

## Striped Bass

*Roccus saxatilis* (Walbaum) 1792

[Jordan and Evermann, 1896-1900, p. 1132, as *Roccus lineatus* (Bloch).]

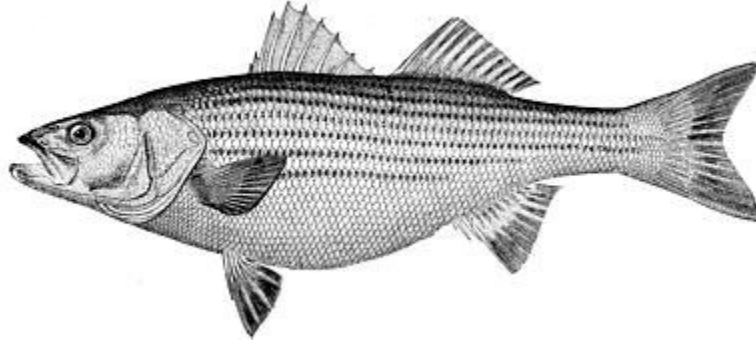


Figure 209. - Striped bass (*Roccus saxatilis*), Chesapeake Bay region.  
From Goode. Drawing by H. L. Todd.

### Description

No one character alone characterizes the striped bass, but rather the combination of fin structure and arrangement with general outline and structure of the jaw. Its rather deep and keelless caudal peduncle, stout body, the presence of two well-developed dorsal fins (spiny and soft rayed, and the one about as long as the other), its lack of dorsal or anal finlets, and a tail only moderately forked, separate it from all the mackerel tribe, from the bluefish, and from the pompanos. The fact that its anal fin has 3 spines [page 390] and is almost as long as the second dorsal, also (less obvious) that its maxillary (upper jaw) bones are not sheathed by the preorbital bone, separate it from all the weakfish tribe (p. 417). Nor is there any danger of confusing it with the sea bass, cunner, tautog, or rosefish, for its two dorsal fins are entirely separate whereas in all these the spiny and soft-rayed parts are continuous, as a single fin. The white perch comes closest to it in general appearance but the two dorsal fins of the perch have no free space between them (p. 405), and its fin spines are stiffer.

The trunk of the striped bass is  $3\frac{1}{3}$  to 4 times as long (to base of caudal fin) as it is deep, thick through, its back hardly arched. It has a moderately stout caudal peduncle, a long head (almost as long as the fish is deep), two spines on the margin of each gill cover, an oblique mouth gaping back to the eye, a moderately pointed nose, and a projecting lower jaw. Young fish are more slender than old. The two dorsal fins are of about equal lengths; the first (9 or 10 stiff spines) triangular in outline, originating over the middle of the pectorals; the second (12 or 13 soft rays) regularly graduated in height from front to rear, and separated from the first by a distinct (though short) space. The anal (about 11 rays preceded by 3 spines) is of about the same size and form as the second dorsal, and originates below the middle of the latter. The caudal is moderately wide and only slightly forked. The pectorals and ventrals are of moderate size, the latter somewhat behind the former.

### Color

Dark olive green varying to bluish above, paling on the sides, and silvery on the belly, sometimes with brassy reflections. The sides are barred with 7 or 8 narrow, sooty, longitudinal stripes, which follow as many rows of scales and which may be variously interrupted. The highest stripe is the most distinct, and all of them but the lowest are above the level of the pectoral fins. The dorsal, caudal, and anal fins are somewhat dusky.

## Size

The bass grows to a great size, the heaviest of which we have found definite record being several of about 125 pounds that were taken at Edenton, N. C., in April 1891.[24] One of 112 pounds, which must have been at least 6 feet long, was caught at Orleans, Mass., many years ago. One of 100½ pounds is said to have been taken in Casco Bay, Maine[25] and fish of 50 to 60 pounds are not exceptional. Usually bass, as caught, weigh from 3 to 35 or 40 pounds; the average weight of ones recorded in the register of the former Glades Hotel[26] at Scituate, Mass., during the period 1854 to 1858, was about 27 pounds.

Bass weigh about ¾ pound when 12 to 13 inches long; about 2¾ to 3 pounds at 18 to 20 inches; about 5 pounds at 24 inches; about 10-15 pounds at 30-32 inches; and about 18-20 pounds at 33-36 inches. Twenty-pound bass average about 36 inches in length; 30 pounders about 43 inches; 40 pounders about 47 to 48 inches.[27] On the Pacific coast 50 pounders run about 50 to 51 inches,[28] and the relationship between weight and length runs about the same for very large fish on the Atlantic coast. The record fish caught on rod and reel was one of 73 pounds, taken in Vineyard Sound in August 1913 by C. B. Church.

Females grow larger than males; probably most bass of 30 pounds and heavier are females.[29] Thus the common use of the term "bulls" for the very large ones might better be replaced by "cows."

## Habits[30]

Stripers are powerful fish; so strong in fact, that they appear to have no difficulty in handling themselves in the surf, where one is sometimes seen actually in the translucent crest of a comber just before the latter breaks. But this is not a very swift fish as compared with the mackerel tribe. Bass often swirl conspicuously at the surface or splash in pursuit of bait fish. They sometimes roll as the little northern porpoise or puffing pig (*Phocaena*) does. And we have heard of them finning (i. e., with dorsal and tail fins showing).[31] But we have never seen or heard of one leaping clear of the water as tuna and bonito so often do unless hooked in shoal water.

During the first two years they live mostly in small groups. Later they are likely to congregate in larger schools; this applies especially to those up [page 391] to 10 pounds or so, which are often spoken of as "school fish." the larger ones often school, but the very largest, of 30 to 40 pounds and upward, are more often found single or a few together. They are most likely to be in schools while migrating, but more scattered while feeding in one general locality.

Small fish (2 and 3 years old) in particular, tend to school densely; also they travel considerable distances without scattering but, as Merriman emphasizes[32] it is not likely that a given school holds together for any long period, for fish of various sizes (i. e., ages) up to the very large ones often school together, showing that different ages intermingle more or less. Mixed schools running from 8 or 10 pounds to 30 or 40 pounds were reported repeatedly in 1950, for example.

The bass is very voracious, feeding on smaller fishes of whatever kind may be available, and on a wide variety of invertebrates. Lists of its stomach contents for one locality or another include alewife, anchovy, croakers, channel bass, eels, flounders, herring, menhaden, mummichogs, mullet, rock eels (*Pholis gunnellus*), lance, sculpins, shad, silver hake, silversides, smelt, tomcod, weakfish, white perch, lobsters, crabs of various kinds, shrimps, isopods, gammarid crustaceans, various worms, squid, soft clams (*Myra*) and small mussels. In our Gulf the larger bass prey chiefly on herring, smelt, sand lance, eels, and silver hake, on squid (on which they gorge when they have the opportunity), on crabs large and small, on lobsters, and on sea worms (*Nereis*); while small ones are said to feed to a considerable extent on gammarid crustaceans and on shrimps.

When bass are gorging on any one particular prey it is common knowledge among fishermen that they are likely to ignore food of other sorts for the time being. It seems also that when prey is plentiful, bass are likely to gorge, then cease feeding to digest, then to gorge again; also that all the members of a given school are likely to do this in unison, with consequent annoyance to the angler.

Bass, too, seem on the whole to be more active, and especially to feed more actively, between sunset and sunrise than while the sun is high. In estuarine situations this fits with the habits of their prey, for it is by night that the sea worms (Nereis) that are the chief item in their diet there emerge from their burrows to swim about. And bass fishing is often much more productive by night than by day off the open coast also, though schools of bait fish are seen at all hours (else the terns would starve), while the time when crabs, etc., are most likely to be stirred up by the surf, and are most easily caught around the rocks, depends on the stage of the tide, not on the hour of the day. So most fishermen (ourselves included) believe that it is inherent in the nature of the larger sized bass to avoid strong sunlight by sinking to the bottom. A familiar instance is the regularity with which they desert the surface soon after sunrise on bright summer days at places where large numbers are caught by trolling during the hour or two after daybreak; the eastern side of Cape Cod Bay is a local example.

It has been discovered recently that trolling deep with wire lines is often productive, irrespective of the time of day, at times and places where bass "show" only during the early morning hours. This habit, however, is not so deeply engrained but that schools of bass often rise to the surface in pursuit of bait fish at any time of day, or come within easy casting distance of the beach. We recall seeing several schools of good-sized fish (those that we landed ran up to 23 pounds) suddenly splashing all around our boat about midday, on one occasion off Wellfleet, in Cape Cod Bay, though it was only for a few hours after sunrise that the several boats fishing regularly there had taken any by top-water trolling for some time previous.

