

23.—PROTECTING THE OYSTER BEDS FROM STAR-FISH DEPREDATIONS.**By Professor SAMUEL GARMAN.**

[From the Boston Evening Transcript.*]

Among the causes which may be advanced to account for a decline in the production on the mentioned oyster beds are over-fishing, destructive modes of dredging, unusual deposits of sediment, depredations of enemies—such as star-fishes, shell-fishes, crabs, fishes, &c., and the disappearance of certain fishes which checked the increase of these enemies.

It is many years since the decline of the oyster industry, through impoverishment of the beds, attracted attention in Europe. The investigations of M. Coste and others fixed the blame neither upon marine enemies of the bivalve nor upon the elements, but upon the oystermen. Anxious for large catches, and careless of the future, they left few of the larger oysters on the grounds, and recklessly destroyed countless myriads of the young. Great heavy dredges were dragged through the beds, sweeping large areas, alike of the oysters and of places for the attachment of others, and leaving the spaces fit only for the occupancy of mollusks, worms, and other devourers. There is a limit to what can be taken from any colony of oysters. Yet what is of value for present consumption in the catch is as nothing compared with the immense rate of reproducing, and is very little indeed compared with the number of the young destroyed and the ruin wrought in the beds by the fishery. The evil is not so great here as it was across the Atlantic, yet it exists to some extent. Though the remedies are in their own hands, it is necessary here, as in Europe, for the legislature to protect the oystermen against themselves.

Destructive depositions of sediment on the beds are most often accidents, for which the only remedy appears to be planting anew.

Marine enemies of the oyster are numerous and very destructive; star-fish, "five fingers," are of the most dreaded. Employing a diver certainly would be one of the surest methods of getting at them in the adult stages. The idea is a good one; the diver would at any rate be the means of getting an accurate knowledge of the conditions of the colony, effects of dredging, &c., even if he should be able to do little more. May, June, and July are the best months for his work. The spawning time of the star-fishes is begun by one species late in July, and by another is made to last till the latter part of August. The young are not five-fingered,

* In answer to questions concerning destruction of Connecticut oyster beds; including "Can divers be worked with advantage on beds infested by starfish?" "Do menhaden eat starfish?" "What legislation would protect the oystermen from the 'pogy' fishermen?" etc.

hard, and confined to the bottom like the adult; they are transparent, exceedingly minute, and swim freely through the water. Coming to the surface by night they are carried about by the currents, and, unless the attack was a general one, the relief afforded a portion of the bed by the diver would only be temporary. One portion would soon be stocked again by another. It is after they have assumed the common form of star-fish that they are known to be so destructive. Oysters spawn in June, July, and August; they also are free to swim about after birth, but only for a day or two. It may be that while they are free and have no shells they are preyed upon by the jelly-like five-fingers, which swim about freely for a fortnight to three weeks.

It is well established by the researches of Professor Goode and others that menhaden ("pogies") do not eat star-fish in the adult form. Our foremost authority on the subject says of menhaden: "These fish do not feed upon living animals, and teeth would be useless to them." There is little doubt, nevertheless, that a considerable portion of the food of menhaden and kindred fish is made up of the jelly-like larvæ of radiates, mollusks, articulates, and worms, in the mastication of which teeth are unnecessary. It is likely the oystermen are right in saying menhaden are beneficial to them. It is unlikely that all of the captures of the fishermen have perceptibly lessened the numbers of these fish. Menhaden are supposed to spawn in midwinter, and the place is not certainly known; they are not subject to such danger of extinction as fishes caught at the time and place of spawning. Yet the weight of testimony goes to prove that pursuit by the fisherman has driven the menhaden away from the bays and inlets of the coast. They seem as numerous as ever some distance out, but they no longer sweep the mouths of the streams in such enormous schools as in former times.

The oystermen would do well to find out through the diver the exact condition of things on the beds. If he can work to advantage against the five-fingers, so much the better. It should be at once determined, from specimens caught on the spot, whether menhaden do eat larval star-fish and other enemies of the oyster. If so, legislation restricting the pursuit of these fish from the middle of July to the middle of September would include the time they would be of use against star-fishes. Before legislating, however, the thing to do is to determine accurately what enemies to check and what will check them.

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