A study of the marine molluscs from the Scotland's First Settlers test pit sites

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Introduction

This report presents the results of marine mollusc analysis carried out on all the test pit sites. This covers sites examined in 1999 on Skye, the extensive survey programme in 2000 and some further sites found in 2001 in the Sea Loch Survey and sites on Raasay. The molluscs found at these sites were examined in order to produce a catalogue of the species present and the approximate relative quantities of each species.

Methodology

In the majority of cases the shells had already been sorted by students in the Department of Archaeology, University of Edinburgh. The shells had been sorted into bags of identifiable pieces and residue bags of smaller fragments (to avoid repetition, the descriptions of shell species and their habitats can be found in the Sand mollusc paper: Milner, this volume).

In order to produce an idea of the relative quantities of species within each midden each species was weighed. This method was carried out because it is relatively straightforward and quick (as opposed to counting MNI-minimum number of individuals). Although counting MNI is probably more accurate (see below), in the case of test pits it is not necessary to produce that level of accuracy because the samples are fairly small and may not be totally representative of the overall midden: a catalogue of species and an approximation of proportions is adequate enough to provide an overall picture.

In order to understand these results it is useful to have an idea of how much 1 shell of each species weighs, see table xxx. It can be seen that limpets, periwinkles and mussel have in general similar weights, however, larger shells such as the oyster can be much heavier and therefore a weight of 100g of oyster in a sample might only mean 1 complete oyster is present, whereas 100g of limpets would mean 25-30 limpets present. The results of the weighing are presented at the end of this paper (Appendix). The sites are ordered by SFS number and a table of weights and a description of the data is given for each site. For the majority of sites a bar chart is also provided illustrating the relative quantities of the dominant species. In some cases comments are made about the condition of the shell found: some of the shell appears to be very weathered but in other cases it looks very fresh which probably indicates that it has been deposited relatively recently, and probably not in prehistoric times.

limpet	3-6g
periwinkle	3-5g
mussel	5-7g
dogwhelk	5-8g

upper oyster valve	20-30g
lower oyster valve	32-57g
cockle	3-6g
topshell	0.3-1g

Table xxx: approximate weight of the predominant species found in the shell middens

In addition to the methodology described above, a more comprehensive study was made for the sites of Allt na Uamha (SFS 10), Church Cave (SFS 17), Doire na Guaile (SFS 152) and Meall na h Airde 2 (SFS 171). These sites had not been sorted in Edinburgh and so the shells were sorted by students in the Wolfson laboratory, University of Newcastle. The shells and the residue were sorted according to species (there are therefore no residue weights for these sites). In addition, some other empirical methods were carried out on the material from these sites. The MNI was calculated by counting the apices for the gastropods. The umbones of the bivalves are sorted into umbilici; left and right halves and counted (for each test pit the left and rights are summed and the highest number used as the MNI). Tables of the MNI are included along with the weights in the Appendix. In some ways the weights were more effective because MNI counts did not include occasional shells which were present but which lacked an apex or umbone (see for example SFS 10: the scallop, razor shell and topshell are not represented in the MNI count). However, the fact that the shell weights are not adjusted to take account of the different average weight of each species or the taphonomic processes that may have affected the shells means that the results of the weights and the MNI may sometimes be at odds. For example, at both Doire na Guaile (SFS 152) and Meall na h Airde 2 (SFS 171) the results of the weights imply a predominance of dogwhelk over limpets, whereas when using the MNI there appear to be a greater number of limpets. Dogwhelks tend to be a little heavier than limpets and so this probably partly accounts for the discrepancy. It can also be seen in these cases that the limpets are very fragmentary at both sites (< 20% are whole) whereas the dogwhelks are mostly complete (50% at SFS 171 and 60-80% at SFS 152): some of the limpet shell may have degraded and been lost due to breakage and therefore may not weigh as much as they would if all the shells were complete.

Such taphonomic factors should be taken into account at all the sites (see the Sand mollusc paper: Milner, this volume). Broken shells are less likely to be as well represented as if they were whole. In addition, some species are much more prone to taphonomic processes than others (Claassen 1998). Mussels probably preserve least well on archaeological sites. In some of the sites they do appear to be very robust and well preserved but it may be that these sites are relatively recent in age, or else the preservation conditions are favourable. Razor shells also appear to be broken on most sites and are not particularly robust. As already shown, if limpets are broken up they may not survive as well as when they are complete. The gastropods such as periwinkles, dogwhelks and topshells however, are fairly tough and tend to survive well.

For the four sites Allt na Uamha (SFS 10), Church Cave (SFS 17), Doire na Guaile (SFS 152) and Meall na h Airde 2 (SFS 171) some measurements were also made on the

predominant species (limpet, periwinkle and dogwhelk) as described in the paper on the molluscs from Sand (Milner this volume). However, because there is no clear idea of stratigraphy in the test pits these results provided little information and any changes in size which were observed could not be interpreted (again as explained in Milner this volume). These results have not been included here (see Milner 2004).

Some attempt at describing fragmentation for the four sites was made and this is included in the Appendix. Fragmentation of shell is assessed here by calculating the percentage of complete shells in relation to the MNI (the number of complete shells are divided by the MNI). Only samples with over 10 MNI are included in this analysis (any smaller numbers may skew the results). Shells such as dogwhelks are sometimes broken in order to extract the animal, perhaps when being used for bait or it has been suggested that dogwhelks may be used for creating purple dye (Gibbons and Gibbons 2004). There are however, other methods for extracting the animal which including boiling the animal and picking it out of the shell. If the shellfish is to be eaten this method may be preferable because it prevents small pieces of shell getting into the food. Therefore a high level of fragmentation may indicate that shells were being broken for bait, or maybe even dyeing. On the other hand, fragmentation may also be caused by people walking over the shellmidden, or natural post depositional events and weakening of the shell through diagenesis. There is no way of knowing whether the reason for the fragmentation is created during processing the shellfish or post-depositionally.

Results

On the whole, limpets predominate on the vast majority of sites. Periwinkles are also very common and on some sites mussels are fairly common as well. However, there are a number of sites which stand out because they do not follow this pattern or because other species also appear to be of significance. These sites will be explored in further detail below including those that have a significant quantity of oysters or dogwhelks in their assemblages and those that are noteworthy because they contain a wide variety of species.

Quite a number of sites contain oyster shell which is worthy of note when it is considered that Sand did not appear to contain any oyster. The oyster does occur in very small quantities at some sites; perhaps only one or two shells. However, it is interesting that oyster appears to be present on most of the Toscaig sites: Toscaig 1 (SFS 19), Toscaig 2 (SFS 20), Toscaig 3 (SFS 34), Toscaig 6 (SFS 38), Toscaig 7 (SFS 39), Toscaig 9 (SFS 41) and Fraser's Croft, Toscaig (SFS 100). It is not unreasonable to assume that the ecological conditions are such that oysters are able to live and breed in the vicinity of these sites. Perhaps the reason for their absence from other sites is that they simply are not available elsewhere. Oysters are also present at Crowlin (Skye 1999 season), Church Cave (SFS 17) and Coire Sgamhadail 3 (SFS 90).

Dogwhelks are not particularly common and there are only two sites where they occur in any significant numbers. These are Doire na Gualie (SFS 152) and Meall na h Airde 2 (SFS 171). Periwinkles and dogwhelks were not separated for Fergus's shelter (SFS 114)

but here these gastropods dominate the assemblage. There has been much discussion of dogwhelks in the literature as to whether they were collected for consumption, bait or dyeing purposes (see Milner this volume for a full discussion). If dogwhelks are being used for dyeing it is usually argued that they would appear fragmented in the archaeological record. At Doire na Gualie (SFS 152) the dogwhelks are not particularly fragmented (60-80% are whole). At Meall na h Airde (SFS 171) 50% are whole. Until more experimentation is carried out on the dyeing properties of the dogwhelk it is difficult to be sure what the reason for their procurement was.

