

# Being a bouillabaisse of fascinating facts about

# FISH: The most-asked questions

The National Marine Fisheries Service annually answers thousands of questions about the oceans and the life that thrives within them. Questions come from seasoned scientists, from teachers, from elementary school pupils—from a whole host of citizens seeking knowledge that may be highly specialized, or may be rudimentary.

On the basis of a canvass of experienced marine scientists in the Fisheries Service, more than a hundred questions have been chosen as most representative. They are the questions asked most frequently, the topics that people find most interesting. They begin with: **Marine Finfish and How They Live.**

## Is life found at all depths in the ocean?

The question was settled in 1960, when Piccard and Walsh reported a swimming animal, resembling a sole or other flatfish about a foot long, at 35,800 feet deep, observed from a porthole of the bathyscaphe *Trieste*.

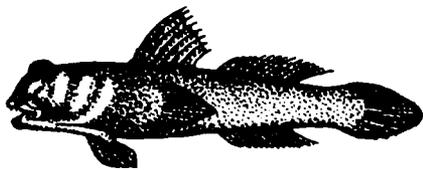
Some scientists believed, as recently as 1860, that marine life could not exist below 1,800 feet. That view was altered when a telegraph cable laid in the ocean bottom at 6,000 feet deep was retrieved and found covered with many forms of marine life.

## How many fish species are there?

The most oft-quoted estimate is 20,000. There may be as many as 20,000 more.

## Which is the oldest fish, as a class?

The most primitive fish-like animals are those with sucking mouths, such as lampreys and hagfishes, whose evolution stopped short of the development of biting jaws. Mainly bottom-dwellers, these animals are of great interest to zoologists, for many parts of their bodies show forms and functions that help to explain some of the evolutionary steps leading from low to advanced life forms.



## What is the world's largest fish? The smallest?

The largest is the whale shark, which grows to more than 50 feet in length and may weigh several tons; second largest is the basking shark, which may measure 35 to 40 feet long. The smallest fish is the tiny goby, an inhabitant of fresh-to-brackish-water lakes in Luzon, Philippines. It seldom is longer than a half-inch at adulthood, yet is so abundant it supports a fishery.

## What is the most common fish in the sea?

Any of the several species of *Cyclothone*, a deepwater fish sometimes called a "bristle-mouth." Rarely visible at depths that man can readily reach, the fish is about the size of a small minnow. It is netted at 500 meters or deeper all over the world.

## What is an anadromous fish? A catadromous fish?

An anadromous fish, born in fresh water, spends most of its life in the sea and returns to fresh water to spawn. Salmon, smelt, shad, striped bass, and sturgeon are common examples. A catadromous fish does the opposite—lives in fresh water and enters salt water to spawn. Most of the eels are catadromous.

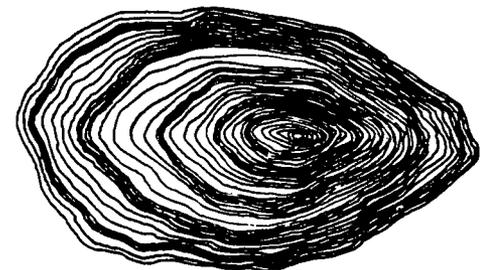
## Why do scientists classify fish?

Since common or colloquial names of fish vary from place to place (menhaden, for example, are known by at least three different names, and striped bass are called "stripers" in New England and "rockfish" in Chesapeake Bay), investigators would have no way of differentiating among species without a uniform naming system.

The system used to name the 20,000-odd fishes known to science is called "the binomial system of nomenclature." It usually consists of a scientific name in two parts, the generic and specific names, or three parts if subspecies have been described. The words of the names are latinized regardless of the language or alphabet of the study and are frequently descriptive of a significant feature of the organism. The generic name generally applies to several species showing basic characteristics while a specific (species) name is based on a few characteristics applying to one species, separate and distinct from all others. (Example: The generic name *Morone* applies to white perch, white bass, and striped bass; the species names for those three fishes are *Morone americanus*, *M. chrysops*, and *M. saxatilis*.)

