

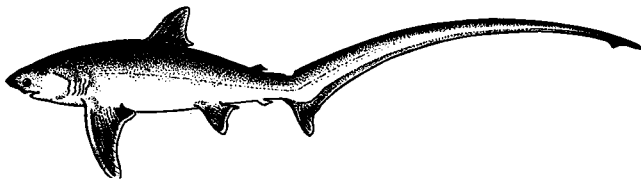
Some Large Marine Fishes

By E. LAURENCE PALMER

Illustrated by Ellen Edmonson

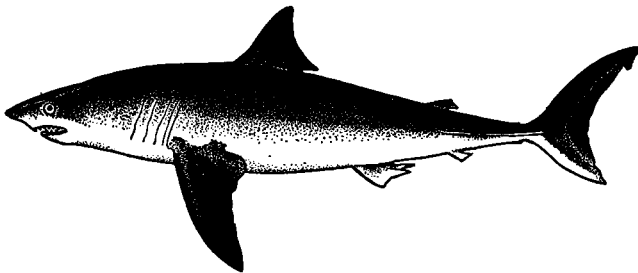
This is the seventy-fourth in NATURE MAGAZINE'S series of educational inserts.

IN THE spring of 1952 a fishing tackle company sent me a pocket piece that was a token for good luck when fishing. I showed it to a friend, who promptly pocketed it insisting that he needed it more than I did. Not long afterward I went on the most momentous fishing trip of my life—without the luck token. I had spent



THRESHER SHARK

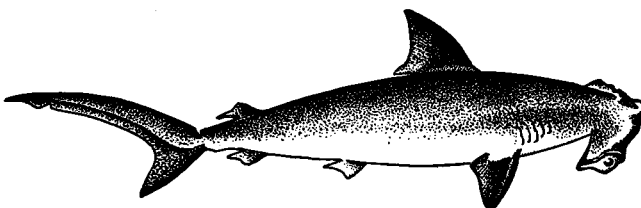
several days at the professional meetings of the Outdoor Writers Association of America in Miami, Florida. These sessions came to a climax on Friday, the thirteenth, when we pulled out of the harbor at Miami on a chartered cruiser in search of something big in the fishing line. Ours was the good ship *Ripride*—captain, Ollie Knittle—and I doubt that any combination of ship and captain could have provided a more exciting afternoon.



WHITE SHARK

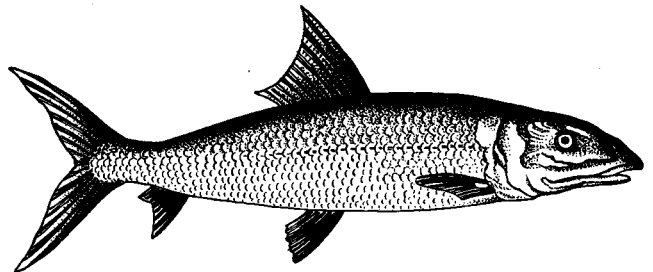
I have no faith in lucky tokens, and no fear of Friday the thirteenth, and I surely can blame neither Captain Knittle nor his yacht for what happened. However, that afternoon's experience is the chief reason why I elected to write this seventy-fourth special insert on large marine fishes.

Four of us Outdoor Writers had lines out as we passed the last buoy to our port side at the entrance of Miami



HAMMERHEAD SHARK

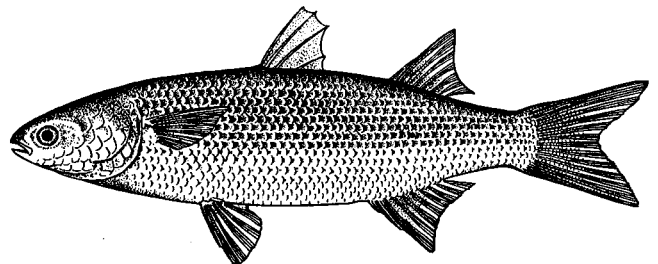
Beach harbor. Then things began to happen. A former student of mine, Mary Sherwood, "manned" the pole to the extreme port side, and I had the pole on the opposite side. Between us was a gentleman named Kelly from Canada, whose one ambition was to show his son a big fish when he got home. The fourth was a sporting goods dealer from the mid-west. Just as Mrs. Sherwood's bait passed the last buoy a huge, curved, dorsal fin cut the water in its vicinity. The hook was struck home and from then on, for more than six hours, things happened. Mrs. Sherwood quickly handed her pole to Mr. Kelly, saying that she could not handle the catch. At the time I wished that she had handed it to



BONEFISH

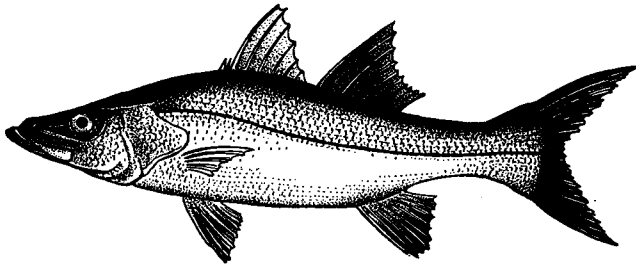
me, but eventually was glad that she had not. The huge blue marlin at the end of her line almost immediately leaped into the air and then set off. Captain Knittle settled down to a job that took him from Miami Beach more than twenty miles to Fort Lauderdale before darkness came.