Toscaig 2 (SFS 20), Crowlin 3 Sea Cave (SFS 22), Crowlin 7 (SFS 26), Toscaig 9 (SFS 41), Camusteel 2 (SFS 77), Coire Sgamhadail 3 (SFS 90) and Clachan Church (SFS 99) all have unusual assemblages, most of which stand out because they have a large number of species present. It should be noted that at Coire Sgamhadail 3 (SFS 90) there are significant quantities of shells that burrow in sand (cockle, carpet shell and venus shell). Clachan Church (SFS 99) is interesting in that it too contains cockle, but this species dominates the assemblage, which is unique among these test pits. Toscaig 9 (SFS 41) is perhaps the most intriguing site in that it has a great variety of species but also contains huge quantities of topshell (approximately 1300). In addition, the topshells and some of the other gastropods (the dogwhelks and the buckie in particularly) are unusually small in size. There is no clear reason why the shells are so small and the most logical explanation would be environmental. Camusteel 2 (SFS 77) is similar in that there are also large quantities of flat periwinkle and topshell in this assemblage. Perhaps the most obvious explanation for the collection of these species is their aesthetic qualities; the topshell with a mother-of pearl appearance and the flat periwinkle being brightly coloured. It would have taken a long time to collect these sorts of quantities on the beach.

Conclusion

In sum, in terms of methodology, the weighing of the species appears to be a satisfactory method for determining relative quantities within each test pit. Although there are some discrepancies, further work on adjusting weights for the different species and consideration of taphonomic bias should rectify these small disparities. The fragmentation index can be of use when considering breakage and taphonomy (and perhaps the possibility of dyeing using dogwhelks) but this is time consuming because it requires an MNI count, and is perhaps not worthwhile on test pit material unless specific questions are being asked. There is no reason for measuring shells from test pit assemblages: there is no clear idea of stratigraphy in the test pits and therefore any changes in size which are observed can not be easily interpreted.

The work carried out has demonstrated that the assemblages of molluscs found in the test pits are not homogenous: there are some significant differences in species present. The reasons for these differences may be ecological in some cases: limpets will only occur on rocky outcrops, cockles will only be found in sandy or muddy beaches and so on. Some of the differences are cultural however and it is very likely that some shells are being collected for their aesthetic qualities (such as the topshells and flat periwinkles). It is not clear whether the shellfish were eaten, and/or being used for bait, or perhaps even for

dyeing in the case of dogwhelks. As has been shown for Sand (Milner, this volume) there is much ethnographic evidence for limpets being used for bait (e.g. Fenton 1978) as well as for direct consumption (e.g. Wickham-Jones 2003), and this is probably the case for many of the other species as well.

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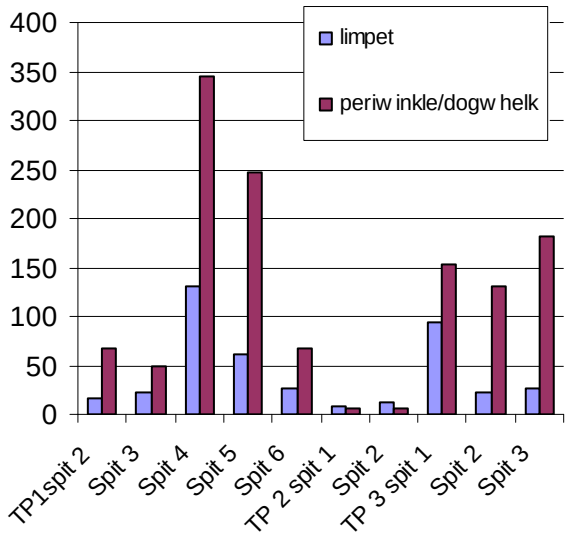
APPENDIX

Skye 1999 Loch A Sguirr (Raasay)

Throughout these test pits periwinkle and dogwhelk predominate followed by limpet. No other species are found here.

Skye 99 Loch A Sguirr (Raasay)	limpet	periwinkle/ dogwhelk	residue
Test pit 1 Spit 2	17	67	77
Spit 3	23	50	99
Spit 4	130	345	1247
Spit 5	62	246	1740
Spit 6	27	67	520
Test pit 2 Spit 1	9	6	36
Spit 2	12	6	48
Test pit 3	94	154	

Spit 1			
Spit 2	22	130	179
Spit 3	26	181	424
Test pit 10 Spit 1			32
Spit 2	2		

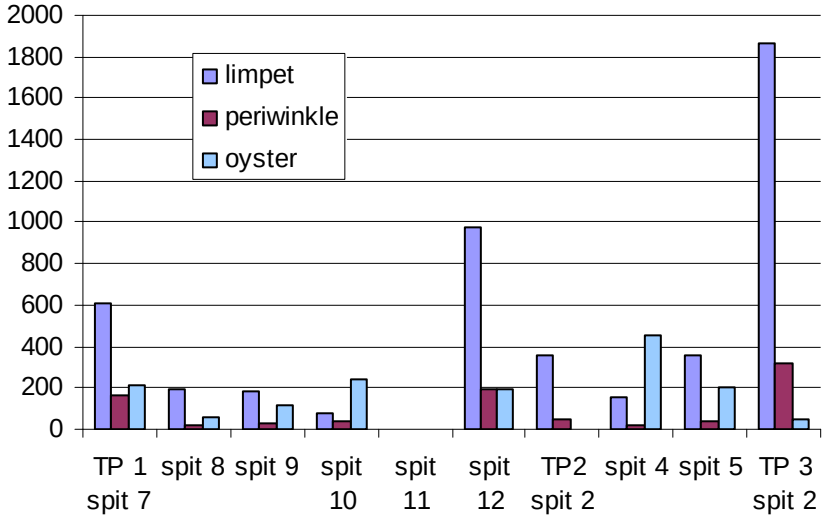


Skye 1999 Crowlin

Limpet predominates here with some oyster and periwinkle throughout both test pits.

Skye 99 Crowlin	limpet	periwinkle	oyster	residue
Test pit 1 spit 2				37
spit 4		<1		34
spit 5				69
spit 6				333
spit 7	604	167	208	136
spit 8	189	15	60	54
spit 9	182	29	115	26
spit 10	79	38	245	46
spit 11	4	2		4
spit 12	975	191	196	252
Test pit 2 spit 2	355	50		120

spit 4	158	18	453	474
spit 5	356	38	206	582
Test pit 3 spit 2	1865	323	44	155
spit 3				100



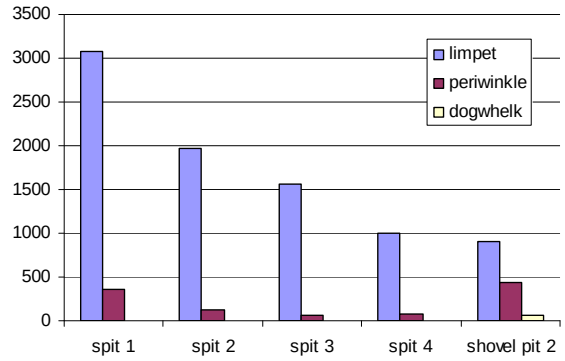
Skye 1999 Ashaig

Trench 1, spit 1: oyster, limpet, periwinkle and cockle (1867g), spit 2: oyster, periwinkle and cockle (1799g).

SFS 10 Allt na Uamha

Limpet predominates throughout, followed by periwinkle. There are some other species but these occur in much smaller numbers.

