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MUDSNAIL MIDDENS ON THE NORTH CANTERBURY COAST

DAN WITTER

Introduction

The mudsnail, *Amphibola crenata*, is commonly seen on New Zealand mudflats and can occur in very high densities (Marsden and Knox 2008:753), giving it the potential to be an important food source. They are found in middens, but as a traditional Māori or prehistoric food species, mudsnails seem to get little attention. There is very little information on them in Leach (2006), nor much mention in the ethnographic material such as Beattie (2009) or Best (1929).

In the Sovereign Palms subdivision north of Kaiapoi the mudsnail was an important midden species for some sites. I have recently discussed working in this area on the North Canterbury coast about 20 kilometres north of Christchurch (Witter 2013). This ongoing subdivision includes an area of dunes about 700 x 700 m in which 57 prehistoric sites have been recorded thus far during earthworks (Figure 1). Of these, 48 were middens. A series of nine radiocarbon dates were obtained, all from cockle shell. The median date for eight of them (Wk calAD 95.4%) was from 1530 to 1562; the median for the remaining sample was 1433. At this time the Ashley River would have turned south-east from Rangiora, and from Woodend followed a channel south into a river mouth estuary near Kaiapoi. The sites were on a dune which was next to this former estuary with extensive mud flats.

In this article I wish to discuss two aspects concerning the occurrence of mudsnails in these sites. The first is the problem of quantifying their MNI (minimum number of individuals) in a sample. The second relates to their fragmentation and the process of meat extraction.

Mudsnail Middens

A mudsnail midden is where mudsnails are dominant according to the MNI counts for all species. The recommendations for gastropod MNIs in the New Zealand Historic Places Trust 'Guidelines for Midden Sampling and Analysis' (2010:21) was to count apices, apertures or opercula, and use whatever was highest for the count. The approach used by Jacomb *et al*. (2010:42) in their study of a Karamea pipi midden, was to use the whorl for counting

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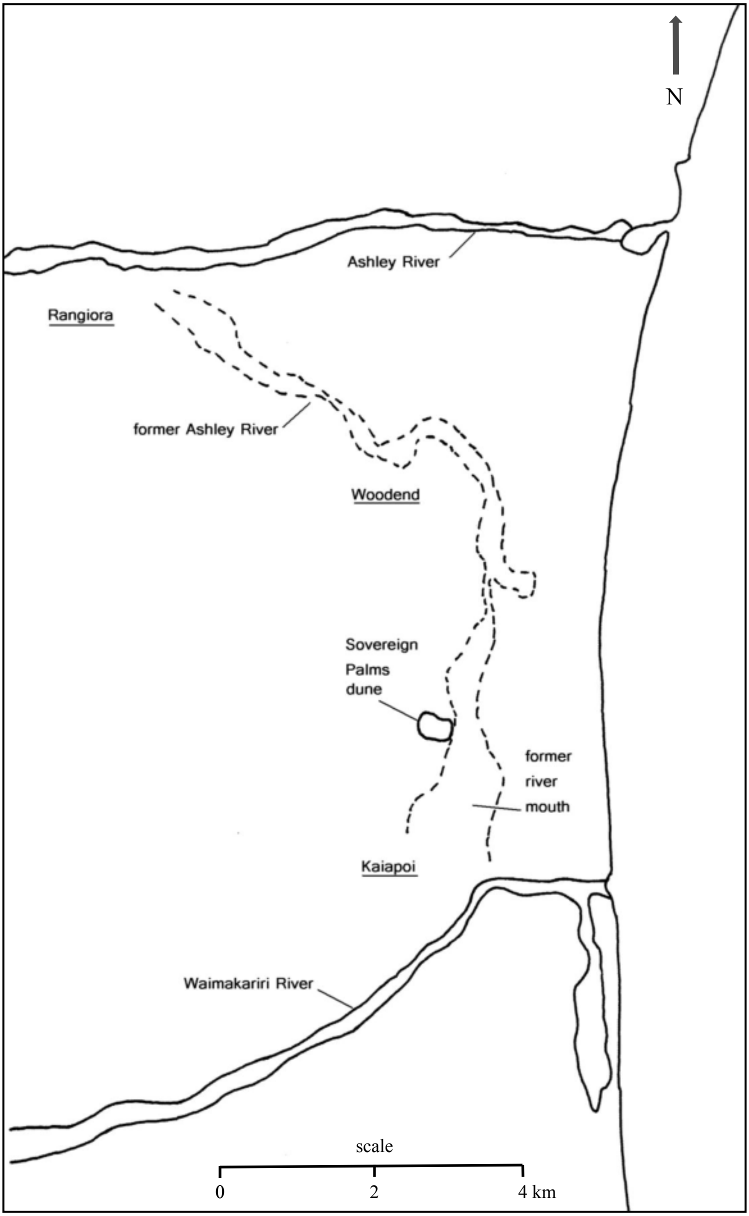