The best advice we can give the surf-caster, in this regard, is to go fishing whatever time of the day he is free to do so

The striper is so strictly an inshore fish that we have never heard of large catches being made, or schools seen, more than 4 or 5 miles from the nearest point of land,[33] though the migrating schools doubtless pass much farther out in crossing the mouths of the larger indentations of the coast, such as Delaware Bay and Long Island Sound. And a few fish may stray far offshore in winter, for one about 18 inches long was taken in an otter trawl about 60 miles south of Marthas Vineyard, in 70 fathoms of water, in February 1949 (p. 400).[34]

On the landward side, many bass come within easy casting range of the shore; we have had a fair sized one strike our plug not 4 feet from the rock from which we were casting on the Cohasset shore. Many (especially the smaller sizes, but large ones also) run up into estuaries and into river mouths. In some rivers, good numbers (large as well as small) are caught so far upstream as to make it likely that they remain there the year round. This is notably the case in the Alabama River system where (we hear) 250 to 300 bass ranging from 5 to 40 pounds were caught near Tallasseem some 30 miles above Montgomery, which is at least 300 miles from salt water, following the river.[35] they are also known to spawn some 250 miles up the Sacramento River in California. It would be interesting to know what proportion of the bass that spawn at Weldon, N. C., 100 miles or so up the Roanoke, and that run 60 to 90 miles up the St. John, in New Brunswick,[36] ever see salt water. Bass also run up the Hudson for about 160 miles to Albany.

The great majority of the total population of bass frequent the coast line, except at breeding season. Among these, the smaller sizes, up to 15 pounds or so, are found indifferently within enclosed bays, in small marsh estuaries, in the mouths of rivers and off the open coast. But we do not often hear of fish heavier than 20 to 25 pounds caught in situations of these sorts. And the great majority of the large bass, of 30 pounds or more, hold to the open coast, except at spawning time (p. 394), and perhaps in winter (p. 400). But this is not an invariable rule; we are familiar with one narrow inlet where tides run strong, and where some lucky angler catches a very large bass now and then (p. 396).

Bass off the open coast are most likely to be found along sandy beaches, in shallow bays, along rocky stretches, over and among submerged or partially submerged rocks and boulders, and at the mouths of estuaries, the precise situations that they occupy being governed by the availability of food. Off the outer beaches they may be anywhere right to the breakers. When they are close in they frequent the troughs that are hollowed out by the surf behind off-lying bars, also the gullies through which the water rushes in and out across the bars as the rollers break, for it is in such situations that bait fish are easiest caught, and that crabs, worms, and clams are most likely to be tossed about in the wash of the breakers. When the tide is high, bass often lie on a bar, or even in the white water along the beach if there is a good surf running. When the tide falls they drop down into the troughs or move farther out, according to the precise topography. In either case, every surf fisherman knows that his chances are much better when the sea is breaking at least moderately heavy so that he can cast into white water, than when it is smooth.

They also lie under rafts of floating rockweed at times, probably to prey on the small animals they find among the weeds.

The best spots along rocky shores are in the surf generally, and in the wash of breaking waves behind off-lying boulders and among them, or where a tidal current flows most swiftly past some jutting point. In the mouths of estuaries they are apt to hold to the side where the current is the strongest, and in the breakers out along the bar on that side. In shallow bays, they often pursue small fry among the submerged sedge grass when the tide is high, dropping back into the deeper channels on the ebb. And they frequent mussel beds, both in enclosed waters and on shoal grounds outside, probably because these are likely to harbor an abundance of sea worms (*Nereis*).

When bass are schooling outside they are likely to be moving along the coast in the one direction or in the other. But they may remain in the same general locality for weeks, or through the summer. Thus a body of very large fish, of 25 to 50 pounds, stayed close in to the outer beach near the tip of Cape Cod, through most of July of 1951 and into that August, yielding consistent catches to the more skillful surf-fishermen.

Bass are active over a temperature range from perhaps 70° down to about 43°-46° F. Present indications are that if the temperature falls lower they either withdraw to somewhat warmer water if off the outer coast, or lie on the bottom in a more or less sluggish state if they are in some estuary. On the other hand it is not likely that they can long survive temperatures higher than about 77°-80°, for many were found dead in [page 393] shallow estuaries in Connecticut and in Massachusetts during the abnormally hot August of 1937.[37] they are equally at home in fresh or slightly brackish water, and in coastal salinities of 3.1 to 3.3 percent. But their usual wanderings do not take them out into waters of full oceanic salinities (3.5 percent or higher).

## Migrations

No phase of the life history of the bass arouses as much discussion among fishermen as their migrations. And the picture still remains so puzzling that we dare not attempt anything more than a brief summary of what has been learned to date.

It seems certain that stripers do not ordinarily travel far until they are 2 years old. Thus the young fish from the enormous year classes of 1934 and 1942—apparently produced in the Chesapeake Bay-Delaware Bay region chiefly— did not appear in New England waters until 2 years later. But the fact that they did appear there and in the Gulf of Maine in hordes in the summers of 1936 and 1944 shows that a bass is capable of very extensive journeys, once it has reached its third year.

It has long been known, too, that the pound nets on Long Island and along southern New England ordinarily make large catches only in the spring (peak in May), and again from early October into November;[38] also that large spring catches are made progressively later in the season, proceeding from south to north, the reverse being true in the autumn. This, of course, suggests that part at least of the bass population follows the shore line northward and eastward as far as southern New England in spring, to return westward and southward in autumn. And this is verified for bass 2 and 3 years old by the returns from tagging experiments by Merriman at the eastern end of Long Island and in Connecticut during the years 1936 to 1938,[39] for recaptures of fish that had been tagged there in May came mostly from farther east along southern New England, one from Cape Cod Bay, and another from Cohasset on the southern shore of the inner part of Massachusetts Bay. But the recaptures from fish tagged in summer were mostly from nearby (evidence of a stationary population), while those for autumn-tagged fish were scattered along the coast from the eastern end of Long Island to Chesapeake Bay, with one from Croatan Sound, one from Albemarle Sound (Stumpy Point), and one from Pamlico Sound in North Carolina.

But the picture is by no means so simple as the foregoing might suggest. To begin with, no evidence is available as to the movements of large bass, other than the successive dates when they appear or disappear off different parts of the coast.[40] And it is no less true of bass than it is of mackerel (p. 330), that successive appearances and disappearances from place to place are not conclusive evidence of along shore migration. Yet it is now certain that while some bodies of bass carry out extensive migrations north and east in spring, west and south in autumn, other bodies do not. Thus, as Merriman points out,[41] the bass of the northeastern shore of the Gulf of Mexico are completely isolated, while those of the Atlantic coast south of Cape Hatteras form another separate population, few of which (if any) ever spread farther north. The bass of the Gulf of St. Lawrence and of the lower St. Lawrence River appear to be wholly isolated also. And while some interchange may take place between the populations found in various bays and rivers around the outer coast of Nova Scotia, it is doubtful whether these have any regularly migratory association, either with the Gulf of St. Lawrence fish or with those of more southern waters, except in occasional years (p. 398).

Chesapeake Bay, however, harbors both migratory bass,[42] as proved by tagging experiments (p. 393) and other evidence (p. 393), and non-migratory as proved by the fact that fish of all sizes are taken there both in summer and in winter, though not so many of them as in spring and fall. Similarly, some bass winter in northern waters though most of the fish appear to be migrants there; and perhaps a considerable percentage do so in the lower reaches of the Hudson River estuary.

Merriman[43] has suggested that these northern wintering fish may be "of two types—the individuals that form the resident more or less isolated population" and others "that may have had their origin farther south but spend an occasional winter in northern waters." It may prove that a good proportion of these bass that come from the south when they are 3-4 years old may remain in the north for the rest of their lives. And there is no way for the fisherman to tell in which of these categories the bass belong, that he lands. The reader will find some further discussion of migrations in connection with the status of the bass in the Gulf of Maine (p. 395). We need only add that the existence of these non-migratory populations and the fact that the Pacific coast bass are similarly stationary, are sufficient proof that seasonal migration is not an essential incident in the life of the striper.

Bass spawn either in brackish water at the heads of estuaries[44] (the Hudson, for example) or in fresh rivers, never off the open coast in salt water so far as is known. Those that enter fresh rivers may deposit their eggs only a short distance above the head of tide as they do in the Potomac, or they may run much farther upstream. But we have yet to learn how large a percentage of the bass that are known to spawn 100 miles up the Roanoke, near Weldon, N. C. (a major spawning ground), or still farther up the Alabama,[45] and up the Sacramento River in California, have come from salt water (p. 392).

