4HMEG02

FINS & SCALES

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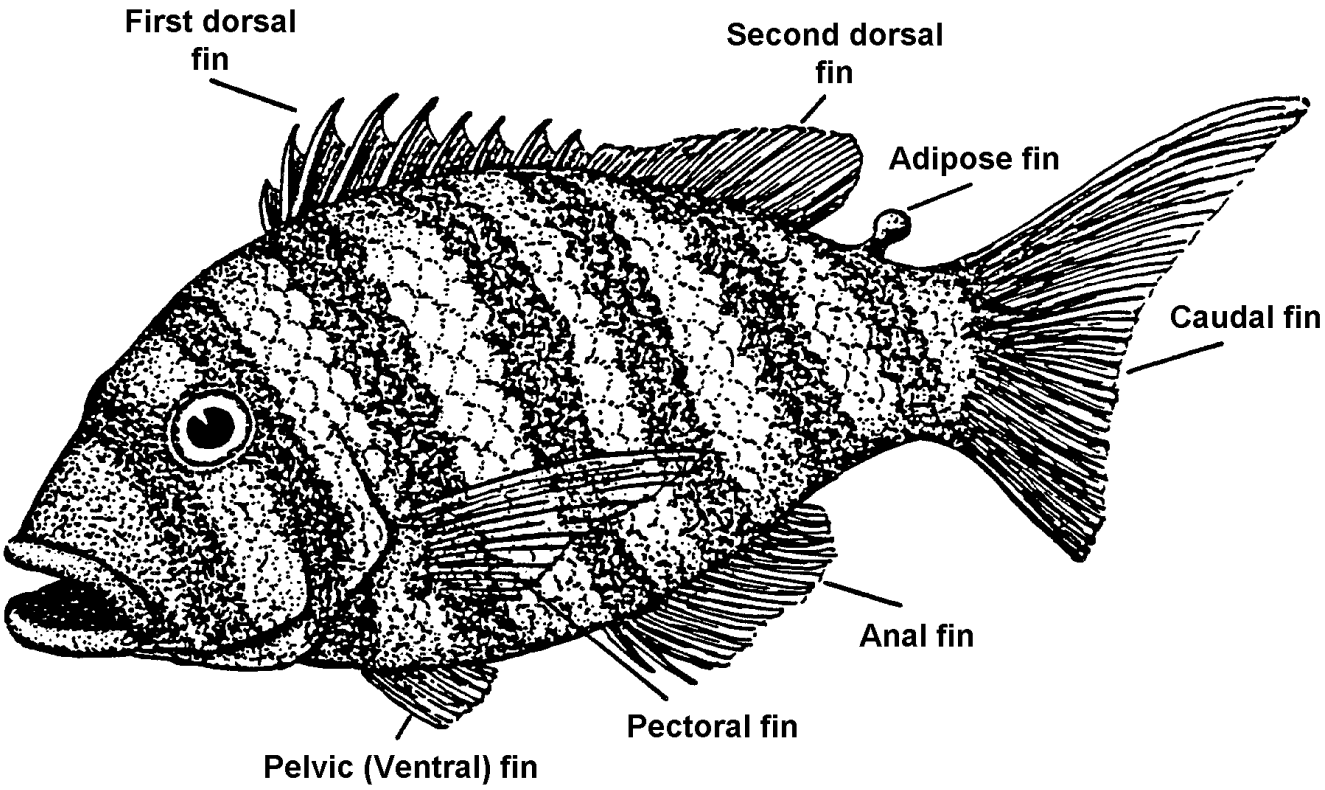
Florida 4-H Marine Education Specialist

A PROJECT FOR 4-H MEMBERS



Florida Cooperative Extension Service
Institute of Food and Agriclutural Sciences
University of Florida, Gainesville
Christine Taylor Waddill, Dean for Extension

Fish

A fish, as most people think, is a scaly animal that has fins and lives in the water. Bony fish have skeletons made of hard bone whereas fish such as sharks and rays have skeletons made of soft cartilage. For this activity we are concerned with the bony fishes. Bony fish include: bass, trout, tarpon, catfish, herring, flounder, and swordfish. There are about 23,000 different kinds of bony fish.