## How is the age of a fish determined?

Mainly by two methods: Growth "rings" on scales, and/or ringlike structures found in otoliths (small bones of the inner ear), are examined and counted. The rings correspond to seasonal changes in the environment and can be compared to the annual rings of tree trunks. A series of fine rings are laid down in scales for each year of life—in summer, the rings grow faster and have relatively wide separations; in winter, slower growth is indicated by narrow separations between rings. Each pair of rings indicates one year. Because scale rings are sometimes influenced by other factors, scientists often use otoliths, whose ringlike structures also indicate years of life.



## How long do fish live?

A few weeks or months (some of the small reef fishes) to 50 years or more (sturgeons). Longevity information is still sparse, but scientists have learned that species live 10 to 20 years in temperate waters.

## Do some fish give birth to living young?

Yes, many do. These are called viviparous fishes. The sea perches of the Pacific coast, for example, give birth to living young of considerable size, sometimes one-fifth the size of the mother. Several kind of sharks produce living young.

## Do fish breathe air?

Yes, but not directly into the lungs as mammals do (except for some tropical fish). As

water passes over a system of extremely fine gill membranes, fish absorb the water's oxygen content. Gills contain a network of fine blood vessels (capillaries) that take up the oxygen and diffuse it through the membranes.

#### **How do fish swim? How fast?**

Primarily by contracting bands of muscles in sequence on alternate sides of the body so that the tail is whipped very rapidly from side to side in a sculling motion. Vertical fins are used mainly for stabilization. Paired pectoral and pelvic fins are used primarily for stability when a fish hovers, but sometimes may be used to aid rapid forward motion.

Tunas and tuna-like fish, billfish, and certain sharks are the speed champions, reaching 50 miles per hour in short bursts. Sustained swimming speeds generally range from about 5 to 10 miles per hour among strong swimmers.

#### **Can fish swim backwards?**

A number can, but usually don't. Those that can are mostly members of one of the eel families.

#### **Do all fish swim in the horizontal position?**

Most do. The sea horse is among the exceptions. Another is the shrimp fish of the Indian Ocean, which congregates in schools of several individuals and swims vertically, its long tube-like snout pointing directly upward. A catfish indigenous to the Nile and other African rivers also swims in the vertical posture. Many kinds of midwater deepsea fishes swim or rest vertically.

#### **Do fish chew their food?**

Not in the human manner. Carnivorous fish use their sharp teeth to seize and hold prey while swallowing it whole or in large pieces. Bottom dwellers such as rays are equipped with large flat teeth that crush the shellfish they consume. Herbivorous fish (grazers) often lack jaw teeth, but have tooth-like grinding mills in their throats, called pharyngeal teeth. Fish would suffocate if they tried to chew, for chewing would interfere with the passage of water over the gills, necessary for obtaining oxygen.

#### **Can fish distinguish color?**

Most fish are colorblind, despite the opinion of many sportfishermen. Fish can see color shadings, reflected light, shape, and movement, which probably accounts for the acceptance or rejection of artificial lures used by fishermen.

#### **Are all fish edible?**

Most kinds encountered by anglers are. The organs of some species are always poisonous to man; other fish can become toxic because of elements in their diets. The latter are most often from tropical regions of both the Atlantic and Pacific Oceans. Scientific literature has pinpointed danger areas in which the disease called "ciguatera" (a disease dangerous to man) may occur in tropical and subtropical fish.

#### **How can poisonous fish be distinguished from edible ones?**

They cannot, without personal knowledge of the types of fish which are at times poisonous.

Frequently local customs can be relied upon. A comprehensive three-volume publication on the subject is entitled "Dangerous Marine Animals" by Dr. Bruce Halstead.