The chief requirement for successful spawning is (it seems) a current turbulent enough to prevent the eggs from settling on bottom where they would be in danger of being silted over and smothered.

The spawning season is from late April to early May in North Carolina; in May, chiefly, in the Chesapeake Bay region; perhaps equally early in the waters of New York.[46] Any bass that may spawn in the rivers of Massachusetts, of Maine, and of the Bay of Fundy, probably do so in June; those of the southern shore of the Gulf of St. Lawrence and of the lower St. Lawrence River in June and July.

A large female during spawning may be surrounded by many small males, and the latter are described as fighting fiercely[47] with one another.

Females stripped at the Weldon, N. C. Hatchery yielded from 11,000 to 1,215,000 eggs each, during the period 1928 to 1938, with one of 4½ pounds yielding 265,000. Thus the oft-quoted estimate of 10 million fish for a really large one is within reason.[48]

The eggs average 1.1-1.35 mm. in diameter when they are deposited in the water, but the perritelline membrane swells during the first hours after fertilization to an average diameter of about 3.6 mm. They have a large oil globule and are semibuoyant; that is, they sink in quiet water, but are swept up from the bottom by the slightest disturbance, so that they tend to drift downstream with the current. Consequently the eggs that are produced far upstream may not hatch until they have reached tidewater. The eggs are reported as hatching in about 70 to 74 hours at a temperature of 58-60°; in about 48 hours at 67°; in about 30 hours at 71-72°.

In Chesapeake Bay, the young fry of the year are about 11/5 inches (30 mm.) long by June; 14/5 to 21/12 inches (45-53 mm.) long in July; 2 to 24/5 inches (50-70 mm.) in August; and 3¾ to 8½ inches by the following April and May; i. e., at the end of their first year.[49] According to Merriman,[50] most of the fry of the year taken in the Hudson River during their first summer are between about 15/8 inches (40 mm.) and about 3½ inches (90 mm.) long; a few seined in the Parker River, Newbury, Mass., were from about 2¾ inches (71 mm.) to about 33/8 inches (85 mm.) long. And this last is perhaps representative for whatever bass may now be produced in Gulf of Maine rivers, for we read that great numbers of fry of 2 to 3 inches were taken of old in winter in the rivers of Maine in bagnets set for smelt and tomcod.[51]

Two-year-old bass taken in Connecticut averaged 11 to 11½ inches (28 or 29 cm.) long in spring, [page 395] about 12 inches (30 cm.) in June, and about 14½ inches (37 cm.) in October; the 3-year-olds about 15¾ inches (40 cm.) in spring and about 18 inches (46 cm.) in October, while 4-year-olds increased in length from about 18¾ inches (48 cm.) to about 20¾ inches (53 cm.) between spring and autumn, on the average.[52] And the average rate of growth was about the same for Hudson River fish examined by Greeley.[53] But the rate at which they grow is governed largely by the food supply. Bass in captivity have been known to grow from 6 inches long to 20 inches in 11 months, while some that were kept in a certain pond in Rhode Island are described as having gained weight from 1 pound in June to 6 pounds in October.[54]

The later growth rate has not been traced for our Atlantic bass. But it is generally believed that the 35-50-pounders that were caught in considerable numbers in 1950, and are being taken in 1951, were members of the very successful year classes of 1940-1942, which fits well with the growth rate of bass on the Pacific coast, where the average age is about 7 years for 20-pound fish, 10-11 years for 30-pounders, about 14 years for 40 pounders, and 17 to 18 years for 50-pounders.[55]

On the Pacific coast females grow faster than males after the third year, which is probably true of the Atlantic bass also.[56] This certainly is a long-lived fish for one kept in the New York Aquarium lived to be 23 years old.[57]

Merriman[58] found that "approximately 25 percent of the female striped bass first spawn just as they are becoming 4 years old, that about 75 percent are mature as they reach 5 years of age, and that 95 percent have attained maturity by the time they are 6 years old," among Connecticut fish. But a large percentage of the males had matured at 2 years, probably nearly all of them by the time they were 3 years old. And it is probable that this applies equally to the Maine bass. Merriman has also made the interesting discovery that only about one-tenth of the bass of northern waters are males, but that males are nearly as numerous as females, southward from Delaware Bay.

It has been suggested that the striper may not be a regularly yearly spawner,[59] but no positive evidence is at hand as to this.

## **General range**

Atlantic coast of eastern North America, from the lower St. Lawrence River and the southern side of the Gulf of St. Lawrence to northern Florida; also along the northern shore of the Gulf of St. Lawrence to Alabama and Louisiana; running up into brackish or fresh water to breed.[60] In the last quarter of the 19th century it was introduced on the Pacific coast, where its range extends now from Grays Harbor, Wash.,[61] to Los Angeles County, Calif. It is now a favorite game fish there, and the yearly commercial catch since World War I ran between 500,000 and about 1,000,000 pounds there, until 1935, when commercial fishing for stripers was prohibited by the State of California.

## **Occurrence in the Gulf of Maine**

The range of the striper includes the coastline of our Gulf from Cape Cod to western Nova Scotia. But its distribution there in detail is determined by its very evident preference for surf-swept beaches and for particular stretches of rocky or bouldery shoreline; also for shallow bays, inlets, and estuaries. The geographic status of bass in our Gulf also depends on whether it be a good bass year (or run of years) or a poor one.

When bass are reasonably plentiful, as they have been during the past 15 years, and with a good representation of fish of different ages, the outer shore of Cape Cod provides the most productive surf casting, with Monomoy Island, the general vicinity of Nauset Inlet, and the tip of the Cape northward from Highland Light perhaps the warmest stretches, in most years. But the topography of a beach may be altered to such an extent during severe storms that a stretch that is good bass water one summer may be poor the next. Nauset beach is an example, for very few bass have been caught or seen there during the present summer (1951), though this has been one of the most productive localities on the Cape during the past few summers. Considerable numbers, mostly [page 396] of the smaller sizes, are caught in Pleasant Bay too, within Nauset Marsh, and in Town Cove, Orleans.

Considerable catches are made by boats trolling outside the surf, also, or by casting in toward the breakers along the outer Cape Cod shore, when the weather permits. But the most productive and reliable trolling grounds are along the eastern and southern sides of Cape Cod Bay in most summers, especially off the Eastham shore a few miles southward from Wellfleet, and off the mouth of Scorton Creek, Barnstable and the Sandwich shore.[62] the shores of Cape Cod and Cape Cod Bay have, in fact, been the chief center of abundance for bass within the Gulf from as far back as the record runs. Few bass are reported along the rocky stretch from the Cape Cod Canal to the entrance to Plymouth Harbor, though this would seem to be very good bass water, and schools must pass by. But many are caught in Plymouth Harbor, especially off Eel Creek, also up Duxbury Bay to the salt marsh creeks that open into its head.

Surf casters account for some along Duxbury Beach on the outside, for a few also in the boulder-strewn area at the western end of Humarock Beach.[63] the North and South Rivers in Marshfield yield considerable numbers in good years; we have seen and taken good fish there. Anglers, casting from the shore, take a few (never any great number) on boulder-strewn stretches along the Scituate shore, while Glades Point was famous for large bass in earlier periods of abundance (p. 390), when it was common practice to chum the fish by throwing out chopped lobsters, a method never likely to be revived because lobsters are far too costly nowadays. The Cohasset shoreline (with which we are familiar) yields a few yearly (mostly caught between sunset and sunrise), occasionally a very large one. In seasons when there is a good run of the smaller sizes, considerable numbers are taken at various places within the limits of Boston Harbor; Hull Gut, Weir River in Hingham, and Wollaston Beach are well known localities. And in years when there is a run of little fish, many of them are caught from the docks and from the bridges, to the head of Boston Harbor.

The north shore of Massachusetts Bay seems not to be as attractive for bass as its succession of inlets, beaches, and rocky headlands might suggest, for catches reported are small and scattering in most summers. But the beaches and enclosed waters from a few miles north of Cape Ann to and including the mouth of the Merrimac River are productive enough to rank second to the Cape Cod-Cape Cod Bay region. Bass are taken in the surf from Ipswich Beach, Cranes Beach, and along the entire length of Plum Island Beach; many more are caught by boat fishermen over the flats within the mouth of the Merrimac, as well as about the jetties at its entrance. Schools are often reported in Plum Island Sound. And the Parker River, emptying into the latter, is not only well known water for bass, especially small fish, but it holds some bass over the winter (p. 400), and it is one of the few streams along the New England shores of our Gulf where very young bass have been taken within recent years (p. 398).

