NEW ZEALAND MARINE DEPARTMENT

FISHERIES TECHNICAL REPORT

No.71

ROCK OYSTER (*CRASSOSTREA GLOMERATA*) SPAT COLLECTING ON AN EXPOSED BEACH AT MAHURANGI HEADS NEAR AUCKLAND

J. P. C. GREENWAY

WELLINGTON, NEW ZEALAND
1971

NEW ZEALAND MARINE DEPARTMENT

FISHERIES TECHNICAL REPORT

NO. 71

ROCK OYSTER (CRASSOSTREA GLOMERATA) SPAT COLLECTING ON AN EXPOSED BEACH AT MAHURANGI HEADS NEAR AUCKLAND

J.P.C. GREENWAY

FISHERIES DIVISION
MARINE DEPARTMENT
AUCKLAND
NEW ZEALAND

CONTENTS

SUMMARY

A trial was carried out for catching oyster spat between asbestos cement and reinforced concrete battens on an exposed beach at Mahurangi South Head, near Auckland. Comparable groups of battens each caught a similar number of spat. Physical damage due to wave action broke much of the asbestos cement, but the reinforced concrete remained practically intact for the two months (February, March 1970) during which the experiment lasted.

INTRODUCTION

The use of asbestos cement battens for spat collecting has been favoured during the recent development of the Auckland rock oyster industry by the Marine Department (Curtin 1968). However, its limitations due mainly to its ready fracturability have always been recognised (Curtin 1968, Greenway 1969). Steps are currently being taken to find more durable materials which will also attract a reasonable amount of oyster settlement. Such materials would enable more exposed spatting areas to be tried. One possible alternative is reinforced concrete and Mr N. Drummond of Birkenhead, Auckland, recently gave the Marine Department some trial battens for test. These were prepared in January 1970. The results of a very limited test using a few of the battens available are described in this report.

METHODS

Only four freshly made reinforced concrete battens were available, made up into a two by two bundle. One batten had been previously fractured in a demonstration to demonstrate the strength of the reinforcing and subsequently a small portion of this batten was lost. A duplicate bundle containing four asbestos cement battens was made up. The bundles were placed near the bottom of the natural oyster zone amongst rocks bearing signs of extensive settlement (Plate 1). The ends of wooden 1" x 1" bearers which projected but were attached to the underside of the bundles were weighted down with loose rocks available on site. After a period of two months (February, March) the battens were removed to the Laboratory, examined under a large X2 reading lens, and all visible oysters encircled in pencil. These were then counted and measured under a X15 Nikken measuring microscope to the nearest 0.1 m.m. below for a maximum length and breadth. These measurements were divided to give a mean diameter for each oyster. Very recently settled spat of <0.5 m.m. would be

missed by such a cursory examination and were not taken into account. Respective size and weight data for the materials are shown in Table 1. Details of costing are not known although Mr Drummond claims he could produce concrete battens at approximately the same cost as proprietary asbestos cement battens.

TABLE 1

Material	Length	Width (ins)	Thickness (ins)	Weight (lbs)	Total Weight (lbs) (4 battens)
Reinforced concrete	4	2	9/16	Two at 5 ea.	24
			12/16	Two at 7 ea.	
Asbestos cement	4	2	3/16	Four at 1½ ea.	6

RESULTS

The battens were placed in position on 4 February and lifted on 3 April. During a visit to the site on 4 March it was noticed that the concrete battens had been dislodged and had turned over. They were replaced the correct way up. When the battens were finally removed, a strong easterly gale was blowing. This had caused both sets of battens to be uplifted. The concrete ones had been carried about 20 feet away with the loss of about one foot from the batten which had been fractured previously (Plate 2). The asbestos cement battens, whilst not so far flung, had been fractured in several places and would not have been capable of being set out in a future growing position. The recovered battens are shown alongside one another in Plate 3. Table 2 shows the actual number of rock oysters counted and their mean diameters with respective standard errors.

It was noticed that the thinner concrete battens bore rust marks where the reinforcing lay near to the surface. These marks were very localised and natural rock oysters are to be found attached to ironwork so these marks are unlikely to have inhibited settlement.