#### **Why do food fish sometimes have a strong odor?**

For most species, truly fresh fish is almost odorless. Fish begin to smell "fishy" when deterioration sets in, often caused by incorrect storage practices that bring about the release of oxidized fats and acids through bacterial and enzymatic action.

#### **Is there much salt in fish?**

Very little in most. More than 240 species contain so little salt that doctors recommend them in salt-free diets. Shark meat is salty—as salty as the sea the shark lives in.

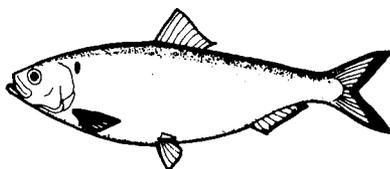
#### **What is the blood-like material found along the backbone in the body cavity of most fishes?**

The kidney. It is usually removed when the fish is cleaned.

#### **Can shark meat be used as food for humans? Is it true that the meat of the hammerhead shark is poisonous?**

Yes to the first question. Shark meat is palatable and nutritious if properly prepared. In some countries shark meat is marketed under its common name, in others it is marketed under various names. The fish in England's "fish and chips" is very often dogfish (a shark) or school shark. The prejudice against shark meat arises from a distaste for the scavenging habits people attribute to sharks, and to the fact that the meat spoils quickly. The meat of certain species is apt to be strongly flavored, a characteristic that may be reduced by icing for 24 hours, then soaking for two hours in brine. Dry salted shark has become a staple food in some countries where salt cod was formerly popular. But shark liver should never be eaten—its high concentrations of vitamins can cause illness in humans.

It is only a rumor that the hammerhead is poisonous.



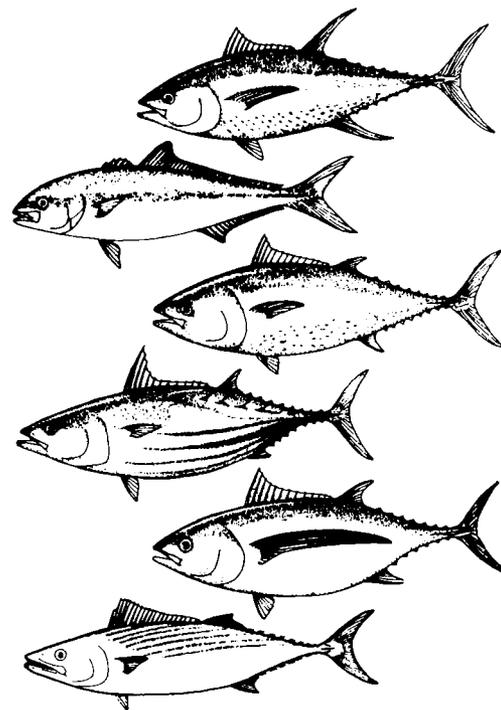
#### **What is the true description of a sardine?**

Commercially, the name has come to signify any small herring-like ocean fish. In the United States, it is mandatory that when the name "sardine" is used on a can, the country or state of origin be listed, and a statement must appear that identifies preserving and flavor supplements.

#### **How many kinds of tuna are there, and which kind makes up the biggest catch?**

There are seven commercial and sport-caught tunas, as well as several related species, all of which are members of what is called the scombrid family. Commercially caught tunas consist of albacore, bigeye, blackfin, bluefin, bonito, skipjack, and yellowfin. Yellowfin,

taken in the eastern Pacific and tropical Atlantic, makes up the biggest U.S. commercial catch. Albacore, caught in the eastern Pacific, is the true "white-meat" tuna; skipjack, caught throughout the world in tropical and subtropical waters, makes up the second largest U.S. commercial catch; bigeye is caught mostly in tropical waters; blackfin is caught commercially only in the Caribbean and off South America; the very large bluefin (rod-and-reel record, 1,040 pounds) is a highly prized sport catch in the Atlantic and Pacific; and the widely distributed bonito is used largely as pet food.