After a long fight Mr. Kelly found he could not keep it up any longer and I took over, even though in doing

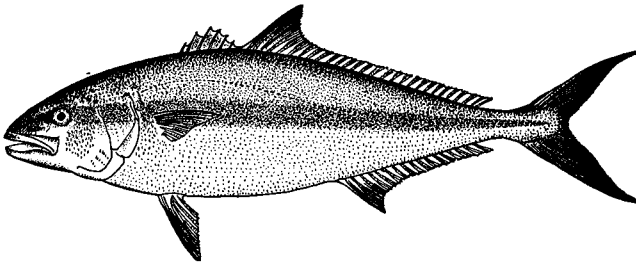


MULLET

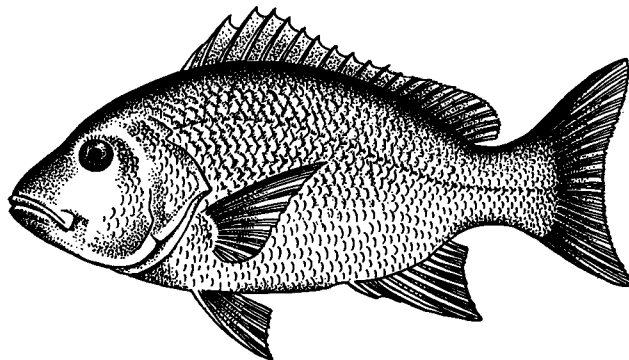
so the catch could not be recorded and credited to anyone. I kept at the job until I could do no more, and a boatman took over, with similar results. Eventually we got the huge fish up beside the boat. While I held a flash light on him the boatmen carefully drew the wire leader closer to the gaff. At the last instant the fish dove for the boat's propeller and the wire was snapped



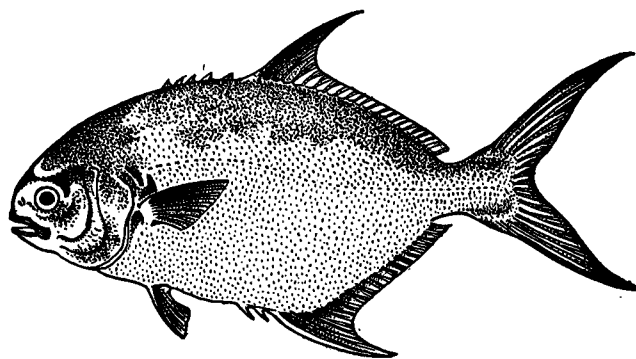
SNOOK



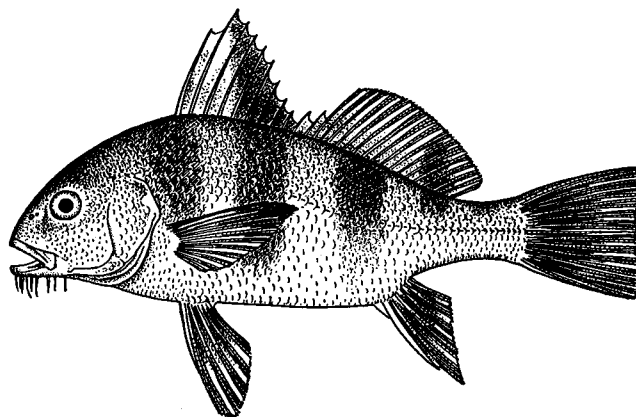
YELLOWTAIL



RED SNAPPER



POMPANO



BLACK DRUM

off short. The day was done, and a marlin, estimated by the experts on board to have weighed about two hundred pounds, went on his own with a hook about mid-marlin instead of in its jaws. I would have given a lot to see that fish mounted in Fernow Hall at Cornell University to rival the prize fishes of others on the university's faculty. Even so, I confess I would have been a little regretful to have seen the fish lose the fight after contending against the combined efforts of a large power boat, three professional fishermen, and four amateurs. The marlin deserved freedom.

I probably should apologize for recounting my experience with a big game fish of the sea. I have caught other good sized fishes of the various oceans I have visited, but I will never forget that bundle of "fight" at Miami.

If you will read the life history charts that accompany this insert you will notice how many of the species considered serve, either primarily or secondarily, as sports fishes. I could easily write the rest of this article about the recreational value of catching big game fishes. If I had the time I would tell you about a week end off the California coast with the tuna fleet, about catching mackerel off the coast of Mexico, and so on. But if I started in on that I would, in justice, have to tell about fishing for trout this year, as a youngster and in the years between. Before I got through with piscatorial reminiscence I fear you would be bored. Anyway, Dick Westwood, the editor of *Nature Magazine*, would use his blue pencil on my ramblings.

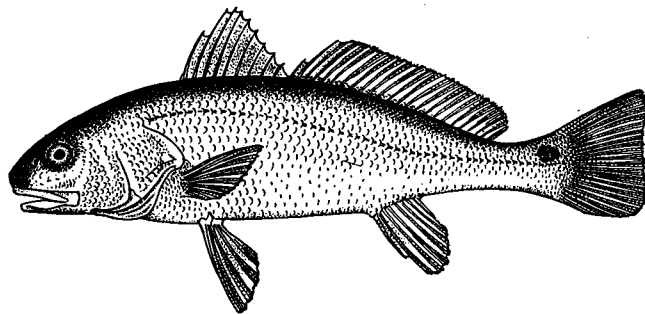
R. W. Eschmeyer, Executive Vice-president of the Sport Fishing Institute and an inveterate writer of excellent material, expresses the pooled judgment of most writers when he tells us that, to probably 25,000,000 of the 160,000,000 Americans, fishing represents the leading form of outdoor recreation. I can no more argue with him about those figures than he can argue with me about the size of the blue marlin we met near Miami. But we are agreed that to a substantial segment of our population, as Jack Van Coevering of the *Detroit Free Press* so aptly summed it up, "Fishin' for Fun" makes life worth living. Most of us fish for small, fresh-water panfish, largely for the fun of it. No doubt there are some like a certain southern gentleman, who insisted that he fished to prove to his wife that he did not have time to pare potatoes. There are many, however, who plan their lives in accordance with tides, open fishing seasons, and other factors, like migrations, that are likely to bring a man and his fish together with satisfying results to the human, at least. I have yet to decide whether the fact that they closed the trout season in New Zealand the day before I arrived and opened it the day after I left was good planning on the part of the New Zealanders, or poor planning on my part. At any rate my failure to synchronize dates reduced a bit the entire pleasure I got from that sojourn "down under."