DISCUSSION

The battens were only in the water towards the middle and end of the expected settlement season and numbers of visible spat counted were small. Worthwhile spatfalls can be expected from December to April (Greenway 1970) and it is likely that considerable potential settlement was missed. There is evidence for gregarious settlement amongst European flat oysters (Cole and Knight-Jones 1949). Some experiments to test for this amongst rock oysters at Mahurangi are being carried out and are due to be reported on later in the year. If gregariousness does occur (and this appears likely) then some advantage in regard to quantity might be expected from battens laid early on in the settlement season. Therefore not much importance is attached to the overall sparseness of the settlement obtained in this particular experiment which was laid late in the season. It does, however, make the drawing of definite conclusions harder.

The total numbers of spat for concrete and asbestos cement battens were nearly identical but there was considerably more variation amongst the asbestos cement battens than those of concrete. It is possible that this was due to the concrete battens having been overturned for a part of the time so that settlement became distributed both on the upper and lower surfaces, whereas only the lower surface of the asbestos cement (which remained right way up throughout) was settled by oysters. All surfaces were remarkably clean and free of muddy silt in contrast to battens at Jackson's Bay (Pukapuka Inlet) where upper surfaces soon collect a mudslime. Quite marked differences in mean diameter of spat between upper and lower surfaces again suggest that more than one settlement may have been involved. Because of this, it is not possible to attribute better growth to the concrete although those on it show a greater mean size than those on the asbestos cement.

Breakage amongst the asbestos cement battens was as expected and the disappearance of the previously fractured end of one concrete batten has a ready explanation. The reinforcing rod was perfectly clean and smooth at manufacture so that the set concrete probably had little difficulty in simply sliding off it. Rusted and weathered reinforcing bar would probably offer better contact and prevent such an occurrence. The concrete battens were fairly easily fractured across the broad surface when first received while they were still "green". However, after "curing" for two months in the water, they gained considerable strength.

The main disadvantage of the concrete appears to be its great weight. Our bundle was four times the weight of the asbestos cement. For spatting purposes the latter have recently been made up into bundles of 4 across by 8 high or 32 to the bundle, weighing approximately 50 lbs when made up. For the same ease of handling, a bundle of only 8 cement sticks would be about the limit. If bearers were used to set the bundles out, a much greater area would be needed than for the asbestos cement. However, it might be possible to build up really large bundles of concrete sticks on suitable clean rocky spatting areas, such as Mahurangi South Head, by wiring together smaller bundles. These could be built on site to dimensions resembling the larger and immobile natural boulders. These could be expected to withstand severe storms but it might be wise to protect them from extreme surge by a breakwater of roughly placed boulders to seaward. On setting out for depoting, growing and final harvesting the greater strength of the concrete would be most advantageous. During these operations any retarding effect on handling due to weight might well be offset by the saving in breakage and the probable reuse of battens. Asbestos cement battens are likely to be only used once. It would be interesting to test reinforced concrete battens only one inch wide at some future date.

CONCLUSIONS

With regard to settlement and initial growth, neither the reinforced concrete nor the asbestos cement showed any marked or positive advantage over the other. Both appear satisfactory in this respect. Some advantage might be obtained by turning battens over halfway through the settlement season in areas relatively free of silt when a more even spread of spat could take place. Under conditions of exposure and shock the durability of the concrete far outweighed the asbestos cement. Further improved techniques of handling and modification in construction might favour the use of reinforced concrete in situations where it would be futile to use asbestos cement.

ACKNOWLEDGEMENTS

Thanks are due to Mr N. Drummond of Birkenhead for kindly placing his concrete battens at our disposal.

REFERENCES

Cole H.A. and E.W. Knight-Jones 1949 - The setting behaviour of larvae of the European flat oyster, Ostrea edulis L; and its influence on methods of cultivation and spat collection. Fish.Invest.Lond., ser.2.17: 1-39.

Curtin, L. 1968 - Cultivated New Zealand Rock Oysters. N.Z. Mar.Dep.Fish.Tech.Report No. 25.

Greenway, J.P.C. 1969 - Testing Rock Oyster Settlement on various artificial surfaces at Mahurangi. N.Z. Mar.Dep.Fish.Tech.Report No. 33.

Greenway, J.P.C. 1970 - The Monitoring of Rock Oyster, Crassostrea glomerata, settlement at Mahurangi, Auckland 1968-69. N.Z. Mar. Dep.Fish.Tech.Report No. 48.

