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# SHELLFISH DISPOSAL METHODS ON THE NORTH CANTERBURY COAST

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## Introduction

The purpose of this article is to describe the disposal processes for coastal shell midden deposits on the North Canterbury coast, in the dunes between the Waimakariri and Ashley Rivers, an area long known for an abundance of middens (Challis 1995:24-25). I have been investigating these middens in the context of NZHPT Authority requirements for subdivision development since 2006. The projects include Sovereign Palms north of Kaiapoi, Pegasus Town at Woodend and Northside Country at Waikuku (Figure 1). I have investigated over 200 *in situ* middens over this seven year period.



*Figure 1: Location of North Canterbury middens*

The approach was based on “the midden cycle” as follows:

A. Habitat and harvesting: the first stage covers the activities on the shell bed. It relates to the environment being exploited and the method of shellfish gathering.

B. Processing and disposal: the second stage covers the activities on shore which result in the midden deposit. It includes cooking, shell discard and secondary disposal.

This article is concerned only with the second stage, the processing and disposal part of the midden cycle. It describes the types of shell deposits found, as well as their context. Patterns of behaviour and the labour organisation implied by various forms of disposal are also discussed.

### **Types of Shell Deposits**

The types of shellfish deposits investigated include “bunched shells”, “jumbled shells” and flat-lying shells.

Bunched shells are small tight discrete clusters of shells. Each bunch is the size of a handful and consists of 5 to 9 bivalve shells, but there can be as many as 13. Usually they are tightly stacked where the convex part of one shell fits into the concave part of another. Bunches range in form from rosettes to slug-like shapes. Sometimes other shells are fitted around them. There can also be balls of interlocking shells, packed with the convex surface on the outside. Bunches are usually very compact in the deposit, but individual bunches can be isolated during excavation (Figure 2). Sometimes it is possible to reach in with the hand and remove these compact bunches intact (Figure 3). Among the bunched bivalves, pockets or balls of mudsnails may also be present. In some sites careful excavation may show units of bunched shell about 20 to 30 cm in size and 10 to 20 cm thick. These are square cornered and contain tightly packed bunched shells. A fine division between the masses of shells is sometimes visible, and it is possible to excavate these squarish units out separately (Figure 4). These units are about the size of the kono or rourou eating baskets used at hangi. No trace of flax fibre has so far been found, but it is inferred that these baskets were used to contain tightly packed shell refuse for disposal. During excavation it is often difficult to penetrate the deposit with a trowel and the shells are so interlocked that it is difficult to extract them whole. On rare occasions an isolated “basket” can be found, but normally they appear grouped together in a larger deposit.

Not all of the bunched shell handful type deposits are identifiable as disposals using eating baskets. In some cases the bunched and stacked shells are among looser shells and there may be considerable fire-cracked rock and



*Figure 2: Stacked handful or “bunch” of cockle shells*



*Figure 3: Stacked handful of cockle shells*



*Figure 4: Excavation of site M35/975 to show shells packed inside what is interpreted as a square-sided eating basket*



*Figure 5: A poured-out pile of jumbled cockle shells (non-archaeological)*

lumps of charcoal present as well. This seems to be a different method of clean-up and disposal.

Jumbled shells are bivalve shells in a dense deposit, which is not as compact as the bunched shells described above. Although there may be some loose nesting, they do not form the tightly packed bunches. The shells are randomly tilted and imbricated, especially cockles. This is less so with pipi, which are somewhat more flat-lying and more readily nested. This type of deposit can be replicated during excavation. If shells from the sieve are put in a 10 litre bucket and then poured out on the ground as a pile, the manner of repose and the density can be seen to be the same as in the deposit (Figure 5). It is inferred that these middens were poured from a container of some type. Although a single pile of jumbled shells may be found, they may occur as over-lapping conical piles, or more often superimposed on each other as a mass.

Thin deposits of flat-lying shells may also be found. While some cases seem to be eroded, reworked and highly weathered, others seem to be in their original context. Discontinuous small piles may resemble an informal experiment I made while working on the Pegasus project. On one occasion I collected a large quantity of cockles and cooked them in an umu, and then invited my field crew (consisting of members of Ngāi Tūāhuriri Rūnanga) to eat as many as possible. The shellfish were carried in a paper plate to a place on the ground where they were eaten with bread and butter. When seated the shellfish were eaten off the shell, and the shell was put down on the ground. When the person got up and walked away, that which was left consisted of small piles or clusters of shells as well as scattered shells. Excavated examples resembling this were rare.

A sheet of flat-lying shells was exposed during another excavation. This effect was replicated using sieved cockles in a 10 litre bucket which were tossed (not poured) on to the ground. The shells were much less likely to be tilted or vertical as observed in the more conical piles which were poured from the bucket.

## **Associations**

Many of the middens were simple isolated deposits containing nothing but shell and not associated with any other feature. Sometimes however there were associations with other remains or various features at or near the deposit. Such associations help interpret the behaviour related to the deposit. The associations with middens I have been investigating include the following:

**Artefacts:** artefacts in the middens were rare, and included items of stone, bone and shell. Usually they seemed to have no direct relationship with shellfish. However, there were examples of shell tools or fire-cracked rock fragments with edge wear. These may reflect localised activities connected

with the production of the shell deposit.

