

Tunas—Nomads of the Sea

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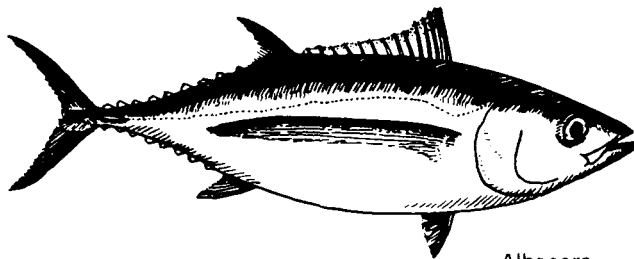
THE FISHERY for tunas is an ancient one, yet modern man does not know a great deal more about these fishes than his ancestors did. Their very nature poses a stumbling block, for tunas are the nomads of the seas.

The commercial tunas belong to the tribe Thunnini of the family Scombridae, and are related to such fishes as marlins, swordfish, and sailfish, whose speed, size, and stamina rank them among the world's most popular gamefishes. Because tunas are plentiful and occur in many geographic regions, they form the basis for some of the world's most thriving and productive commercial and recreational fisheries. Nearly 70 nations have coastal and inland tuna fish-

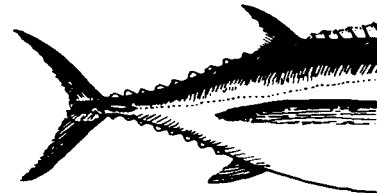
eries, using methods ranging from small primitive sailing boats to massive modern purse-seine liners. These fisheries are generally categorized according to depth fished or type of gear used. Pole-and-line, trolling, and netting purse-seine are used by the surface fisheries, while longliners fish the subsurface waters.

Different Species at Different Latitudes

The important commercial tunas fall into two major geographic groups: temperate and tropical. Temperate tunas inhabit both the northern and southern temperate latitudes. These include the northern and southern bluefin, and the albacore, which all



Albacore



migrate seasonally to warm-water regions for spawning.

The tropical tunas, which include the skipjack, yellowfin, and bigeye, are widely dispersed. Because they do not undertake a spawning migration, they tend to travel less and generally remain within the same geographic area throughout their lives.

The delicate-tasting tuna meat used in casseroles, salads, and other dishes usually comes from five major species. The mildly flavored canned white tuna sold in supermarkets is always albacore tuna. The somewhat darker, light-meat tuna which has a more pronounced flavor, comes from yellowfin, bigeye, bluefin, or skipjack.

Because tuna is nearly as costly as beef, most of the tunas harvested by other countries are exported as a cash crop. Ninety percent of the world's tuna catch is used in just a few countries: the United States, Japan, France, Spain, Italy, and West Germany.

Adult tunas encompass a wide size range. The tiny bullet tuna only reaches 7 pounds, while the giant

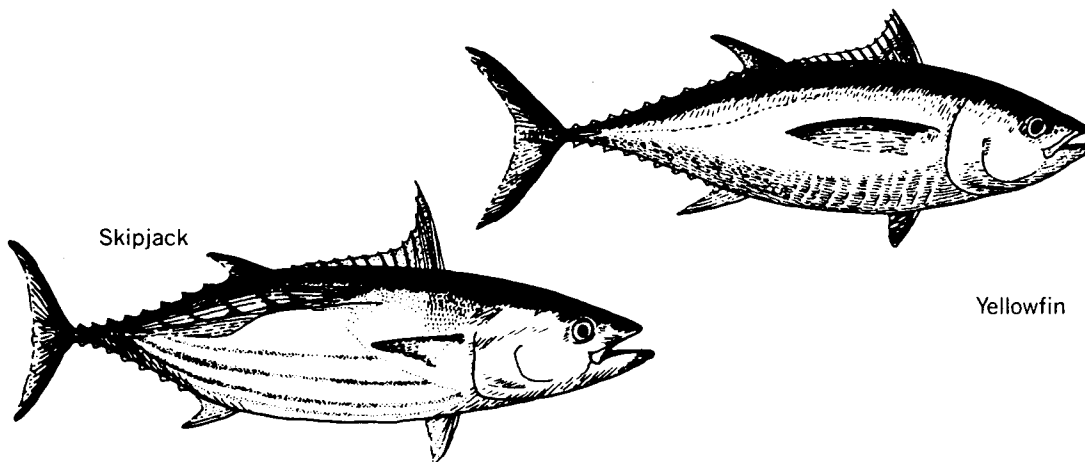
7 pounds = 3.17 Kilograms

bluefin can weigh 1,500 pounds or more. Their age can be determined by counting the rings that develop in the inner ear bones, or otoliths, in much the same way that a forester might count the growth rings on a tree. This research is still at an early stage, but results indicate that some species live from 15 to 20 years.

