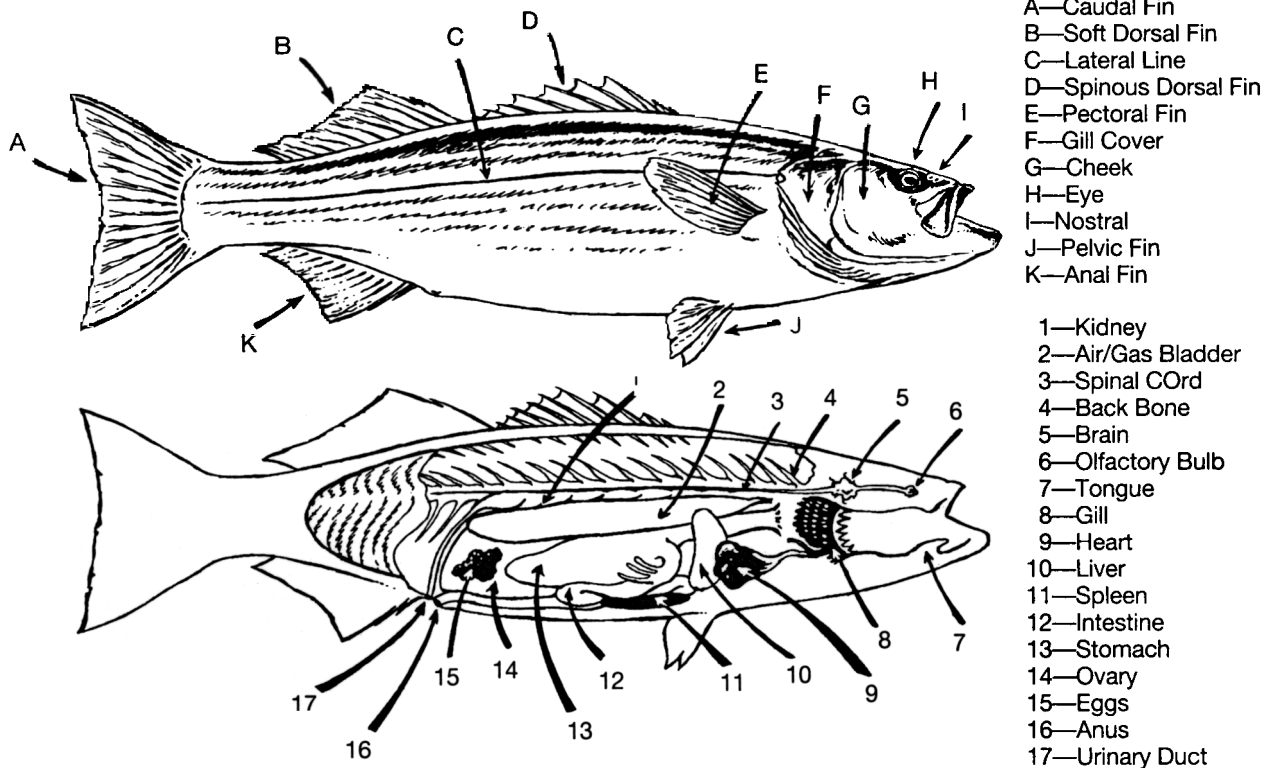


What is a Fish?

All fish are aquatic. This means that although some fish can spend time out of water, all fish must return to water to breathe and to keep from drying out. However, not all creatures that live in water are fish. So, what is a fish?



- **Fish are cold-blooded animals.** Cold-blooded means they have a body temperature that is close to that of the water in which they live.
- Fish are the only **vertebrates** (animals with a backbone) that are able to live in water without breathing air from the atmosphere.
- Their bodies are supported by a **skeleton**,

made up of bone or cartilage, and have a brain case (cranium) that holds the brain.

- **Fish also have permanent gills.** Most fish also have fins, scales, a slimy mucus and a swim bladder.

Fish have been around for more than 400 million years. Today there are about 21,000 species! Fish live in water from a few inches deep to as much as five miles beneath the surface. Fish

live in waters from the North and South Poles to the Equator.

