



**NEW ZEALAND
MINISTRY OF AGRICULTURE AND FISHERIES**

**FISHERIES TECHNICAL REPORT
No.123**

**SHELLFISH SURVEY
NELSON SEWER OUTFALL AREA
APRIL — JUNE 1972**

D. H. STEAD

WELLINGTON, NEW ZEALAND

1973

NIWA Library



J011877

FISHERIES TECHNICAL REPORT

SHELLFISH SURVEY NELSON SEWER OUTFALL AREA

APRIL - JUNE 1972

D.H. STEAD
WELLINGTON.

CONTENTS

	<u>Page</u>
SUMMARY	1
INTRODUCTION	1
METHODS	2
DISCUSSION	6
CONCLUSIONS	8
RECOMENDATION	8
ACKNOWLEDGMENTS	8

SHELLFISH SURVEY - NELSON SEWER OUTFALL AREA
APRIL - JUNE 1972

SUMMARY

The aim of the survey was to assess the size and distribution of stocks of shellfish in the vicinity of the Nelson City Sewer Outfall.

Green mussels, oysters and scallops were studied. A chartered shellfish boat was used to dredge sea bed samples at 27 stations within a radius of 3-4 miles of the sewage outfall.

Survey results showed only a very sparse distribution of scallops while mussels and oysters occurred in commercial quantities in certain areas; elsewhere within the sample area catches were poor.

INTRODUCTION

The Nelson City Sewer outfall on the Boulder Bank was commissioned in August 1970. There was concern over possible bacterial contamination of shellfish in the vicinity of the outfall and since December 1969 regular testing of shellfish and seawater samples from sites shown on Map 3 has been carried out by the Nelson City Council and Cawthron Institute. The following survey was carried out in April-June 1972 to assess the level of shellfish resources in an area which might be affected by the discharge of sewage.

METHODS

The 34 foot shellfish dredger 'Destiny G' (Plate 1) was chartered for the survey.

A single 7 foot wide shellfish dredge (Plate 2) was towed for five minutes at each of 27 stations shown on Map 1 on 18 and 20 April and 16 June 1972. Species studied were green mussels Perna canaliculus, scallops - Pecten novaezelandiae, and oysters - Ostrea lutaria. Those taken in the dredge at each station were counted and shell length in cm was recorded. Samples were examined for 'meat' condition. Also recorded were other species, type of substrate, any obvious signs of pollution and surface water temperature.

RESULTS

Map 2 shows the number of live mussels, oysters, and scallops and those of market size taken in the dredge at each station. Very few live scallops were taken over the whole sample area and catches were well below the commercial level.

Areas where mussels and oysters were estimated to occur in commercial quantities are shown surrounded by a broken line on Maps 2 and 3.

MUSSELS

Figure 1 shows percent length frequency of all 766 live green mussels Perna taken at all stations during the survey. The histogram shows three modes at 1, 9, and 13 cm shell length, indicating different year classes from spat settlement in 1972, 1971 and 1970 respectively.

About 57% of mussels were of market size i.e. 10.5 cm (4 inch) shell length and above.

Condition of most mussels examined was only average and only a small proportion had fat gonads.

Mortality of mussels was low and the few dead specimens taken were over 16 cm shell length.

Most Perna were in aggregations attached by byssus threads to other mussels, dead scallop shell, and dead gastropods such as Struthiolaria and Maoricolpus. Most Perna had shells encrusted with bryozoa and calcareous worm tubes.

Oysters

Figure 2 shows per cent length frequency of all 221 live oysters taken at stations during the survey. The histogram shows a single mode at 9 cm shell length. About 80% of live oysters were of market size i.e. 6.5 cm (2½ inch) shell length and above.

Condition of most oysters was good with white glycogen reserves in the gonad.

Several older oysters had thickened shells infected with the yellow boring sponge Cliona sp. Mortality of oysters was moderate and about 10% of all oysters taken were recently dead, i.e. the two halves of the shell were attached at the hinge and had intact conchiolin. Most oysters were individuals but several smaller oysters were attached to scallop and dead gastropod shells.

Scallops

Figure 3 shows length frequency of live and dead scallops from stations where they occurred. Only 22 live scallops were taken, of which only 5 were of market size i.e. 8.5 cm (3¾ inches) shell length and above. Minimum takeable size for scallops is 4 inches shell width, which is about equivalent to the shell length shown above. Although

many old dead scallop shells were taken, only a small random sample is shown in Figure 3.