As our populations grow larger, and as the speed of living increases, it is important that we preserve wholesome ways of getting recreation. To me fishing ranks about tops in this category. Whether I catch anything

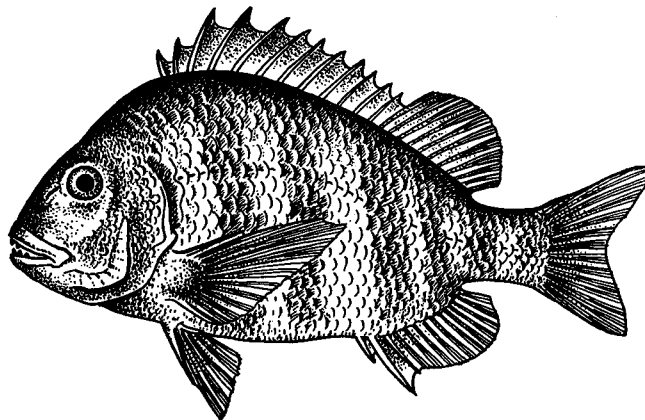
or not is less important than that I have the chance to try, and at least the hope that I may have luck. If we allow pollution to continue, if we increase the effectiveness of harvesting fish wholesale by mechanical means, if we continue erecting dams that prevent the reproduction of fish that must breed in fresh water, even though they develop in the seas, if we harvest indiscriminately the plants and small fishes that form the base of the food pyramid that supports large ones, then there is no hope for big sea fishes and for those who like to try to catch them. I might suggest that there even has been a decline in the wholesomeness of those who chronicle fishing, when I compare the English and philosophy of Henry Van Dyke with the jargon of Ernest Hemingway. Somehow I have faith that fishing ordinarily brings out the good in a person, providing, of course, it is there to be brought out. Three hundred years ago Izaak Walton wrote a little book on his philosophy of fishing. I rather think that *The Compleat Angler* and Henry Van Dyke's *Fisherman's Luck* will be read and appreciated long after we have forgotten a recently reported combat between an old man and a huge fish of the sea whose spine could be measured accurately even after its carcass had been torn to pieces by the sharks.

Zane Grey told us much about the joy of catching big fishes in various parts of the world. Many of us envied him his experiences. Most of us, however, have had some experience with fishes that came from the sea. We buy salmon, tuna and bonito in tin cans at the grocery. The old country store used to have dried cod, halibut, herring, and mackerel in a still recognizable form. There are few of us who have not eaten shrimps, clams or oysters that help to make up the food of many of the larger sea fishes, so really we do have some contact with the subject of this insert. With refrigeration what it now is, the number and variety of sea fishes available in a reasonably fresh form is greater than it was a generation ago. It is obvious that society recognizes a place for fishes in the lives of all of us. It behooves us to see that the supply is continued beyond our time. This is most likely to eventuate if we understand what it is all about. The Government Printing Office in Washington issues a 50-cent bulletin on the *Fisheries Resources of the United States*, which should be in every home and school in the country. We have no intention here of paraphrasing it, even in part, because we do not have the space to do so adequately. Get it for yourself for your library.

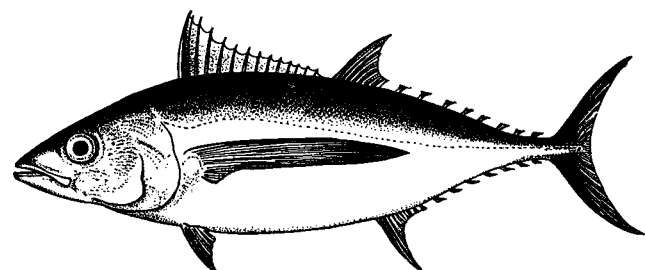
As is the case in any natural resource, the large fishes of the sea serve us variously. Surely we get fun from an afternoon when we are joined by a line with a huge blue marlin. But every Friday at my restaurant, whether I like it or not, there is fish on the menu, in the soup and in the air. Eventually some of it is in my stomach, and as often as not it is from a marine species. I go to a high-class social function, and am offered tunafish salad. Or I may find myself off in the corner surreptitiously getting rid of some fish-eggs that came from a sturgeon, which came from the sea, and got mixed into the little sandwiches that I unwittingly (Continued on page 32)



