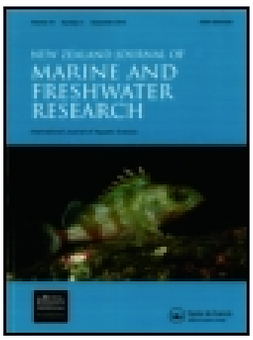

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MASS STRANDING OF MOLLUSCS AT TE WAEWAE BAY, SOUTHLAND, NEW ZEALAND (NOTE)

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ABSTRACT

A stranding of shellfish on the beach at Te Waewae Bay, Southland, occurred during a period of very cold, stormy weather in September 1970. More than 20 million shellfish were stranded, the majority being *Mactra discors* Gray. It is suggested that the cause was a combination of strong inshore winds and low air temperatures, coupled with an increased flow of fresh, cold water across the beach.

INTRODUCTION

A mass stranding of bivalve molluscs occurred at Te Waewae Bay, Southland, about 28 September 1970. The authors with two fisheries inspectors from Bluff visited the area on 1 October 1970.

The beach at Te Waewae Bay runs for about 13 km westward from the mouth of the Waiau River (167° 37′ E, 47° 48′ S) and is exposed to heavy seas from the south-west to the south-east. It is crossed by four small rivers and several creeks. The beach is gently sloping, its firm sand supporting a large littoral population of toheroa, *Amphidesma ventricosum* Gray, and some *Macomona liliana* (Iredale).

OBSERVATIONS

The molluscs were stranded on each side of the Rowallan Burn, which flows out about half way along the beach. For about 300 m on each side of the burn the shore was thickly littered with driftwood mixed with the molluscs, but for about a further kilometre on each side of the burn only the molluscs were present. They stretched in a band up to 70 m wide along the beach. Densities varied, but in much of the band the shells were touching each other; in some areas they were banked several layers deep (Figs 1 and 2). The average density was estimated to be higher than 100/m^2, and the total number of animals more than 20 million.

About 90% of the molluscs were *Mactra discors* Gray. The second most abundant species was *Resania lanceolata* Gray. About 5,000 toheroa, *Amphidesma ventricosum* Gray (equivalent to about one day's

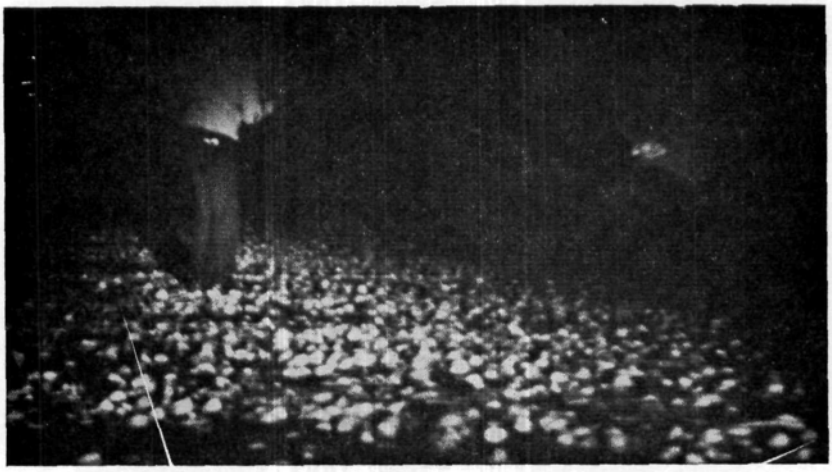

FIG. 1—Part of the stranding of bivalves at Te Waewae Bay, 1 October 1970, showing their average density.

TABLE 1—Meteorological records from Invercargill Airport (64 km west of site of stranding), 22-28 September 1970

Date (1970)	Temperature (°C) Maximum	Minimum	Rainfall	Wind Direction	Wind Speed ($m.s^{-1}$)
22 Sept	12	6.5	Light	W–NW	7–13
23 Sept	13.5	3.5	Light	W–NW	7–9
24 Sept	5	0.5	Heavy	SW	7–9
25 Sept	6	−2	Light	SW	7
26 Sept	9.5	−3	Light	NW	9–11
27 Sept	8	0.5	Light	W–SW	13–25
28 Sept	7	2	Light	SW	13–28

"take" in the season) were also present, with small numbers of *Dosinia anus* (Philippi), *Spisula aequilateralis* (Deshayes), *Macomona liliana* (Iredale), *Zenatia acinaces* (Quoy and Gaimard), and green-lipped mussels, *Perna canaliculus* (Gmelin). Some of the mussels bore small dredge oysters, *Ostrea lutaria* Hutton. A sea-cucumber, probably *Heterothyone* (*Cucumaria*) *ocnoides* (Dendy), was plentiful among the molluscs on the lower shore.

