

Baseline survey of the proposed Waitutu Mātaitai reserve 2010



UNIVERSITY
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Christopher Hepburn & Derek Richards
Department of Marine Science
University of Otago
He Kōhinga Rangahau No 12 April 2012



Te Tiaki Mahinga Kai

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Research Team: Tarsh Turner (Front), Chris Hepburn, Tiny Metzger, Tom McCowan, Rob Win, Peri Subritzky and Derek Richards (back Left to Right)

Introduction

This report provides an outline of the methods and results from our first visit to the Waitutu area during late 2010 (Figure 1). Staff and students from the University of Otago, who are part of the research group Te Tiaki Mahinga Kai, conducted baseline surveys of the abundance and distributions of important kaimoana with particular emphasis on pāua (*Haliotis iris*) and the composition of habitats that support this customary fishery.

Internationally, over exploitation of abalone fisheries (such as pāua) has led to their collapse or near extinction. Pāua is an important species in commercial, recreational and customary fisheries with an annual total catch of approximately 1200 t (McShane et al 1994).

Furthermore, pāua are considered a taonga species for Kai Tahu in New Zealand's coastal ecosystem. Overfishing leading to localized depletion, combined with management practices operating on the wrong scale has all combined to put this species at risk. McShane et al (1994) found that the management of pāua would be more appropriate over spatial scales that reflect the local populations variation in size structure (100's m), rather than the large spatial areas (1000's m) that are currently used to manage the New Zealand pāua fishery. The relatively recent establishment of many taiāpure and mātaimai throughout New Zealand has provided the opportunity for kaitiaki to manage pāua stocks at the appropriate scale (100's m). Taiāpure and mātaimai allow for local scale or "reef-by-reef" management systems that in turn may provide sustainable customary fisheries.

The goal of this work was to provide a baseline stock assessment of the fishery (focusing on pāua), within the proposed Waitutu Mātaimai, in order to provide robust information on the abundance, size and distribution of pāua in this area.