Fins

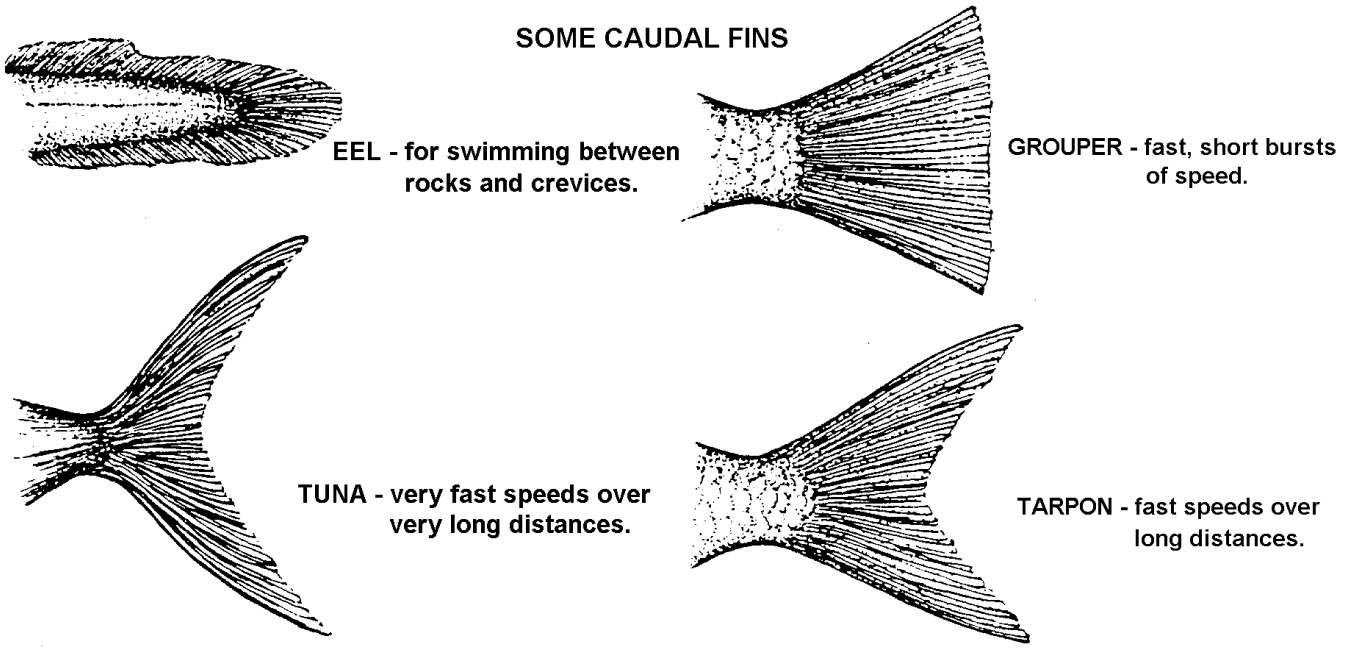
The drawing on the cover is not of any particular fish, but is rather a composite of fishes. Bony fishes have different kinds of fins for different purposes.

Dorsal fin -This is a single (not paired) fin located on the fish's back. Some fish may have only one dorsal fin while others may have two or even three. In many bony fishes the dorsal fin has Stout spines in the front to help give the fin support. The dorsal fin helps the fish in swimming as well as in protecting itself. It can protect the fish against larger animals by becoming erect and making it difficult for other animals to eat the fish. The triggerifsh and filefish are good examples of fish that have welt developed dorsal spines which help protect them from predators. The dorsal fin also acts as a stabilizer, much like the feathers on an arrow, so the fish can remain upright.

Adipose fin - This fin is found or such fish as the catfish and trout. It does not serve much of a purpose. It is probably just part of an ancient fin that was once found on the fish's ancestors.