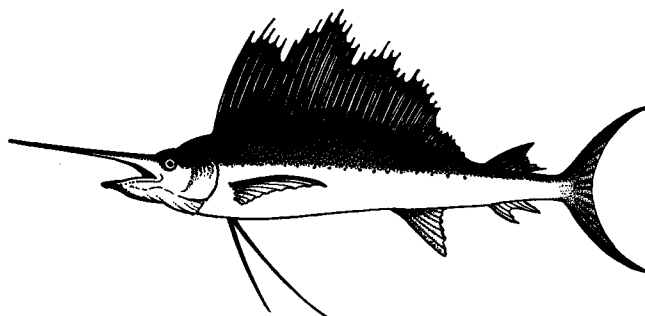
CHANNEL BASS



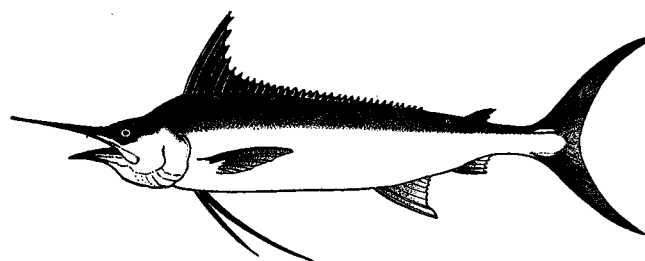
SHEEPSHEAD



ALBACORE



SAILFISH



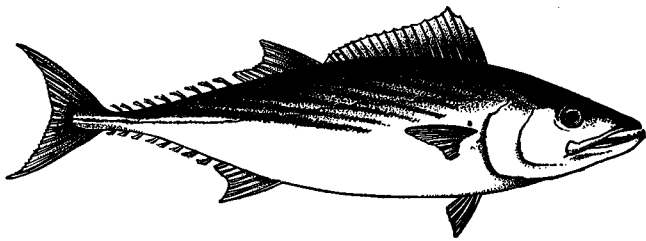
BLUE MARLIN

NAME SCIENTIFIC NAME	THRESHER SHARK <i>Alopias vulpinus</i>	WHITE SHARK, MAN-EATER <i>Charcharodon carcharias</i>	HAMMERHEAD SHARK <i>Sphyrna zygaena</i>	BONEFISH <i>Albula vulpes</i>
DESCRIPTION	Length to 25 feet, one-half of which may be upper lobe of tail. Weight to nearly 1000 pounds; a 13-foot shark may weigh 400 pounds. 5 gill slits, with last over pectoral fin. Eye, small. Scales, minute. Spiracles, missing. Teeth, small, triangular, smooth-edged. Snout, blunt. Mouth, below. White beneath; dark above.	Length to over 40 feet? A 21-foot animal weighed 7302 pounds, reputedly. Dull gray above, dull white beneath. Teeth, large, triangular, saw-edged, 26 on upper and 24 on lower jaws. Head conical but wider than deep. Gill openings wide, 5. Membrane or fold closes over eye. No spines in dorsals. Pectoral, dark spotted.	Length to 18 feet. Weight to 1500 pounds. A 12½-foot animal weighs to 900 pounds. Head to 3 feet wide, with eyes at extremities and nostrils in slit along front of snout. Membrane of fold may cover cow-like eyes. No spiracles. 1st dorsal high. Tail to 1/3 total length, upper lobe 3 times length of lower.	Length to 3 feet. Weight to 20 pounds. Usual weight about 2 pounds. Dark blue or greenish above and silvery on sides, with narrow, faint horizontal stripes and 8-12 dusky vertical bars. Fin bases yellowish. 65-75 scales in lateral line. Scales small, silvery. Mouth under pig-like snout, small.
RANGE AND RELATIONSHIP	One species bearing many names such as Fox, Swivel-tailed, Swingle-tailed, Whip-tailed Shark. Ranges widely northern Argentine to Nova Scotia; New Zealand to Japan. Most abundant in summer off New England, but never there in winter. Essentially an offshore form. Order Lamniformes. Family Lamnidae.	Order Lamniformes. Family Carcharhinidae. Ranges off shore, rarely abundant, most common off Australia. Found Nova Scotia to Brazil and Monterey, California, to Australia in tropical and subtropical waters. Found also from Spain to Cape of Good Hope in eastern Atlantic. Usually near surface, but a record of 700 fathoms is claimed.	Order Lamniformes. Family Sphyrnidae. Abundant in warm seas near or off shore, north to Maine and Japan. Known from Miocene times as fossils. 5 species, of which 3 are found off California. Bonnet-head, <i>S. tiburo</i> , spade shaped head with even form; Scalloped Hammerhead, with head notched in front.	Order Clupeiformes. Family Albulidae. Known as fossil family since Paleocene but <i>Albula</i> is recent. Closely related to ten-pounder <i>Elops</i> . Air bladder not connected to ear. Found in worldwide distribution in tropical and semi-tropical seas from Cape Cod and central California southward.
HABITS	Little known of life history, but female bears few young and these are large. A 14-foot female was found bearing an embryo 5 feet, 1 inch long. Maturity apparently reached in female at a length of about 14 feet. Young have been taken off Florida and New England.	Almost nothing known of its breeding habits.	Authorities differ as to whether this shark lays eggs or gives birth to living young, and wise writers merely state fact that up to 37 embryos have been taken from a single female. Young to 2 feet long, may be common in region of New York in summer. Young probably shift for themselves at once.	Probably eggs laid in deeper water. Young found in schools in harbors and shallows at night as transparent ribbons with dark eye spots, feeding at surface. At 3½ inches shrink to 2-inch length and assume usual adult fish form. Few spawning areas known.
FOOD	Food: fish such as herring, menhaden, mackerel taken by forcing school into compact circle, possibly by exciting by tail movement. Individuals may work together but reputed cooperation with swordfish is probably not authentic. Swift, nervous swimmers becoming exhausted if confined. Essentially surface feeder.	Feeds partly as a scavenger, but also on fishes, turtles, squids, other sharks, sea lions. One is recorded as having swallowed a horse whale, and a 30-foot white shark swallowed a whole young sea lion. Even a 7-foot shark was found to have eaten young sea lions whole. Tremendously hardy.	Food includes fishes, squids, crabs, sting-rays, barnacles. Teeth on upper jaw similar to but larger than those on lower, and with saw-toothed edges. Fast swimmers with extraordinary ability to change direction, the head helping in vertical change of direction. Fins dark tipped, especially the pectorals.	One of the fastest fishes known. Suspicious. Feed on mollusks and other small animals in mud on bottoms of shallows, often showing back and fins while feeding. Often feed in schools. Taken on hooks baited with crabs or mollusks dropped quietly in front of feeding school.
ECONOMIC IMPORTANCE	Not dangerous to man. Nuisance to fishermen, whose nets may be destroyed. Takes a baited hook and makes good game fish. A 922-pound fish is probably the rod and reel record. Flesh is popular as food in Japan and has been compared favorably with salmon but not emphatically so.	Probably worst of man-eaters, and worst at Australia, but has caused fatalities off New Jersey coast. Swimmers must be protected by nets where this shark is common. Known to attack boats when hooked or harpooned, but does not leap from water when hooked. Puts up prolonged and vigorous fight when hooked.	Known to attack man in Australia, and an 1805 record of one with human flesh inside in America, but probably its danger is overestimated. Skin thin, makes fine leather. Liver valuable. Flesh fine grained and popular as food in Japan. Because of activity and hardness is one of best shark sport fishes.	Because of speed and fighting ability considered one of finest of sport fishes, even though its flesh is usually considered of little food value. May be taken on fly. Initial run may be for 125 yards. Plugs, Brown Hackle flies, sand fleas, shrimps, and small hermit crabs used as lures.

