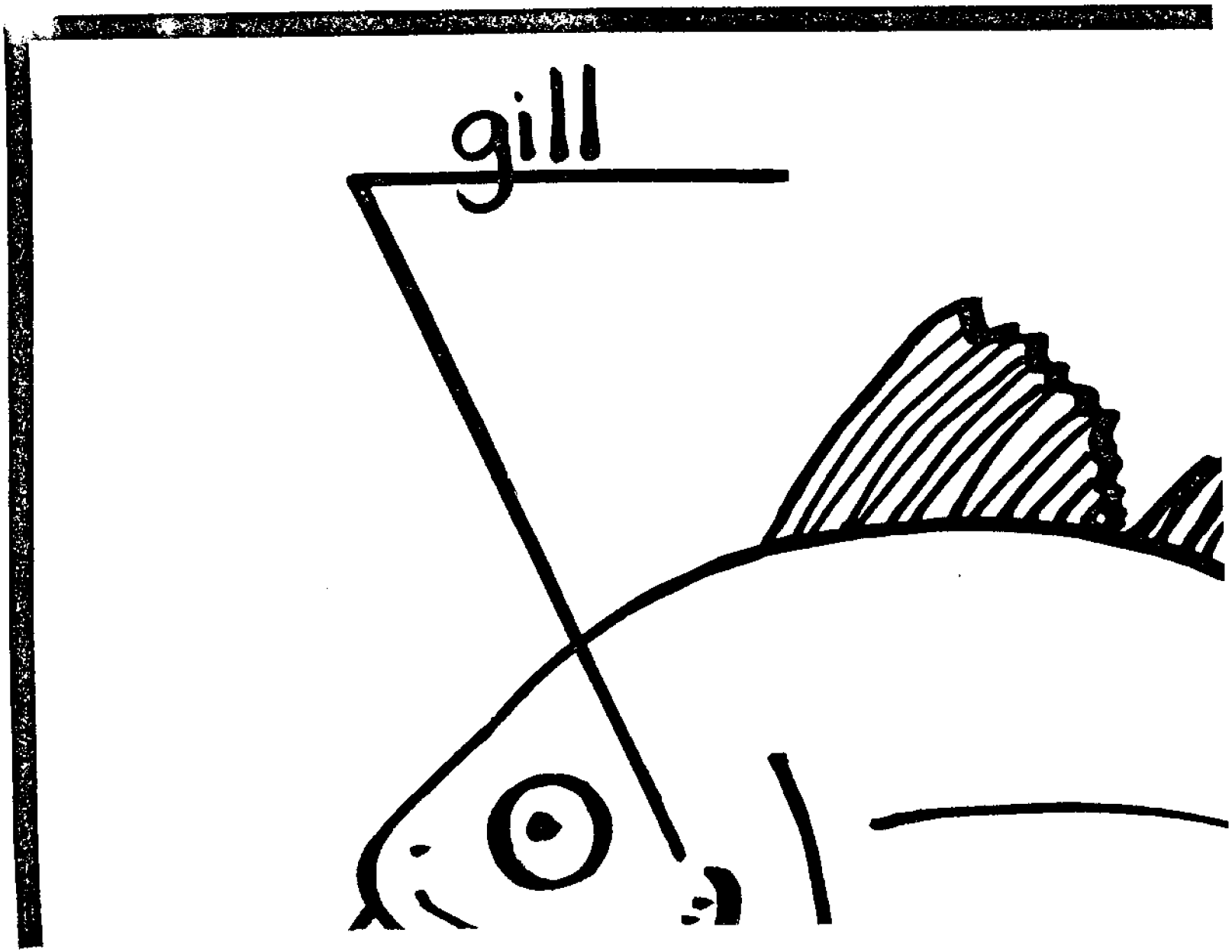