#### **Do tunas have scales?**

Yes, all species do, but scales are so small over most of the body as to be nearly invisible. Prominent scaling appears only around the head, on the cheeks, and in a triangular area on each side of the body near the head.

#### **Are saltwater catfish good to eat?**

The two species of sea catfish caught in U.S. waters are edible. The gafftopsail catfish is considered more tasty than the smaller common sea catfish.

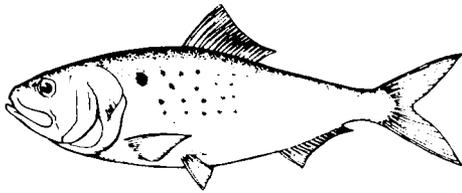
#### **What is the fish listed as "scrod" in New England restaurants?**

The name comes from a Middle Dutch word "schrode" meaning a strip or shred. In New England scrod may be immature cod or haddock weighing 1½ to 2½ pounds. Sometimes the term is applied to cusk of about the same weight, or to pollock weighing 1½ to 4 pounds. When fishermen use the word, they are usually referring to gutted small haddock.

#### **What are menhaden?**

Menhaden are silvery, herring-like fish that travel in large schools along the Atlantic and Gulf of Mexico coasts of the United States. Plankton-eaters, menhaden attain a weight of about three-quarters of a pound. Flesh is oily and considered inedible for humans. The

fish are caught by purse-seine nets in shallow water and processed into oil for cosmetics and fish meal for animals, particularly for poultry. Menhaden support the largest fishery by volume and the eighth most profitable fishery in the United States.

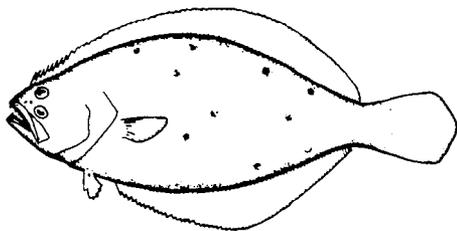


**Where are Atlantic menhaden spawned, and where do they go after hatching?**

Spawning is in the ocean. One important spawning site is at Onslow Bay, North Carolina. Some spawning takes place along the Atlantic coast from Massachusetts to Florida. The young menhaden first drifts with currents until it reaches an inlet, then works upstream to live for the summer near freshwater. In fall, schools move downstream to permanent ocean residence.

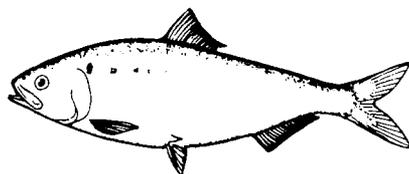
**What do herring eat?**

They subsist on zooplankton. Herring, which populate the oceans in enormous numbers, play an important role in the oceanic food chain in that they are primary converters of plankton. Herring form the food base for many larger species, and enormous quantities are taken commercially for fish meal, human food, and bait.



**Are the eyes of flatfishes on the right or left side?**

Except for the rare abnormal specimen, two of the four flatfish families (tongue soles and turbot) are always sinistral (eyes on the left side); the other two (both flounders) are dextral (eyes on the right side).



**Has any kind of marine or ocean dwelling fish been successfully transplanted from coast to coast in the United States?**

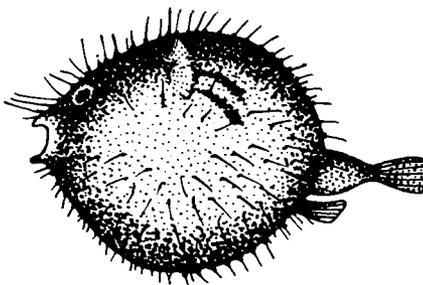
Yes, larvae and juveniles of the shad and the striped bass were taken from the Atlantic and released in the Pacific in the 1870's. So successful were the transplants that shad became permanent inhabitants of waters from southeast Alaska to Los Angeles, and striped bass support a good sport fishery off the California and Oregon coast.