All the animals had obviously been alive when cast ashore. On 1 October most of the *Mactra* were alive but moribund*. A few had

*Some of the living *Mactra* were cooked and eaten. They were excellent in flavour and quality. If these shellfish occur in quantity in the immediate sublittoral, they may well become popular as a local delicacy.

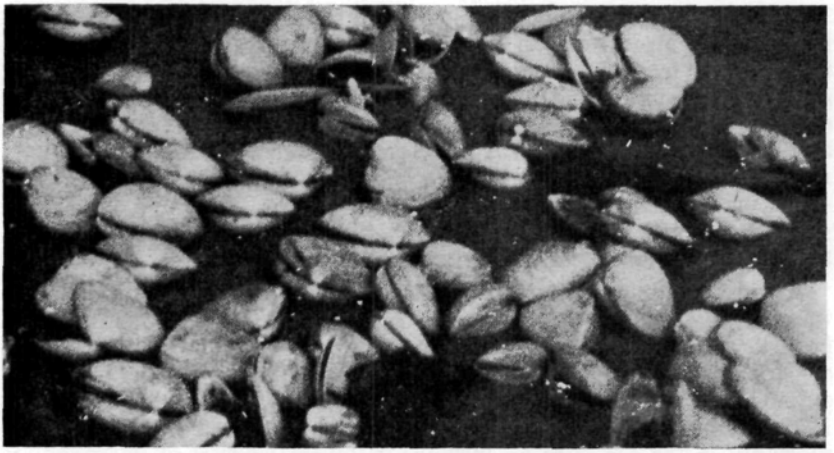

FIG. 2—The most abundant species in the stranding of bivalves at Te Waewae Bay, 1 October 1970, was *Mactra discors*.

burrowed into the sand, but most were lying on the surface and a few were gaping; all the toheroa and mussels were dead. Many, although superficially undamaged, had the mantle cavity and siphons filled with sand. Several thousand gulls were feeding on the shellfish.

The *Mactra* were large, measuring from 8 to 10 cm in shell height (hinge to furthest part of shell), with very few smaller specimens. The toheroa were also large. The largest measured 13.8 cm in length (right angles to hinge) and the smallest 10.4 cm; 107 were measured (length to the nearest 0.5 cm below): 10.0 cm (1); 10.5 cm (5); 11.0 cm (20); 11.5 cm (33); 12.0 cm (19); 12.5 cm (12); 13.0 cm (13); 13.5 cm (4).

DISCUSSION

Street (1971) has surveyed the toheroa population of this beach regularly for several years. His data show that this size group of toheroa are most probably from the lower shore. Although small toheroa had been abundant on the beach at mid-tide and higher levels in March 1970 and were still found to be so in July 1971 (A. R. Branson, pers. comm.), no small specimens were found in the strand line. Street has unsuccessfully searched the immediate sublittoral for toheroa by diving. The only mollusc other than toheroa that he has found on the beach is *Macomona liliana* in small numbers. Thus, the stranded animals probably came from the lower shore and sublittoral.

Any attempt at explaining the cause of the stranding must be speculative, but it is most likely that the local weather was a major factor. The period 24–28 September 1970 was one of persistent strong to gale inshore winds (SW–WSW) coupled with a sharp drop in air temperature. Showers fell every day from 22 to 28 September, with occasional snow (Table 1).

The flow of fresh, cold water from the swollen Rowallan Burn, with the low air temperatures and snow showers, probably resulted in a local fall in water temperature on the shore and in the shallows off this very gradually sloping beach. In addition the substantially increased discharge of fresh water and turbulent on-shore conditions may have resulted in a lowering of the salinity. It is therefore postulated that these conditions reduced the activity of the animals and their ability to counteract the scouring effects of the heavy seas on the lower shore and immediate sublittoral. Once stranded, the shellfish were susceptible to the depredations of scavengers or to the far lower air temperatures.

A similar stranding has been reported more recently from Nelson (Anon. 1971), but few instances of mass mortality of this nature have been described in scientific literature. Crisp (1964) and Gibson (1963) suggest lethargy induced by cold as being the major factor in the stranding of animals from the sublittoral during the severe winter of 1962–63 in Britain. Brongersma-Sanders (1957) in a review of mass mortality in the sea cites an instance of several species of invertebrates rarely found on the beach being ploughed from the bottom of the sea by a severe storm and cast up, still living, on beaches in the Netherlands. Dahlberg and Smith (1970) suggest unusually prolonged low temperatures as the main cause of mortality of fish and invertebrates on the Georgia coast in January 1970 and concur with Gunter and Hildebrand (1951) that shallow water, which allows rapid cooling, is an additional factor.

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