Fish come in many sizes, shapes, and colors. Different species (types) prefer different aquatic environments (surroundings) and live their lives in different ways. The more you know about fish, the better the angler you'll become.

PARTS OF A TYPICAL FISH

Why do fish have fins? Fins make it possible for a fish to stay upright, move and maneuver in water. Fins are thin membranes usually supported by rays or sharp bony spines.

What kinds of fins do fish have and what are their names?

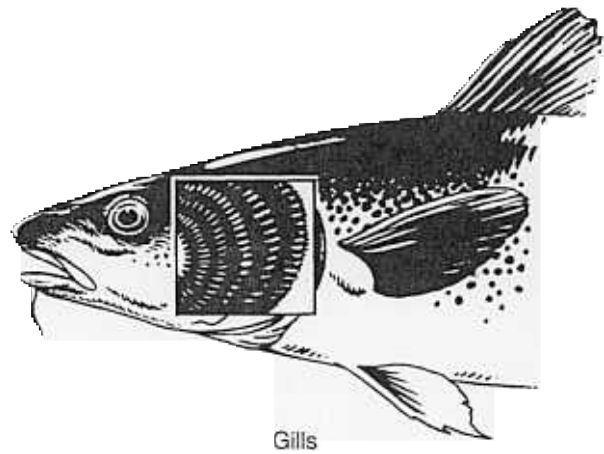
The **dorsal fin** and the **anal fin** help fish keep their balance and move in tight places. **Pectoral fins** are found on each side of a fish's body, just behind its gills, and help a fish stay in one place and to dive or surface. The **pelvic fins** are found on each side of the belly and aid in positioning and balance. The **caudal fin** is another name for the tail fin and it helps fish move.

Some fish, such as salmon, trout, and catfish also have a small, fleshy **adipose fin** on their backs behind the dorsal fin.

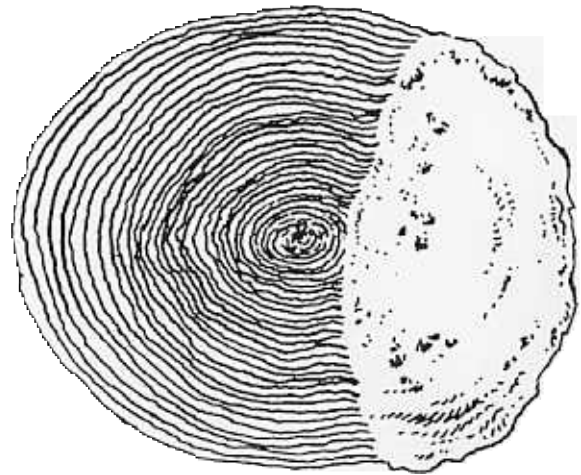
Why do fish have gills? Fish get the oxygen they need to live from water. They use the gills on each side of their head to remove oxygen from the water as it enters through their mouth and then passes over the gills. The gills provide oxygen for life, and without them fish could not live. **Injury to the gills is often fatal.**

Scales

The bodies of most fish are covered with scales. Scales help protect their body from injury and disease. Fish don't grow more scales as they get older, the scales just get bigger. As a fish grows, each scale grows rings like the rings on a cross-



Gills



Rings of Fish Scale

section of a tree trunk. By studying a single scale's rings, scientists can tell a fish's age.

Mucus

Fish are coated by mucus (slime) that helps protect a fish from infection and disease and reduces friction with the water, making it easier to swim. When you plan to release a fish, it's important not to damage this slimy coating. Touching a fish's body can destroy or remove this protective layer. **If you must handle a fish's body, wet your hands first.**

Swim Bladder

Many fish have a gas, or swim, bladder in their bodies. This makes it possible for them to sus-