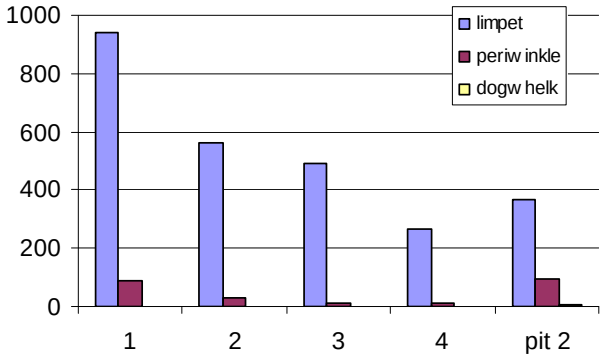
SFS 10	limpet	periwinkle	dogwhelk	flat periwinkle	otter shell	topshell	razor shell	scallop
spit 1	3075	366		2		1	5	
2	1972	122						5
3	1565	64	3		3			
4	996	80						
shovel pit 2	903	443	57					



Barchart showing the weights in grams for each species

context	limpet	periwinkle	dogwhelk	flat winkle	otter shell
1	941	89		2	
2	560	29			
3	489	11	1		1
4	264	12			
pit 2	366	96	8		

The MNI of species from each context



Barchart showing the MNI for each species

Fragmentation

The results of fragmentation analysis can be seen in the chart below. There was not enough data on dogwhelks to include them in the analysis. The limpets are highly fragmented (in most cases less than 20% are complete). The MNIs are large from this site making the results very reliable. It is interesting that context 1 has about 25% of complete shells compared to the lower contexts which have less than 10% whole. This could be connected with the weight of the midden, or there being less trampling after the final deposition of shells.

The MNIs for the periwinkles are not as great as the limpets and therefore the results are more prone to being skewed. Nevertheless there does seem to be quite a drop in the number of whole shells in shovel pit 2 (only about 50% are whole, compared with 70%

and higher in context 1 and 2). Without further examination of the site it is impossible to say why this is the case.

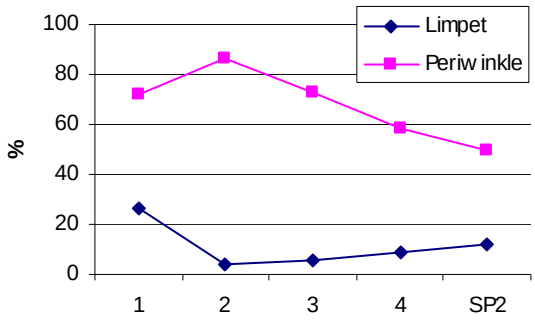


Chart to show the fragmentation of limpets and periwinkles.

SFS 13 Strollamus 2

Grab sample: limpet (7g), periwinkle (3g) an oyster (451g)

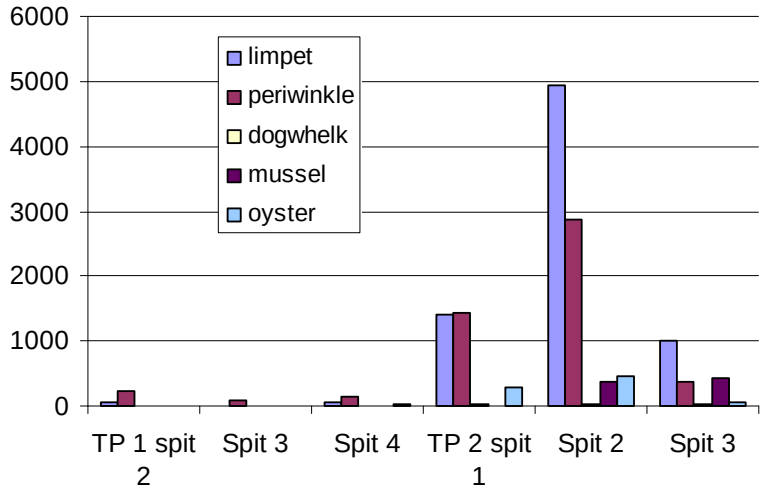
SFS 17 Church Cave

Church cave is situated on the island of Rona. The cave is so-called because up until 1912 it was used regularly as a Church and it still houses a row of stone pews and a low stone pillar altar at the entrance. The result of the survey show that in the past is has also been used for other purposes. A test pit was dug in an area of cave earth in front of the seating towards the back of the cave. Test pit 2 was dug nearer the entrance in the area of shellmidden. Shells were found in both areas.

Periwinkle predominates in test pit 1 but the numbers are very small and unlikely to be statistically valid. Limpet predominates in test pit 2 although there is also a lot of periwinkle here too. Other species are present including a significant amount of oyster and mussel in test pit 2.

SFS 17	limpet	periwinkle	dogwhelk	mussel	oyster	venus	topshell	flat periwinkle	carpet shell
TP 1 Spit 2	58	232	3		5	1			
Spit 3	10	95							
Spit 4	60	132			31				
TP 2 Spit 1	1412	1427	16	8	293		1	1	
Spit 2	4934	2868	42	364	453	5		4	4

Spit 3	1005	386	15	437	46				



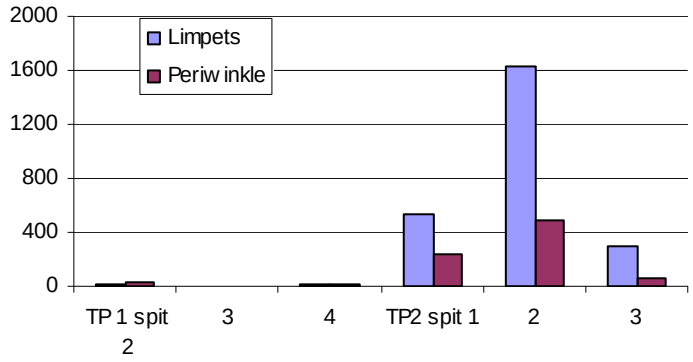
Barchart showing the weights in grams for each species

Context	Limpets	Periwinkle	Dogwhelk	Oyster
2	13	23	1	1
3	4	7		
4	12	16		1

Table showing the MNI of species in test pit 1

Context	Limpets	Periwinkle	Dogwhelk	Flat periwinkle	Top shell	Oyster	Mussel	Carpet shell
1	535	234	4	3	1	10	1	
2	1632	484	9	6		13	20	1
3	293	66	3			1	12	

Table showing the MNI of species in test pit 2



Barchart showing the MNI for each species

Fragmentation

The results of fragmentation analysis can be seen in the chart below. The limpets are fairly fragmented (mostly between 20% and 40%). It seems that the limpets at the base of the midden in test pit 2 are less fragmented than those at the top, perhaps suggesting fairly rapid accumulation. The periwinkles in test pit 2 also tend to be whole (between 75% and 94%), whereas those in test pit 1 appear to be more fragmented.

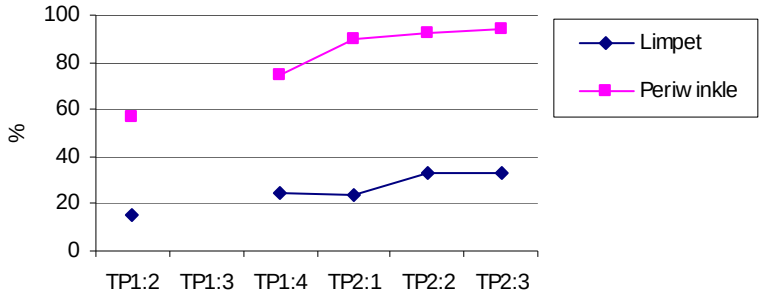


Chart to show the fragmentation of limpets and periwinkles in both testpits. There were not enough samples from TP1:3 to make any reliable calculation

SFS 19 Toscaig 1 rockshelter

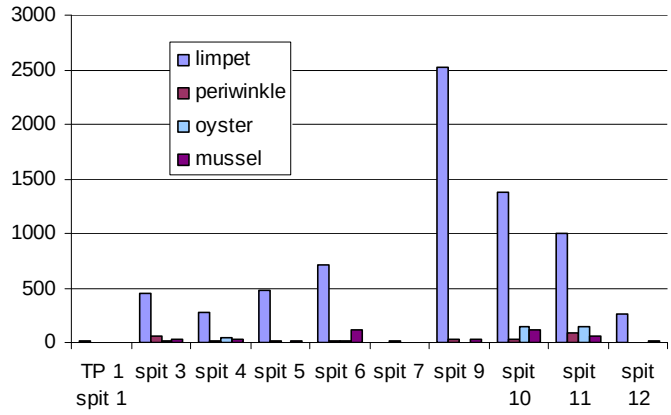
Near the hearth there was a predominance of limpet shell (557g) with a very small amount of mussel (5g) and periwinkle (11g) (residue: 32g). In C1004 a variety of shells are present with periwinkle and dogwhelk predominating (1785g), limpet (582g), oyster (72g), mussel (29g), razor shell (1g), flat periwinkle (1g) and topshell (1g) (residue:1199g).

