PREDATION BY BLUEFISH ON FLATFISHES

Fred E. Lux and John V. Mahoney

Severe wounds observed on yellowtail flounder, Limanda ferruginea (Storer), from otter trawl catches off New York in 1971 apparently were inflicted by bluefish. Some of the yellowtail probably survive the wounds, in which large pieces of flesh are sometimes bitten away. Such healed wounds possibly are related to certain kinds of morphological anomalies occasionally found in flatfishes.

Bluefish, Pomatomus saltatrix (L.), which occur in New England and Middle Atlantic coastal waters in summer and autumn, are probably the most voracious of Atlantic coast fishes. Their prey consists of both pelagic and demersal fish and also, at times, invertebrates (Baird, 1873; Bigelow and Schroeder, 1953). There are, however, no published accounts of bluefish predation on adult flatfishes (Pleuronectiformes), which live in closer association with the bottom than most other demersal fishes, although baby winter flounder, Pseudopleuronectes americanus (Walb.), have been observed in stomachs of juvenile bluefish (Greeley, 1939).

We report here cases of predation on adult yellowtail flounder, Limanda ferruginea (Storer), in the autumn of 1971. We discuss the possibility that some of the morphological anomalies occasionally found in coastal flatfishes stem from wounds inflicted by bluefish.

Five Bitten Yellowtail

On September 28, 1971, Captain Norman Edwards, a commercial otter trawl fisherman from Amagansett, New York, brought to us five yellowtail flounder that he had caught the day before off Montauk Point, Long Island (40°51' N, 71°42' W) at a depth of 30 fathoms (55 meters). All five, which ranged in total length from 31 to 36 centimeters, clearly had been bitten on posterior parts of their bodies (Figure 1). In four of the five, substantial parts were bitten away. The fish apparently were alive when caught because all were in fresh condition. The wounds of two were healing (Figure 1a and 1b). This indicates that some of the yellowtail survive wounds of this severity. The survival of other species of fish after suffering wounds at least as severe as these has been reported (Breder, 1953; Gunter and Ward, 1961).

The Captain's Testimony

Captain Edwards was fishing for yellowtail flounder and other mixed fishes in the above area through the summer and autumn of 1971. He felt that the wounded yellowtail had been attacked by bluefish which, he said, had been unusually common in this area since mid-August and sometimes drove other fish from the grounds. Occasionally in this period he was catching one- or two-dozen bitten yellowtail per haul. He estimated that the average haul contained a total of about 1,000 to 2,000 yellowtail. Sometimes he caught one or two bluefish in a haul; individuals ran about 5 to 10 pounds (2.3 to 4.5 kilograms). He did not examine any of their stomach contents prior to November.

On November 9, 1971, Captain Edwards caught a bluefish in the area referred to earlier. He gave it to us along with its stomach contents. This fish, 52 centimeters fork length and 1.9 kilograms gutted weight, had in its stomach 340 grams of fish chunks consisting of six pieces of yellowtail and two pieces of northern sea robin, Prionotus carolinus (L.), (Figure 2). The prey apparently had been eaten not long before the fish was caught, for only first signs of digestion were