<p>STRIPED MULLET <i>Mugil cephalis</i></p>	<p>SNOOK, ROBALO <i>Centropomus undecimalis</i></p>	<p>PACIFIC YELLOWTAIL <i>Seriola dorsalis</i></p>	<p>RED SNAPPER <i>Lutianus blackfordi</i></p>	<p>COMMON WEAKFISH, SEA TROUT, SQUETEAGUE <i>Cynoscion regalis</i></p>
<p>Length to 2 feet in the southern part of range, to 1 foot in the north-ern. Slender, with broad blunt snout. Teeth, minute. Scales, large, particularly on head. No scales on soft dorsals. Silvery, with dark heavy stripes on scale rows. 37-41 scales in lateral line. Dorsal fins well separated with four spines in 1st.</p>	<p>Length to 4 feet, but more likely about 1 foot. Weight to 51 pounds. Pike-like in appearance with long concave snout, longer lower jaw and relatively large eyes. Silvery in appearance, but dark greenish-brown above and with prominent, narrow, black lateral line. Dorsal fins dusky; ventrals yellowish. Fully and roughly scaled.</p>	<p>Length to 5 feet. Weight to 90 pounds. Shows conspicuous yellow stripes along the sides. Upper parts and back green or pale blue with silvery on the sides and beneath. Fins yellowish. 15-17 gill rakers on first gill below angle. A blunt keel is found on each side of the base of the tail area.</p>	<p>Length to 3 feet. Weight to 35 pounds. Sides, fins, eyes and whole body rosy red with black edges on tail and dorsal fins. Intensity of color may vary. Iris red. Rays in soft anal fin, 9. Large-headed, stocky fish with medium sized scales and a high arching lateral line.</p>	<p>Length to more than 2½ feet. Weight to 30 pounds. Silvery brownish above, with bright back and sides with irregular dark spots to streaks. Fins pinkish, yellowish, or greenish. Lower jaw the longer. Upper jaw with 2 large canine teeth not duplicated on lower. Mouth large and soft, giving the name "weak" to the fish.</p>
<p>Order Mugiliformes. Family Mugilidae. Found from Maine to Brazil and from California to Chile, also in Hawaiian Islands and Salton Sea. Related white mullet reaches 3 feet, and Brazilian mullet 18 inches. Former has soft dorsal and anal fins scaled. Latter has from 31-32 scales in lateral line.</p>	<p>Order Perciformes. Family Centropomidae. In tropical salt water from Florida to Brazil with center of United States abundance in Florida. Some thousands of pounds are taken annually along Texas coast, but the fish is more abundant in Mexico and Central America. This is not the snook of South African coasts.</p>	<p>Order Perciformes. Family Carangidae. A Pacific Coast species ranging off southern California and western Mexico shores; also found in Australia and South America. It is usually found off rocky shores, but also haunts kelp beds that support the smaller fishes on which it feeds. It is called California Yellowtail.</p>	<p>Order Perciformes. Family Lutianidae. Long Island to Brazil, sometimes north to Massachusetts, but most abundant in the Gulf of Mexico-West Indies area. There are more than 200 species of snappers in the family included in some 20 genera. At least a half dozen in this genus are commercially valuable.</p>	<p>Order Perciformes. Family Otolithidae, or, by some, the Sciaenidae. Included as weakfish are the Gray, with 10 anal rays instead of the 9 in others; the Sand, with pale coloration and no definite spots; the Spotted, with scaleless soft rays and body covered with spots, and the Common, as indicated above. Florida to Massachusetts.</p>
<p>Striped mullet spawn in autumn and early winter. White mullet spawn in May and June. There are nearly 100 species of mullets. They are all more or less of the schooling type, usually moving against tides and upwind. They may leap freely into air when pursued or when being netted.</p>	<p>Little known about the life history. The animals are reasonably abundant the year round where they are found, and while they may ascend streams to the limit of brackish water this may or may not be associated with breeding habits. The fish appears in schools and in Florida bite most readily in early summer.</p>	<p>Little is known about the breeding habits, or about its migrations, which might give some clue to these habits. They spawn in spring and summer and may be abundant off San Diego from March to May, and off Los Angeles from April to June. In fall and winter, they are found off Lower California.</p>	<p>Spawning probably takes place in deep waters off-shore as the young are rarely found in shallower waters. During the spawning period, which probably is in late summer or autumn, they rarely bite baited hooks, though this is not known as a fact. The schools of fish move about considerably.</p>	<p>From May to September from South Carolina to Cape Cod the eggs are laid near bottom, at depths of 3 to 5 fathoms. They float to surface and hatch in 1½ days. The young soon resemble the adults, and reach sexual maturity and spawn when from 3 to 4 years of age. Spawn regularly annually thereafter.</p>
<p>Feed largely on plant material taken in with mud and other extraneous substances. May be taken on such baits as bacon, bread, bananas and sometimes on light artificial flies. They may bite readily at night and jump freely when hooked. They are not netted easily except with large seines.</p>	<p>The small teeth are appropriate since snook feed largely on shrimp, crabs and small fishes. They do not pull shellfish like oysters from rocks, nor do they feed on large fishes. They are often found most abundant around pilings and in mangroves, where they can feed on small animals that may abound there.</p>	<p>Food is largely the smaller fishes that have the schooling habit, such as herring, mackerel, sardine, flying fishes, smelts and anchovies. They may also eat squids and shrimps. They dash wildly into the schools of their food organisms. May be taken by trolling or with a baited hook.</p>	<p>Food, crustaceans, shrimps and small fishes. They move out of waters where temperature goes below 50°F. and some believe that they move inshore in autumn. They may be most abundant 10 to 25 miles off shore in waters to 300 feet deep and when in schools may bite furiously.</p>	<p>Food is small fishes like mullet and herring and eels. Also eats shrimps and crabs. The "schooling" small weakfish weigh to 5 pounds and the larger more solitary common weakfish feed in surf and more active water, often taking baits at night. Smaller spotted weakfish commonly found over quiet flats and bars.</p>
<p>One of the most popular of baits when scaled and cut into strips. Flesh is from good to excellent depending, in part, on what it may have been eating. It is one of the more important commercial species to be found within its range and is popular as human food, for sport and for bait.</p>	<p>Some 500,000 pounds are caught annually in the United States, largely by sport fishermen. Plugs and baits are taken with a rush, and a good fight follows. The flesh is excellent, white and flaky, and is eaten fresh or smoked and eaten. The rod and reel limit is one that weighs 50½ pounds.</p>	<p>A commercial fish, being sold fresh, canned or otherwise processed. Sells like a cheaper tuna and an annual California pack might be 60,000 cases, although the take is apparently growing smaller along with the reduced amount of menhaden and anchovies available for its food. One of the most popular of sport fishes.</p>	<p>About 8 million pounds of snappers are taken annually by commercial fishermen, mostly in the Gulf of Mexico area. Many are taken by still fishing with hook baited with small live fishes or cut bait. Food value of the flesh is high and the sport value is considerable.</p>	<p>Annual catch of gray weakfish may reach 25,000,000 pounds. Record rod and reel catch of a weakfish is 17½ pounds. One of the most popular of all saltwater fishes. Larger fish leave shores in fall and return in spring off North Carolina coast. Male makes drumming sound, using air bladder in part.</p>