TABLE 2

		Battens (1)	(2)	(3)	(4)	Mean No. Oysters/ Batten	Standard Error	Mean Diameter of Oysters m.m.	Standard Error
Reinforced Concrete	Upper surface	7	1	3	4	3.75	1.25	2.50	0.05
	Lower Surface	0	4	1	1	1.50	0.86	1.98	0.01
	Combined Surfaces	7	5	4	5	5.25	0.62	2.35	0.15
Asbestos Cement	Upper Surface	0	0	0	0	0	0	0	0
	Lower Surface	7	13	2	0	5.50	2.90	2.02	0.05

LIST OF PLATES

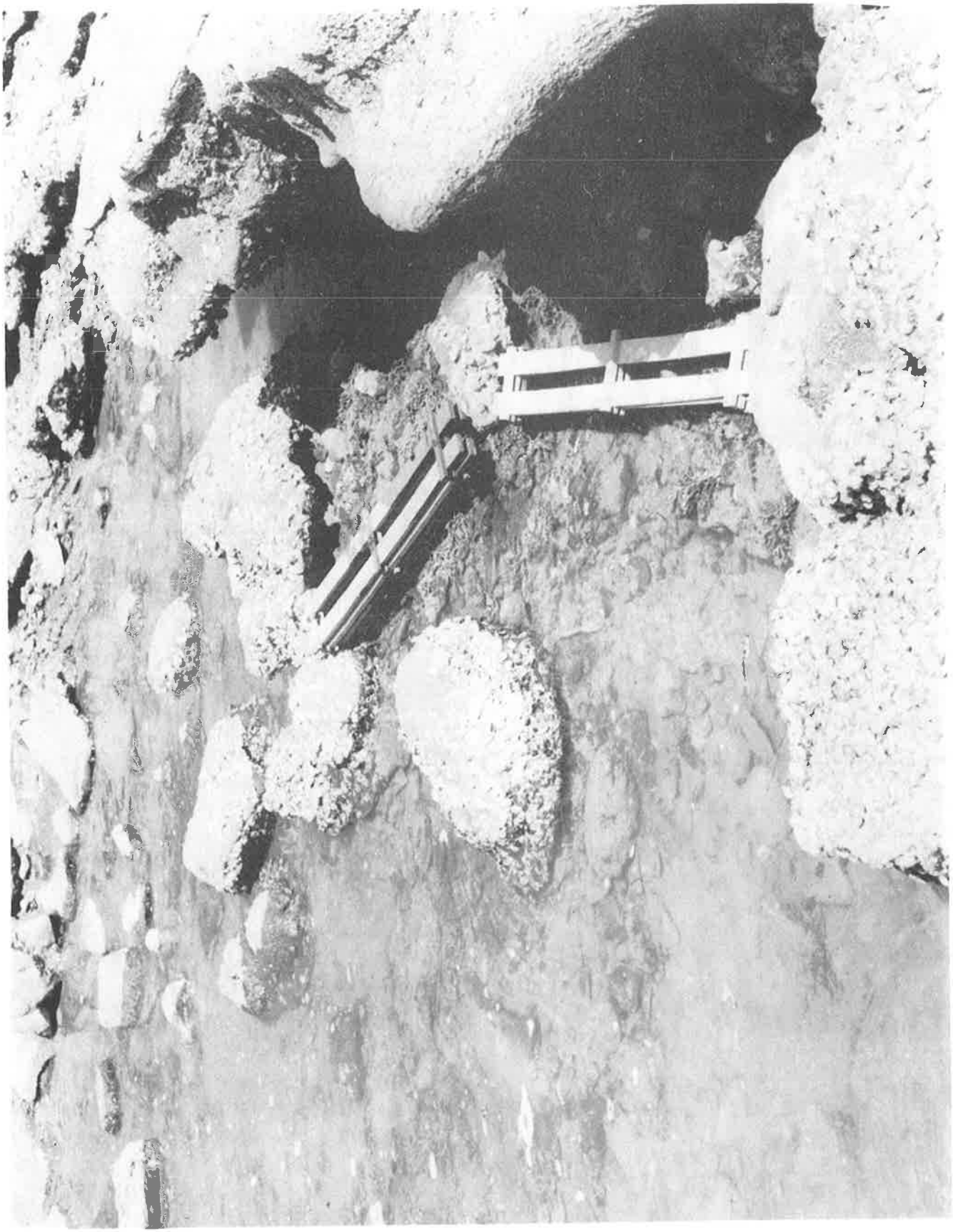

Plate 1 Battens set in position - 4 February 1970.