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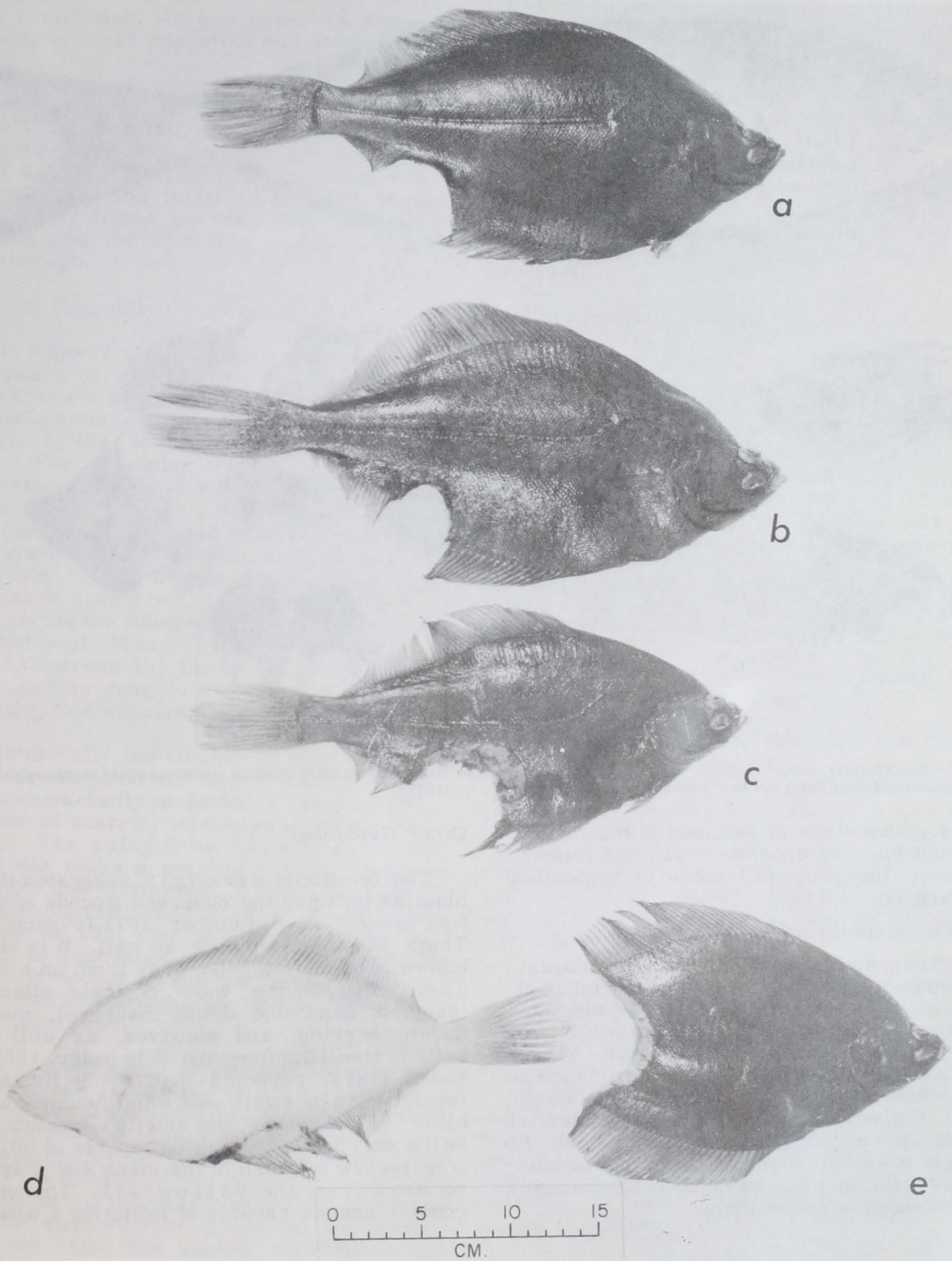

Fig. 1 - Yellowtail flounder, caught in September 1971 off Long Island, New York, with wounds apparently inflicted by bluefish.