SFS 20 Toscaig 2

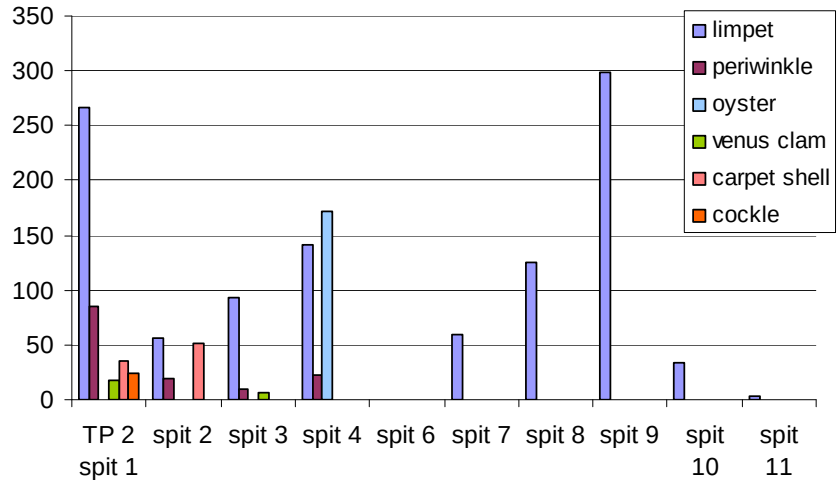
In both test pits limpet predominates. There are a number of periwinkles in most contexts. There are also a number of other species present but only in very small numbers. Oyster occurs through test pit 1 but only in spit 4 in test pit 2 and in test pit 2 there are variety of species in the top few spits. The limpets within test pit 1 are very large and bleached as if they have been exposed at some point.

	limpet	periwinkle	oyster	mussel	razor shell	flat periwinkle	scallop	venus clam	dogwhelk	carpet shell	cockle	residue
TP 1 spit 1	9					9						
spit 3	452	65	13	33		1						634
spit 4	280	20	40	24		1						339

spit 5	481	8	7	14	1	3						621
spit 6	703	12	17	123								
spit 7		12			1	1						
spit 9	2523	25		23	8	4						2053
spit 10	1384	23	139	120	10	3		3				2059
spit 11	1003	88	143	65			1					1779
spit 12	263	3		9								1250
TP 2 spit 1	266	85						18		36	24	868
spit 2	56	19		1	4	<1				52		
spit 3	93	10				<1		7				67
spit 4	142	23	172			2						55
spit 6												26
spit 7	59	0.5			0.5	<1						61
spit 8	125								3			168
spit 9	299			1	5	1						373
spit 10	34											
spit 11	3											



Test pit 1



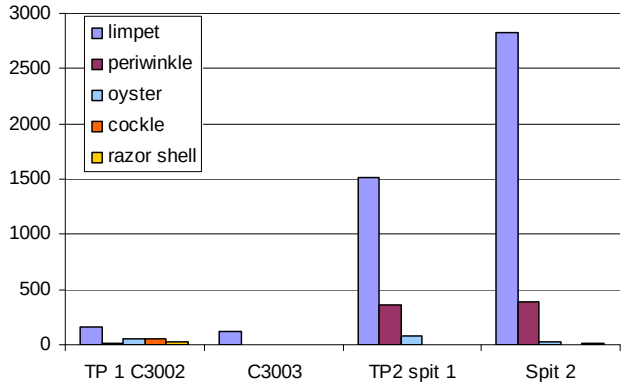
Test pit 2

SFS 22 Crowlin 3 Sea Cave

Here two test pits were excavated. In all contexts there is a predominance of limpets. There is a greater variety of species in test pit 1 but on the whole fewer shells compared with test pit 2.

	limpet	periwinkle	oyster	mussel	scallop	cockle	razor shell	clam	residue
TP 1 C3002	166	19	49	7	15	48	24	7	514
C3003	127	2							26
TP2 spit 1	1511	361	78	4					567
Spit 2	2828	390	29	11			9		892

Table xxx: SFS 22, weight in grams of species present in each context.



SFS 23 Crowlin 4

There was very little shell material from this site and what there was very fragmentary: limpet (32g), periwinkle (11g) and residue mainly made up of limpet shell (299g).

SFS 26 Crowlin 7

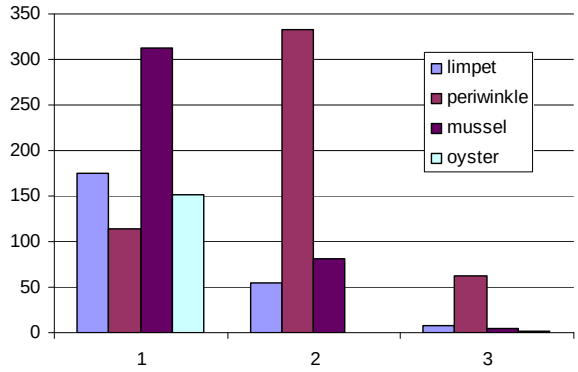
The limpets from this site are large. Limpet predominates but in C2613 there is a variety of species.

	limpet	periwinkle	buckie	mussel	scallop	oyster	flat periwinkle	residue
C2611	699						1	116
C2612	246	1						60
C2613	473	23	3	2	10	61	2	138

SFS 34 Toscaig 3

The shells in the top spit were very fresh looking and are probably not particularly old. They have also been exposed and are green. Mussel predominates here with some limpet, periwinkle and oyster. The shells in spit 2 and below look much older and much more weathered and the species representation is different with periwinkle predominating and some limpet and mussel. The limpets in the lower spits are also smaller on the whole.

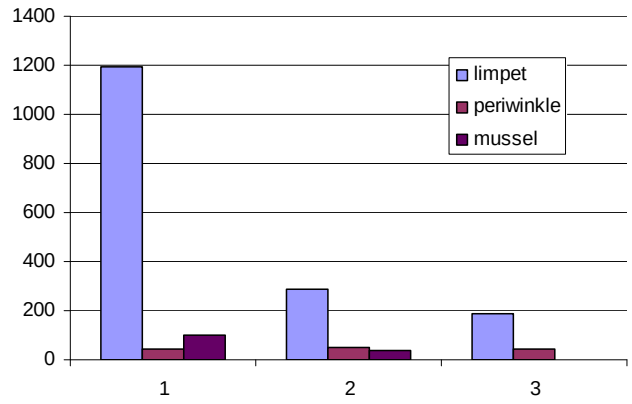
Spit	limpet	periwinkle	mussel	oyster	residue
1	175	114	312	152	
2	54	333	82		243
3	8	63	5	2	18
4					11



SFS 35 Toscaig 4

In trench 1 limpet predominates throughout. The limpets are fairly large in spit 1 and in spits 2 and 3 the shells are in quite a fragmentary state.