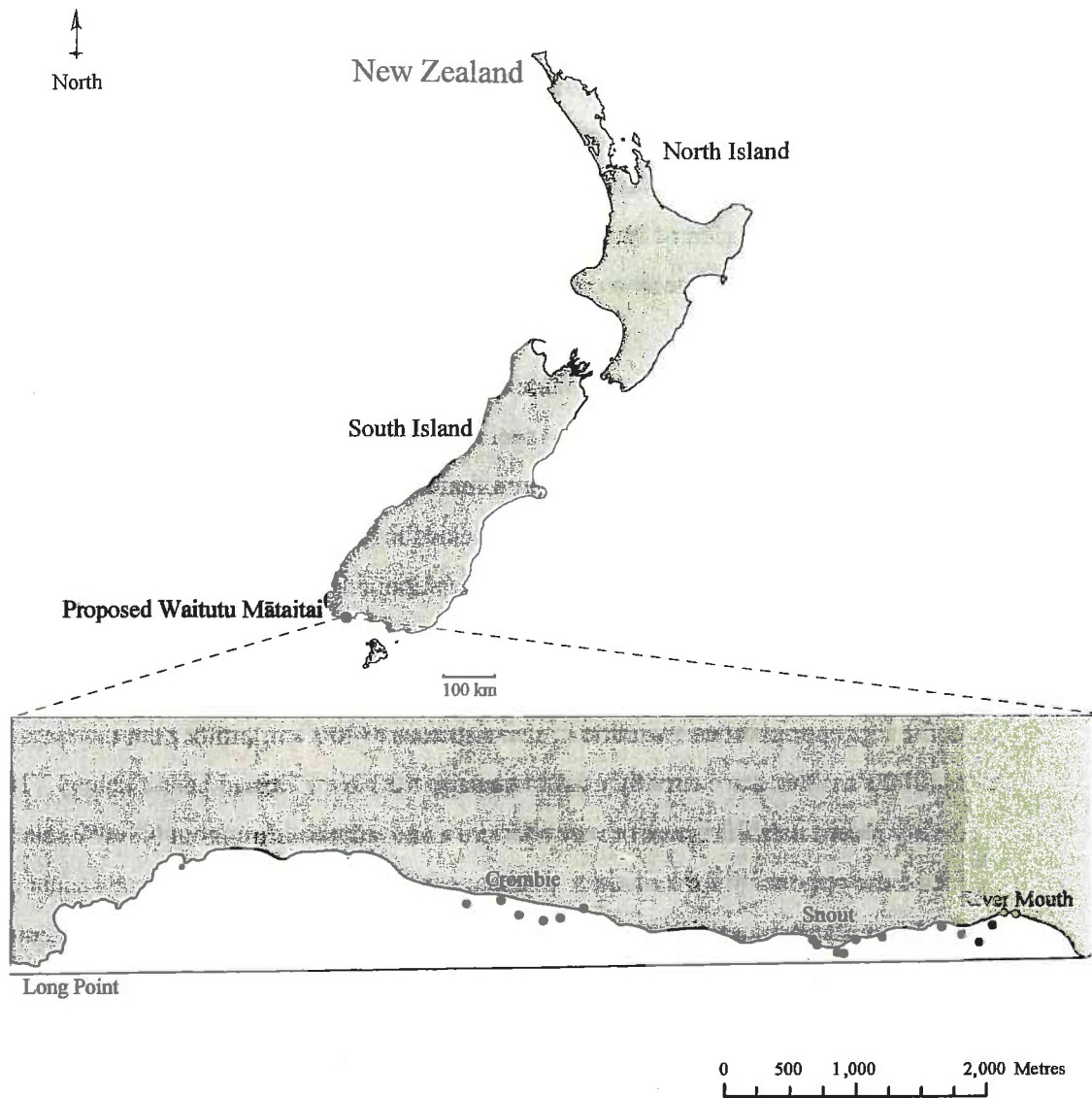


Figure 1. Sites surveyed within the proposed Waitutu Mātaitai and the other customary fisheries areas previously worked on throughout New Zealand.

Methods

Scoping surveys

Initial scoping surveys (observation by snorkelling at several sites by five divers) of the reefs along the Waitutu coast were used to guide our surveying approach. Initial observations indicated very low abundances of pāua (*Haliotis iris*). We found that pāua were less common at greater depths and were not observed beyond 3 metres, therefore we focused our approach on shallower sections of the reef. The shallow distribution of pāua populations is fairly typical in southern New Zealand. All pāua were observed on boulder habitat and the vast majority were found in cyptic habitats beneath large boulders.

Initial survey techniques

We conducted a baseline survey of sites within the proposed Waitutu Mātaitai from the 26th of November to the 3rd of December (Figure 1). To address low densities of pāua observed on initial dives we decided to survey six large 50 x 50 metre quadrats in the first bay and point to the west of the Wairaurahiri River Mouth (River Mouth Site). 50 by 50 metre quadrats were placed parallel to the shore and ran from the low intertidal zone to approximately 4 metres depth, depending on the slope and characteristics of the area being surveyed. Five snorkelers counted and measured all blackfoot pāua (*Haliotis iris*), yellowfoot pāua (*Haliotis australis*), cook's turban (*Cookia sulcata*) and kina (*Evechinus chloroticus*) within each of the quadrats. Where possible all individuals were measured while attached, but where necessary they were gently removed by hand or using a specialised pāua tool. Measurements taken were: greatest shell length of blackfoot and yellowfoot pāua; greatest width of cook's turban; and test diameter of kina (Figure 2). Measurements were made using plastic vernier calipers. All removed individuals were returned to as near as possible to their original position. Each individual measures had its shell marked with a crayon to prevent re-measurement. All red rock lobster (koura, *Jasus edwardsii*) within quadrats were also counted.

Stratified random sampling using 4 m² quadrats

Concerns that we may have been missing some groups of pāua in 50 x 50 m quadrats lead us to use a stratified random approach to survey the rest of the proposed mātaimai. We surveyed three sites that consisted of approximately one kilometre of shoreline across the proposed mātaimai (Figure 1). We resurveyed the River Mouth site, the reef and boulder bays surrounding the Snout that was approximately one hours walk from the Waitutu Lodge and the reefs on the western side of the Crombie Stream (Crombie Site) approximately two hours walk from the Lodge. Within each site, six 50 metre transects were placed parallel to the shore above the low tide mark (see figure 1). We sampled three zones: (i) at the low tide mark (we set this depth as a reference depth of zero metres for all other depths); (ii) approximately twenty metres out from the intertidal site (0.1 - 2 m depth); (iii) approximately fifty metres out from the intertidal site 0.5 - 4 m. This depth range covered all pāua that were seen during observational scoping dives. A 4 x 1 m square quadrat was placed at 10 random positions (using computer generated random numbers) along the line at each of the zones surveyed. 4 m² quadrats were selected, as they are the largest sized quadrat that can be easily managed in wave-exposed habitats. Within each quadrat counts and measurements of pāua and other key species occurred as described above. Information on habitat type (e.g. Boulders, reef, sand, shells) and % cover of habitat forming organisms (e.g. seaweed) were also made.