Some are caught in Hampton Harbor, N. H. But the next important bass waters (moving northward) are the lower reaches of the Piscataqua River system, marking the boundary between Maine and New Hampshire; a good number, large and small, are now caught there yearly. In good years bass are to be caught in several of the streams that drain the southern part of the Maine coast, especially in the York, the Mousam, and in the Saco which is the most productive. Schools are sighted and a few are caught along the intervening beaches and some in the shallows of Biddeford Pool.



Information as to the status of bass for the coastline and streams of northern and eastern Maine, past or present, is scant, and we have come to suspect that bass may never have been as plentiful there as was supposed. A few are caught here and there around Casco Bay in good years, product perhaps of the Kennebec. But the estimated catch in the Kennebec was only about 12,760 pounds as far back as 1880;[64] and there have been far fewer bass there of late years. Our most recent information is that schools of large fish were seen in the lower Kennebec, off Popham and Reed Beaches in early October 1950 with some [page 397] caught up to 26 pounds, and that a few were being taken daily, in late June 1951.[65] Nearly as many were taken in the Sheepscot, formerly, as in the Kennebec; the present condition is not known.[66] there were bass in the St. George during the period 1936-1940; doubtless there are some there still, for we heard of some in the surf near Georgetown, Maine, in August 1951.

Bass are seen in most years in Bangor Pool at the head of the estuary of the Penobscot, where some are caught by anglers casting especially for them, also by salmon fishermen. And many in the 2- to 4-pound class were reported and caught in the Belfast River and in Searsport Harbor farther down Penobscot Bay in 1938. But there have not been enough of them there during the past few years to have caused special comment. Stripers were seen in the tide rips in the narrows between Mount Desert Island and the mainland (near the Hancock-Sullivan Bridge) in August 1951, and others were reported driving squid ashore near Winter Harbor, Maine, a few miles farther east. Salmon fishermen sometimes "rise" bass in the Narraguagus, and Atkins[67] speaks of "a very few" in the St. Croix, though Huntsman found no recent record of bass in the Passamaquoddy region.

There may be an occasional bass in Maine rivers other than those we have mentioned, but there is nothing in the past record to suggest that there ever were many. In 1880, for example, the reported catch was nearly as great for the Kennebec (about 13,000 pounds) as for all the other rivers and coast of Maine combined (about 15,000 pounds). And there is no reason to suppose that the regional contrast has altered subsequently in this respect.[68] In the Bay of Fundy region, bass, as Huntsman has pointed out,[69] are confined to the large warm estuaries and the neighboring fresh water; i. e., to those of the St. John, Minas Basin-Cobequid Bay and Shubenacadie River systems, and of the Annapolis.

Available information suggests that bass always were more plentiful in St. John River waters than anywhere along the eastern part of the coast of Maine, and that they are still. Bass are occasionally caught in St. John Harbor, mostly between April and June.[70] And while they were reported as already much less numerous in St. John waters by 1884 than they had been in earlier times,[71] there still are enough of them in the St. John and its tributaries to have yielded commercial catches of 12,200 pounds in 1944, and 7,400 pounds in 1946. The most recent news that has reached us from the St. John is that salmon fishermen saw a school at the surface and caught some that weighed 3 to 11 pounds in late June or early July of 1951.[72]

Bass are well known in the Minas Basin Cobequid region. According to local fishermen,[73] as many as 80 fish are sometimes taken in weirs there in a day, most of them in the 8- to 10-pound category, but with occasional fish reported up to 33 pounds.

The status of the bass is especially interesting in the Shubenacadie River, for they are not only caught in fresh water there and in Shubenacadie Lake where they are known to spawn, but some large fish remain throughout the year in the lake; i.e., they behave like a land-locked population.[74] A thousand or so, in fact, are caught yearly by anglers in the Lake and in the Shubenacadie River;[75] and it is said that fish as large as 50 pounds have been taken,[76] though most of them run small there.

We are informed[77] that the catch by anglers was about 620 bass (average about 4½ pounds) in the Bass River, tributary to Cobequid Bay in 1950, and that the catches for 1949 and 1950 combined were about 1,350 fish (average about 21/3 pounds) in the Gaspereau, tributary to Minas basin; 4,650 fish (average about 5¾ pounds) in the Annapolis River; and about 125 fish (average 6 pounds) in the Bear River, tributary to Digby basin, in 1950. It is interesting, that these fish ran so small, for the bass caught in Cape Cod and northern Massachusetts waters during these same [page 398] years included a good number of very large fish (p. 403).

Anglers have also come to realize recently that bass are to be caught in various bays and river mouths along the western shoreline of Nova Scotia. But no definite information has reached us as to how plentiful they are there, or how large.

The regional contrasts in the abundance of bass along different sectors of the coastline of our Gulf may be illustrated more concretely by the commercial landings for 1945. [78]

Outer Cape Cod and Cape Cod Bay [79]	perhaps about 57,000 lbs.
Cape Cod Canal to New Hampshire line	51,100 lbs. [80]
New Hampshire	9,000 lbs.
Maine	None reported
St. John River system, New Brunswick	2,400 lbs.
Minas Basin, Cobequid Bay and Shubenacadie River region,	13,800 lbs.
Nova Scotia	
Annapolis County, Nova Scotia	3,100 lbs.
West coast of Nova Scotia	800 pounds in 1944; none reported in 1946

[79] Assuming that about 2/3 of the Barnstable County catch of 86,200 pounds was taken along the outer shore of Cape Cod and in Cape Cod Bay (probably an underestimate).

[80] Assuming that about 1/3 of the Plymouth County catch of 75,000 pounds was taken on the Massachusetts Bay side.

A regional contrast of another sort, of interest to anglers, is that really large bass of (say) 30 pounds and upwards, are far more plentiful along the Massachusetts coast (especially in Cape Cod waters) than they are anywhere farther north and east in our Gulf.

Localities along the outer coast of Nova Scotia where we have heard (or read) of stripers are the head of Mahone Bay; head of Chedabucto Bay; and Mira Bay and other harbors of Cape Breton. The numbers caught there are so small that they are not included in the published statistics of the commercial catches for the counties in question. The shoal estuaries, however, of the Richibucto Bay region and also the estuary of the Miramichi River (on the southern shore of the Gulf of St. Lawrence) harbor isolated populations of bass plentiful enough to have yielded commercial catches of about 3,800 pounds and 9,000 pounds, respectively, in 1929, 4,100 and 3,000 pounds in 1931[81] And there is also a population (or populations) below Quebec in the lower St. Lawrence River, of bass that winter in that same general region, as proved by marking experiments recently carried out by Vladykov.[82] there are enough of them, in fact, around Isle d'Orleans for bass fishing to be a favorite sport there. But the commercial catches are so small as to suggest that the stock of bass is not very large.[83]

It has been known for many years that bass spawn in the St. John River,[84] and it is probable that they also spawn in the small streams tributary to Minas Basin and Cobequid Bay at the head of the Bay of Fundy; in Grand Lake at the head of the Shubenacadie River, and probably in the Annapolis River. It is generally believed, also, that some bass spawned of old in all the larger rivers from the Penobscot westward. Great numbers, so small (2-3 inches) as evidently to be fry of the year, were caught, for example, in winter in the 1880's in the Kennebec, where ripe fish also have been reported[85] from the end of June into July. But the only Maine or Massachusetts streams where we find evidence of spawning bass in recent years are the Mousam, in Maine, where fishermen have reported taking females with ripe eggs on several occasions;[86] and the Parker, in Massachusetts, where Merriman[87] took three fry of the year  $2\frac{3}{4}$  to  $3\frac{1}{4}$  inches (7.1-8.5 cm. long) on August 4, 1937. Thus it seems sufficiently established that a great majority of the bass that summer in the western side of our Gulf come from spawning grounds to the west and south.

Merriman's[88] painstaking investigations show beyond reasonable doubt that most of the little bass of 2 to 5 pounds that appeared in great numbers along southern New England and to the northward in 1936 (p. 402), following a period of great scarcity of bass there, had been hatched two years previously (1934) in the region of Chesapeake Bay, perhaps some of them in the Delaware Bay region. Some of the abundant year classes of 1940 and 1942, which appeared in our Gulf in 1942, and 1944, also may have come [page 399] from equally far away; others perhaps from intermediate spawning areas.

