

In addition to the above operations, which have been carried on because they are known to have a definite practical value, experiments are being made in other methods of oyster-cultivation at present unproved under New Zealand conditions. It will be more appropriate to refer to them in the section dealing with scientific investigations (see p. 23) since the work has been for the most part initiated and organized by the Marine Biologist, Mr. M. W. Young, to whose assistance the more systematic recording of the results of the industrial oyster picking and cultivation is also due.

DREDGE OYSTERS.

The Bluff fleet of seven steam oyster-dredgers operating in Foveaux Strait had a successful season and their total landings of 42,744 sacks showed an increase of $8\frac{1}{2}$ per cent. above those of the previous year. The catches were steadily maintained throughout the season, with the usual decline owing to diminished demand at the end of the period. The quality of the oysters was excellent, but it was marred towards the end of the season by the occurrence of an appreciable proportion of spawnny oysters. Seeing that the oysters were in good edible condition before the commencement of the open season, it was decided to put forward the opening of the season by one month for the following year. Towards the end of the season a new company commenced canning oysters at Bluff.

TOHEROAS.

The output of the two toheroa-canneries in the North Auckland district for the 1930 season was 2,336 cases, a great decline from the previous year's production, due, doubtless, to the weaker export market.

In April, 1930, there was considerable mortality among the toheroas on the Ahipara ("Ninety Mile") Beach. The losses were confined to one portion of the beach, about eight to ten miles in extent, commencing about twenty-five miles north of Ahipara. The remainder of these extensive beds were unaffected and are well stocked. The deaths are to be ascribed to the covering of the beach with dry sand blown from the sandhills on the landward side by the strong and continuous easterly winds which had prevailed, the toheroas presumably being suffocated. It was noticed that the large-sized shell-fish were affected more than the smaller ones. Similar mortality, but not perhaps on so large a scale, had been noticed in former years when strong easterlies had been blowing.

The beds on the cannery leases on the North Kaipara Beach are very well stocked with toheroas of all sizes.

No special mortality was reported from the North Kaipara Beach. Here it was remarked that during the 1930 canning season, which occupies the winter months, the condition of the toheroas handled at the factory was clearly below average. This was indicated by the bulk ratio between the unshelled and shelled toheroa. The normal ratio is as 6 to 1. This season it was 8 to 1. As for the explanation, it is also in all probability to be found in meteorological conditions. As is well known to those working in the toheroa industry, these bivalves are in their best condition in winter. It has been noticed that they very perceptibly improve after the autumn rains have set in, and that there is at the same time a remarkable development of a greenish-brown scum on the beach and in the water. This scum has been found to consist of microscopic algæ belonging to the class called diatoms; and it undoubtedly affords an important, if not the principal, source of food for toheroas. Last season the appearance of this scum was delayed for some weeks later than its usual time, and this was probably in consequence of the prolonged autumn drought. Soon after its appearance the condition of the toheroas showed appreciable improvement. It is noteworthy that all the beaches on which toheroas are found in quantity are subject to the more or less continuous effects of fresh water. This may reach the beach by percolation through sandhills from lagoons situated behind them, or from small creeks, or from springs in the cliffs. It seems probable that the presence of this fresh water is a factor which affects both the feeding of toheroas and their survival in the earliest stage of their existence on the beach.

There is real need not only for more extensive and intensive surveys of quantitative distribution, but also for more systematic and intensive biological research into the natural history of the toheroa. It may be claimed that our intermittent efforts have secured sufficient knowledge to afford a basis for a sound conservational administration, but the hope of ever doing anything to develop and improve these natural resources depends entirely upon a thorough grasp of the physical and biological factors affecting the reproduction, growth, and distribution of these valuable bivalves.

Although the systematically worked and well-conserved beds of toheroas on the cannery leases are in a well-stocked condition, there is no doubt about the present state of depletion on the more accessible beaches, such as the southern portion of the Muriwai Beach and those parts of the North Kaipara Beach which are nearest to the road approaches from Dargaville. The increase in the number of motor-vehicles, and improved accessibility for the same to the various beaches, have considerably increased the inroads made on the toheroa stocks not only by private parties, but also by people who dig toheroas for market purposes. The beds clearly cannot withstand such intensive exploitation. Regulations have been framed to deal with the position, and the desirability of bringing them into force forthwith cannot be too strongly emphasized. A difficulty is that these toheroa beaches are somewhat isolated and remote from other fishery interests, and are therefore scarcely ever patrolled by an Inspector of Fisheries. The removal of this deficiency, as against the moderate expenditure involved, would in the long-run be a real economy.