Figure 1: North Kaiapoi coast showing the Sovereign Palms dune and the former Ashley River

At Sovereign Palms site M35/969 (AS-21) mudsnails were obviously the major component, but the calculation of MNI presented a problem. In looking at the material I could see that there were whole shells, the internal columella by itself, the broken-off spire/apex, and pieces of the body whorl. The whole shells were mostly damaged with part of the body whorl gone. Thus shells with an intact aperture were few, but if the spire and columella were still attached I counted them as "whole". The count for the columella or spire could then be added on to the whole shell count, using whichever was higher to give the MNI. The data from my sample is shown in Table 1.

Sample E61 N53, L1

	mudsnail			cockle
whole	35		whole	2
columella	536		hinge	2
spire	181		Total	4
MNI	571		MNI	2

Table 1. Sample data from site M35/969 (AS-21)

With the columella added to the number of whole shells, the MNI count was 571. If I had used the spire instead, the MNI would have been only 216. Why should there be such a difference between the spire and the columella? It may have been that with weathering the columella fragments tended to filter down the deposit and it was a sample/taphonomic effect. Alternatively, the spire might not be as robust and more likely to break up. In either case, the quantity of mudsnails overwhelmed that of cockles.

Another site, M35/987 (AS-47), was stratified and had lenses dominated by either cockles or mudsnails. The cockles were densely stacked and bunched, and the mudsnails were also tightly packed in balls. The midden was interpreted to be a deposit of rourou baskets full of shell (Witter 2013:165). The data for the samples with large numbers of mudsnails are shown in Table 2.

In Sample A, the counts for the spire and columella were relatively close, making the MNI 161 or 129 respectively. Sample B was similar: MNI 97 using the spire and 77 with the columella. In these the spire was more abundant than the columella. Possibly being packed into the rourou baskets meant less filtering of the columella or weathering of the spire. However, in Sample C there was a great discrepancy between the columella and spires. With the columella the MNI was 226; if the spires were used it is 96, making the dominance over the cockles less impressive. Sample C was on the margin of the deposit and was perhaps more subject to weathering.

Sample A (E11 N10, L1 F3)

	mudsnail			cockle
whole	17		whole	10
columella	112		hinge	18
spire	144		total	28
MNI	161		MNI	14

Sample B (E11 N10, L1 F2)

	mudsnail			cockle
whole	13		whole	20
columella	64		hinge	22
spire	84		total	41
MNI	97		MNI	21

Sample C (E10 N10, L2 F2)

	mudsnail			cockle
whole	34		whole	10
columella	192		hinge	38
spire	62		Total	48
MNI	226		MNI	24

Table 2. Sample data from site M35/987 (AS-47)

The problem however can become more complicated, as evidenced at site M35/963 (AS-11). This site was a stratified deposit where the shells had been dumped into a blowout. It was a poured-out disposal in which the shells were jumbled together and less dense (Witter 2013: 168). A remarkable characteristic was the abundant presence of *Cyclomactra ovata,* a very large cockle-looking mactrid that lives in deep mud. This species sometimes dominated, but the samples in Table 3 are those with large numbers of mudsnails.

In Sample A, adding the spire to the whole shells, the mudsnail MNI was 527; with the columella instead it was 441 and still the most abundant species. The mudsnail for Sample B was 279 from the columella, but with the spire it would be 244. Again, there was a considerable difference depending on what was used, although the mudsnail was clearly the most numerous species.

