

What are the Characteristics of Some Great Lakes Fish?

If you know how to construct a dichotomous key, you can make one that classifies real organisms, some fish in the Great Lakes. For this activity you will work in groups of 3 or 4. Your group will construct a key to identify some fish families and learn something about them. Lake Erie has a larger variety of fish life than any of the other Great Lakes. Scientists believe this is because of the southern position of the lake and because it is shallow. Lake Erie has 138 species of fish. These species can be grouped into 27 families. All of the fish in a given family share certain characteristics. In this exercise you will learn how to use these characteristics to identify the 27 families. The fish are also found throughout the other Great Lakes, along with others that prefer colder water.

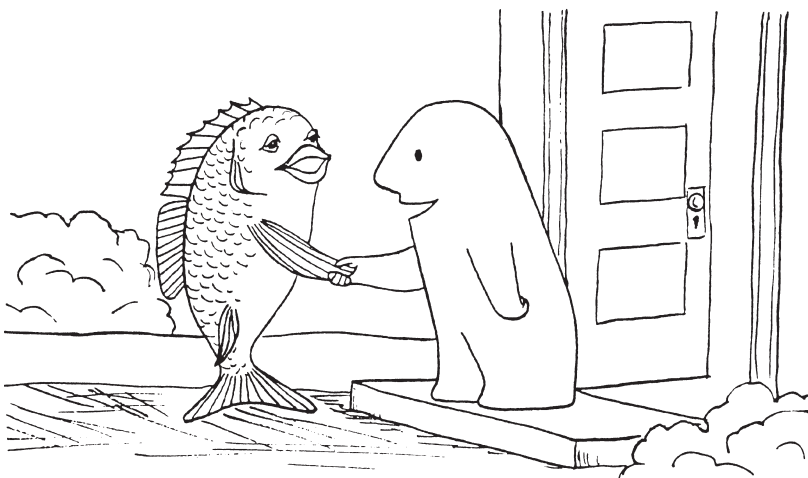
OBJECTIVES

Upon completion of this activity, you should be able to:

- Describe some ways fish differ from each other in appearance.
- Use similar characteristics of fish to group them into categories for classification.
- Comment on the diversity of fish in the Great Lakes.

PROCEDURE

Regardless of whether they live in an ocean, lake, or stream, all fish are alike in some ways. A typical bony fish has scales embedded in its skin. These scales have concentric growth rings that can be counted to determine the age of the fish. A few kinds of fish do not have any scales.



Source

OEAGLS EP-019, "Getting to know your local fish" by Suzanne M. Hartley and Rosanne Fortner.

Earth Systems Understanding

This activity focuses on ESU 3, a key is a tool used by scientists to organize information.

Materials

- Fish pictures and information about fish families.

Teacher's Notes

Go over the fish characteristics with students to make sure they are aware of what differences to look for. Remind them of the glossary, not only for looking up unfamiliar words, but for choosing descriptive words to use in their key.

Following this activity are pages of fish for student teams to key. Both the pictures and the written descriptions can be used to describe differences.

Fish also have gills. The fish's mouth and cheeks act as a pump to push water over the gills. As water passes over the gills, oxygen dissolved in the water is exchanged for carbon dioxide from the fish's blood.

Fish differ from each other in several characteristics. Study the fish characteristics diagram so you can recognize differences when you get your fish pictures from your teacher. Refer to the GLOSSARY to find definitions of terms you do not understand from the pictures.

1. Divide into five groups. Each group will receive pictures and descriptions of a group of fish common to Lake Erie, whose families are also found throughout the Great Lakes. Look at the fish pictures with your group. List the names of the fish you are working with on your answer sheet.
2. How are your fish different from each other? List four general ways (head shape, spines, etc.).
3. Cut your picture sheet into sections so that each piece contains only one fish. With your team, decide how to divide the fish into two groups based on one characteristic. Put the fish pictures into piles according to that characteristic, which will be Statement 1 of your key. On your answer sheet, fill in 1A and B, with the next steps or identification on the right side. [If you have not done the activity "How does a dichotomous key work?," you should refer to it for ideas here.]
4. Next, take the fish in one pile and discuss how they differ from each other. Fill in Statement 2A and B.
5. Continue dividing your fish in this way until each group has only one fish in it. When you reach this point, the right-hand column should be filled in with the fish's name.

