

Sand Flounder

Lophopsetta maculata (Mitchill) 1814

WINDOWPANE; SPOTTED FLOUNDER; NEW YORK PLAICE; SAND DAB;
SPOTTED TURBOT [Jordan and Evermann, 1896-1900, p. 2660.]

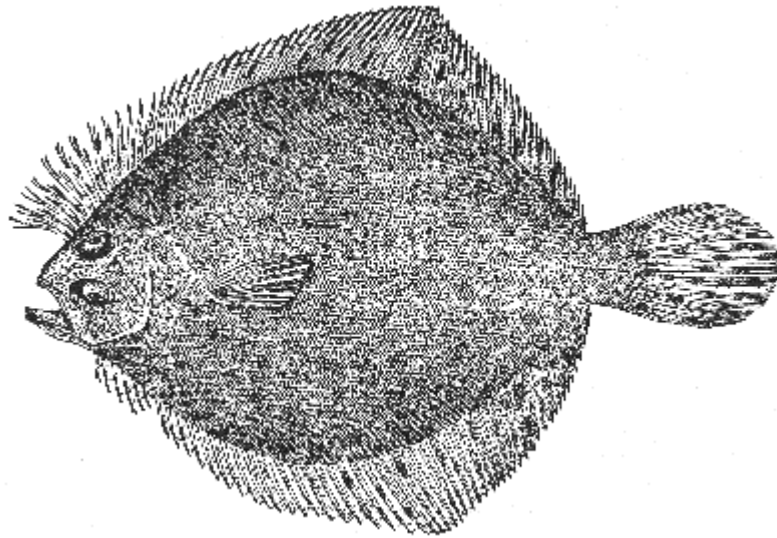


Figure 151 - Sand flounder (*Lophopsetta maculata*)
From Jordan and Evermann. Drawing by H. L. Todd.

Description

This is the closest North American relative of the European turbot and brill. It is left-handed (eyes and viscera at the left-hand side) and large-mouthed, like the summer and four-spotted flounders, but it is readily separable from both of these by the outlines of its ventral fins. In all other Gulf of Maine flatfish (except for the hogchoker) these are narrow at the base and widen toward the tip, but the ventrals of the sand flounder are as wide at the base as they are at the tip, each simulating a detached segment of the anal fin. Furthermore the two ventral fins are not alike either in location or in size, the left-hand (upper) fin, which is the longer of the pair, being practically a continuation of the anal fin so far as its appearance goes, whereas the right-hand (lower) ventral fin is situated a short distance up the right-hand side of the throat. The general appearance of the dorsal fin is no less diagnostic, for its first 10 or 12 rays are not only free from the fin membrane along the outer half of their lengths, but they are branched toward their tips, so that they form a conspicuous fringe which is without parallel among Gulf of Maine flatfishes. Furthermore, the sand flounder is more nearly round in outline than any of our other local flatfishes (it is only about one and one-half times as long as it is broad), and so thin through that its body is translucent when it is held up against the light. Its pectoral fins, too, are longer than in our other left-handed flatfishes; its caudal fin is more rounded; and its teeth smaller although the gape of the mouth is wide.

The dorsal (right) fin (63 to 69 rays) tapers toward the tail; the anal (left) fin (46 to 52 rays) tapers toward head and tail, while both of these fins are noticeably thick and fleshy at the base; and there is no free anal spine. The pectoral fin on the eyed side is longer and more pointed than its mate on the blind side; the scales are smooth to the touch; and the lateral line is bowed abreast of the pectoral fin.

Color

The sand flounder varies less in color than most shoal-water flatfishes do, the general ground tint of its eyed side (both as described by previous authors and in those we have seen) being of a pale and rather translucent greenish olive or slightly reddish or light slaty brown more or less mottled with darker and paler, and usually (if not always) dotted with many small brown spots of irregular shapes. Some fish are also marked on the body and on the bases of the dorsal, anal, and caudal fins with white spots that vary in number and in size from fish to fish. But others lack these spots. The dorsal, anal, and caudal fins are of the general body tint, more or less mottled with darker, while the pectoral of the eyed side is dark crossbarred or speckled. The blind side is white in most of them, but specimens have been seen on which it was irregularly dark-blotched.^[1]

Size

The sand flounder is said to grow to a maximum length of 18 inches and to a weight of 2 pounds. But the largest we have seen (from Waquoit on the southern shore of Massachusetts), were about 15 inches long. And adult fish run only about 10 or 11 to 12 inches in length. Sand flounders from southern New England measured by Moore^[2] averaged about $\frac{1}{4}$ pound at 8 inches; about $\frac{1}{2}$ pound at 10 inches; about $\frac{3}{4}$ pound at 12 inches; and a little more than 1 pound at 14 inches.