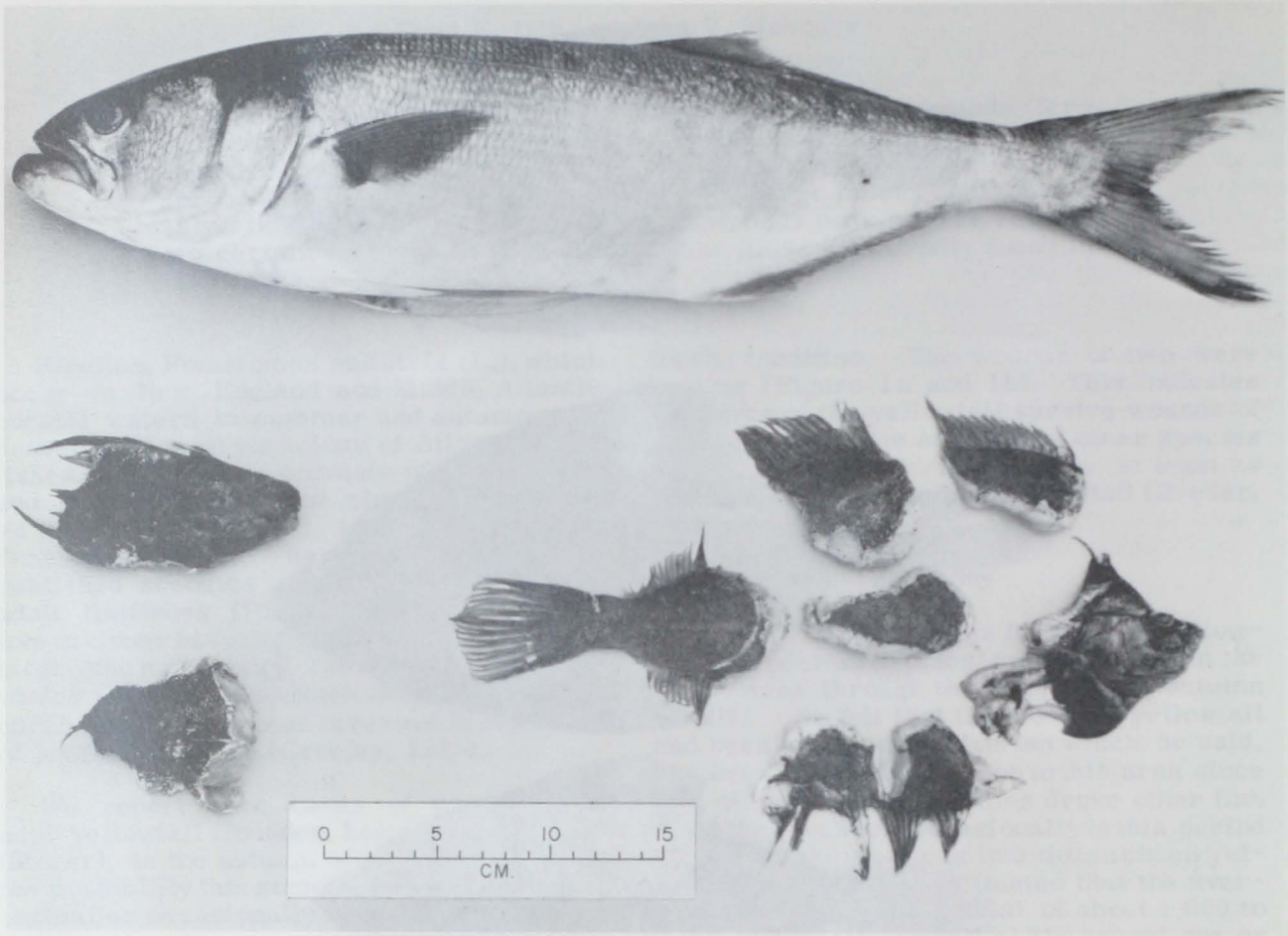

Fig. 2 - Bluefish (top), caught in November 1971 off Long Island, New York, with stomach contents consisting of six chunks of yellowtail flounder (lower right) and two chunks of northern searobin (lower left).

noted. The sizes and shapes of the yellowtail chunks were consistent with the missing parts of the yellowtail taken in September (Figure 1).

Another Captain Agrees

Subsequently, we talked with Captain Alfred Rebello of New Bedford, Massachusetts who, in 1971, had fished some of the same areas off Long Island that Captain Edwards fished. His experience was similar. He reported that catches of yellowtail dwindled whenever bitten fish appeared in the catch. This suggested to him, also, that bluefish broke up the yellowtail concentrations. He said he opened stomachs of a number of bluefish caught in the trawl and found chunks of yellowtail in some of them.

Other Evidence

The foregoing strongly suggested that bluefish inflicted the observed wounds of the fish caught in September 1971 (Figure 1). There is other evidence as well. It is well known that bluefish drive prey from an area. They leave in the wake of their attacks mangled, dead and dying mackerel, menhaden, herring, and alewives, as well as bottom fish (Bigelow and Schroeder, 1953). Baird (1873) reported that where fish are too large to be swallowed whole, chunks are bitten off. Further, the bluefish appears to be the only fish of the region capable of biting free pieces of flesh of the sizes and shapes removed from the yellowtail. The only coastal sharks capable of inflicting a wound

of this shape are too large to make one of such small size. In any case, we have no records of shark predation on flatfishes.