In Sample C, the mudsnail MNI from the spire was 143 and from the columella it was 161, in either case not far from the *Cyclomactra* MNI of 129. However, with Sample D, the MNI is 130 using the spire, and 96 using the columella. In this case, with the spire count the mudsnails were fewer than the *Cyclomactra* which was 107.

With M35/963 (AS-11) there is a further taphonomic and sampling issue. While sieving out the midden deposit, an informal experiment was made pouring out the sieve contents out on the ground from a 9 litre bucket. It was noted that the mudsnails tended to roll down the slope of the pile and accumulate around the edge. Thus, depending on where a sample was taken there would be differences in the proportions of shell species from the same container.

Sample A (E9 N12, L2 U4)

	mudsnail			cockle			cyclomactra
whole shell	201		whole	5		whole	13
columella	240		hinge	10		hinge	83
spire	326		total	15		total	96
MNI	527		MNI	8		MNI	48

Sample B (E9 N12, L4 U3)

	mudsnail			cockle			cyclomactra
whole shell	139		whole	3		whole	14
columella	140		hinge	3		hinge	102
spire	105		total	6		total	116
MNI	279		MNI	3		MNI	58

Sample C (E9 N12, L2)

	mudsnail			cockle			cyclomactra			pipi
whole shell	87		whole	24		whole	38		whole	
columella	74		hinge	13		hinge	220		hinge	1
spire	56		total	37		total	258		total	1
MNI	161		MNI	19		MNI	129		MNI	1

Sample D (E9 N12, L4 U5)

	mudsnail			cockle			cyclomactra			pipi
whole shell	53		whole	46		whole	18		whole	
columella	43		hinge	63		hinge	195		hinge	1
spire	77		total	109		total	213		total	1
MNI	130		MNI	55		MNI	107		MNI	1

Table 3. Sample data from site M35/963 (AS-11)

Figure 2. Series of mudsnails from a midden which have had the body whorl chipped away to extract the steamed meat.

Figure 3. Pebble found at a midden and thought to have been used to chip the mudsnail shells

Meat Extraction

It does not seem likely that a fully grown mudsnail would be as important a meat producer as a pipi or cockle. Since they live in the same habitat a those species, their presence in a midden may be only incidental, especially if mass-gathering techniques were used. A question therefore remains as to whether mudsnails were sometimes only a by-catch and not necessarily eaten, or if they comprised a desirable food species.

This leads back to my earlier comment about how few "whole" mudsnails were entire with an intact aperture. While looking at the discrepancies between the columella and spire fragments, I also noticed the breakage patterns on the "whole" shells. These consistently showed a notch in the body whorl and jagged edge around the spire. It did not seem like a natural form of breakage but that the body whorl had been chipped away. As indicated in Figure 2 this pattern of breakage is very regular.

In an informal experiment I gathered about two litres of mudsnails. One batch was boiled and the other steamed. In the case of the boiled, the body extended slightly from the shell and was easy to pick out for the morsel of meat. In the steamed, the body had withdrawn deep into the shell, and I had to chip the body whorl back to get at the meat. I used a beach pebble which resembled one I had found on a site at a midden and which seemed to be a likely candidate for a chipping tool. The archaeological pebble was flat and oval (dimensions 52 x 36 x 16 mm) and showed a slight amount of wear under the microscope (Figure 3). My steamed shells with the meat extracted exactly resembled the chipped ones I had been finding on sites as shown in Figure 2.

In my midden samples the whole shells were always fewer than the columella or spires. I suspect that an alternative way of extracting meat from steamed mudsnails may have been by smashing them on an anvil, a method which may however have left sharp chips in the meat. This indicates a further line of experimentation.

Conclusions

The best method for quantifying mudsnails remains a problem. In situations such as with Jacomb *et al*. (2010) where mudsnails were very few, the method of quantifying them and whether or not they were food is of little significance. However in cases where they are abundant these issues are more important. I expect to continue using the "whichever is greater" approach for quantification, but there are many questions about taphonomy, *in situ* weathering, food processing, and disposal methods, as well as sample techniques which need to be understood.

In some cases it may be doubted that the mudsnails in a deposit were part of the diet. However, if they are chipped back in the way described above, it seems to be a reasonable interpretation that this species was not a by-catch but a food item.

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