Caudal fin - Also called the tail fin, it helps in propelling the fish through the water. It has been shown, though, that this fin is not absolutely necessary in swimming. Experiments where the caudal fin was removed, proved that the fish continued to swim quite successfully. This is not to say, though, that the caudal fin does not play an important role in the fish's ability in swimming. Without a caudal fin, a fish such as the tuna would not be able to swim at great speeds over long distances. The stout blunt tail of a grouper helps it in moving swiftly from one hole in a reef to another. Here are some pictures of various caudal fins and how they help the fish.

Anal Fin - Like the dorsal and caudal fins, the anal fin is unpaired. This fin may not be present in some fish while on others it may be very long. The role of the anal fin is to help stabilize the fish while it is swimming. In some fish such as the triggerfish, the anal fin is used in sculling. This is necessary because the triggerfish has a rather rigid body and the wave-like motion of the anal fin helps in propelling the fish through the water. In some live-bearing fish (fish whose young are born alive) the anal fin of the male is modified into a

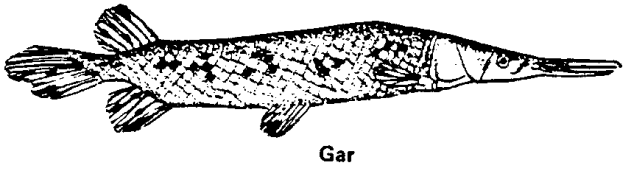


gonopodium. The gonopodium is a long extension of the anal fin and is used in transferring sperm from the male into the female fish.

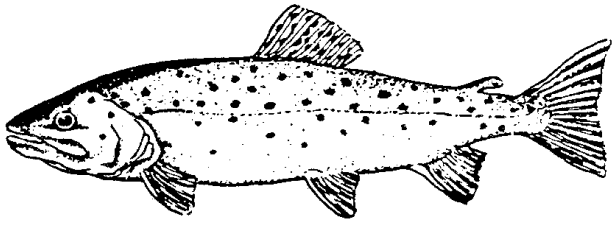
Pelvic (Ventral) fin - This fin is paired. There are always two pelvic fins, a right one and a left one. See the figure on the front page. On some fish the pelvic fins may be way up front and very close to the fish's throat while on other fish they may be further back and very close to the anal fin. The Pelvic fins are used in stabilization and for stopping. They are also used in sculling. In some fish such as the clingfishes, the pelvics resemble a suction cup and help hold the fish onto rocks.

Pectoral fin - Like the pelvics, these fins are also paired. The pectoral fins are usually located on the side of the body near the fish's head. These fins are used in most fish for turning and sculling. If you watch a fish in an aquarium, notice that the pectoral fins scull back and forth in order to keep the fish in one position. As a fish "breathes," water passes out the back of its gills. This tends to act as a jet propulsion moving the fish forward. The sculling action of the pectoral fins helps to counteract this jet propelling action and will keep the fish in one place. In flying fish the pectoral fin are enlarged for soaring in the air.