Spit	limpet	periwinkle	dogwhelk	mussel	residue
1	1191	43	2	100	453
2	287	51		40	124
3	185	42			48
4	<1	<1			



SFS 38 Toscaig 6 rock shelter

There is a very small amount of un-stratified shell from test pit 1 composed of an MNI of 5 oysters (5 upper and 4 lower valves and 2 fragments) and 4 limpets. The oysters are very worn and look like they might have been exposed to the wind and rain at some point. A surface sample of shell (only 315g) was also taken 11 metres from the corner of the building and this is made up of limpet and oyster.

SFS 39 Toscaig 7 rock shelter

Two small samples were taken from this rockshelter. Sample 1 consists of unidentified fragments (7g) and a mix of limpet and oyster (112g). These shells are eroded and have a chalky appearance. Sample 2 is of a similar nature.

SFS 41 Toscaig 9

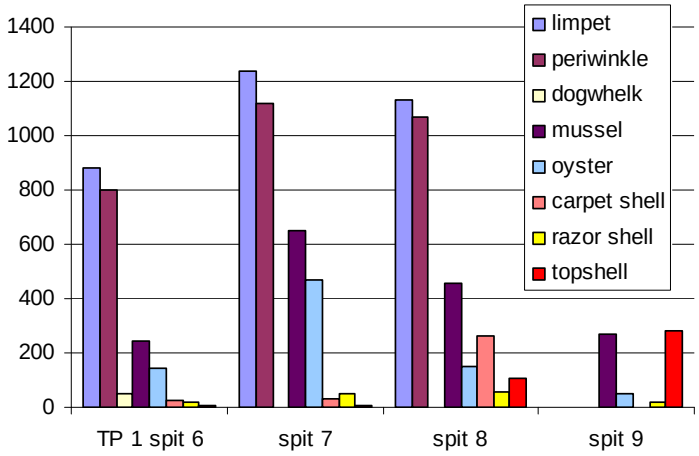
On the whole limpet and periwinkle predominate with some mussel and oyster but there is also a mixture of other shells within this site, especially in test pit 1 There are also a few shells which are not presented in the table because it is not clear what species they are but it is possible they are warty venus (*Venus verrucosa*) and rayed artemis (*Dosinia exoleta*).

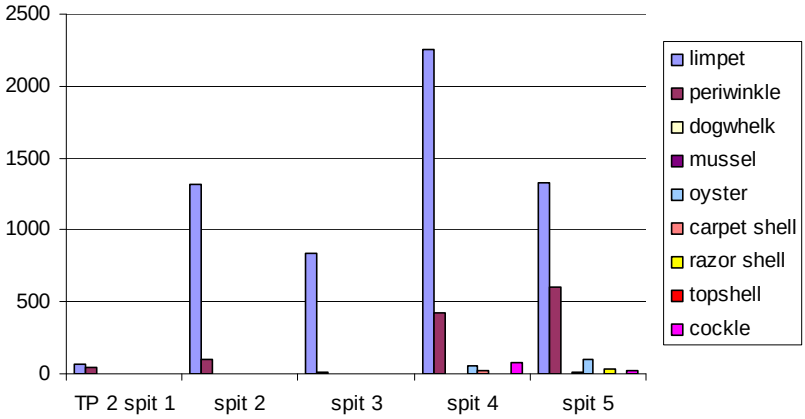
What also appears to be unique about this site is the quantity of topshell in the lower levels. They are very small: 30 shells = about 9g so in spit 8 there are about 360 shells and in spit 9 almost 1000.

In test pit 1, spit 6 it was noted that the shells appear to be very robust, especially the mussel which is very well preserved and probably fairly recent in date. In addition to the topshells being very small there are a number of other species which appear to be very small, including a buckie, and some very small dogwhelks in spit 8.

In test pit 2, spit 1 the limpets are fairly eroded and look like they have been exposed; they are light in weight and fairly bleached.

	limpet	periwinkle	dogwhelk	mussel	oyster	clam/carpet shell	razor shell	topshell	cockle	cowrie	residue
TP 1 spit 6	881	803	49	244	144	24	20	7			3058
spit 7	1238	1117		649	469	31	47	4			
spit 8	1131	1068		458	153	264	54	108		1	1514
spit 9				266	52	1	17	281			982
TP 2 spit 1	65	46							4		10
spit 2	1320	95									338
spit 3	841	13		3		2	4				90
spit 4	2258	423		4	57	23			83		1186
spit 5	1333	607		15	102		33		25		1285

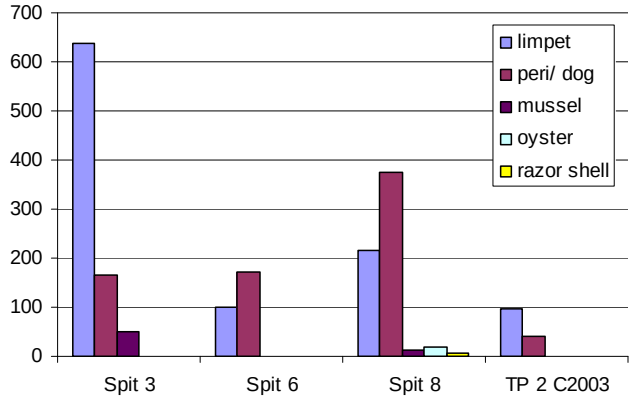




SFS 49 Cave site Creag Na H-Uamha

Two testpits were dug in this cave site. In the first there was some variation through the spits with limpet predominating nearer the top of the midden and periwinkle dominating spit 8, also accompanied by a number of other species. Dogwhelk is only present in spit 3 and has been weighed with the periwinkles. It was noted from this site that the limpet shells were very large. There was very little shell material from spit 2.

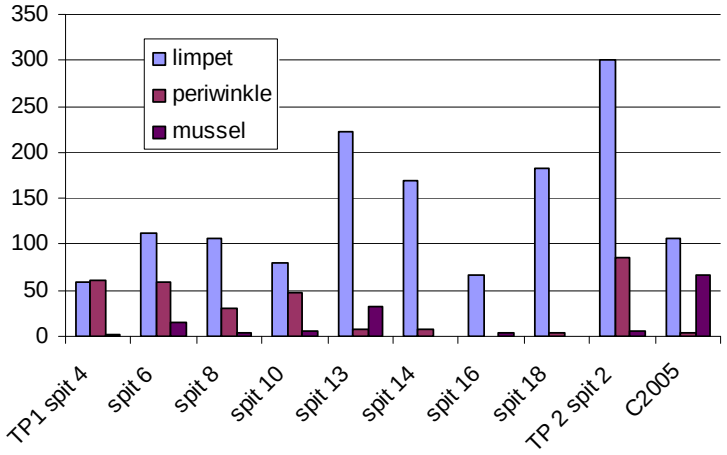
	limpet	periwinkle/ dogwhelk	mussel	oyster	razor shell	residue
TP1 spit 1						3
Spit 3	637	165	49			395
Spit 6	100	172				117
Spit 8	215	374	11	18	7	323
TP 2 C2003	97	42				308



SFS 58 Rubha Chuaig rockshelter

Two test pits were excavated at this site. In test pit 1 limpet, periwinkle and mussel occur in spits 4, 5 and 8 with limpet predominating. Spit 10 is similar with the addition of 1 topshell. In spit 13 there is some variation with dogwhelk and topshell present, in spit 14 oyster occurs along with limpet and periwinkle and in spit 16 only limpet and periwinkle can be found. However, as can be seen in the barchart, limpet predominates throughout, periwinkle is fairly common in the top spits and the other species found are all very minor contributors and tend to represent only 1 or 2 shells. In summary, there may be some difference in the midden which occurs somewhere between spits 10 and 13. Test pit 2 is very similar with limpet predominating, some periwinkle, mussel and very small quantities of dogwhelk, flat periwinkle and razor shell.

