

Age and Growth



in Fishes

If people grew the way fish do, grandparents would be taller than basketball players.

based on an article by Jeff Beane



●●●HOW FAST DO FISH GROW?

What if you kept getting taller every year, and never stopped? If people grew the way fish do, grandparents would be taller than basketball players!

Fish never stop growing. Some grow fast, reaching adult size in a few months. Others take 10 years or more to become adult size.



eggs

1 day

Usually, larger types of fish grow more slowly than smaller types, but not always. Striped bass in rivers and lakes can grow 10 to 12 inches in their first year, while wild channel catfish usually grow only 3 to 6 inches in their first year.

●●●HOW LONG DO THEY LIVE?

How long fish live (**longevity**) is not well understood. In general, bigger types of fish live longer than smaller types. The little mosquitofish, many of the killifishes, and some minnows normally live less than one year. Larger whale sharks, sturgeons, groupers and carp may survive for 100 years or more. Many fish live 10 to 15 years—if they stay away from their enemies that long.

What is the oldest fish in the world? No one knows for sure. Large aquariums have not been around long enough to know how long a fish can live in captivity. But we do have ways of finding out a fish's age in the wild.

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●●●AGING FISH

Biologists who study fish can look at bony parts of fish, such as the spine, gill covers (**opercular bones**), bones of the ear (**otoliths**) and **scales**. Bones and scales grow in thin layers called **circuli**. These can be counted like growth rings of a tree trunk. In the summer, when fish grow faster, the layers grow larger and wider apart, and look light-colored. In the winter, when the water is colder and fish eat less, growth is slower—then the rings are thinner and closer together, and look dark colored. By counting the summer or winter layers in bones or scales, we know how many years a fish lived.

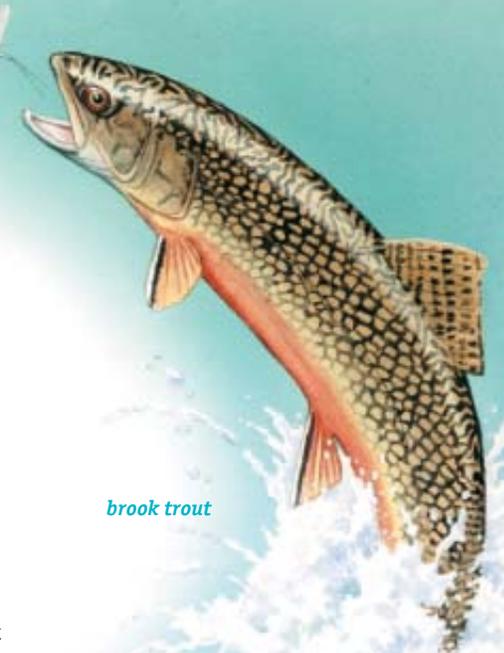
Most fish have scales that grow in rings (**cycloid scales**) or with jagged edges (**ctenoid scales**). A biologist can remove a scale like this and find out the fish's age without harming it.

For fish without scales, such as catfish, a piece of the fin spine is needed to study the fish's age. Even in some fish with scales, growth rings can be hard to see or count—then biologists have to look at the bones, especially otoliths, to learn the fish's age. But this means the fish must be killed.

And collecting otoliths takes more time and skill than removing a scale.

Some fish without scales have skeletons made of nonbony, flexible material called **cartilage**. The age of these fish, which include sharks and rays, is not as easily determined.

Tagging studies are another way to learn about age and growth in fishes. Biologists attach numbered tags on the outside or implant tiny electronic tags under the skin of a fish that can



brook trout

illustrations by David Williams

be read with a scanner. When a tagged fish is caught again, any change in length or weight can be measured.

Fish populations that are popular with anglers are usually managed to maintain their abundance. This is done through rules that limit the number and size of fish that can be kept. To keep track of how fish are doing,

biologists need to know their age and growth, when they become adults, and how long they live.