**How large do ocean sunfish get?**

All four species reach from seven to ten feet in length. Because of their tremendous weight, the fish are difficult to land and weigh. One accurately weighed specimen tipped the scales at 3,102 pounds.

**How do porcupine fish inflate themselves?**

All puffer-like fish inflate by pumping water into special sacs when in their natural environment. Out of water, a puffer fills the sacs with air instead, and takes on a balloon-like appearance.



**What is an "exotic" fish?**

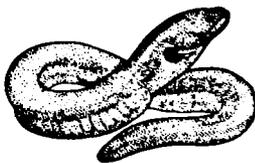
One not native to an area, but introduced either by accident or design. Some such species can cause problems. Often their natural predators are absent from the new area, permitting more rapid reproduction rates than those of natural inhabitants, sometimes at the expense of more desirable native fish. The "walking catfish" in Florida is an example. Thought to have escaped from a private aquarium, the catfish have shown a remarkable ability to avoid eradication efforts by man. An aggressive and voracious fish, it poses a threat to other forms of aquatic life. Population is now estimated in the millions.

**What fishes are named after other animals?**

Many are named after animals—alligator, bird, boar, buffalo, cat, cow, dog, elephant, frog, goat, goose, hawk, horse, leopard, lizard, parrot, porcupine, rabbit, sheep, squirrel, tiger, toad, unicorn, viper, wolf, and zebra.

**What kind of fish is a "Bombay Duck"?**

Also called bummalu, Bombay Duck is a marine lizardfish from southern Asia, particularly abundant in the Ganges Delta and the Arabian Sea of western India. The ordinarily small fish is split, boned, and sun-dried, and used as a condiment.



**How much electricity does an electric eel generate?**

The average discharge is more than 350 volts, but discharges as high as 650 volts have been measured. Voltage increase until the eel is about three feet long, after which only amperage increases. Some South American eels measure 10 feet in length.

**What are moray eels and where are they found?**

Moray eels belong to a family of fish which differs from the common eels by their lack of side fins, their well-developed teeth, and their lack of scales. Common eels have embedded scales, but these are not readily noticeable.

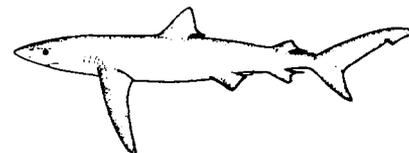
Morays occur in tropical and subtropical seas of the world. In the United States, they are usually found in quantity only in Florida waters, although they have been seen as far north as North Carolina and even New Jersey. Little is known of their breeding habits except that the young pass through a stage which is very thin, ribbonlike, and transparent. Morays feed largely on other fish caught as they work their way through coral reefs. Some morays are equipped with teeth in the back of the mouth for crushing hard-shelled animals such as clams and oysters.

Morays are occasionally caught on hook and line by fishermen, sometimes are captured by trawlers that drag nets over the bottom. People in some parts of the world value the moray as food.

Some Pacific morays measure as long as 10 feet and are considered dangerous to man when aggressions are aroused, generally by divers' actions. Several records exist of attacks on humans by wounded morays.

**What is pearl essence?**

It is the silvery substance in the skin of herring and other fishes. Pearl essence is a lucrative byproduct of herring fisheries inasmuch as it is essential to the manufacture of lipstick, nail polish, paints, ceramics, and costume jewelry.



**Is the blue shark really blue?**

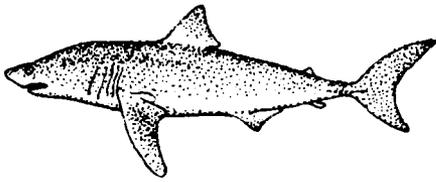
In life the blue shark displays a brilliant blue color on the upper portion of its body and is normally snowy white beneath. The blue quickly fades to dull grey after the shark is killed. The mako and porbeagle sharks also exhibit a blue coloration, but it is not nearly as brilliant as that of a blue shark. In life most sharks are brown, olive, or grayish.