Plate 2 Final positions of battens - 3 April 1970.

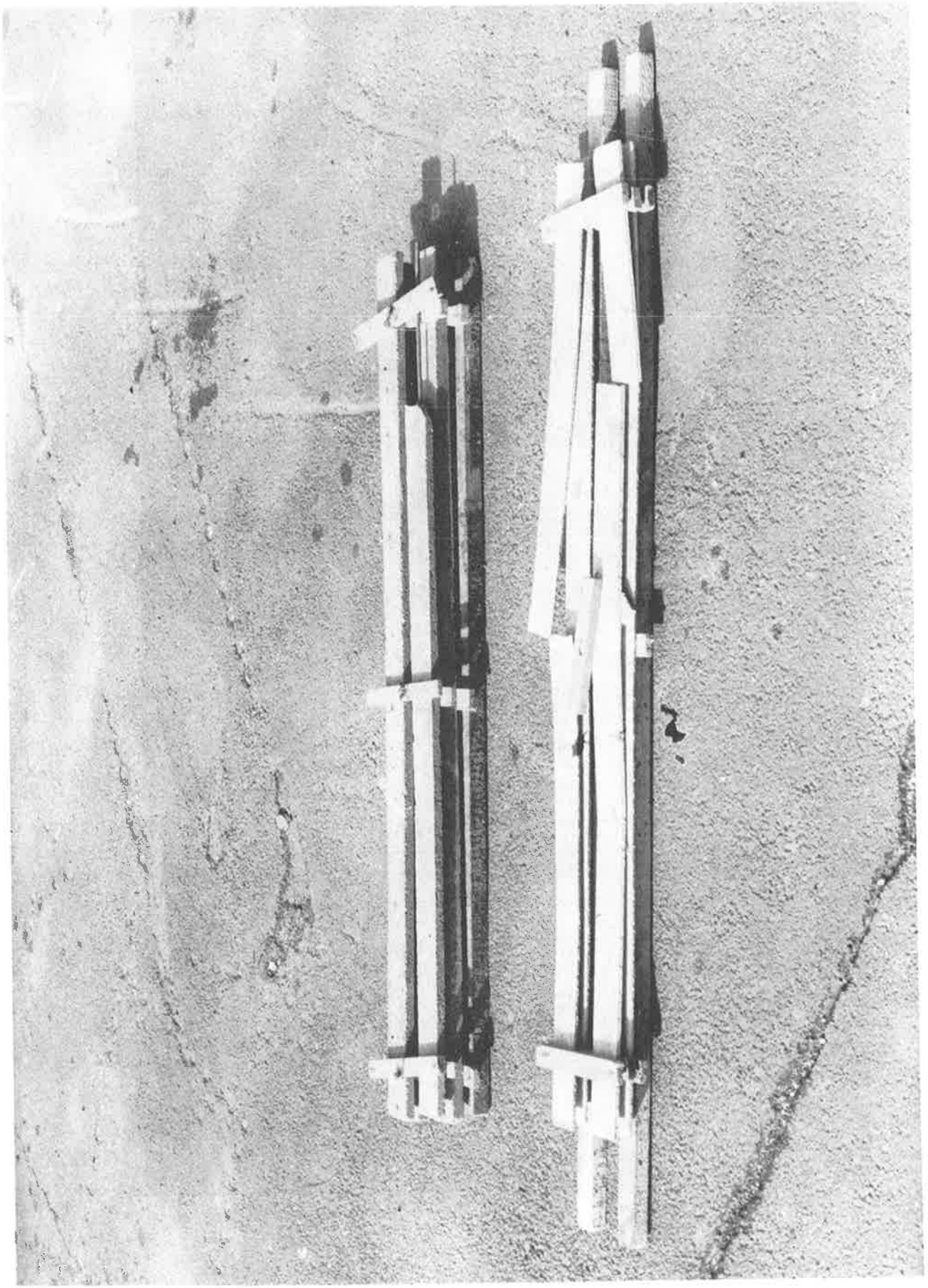

Plate 3 Battens showing damage. Asbestos cement in foreground.