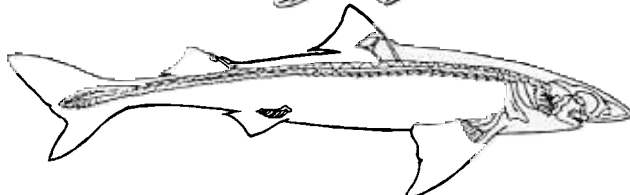
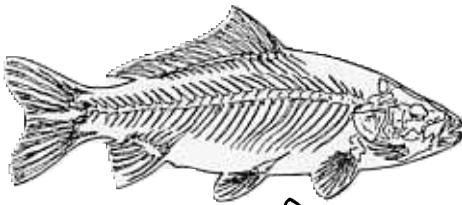
pend themselves in water and not sink to the bottom. In most fish, the bladder is an air-tight sac; in others fish can add or release gas to remain in deep or shallow water.

Some fish don't have a swim bladder or don't rely on one because they're always moving. Some examples are mackerels, sharks, and tunas.

Skeleton

Most fish have a bony skeleton. However, some fish, including lamprey, sturgeons, and sharks, have skeletons of cartilage rather than bone. The skeleton protects their organs and supports the muscles. The location and flexibility of the spine allow fish to swim.

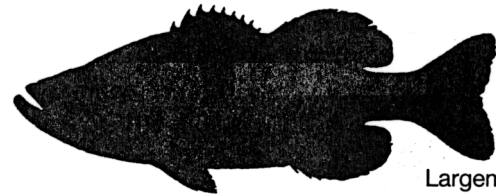
Fish with Bony Skeleton



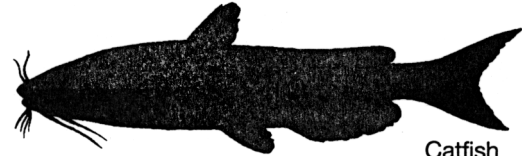
Fish with Cartilage



Trout



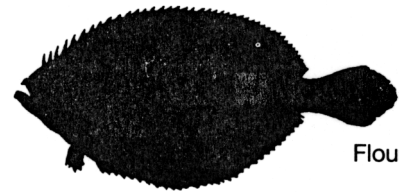
Largemouth Bass



Catfish



Sunfish



Flounder

Fish Shapes

Flat fish such as flounder often lie right on the bottom. To help them see, both eyes are on one side of their head! Catfish have a body, head shape, and coloration that hint that they live and feed on the bottom. Bluegills are compressed, which indicates that they can move in tight places and do not have great speed.

THE SHAPE OF FISH

Fish come in many shapes. Some are long and narrow. Some are short and thick. The shape of a fish's body gives you a hint as to the way it lives.

For example, a trout that spends most of its life in a river's flowing water has a more streamlined body than a largemouth bass that lives among the weeds in the still waters of a pond or lake. The trout's body is sleek so that flowing water passes around it easily. A bass has a chunkier body and a broad, flat tail that makes the fish highly maneuverable in dense weeds.

FISH COLOR

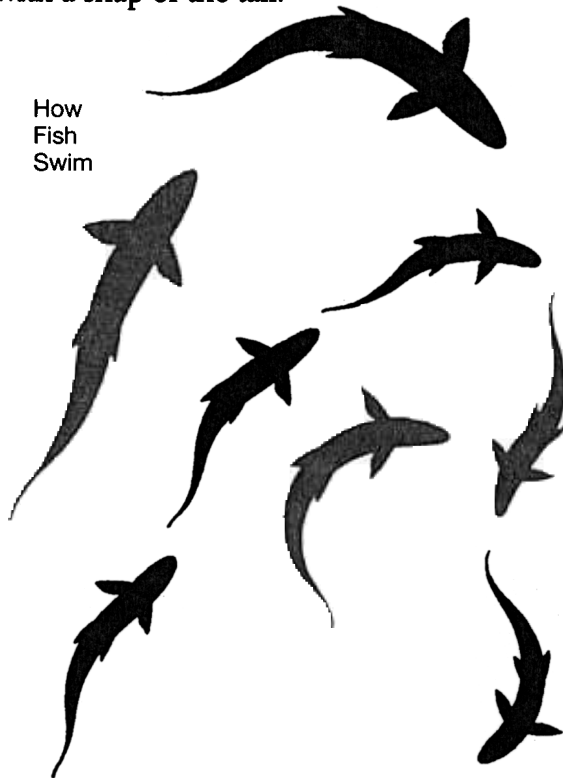
Fish, especially saltwater fish, come in a variety of colors and patterns. In most cases, the coloring of fish allows them to blend in with the place where they live. For example, the upper part of the body of a bullhead, which spends much of its time near the bottom, is dark. So, from above, it's difficult to see a bullhead against the muddy bottom of a river or a lake.