**What attracts sharks? Which are most dangerous?**

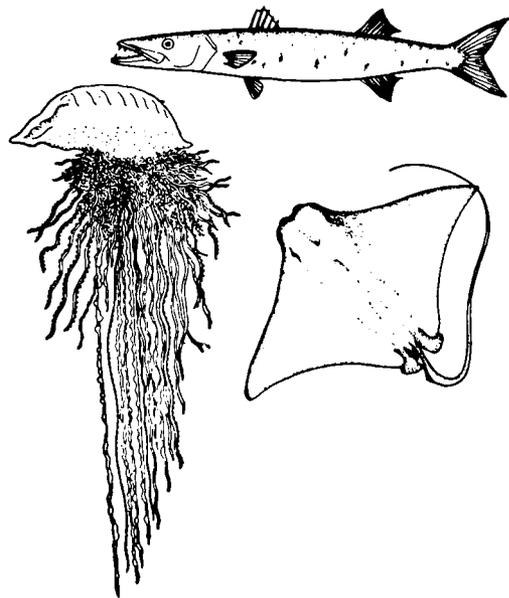
Considerable research has been devoted to finding out what stimuli attract sharks and incite them to attack. Results are mostly inconclusive, but some general principles have been advanced: Certain types of irregular sounds—like those made by a swimmer in trouble or a damaged fish—seem to attract sharks from great distances. Sound, rather than sight or smell, seems to be a shark's primary cue for moving into an area. Some scientific experiments indicate that sharks can distinguish light colors from dark, and that they may even be able to distinguish colors. Yellow, white, and silver seem to

attract sharks. Many divers maintain that clothing, fins, and tanks should be painted in dull colors to avoid shark attacks.

Though blood itself may not attract sharks, its presence in combination with other unusual factors will excite the animals and make them more prone to attack.



The most dangerous species in order of documented attack records are: the great white shark, bull shark, tiger shark, grey nurse shark, lemon shark, blue shark, whaler shark, sand tiger, several species of hammerheads, and the mako. Some species such as the nurse shark are extremely sluggish and have poorly developed teeth, but even these have been known to attack man when excited or disturbed.



**What sea creatures other than sharks may be dangerous to swimmers?**

The barracuda (though divers claim its ferocious reputation is undeserved), moray eels, octopuses, and sharp-spined sea urchins can be dangerous to swimmers. The Portuguese man-of-war has tentacles up to 50 feet long with specialized cells that produce painful stings and welts on contact by swimmers. Sting rays, toadfish, catfish, and jellyfish can inflict damage on swimmers and waders. Certain coral-reef organisms are to be avoided by divers.

**How many species of Pacific salmon are there?**

There are six: Chinook, coho, pink, sockeye, chum, and masu. The first five are found in North America. The masu occurs only on the Asiatic coast of the North Pacific.

**Is it true that salmon return to spawn in freshwater areas where they were born?**

Almost always. Some straying has been docu-

mented, but it is minor. Most spawning salmon return to the precise stream of their birth, sometimes overcoming great distances and hazardous river conditions to reach home.

**What is the difference between the Atlantic salmon and the Pacific salmon?**

The Atlantic salmon is actually a member of the genus *Salmo*, or trout family, not a salmon, which is placed in the genus *Oncorhynchus*. The misnomer is so widely accepted that it would only cause confusion to rename the species. The main biological difference between the Atlantic and Pacific "salmons" is that *Salmo* may spawn more than once, and *Oncorhynchus* die soon after one spawn.