Fishermen report that in 1961 there was a commercial scallop bed in the area but this was soon depleted. The old shells possibly represent the remnants of that scallop bed. Most dead shells were broken and encrusted with marine growth so mortality was not of recent occurrence.

Condition of most scallop gonads was poor, possibly due to recent spawning.

Other Species

Other species taken in the dredge during the survey included the following:-

Gastropods: Struthiolaria (common), Poirieria (spiny murex), Alcithoe (volute), Maoricolpus - turret shells (common) and others.

Other shellfish: Atrina (horse mussel), Glycymeris (dog cockle), Chlamys (fan scallop), Zegalerus (slipper shell), Musculus, Dosinia, and various small lamellibranchs.

Crustacea: Balanus (barnacle), Eupagurus (hermit crab). Paramithrax (spider crab), Pinnotheres (pea crab) found inside mussels.

Echinoderms: Coscinasterias (starfish), Patiriella (cushion star), Echinocardium (heart urchin) - common. brittle stars.

Fish: Rhombosolea (2 species of flounder), Peltorhamphus (sole), Narcobatus (electric ray), Raja (skate) and various small fish.

various tube worms, Vermilia (calcareous tube worm) very common, Lepidonotus (sea mouse).

also ascidians, sponges, octopus, various bryozoa and corals and marine algae.

Predators

Coscinasterias calamaria (eleven armed starfish) was taken at several stations. This is known to be a major predator of shellfish, especially scallops.

Substrate

At all stations except 10 the bottom was a soft mud with various amounts of overlying shell. At station 10 the bottom was covered with large boulders.

The only obvious sign of sediment pollution was at Station 8 (Map 1) where black mud was taken. This smelt strongly of hydrogen sulphide, the result of organic decomposition.

Sea Temperature

Sea surface temperature on 18.4.1972 was 17°C and on 16.6.1972 it was 13°C.

Commercial Dredging

This has occurred only rarely in the sample area within the past two years.

The following observations were made on a commercial shellfish boat on 4 March 1971 in approximately the same area as that covered by the 1972 survey but over one mile from the shore. The boat used two eight foot dredges and eight hauls were made, each of average duration forty-nine minutes.

The total catch for the day was 9.5 cases of green mussels, three cases of oysters and only 59 scallops. This represents an average catch per tow of 1.2 cases of mussels, .4 case oysters and 7 scallops. The mussel catch

may be regarded as being of only average commercial grade for a days dredging, although the oyster catch compares favourably with those taken from other commercial grounds in Tasman Bay. These estimates are based on the quantities of each type of shellfish taken and their relative value to the fisherman.

Shellfish dredgers have occasionally worked close in to the east coast of Tasman Bay during the past few years, usually to obtain shelter in easterly weather conditions. This was the case on 4 March 1971.

In view of the paucity of scallops there is no dredging in the area during the scallop season - 1 August to the end of February, and shellfishermen have voluntarily agreed to keep well clear of the sewer outfall at all times.

DISCUSSION

The aim of the survey was to assess the size of the commercial shellfish resource in the vicinity of the Nelson sewer outfall in an area extending approximately three miles from the shore. This area includes the eight bacteriological test stations shown on Map 3. Although there was a scallop bed in the area in 1961 this was soon fished out and the 1972 survey showed only very small quantities of scallops.

Green mussels occurred in the area in what may be termed marginal or average commercial quantities compared with mussel resources on the main dredging grounds in Tasman Bay. The inshore area is, however, fairly close to Nelson and is sheltered in easterly weather. It has, therefore, been a convenient area to work at certain times during the mussel/oyster seasons. Oysters taken during the 1972 survey were of good size and quality and they occurred in quantities comparable with those

on other commercial grounds in Tasman Bay.

Tests on shellfish and water samples since 1969 have shown fluctuating but generally increasing levels of coliform bacteria at some of the eight stations on Map 3.

After a study of all relevant data the Department of Health has recommended that an area inside a radius of 10,000 feet from the Nelson sewer outfall be closed to dredging as a public health precaution. (see Map 3).

Closure of this area would, therefore, deprive shellfishermen of a convenient source of mussels and oysters.

One benefit of closure however, would be to allow regeneration of shellfish stocks in the area, provided that the source of pollution is eventually eliminated and the beds are again reopened to dredging.

The predominant water movement in this part of Tasman Bay is to the north or north-east along the coast. During the survey some apparent evidence of pollution in the form of organic sediment decomposition was detected at dredge station 8 (Map 1) about 2 miles from the sewer outfall.

With the continued discharge of untreated sewage effluent it is possible, though unlikely that bacterial contamination could spread beyond the boundary of the proposed restricted area and into the main commercial shellfish beds.