NAME SCIENTIFIC NAME	BLACK DRUM <i>Pogonias cromis</i>	CHANNEL BASS <i>Sciaenops ocellatus</i>	SHEEPSHEAD <i>Archosargus probatocephalus</i>	POMPANO <i>Trachinotus carolinus</i>
DESCRIPTION	Length to 4 feet. Usual weight 3 to 6 pounds, but some records of 50 and one of 146 pounds given. Hump-backed, with mouth set low at end of short, blunt snout and with numerous barbels from chin to below middle of eye. Adults silvery to brassy, becoming gray when dead. Young with 4-5 dark bars.	Length to more than 5 feet. Weight to about 85 pounds. Gray-silver with coppery or coppery-red cast, and with one or more conspicuous black spots near the base of the tail. Head long and without barbels, but with large outer teeth on the upper jaw. Fish under 15 pounds known as puppy drum.	Length to 30 inches. Weight to 30 pounds. Body conspicuously and coarsely banded with black over dark olive above and pale silver beneath. Name derived from protruding flat teeth such as show in a sheep. Bands darker and more distinct in younger fish. No distinct shoulder spots.	Length to 18 inches. Weight to 8 pounds. Average size, 1 to 2 pounds. Upper parts dark blue with head somewhat darker. Body silvery with golden touch. Dorsal fins blue. Anal fin, light orange. Tail dusky with a yellow border. Lacks cross bars found in related <i>T. glaucus</i> . Adults toothless.
RANGE AND RELATIONSHIP	Order Perciformes. Family Sciaenidae. Black drum has 41-45 scales in lateral line; the Atlantic croaker 64-72. Black drum has long, strong 2nd anal spine and high spines in the dorsal fin. A substantial fish in which a 3-foot fish would weigh about 34 pounds, or a pound to an inch.	Order Perciformes. Family Sciaenidae. Found along the Atlantic Coast from New York to Mexico, and on to Panama. Its best specimens are taken off the coasts of Virginia and North Carolina. They may be found in deep seas, but more commonly feed in inlets and bays; often brackish water near bottom.	Order Perciformes. Family Sparidae. Family, the Porgie Family, does not include the fresh-water sheephead, which belongs to the drums, Sciaenidae, or the Pacific Sheep-head, <i>Pimelometopon pulchrum</i> , which belongs to the Wrasse Family, Labridae. <i>Archosargus probatocephalus</i> ranges from Massachusetts to Gulf of Mexico, Tampico.	Order Perciformes. Family Trachinidae. Presence of 25 dorsal and 23 anal rays in fins distinguishes common Pompano from the round P. and the great P. which have 19-20 in the dorsal and 17-19 in the anal fins. Ranges from Cape Cod to Brazil and not known on the Pacific coast.
HABITS	Spawns in Gulf of Mexico from February through May, but found along Atlantic coast from Cape Cod to Argentine. Eggs deposited near bay entrances, a 44-inch fish laying to 6,000,000 eggs. Males give drumming sound during breeding period. To 10 inches at 1 year and matures at 15 inches the second.	Spawn chiefly in autumn along Texas coast about the mouths of inlets. Young drift with the tides into bays and lagoons. Here they develop rapidly with abundant food and shelter. By first winter, are 2 to 6 inches long, but in spring may move out into deeper waters. At 1 year, 13½ inches; at 2, 21 inches.	Spawns in Gulf of Mexico in March and April in to 8 feet of water over sandy bottoms. Eggs are round and when laid float to the surface where development continues. Adults not normally common over sandy bottoms except during breeding season. Eggs hatch in 40 hours at 77°F., non-adhesive and .8 mm.	In Gulf of Mexico spawns from April through June, with the females appearing well beyond the surf line and the young in the surf. Spawning is in moving water, probably over hard bottoms. North of New Jersey only young pompanos are found, indicating a juvenile migration north.
FOOD	A bottom feeder, eating shellfish and crustaceans, which are crushed by strong teeth. May feed in schools over oyster beds and have been reputed to do great damage to them. May also eat fishes in some amounts. Taken using cut bait or clams as bait and fished close to the bottom. An indifferent fighter.	Primarily bottom feeders, eating mullets, menhaden and similar small fishes, as well as shrimps, crayfish, sand fleas, squids and marine worms. May be taken by casting plugs or baits into surf, or by trolling or still fishing. They prefer a moving bait. Taken day or night usually at turn of tides.	Food is gleaned from bottom; includes mussels, barnacles, crabs, shrimps, oysters and similar animal life. Because of food, these fishes are found around rocks, docks, wrecks and the like. Most commonly taken at slack, high or low tides from May to September in northern part of the range.	Food is small animals such as crustaceans, hermit crabs, clams, shrimps, sand fleas and so on. Often appear in schools, but are influenced by temperature changes and may vanish from an area suddenly. Young may feed at water's edge being washed out with one wave and back with the next.
ECONOMIC IMPORTANCE	Important commercial fish with to 2,000,000 pounds representing an annual catch. On the debit side is the damage done to valuable oyster beds. The flesh is of mediocre quality and is coarse. The hard scales are used in making some kinds of cheap jewelry. 50%-80% from Texas. Inshore fish, black; offshore, silvery.	Excellent as food fish and superior as game fish, with sports fishermen and commercial fishermen probably harvesting about equal amounts. About 1,500,000 pounds are taken commercially in nets and sold in the fresh fish market. The species is one of the most important fishes of the South.	Of excellent food value and a popular fish with those fishermen patient enough to be still fishermen. Small crabs seem to be the most popular bait. A hooked fish makes an excellent fight, being considered one of the best fighters. Commercial fishermen take limited amounts in purse and haul seines and on lines.	Less than a million pounds taken annually by commercial fishermen. Now recognized as a game species by men who favor them above all others. Food value extraordinarily high. The entire crop harvested by commercial fishermen is used in the fresh-fish market, principally in the North.