Since the mature bass that visit the coasts of Cape Cod and northern Massachusetts in such plenty in good years almost certainly do not spawn in any numbers in any of the Gulf of Maine rivers, we can only suppose that they repair to more southerly rivers to spawn, perhaps to the Hudson, in particular. But many of them reach northern Massachusetts so early in the season, and so little information is available as to the condition of their sexual organs when they arrive, that we still face something of a mystery, here.

In the salt estuaries and open waters of our Gulf bass are taken only from late spring, through the summer, and until late in the autumn. In years when they are plentiful enough to attract attention, they are likely to be reported about equally early in the season all along from Cape Cod to the Merrimac River. In 1950,[89] for example, bass had been reported from the outer shore of the Cape (Pleasant Bay and Orleans) by mid-May, from the North and South Rivers, at Marshfield on the southern side of Massachusetts Bay, and from the Merrimac at Amesbury by mid-May; we heard of one caught in Duxbury Bay as early as May 1 that same year; and in normally early years they are generally distributed along the Massachusetts Coast of the Gulf in May or by the first days of June. The first bass were reported in and off Hampton Harbor and in the Piscataqua River about the beginning of the second week in June (1950), and in Casco Bay about the middle of the month.

Bass are said to appear as early as the end of May in Bangor Pool at the head of the estuary of the Penobscot in some years.[90] In 1950 they were scattered all along Penobscot Bay before the end of June. And it is probable that the seasonal schedule is about the same for the bass at the head of the Bay of Fundy, but information is scant.[91]

Once the bass have appeared, they continue in evidence until well into the autumn (p. 399). During this part of the year, the bass of the coasts of Massachusetts and most of those in Maine are in salt water and in brackish, except for such as enter fresh water to spawn (p. 398). But they are caught all summer in fresh water far above the head of tide in the Shubenacadie in Nova Scotia (p. 397),[92] also in the Annapolis, and part of the stock may have here a similar habit in various of the rivers of Maine, as in the Kennebec, where they ran up as far as Waterville until they were prevented by the construction of the dam at Augusta.[93]

In rivers where bass winter, they may, of course, be taken in any month from late autumn into the spring (p. 400). As autumn approaches the bass vanish however from the open coast. What little information we have suggests that most of them have disappeared along the outer coasts of Maine by mid-October or the end of that month in most years. But they may be in evidence in Maine rivers until later in the autumn, as they were of old in the Kennebec, where Atkins[94] described them as continuing "feeding in weedy coves until November"; and in the Mousam River in southern Maine, where fishing is said to have been good until November during the period 1938-1940, when our Gulf had a spectacular run of young fish (p. 402).

Farther southward in our Gulf, they may linger equally late off the open beaches. In 1949, for example, a set of traps[95] located near Provincetown Harbor in 35-45 feet of water, took 3,705 pounds (the only large catch of the year) on November 3.

In 1950, a late season, Cape Cod Bay eastward from the Cape Cod Canal was described to us as "loaded" with bass until the third week in October, fair numbers were still being caught along the outer shore of Cape Cod at the end of the month, schools of small fish were reported on November 9, and half a dozen were landed from the surf on November 18, and one, on December 3.[96] Surf casting is likely to be much more productive along the outer Cape Cod beaches during 2 weeks or even 3 weeks of November than it is in July or August, especially for the smaller fish, and during the hours of daylight (p. 391).

And the bass in salt water may be in evidence until equally late in the season in the Minas-Cobequid [page 400] Bay region, at the head of the Bay of Fundy for fishermen report taking them there through October and into November.[97]

The question where the bass that visit the different parts of the coast of the Gulf of Maine spend their winters still awaits a comprehensive answer. It has long been known that the Chesapeake Bay bass winter in the deeper channels near the head, of the bay as well as in its estuaries, and in the lower reaches of the rivers, in a more or less inactive state; also those of the New Jersey coast run up into rivers to remain until the following spring, as described more than a century ago by Mease.[98]

Knight[99] writes too, that as the weather becomes colder, the bass of the southern side of the Gulf of St. Lawrence "penetrate into the bays and arms of the sea and ascend the rivers at some distance, where they spend the winter resting on the mud in a half torpid state." the bass also, in Maine "pass the winter in quiet bays and coves of fresh water in the rivers," according to Atkins.[1] We see no reason to doubt that the Bay of Fundy bass, and also those that still frequent the Maine rivers from the Penobscot westward, still follow this habit.

It has been known, also, for many years that some bass winter in the Parker River, in northern Massachusetts. In fact, some 8,700 pounds were taken there during the financial depression of 1930 (p. 402). Local fishermen tell us also that a few bass winter in the deeper parts of the North and South Rivers in Marshfield, Mass., on the southern side of Massachusetts Bay, apparently in salt water. But these and other small streams do not seem extensive enough to provide wintering grounds for all the schools of bass that appear in summer between southern Maine and Boston Harbor in reasonably good years. Neither is there anything in the available record to suggest that the Merrimac ever was an important wintering ground. And it is hardly conceivable that the multitude of bass that sometimes frequent Cape Cod Bay and the outer shore of the Cape in good bass years can winter nearby (unless they do so offshore), there being no large rivers along this section of the coast, and no local report of bass in winter in the shallow, partially enclosed bays there, or in the salt marshes.

It was generally believed until recently that the great majority of bass that frequent the Massachusetts coasts of the Gulf (and the Cape Cod region in particular), and also those that summer off southern Massachusetts and around the off-lying islands, move westward along the shore in autumn: some to contribute to the bodies of fish that are known to winter in the rivers of Connecticut and in the lower Hudson, and some to journey perhaps as far as Chesapeake Bay; i. e., to the region where many of them are hatched. The capture, however, in 1949, of an 18-inch bass some 60 miles south of Marthas Vineyard in 70 fathoms of water in February (p. 391) seems to favor the view, now gaining favor among observant anglers, that at least a part of the bass of the Cape Cod region may only move offshore to winter on bottom well out on the continental shelf in localities where the otter trawlers do not ordinarily operate, as has been found of late to be true of the summer flounder (p. 268).

If true, this would mean that some of the Chesapeake-hatched bass that spread northward to Massachusetts and Maine when 2 or 3 years old may never return to their home waters. More definite information in this regard is to be expected from tagging experiments now in progress.

### **Periodic fluctuations in abundance**

Nothing regarding bass is of greater interest to commercial fishermen and to anglers than the great fluctuations in its numbers that have taken place in our Gulf within historic times.

The bass was a familiar fish when New England and the Maritime Provinces were first colonized, all along the coast from Cape Cod to the Bay of Fundy; plentiful and easy to capture, because of its large size and its habit of coming into the mouths of streams and creeks; it was also an important food supply for the early settlers.

Wood[2] for example, tells us that in what is now a part of Boston Harbor:

The basse is one of the best fishes in the country, and though men are soon wearied with other fish, yet are they never with basse. It is a delicate, fine, fat, fast fish, having a bone in his head which contains a saucerfull of marrow sweet and good, pleasant to the pallat and wholesome to the stomach . . . Of these fishes some be three and four foote long, some bigger, some lesser; at some tides a man may catch a dozen or twenty of these in three hours . . . When they use to tide in and out of the rivers and creekes the English at the top of an high water do crosse the creekes [page 401] with long seanes or basse nets, which stop in the fish; and the water ebbing from them they are left on the dry ground, sometimes two or three thousand at a set, which are salted up against winter, or distributed to such as have present occasion either to spend them in their homes or use them for their grounds.

He also describes[3] how "shoales of basse have driven up shoales of mackerel from one end of the sandie beach to the other," near Salem, and mentions them in the Merrimac. In the earliest record the chief centers of abundance for them within the Gulf were Cape Cod Bay and the shore of Cape Cod; the neighborhood of Boston Bay and harbor; the vicinity of the Merrimac River; the Kennebec River and vicinity, and the larger rivers that drain into the Bay of Fundy. Inexhaustible, however, though the supply seemed, a decrease was reported as early as the last half of the eighteenth century. At first this was apparent only locally. For example, fewer were seen in the Piscataqua after about 1792, and very few were reported there from about 1880 down to 1936 or 1937, when the young fish, that were hatched in southern waters in 1934, appeared in our Gulf in such numbers (p. 402).