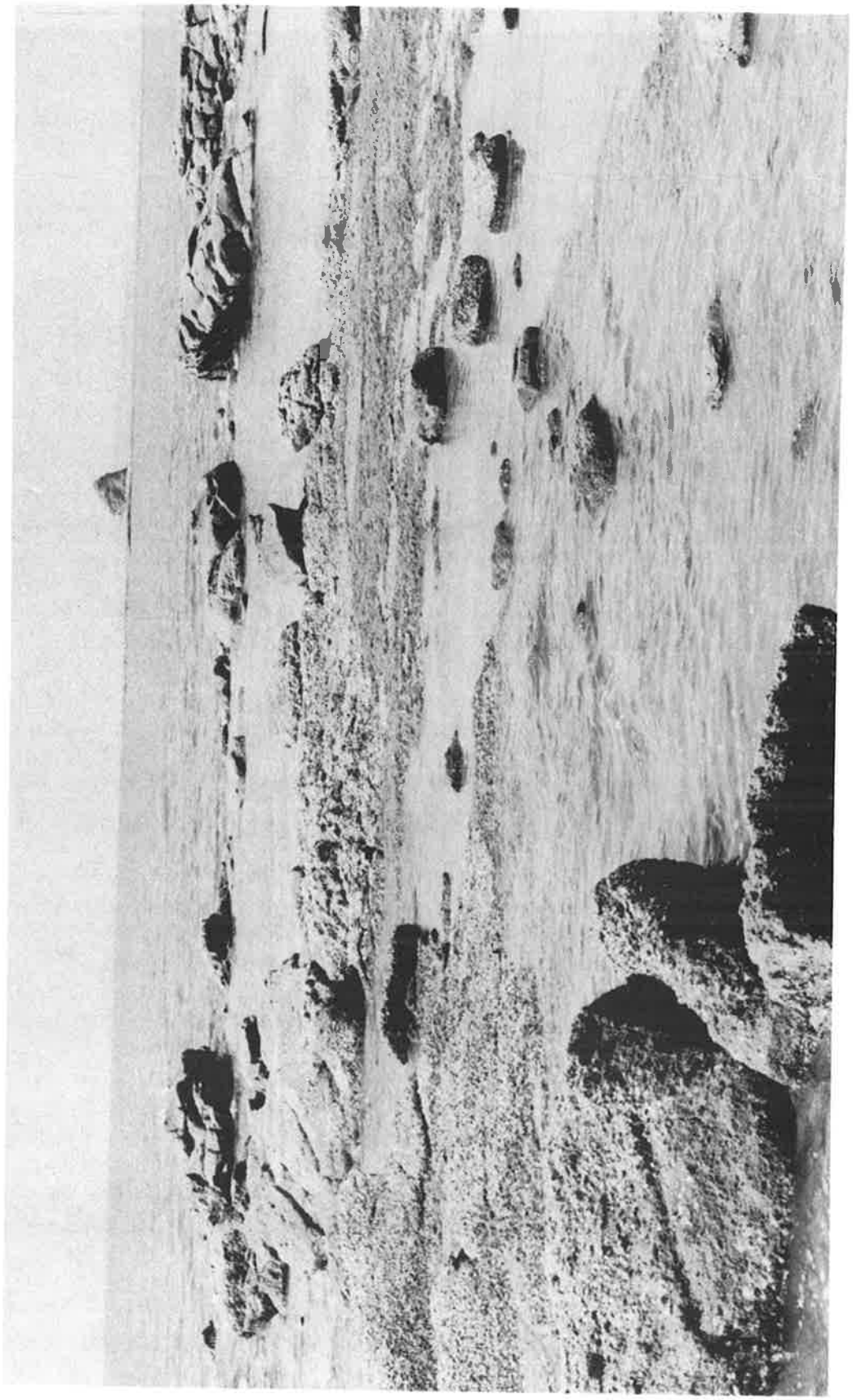

Plate 4 Experimental site. Note rock oysters.

NEW ZEALAND MARINE DEPARTMENT

FISHERIES TECHNICAL REPORT

No.71

ROCK OYSTER (*CRASSOSTREA GLOMERATA*) SPAT COLLECTING ON AN EXPOSED BEACH AT MAHURANGI HEADS NEAR AUCKLAND

J. P. C. GREENWAY

WELLINGTON, NEW ZEALAND
1971