Teacher's Notes

Answers to questions 1 and 2 will differ from team to team. The questions are given mainly as advance organizers and to guide you in assessing student performance.

The "Key to Great Lakes Fish" will also differ from team to team. An example is given using Group III.

Possible Key to Group III

Characteristic	Next step or identification
1A. Lateral line	2
1B. No Lateral line.....	4
2A. Forked tail	Salmon
2B. Rounded tail	3
3A. Long dorsal fin	Bowfin
3B. Short dorsal fin	Pirate Perch
4A. Vertical stripes on sides.....	Killifish
4B. No stripes.....	5
5A. Long narrow anal fin.....	Livebearer
5B. Short anal fin	Mudminnow

6. Check your finished key when all your fish have been classified. You should be able to pick up any fish picture and follow the key to find the name of the fish.
7. Exchange keys and fish pictures with another group. Do not give the list of fish names from the original sheet to the other team. See if they can identify the fish using only your descriptions in your key.
8. Get your original fish pictures and key back when the other team is finished. Read the Fish Family Descriptions your teacher has given you. Tell the class how you grouped your fish and a little about each fish.
9. From the group reports, answer these questions.
 - A. What fish is covered with bony plates?
 - B. How do sea lampreys damage other fish?
 - C. How does a filter-feeding fish eat?
 - D. Describe a major characteristic of a bowfin.
 - E. List five Great Lakes fish that are valuable as food for humans.
 - F. How did the sucker family get its name?
 - G. Name two Great Lakes fish that have no scales.
 - H. How did the freshwater drum get its name?
 - I. Name two kinds of Great Lakes fish that are used as bait for fishing.
10. If time permits, work with the entire class to develop a key that will classify all 27 families of Lake Erie fish.
11. Contact your state's Fisheries office and find out what other families of fish are found in your nearest Great Lake. Add a page of those fish to this activity.

Teacher's Notes

The exchange of keys and pictures with another group is a good way to find out if the keys will work. It also exposes students to other possible ways of distinguishing between fish. When the students have constructed their own key and tried out the key made by another team, they should be well aware of what differences to look for. Making a key to all the fish should not be difficult at this point. If you want to try this, we suggest that you have students write the name of each fish on its picture, then tape all the pictures to the blackboard. Have students volunteer to divide the fish into groups to create a key, one step at a time.

If you prefer to use the overhead projector, an included page (31) has pictures of all of the fish. Make a transparency of that page and cut it apart so you can physically group the fish as the key is constructed. One possible way to group all the fish is shown on page 32. A graphic way to show the same classification scheme is also provided on page 32. It may assist students who learn better with visual cues.

Answers

- A. Sturgeon are covered with bony plates.
- B. Lampreys are parasites that attach to other fish with their sucker mouths and suck out their blood and body fluids.
- C. It filters microscopic organisms from the water by collecting the organisms on gill rakers. Then the fish swallows these food organisms.
- D. It has a long fin that arches in a bow along its back.
- E. Sturgeon, yellow perch, white bass, burbot, salmon, freshwater drum, white perch, walleye, and catfish are valuable as human food.
- F. The fish have an extendable sucker mouth for picking or sucking up organisms.
- G. Catfish, eel and sturgeon have no scales.
- H. It makes a drumming sound.
- I. Minnows, shiners, and chubs are used as bait.