They seem to have continued moderately plentiful in Massachusetts Bay and around Cape Cod during the first half of the nineteenth century, when bass were still being netted in abundance along the beaches between Boston and Cohasset; 300 good-sized fish were taken in one seine haul at the mouth of Barnstable Harbor in July 1829; while 700 were taken at Provincetown in a day in October 1859. Fishing for bass from the rocks with hook and line was a well recognized sport then around Massachusetts Bay. But Freeman wrote as long ago as 1862 (in his History of Cape Cod) that the bass were much less plentiful in Cape Cod waters than they had been of old. And the catch for Cape Cod Bay and the outer shore of the Cape, combined, reached 2,000 pounds in only three of the years of record during the last quarter of the 19th century and the first quarter of the 20th.[4] Bass, in fact, had so nearly vanished soon thereafter from the Massachusetts coast north of Boston that no commercial catches were reported there for the period 1876 to 1883, though an occasional fish may have been caught.

There may have been a few more bass along the coast of northern Massachusetts during the next 17 years, for yearly catches ranging from none up to 441 fish (1892) were reported for Essex County between 1884 and 1900, while a number were seined in the Merrimac River in 1897. But this was again succeeded by a period of scarcity so extreme that no bass were reported for the Massachusetts coast north of Boston during the next 30 years.[5] And the capture of a single fish in the inner part of Massachusetts Bay by any method was so unusual an event then that one of 44¾ pounds, caught near Brant Rock on the southern shore of the Bay, in November 1930, was given wide publicity in the newspapers.

The bass of the coasts of Maine fared no better. They had practically gone from the Androscoggin by 1860; the reported catch for the entire coastline of Maine (already only about 27,000 pounds in 1880) had fallen to about 1,600 pounds in 1902, 4,200 pounds in 1905, to 600 pounds in 1919. And no commercial catches at all have been reported from Maine in any subsequent year,[6] except for 537 pounds in 1932.

It seems that the bass population of the St. John River system shared with those of Massachusetts and of Maine in the general decline in abundance during the first half of the nineteenth century, for they were reported as much less plentiful there by 1873 than they had been in the early 1800's when they were a familiar sight rolling and splashing at the surface in June[7] But neither the St. John population, nor the population at the head of the Bay of Fundy, nor of the Annapolis River, seem ever to have fallen to as low an ebb as has happened along Maine and Massachusetts. In 1919, for example, when no bass were reported from the Massachusetts coastline of the Gulf (p. 401) and only 600 pounds for Maine, 2,700 pounds were reported from the Nova Scotian coastline of the Bay of Fundy,[8] 1,600 pounds for the St. John River system.

The year 1921 seems to have marked the "turning of the tide" for the bass in Cape Cod Bay waters, for 4,784 pounds were taken that year at [page 402] Sandwich, near the Cape Cod Canal, through which they may have come, while some, that did not find their way into the official returns were taken in the inlets along the outer shore of Cape Cod during that summer or the summer before. And the commercial catches for Barnstable County rose to 8,060 pounds for 1928, to 18,665 pounds for 1929, and ran between about 27,000 pounds and about 34,000 pounds[9] for 1930, 1931 and 1932.

Surf fishermen, too, did better along the outer Cape shore from 1930 through the next couple of summers than they had for many years; (a 33-pounder was taken in the surf on Cape Cod, and one of 44¾ pounds on the south shore of Massachusetts Bay, p. 401). And it appears that the bass spread northward to the estuaries north of Cape Ann during these years (unless a small stock had persisted there through the poor period), for some were taken in the Parker River in the late 1920's while 8,700 pounds were reported thence in the winter of 1930, when net-fishing was allowed, temporarily.

This upswing was brief (the reported catches for the entire coastline of Massachusetts were only 4,500 and 5,100 pounds, respectively, for 1933 and for 1935).[10] But at least it gave a foretaste of what was to come, for the waters around Cape Cod were invaded during the summer of 1936 by countless schools of little bass, weighing about 2 to 3 pounds. These (as is now known) had been hatched in 1934 (i. e., 2 years previous) in the Chesapeake Bay-Delaware Bay region (p. 393), and it is interesting, not only that they came from so far away, but that this was the largest year's brood that has been produced in Chesapeake Bay for as far back as any record is available.[11] Unfortunately, there is no knowing in what numbers they reached the outer shore of Cape Cod and Cape Cod Bay in 1936, for no record seems to have been kept of commercial catches of them there in that year.

But they (chiefly) comprised the catches which were some 5 to 16 times as great in 1936 as in any of the 8 previous years[12] along the coast of Rhode Island. And considerable numbers of them were reported from as far north as the harbors and rivers along the southern part of the coast of Maine, where very few bass, large or small, had been caught for many years previous.

In 1937, having now grown to an average weight of about 3 to 5 pounds, they not only reappeared in such numbers that a commercial catch of something like 80,000 pounds was reported from the Gulf of Maine coast of Massachusetts,[13] but so many of them spread north past Cape Ann that the catch from the inner part of Massachusetts Bay to the New Hampshire line (about 55,000 pounds) was perhaps three times as great as that for the Cape Cod Bay-outer Cape region (in the neighborhood of 19,000 pounds). And more of these little bass were caught by anglers in the river mouths and estuaries of New Hampshire that summer, and of Maine as far as the Penobscot region, than had been the case the year before, but not enough to figure in the official statistics.

The fish of the 1934 year class averaged around 6 pounds by 1939 (many had reached 7-9 pounds); and the bass seemed so well established all along from Cape Cod to southern Maine that anglers had largely forgotten the preceding lean years. And the growth of the individual fish as they advanced in age, combined with fresh increments from the south seem to have more than balanced the death rate (natural or from fishing) for the next 5 or 6 years, for the coast of Massachusetts as a whole.[14] And a good part of the fish of the 1934 year class (still swimming in good numbers) grew meantime to 18 to 25 pounds, to the delight of the anglers.

Bass fishing improved so much in the Hampton region also, and in the Piscataqua River system that about 19,000 pounds were reported for 1943 in the commercial statistics for New Hampshire, where bass had not been mentioned in the fishery statistics for many years. But it is evident that depletion in numbers outran renewal along the coast of Maine during this same period, for there were many fewer fish there in the season 1940 than there had been in 1939 or 1938, though they ran larger, averaging about 8-10 pounds according to local reports.

Small bass (apparently spawned in southern waters in 1940, 1941, or 1942[15] and now large enough to be included in the commercial statistics) again entered the southern part of our Gulf in 1944 in such numbers that the commercial catch for Massachusetts as a whole was nearly twice as great for that year (about 191,000 pounds) as it had been the year before (about 99,500 pounds).[16]

But it seems that very few of the fish of the 1942 year class, if any, spread northward much beyond the Merrimac River, for the reported catch for New Hampshire fell from about 19,000 pounds in 1943 to between 10,000 and 11,000 pounds in 1944, and to about 9,000 pounds in 1945, though the proportion of large fish was greater, while occasional bass, only, were reported in Maine waters in these years, or in the later 1940's.

Anglers' reports in general, and our own observations, are to the effect that few young bass appeared in the Cape Cod Bay-outer Cape region during the four years 1946-1949, or farther north along the New England coast. While this prevailing scarcity of baby bass caused widespread fears that the striper might be facing another serious decline, anglers welcomed an accompanying increase in the numbers of bass weighing upwards of 20 to 25 pounds. Thus, a larger number of fish heavier than 26 to 35 pounds were landed along the outer shore of the Cape, in Cape Cod Bay and in northern Massachusetts waters in 1950 than for many years. We saw one of 45 pounds that was caught by an angling companion in the inner part of Massachusetts Bay that September, and one of 51½ pounds, caught in the surf, was reported from the outer shore of Cape Cod that August, while others, doubtless in the 50-pound class, were taken of which we did not chance to hear. A few very large fish were reported, that summer, in the surf at Old Orchard Beach, Maine. And hundreds of bass of 25 to 45 pounds, with a few running up to 52 or 53 pounds (few smaller than 25-30 pounds) were caught in the surf on the outer beach near the tip of Cape Cod during the summer of 1951, many up to 30-45 pounds in Cape Cod Bay that July; a few as large as 20 to 30 pounds in Duxbury Bay; at least two (to our knowledge) weighing a little more than 50 pounds in the inner part of Massachusetts Bay; a few in the 30 to 45 pound class on the northern Massachusetts coast.

It is almost certain that most of these large fish belong to the abundant year classes that were spawned in the early 1940's or even previously. Hopes for the future depend, therefore, on renewed replenishments of the stock. A year ago (in 1950), prospects seemed good in this respect, for great numbers of little bass (many smaller than the legal length in Massachusetts, 16 inches from snout to fork of tail) were reported that summer and autumn from various localities along southern New England, and northward as far as Plymouth and Duxbury Bays; from the North and South Rivers in Marshfield; from Boston Harbor; from the Parker River (Plum Island Sound region); from the lower Merrimac River; and from Hampton Harbor, N. H. Many "school" fish of 2 to 8 pounds seen (and some caught) in the Saco in July and August of 1950, and a few landed every day from the York and Mousam Rivers late that June, point similarly to a fresh influx of bass to southern Maine waters, either that year or the year before, for it is not likely that these fish had been spawned in the streams along that part of the coast.