If the area is closed to dredging it will therefore be necessary to establish more test stations outside the restricted area to monitor bacteria levels in shellfish and water samples.

If as a result of testing it were later confirmed that bacterial contamination had spread beyond the present proposed restricted area the need for a sewage treatment plant should

become more apparent.

The shellfish beds in Tasman Bay represent a valuable natural resource and there is a considerable export market for shellfish.

CONCLUSIONS

Within the surveyed area the commercial resource ratings of the three shellfish species studied were estimated to be as follows:-

Scallops - only small quantities - not commercial.

Green mussels - marginal to average.

Oysters - average to good.

Closure of the area shown on Map 3 would prohibit fishermen from dredging on about one square mile of commercial mussel and oyster grounds. Closure of the area may be beneficial in allowing regeneration of shellfish stocks but the area should be reopened to dredging soon after a sewage treatment plant is established and operating.

RECOMMENDATION

That more bacteriological test sites be established outside the proposed restricted area to monitor any increase in bacteria levels in shellfish on good commercial grounds.

ACKNOWLEDGMENTS

I wish to thank Mr G. Wells and Mr R. King-Turner for their assistance as skippers of the chartered boat 'Destiny G'.

Thanks are also due to the Cawthron Institute, the Nelson City Council, the Nelson Catchment Board, and Department of Health for supplying data and reports on the shellfish and water testing programme.



PLATE 1. Shellfish Dredger 'Destiny G'.

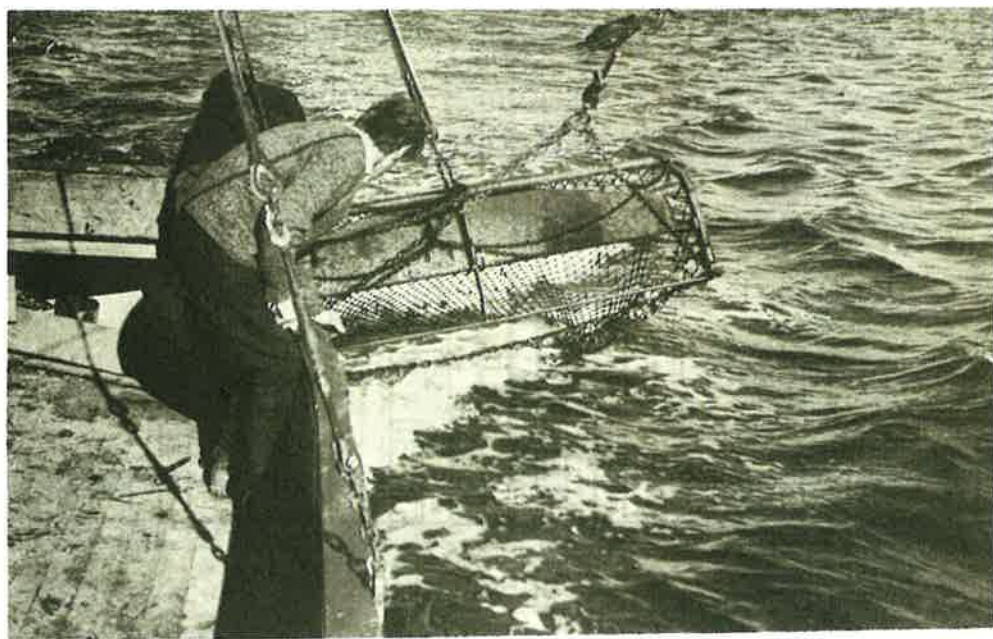


PLATE 2. Commercial Shellfish Dredge (7' wide) used during Survey.

FIG. 1

% LENGTH FREQUENCY

GREEN MUSSELS (PERNA)