Great Lakes Fish
(Possible Key)

Next step or identification

<u>Characteristic</u>	
1 A. Snake-shaped.....	2 Sunfish
1 B. Shaped like a fish.....	3 Smelt
2 A. Sucker mouth.....	Lamprey
2 B. No sucker.....	Eel
3 A. Barbels.....	4
3 B. No barbels.....	7
4 A. Bony plates.....	Sturgeon
4 B. No bony plates.....	5
5 A. One barbel.....	Burbot
5 B. Two or more barbels.....	6
6 A. Slim body.....	Catfish
6 B. Fat body.....	Carp
7 A. Two dorsal fins.....	8
7 B. One dorsal fin.....	17
8 A. All fin rays connected.....	9
8 B. Four to six unconnected spines.....	Stickleback
9 A. Second dorsal fin large.....	10
9 B. Second dorsal fin small.....	15
10 A. Dorsal fins separate.....	11
10 B. Dorsal fins joined.....	12
11 A. Horizontal stripes.....	White bass
11 B. Vertical color bands.....	Yellow perch
12 A. Fan-shaped pectoral fin.....	Sculpin
12 B. Small triangular pectorals.....	13
13 A. Skinny body.....	Silverside
13 B. Round body.....	14
14 A. Mouth on top.....	Sunfish
14 B. Mouth on bottom.....	Drum Salmon
15 A. No spines.....	Troutperch
15 B. Spine on side.....	Smelt
16 A. Row of spots.....	19
16 B. No spots.....	18
17 A. Short nose.....	Paddlefish
17 B. Long nose.....	Gar
18 A. Forked tail.....	20
18 B. Rounded tail.....	24
19 A. Forked tail.....	21
19 B. Rounded tail.....	Sucker
20 A. Regular mouth.....	22
20 B. Sucker mouth.....	23
21 A. Wide body.....	Mooneye
21 B. Narrow body.....	Gizzard shad
22 A. Smooth belly.....	Pike
22 B. Sawtooth belly.....	Minnows
23 A. Flat head.....	Bowfin
23 B. Round head.....	25
24 A. Long dorsal fin.....	26
24 B. Short dorsal fin.....	Livebearer
25 A. Short anal fin.....	27
25 B. Long anal fin.....	Mudminnow
26 A. Lateral line (partial).....	Pirate perch
26 B. No lateral line.....	Killifish
27 A. Two bands at base of tail.....	
27 B. Many bands at tail.....	

REFERENCES

Hubbs, Carl L., and Karl F. Lagler. 1983. *Fishes of the Great Lakes Region*. Ann Arbor: The University of Michigan Press.

Trautman, Milton B. 1981. *The Fishes of Ohio*. Columbus: Ohio State University Press.

There are several Web sites regarding fish species in the Great Lakes. Investigate the following:

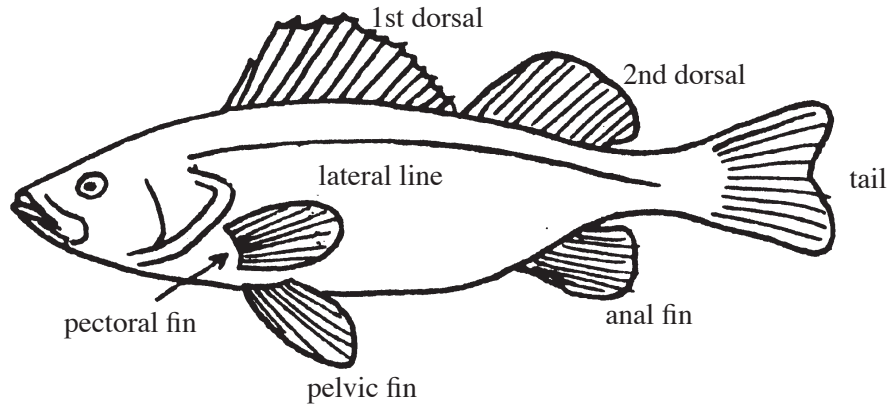
<http://h2o.seagrant.wisc.edu/communications/publications/FISH/LakeMichFishIndex.html>