And reports that Pleasant Bay, on Cape Cod, the Massachusetts Bay end of the Cape Cod Canal, and Duxbury Bay, have all been "loaded" with small bass at times during the present summer (1951) and also of many too small to keep, off Wollaston Beach in Boston Harbor, are promising at least; so is the fact that a good many fish in the 10 to 15-pound class have been caught at various places along the coast.

An interesting aspect of the bass situation is that the young bass that invaded the water of Massachusetts and of Maine in 1936 and 1937 seem not to have spread to the St. John River system for while commercial catches ran larger there during the 1930's than they had during the 1920's, the increase may not have been greater than can be accounted for by an increasing demand for bass. And, in any case, it had taken place by 1932, i. e., two years before the fish were spawned that replenished [page 404] the Massachusetts stock in 1936 and 1937 (p. 402).[17]

Some of these that reached Massachusetts in 1944 may have spread to Nova Scotia, also, for the average catch was larger there from 1944 to 1946, than it had been for many years. But the increase was not great enough to suggest than any large recruitment had taken place from the south.[18]



Additional evidence that the bass of the Bay of Fundy region do not intermingle to any great extent with those of the western side of the Gulf of Maine is that the fish ran so small in the Nova Scotian streams in 1949 and 1950 (p. 397) when there were so many very large ones in Massachusetts waters (p. 403). And the fact that those caught in those years ran considerably larger in the Annapolis River than in the Shubenacadie River (p. 397) emboldens us to suggest that the populations in the several Nova Scotian streams are more or less separate; and separate also from the bass of the St. John.

It would, of course, be of the greatest interest, to commercial fishermen and to anglers alike, to know what determines that an abundant brood of bass, or a poor brood is to be reared in any given year. All we dare say is that the largest brood on record (that of 1934, in Chesapeake Bay) was produced when the parent stock was at a very low ebb, which may prove a general rule, and that studies by Merriman[19] and by Tiller[20] suggest that very large broods are raised only in years when the temperature of the water is lower than normal, both before the spawning season and after it.

### **Importance**

Striped bass have not been plentiful enough in the Gulf of Maine at any time during the past 100 years to support a commercial fishery of any great magnitude. Even in the good years 1944-1946 the reported value of the commercial catches for Massachusetts as a whole was less than \$50,000 yearly.[21] But this does not take into account bass used for home consumption or those sold in small lots. In the seasons of 1937 and 1938, when the yield of the year class of 1934 was at its peak, about 30-40 percent of the reported commercial catch was made by hook and line, about 40-45 percent in pound nets and traps. But with the development of increasingly efficient methods of trolling with hand lines from small craft, the hook and line catch increased in importance to about 63-65 percent for the seasons of 1939, 1940, and 1943,[22] and to about 89-91 percent for 1944, 1945, and 1946, while the pound net and trap catches decreasing correspondingly.[23]

The striper is the leading game fish in its periods of plenty all along our coast, from the outer shore of Cape Cod to New Hampshire waters. The number of anglers who cast for them in the surf along the beaches of Cape Cod and northward from Cape Ann to the mouth of the Merrimac and at scattered spots elsewhere certainly is in the thousands. Many party boats troll daily for bass in Cape Cod Bay, some also along the Plum Island shore and at the mouth of the Merrimac, while many are caught by trolling, by live line fishing, and even by still fishing in the various inlets.

So far as we know, Shubenacadie River and Lake, and the Annapolis River are the only waters on the Canadian shores of our Gulf where the striper attracts attention as a game fish (p. 397); anglers visiting the St. John are far more interested in salmon.

So much has been written about the techniques of surf casting, trolling, choice of lines, and baits, that we need not delay; but it is interesting, in comparison, to read, in Wood's *New England's Prospect*, published in 1634 (p. 37), that "the way to catch them is with hook and line, the fisherman taking a great cod line to which he fasteneth a peece of lobster and throwes it into the sea. The fish biting at it, he pulls her to him and knockes her on the head with a sticke".

We should point out in conclusion, that the recreational value of the striper is high; its money return to the seaside communities where bass are plentiful is much greater than the price the fish bring in the market, if the amounts spent for tackle and bait, boat hire, lodging, guide service, and the patronage of service garages, and gasoline filling stations are taken into account.

---

[1] Fish. Ind. U. S., Sect. 5, vol. 1, 1887, p. 693.

- [2] New Englands Prospect, 1634, p. 37.
- [3] Wood, New Englands Prospect, 1634, p. 47.
- [4] 1878—4,974 pounds; 1897—4,820 pounds; 1900—6,450 pounds.
- [5] Statistics have been published for 1903 to 1910, 1919, and 1928-1930.
- [6] Statistics published for 1929-1933, and 1935-1947.
- [7] See Adams (Field and Forest Rambles, 1873, pt. 3, Fishes, p. 248), who described the Indians of the Melicete Tribe as still spearing good-sized bass from their canoes in the St. John, in 1873.
- [8] 2,000 pounds from the Cobequid-Shubenacadie region (Hants County), 700 pounds from Annapolis County.
- [9] To the nearest 1,000 pounds.
- [10] No data for 1934.
- [11] Tiller, Publ. 85, Chesapeake Biol. Lab., 1950, p. 24.
- [12] For details, see Merriman, Fish. Bull. No. 35, U. S. Fish and Wildlife Service, vol. 50, 1941, p. 10, fig. 4; p. 13, fig. 8.
- [13] Assuming that about two-thirds of the catch of 28,700 pounds for Barnstable County came from the outer shore of Cape Cod and from Cape Cod Bay, probably an under estimate.
- [14] Reported catches for Massachusetts as a whole were about 62,500 pounds for 1939, about 75,700 pounds for 1940, about 99,500 pounds for 1943, no data available for 1941 or 1942.
- [15] the broods of 1940-1942 were large, in Chesapeake Bay, though not as large as the brood of 1934 (Tiller, Chesapeake Biol. Lab., Pub. 85, 1950, pp. 13, 24-25).
- [16] the minimum legal length for bass (snout to fork of tail) having been set in Massachusetts at 16 inches (fish 3-4 years old).
- [17] Maximum reported catch for St. John River system for period 1922-1943, was 21,200 pounds in 1932.
- [18] Average yearly catch, Nova Scotian rivers and coast of the Bay of Fundy was about 3,355 pounds for 1922-1930; about 12,600 pounds for 1932-1943; about 18,300 pounds for 1944-1946.
- [19] Fish. Bull. 35, U. S. Fish and Wildlife Service, 1941, vol. 50, p. 14.
- [20] Pub. 85, Chesapeake Biol. Lab., 1950, pp. 18, 28.
- [21] 1944, \$29,173; 1944, \$34,643; 1945, \$48,748; 1946, \$34,643.
- [22] No data are available for 1941 or 1942.

[23] About 15-35 percent for 1939, 1940, and 1943; about 5-11 percent for 1944, 1945, and 1946.

[24] Smith, North Carolina Geol. and Econ. Surv., vol. 2, 1907, p. 271.

[25] Atkins, Fish. Ind. U. S., Sect. 5, vol. 1, 1887, p. 694.

[26] Kindly lent by John Adams.

[27] For a detailed tabulation of the length-weight relationship for bass from ¼ pound to 47¼ pounds, see Merriman, Fish. Bull. No. 35, 1941, U. S. Fish and Wildlife Service, p. 7, vol. 50, 1950, pp. 1-77.

[28] As scaled from a graph given by Scofield, California Fish and Game, vol. 18, 1932, pp. 168-170, fig. 38.

[29] Definite information in this regard is scant.

[30] Interesting recent studies of the striped bass are by Pearson (Bull. U. S. Bur. Fish., vol. 49, 1938, pp. 825-851) and by Merriman (Fishery Bull. 35, U. S. Fish and Wildlife Service, 1941, 77 pp.).

[31] Frank Mather of the Woods Hole Oceanographic Institution reports an instance of this.

[32] Fish. Bull. 35, U. S. Fish and Wildlife Service, 1941, vol. 50, p. 43.

[33] Henry Lyman informs us that bass are caught in numbers late in the autumn in the rips east of Nantucket about 4 miles out, but that verbal reports of some taken during the summer of 1950 on the offshore part of Georges Bank were actually based on two weakfish (p. 419).