Habits

The sand flounder is a shoal-water fish. Its upper limit is close below the tide mark, and the 20 to 25 fathom line probably marks its lower limit, in general, in the coastal zone north of Cape Cod. But Moore reports it as occurring regularly down to 27 fathoms off Connecticut, and Welsh saw it taken on Georges Bank down to 30 or 40 fathoms, while the Albatross III trawled a few on the southwest part of the Bank along this same depth zone in May 1950.

It is caught chiefly on sand bottom off southern New England and southward, as its name implies, but its comparative abundance in Casco Bay and in Minas Channel shows that it also frequents softer and muddier grounds in the Gulf of Maine.

The sand flounder is a year-round resident off the southern New England coast, and probably this applies to it in the Gulf of Maine also, there being no evidence that the adults carry out any migrations inshore or offshore, with the change of the seasons. But such of the young fry as settle to bottom in shallow water inshore tend to work offshore as they grow, and deeper, while tagging experiments off southern New England have shown that individual sand flounders may wander along the coast for considerable distances, or across open water, much as winter flounders. Some of them went as far as 80 miles in 3 months.^[3] And it is probable that the wanderings of the adults play an important part in the intermingling of local populations.

The adult sand flounder is necessarily attuned to a wide temperature, occurring as it does over many degrees of latitude, and in shallow waters where it is exposed to the extremes of winter chilling and of summer warming. Such of them as winter in shoal bays experience winter temperatures close to the freezing point of salt water in winter, not only in the northern part of their range, but even as far south as the Connecticut shore.^[4] And it is probable that the entire population in the Gulf of Maine winter in water colder than 36° F. But these same fish summer in temperatures of 50° to 70°, according to locality and depth. And some sand flounders summer in still higher temperatures farther south. Nevertheless, it seems that temperature is the factor that governs the northerly range of the species and its local abundance, for it is only where the surface waters warm to 55° or higher in summer, as happens in Massachusetts Bay, in Casco Bay, in Minas Channel, and over the southern shallows of the Gulf of St. Lawrence, that the sand flounder is able to maintain itself in any numbers. Apparently either its eggs or its young larvae, or both, fail to develop in lower temperatures. And these isolated breeding centers are not productive enough to stock the intervening stretches of shoreline in the case of a fish as stationary as the sand flounder. Thus its distribution is somewhat analogous to that of the oyster.

The large mouth of the sand flounder suggests that it feeds on active prey. Welsh, in his field notes, remarked, in fact, that sand flounders caught off Atlantic City, N. J., were full of "schizopod shrimps" (mysids) and of these alone, and mysid shrimps (*Neomysis americana*) had similarly been the predominant item in all months of the year, for 654 Long Island Sound fish examined by Moore,^[5] with shrimps of other kinds ranking second. Moore also concluded that the few fishes included in their diet were not enough to class the sand flounder as a fish eater. But hake, herring, launce, and silversides have been found in their stomachs at Woods Hole, while North Carolina specimens had eaten fish, also crabs and shrimps.^[6] And we suspect that they seize small fish whenever they can, for we once hooked a sand flounder only about 12 inches long on a 2½-ounce metal jig, while we were casting for striped bass in the surf on Orleans Beach, Cape Cod.

A variety of small invertebrates other than shrimp have also been found in their stomachs; Vinal Edwards noted annelid worms, crabs, squid, small mollusks, ascidians and even seaweed, to which Moore adds gammarids and other small Crustacea, worm tubes, sea cucumbers (holothurians), glass worms (*Sagitta*), and sand. A larval sand flounder 11.5 mm. long examined by Moore^[7] contained minute copepods (*Temora* and *Centropages*) and amphipods (*Unciola* and *Leptocheirus*).