*Fauna:* bones of fish or bird also may be present as rare items and in a few cases they were relatively frequent. Fish or birds were possibly taken as incidental items during shellfish harvesting. More rarely, sufficient quantity of faunal remains may be found to indicate fishing or birding as an activity on its own. Rat bones may also occur, but this may be due to the intrusive behaviour of these rodents, rather than representing a food item.

*Oven stones:* some middens have little or no fire-cracked rock present and in others it is relatively abundant. The quantity probably reflects differences in the context and method of clean-up activities.

*Charcoal:* charcoal is commonly present in small amounts. It can also be so abundant that the shell layer is black. The charcoal may appear as fine particles or occur as large lumps. Abundant charcoal lumps and fire-cracked rocks sometimes go together and are suggestive of sweeping up around an oven.

*Calcined and burnt shell:* the shell may be found in a blackened, charred or burnt condition, usually very fragmented. There also may be white masses of calcined shell that has been burnt into calcium oxide (lime). The calcining would be due to a hot fire and suggests that organic fuel such as wooden or fibre materials had been mixed in the deposit and then set alight. A few cases seem to be shells dumped on a hot oven and overlying fire-cracked rock.

*Oven pits:* ovens may be a few centimetres to several metres away from a midden and were probably used to cook the shellfish. In some cases the ovens were in a cluster in which one still had its oven stones intact and the others had most of their stones robbed out.

*Postholes/ structures:* On rare occasions postholes belonging to a house, fence or palisade or structures such as a pit house were associated with a shell deposit.

*Ground surface:* the ground surface where the shells were discarded or deposited varied. Some shells were on an organic soil whilst others were found on eroding bare sand such as a blowout. Poured-out piles of jumbled shell were commonly found on old blowouts slopes.

## Implications

During my work in this region I became increasingly interested in the various refuse disposal processes and interpretations of landscape partitioning and labour organisation. At present most of the Sovereign Palms project has been excavated and analysed, and this represents my best data. The amount of unanalysed material still sitting in containers at Pegasus is immense. It accumulated over three and a half years of field work (Witter 2009), and I am only able to make use of general impressions formed during excavation. The Northside excavated material is expected to undergo analysis soon. As a

preliminary statement however there seem to be four main discard and disposal situations which I have encountered: primary discard, formal meals, shellfish meat drying and habitation middens.

### 1. Primary discard

Deposits which seem to be primary discard appear to be rare for the North Canterbury middens. One example comprised small clusters of flat lying large-sized cockles (site M35/438). The amount of *in situ* material was limited and it produced a small pestle with ochre residue. It is interpreted that this was a meal in which the cockles were eaten, the shells put down on the ground, and then the diners got up and walked away.

### 2. Formal meals

Numerous examples of rourou basket disposals with bunched shells were found at Pegasus (Witter and Witter 2007, Witter 2009) and these were not associated with habitations. They were interpreted as events out in the dunes where the shells were cleaned up after large communal meals and then stacked elsewhere. No remains of any primary discard nearby could be found. Artefacts and bone were absent. These sites imply a system of labour organisation to produce a large meal. The first step was possibly having the fernroot dug up by men in advance. Then a group of women were coordinated to gather up the fern root to roast in a fire and pound the starch out. Another group were required to harvest shellfish from the estuary probably at the same time. It was necessary also to obtain the stones needed for the oven – whether from an outcrop or by raiding stones out of previous ovens. Fire wood also had to be gathered. In addition, someone needed to go to a stand of flax, cut the leaves, and weave the rourou baskets. When ready, the meal portions were distributed in the baskets and then afterwards some of the baskets were used to gather up the shells and remove them to a place of disposal. Although this process would have been routine, a level of coordination would be expected. This would have been an effective system to minimise the transport of high bulk resources such as fernroot and shellfish. There also may have been occasions in which such open air feasting was appropriate.

At Sovereign Palms site M37/437 there were ten small grouped, but separate, rourou basket disposals; predominantly cockles. These were associated with a cluster of ovens that had been robbed-out but one was still intact with its oven stones. Bone was very rare, there were no artefacts, and fire-cracked rock and charcoal was scarce. It was interpreted that this was a series of meals away from the habitation or settlement. As suggested above, bracken would have been abundant in the dunes and fernroot was the basis of the meals. The shellfish were the protein component, and the food portions were

served in the rourou/kono baskets. After the meal the shells and other food remains were removed and taken back to the place of cooking. This would have been due to the noa effect since speeches, prayer and song would follow with such a gathering.

### 3. Shellfish meat drying

The drying of shellfish meat also involved a series of steps. The first was the harvesting process on the shell bed. Shellfish may have been transported with kete but historic photographs show larger circular baskets that probably held twenty litres or more that may have been used (e.g. King 1996:125). Bivalves were opened up in an oven and the meat was extracted and threaded for drying (Buck 1950:106, Best 1929:70, 81, photo in King 1996:155). The mass of waste shells which accumulated at the meat extraction site had to be removed and dumped. This implies that a form of labour organisation and coordination would be required if it was to be a continuous process.