A Rarity — Warm-Blooded Fishes

Unlike almost all other fishes, tunas are thermoconserving, or warm-blooded, that is, they keep their bodies at temperatures higher than those of the surrounding waters. Scientists believe that the elevated temperature helps the tunas' eyes and brain to function more efficiently. This is particularly important because tunas locate their food primarily by sight, although smell may also be used. Their higher body temperature may also enable them to convert food more rapidly into energy, which they need for constant movement, respiration, and rapid bursts of swimming speed to pursue prey or escape predators.

1,500 pounds = 680 Kilograms



Skipjack

Yellowfin

Tunas are built for speed. They are among the fastest swimmers in the oceans and must move forward constantly to keep from sinking. They are very heavy in relation to their body length because of their densely packed muscles. They also lack or have a reduced swim bladder that would give them added buoyancy. The constant movement compensates for these physiological characteristics and also keeps a continuous passage of large volumes of water over the gills. This gives them the large supplies of oxygen they need for their metabolic processes.

To fuel their bodies for this constant swimming, tunas require enormous amounts of food. A skipjack tuna can eat up to 25 percent of its weight each day, and 10 percent is common among other species. Small

tunas (less than 15½ inches) can eat more than 30 percent of their body weight per day.

Tunas are opportunistic predators, eating whatever small moving prey they can catch. Although tunas have teeth, they usually gulp and swallow their prey whole. Smaller fishes, crustaceans, mollusks and, occasionally, plankton are all included in a typical tuna menu.

While stomach contents reveal what tunas feed upon, other aspects of their behavior such as mating practices are not well known. The parents do not appear to form a pair bond and do not provide care for the young. A male and female will separate from a school, release eggs and sperm into the water, and rejoin the group or swim off separately.

15½ inches = 39.4 centimeters

CLOSE BUT NEVER TOUCHING, members of a yellowfin tuna school sense the presence of nearby individuals and keep their distance. Active, pelagic predators, tunas possess many adaptations for rapid swimming. Among them are a fusiform, torpedolike body which reduces drag, and a lunate or crescent-shaped tail which provides for the greatest forward thrust at a high hydrodynamic efficiency.



In a single spawning, a female tuna releases many eggs, each about the size of a BB shot, and soft and rubbery in texture. Each egg contains an oil drop that causes it to float near the surface where it hatches after 30 hours. During its first few critical days of life, the larva lives off the yolk of its egg. After its digestive system has developed, the young tuna begins to hunt for food.

The chances of a larval tuna surviving its first few weeks of life are poor. Fighting to eat and not be eaten, only a few of the multitude of larvae will survive. Some will starve, but most will be eaten by other fishes, sea birds, and older tunas, which are cannibalis-

SMALL AND DELICATE, juvenile yellowfin tuna must be handled with forceps. They grow rapidly, reaching an average weight of 7 pounds by the end of their first year and as adults may weigh up to 350 pounds.



All illustrations courtesy of National Marine Fisheries Service except where otherwise noted

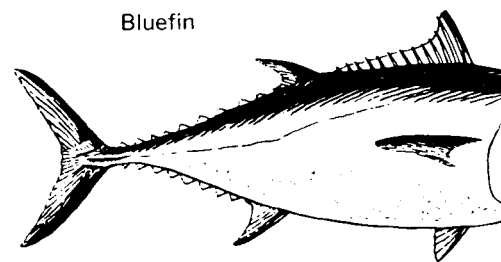
tic. What little is known about the life stages of tunas under 12 inches has been learned from studying the stomach contents of larger fishes.

Schools Only for the Young

It is known that young tunas grow quickly and remain near the surface of the ocean for their first three or four years. The survivors of a single spawning often swim and feed together in schools. Some of these schools may contain several species of young tunas, for the young generally prefer the warmer surface waters while the adults seek the cooler temperatures of the depths. This schooling behavior may protect the young because the constantly shifting and shimmering mass of the school makes it difficult for a predator to single out an individual to attack.

These surface schools are important to fishermen because enough tunas aggregate to make fishing profitable. In order to effectively manage these valuable tuna resources, however, scientists must define the areas occupied by these composite or

12 inches = 30.5 centimeters



Bluefin

Sea Frontiers

mixed schools, determine how and where the fishes move seasonally, and observe how members of each species in the schools mingle with tunas from other areas.

A tuna remains in surface schools for about five years. Then, for reasons scientists have yet to discover, it abandons the schools and becomes a more solitary, deepwater swimmer. Information concerning the swimming depths of the important commercial tunas has primarily come from depth measurements taken during fishing operations and research fishing tests. It has been found that the species composition will vary according to the season and geographic area being fished and the vertical distribution of the tunas. Different tuna species have different tolerances to ocean temperatures and oxygen levels. These tolerances will help stratify the tunas within a given area, not only by species but also by age group within a species.

