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Relative abundance and size frequency of kina (*Evechinus chloroticus*) in the Chatham Islands in the 2001–02 fishing year

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EXECUTIVE SUMMARY

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Fishery independent kina surveys were carried out at the Chatham Islands (SUR 4) at the request of the Ministry of Fisheries as project MOF2001-03F. The relative abundance and population size structure of kina from four strata in SUR 4 are presented. These were estimated from transects done as an adjunct to paua surveys carried out during the 2001–02 fishing year to provide baseline data against which future trends in the kina fishery may be assessed. Mean kina density ranged from 2.26 per 10 m^2 in stratum 1 to 13.42 per 10 m^2 in stratum 4. The mode of size frequencies in all strata was between 85 and 110 mm.

1. INTRODUCTION

1.1 Overview

This document presents the relative abundance and population size structure of kina from four strata in the Chatham Islands (SUR 4) estimated from transects conducted as an adjunct to paua surveys carried out during the 2001–02 fishing year.

1.2 Description of the fishery

Kina (*Evechinus chloroticus*) inhabit shallow subtidal reefs around New Zealand and form the basis of important recreational, customary, and commercial fisheries (see Andrew (2000) for review).

The commercial kina fishery in New Zealand is divided into 10 Fishery Management Areas (FMAs), 5 of which produce significant catches. Fishing is restricted to breath-hold diving and dredging, and since 1988–89 all important FMAs, except east Northland (SUR 1) and the Chatham Islands (SUR 4), have been managed under a competitive TACC. In SUR 1 and SUR 9, the daily catch for each permit is restricted to 300 kg. In 1992 a moratorium on the issue of new permits was introduced. From 1 October 2002, the kina fisheries in SUR 3, 4, 5, and 7 will be managed under the Quota Management System.

Between 1989 and 1999, the reported mean annual catch in SUR 4 was about 146 t, but fluctuated widely between years, peaking in 1998 at a little over 300 t (Andrew 2000). A full summary of the New Zealand kina fishery was given by Andrew (2000).

2. METHODS

2.1 Relative abundance

In SUR 4, four strata were surveyed (Figure 1). Strata boundaries are consistent with the Statistical Reporting Areas for the QMA.

The relative abundance of kina was estimated by diver transects at all sites where paua surveys were conducted during the 2001–02 fishing year.

The coastline in each stratum was subdivided into 250 m strips, each considered a potential sample site. Fifteen sites were randomly chosen within research strata; however, if a site proved to contain unsuitable habitat, it was permanently discarded from the list of potential sites and another chosen.

At each site two divers each deployed a 25 m tape in a haphazardly chosen direction. Transects were restricted to a depth of between 2 and 15 m as previous work (Schiel et al. 1995) indicated that most kina at the Chatham Islands were within this range. Divers counted and recorded the number of kina within two randomly chosen 10 x 1 m transects along the tape. At each site, each diver made three lays of the tape, resulting in 12 replicate transects per site. Transects were also done at each of three paua tagging sites in SUR 4.

Estimates of density are presented as means ±95% bootstrapped confidence intervals. The bootstrapping was done in S-PLUS by replicating the structure of the data (replicate counts paired within sites and sites grouped within strata).

2.2 Population size frequencies

The size composition of kina at each site was estimated by collecting all kina found during transects and measuring the test diameter to the nearest millimetre. Where few kina were collected during transects, all kina encountered during the swim back to the diving tender were also collected, until the diver's catch bag was full. At each of the three paua tagging sites, all kina within a 50 m radius of the site were also collected and measured to the nearest millimetre.

All size frequency data were grouped into 2 mm size classes for presentation. Size frequency distributions are presented for all of SUR 4, and for statistical areas within SUR 4.

3. RESULTS

3.1 Relative abundance

More than 690 10 x 1 m transects were completed over the four strata in SUR 4. At one of the 15 sites surveyed for paua in stratum 3, divers were unable to lay transects because of already large and rising sea conditions.

Mean kina densities for the strata surveyed are shown in Figure 2. Mean density ranged from 2.26 per10 m^2 in stratum 1 to 13.42 per 10 m^2 in stratum 4. The density of kina in stratum 4 was nearly 6 times that in stratum 1 and about 4 times the density estimated for strata 2 and 3. Density in stratum 4 was significantly greater than that of all other strata, and the density of kina in stratum 2 was significantly greater than the density in stratum 1. The density of kina in strata 2 and 3, and strata 1 and 3, are not significantly different (Figure 2).

3.2 Population size frequencies

A total of 2330 test diameters were recorded across the four strata (Figure 3). The mode of size frequencies in all strata is between 85 and 110 mm. More kina below 80 mm diameter were observed in stratum 4, and slightly more kina over 130 mm were observed in strata 1 and 3 than in strata 2 and 4 (Figure 3). The size frequency distributions were unimodal, except in stratum 4 where two modes were observed.