<http://h2o.seagrant.wisc.edu/communications/publications/FISH/LakeSupFishIndex.html>

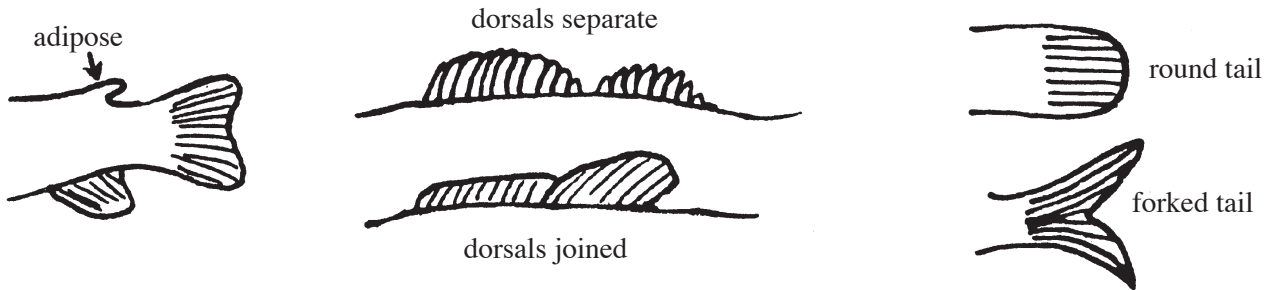
Contact your nearest Sea Grant office for fishery publications. Addresses are on page 10.

Fish Characteristics

Where the fins are:



Fin types:



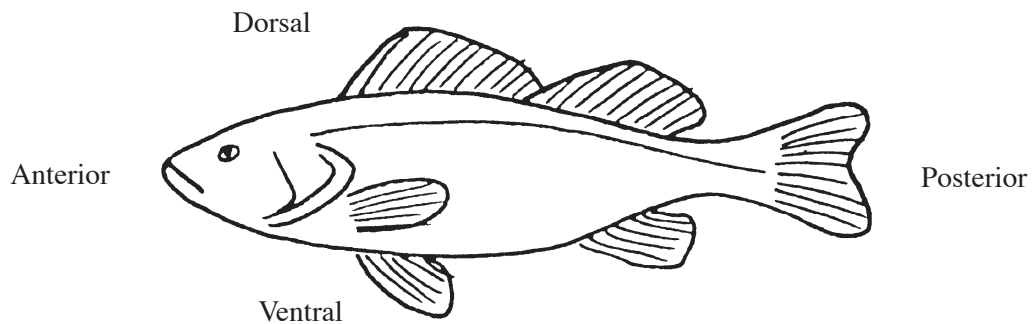
Head features:



Also look for differences in:

- Body shapes
- Lateral line (present or absent)
- Spines (present or absent, and location)
- Spots or stripes
- Head shapes
- Fin shapes

GLOSSARY



Adipose Fin – Fleshy fin behind the dorsal fin.

Anterior – Front.

Barbels (pronounced bar-bulls) – Whiskers that help the fish detect food.

Carnivore – Flesh eating animal.

Commercial Fish – Fish caught for commercial trade.

Concentric – Having a center in common. Example: growth rings on a tree.



Dorsal – Pertaining to the back or top.

Filter Feeder – Filters microscopic plants and animals from the water for food.

Forage Fish – Fish used as food by larger fish.

Lateral Line – A sensory organ with a row of pores running along each side of the head and body of most fish.
It looks like a dotted line.

Omnivore – An animal that eats any sort of food, plant, or animal.

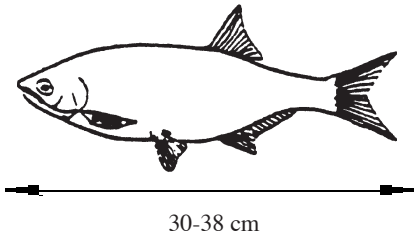
Parasite – An organism living in or on another organism (its host) from which it obtains food.