The sand flounder is a late spring and summer spawner in the northern part of its range; thus Welsh found them spawning late in June at Gloucester, and ripe fish are taken at Woods Hole in May and June, while Moore reports sand flounders ripe in Long Island Sound from early May to August, with some still incompletely spawned out there in September. And it seems that they commence spawning still earlier in the season to the westward and southward, for Nichols and Breder^[8] report young fry 20 mm. long in Sandy Hook Bay by May, while the sizes of the young fry taken in winter in Chesapeake Bay suggest that they are hatched there as early as March or April.^[9]

It is not yet possible to state the extremes of temperature within which the sand flounder spawns. But 50° to 60° F. has proved favorable for hatching artificially fertilized eggs at Woods Hole, with even 70° not too warm for successful incubation. The eggs are spherical, transparent, buoyant, 1 to 2 mm. in diameter (measurements taken at Gloucester by Welsh), with a single colorless or pale-lemon oil globule of 0.15 to 0.28 mm. And the surface of the egg shows faint irregular markings. Incubation occupies about 8 days at 51°-56°; its duration has not been recorded for higher temperatures. The sand flounder, like the winter flounder, completes its metamorphosis while it is smaller than either the yellowtail or the. Thus the dorsal and anal fin rays were complete and the ventral fins had formed in one only 8½ mm. long (fig. 153), and its right-hand eye had already moved around to the back-line of the head, while the migration of the eye is completed, and they are ready to take to bottom by the time they have grown to 10 mm. long.^[10]

Rate of Growth

It seems that the sand flounder passes through its larval stage more rapidly than most flatfishes do, for many of its fry with the migration of the eye completed have been taken at Woods Hole only 1 to 2 months after spawning commences there. One that was kept in an aquarium there by Williams^[11] grew from 10 mm. to 22 mm. in length in 11 days; and Nichols and Breder's^[12] observation that fry of the year in Sandy Hook Bay grew from an average length of about ¾-inch (to the base of the tail fin) in May, to about 2 to 23/8 inches by late September, is in line with Tracy's statement^[13] that the fry are 2 to 3 inches long in July in Rhode Island waters, growing to 4 inches and upwards in December. Fry only 1 to 2 inches long reported by Nichols and Breder at Orient, N. Y., in December, seem to have been from a late-hatched brood.



FIGURE 152.—LARVA, 5.5 mm.



FIGURE 153.—LARVA, 8 mm.

Figure 152 - Larva, 5.5 mm.

Figure 153 - Larva, 8 mm.

Sand flounder (*Lophosetta maculata*)

Moore concludes, from her very detailed study of the growth zones on scales and otoliths, that sand flounders in Long Island Sound average about 4½ inches long when they are 2 years old (i. e., at the beginning of their third summer); about 7½ inches at 3 years; about 9 to 10 inches at 4 years; about 11 inches at 5 years; about 11½ inches at 6 years; and about 12 inches at 7 years.^[14] And Gulf of Maine fish probably grow at about this same rate. They mature at 9 to 10 inches; i. e., in the third or fourth year, according to the foregoing schedule.

General range

Coastal waters of eastern North America, from the Gulf of St. Lawrence to South Carolina; most abundant west and south of Cape Cod, north and east of which it is confined to favorable localities.

Occurrence in the Gulf of Maine

This flounder is not common in the Gulf of Maine, except locally. Dr. W. C. Kendall found it at Monomoy; we have caught one on the outer shore of Cape Cod; Storer found it at Provincetown, where he saw a considerable number in shoal water; it is reported from North Truro; from Gloucester Harbor, where a considerable number were collected in 1878 (Welsh found it there in 1916), and at Milk Island nearby. But we have not learned of it anywhere else in the Massachusetts Bay region, and it has never been recorded between Cape Ann and Cape Elizabeth, nor did Welsh see it taken there by the gill-netters during the spring of 1913. It has been reported repeatedly at several localities in Casco Bay, which seems to be a local center of abundance. But it cannot be common along the eastern Maine coast or on the New Brunswick side of the Bay of Fundy, for the only records from this stretch of coastline are from Bucksport, from Eastport, and from Passamaquoddy Bay where one was taken in 1880 and another in 1912. Minas Channel on the Scotian side seems to be a second center of abundance, like Casco Bay, for Leim found it common there.^[15] Huntsman reports it in St. Mary Bay also. But we have found no other record of it along the western coast of Nova Scotia.

Welsh saw it taken by the otter trawlers on Georges Bank in June 1913, and we have seen it there on four recent trawling trips, including about a dozen specimens trawled by the Albatross III on the southwest part of the bank and off Nantucket in 22 to 39 fathoms, in mid-May 1950, and 132 taken by the Eugene H in that same general region, in 36 hauls at 25 to 45 fathoms, in late June 1951. Beyond this, nothing is known of it on the offshore fishing grounds.

The evidence of the Gloucester specimens mentioned above proves that it breeds in the Massachusetts Bay region to some extent, while its local abundance suggests the same for Casco Bay, as does the capture of its larvae for Minas Channel. It may also breed at the heads of the warmer and shoaler bays between Casco Bay and Grand Manan. Seemingly it does not do so in any of the estuaries on the New Brunswick side of the Bay of Fundy for no larvae have ever been found in Passamaquoddy Bay, a fairly representative situation, probably because of low temperature. But we have no doubt that the local stocks in the Gulf of St. Lawrence are self-sustaining.