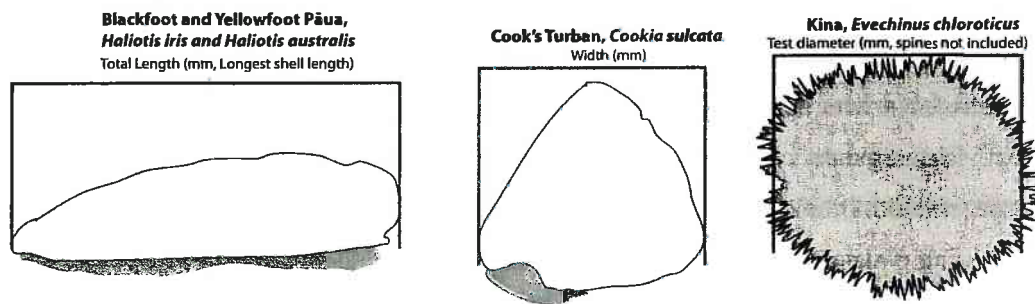


Figure 2. Methods for measuring key grazer species in surveys

Results

Habitat characteristics

The three sites were similar in their habitat composition over the depth ranges surveyed (Figure 3). These areas were typically dominated by brown seaweeds (particularly species of the *Cystophora* genus) and by a range of small turfing (low growing) red and brown seaweeds (see appendix for photos). In general sites were dominated by soft sedimentary reef (papa) with varied amounts of boulder habitat with high (>50%) turf coverage. Specifically, the Crombie site had significantly less boulder and low turf habitat when compared to the River Mouth site (One Way ANOVA $F_{2,53} = 3.88$ $P = 0.027$ and One Way ANOVA $F_{2,53} = 3.12$ $P = 0.041$ respectively) whereas the River Mouth site had significantly reduced amounts of turf when compared to the Crombie (One Way ANOVA $F_{2,53} = 3.23$ $P = 0.047$).

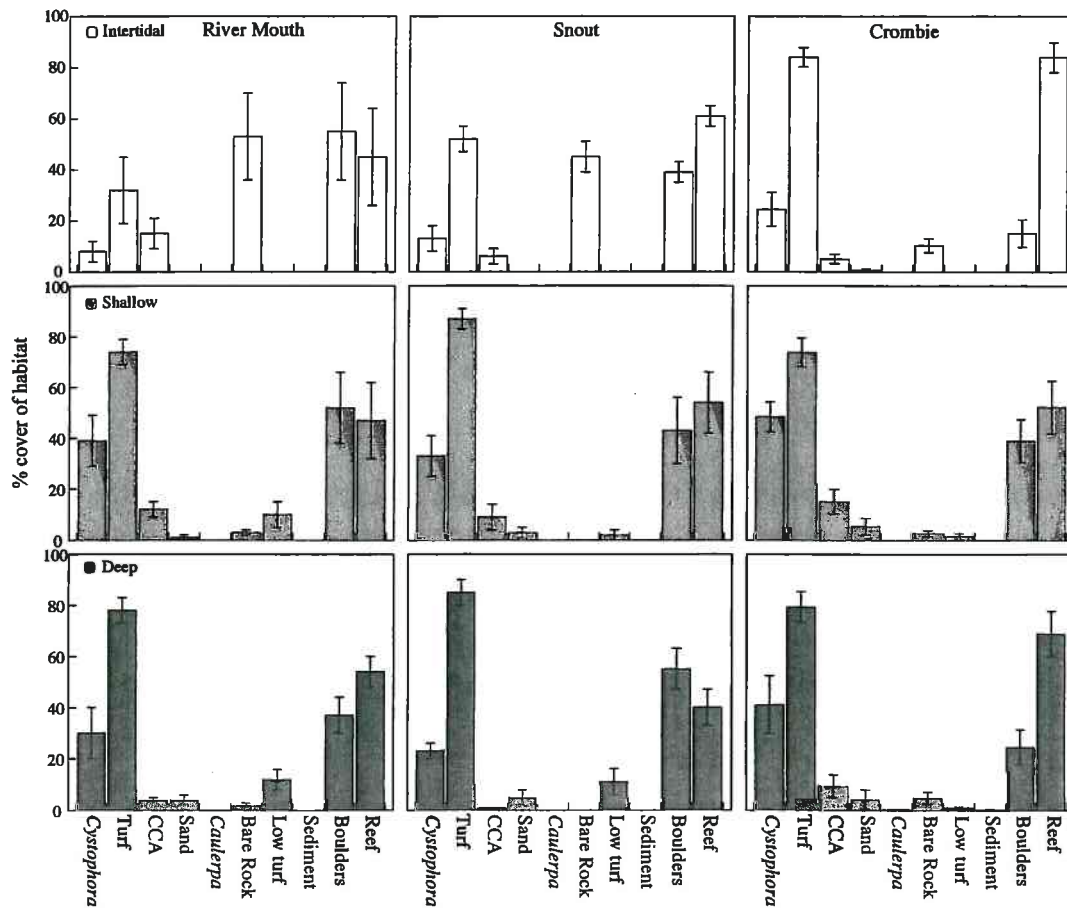


Figure 3. Percent cover of substrata at the three study locations during December 2010. Bars represent means \pm standard error $n = 6$ at each location. CCA= Crustose coralline algae also known as pink paints.