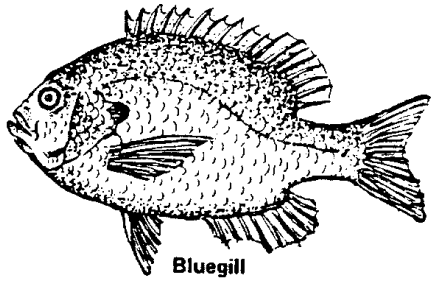
SOME FISHES



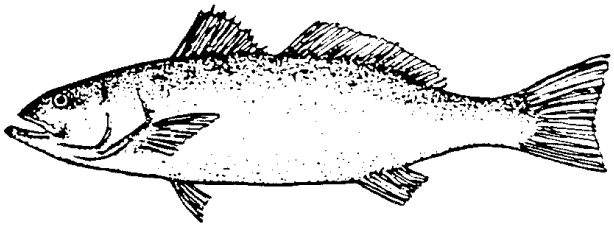
Gar



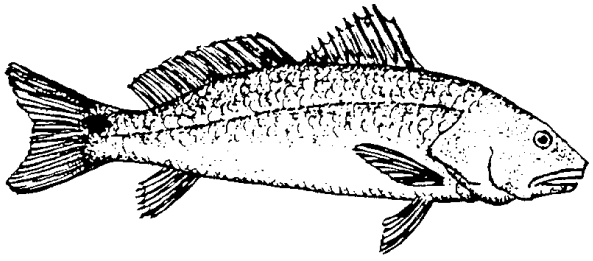
Freshwater Trout



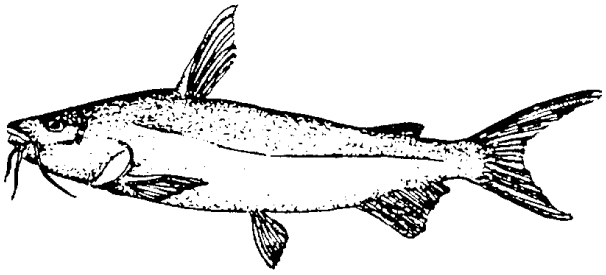
Bluegill



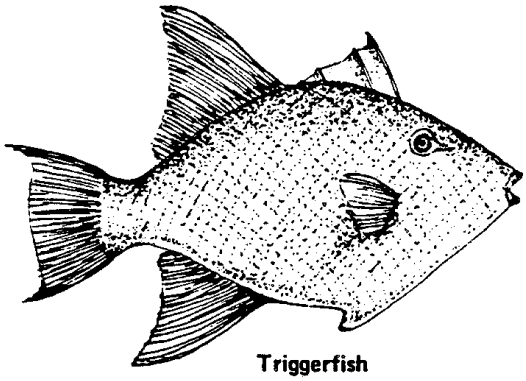
Sea Trout



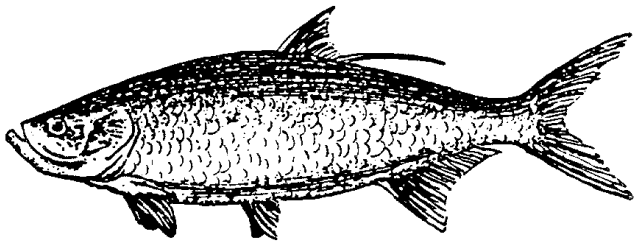
Channel Bass



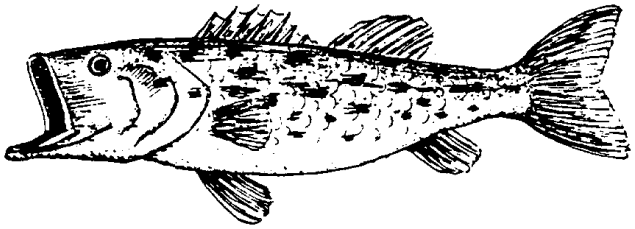
Sea Catfish



Triggerfish



Tarpon



Largemouth Bass

Activities

1) Go fishing and catch a fish.

2) In what kind of habitat does this fish live? In other words, where you caught your fish are there rocks, weeds, grass, mud or sand on the bottom? Was it caught in deep water or shallow water? Was it caught in a bay, under a pier, near a sunken tree or someplace else?

3) Draw a picture of your fish with its fins spread out. Use the space below for your drawing.

4) Label the fins on your drawing by writing the name of each fin beside the fin.

5) How would the fin/fins on the fish's back (dorsal fin) help this fish?

6) According to the type of tail fin (caudal fin) that this fish has, would it be a fast, moderate or a slow swimmer?

7) Would it swim in short bursts or would it be a long duration swimmer?

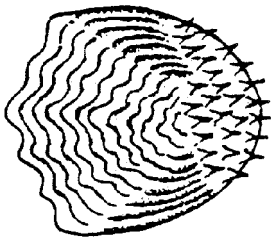
8) If there are pectoral fins on your fish, how would they help it?