Posterior – Rear.

Scales – Flexible overlapping plates that cover the bodies of some fish. Scales help to protect the fish.

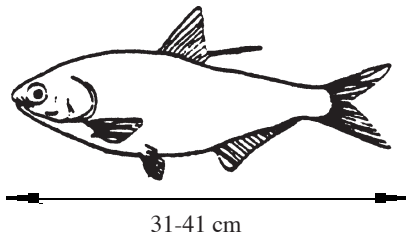
Sport fish – Fish that are caught by individuals for recreation.

Ventral – Pertaining to the underside or belly.



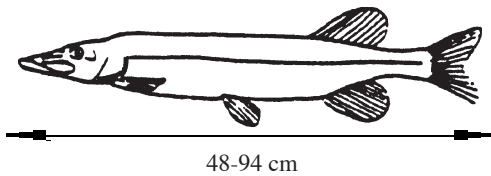
I.
A. Mooneye Family - Hiodontidae

These fish are silver or gold in color. They eat insects, insect larvae, and small minnows. They prefer to feed in swiftly moving water, but live in calm water. Mooneyes are not very good to eat.



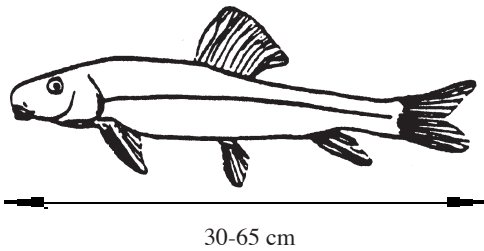
B. Herring Family - Clupeidae

Herrings have a saw-toothed or jagged belly. They feed on plankton. Many larger fish such as walleyes often eat gizzard shad, one member of the herring family. Alewives, another member of this family, have been introduced to the Great Lakes. They have great population explosions followed by rapid die-off. The accompanying picture is of a gizzard shad.



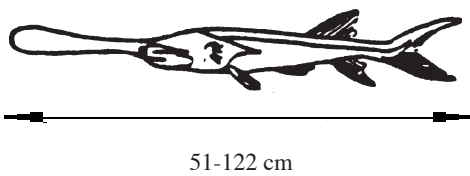
C. Pike Family - Esocidae

Pike live in lakes, ponds, and streams where the water is warm and full of weeds. They are very fierce and eat anything they can catch. Some pike grow to be 7 feet long and weigh as much as 35 pounds. Pike populations have declined because of destruction of spawning grounds.



D. Sucker Family - Catostomidae

Suckers live on the bottom of lakes, ponds, and streams. They have special mouths that help them to suck up small animals and plants. Some suckers, like the bigmouth buffalo, grow to be very large. Many fishermen like to catch these big fish, which are good to eat.



E. Paddlefish - Polydontidae

Paddlefish live in silty rivers and flood plain lakes. Some grow to be 6 feet long and weigh up to 150 pounds. They get their name from their paddle-shaped snouts. Paddlefish eat by swimming with their mouths open. Food washes into their mouths as they swim along. Fish that eat this way are called filter feeders. Paddlefish are endangered because dams along rivers prevent migration and spawning.



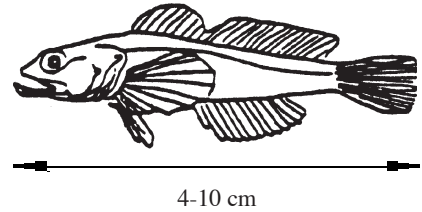
F. Gar Family - Lepisosteidae

These fish have bony plates covering their bodies. Gars have sharp, strong teeth and eat all kinds of fish, both living and dead. They are so hard to catch that fishermen have gar-rodeos and use wire snares instead of fishing poles to catch the fish. Gars prefer to live in the calm waters of bays rather than in the open lake.