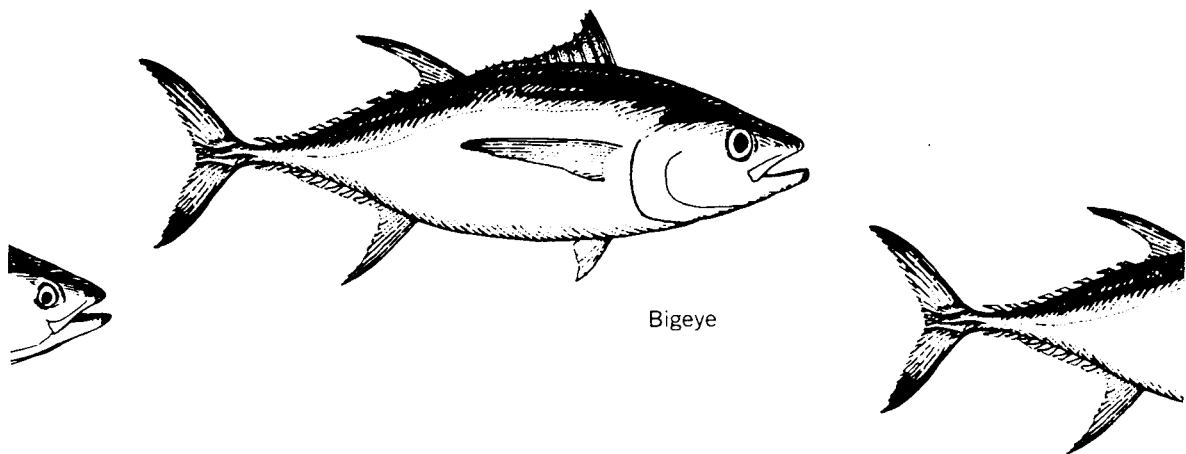
In the early 1970s, the Japanese, who support a large tuna fishing industry, experimented with special vertical long-line fishing gear in

order to record accurately depth information for commercially important species of tuna. Japanese scientists, Drs. S. Saito and S. Sasaki, designed equipment that had a depth recorder attached at each hook on a long-line. These scientists tested their gear west of Fiji. There they found that yellowfin and albacore tunas were abundant above 1,000 feet, but catches of these tunas declined rapidly below that point. However, the bigeye tuna, a premium, high-quality tuna important to the world's fisheries and the Japanese market in particular, appeared much more frequently below 1,000 feet, with its abundance still increasing at 1,246 feet, the deepest level fished in these experiments.

Reaching Deeper for Bigeye

The long-line gear currently in use can reach to 1,000 feet. While this will catch most species of commercial tunas, Saito and Sasaki believe that it does not reach the most abundant depths for bigeye tuna. The Japanese are now modifying their long-line

1,000 feet = 305 meters; 1,246 feet = 380 meters



gear in order to fish for this valuable species at a greater, and possibly more profitable, depth.

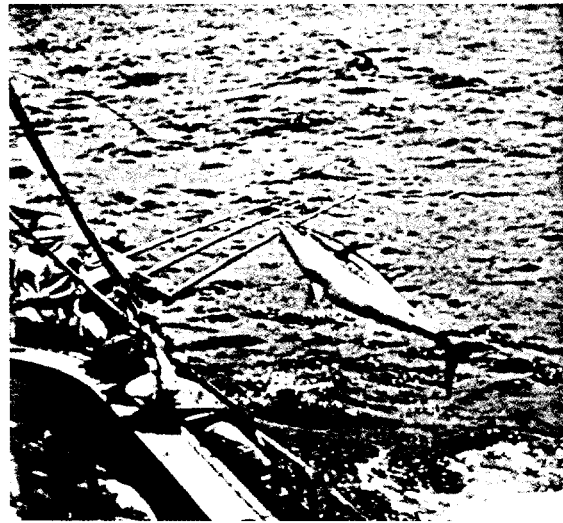
Tunas have the ability to migrate large distances, covering from 9 to 31 miles per day, and they can move independently of the ocean's currents. However, each species has limits on its distribution which keep it from ranging throughout all oceans.

One way to gather information on the movement of tunas is by tagging a fish and releasing it for recapture at a later date. When the fish is recaptured and the tag returned, the scientist can tell how far the fish has traveled between the two capture times. This will be a minimum distance traveled, since the fish will not always move in a straight line from one point to another. In addition to the time and place of capture, information concerning length and weight, fat content, blood, and general condition of the fish can be compared from the time that the fish was tagged to the time of its recapture.

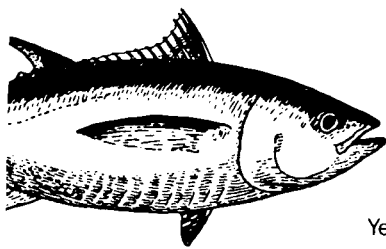
There is some disagreement among scientists as to whether tunas undertake migrations or whether they sim-

ply travel along with the prevailing currents. Perhaps continuing studies will some day shed more light on the movements and life style of these magnificent wanderers — these nomads of the sea. □

TAKING A FLYING LEAP, a yellowfin tuna is hooked by a pole-and-line fisherman (upper). Purse-seining which accounts for 30 percent of the world tuna catch utilizes nets (lower) sometimes over ½ mile long to encircle schools of tuna.



Bottom: Inter American Tropical Tuna Commission



Yellowfin

9 to 31 miles = 14 to 50 kilometers