[34] Reported to us by Capt. Henry W. Klimm of the dragger Eugene H.

[35] Information from Henry Lyman, from an angling correspondent in Alabama. They have long been known up the Alabama as far as Montgomery (Pearson, Bull. U. S. Bur. Fish., vol. 49, 1938, p. 826).

[36] According to Adams (Field and Forest Rambles, 1873, Pt. 3, Fishes, pp. 248-249), who has given an interesting and readable account of the bass in the river.

[37] Merriman, Fishery Bulletin No. 35, U. S. Fish and Wildlife Service, 1941, vol. 50, p. 43.

[38] See Merriman, Fish. Bull. No. 35, U. S. Fish and Wildlife Service, 1941, vol. 50, pp. 33, 34, fig. 24, for details.

[39] For details we refer the reader to Merriman's original account (Fish. Bull. No. 35, Fish and Wildlife Service, 1941, vol. 50, pp. 36-42, figs. 26-29; also pp. 71-73, tables 17-20), which is the most authoritative discussion of the subject that has appeared yet.

[40] the few returns so far from bass of 5 pounds and upward that have been tagged have been from nearby, and soon after they were released.

[41] Fish. Bull. No. 35, U. S. Fish and Wildlife Service, 1941, vol. 50, p. 42.

[42] Using this term to mean extensive seasonal journeys.

[43] Fish. Bull. No. 35, U. S. Fish and Wildlife Service, 1941, vol. 50, p. 42.

[44] See Merriman, Fishery Bulletin No. 35, U. S. Fish and Wildlife Service, 1941, vol. 50, p. 17, for precise salinities in which bass in their first summer have been taken in the Hudson River, and in the Parker River, Massachusetts. See Tresselt (Bull. Bingham Oceanogr. Coll., vol. 14, art. 1, pp. 98-110, 1952) for a survey of spawning grounds tributary to Chesapeake Bay.

[45] Pearson (Bull. U. S. Bur. Fish., vol. 49, 1938, p. 829) records a female with eggs from the Alabama River near Montgomery.

[46] Greeley (New York Conserv. Dept., Biol. Surv. Lower Hudson Watershed, 1937, p. 100) concludes that the spawning season in the Hudson "includes May."

[47] See Smith, North Carolina Geol. Econ. Survey, vol. 2, 1907, p. 272, for an eyewitness account by S. G. Worth.

[48] Merriman (Fish. Bull. No. 35, U. S. Fish and Wildlife Service, 1941, vol. 50, p. 19) gives an excellent summary of information available as to spawning, characteristics of the eggs, and period of incubation.

[49] Hildebrand and Schroeder, Bull. U. S. Bur. Fish., vol. 43, Pt. 1, 1928, pp. 248-249.

[50] Fish. Bull. No. 35, U. S. Fish and Wildlife Service, 1941, vol. 50, p. 17, fig. 10.

[51] Atkins, Fish. Ind. U. S., Sect. 5, vol. 1, 1887, p. 693.

[52] Merriman, Copeia, 1937, p. 23.

[53] New York Conserv. Dept., Biol. Surv. Lower Hudson Watershed, 1937, p. 62.

[54] Bean, Bull. New York State Mus., 60, Zool. 9, 1903, p. 527.

[55] Scaled from Scofield's graph (California Fish and Game, vol. 18, 1932, pp. 168-170, fig. 38).

[56] See Scofield, Fish Bull. No. 29, Div. of Fish and Game, California, 1931 for growth of bass in California.

[57] Bull. New York Zool. Soc., vol. 16, No. 60, November 1913, p. 1049.

[58] Fish. Bull. No. 35, U. S. Fish and Wildlife Service, 1941, vol. 50, p. 22.

[59] Merriman, Fish. Bull. No. 35, U. S. Fish and Wildlife Service, 1941, vol. 50, p. 16.

[60] Pearson (Bull. U. S. Bur. Fish., vol. 49, 1938, p. 827, fig. 1) charts its United States range, but does not include its Canadian range.

[61] Gerlach (Contrib. 14, Oregon Fish. Comm., 1950) gives an interesting account of the life history and distribution of the striper in Oregon waters.

[62] Many are caught by anglers casting in the Cape Cod Canal, but this is not properly a part of the Gulf of Maine.

[63] the bouldery area at the eastern end at the North River inlet is now within the limits of the military reservation; hence the only way to fish it is from a boat by casting in, toward the rocks.

[64] Atkins, Fish. Ind. U. S., Sect. 5, vol. 1, 1887, p. 675.

[65] Reported in Saltwater Sportsman for October 6, 1950.

[66] Yearly catch about 1880, some 8,000 pounds in the Sheepscot according to Atkins, Fish. Ind. U. S., Sect. 5, vol. 1, 1887, p. 716.

[67] Atkins (Fish. Ind. U. S., Sect. 5, vol. 1, 1887, p. 700) reports one of 20 pounds, taken in the St. Croix in a weir in 1880.

[68] What few bass were reported from Maine in 1919 were from the Kennebec (592 pounds) and from Penobscot waters (57 pounds); bass have not been included in the fisheries statistics for Maine for any subsequent years.

[69] Contrib. Canadian Biol. (1921) 1922, p. 63.

[70] Information from Dr. A. H. Leim.

[71] Goode, Fish. Ind. U. S., Sect. 1, 1884, p. 425.

[72] Saltwater Sportsman for July 6, 1951.

[73] According to Moore, Boston Herald, August 28, 1950.

[74] Information from Dr. A. H. Leim.

[75] According to Huntsman, Ann. Rept. Fishery Board Canada, (1949) 1950, p. 41.

[76] Vladykov and McKenzie, Proc. Nova Scotia Inst. Sci., vol. 19, 1935, p. 91.

[77] Information from Maj. Howard Scott of the Fishery Division of the Nova Scotian Department of Trade and Industry, received through Henry Lyman.

[78] the most recent year for which detailed statistics are readily available.

[81] This is the most recent year for which information is available for Northumberland and Kent Counties.

[82] Rapp. Gen. Ministr. Chasse et Pêch., Quebec, Pêcheries (1946-1947) 1947, p. 50.

[83] the reported catch for 1948-1949 was only about 1,800-1,900 pounds (17 quintals; See Rapp. Gen. Ministr. Chasse et Pêch., Quebec, Pêcheries (1948-1949) 1949, p. 94).

[84] Adams, Field and Forest Rambles. 1873, Pt. 3, Fishes, p. 248.

- [85] Atkins, Fish. Ind. U. S., vol. 5, Sect. 1, 1887, p. 693.
- [86] Towne, State of Maine Striped Bass Survey, Maine Devel. Comm. and Dept. Sea and Shore Fisheries, 1941 [approx. date], p. 14.
- [87] Fishery Bulletin No. 35, U. S. Fish and Wildlife Service, 1941, vol. 50, p. 17.
- [88] Fish. Bull. No. 35, U. S. Fish and Wildlife Service, 1941, pp. 46-52
- [89] This is the only year for which we have detailed information.
- [90] Weston, Field and Stream, March 1932, p. 69.
- [91] Moore (Boston Herald, Aug. 28, 1950) reports that bass are taken in traps from July on, in the Cobequid Bay region.
- [92] Huntsman, Ann. Rept. Fisheries Res. Board Canada, (1949) 1950, App. 2, pp. 41-42.
- [93] Atkins, Fish. Ind. U. S., Sect. 5, vol. 1, 1887, p. 693.
- [94] Fish. Ind. U. S., Sect. 5, vol. 1, 1887, p. 693.
- [95] Property of the Pond Village Cold Storage Co., of North Truro, to whom we are indebted for much information.
- [96] Reported by Henry Moore, Boston Herald for Dec. 7, 1950.
- [97] Report by Henry Moore, Boston Herald for Aug. 28, 1950.
- [98] Trans. Litt. Phil. Soc. New York, vol. 1, 1815, pp. 502-504.
- [99] the River Fisheries of Nova Scotia, 1867, p. 12.

---

**Fishes of the Gulf of Maine** by Bigelow & Schroeder is the seminal work on North Atlantic fishes. It was originally published in 1925 with William Welsh, a Bureau of Fisheries scientist who often accompanied Henry Bigelow on his research cruises. In the late 1920's, Bigelow began a long association with William C. Schroeder, publishing a number of papers and reports on fishes of the North Atlantic, including the first revision of *Fishes of the Gulf of Maine*. This excerpt is from that 1953 edition.

This reprint is from <http://NJScuba.net>