II.

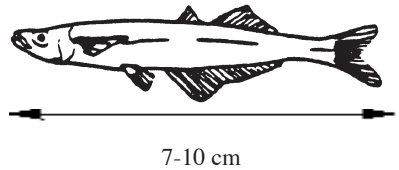
A. Sculpin Family - Cottidae

Sculpins have large spiny heads. They have no scales. Sculpins live on the deep bottom, feeding on small fish.



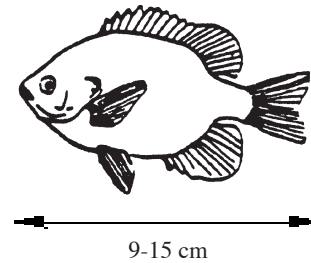
B. Silverside Family - Atherinidae

Silversides get their name because of their very light color. They feed near the surface of the water and often skip in the air for short distances. The Silverside's numbers are decreasing.



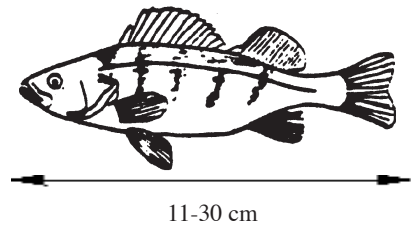
C. Sunfish Family - Centrarchidae

There are many types of fish in this family. Largemouth bass, smallmouth bass, and bluegills are all sunfish. They eat smaller fish, frogs, and other creatures such as crayfish. Sunfish are protected from commercial fishing.



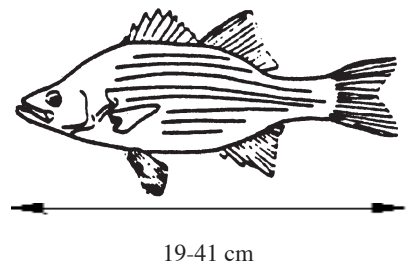
D. Perch Family - Percidae

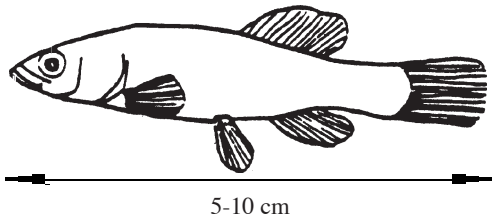
This group includes the walleye and the yellow perch, both of which are important in sport fishing. They are also important commercially. Walleye live in cold, clean water. Yellow perch are smaller than walleye and can live in warmer water.



E. Temperate Basses - Percichthyidae

The white bass and the white perch are the temperate basses found in Lake Erie. These fish live in quiet water over sand and gravel bottoms. Schools, or groups, of white bass are often seen just under the surface of the water. They feed on smaller fish, including their own young.

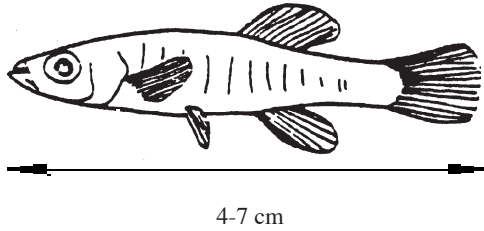




III.

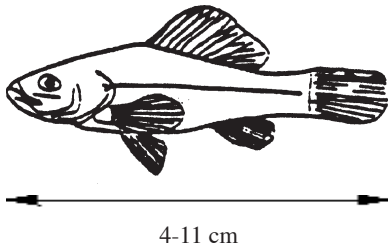
A. Mudminnow Family - Umbridae

Mudminnows eat many kinds of food, both plants and animals living. Mudminnows will dive into the muddy bottom to escape from danger. Because other fish like to eat mudminnows, anglers often use them as bait.