The sand flounder is much more plentiful west of Cape Cod than it is anywhere in the Gulf of Maine, southward at least to Chesapeake Bay, where it is very generally distributed in depths down to 25 fathoms, especially in the southern part. And it is reported as common at Beaufort, N. C.^[16]

The sand flounder is known only here and there to the eastward and northward of our Gulf. Its pelagic larvae have been reported on Middle Ground off Halifax and near Sable Island;^[17] a few adults have been taken in Chedabucto Bay, eastern Nova Scotia;^[18] Cox^[19] states that it is "by no means uncommon" around the Magdalen Islands, in the southern side of the Gulf of St. Lawrence, where Huntsman^[20] classes it as characteristic of the warm surface stratum inshore; and it has been taken off Port-au-Port on the west coast of Newfoundland.^[21]

Importance

Sand flounders are so small and so thin bodied, and so few of them are caught in the Gulf of Maine that they are of no commercial importance there, nor likely to be. However, a market developed for them during the war years in New York, where a much larger supply was near at hand, culminating in landings of about 340,000 pounds in 1944, and about 360,000 pounds in 1945. But as Moore has pointed out,^[22] the demand fell off during 1945, as the war drew to its close. And now the sand flounder is a neglected fish again.

^[1] Moore, Bull. Bingham Oceanogr. Coll., vol. 11, art. 3, 1947, p. 20

^[2] Bull. Bingham Oceanogr. Coll., vol. 11, art. 3, 1947, p. 53, fig. 12.

^[3] For details, see Moore's (Bull. Bingham Oceanogr. Coll., vol. 11, art. 3, 1947, pp. 58-63) detailed study of the sand flounder in southern New England waters.

^[4] Warfel and Merriman (Bull. Bingham Oceanogr. Coll., vol. 9, art. 2, 1944, pp. 61-62) give details of temperature and salinity for Connecticut waters. With references.

^[5] Bull. Bingham Oceanogr. Coll., vol. 11, art. 3, 1947, pp. 54-58.

^[6] Smith, North Carolina Econ. Geol. Survey, vol. 2, 1897, p. 392.

^[7] Bull. Bingham Oceanogr. Coll., vol. 11, art. 3, 1947, pp. 26-27.

^[8] Zoologica, New York Zool. Soc., vol. 9, 1927, pp. 181-182.

^[9] Hildebrand and Schroeder, Bull. U. S. Bur. Fish., vol. 43, Pt. 1, 1928, p. 172.

^[10] Williams (Bull. Mus. Comp. Zool., vol. 40, 1902, No. 2) has given a brief account of the anatomical changes that take place during the passage of the eye in the sand flounder, and a more detailed account for the winter flounder. For photographs of larvae and small fry, see Moore (Bull. Bingham Oceanogr. Coll., vol. 11, art. 3, 1947, fig. 3).

^[11] Bull. Mus. Comp. Zool., vol. 40, 1902, p. 3.

^[12] Zoologica, New York Zool. Soc., vol. 9, 1927, pp. 181-182.

^[13] Rept. 40, Comm. Inland Fish. Rhode Island, 1910, p. 166.

^[14] Bull. Bingham Oceanogr. Coll., vol. 11, art. 3, 1947, pp. 47-51.

[15] Huntsman, Contrib. Canadian Biol. (1921), No. 2, 1922, p. 70.

[16] Smith, North Carolina Geol. and Econ. Survey, vol. 2, 1897, p. 392.

[17] Report 1, No. 4, Newfoundland Fishery Res. Comm., 1932, p. 110.

[18] Cornish, Contrib. Canadian Biol., (1902-1905) 1907, p. 90.

[19] Contrib. Canadian Biol., (1918-1920) 1921, p. 113.

[20] Trans. Roy. Soc. Canada, Ser. 3, vol. 12, Sect. 4, 1918, p. 63.

[21] Rept., Newfoundland Fish. Res. Comm., vol. 2, No. 1, 1933, p. 127.

[22] See Moore (Bull. Bingham Oceanogr. Coll., vol. 11, art. 3, 1947, p. 71) for detailed tabulation of the New York landings, 1943-1945, from the Daily Market News Service, Division of Fishery Industries, U. S. Fish and Wildlife Service. The sand flounder is not included in the general fisheries statistics published yearly by the Fish and Wildlife Service.

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.

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