TASMAN BAY

APRIL - JUNE 1972

TOTAL : 766 PERNA AT STATIONS 1 - 27

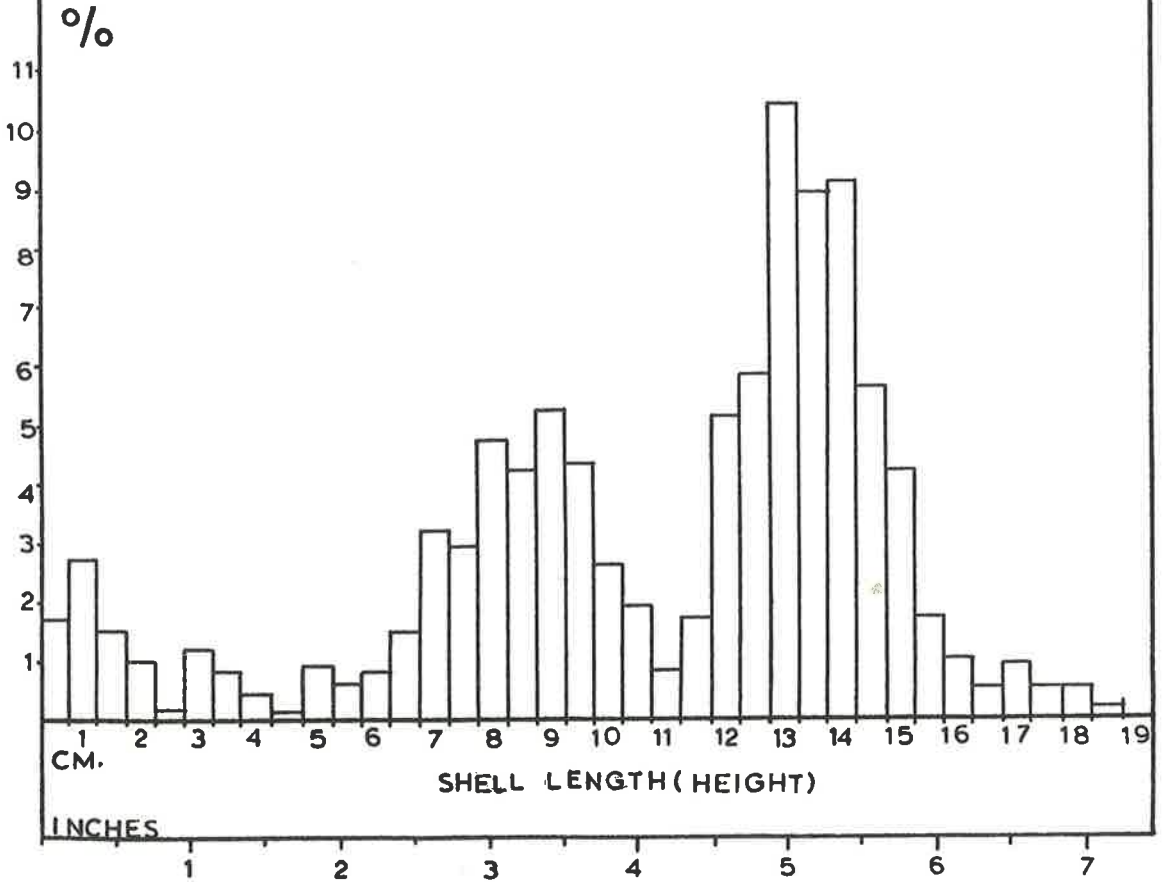


FIG. 2

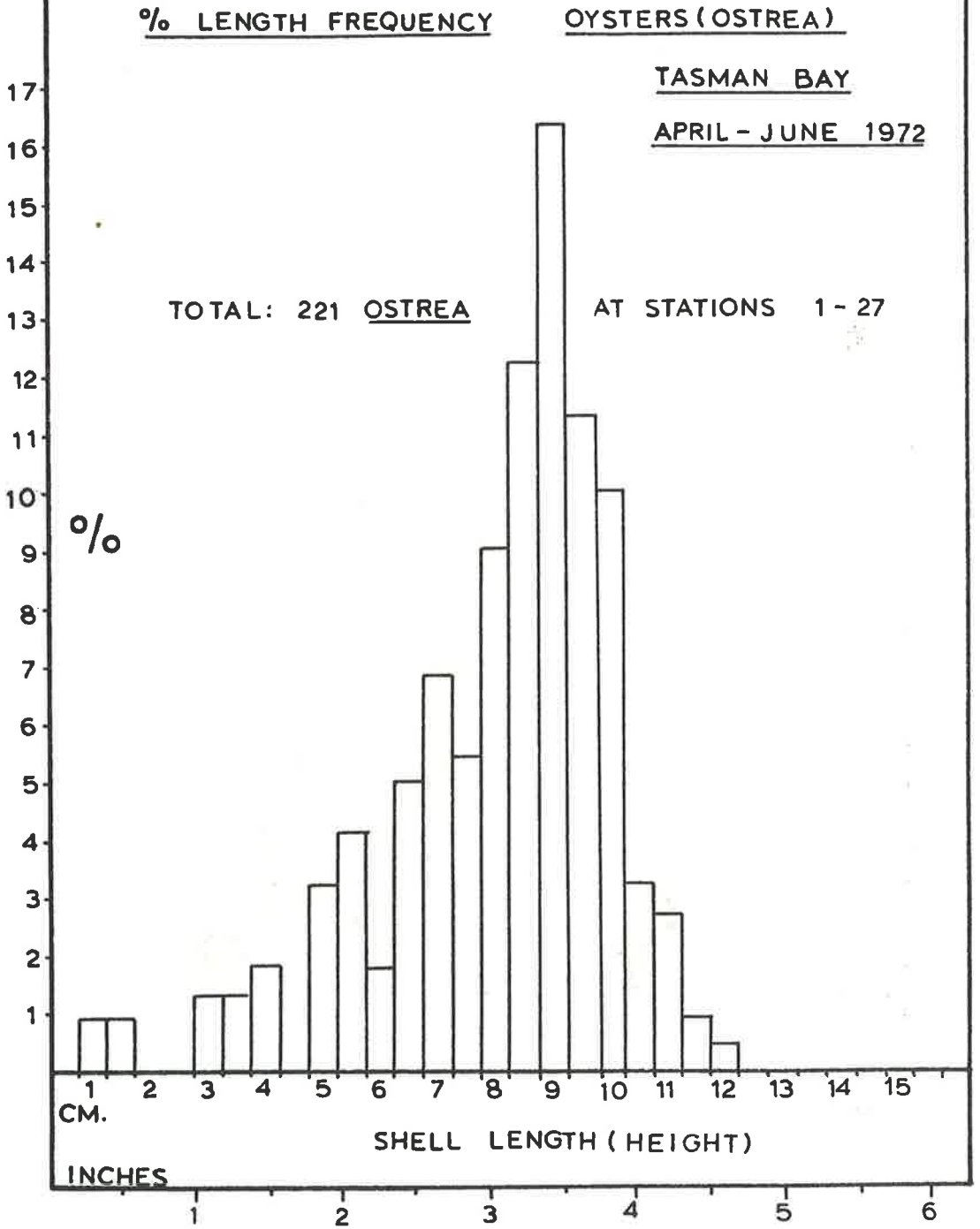