	limpet	periwinkle	mussel	oyster	razor shell	topshell	residue
TP1 spit 4	59	61	2				385
spit 6	113	59	15				309
spit 8	106	30	3				139
spit 10	80	47	6				201
spit 13	223	7	33			1	202
spit 14	170	8		3			181
spit 16	66		3				95
spit 18	183	4					130
TP spit 2	300	85	5				485
C2005	106	3	66		<1		71



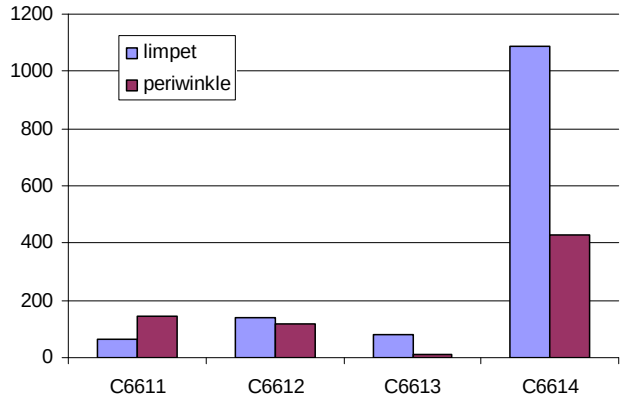
SFS 59 Ob Chuay

There were very few shells from this site: limpet (148g), periwinkle (29g) and residue (9g).

SFS 66 Ard Clais Salacher 2

At this site limpet and periwinkle predominate throughout. Mussel, razor shell and flat periwinkle occur in very small amounts.

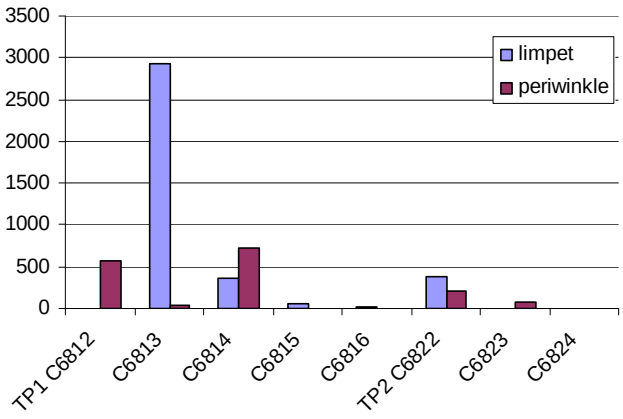
	limpet	periwinkle	mussel	razor	flat periwinkle	residue
C6611	65	147				135
C6612	137	120				144
C6613	81	13	<1	<1		173
C6614	1087	431			1	658



SFS 68

Here limpet and periwinkle dominate throughout. A number of other species are present but in very small numbers.

	limpet	periwinkle	dogwhelk	mussel	oyster	clam	topshell	residue
TP1 C6812		573		59	2	1		7106
C6813	2925	47		2				2224
C6814	367	725						1624
C6815	53	5						108
C6816	17							60
TP2 C6822	387	211						712
C6823	4	83	6					225
C6824		2						7
TP3		<1					<1	1

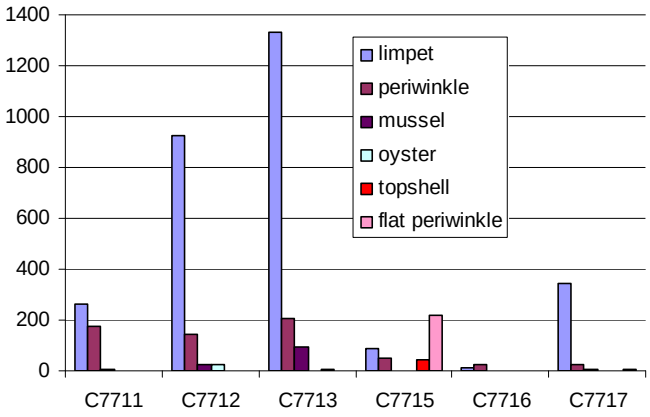


SFS 77 Camusteel 2

Limpet predominates throughout the midden. Periwinkle is present but in much smaller quantities. There are also a number of other species present including an unusual number of flat periwinkle and topshell in C7715.

SFS 77	limpet	periwinkle	mussel	oyster	topshell	flat periwinkle	razor shell	clam	cockle	scallop	residue
C7711	265	178	6								755
C7712	927	142	27	22	1						1506

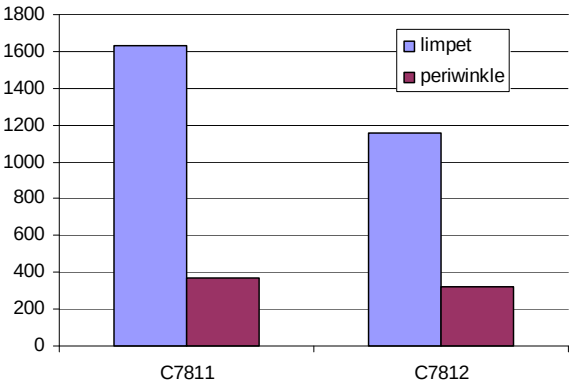
C7713	1332	207	94		7		21	21			897
C7715	87	48	1		46	217		3	12	4	342
C7716	15	22									212
C7717	345	22	9		2	8					



SFS 78 Camusteel 3

At this site limpet predominates, periwinkle is present in smaller quantities and very small quantities of mussel appear.

SFS 78	limpet	periwinkle	mussel	residue
C7811	1632	369	4	1159
C7812	1156	321	7	774

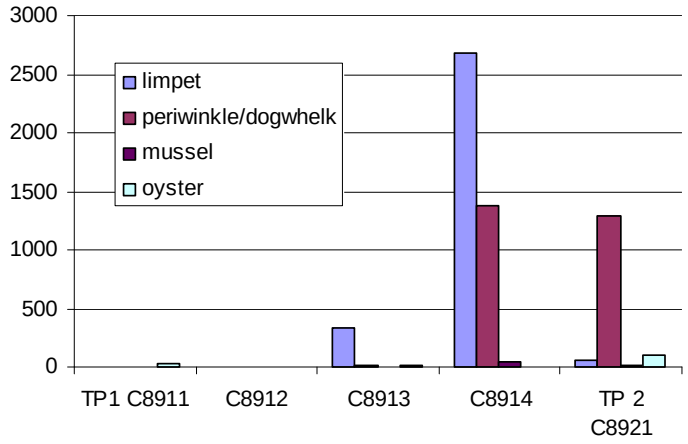


SFS 89a Coire Sgamhadail 1

Limpet predominates, followed by periwinkle/dogwhelk. There are a variety of other species present but these occur in very small numbers.

