LENGTH-WEIGHT RELATIONSHIP AND STOMACH CONTENTS OF THE SWELLFISH (SPHEROIDES MACULATUS) IN THE YORK RIVER, VIRGINIA

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ABSTRACT

Data are presented on the relationship between total length and weight of the swellfish (Spheroides maculatus) based on measurements of 109 fish caught by the author from the York River in Virginia. The fish ranged in total length from 109 to 304 mm. (about 4.3 to 12.0 inches), and in weight from 26 to 536 grams (about 0.9 to 18.9 ounces). As is to be expected, plotting of weights of individual fish against their respective lengths indicates a definite relationship between those measurements.

The stomachs of 48 specimens ranging in length from 142 to 271 mm. (10.7 inches) were examined. No variation in diet could be correlated with size, sex, or condition.

Comparison between data on swellfish from the York River and from New Jersey waters indicated that even though the food habits were similar, the York River fish were significantly heavier.

INTRODUCTION

The American Fisheries Advisory Committee (which includes representatives of the commercial fishing industry from all parts of the United States), at a meeting in Kansas City, Mo., in December 1962, outlined five steps which would help American commercial fishermen meet the competition of foreign fishing fleets. Among the recommendations was the development of of untapped fishery resources which may exist in large quantities.

Commercial fishery statistics show that there is a concentration of effort on a few species of fish, and that many other species are not used for human consumption. The rejection of a number of species is the result of lack of familiarity and a reluctance on the part of the consumer to try something new (Carson 1943).

The principal purpose of this paper is to show that the swellfish (Spheroides maculatus), a species which has not been fully exploited, is present in sufficient quantity and of a marketable size to make a larger commercial venture profitable.

The swellfish is found in abundance from Florida to Cape Cod. Beginning in late April it forms a significant part of the catch of the pound-net fishery in the Chesapeake Bay area. In late May it becomes one of the greater nuisances to the sport fishermen in the New York area.

Early in the fishing season there is a small market for the swellfish. Unfortunately, this market is glutted rapidly, and as the season progresses the excess catches go into the "scrap fish" sold to reduction plants. At the peak of their abundance the swellfish are culled from the "scrap fish" because the reduction plants refuse to accept them.1/ This results in a drop in price from about 20 cents a pound ex-vessel to nothing. The average ex-vessel price for swellfish in 1960 was 2.9 cents a pound (Power 1961).

MATERIALS AND METHODS

During the summer of 1962, the author (working out of the Virginia Institute of Marine Science, Gloucester Point, Va.) kept records of lengths, weights, and sex of swellfish caught both in pound nets and by anglers fishing in the York River.

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1/Because of the tough hide of swellfish, an overload will damage processing machinery at reduction plants.

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In the compilation of the length-weight data, the total lengths were placed in 10-mm. (0.4-inch) classes. The number of individuals in each interval; and the minimum, average, and maximum weights are listed in table 1. The length of the fish ranged from 109 to 304 mm. (4.3 to 12.0 inches) with corresponding weights of 26 to 536 grams (0.9 to 18.9 ounces).

Welsh and Breder (1922) determined a coefficient of condition of swellfish from the New Jersey area by assuming that the weights of the fish vary as the cube of the length multiplied by a constant calculated from the formula: $W = \frac{L^3}{K}$. They found that this relation does not follow the plotted curve exactly due to differences from specimen to specimen in sex, food in the gut, and the development of the gonads. For the sample of fish measured, they calculated a K value of 56. When this formula is applied to the sample of fish from Virginia waters, the value of K is equal to 41.5 which indicates that the fish from Virginia are significantly heavier than the fish of corresponding length from New Jersey.

Table 1 - Length and Weight Distribution of Sampled Swellfish

Total Length (mm.)	Number of Fish	Weight (grams)		
		Minimum	Average	Maximum
100-110	1	-	26.0	-
110-120	3	30.0	38.3	50.0
120-130	3	33.0	35.3	39.0
130-140	3	48.0	55.3	68.0
140-150	4	57.0	64.8	68.0
150-160	5	76.0	83.0	87.0
160-170	7	87.0	97.6	113.0
170-180	14	92.0	108.4	132.0
180-190	14	119.0	129.6	145.0
190-200	11	134.0	154.5	173.0
200-210	11	149.0	173.1	202.0
210-220	7	169.0	187.4	206.0
220-230	6	200.0	205.9	278.0
230-240	4	286.0	298.0	324.0
240-250	3	302.0	312.7	322.0
250-260	4	315.0	372.8	482.0
260-270	2	391.0	423.0	455.0
270-280	4	400.0	424.8	453.0
280-290	1	-	517.0	-
290-300	1	-	494.0	-
300-310	1	-	536.0	-