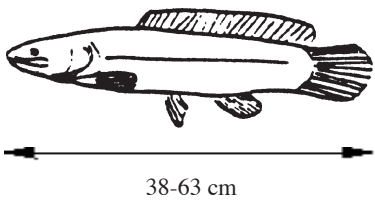
B. Killifish Family - Cyprinodontidae

Killifish have mouths that open along the upper front of their heads. This helps them feed at the surface of the water. Killifish live in clear, shallow water where there are many plants. Anglers use killifish as live bait because many larger fish eat them.



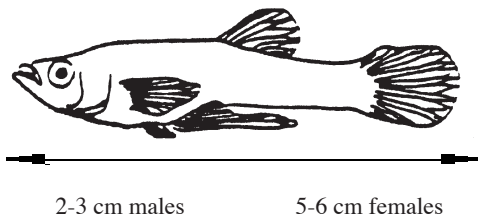
C. Pirate Perch Family - Aphredoderidae

These are small fish, up to 4 inches long. They eat smaller fish and aquatic insects. They are rarely caught.



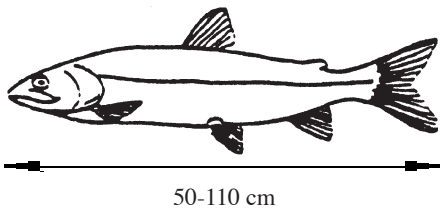
D. Bowfin Family - Amiidae

Bowfins get their name from the long fin that arches over their backs. They live in quiet water where there are many plants. Bowfins eat fish, frogs, and crayfish.



E. Livebearers Family - Poeciliidae

Livebearers do not lay eggs. The baby fish are born alive. The "mosquito-fish" *Gambusia* feeds on the mosquito larvae that live near the surface of the water.



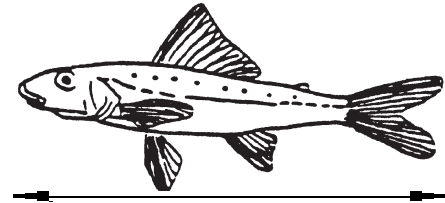
F. Trout and Salmon Family - Salmonidae

Salmon and trout belong to the same family. These fish have an extra fatty fin called the adipose fin. Fishermen like them because they are large and good to eat. Salmon do not live naturally in Lake Erie. The Department of Natural Resources stocks the lake with salmon for the fishermen to catch.

IV.

A. Troutperch Family - Percopsidae

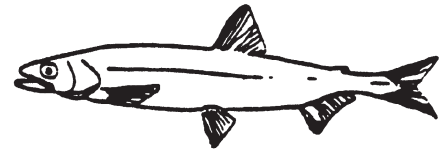
Troutperch have rough scales. They have an adipose fin like the trout and spiny fins like the perch. Many other fish eat the troutperch.



8-13 cm

B. Smelt Family - Omeridae

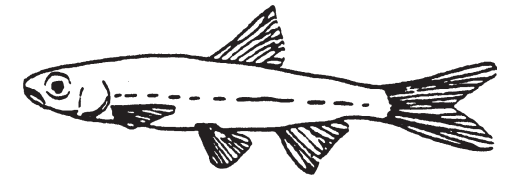
Smelt are small fish with smooth scales. They may grow to be 9 inches long. Smelt have an adipose fin. They also have teeth on their tongues. They eat smaller fish and other creatures such as crayfish.



18-25 cm

C. Minnow Family - Cyprinidae

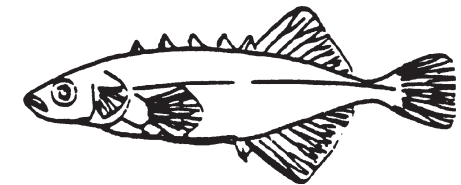
Minnows are important as food for many larger fish. They are also widely used for bait. This family also includes the carp and goldfish. Minnows live in warm, organically rich waters.