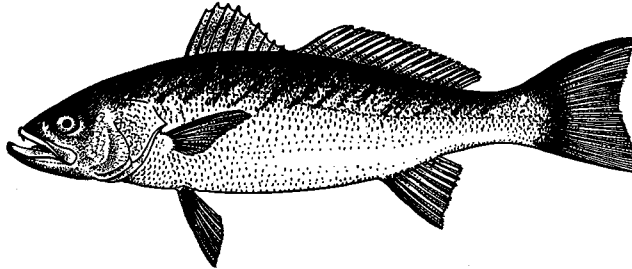
ALBACORE <i>Germo alalunga</i>	SAILFISH <i>Istiophorus americanus</i>	BLUE MARLIN <i>Makaira nigricans</i>	SWORDFISH <i>Xiphias gladius</i>	BONITO <i>Sarda sarda</i>
<p>Length to 5 feet. Weight to 66 pounds. Upper parts dark blue, becoming iridescent bronze to silver on sides and beneath. Fins bright yellow, possibly tinged with blue. Long pectoral fins reach beyond base of anal fin. Scales small. 7-8 finlets behind anal and 2nd dorsal.</p>	<p>Length to 8 feet. Weight to about 105 pounds. Back and upper areas bright dark blue. Sides and underparts bright silver, sometimes with lavender vertical lines. Dorsal high and dark purple with indistinct blotches of darker color. Conspicuous, long, slender upper jaw.</p>	<p>Length more than 13 feet. Weight more than 1200 pounds. Dark blue on back and upper sides, with lower parts silvery with sometimes narrow lavender bands running vertically on the sides. Dorsal fin, dark blue. Other fins, purple black. Dorsal fin, long and continuous and sickle shaped ahead.</p>	<p>Length to more than 15 feet. Weight to more than 1000 pounds. Conspicuous because of long, pointing, bill-like upper jaw. Lacks pelvic fins of the marlin and sailfish and has a shark-like dorsal fin. Brownish-black to bronze above and dirty cream-colored beneath. Body naked and without rudimentary scales of sailfish.</p>	<p>Length to 4 feet. Weight to 12 pounds. Back blue-black. Sides silvery, with narrow dark stripes running diagonally upward and backward over upper areas. Ventral fins whitish. Other fins dusky to dark. Entire body is scaled. Lateral line undulating slightly. Mouth terminal and large. Teeth relatively large.</p>
<p>Order Perciformes. Family Scombridae. Ranges through warm seas, occasionally from Massachusetts south to beyond Florida, and in Mediterranean. Also found from British Columbia and Alaska south to Chile, but most common off California in United States area.</p>	<p>Order Perciformes. Family Histiophoridae. Related to the Marlins, which may reach a weight of 800 or more pounds, but belong in another genus. A related tropical species is reported to reach a weight of 1500 pounds. Sailfish of Atlantic from Florida to Massachusetts. Pacific species Peru to California.</p>	<p>Order Perciformes. Family Histiophoridae. Blue Marlin and White Marlin range the Atlantic from Maine to South America, while the Striped Marlin ranges from California to Mexico, and the Black Marlin from Mexico on south. Good marlin grounds are found about Hawaii.</p>	<p>Order Perciformes. Family Xiphiidae. One species and one genus. Wide distribution in warmer seas of the world; in the Atlantic ranging north to Nova Scotia and in the Pacific north to Oregon. It succeeds at varied temperatures and at varied depths, but there is seasonal abundance at different places.</p>	<p>Order Thunniformes. Family Thunnidae. Included in the family are the tunas, mackerels, skipjacks and similar fishes. Oceanic Bonito is in the genus <i>Katsuwonus</i>. In this, the lateral line curves sharply downward. Common Bonito range from Maine to south of Rio de Janeiro and from Mediterranean to the Cape of Good Hope.</p>
<p>Believed that breeding takes place south of United States and Mexico since mature fishes are not found along the Pacific Coast of North America. This means that the young move northward before reaching maturity, as seems to be the case with some other fishes here considered.</p>	<p>Believed, with reservations, to spawn off Florida from June to August, and off Texas later in the year. Young are chunky with only slightly elongate jaws of equal length, with low dorsal fins and the head with barbed spines. By the time young reach length of 20 inches they resemble the adults in general.</p>	<p>Neither eggs nor larvae have been collected in American waters, and the smallest identified specimen was a 5-pound fish taken in the Gulf Stream off Miami Beach. There is suspicion that Blue Marlins breed off the coast of Cuba, but no concrete acceptable evidence to prove it.</p>	<p>In Mediterranean fish may swim towards shore in twos or threes from June to September, and some may come near shore off Cuba for breeding. Other breeding areas known. Eggs float and hatch in 2½ days. Young have rounded tails, equal-lengthed and toothed jaws and scales or plates over body. Resemble adults at ½ pound.</p>	<p>Spawning season in New York area is June and by September young fishes to 6 inches long are taken in that area. Little seems to be known about the general life history. The fishes occur in schools, which come in to shore periodically to feed, but spend much of their lives at sea offshore.</p>
<p>Food, crustaceans, shrimp, fishes and other marine animals often pursued in schools and may run riot in a school of flying fish or squid. Many of movements highly obscure and apparently only fish bearing eggs have been found off Hawaii; that is, ripe eggs. Schools of 2 to 3 different ages usually.</p>	<p>Food is fishes such as mullets, mackerel, bonitos and similar fishes that school. Into these schools the sailfish dash in search of a meal. They are usually taken by sports fishermen, using lures trolled along the outer reefs of the Gulf Stream area. May take feathered lures. Best fishing January to May.</p>	<p>Food is mackerel, flying fish, bonefish, dolphins and similar fishes. Taken on baits, such as cut bait; live bait including whole flying fish, or on artificial lures trolled usually from power boats capable of surviving on the high seas. The fight may be a long one in time and space.</p>	<p>Food is flying fishes, squids, mackerels and similar schooling marine forms. It is believed that they kill food by striking with side-wise motions of the bill before taking it into the mouth. They have been found to eat deep-sea species as well as the surface forms. Taken on fish-baited trolling sets or by harpooning.</p>	<p>Food is fishes such as menhaden, mackerels, sardines, anchovies, silversides and squids, all taken in mad dashes. They are essentially surface feeders, and when actively feeding may break the water. They are among the fastest swimmers of the ocean. They are taken on cut bait trolled, or by use of artificial plugs.</p>
<p>A valuable commercial fish of most erratic abundance. California canned to 22 million pounds a year from 1919-1925, but thereafter less than 1,000,000 pounds a year. In 1938 the albacore came back, and in 1943 the catch in California was 36,000,000 pounds the largest on record. Flesh, excellent.</p>	<p>Essentially a sports fish. A hooked sailfish may leap clear of the water more than a dozen consecutive times, apparently without interfering with a vigorous run, and fight immediately following. The flesh is of poor food value but improves if smoked, and is then considered good.</p>	<p>A spectacularly successful sport fish that provided the writer with at least one afternoon that will never be forgotten, even though it ended in complete success for the marlin and equally complete defeat for three of us who tried to make a landing. Such sport provides a living for many fishermen.</p>	<p>A superior game fish from any angle, and an excellent food fish in which the commercial demand always exceeds the supply. Usually frozen and sold as steaks. Prior to war a normal Atlantic harvest was 2,200,000 pounds; Pacific, 700,000 pounds. 1,600,000 pounds were usually imported from Canada and 2,400,000 from Japan. Liver oil high in vitamin A.</p>	<p>Commercial catch runs about 7 million pounds a year, but while the fish is good food it is not the equal of the related tuna and when canned must be labelled "bonito." They make a fine sporting fish because of their vigorous fighting when hooked. The resource does not seem to be on the decrease.</p>