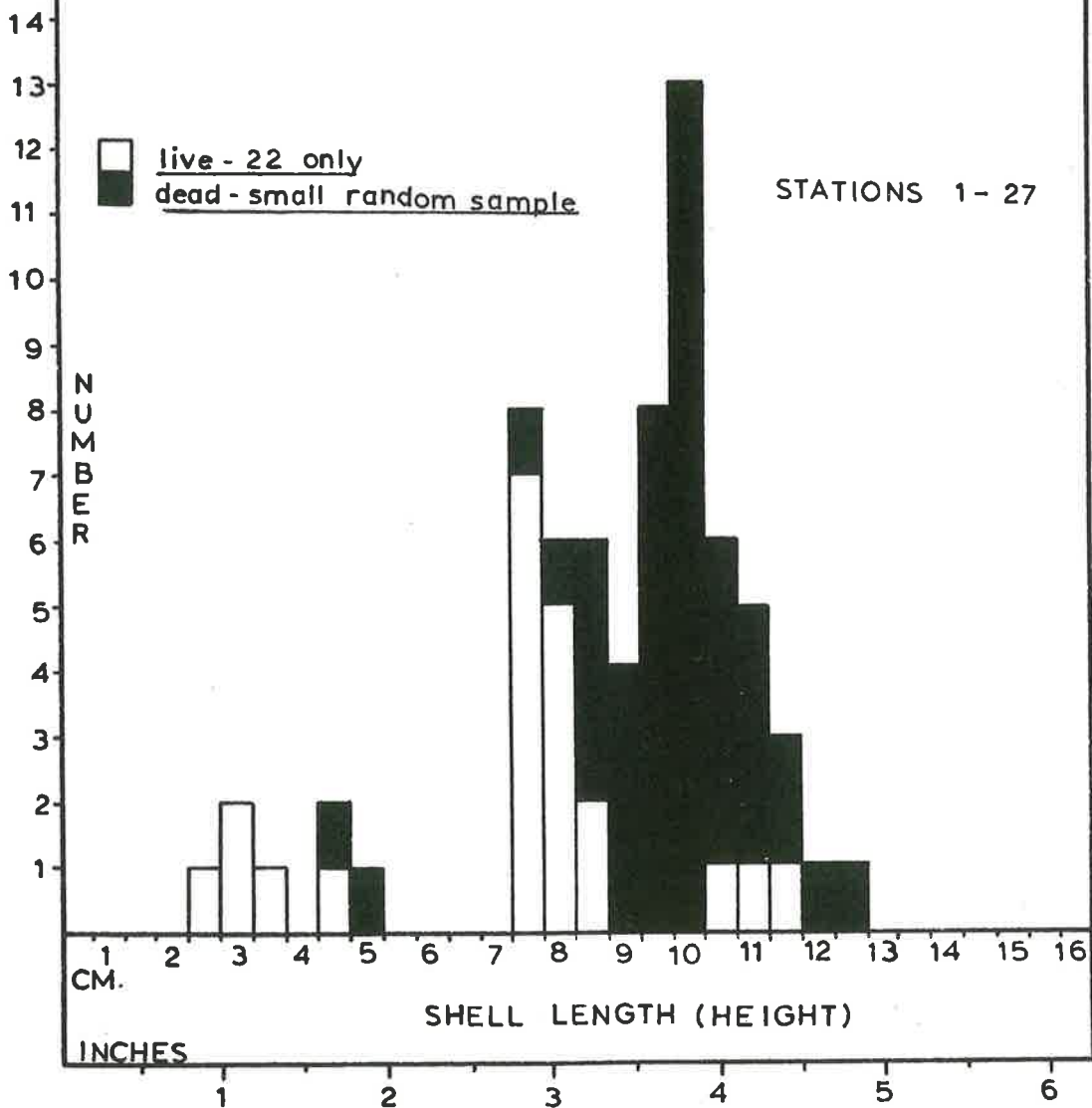
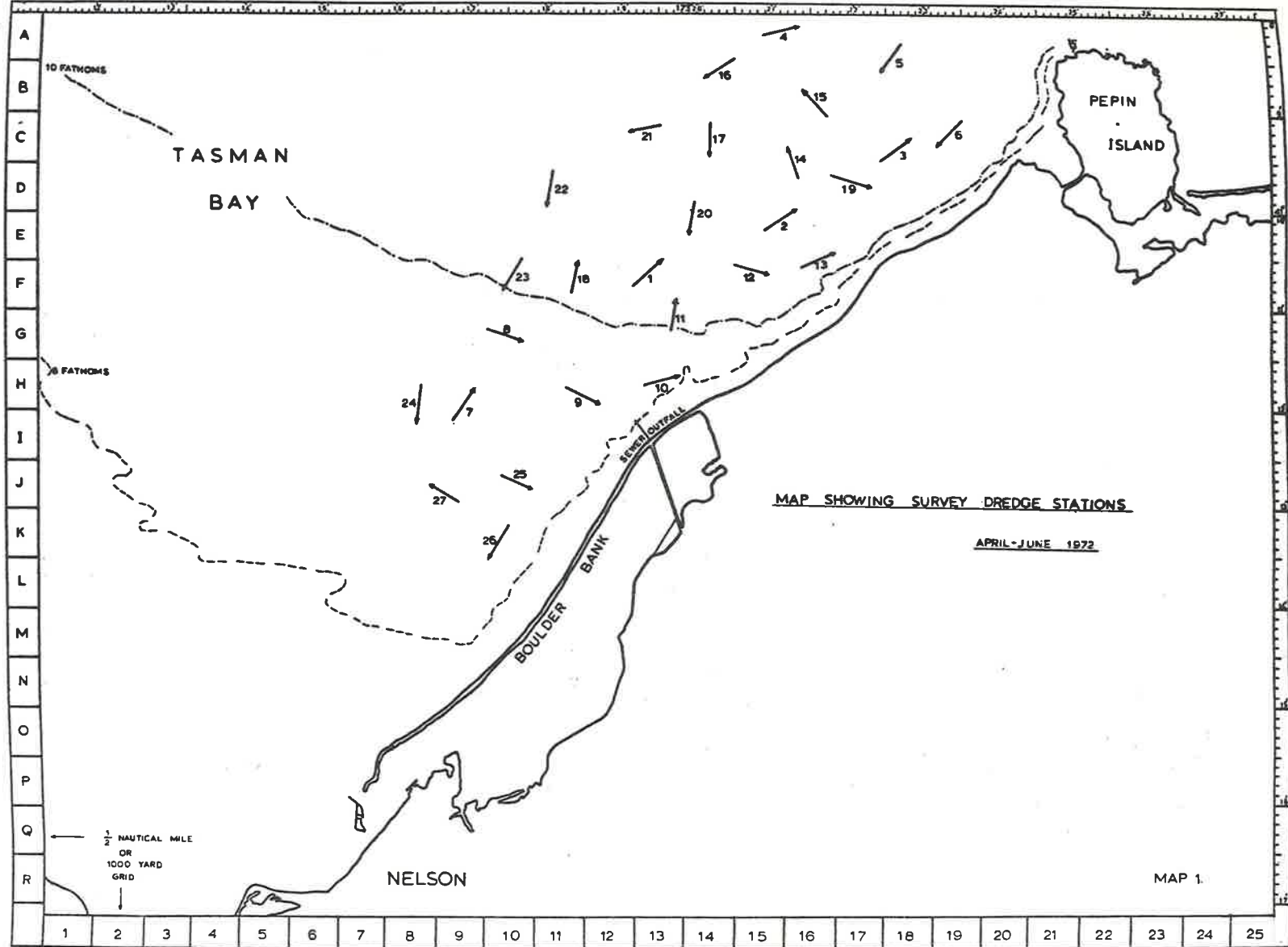