**Where do salmon go in the ocean?**

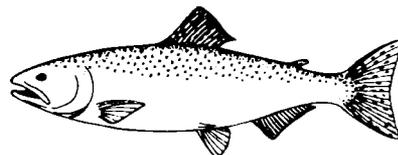
Contrary to earlier beliefs, many salmon from North American rivers roam far at sea in the North Pacific Ocean and the Bering Sea. The oceanic distribution of the salmon is dependent upon the species and point of origin. Sockeye and chinook salmon from northwest Alaska, for example, may migrate across the Bering Sea to areas close to Kamchatka, U.S.S.R., and south of the Aleutian Islands into the North Pacific Ocean; the sockeye also migrate eastward to the Gulf of Alaska. Salmon such as the pink, chum, and coho from central and southeast Alaska, British Columbia, and Washington State, migrate out into the northeastern Pacific and Gulf of Alaska. Many steelhead trout from Washington and Oregon are known to migrate far at sea to areas off the Alaskan Peninsula. Some salmon migrate several thousand miles from the time they leave the rivers as juveniles until they return as adults. A chinook salmon tagged in the central Aleutian Islands and recovered a year later in the Salmon River, Idaho, had traveled about 3,500 miles; a steelhead trout tagged south of Kiska Island (western Aleutians) was recovered about six months and 2,200 miles later in the Wynoochee River, Washington.

**What is a kokanee, or silver trout?**

It is the landlocked subspecies of a sockeye salmon. The kokanee spends its entire life in fresh water and usually does not attain the size of its sea-migrating cousin.

**Do landlocked Pacific salmon die after spawning?**

Yes. This phase of their life history is the same as their seagoing relatives.

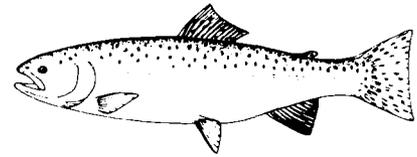


**How large do salmon get?**

Weights of 100 pounds and slightly over have been reported from European countries for the Atlantic salmon; the record for the largest of the Pacific species, chinook, is 261 pounds for a fish caught on commercial gear in Alaskan waters.

**What is the oldest known age of salmon and steelhead (in completed years)?**

Pacific salmon: chinook—7; sockeye—7; silver—4; chum—6; pink—2  
Atlantic salmon: 8  
Steelhead trout: 8



**Is a steelhead a salmon or a trout?**

The steelhead is a rainbow trout that migrates to sea as a juvenile and returns to fresh water as an adult to spawn. Unlike the Pacific salmon, the steelhead trout does not always die following spawning and may spawn more than once and return to the sea after each spawning.

**How old are salmon when they migrate from fresh water to the ocean?**

That depends on species:

Chinook—fall chinook, 3–4 months after hatch; spring chinook, 12–16 months;  
Coho—12–24 months;  
Chum—a week to a month;  
Sockeye—12 months to 36 months;  
Pink—a week to a month.

**How many eggs do salmon have?**

Generally from 2,500 to 7,000 depending on species and size of fish. The chinook salmon generally produces the most and largest eggs.

**What are salmon fed in a hatchery?**

Vitamin-rich, high-protein diets made up of dried meals from coarse fish, animal meat excess, plant meal and bone meal, or meal from calcium-rich shells.

**How many of the young salmon released from hatcheries come back as adults?**

Releases of large fingerlings usually result in returns of one to five percent.

**Why are fishladders constructed?**

A fishladder, or fishway, often used in salmon country, is constructed to provide for upstream passage of fish over a dam or a natural barrier that might prevent or impede progress to spawning grounds.

**How can I maintain a small saltwater aquarium?**

Three principal rules must be followed:

(1) Keep it clean. Remove excess food, coral, algae, and miscellaneous debris. Omit over-decoration with coral, sponges, and other marine plants. Marine aquariums are vulnerable to pollution by spoiled food.

(2) Stock sparingly, using no more than a single one-inch-long fish per gallon of water capacity.

(3) Use quartz sand on a sub-sand filter in the bottom of the aquarium. Good filtration is vital. In addition, some monitoring of fish behavior is advisable—fin-nipping, for instance, may be a sign of problems. Consult literature for precise information.

(To be continued)