Pike look like sunlight beaming through a weedbed. Almost every fish is light on its belly and dark on its back. This protective coloring

helps them to stay hidden from the smaller fish they feed on, and from larger fish that want to eat them!

HOW FISH SWIM

Most fish swim by moving their bodies in a series of wavy, snake-like motions. Each motion ends with a snap of the tail.



Some fish can swim very fast. For example, members of the tuna family can swim up to 50 miles an hour by snapping their tails as much as 10 to 20 times a second! Each tail snap moves a tuna about the length of its body.

THE SENSES OF FISH

Understanding how a fish hears, sees, and smells will help you catch more fish.

How Fish Hear

Fish hear sounds very well and sound travels five times faster in

water than it does in air! That's why you hear anglers talk about the need to move quietly on the bank of a pond or in a boat. Fish can be scared away from where you are trying to fish.

How do fish hear? They have "ears" beneath the skin on each side of their heads. Sound reaches the ears through their skin, flesh, and bone.

Fish also have another way to "hear" sounds. It is called the **lateral line**. This line begins at the head and extends almost to the tail along each side of the fish. The lateral line detects any vibrations in the water. This helps them stay in tight schools, navigate streams, detect predators, and find food.

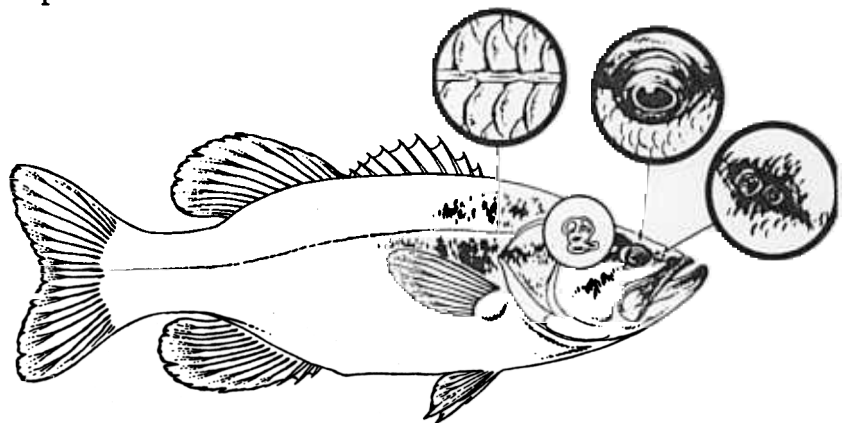
How Fish Smell

The sense of smell is important for many fish. Fish use smell to find food, get warnings of danger, and find their way to spawning areas over long distances. Anadromous fish such as salmon are good examples of this as they can travel several hundred miles to return to their spawning grounds.

All fish have at least two nostrils, called "nares," in their snouts. Behind the nares is a chamber lined with sensors that can detect the slightest odor.

How Fish See

Fish first use their sense of smell or hearing to find food. Many fish then use their sight to make the final attack. Fish can't blink because they have no



Fish Senses

eyelids. And because they have a fixed iris, they have to move into the shade or into deeper waters to escape bright sunlight. The eyes of fish are round and located on the side of the head.

Fish are also nearsighted! Objects at short distances can be seen very clearly, but objects farther away are blurry. But, they can see nearly all around except for a small area directly behind them.