Scales

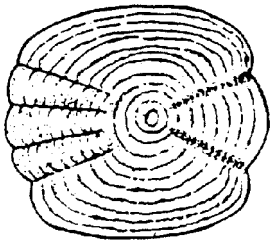
Most fish have scales. Some fish such as catfish have no scales and are said to be "naked." Other fish such as trout and freshwater eels have scales that are very small. The scales are so small on these fish that many people think that they are naked like the catfish.

Scales are used for protection, much like our fingernails. Rather than protecting just a little part of the body, though, scales protect a large part of a fish's body. Scales help protect a fish's skin from being cut by sharp objects. Scales also have color pigments which give the fish its coloration. The scales along the side, which make up the lateral line, contain sensory receptors which enable the fish to detect wave vibrations in the water. That is how a fish hears.

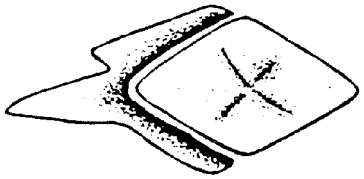
There are three different kinds of scales that may be found on bony fish. A ctenoid (teen-oid) scale has small sharp spines on one end. A cycloid (syk-loid) scale is a smooth scale. A ganoid (gan-oid) scale is a thick platelike scale found on sturgeons and gars.