In C8914 there was also a small mixed bag (60g) which contained some apices of dogwhelk and periwinkle, flat periwinkles, topshell, snail shell, and some minute marine species such as bittium

SFS 89 a	limpet	periwinkle/ dogwhelk	mussel	oyster	scallop	razor shell	clam	residue
TP1 C8911				30				
C8912								21
C8913	336	10		11	9			1485
C8914	2681	1374	41		17			3518
TP 2 C8921	62	1293	21	108		7	7	297



SFS 89b Coire Sgamhadail 2

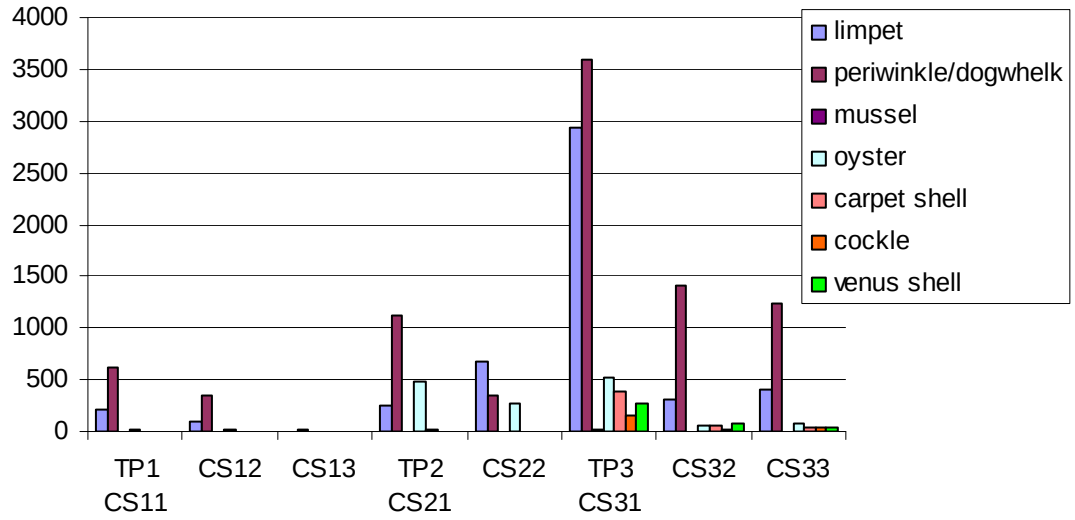
There is little shell from this site. Limpet predominates and periwinkles, mussel and scallop are represented in the top of the test pit.

SFS 89 b	limpet	periwinkle	mussel	scallop	residue
TP1 C9011	112	4	1	11	391
C9012	56				67

SFS 90 Coire Sgamhadail 3

Periwinkle tends to predominate at this site, followed by limpet. A wide variety of other species are present, particularly in the lower levels. Oyster is found throughout though is more prevalent in test pits 2 and 3. In the test pit 3 significant quantities of carpet shell, cockle and venus shell are also found.

SFS 90	limpet	periwinkle /dogwhelk	mussel	oyster	carpet shell	cockle	venus shell	common otter shell	razor shell	residue
TP1 CS11	215	614	2	16	4					713
CS12	102	349	3	11						290
CS13	7	27			4					29
TP2 CS21	250	1112	x	474	17	x				2108
CS22	678	357	5	273		5				3988
TP3 CS31	2936	3591	12	513	388	152	277	7	2	10810
CS32	300	1401		62	63	20	75	3		1513
CS33	415	1246	4	82	48	30	41	3	3	1590



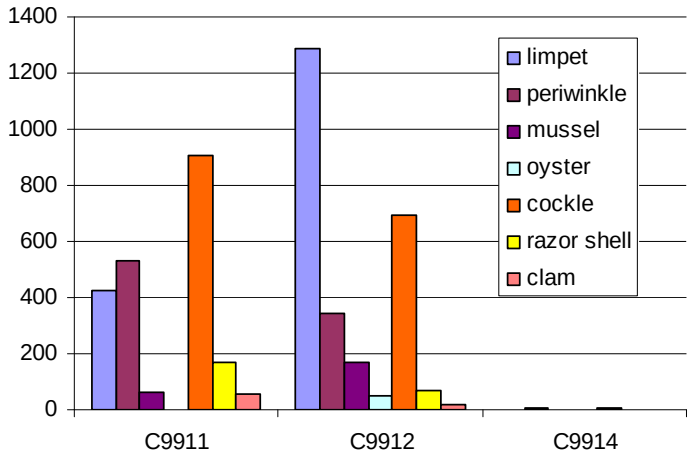
SFS 96

There is a range of shell from this site, all from C9611: Limpet (228g), clam (44g), periwinkle (18g), mussel (1g), tellin (1g), cockle (1g), minute species (2g), terrestrial molluscs (1g) and residue (148g) (mainly made up of limpet, cockle, clam and periwinkle).

SFS 99 Clachan Church

As well as limpet and periwinkle, cockle is also present in significant quantities at this site. A number of other species are also found in significant numbers including the razor shell, clam and mussel.

SFS 99	limpet	periwinkle	mussel	oyster	cockle	razor shell	clam	residue
C9911	427	530	62		906	168	57	1308
C9912	1290	345	168	48	694	66	20	3184
C9914		4			4			22

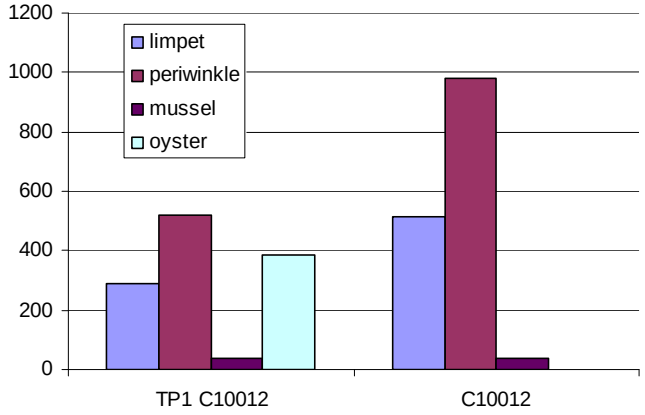


SFS 100 Fraser's Croft, Toscaig

Limpet and periwinkle predominate here although oyster is also present in the top layer. There are also small amounts of mussel and razor shell.

SFS 100	limpet	periwinkle	mussel	oyster	razor shell	residue

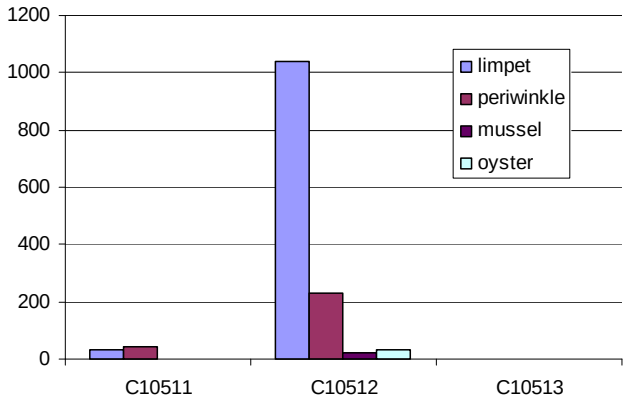
TP1 C10012 (S1079)	288	520	36	385	<1	1118
C10012 (S1082)	514	982	40		<1	1377



SFS 105 Uags 1

Limpet predominates here, followed by periwinkle. A number of other species are present but in much smaller quantities.

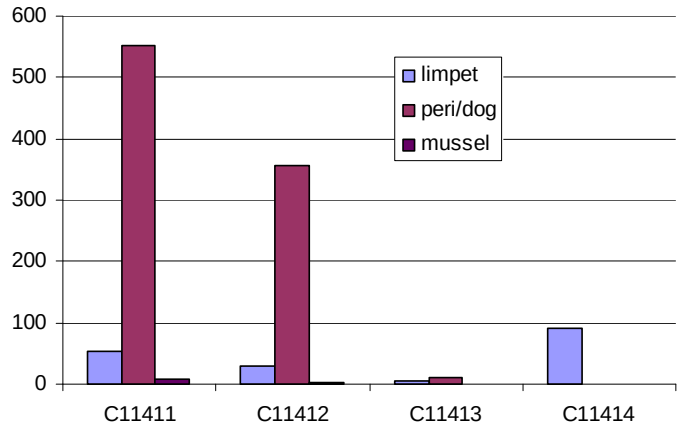
SFS 105	limpet	periwinkle	mussel	oyster	cockle	clam	residue
C10511	31	43	1				101
C10512	1038	228	20	34	1	6	1406
C10513	1						10



SFS 114 Fergus' shelter

Periwinkle and dogwhelk were not separated for this site but combined these species predominate. Much smaller quantities of limpet, mussel and oyster are present.