The main examples of middens interpreted as evidence of meat drying activities were investigated with the Sovereign Palms project. Some sites were

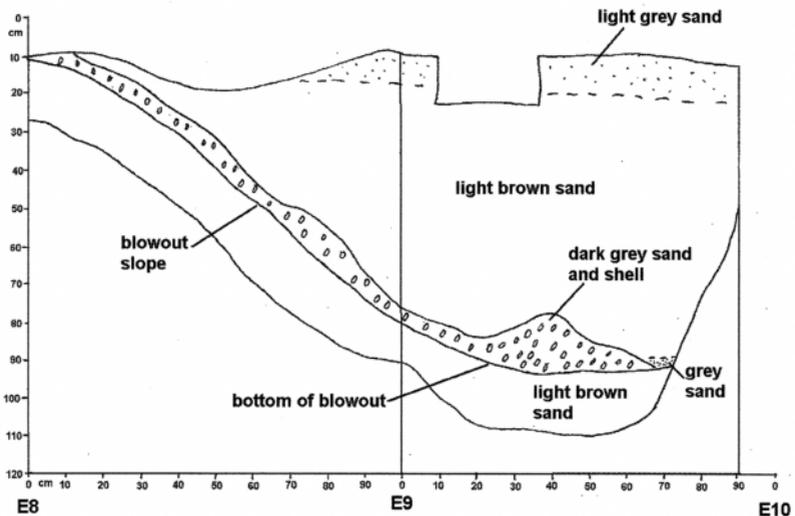


Figure 6: Section of site M35/983 showing a load of shells poured down a blowout slope at Sovereign Palms

found which had an oven associated with midden shell. These shells were flat-lying or indicated the remnant of a pile. There were no stacked handful bunches and they may have represented sites where the meat was extracted. In the vicinity of these sites were deposits of jumbled shells usually poured down blowout slopes. Sometimes there would be more than one dumping event separated by a lens of blow sand. In some cases it could be seen that a large basket had been tipped down a steep blowout slope where it piled up at the bottom by the momentum (Figure 6). Few artefacts were found with these middens and faunal bones were rare, a few being rat. These sites were all located within 200 m of the source estuary.

According to data I have recorded, the wet meat weight to live weight for cockles is about 13%. Thus 87% of the weight is shell and water. When desiccated the percentage meat weight would be considerably less. The logistical advantages to drying shellfish meat for transport are obvious. This resource also would be a commodity which could be stored.

The shellfish in the Sovereign Palms dumps usually consisted of small juveniles of pipi or cockles. The meat drying system probably operated on the principle of an economy of scale. Thus with systematic processing regardless of individual size, the outcome was productive. An example of a midden of relatively small-sized pipi was discussed by Jacomb et al. (2010:47). This was a massive deposit at Karamea on the West Coast that was suggested to have been built up by shellfish drying. This may be another example of economy of scale and labour organisation to provide quantities of dried shellfish meat.

#### 4. Habitation middens

Middens interpreted as belonging to habitations in North Canterbury coastal dunes were uncommon. Village and pa sites with postholes and other features are few in the area. Short term camps and temporary structures do seem not leave much evidence in the dunes, and the middens may be the main indicator of their presence. For example, more faunal remains or artefacts suggest more varied activities than would belong to specialised shell disposal processes. More charcoal and fire cracked rock also is likely to represent substantial clean-up in a family area. The presence of heavily burnt or calcined shell implies other domestic refuse incorporated in the shell disposal which was burned. These middens may contain varied disposal events (both poured-out piles and rourou baskets), and exhibit stratification.

As previously noted, it can sometimes be determined that middens with bunched shells were not in the context of disposal in eating baskets. These consisted of a mass of shells in a 1-2 m area about 10 cm thick. One example contained fistfuls of bunched shells, but no rourou was indicated. It also had handfuls of mudsnails, patches of loose shells and large lumps of charcoal

scattered throughout. Another consisted of bunched shells packed in with scoops of jumbled shell and a scatter of small fire cracked rock fragments. This type of disposal may represent cleaning up of an oven area, possibly by sweeping or scooping refuse up on an oven cooking mat or perhaps a worn out sleeping mat. Handfuls of shells would be included with the loose shell so they kept their form as the mat with all of its contents was carried away for disposal. Such an intensive clean-up may have been the result of long term oven use belonging to a habitation.

## Summary

Much remains to be understood about how midden deposits accumulate, but clearly several distinct processes are represented in this study area. Most middens found on the North Canterbury coast were secondary disposals rather than primary discard events. This means that the shells discarded when the meat was removed were then gathered up or cleaned up and deposited elsewhere. The presence of bunched handfuls of shells seems to be a good indicator of cleaning up after a meal. This type of midden may be associated with a habitation or a meal eaten out in the dunes. The large poured-out middens of jumbled shells without artefacts or faunal bone indicate meat drying, especially if they are located near a shellfish habitat and with no habitation nearby. The disposal and management of shell refuse indicate a range of behavioural patterns connected to the midden cycle. These include strategies for using the landscape and different forms of labour organisation.

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