CTENOID
Perch Scale



CYCLOID
Carp Scale



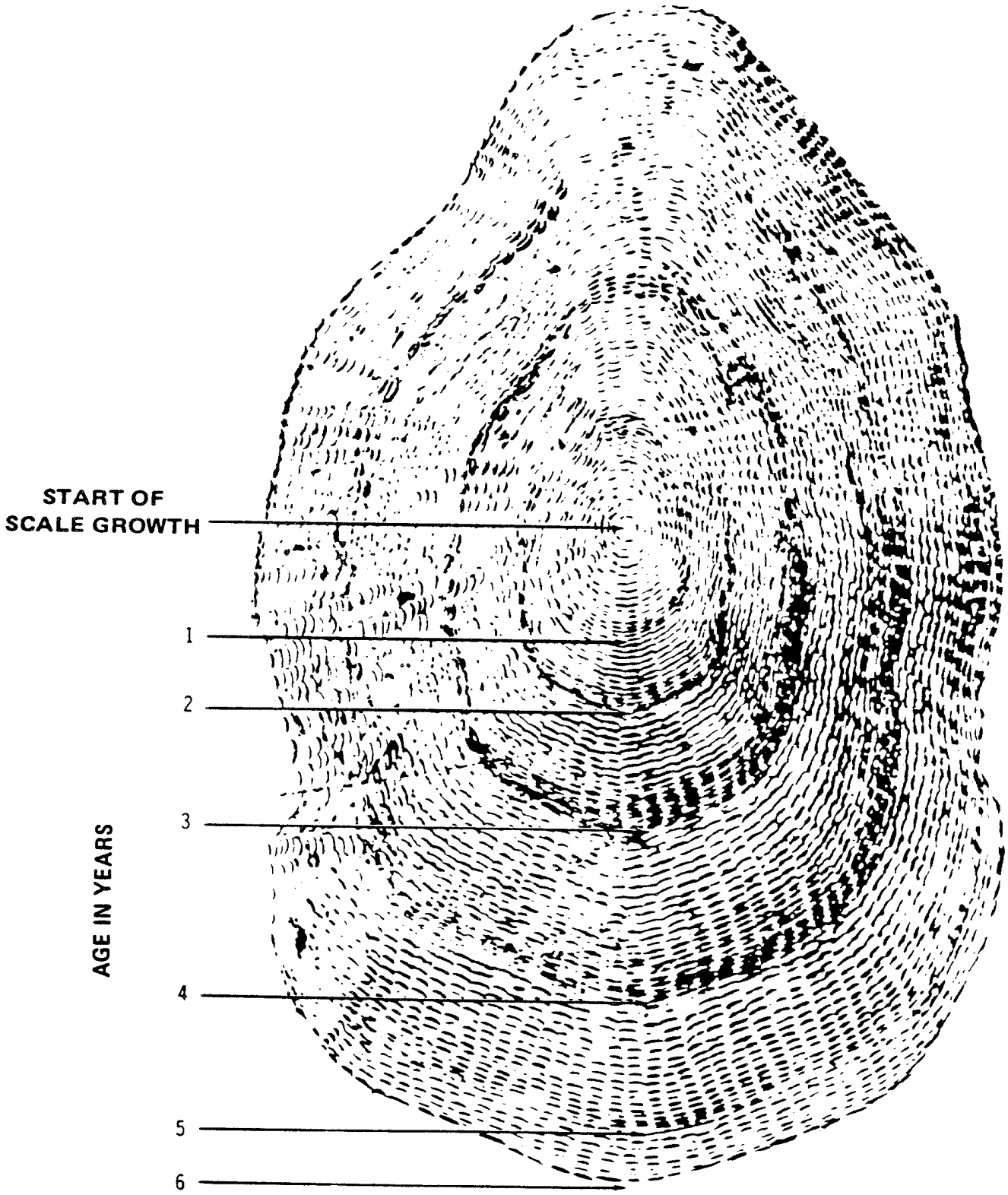
GANOID
Gar Scale

Parts of A Scale

When a fish hatches, it has small scales covering its body. The center (focus) of an older fish's scale represents the scale when the fish was newly hatched. As the fish grows the scales get larger. Rather than growing smooth like our fingernails, scales produce small circular growth rings around themselves. These growth rings are called circuli. A fish grows faster in the summer and slower during the winter. Circuli formed during the summer are widely spaced. Circuli formed in the winter, however, are spaced very close together. A dark ring is formed where the circuli are spaced close together. The darker ring of circuli is called the annulus. The age of a fish can be determined by counting the number of annuli on its scales.

Determining Age

To determine the age of a fish, you must pull some scales off of its body. Two or three scales may be pulled from a live fish without hurting it. The best place to take scales, for age determination, is from under the fish's pectoral fin. The pectoral fin has a tendency to protect the scales and keep them from being lost. If a scale is lost, a new one will begin to grow back. If you count the annuli of a replacement scale you will find that it has fewer annuli than an original scale. By taking scales from under the pectoral fin you have a better chance of getting original scales. Also, to insure an accurate count of annuli, take at least three scales. Take one scale from under the left pectoral fin, a second one from under the right pectoral fin and a third from someplace else, such as the fish's back. If all three scales have the same number of annuli, you can be pretty sure that you have original scales.



Typical cycloid scale from a 6-year old haddock. The more closely spaced rings (circuli) form darker year marks (annuli). The total annuli count determines the age of the fish. U. S. Bureau of Commercial Fisheries)

(from *The Source Book of Marine Science*, 1970)

Activities

Materials: Forceps, microscope slides, silicon glue, microscope or 35 mm. slide projector.

1) By using strong forceps remove three scales from your fish. One from under the left pectoral fin, a second from under the right pectoral fin and a third from the back area.

2) Put one small drop of silicon glue at each of the four corners of a clean microscope slide. Place one, two or all three scales on the slide, if there is room. Allow room for the spreading glue when the second slide is placed on top. If the scales are large, three individual slide preparations will have to be made. Place a second microscope slide on top of the first and press firmly. Place a weight, such as a book, on top of the slides and allow at least one hour for the glue to dry.

3) Observe the scales under a microscope or by using a 35mm. slide projector. If you use a slide projector, simply insert your slide scale preparation into the slot where the regular 35mm. slides drop. This will allow the scale's image to be projected onto the screen.

4) Make a sketch of the three scales, on this sheet, illustrating the general features of the scales: Focus, Annuli, and Circuli. If they are ctenoid scales, indicate the Ctenii (small spines).

5) Determine the age of each scale by counting the number of annuli. Write the age of each scale under your scale drawings.

6) How could age determination of fishes be useful in fishery biology?

7) Why did you do this activity?

8) Who were the people that helped you with this activity?

9) List any books, references, magazines, etc. that you read on fish, scales, age determination in fishes, or any other aspect of fish biology.

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Illustrated by Yaeko Duran

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