8-18 cm

D. Stickleback Family - Gasterosteidae

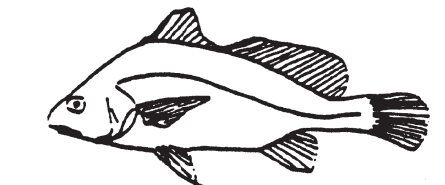
Sticklebacks get their name from the stiff spines on their backs. They live in the cold, quiet waters of streams and bogs.



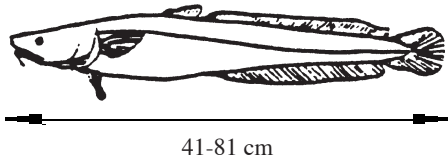
30-76 cm

E. Drum Family - Scianenidae

These fish gets their name from the drumming sound they make. They have a lateral line that extends all the way across their tail fins. Some fishermen call this fish the "sheepshead." Other common names include silver bass, gray bass, and reef bass. They eat crayfish, aquatic insects, and small fish.



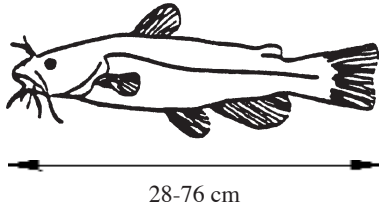
4-6 cm



V.

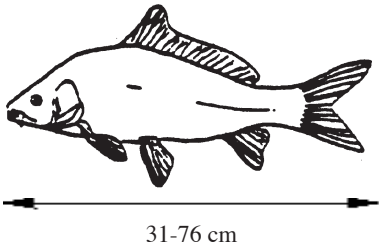
A. Cod Family - Gadidae

Cod have one long feeler, or barbel, under their chins. The Great Lakes representative of the cod family is the burbot. It is not commercially valuable like its marine cousins.



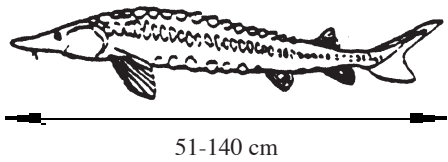
B. Catfish Family - Ictaluridae

Catfish eat both plants and animals. They have feelers (barbels) near their mouths to help them find food. They have no scales. Bullheads are small catfish. They live in muddy ponds and streams. They can survive even when ponds dry up. The male bullhead watches the nest and guards the young. The flathead catfish can weigh up to 100 pounds. Fishermen like catfish because most of them are good to eat.



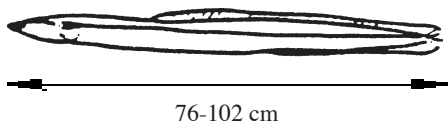
C. Minnow Family - Cyprinidae

Minnows are important as food for many larger fish. They are also widely used for bait. This family also includes the carp and goldfish. Minnows live in warm, organically rich waters.



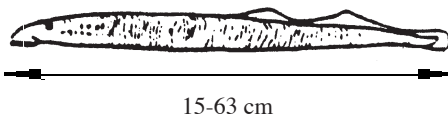
D. Sturgeon Family - Acipenseridae

These fish have bony plates covering their bodies. Sturgeons have special mouths for sucking up food from the bottom of the water. Feelers on their mouths help them to find food. People like to eat caviar made from sturgeon eggs. Sturgeons do not spawn until they reach 20 years of age. Their numbers have decreased sharply since 1916 due to loss of spawning grounds.



E. Eel Family - Anguillidae

Eels eat both plants and animals. They have true jaws. They are long and thin like snakes and have no scales. Eels feed at night and hunt by sense of smell. They can survive in polluted water.



F. Lamprey Family - Petromyzontidae

Young lampreys live in the mud on the bottom of streams. It takes up to 7 years for the young lampreys to grow up. Lampreys have sucking mouths and sharp teeth. Some adult lampreys are parasites. They use their sucking mouths to attach themselves to other fish and suck their blood. Lampreys have no jaws.

Teacher Page. For use as an overhead transparency.