The yellowtail wounds corresponded with the jaw shape and size and dentition of about 2- or 3-kilogram bluefish. The sharp-edged, triangular teeth of bluefish are similar to those of some sharks. The bluefish, after seizing prey too large to swallow whole, presumably flexes its body vigorously, and so develops the shearing action needed to bite through.

Bluefish Unusually Common in 1971

All reports from sport and commercial fishermen corroborated the views of Captains Edwards and Rebello that bluefish were unusually common in the summer and autumn of 1971 in the New York and New England area. For example, the National Marine Fisheries Service statistics reporter from Rhode Island reported for September 1971: "No one that I have talked to has ever seen seen such a profusion of bluefish, for so long, in Rhode Island waters before." Bluefish also were caught with greater frequency in 1971 during the autumn otter-trawl survey of the National Marine Fisheries Service R/V 'Albatross IV' than in previous years, although this gear is not very efficient for sampling this species.

Historically, the number of bluefish found in the New England and Middle Atlantic areas has been markedly variable. It has gone from periods of scarcity to surges of great abundance. The swing from one extreme to the other has taken a varying number of years (Bigelow and Schroeder, 1953). In view of the evidence presented above, it appears that bluefish in 1971 may have been approaching a high in abundance. With the higher abundance, it seems likely that there would be more bluefish attacks on fishes other than their usual prey.

Of course, some of the bluefish attacks on yellowtail could have occurred within the otter trawl. There is evidence that this was not normally the case, however, since bitten yellowtail appeared in many hauls which contained no bluefish. Further, it is unlikely that yellowtail that might have been bitten in the trawl and then were discarded overboard, when the catch was sorted, survived to be caught again in a subsequent haul. Available data indicate that only about 25 percent or fewer of discarded yellowtail survive when they are unwounded (Lux, 1968). Survival of discarded bitten fish undoubtedly would be much lower. Therefore it would be difficult to account for the large numbers of bitten yellowtail that the fishermen observed, except through predation that was largely outside of the trawl. However, we do not rule out the possibility that trawling operations sometimes attract bluefish, as they sometimes attract other fish or sea birds, or that trawling may make flounders more available prey for bluefish.

Winter Flounder Wounds

Few of the other coastal fisheries, such as winter flounder and summer flounder, Paralichthys dentatus (L.), were caught in the area where wounded yellowtail were observed. This was because the water there was deeper than on their usual summer and fall grounds. Therefore, there were no reports of wounds on other flatfishes. Captain Edwards told us, however, that while otter trawling in Gardiners Bay, Long Island, in 5 to 6 fathoms (9 to 11 meters) of water in late May 1970, he caught a few winter flounder that had wounds like those of the yellowtail. Bluefish had just arrived in large numbers in the area, he said, and it was his view that they had inflicted the wounds on the winter flounder.

Over a period of years, Atlantic coast fishermen have been very helpful in bringing to our attention a large number of flatfishes with various morphological anomalies. Causes for most of these remain unknown. Among the records, however, are anomalies in two winter flounder. These, in the light of information presented above, possibly can be explained as resulting from wounds by bluefish that subsequently healed.

The first of these fish was 28 centimeters total length and was caught by otter trawl near Nantucket Shoals (approximate position 41°10' N, 70°10' W) in spring 1959. It had neither caudal peduncle nor caudal fin (Figure 3). If this anomaly was caused by a wound, it was completely healed. The fish looked as though the caudal part might have been bitten away, as in the case of one of the yellowtail caught in September 1971 (Figure 1e), and the ends of the U-shaped wound came together on healing.