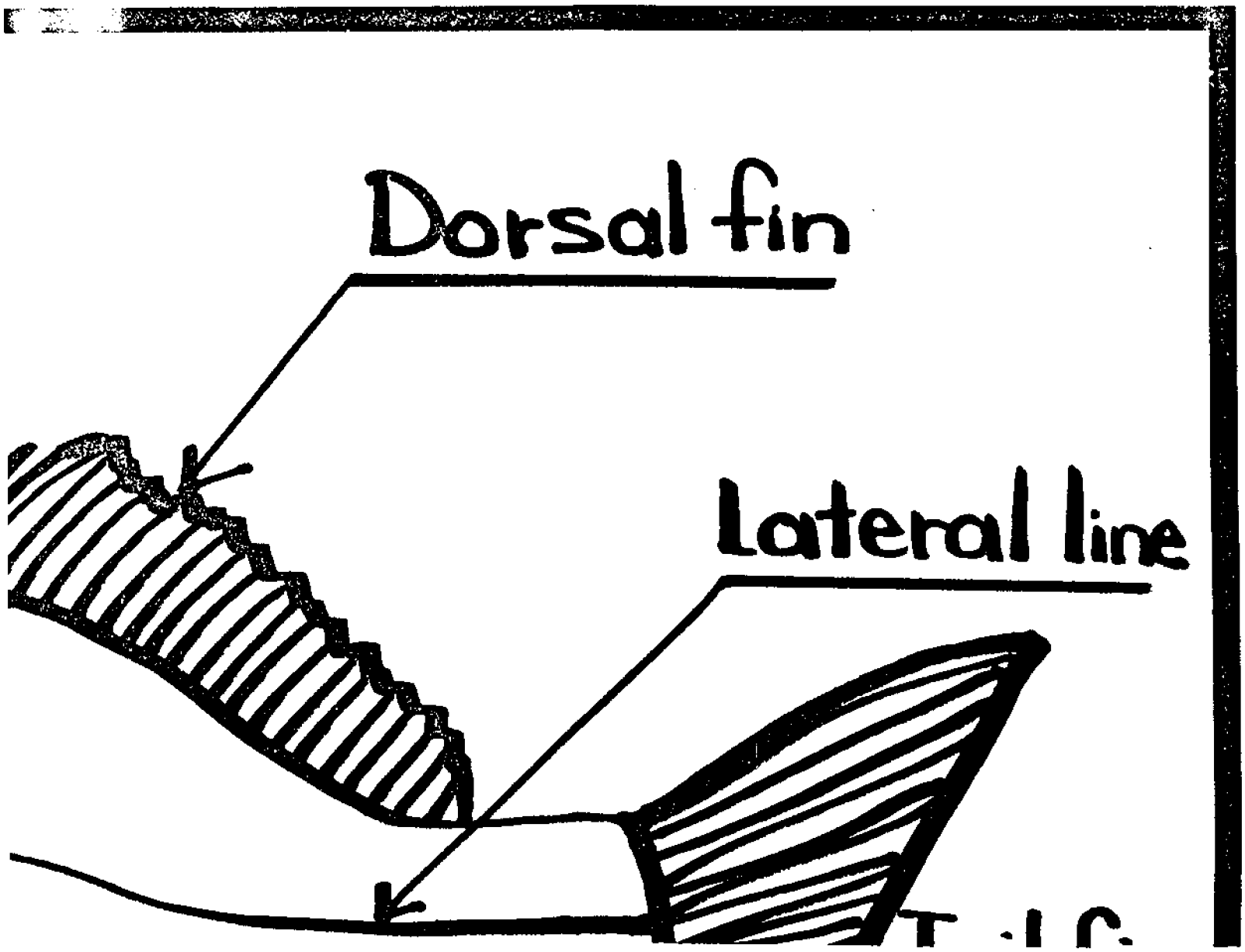
(Sheepshead)