4. DISCUSSION

The estimated density of kina in stratum 4 is significantly higher than in the other three strata (see Figure 2), and is higher than the kina densities reported by McShane et al. (1994) of about 0.1 per m^2 for both Arapawa and D'Urville Island. Overall, however, the estimated density is lower than that reported for Chatham Island by Schiel et al. (1995), who estimated a range of densities between about 0.2 and 6 per m^2 for eight sites and an associated high variance within sites. Dix (1970) reported similarly high mean densities of kina, ranging from 2.2 per m^2 in Queen Charlotte Sound to 6 per m^2 at Kaikoura. Differences between the relatively high density estimates previously reported for SUR 4 (Schiel et al. 1995) and those reported here may be a result of greater sampling intensity in this study.

The mode of size frequency distributions is similar to the size frequency distribution of kina at the Chatham Islands presented by Schiel et al. (1995). It is also similar to estimates reported for Dusky Sound, but much larger than the indicated modes for both Arapawa and D'Urville Islands (30–60 mm and 60–90 mm respectively, McShane et al. 1994).

The estimates of relative abundance and size frequency presented here provide important baseline data, against which future trends in relative abundance may be assessed.

5. ACKNOWLEDGMENTS

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Schiel, D.R.; Andrew, N.L.; Foster, M.S. (1995). The structure of subtidal algal and invertebrate assemblages at the Chatham Islands, New Zealand. *Marine Biology 123*:355–367.

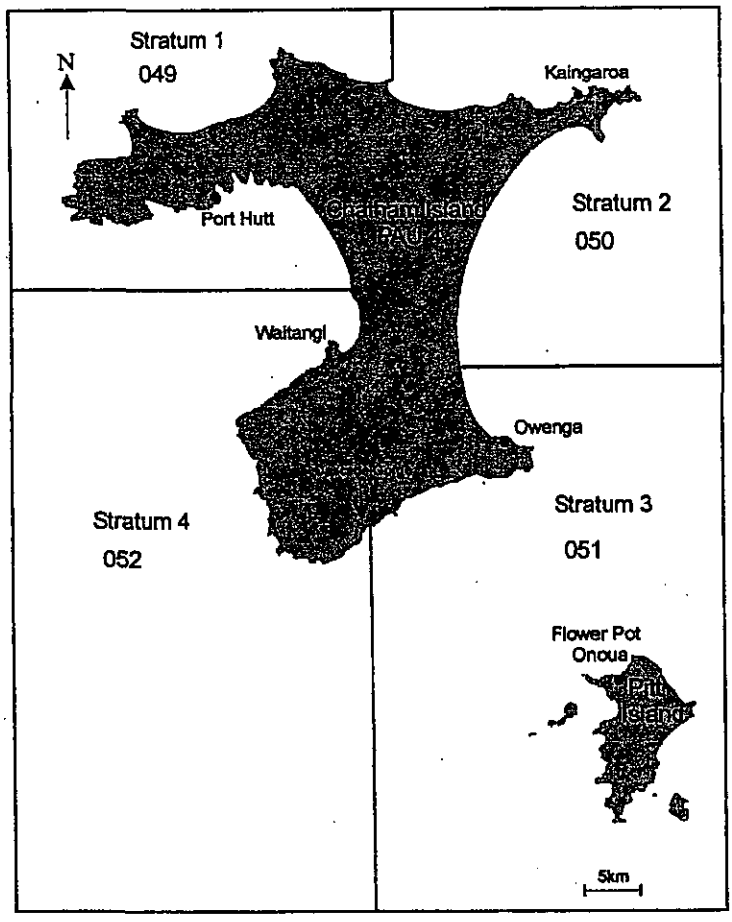

Figure 1: Survey strata and Statistical Reporting Areas in SUR 4.