The other winter flounder (Figure 4) was 35 centimeters total length and caught by

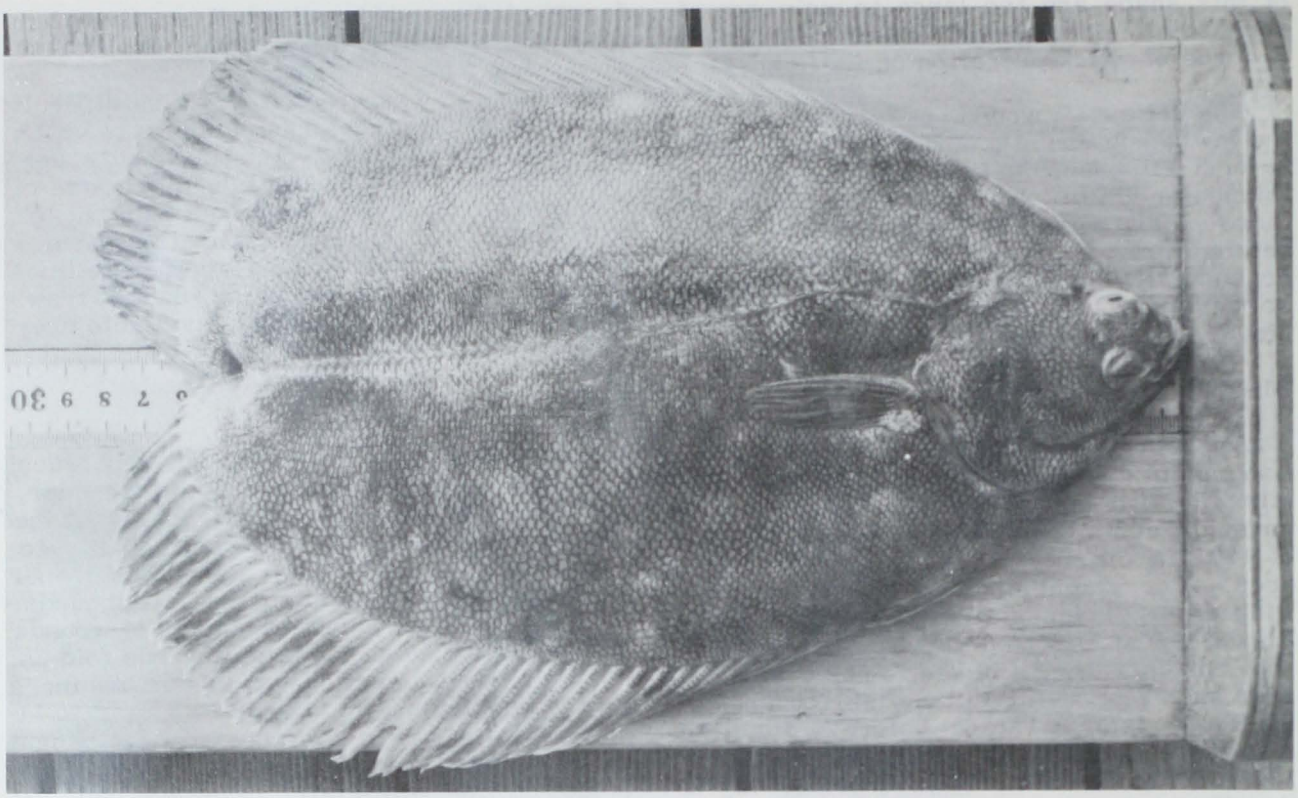

Fig. 3 - Winter flounder, caught near Nantucket Shoals in 1959, without caudal fin or caudal peduncle.