FIG. 3

LENGTH FREQUENCY - SCALLOPS (PECTEN)

TASMAN BAY APRIL - JUNE 1972

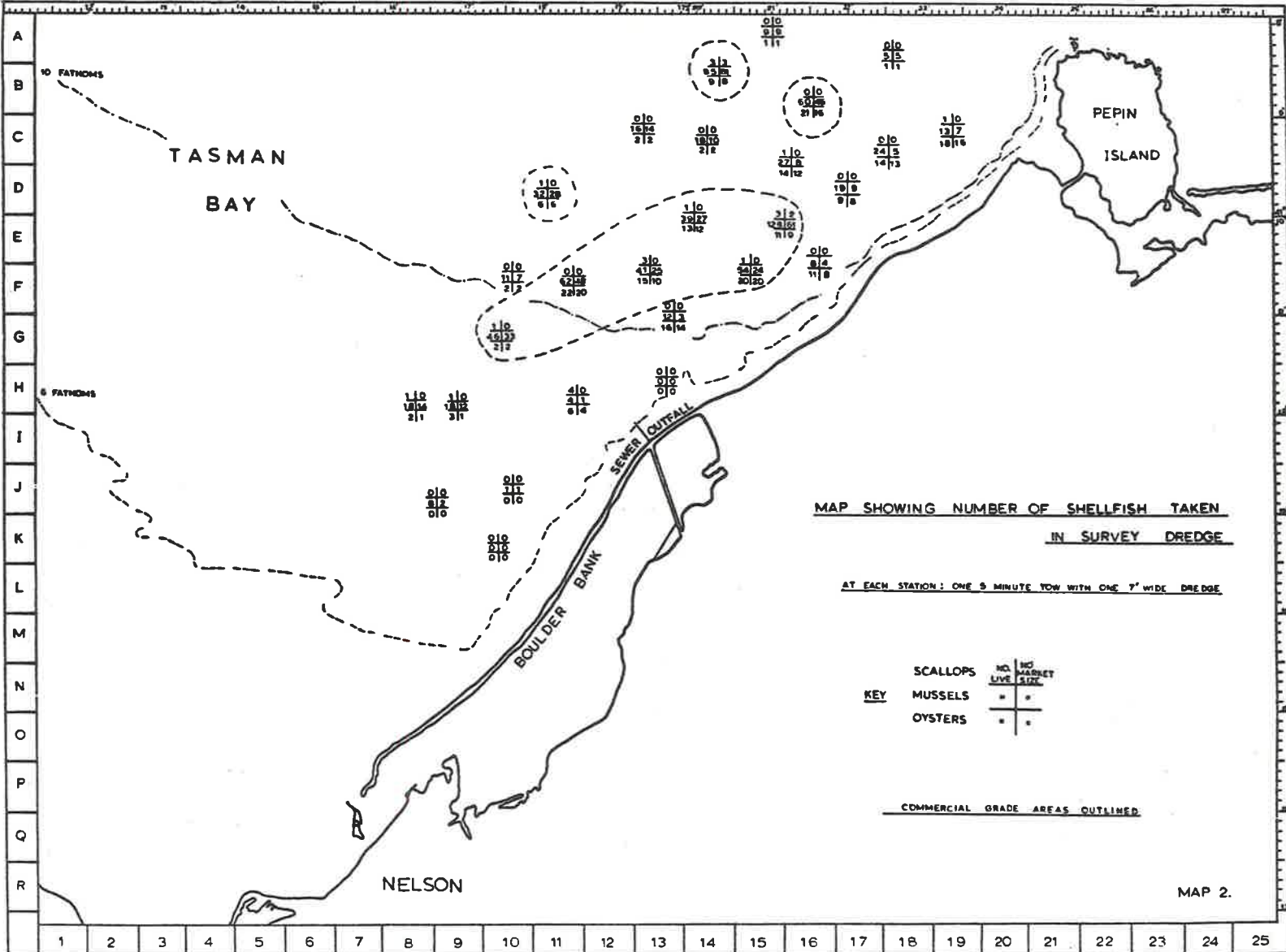


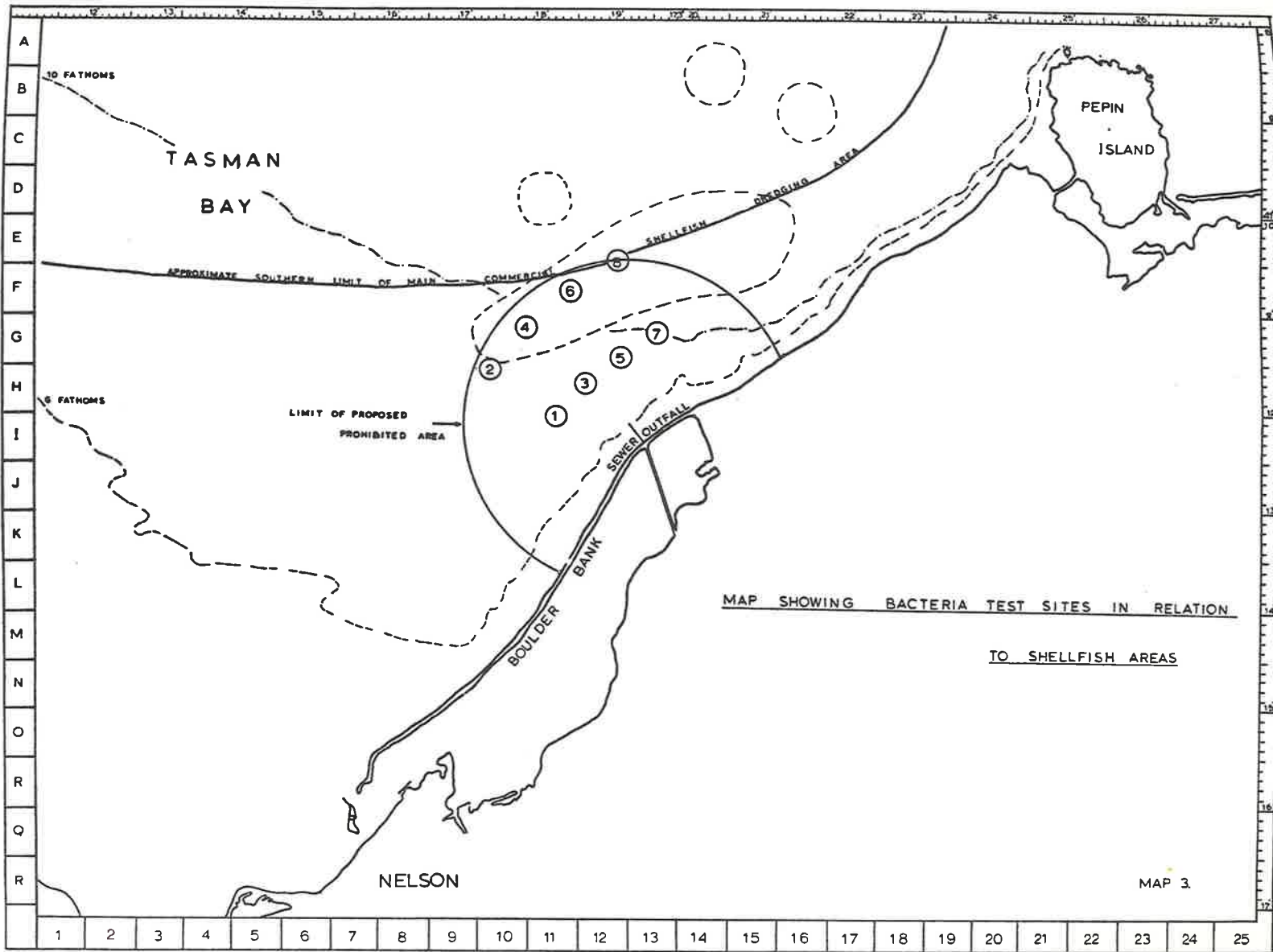


MAP SHOWING SURVEY DREDGE STATIONS.

APRIL-JUNE 1972

MAP 1.





MAP SHOWING BACTERIA TEST SITES IN RELATION
TO SHELLFISH AREAS

MAP 3.