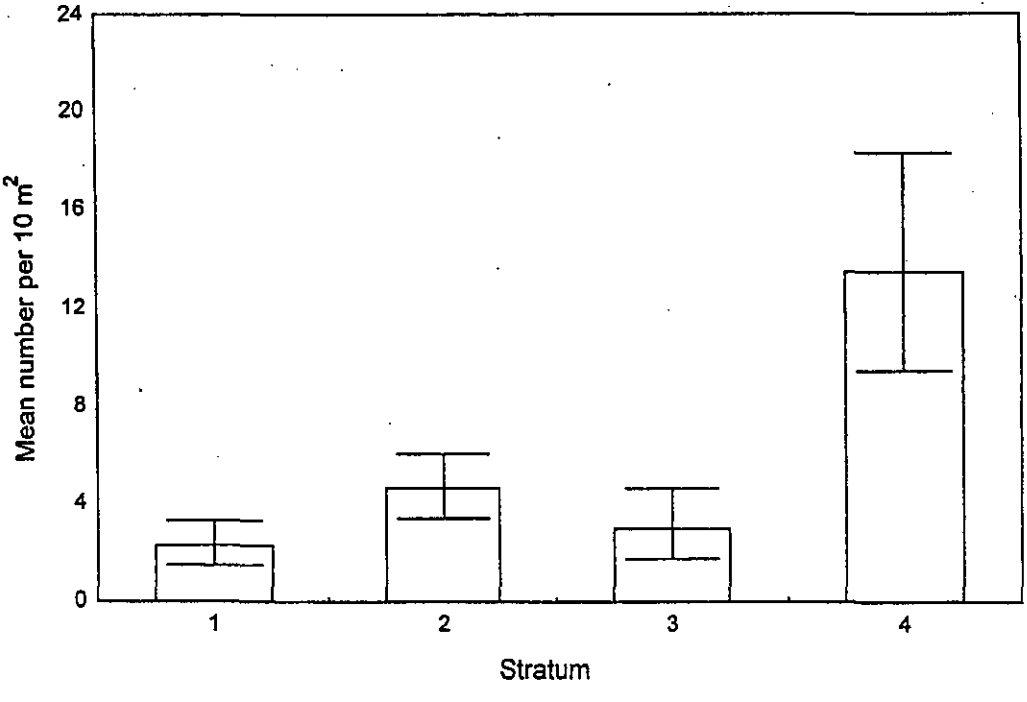

Figure 2: Mean number of kina per 10 m^2 in SUR 2 survey strata (± 95% bootstrapped confidence intervals).

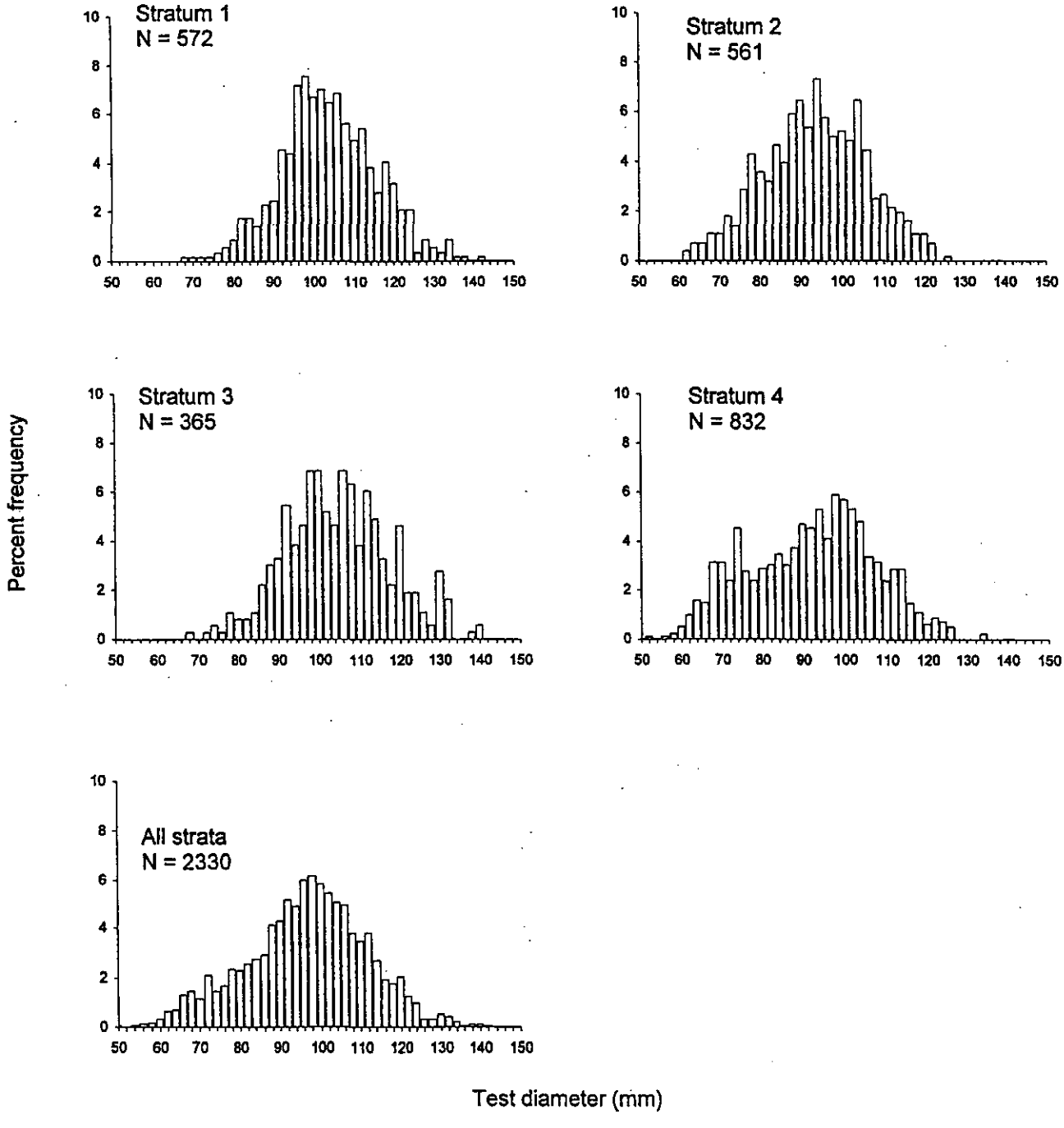

Figure 3: Size frequency of kina from sites sampled from strata in PAU 4.