White Bass

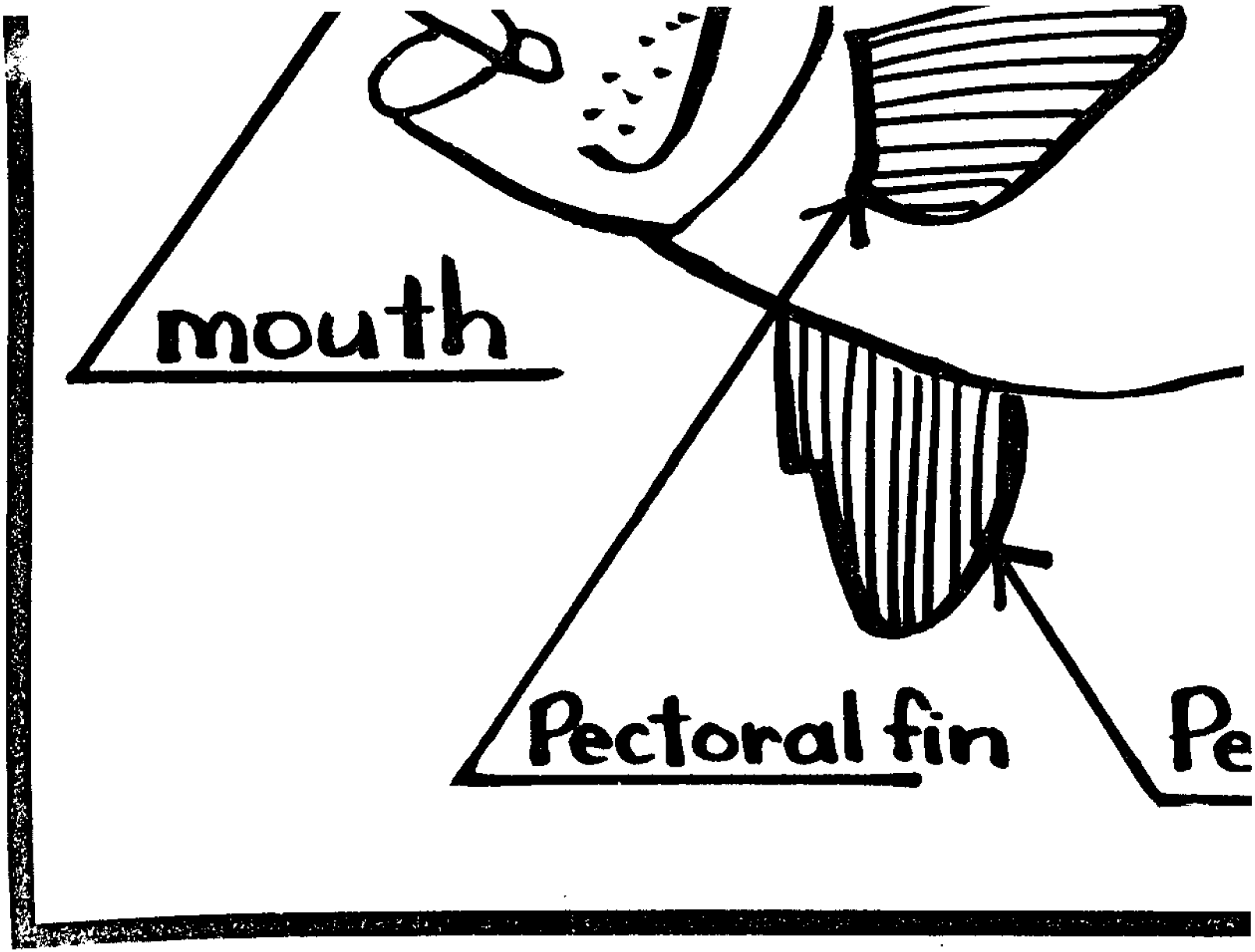
White Crappie




gill


Dorsal fin
Lateral line

Pelvic fin
Anal fin
Tail fin


mouth
Pectoral fin
Pe

Ohio Sea Grant Program

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