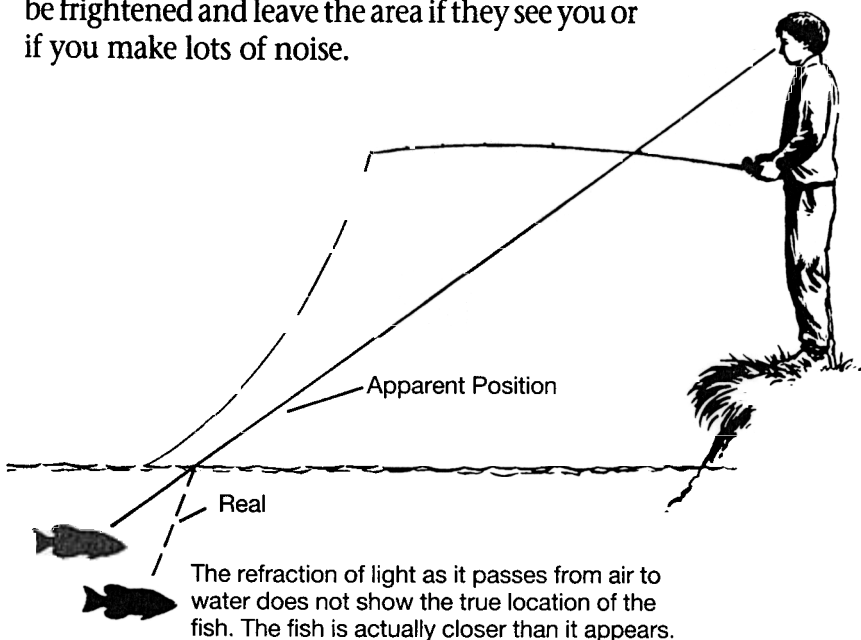
Can fish see colors? Scientists say they can. Many species of fish can see at least 24 different shades of color.

Why Fish Senses Are Important

Most fish are alert to what is happening around them. Therefore, once you know how fish use their senses, you will become a better angler.

When an angler sees a fish under water, the fish is actually closer than it seems. This is because light rays bend (refract) as they pass from the air into the water, like light going through a prism. To a fish, an angler standing on the shore seems to be directly over the fish. Because fish can see you on the bank it is important to keep a low profile while fishing.

When trying to approach fish, remember that fish see and hear very well. These factors can determine what you catch. Approach your fishing area quietly and without being seen. Fish can be frightened and leave the area if they see you or if you make lots of noise.



ACTIVITIES

ACTIVITY 1 — HOW OLD IS YOUR FISH?

For this activity you will need two or more fish of different sizes, tweezers or forceps, and a magnifying glass.

Using the tweezers, carefully pull out a scale. Repeat from the same area on another fish. Compare the size of the scales since they grow as the fish grows. Then examine each with the magnifying glass. Note the "rings" in each. Count the rings to determine each fish's age. Which fish is older? Annual growth shows up as a new ring.

ACTIVITY 2 — IDENTIFYING THE EXTERNAL PARTS OF A FISH

One of the best places to observe healthy, active fish is in an aquarium. If you don't have an aquarium at home visit your local pet store. Introduce yourself to the owner or a worker, and explain why you are there.

By looking at the fish, identify the following:

- | | |
|-----------------|----------------|
| 1. Dorsal fin | 5. Caudal fin |
| 2. Anal fin | 6. Pelvic fin |
| 3. Pectoral fin | 7. Adipose fin |
| 4. Gills | 8. Scales |

Here are some questions you might ask the owner:

1. How often do you feed them?
2. What do you feed them?
3. Do the fish know when it's feeding time?
4. Why do the tanks have filters?
5. Can the fish see us as we see them?

ACTIVITY 3 — FISH DRAWING

Select your favorite species of fish, draw it and then color. Paste your picture on a piece of poster board or construction paper. On a piece of writing paper, write facts about the fish—the species name, where it lives, what it eats, and what might eat it. After finishing, paste this information under your drawing on the same piece of posterboard.

ACTIVITY 4 — WRITING A FISH STORY

Write a story from a fish's point of view. Tell what kind of fish you are, where you live, how you live, what you eat, and what you hide from.