Density of key kaimoana species (50 x 50 m quadrat survey)

Very low densities (less than 0.03 individuals per m⁻²) were observed for all five key kaimoana species sampled (Figure 4). Pāua density ranged between 0 and 0.027 per m⁻², whereas all other species averaged below 0.002 individuals per m⁻² (Figure 4).

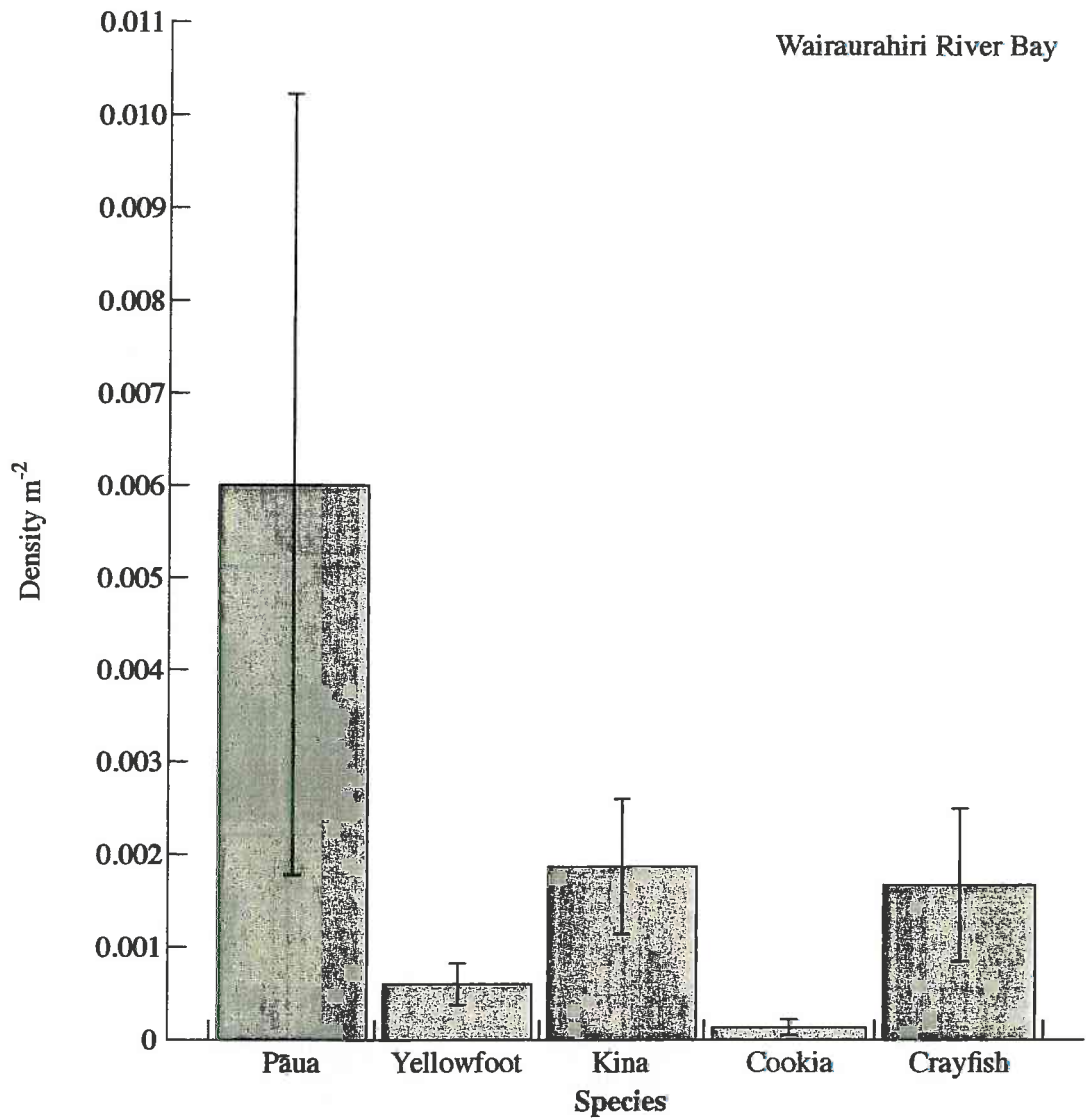


Figure 4. Average density of the five key kaimoana species sampled during December 2010. Bars represent means \pm standard error for 6 (50 x 50 m) quadrats. Pāua (*Haliotis iris*), yellowfoot pāua (*Haliotis australis*) cook's turban *Cookia sulcata*, Kina (*Evechinus chloroticus*) and Crayfish (koura, *Jasus edwardsii*).