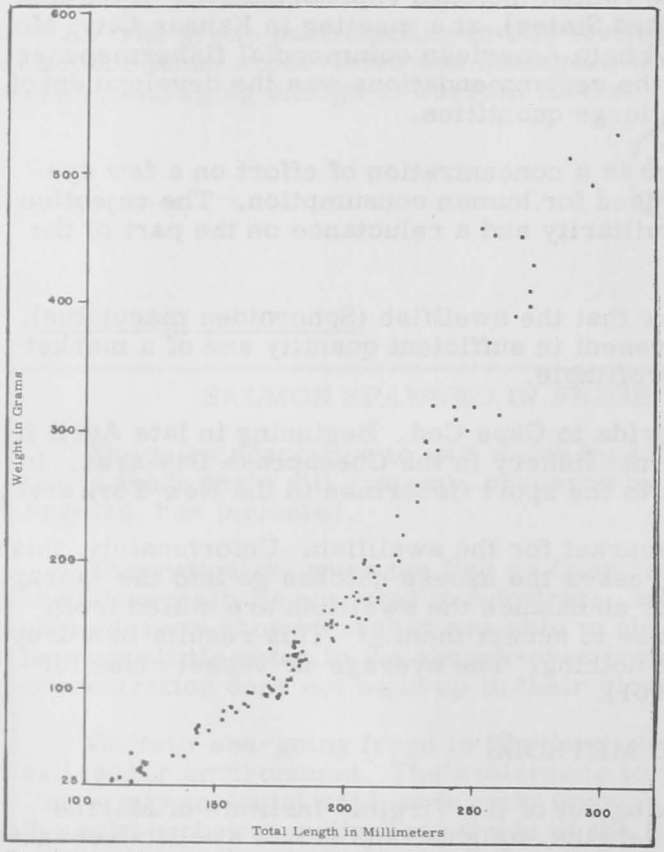

Fig. 1 - Random sample of length frequencies of swellfish from the catch of a commercial pound-net fisherman in the York River.

Table 2 - Analysis of Stomach Contents of Virginia Swellfish (Total Number of Fish, 48)

Food Item	Found in No.
Blue crab	12
Annelid worm	27
Snail (Haminoea)	8
Clam	18
Isopods	1
Cumacea	1
Mud crab	8
Caprellids	4
Hermit crab	1
Mantid shrimp	1
Anemone	1
Shrimp	1
Unidentified	1

Table 3 - Analysis of Stomach Contents of New Jersey Swellfish 1/ (Total Number of Fish, 102)

Food Item	Found in No.
Small crabs	14
Crustaceans (unident.)	2
Mussels	7
Univalves	1
Unident.	82
Empty	16

1/ Linton (1905) on examining 15 specimens found: oysters, scallops, mussles, razor clams, gasteropods, barnacles, crabs, shrimp, sea urchins, worms, acidians, bryozoans, and a watermelon seed. These fish were caught in the Beaufort, N. C., area.

A comparison of the food eaten by both groups (tables 2 and 3) indicates that there are no differences in the food habits, and that the diet depends largely on what organisms are available in the local habitat.

In May of 1962, a random sample of length frequencies was taken of swellfish from the catch of a commercial pound-net fisherman in the York River. On the basis of the length-weight plot (fig. 1) approximately 41 percent of the total sample was of marketable size (fig. 2).

The fishery statistics from the Middle Atlantic States show over 1.3 million pounds of swellfish landed by commercial methods during the 1960 fishing season. This, in the opinion of the author, represents only about one third of the actual catch. Since most of those fish are culled and never reach the market, they are not recorded.

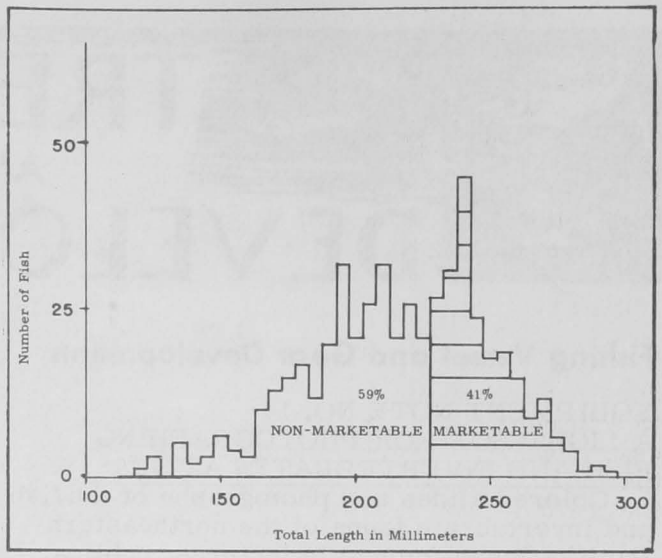

Fig. 2 - About 41 percent of the total sample of swellfish was marketable size.

SUMMARY AND CONCLUSIONS

The swellfish represents a significant fishery resource which is not fully used but which could be exploited more fully if the market were expanded. If there were more information on the distribution and yearly fluctuations in the abundance of this species, it might be feasible to harvest this fish for market in much greater quantities. This would aid the commercial fishermen to increase their earnings and, at the same time, it would ease somewhat the pressure on the species of fish which are more heavily exploited.

LITERATURE CITED

CARSON, RACHEL L.
1943. Food from the Sea, Fish and Shellfish of New England. Cons. Bull. No. 33., U. S. Dept. of the Interior,

COMMERCIAL FISHERIES, BUREAU OF
1962. News Release--Interior 5634, U. S. Dept. of the Interior.

LINTON, EDWIN
1904. Parasites of the Fishes of Beaufort, North Carolina, Bull. U. S. Bureau of Fisheries, Vol. XXIV, p. 402.

POWER, E. A.
1962. Fishery Statistics of the U. S. 1960. Statistical Digest, no. 53, U. S. Dept. of the Interior.

WELSH, W. W. and BREDER Jr., C. M.
1922. A Contribution to the Life History of the Puffer, Spheroides maculatus (Schneider), Zoologica, vol. 2, no. 12, pp. 261-276.