A healthy fish population has both old fish and young fish. Fish that grow very slowly, such as sturgeons and sharks, need special protection. Females need a chance to grow into adults so they can lay eggs or give birth. If too many of these slow-growing types are killed, it will take many years before the young fish that are left will be able to reproduce.



The more we learn
about fish,
the more we realize
how little we can afford
to take them
for granted.

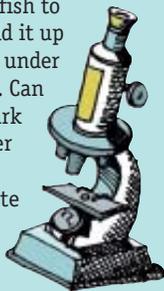
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explore your world

●●●GET OUTSIDE

Next time you catch a fish or see a live wild or captive fish, think about how old it might be. If you scale a fish to eat, save a scale and hold it up to the light or look at it under a microscope if possible. Can you see the light and dark bands indicating summer and winter periods of growth? Can you estimate the fish's age?



expand your mind

●●●WHAT DOES IT MEAN?

Longevity: maximum life expectancy

Opercular Bones: bony plates covering a fish's gills

Otoliths: "earstones;" small, flat-oval bones found inside the heads of bony fish

Circuli: small ridges of bone forming a circular growth pattern

Annuli: growth rings or bands representing one year of growth

Cycloid: smooth scales with no spines on the exposed surfaces

Ctenoid: scales with tiny spines on the exposed posterior surfaces

Cartilaginous: having a skeleton made primarily of cartilage, as in shark and rays

Two Smallmouth Bass... Does Bigger Mean Older?

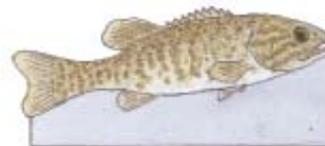
Fish keep growing throughout their lives, but habitat can affect an individual's growth rate.

In one study, researchers observed that smallmouth bass living in a small, cool stream grew to 8 inches in five years. Smallmouth bass living in a larger, warmer stream grew to 17 inches in

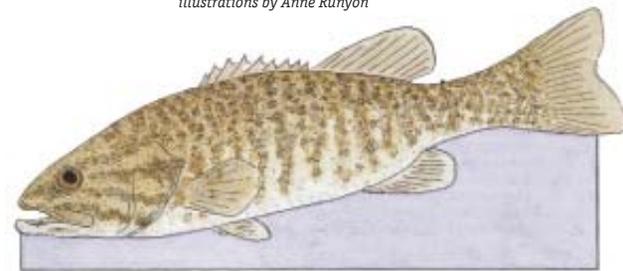
the same five years. These fish grew more than twice as long. Why?

The researchers think that the larger, warmer stream gave the bass a longer growing season with more insects, crayfish and small fish to eat. These smallmouth bass simply grew faster.

illustrations by Anne Runyon

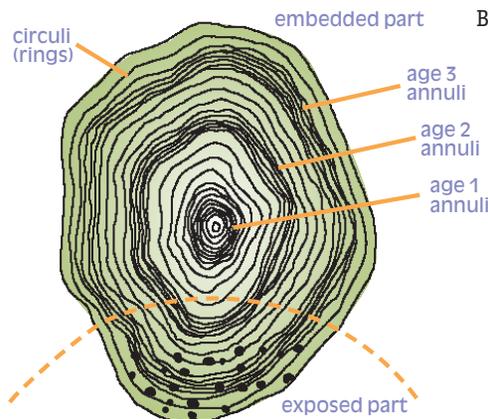


5 years old ● 8 inches long



5 years old ● 17 inches long

How old is this fish?



By looking at the pattern of growth ridges (*circuli*) on the scale, we can tell that this fish is 3 years old. The three dark bands of closely spaced *circuli* tell us that the fish has lived through three winters of slow growth. During the spring, the *annuli* (year marks) form, followed by bands of widely spaced *circuli* showing fast spring and summer growth. Can you see the periods of slow and fast growth on the scale?

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