BONITO



SWORDFISH



WEAKFISH

(Continued from page 27)

picked from a variety that was offered me. Yes, whether you eat in Sloppy Joe's or the Ritz-Statler you will sometimes get seafood, whether you like it or not.

We give cod-liver oil to our children and to our dogs because we say it is good for them. We buy vitamin pills that may have originated in sharks' livers. We wear ear-rings, imitation pearl necklaces made possibly from the minute scales of small sea fishes. We spread fertilizer on our gardens, and some of this may well have come from the sea and contributes to the success of our vegetables. We mend our furniture, repair our books and paint various objects with glues and oils that came in part from marine fishes. We use soaps to wash our faces, oils to soften the leather in our shoes or baggage, and to lubricate our watches. Many of these originated in large marine animals. Cosmetics and perfumes owe a debt to fishes that is rarely recognized, and yet all of these things are dependent on the maintenance of a renewable resource.

It does not seem certain that we are going in the right direction in maintaining this important resource on which our happiness and survival depends. Our rate of consumption continues to rise, and there is no reason to assume that it will lessen. Our methods of wholesale harvesting are becoming increasingly effective and are draining resources that in the past could not be tapped. There is little reason to hope that we will not continue to harvest more effectively whatever resources we have. We can locate fishes by radar, where formerly we located them by luck. We can haul them from depths that heretofore were inaccessible. Helicopters can locate schools of fishes from the air, where a generation ago fishermen depended on ospreys. Only this week, in our own inland lake, the State Conservation Department was photographing the shore line from an airplane because the airplane could discover likely fishing grounds more effectively than could be done from a boat. All of these are ways in which we can more effectively outwit a poor fish and help us win in a competition between us. What can be done to help the fish?

If you will read the chart material in this insert, or the richer literature that is available elsewhere on sea fishes, you will be surprised at the frequency with which you find that little or nothing is known about the means of reproduction of some of them. If we do not know how the species maintains itself, how can we help it? We need more and more research on the lives of these animals that are so important to all of us on Friday, and other days.

Once we do manage to make some progress in this field we will need to know how to put our findings into practice, to the end that we may have more fishes available for the many uses we are discovering for them. This unquestionably will call for international agreement between responsible nations. This means world peace, and certainly that, at present, seems something to hope for but not to attain without effort. It will do no nation any good to discover how a fish reproduces if its breeding ground is made accessible to all, including those who recognize no responsibility in maintaining a source of supply. This means that conservation education on a world basis is really essential to ultimate race survival.

In addition to understanding how and where fishes may maintain their existence by "doin' what comes natcherally," there are things that all of us can do to help. In the management of all biological and perishable resources there is a great gap between the organisms harvested and those consumed. Fishes spoiled by improper handling do no one any good, but serve as a drain on the original supply. Bruised fish spoil more quickly than those that are unbruised, so the fisherman, the fishmonger and the housewife, all have a responsibility. We need more understanding of this problem by everyone. The housewife may learn how to use left-overs profitably in chowders, how to get greater effect from fish when they are used with less expensive foods, how to buy wisely the kinds that will give the greatest value received, and how to judge the fish bought. This should be a part of the school program of everyone who will eventually have to deal with fishes.