SFS 114	limpet	periwinkle /dogwhelk	mussel	oyster	residue
C11411	53	553	7		271
C11412	30	357	3	2	231
C11413	6	11			5
C11414	92		1		26

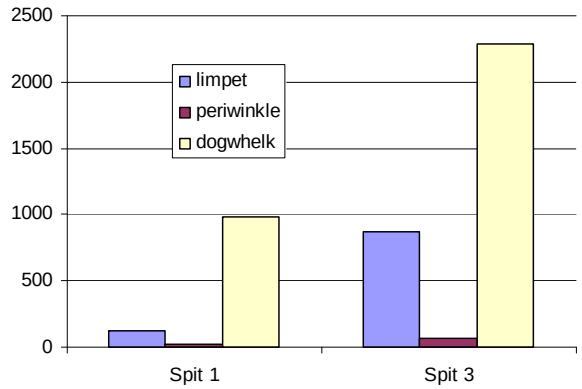


SFS 152 Doire na Gualie

Doire na Gualie is a north facing rockshelter on Rona. An initial test pit produced lithics (suggestive of a prehistoric presence), pottery and shell material. If the MNI are used limpet appears to predominate; the fragmentation shows that limpet are highly fragmented and the dogwhelks are more or less whole, therefore it is possible that some of the limpet shell has been lost to taphonomic processes and therefore the weights are under representative. There is also a significant amount of dowhelk and some periwinkle.

SFS 152	limpet	periwinkle	dogwhelk

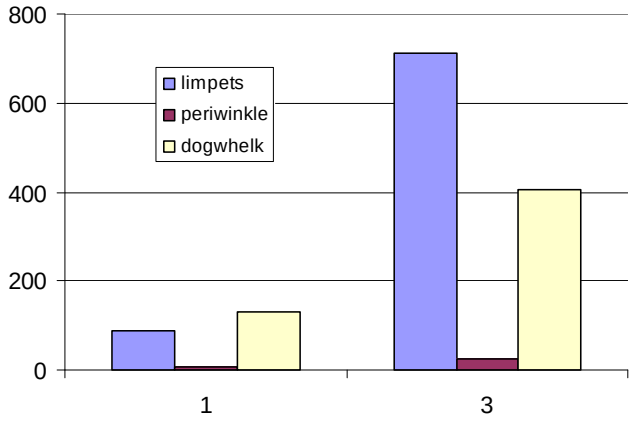
Spit 1	128	27	978
Spit 3	868	67	2292



Barchart showing the weights of the dominant species

context	Limpets	Periwinkle	Dogwhelk
1	88	7	131
3	712	23	405

Table of the MNI counts for each species



Barchart showing the MNI of the dominant species

Fragmentation

The results of fragmentation analysis can be seen in the chart below. It is shown that the limpets are very fragmented (10% or less are complete shells). A fairly high proportion of the dogwhelks are whole (especially in context 1: 80%). The periwinkles also tend to be whole (70%).

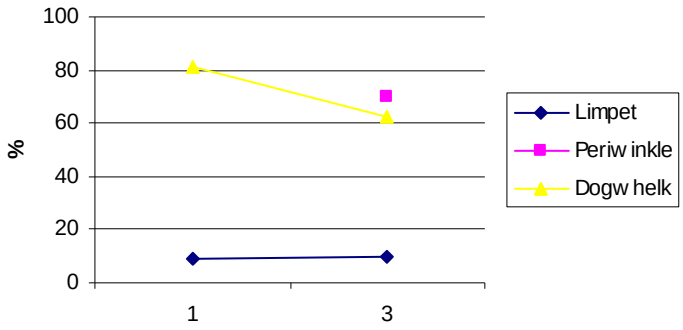


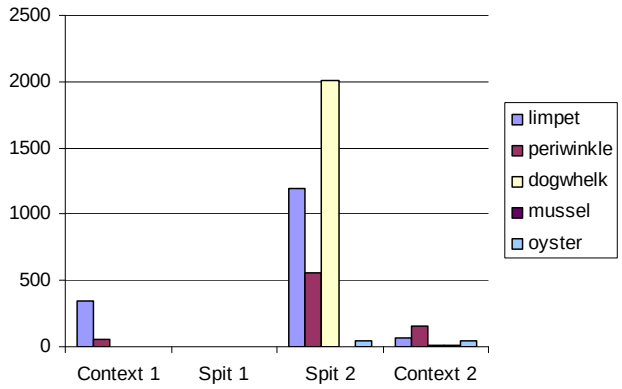
Chart to show the fragmentation of limpets, periwinkles and dogwhelks, although calculations were only made for context 3 in the case of the periwinkles because the sample size was too small for context 1.

SFS 171 Meall na h Airde 2

This site is a south west facing cave with a small area of midden at the rear. It may have been subjected to sea ingress at high tides because it is only 2m OD. A test pit was dug into the midden and 4 contexts assigned. A 50% sample of excavated material was dry sieved on site. Lithics were present on site suggesting an early prehistoric age.

On the whole limpets predominate, followed by periwinkles. In spit 2 there are a large number of dogwhelks. A number of other species are found in small quantities.

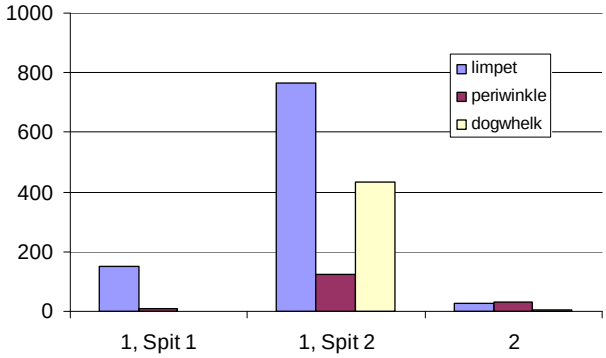
SFS 171	limpet	periwinkle	dogwhelk	mussel	oyster	topshell
Context 1 Spit 1	346	59				
Spit 2	1199	561	2011		41	2
Context 2	64	151	12	6	42	



Barchart showing the weights of the dominant species

	limpet	periwinkle	dogwhelk	oyster	topshell
1, Spit 1	150	9	0	0	0
1, Spit 2	765	123	434	0	3
2	27	33	3	2	0

Table of the MNI counts for each species



Barchart showing the MNI of the dominant species

Fragmentation

The results of fragmentation analysis can be seen in the chart below. From this graph limpets are shown to be very fragmented (less than 20% are whole). About 50% of the dogwhelks are broken, but the periwinkles in general tend to be whole (70% and above).

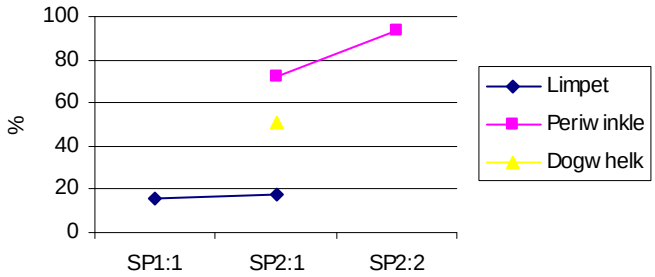


Chart to show the fragmentation of limpets, periwinkles and dogwhelks, although calculations were not made for every context because the sample sizes were too small in some cases.

Coastal survey 2001 Raasay

SFS 47: limpet and periwinkle (40g)
SFS 129: limpet and periwinkle (51g)
SFS 133: limpet, periwinkle and scallop (76g)
SFS 136: limpet and periwinkle (79g)
SFS 141: limpet and periwinkle (72g)