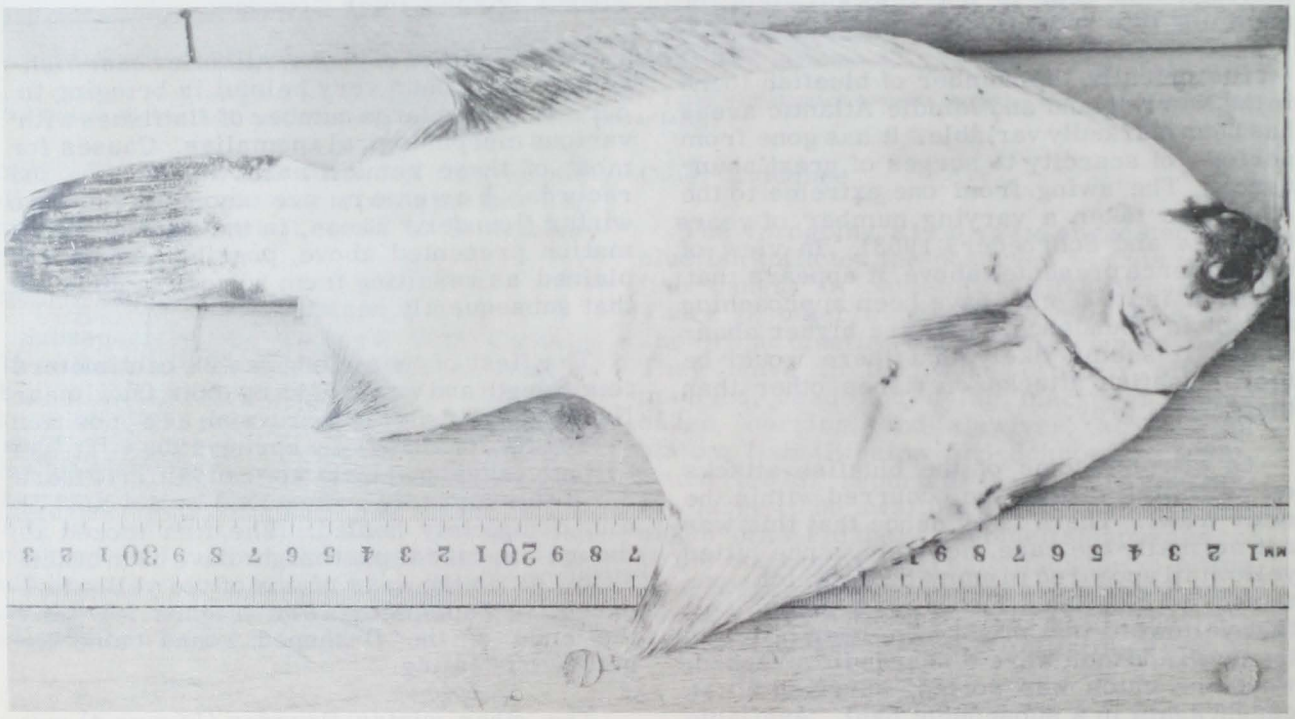

Fig. 4 - Winter flounder, caught in Block Island Sound in June 1960, with healed wound or other anomaly on the caudad ventral edge and with a deficiency of pigmentation.

otter trawl in June 1960 in Block Island Sound. It looked as though it could have suffered a wound like some of the other bitten yellowtail (Figure 1a, 1b, and 1c[1/]. If this was a wound, it also was healed entirely. However, there remained a marked upward curve in the spinal column above the affected area. In addition, this fish was pigmented only on a few scattered areas, notably on the end of the head and on the fins. Whether or not it suffered a loss of pigmentation because of injury is unknown. Wounds and skeletal abnormalities, however, have been reported in association with pigmentation deficiency in a number of flatfishes (Dawson, 1967).

Another winter flounder, 24 centimeters in total length, with a bite-shaped piece missing from its dorsal edge and with a pigmentation deficiency similar to that of the fish of Figure 4, above, was reported by Breder (1938) as being caught near Bayside, New York, in November 1938. Breder suggested that this fish had a healed bite wound. If so, it seems quite possible that it was bitten by a bluefish.

It appears likely that more information on flatfish wounds and their effects will come to light during the next year or two, considering current bluefish abundance. Assuming that we obtain sufficient records of wounded fish, we may be better able to explain certain flatfish anomalies.

ACKNOWLEDGMENTS

We thank Captains Edwards and Rebello and other members of the fishing industry who provided specimens and information for this report.

1/The wounded yellowtail flounder collected in September 1971 (Figure 1), the bluefish and stomach contains collected in November 1971 (Figure 2), and the winter flounder with a possible healed wound collected in June 1960 (Figure 4) are deposited in the U.S. National Museum under catalog numbers USNM 207038, USNM 207037, and USNM 207036, respectively. The winter flounder with the tail missing that was collected in 1959 (Figure 3) was unintentionally discarded.

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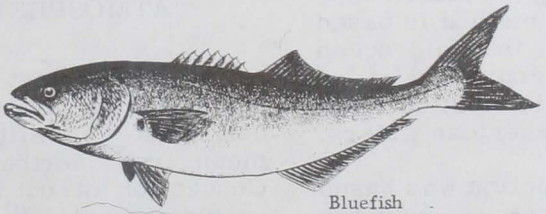

Bluefish
(Pomatomus saltatrix)