Scotland's First Settlers

SCOTTISH **A**RCHAEOLOGICAL **I**NTERNET **R**EPORTS

Content

Information

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Mesolithic and later sites around the Inner Sound, Scotland: the work of the Scotland's First Settlers project 1998–2004

Karen Hardy & Caroline Wickham-Jones (eds)

With contributions by: P Ashmore, P Austin, J Barrett, S Campbell, A Clarke, M Cressey, A Dawson, S Dawson, K Edwards, N Finlay, F Green, A Heald, F Hunter, A Isbister, A MacSween, L McAllan, N Milner, A Newton, R Parks, R Schulting, R Shiel.

Scotland's First Settlers comprised a survey project to locate and examine sites relating to the earliest, Mesolithic, settlement of the Inner Sound, along the coastlands between Skye and the west coast of Scotland. Particular foci of interest included the existence and nature of midden sites, the use of rockshelters and caves, and the different types of lithic raw material in use. In addition, information relating to the human use of the area up to the present day was recorded. Fieldwork took place over five years between 1999 and 2004: the entire coastline of the Inner Sound, together with its islands, was walked... more >>

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Summary | Karen Hardy & Caroline Wickham-Jones (eds)

Scotland's First Settlers comprised a survey project to locate and examine sites relating to the earliest, Mesolithic, settlement of the Inner Sound, along the coastlands between Skye and the west coast of Scotland. Particular foci of interest included the existence and nature of midden sites, the use of rockshelters and caves, and the different types of lithic raw material in use. In addition, information relating to the human use of the area up to the present day was recorded. Fieldwork took place over five years between 1999 and 2004: the entire coastline of the Inner Sound together with its islands was walked; 129 new archaeological sites were recorded; 36 sites were shovel pitted; 44 test pitted; and one major excavation took place. Excavation at Sand has been particularly exciting as it has resulted in the analysis of a shell midden dating to the early-mid seventh millennium BC, the early Mesolithic of Scotland. This report comprises the results of survey and excavation work as well as detailed artefact reports, full information on ecofacts such as shell, and bone, and information on the development of the landscape and environment, including sea level change. Finally, the broad-scale coverage of the project has led to a number of discussion points that have much to offer further work, both within the area and further afield.

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During the SFS project, Karen Hardy and Caroline Wickham-Jones held positions first as honorary post-doctoral research Fellows at the University of Edinburgh and secondly as Visiting Research Fellows at the University of Newcastle. Both institutions are to be thanked for their support.

Initially the project also included Bill Finlayson of the Centre for Field Archaeology (then at the University of Edinburgh), as a third co-director. His departure for Jordan in late 1999 brought an end to his close work with the project but he has remained a staunch friend and helpful colleague throughout. We would like to thank him for all the work he carried out for SFS in its early years and for the advice and encouragement we have received since.

In 1999 and 2000 SFS work was carried out as part of the University of Edinburgh's Scotland's First Settlers (SFS) Project, Denis Harding, Pat Storey and Ian Morrison are all thanked for their logistical help. We would especially like to thank the Centre for Field Archaeology for all their help in the field in those years and with subsequent post-excavation, in particular Jill Strobridge who dealt with urgent phone calls from the isolated highland outposts where we were working. Other logistical support in the field was provided by many, all of whom are owed a great debt: Applecross Estates, Applecross Post Office, the Crown Estates, DERA BUTEC and the Works Services Department Serco, Kyle of Lochalsh, RTB Applecross, Alan Cairns and the crew of LENIE from the RMAS, RJ Mcleod Ltd, Sir Iain Noble, Highland Council Roads Department, Q Banting, Alan Cairns, Lorna Lumsden, Mike Summers, Brian Urquhart and Jimmy Watt. In addition, many local landowners, farmers, and crofters allowed access to their land, provided useful information, and showed great interest in the project, we are grateful to them all.

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Fieldwork over the years involved many people all of whom put up with sun, rain, and midges, sometimes in isolated living conditions. They were all an important part of work and we would like to thank everyone (if we have left you out please accept our apologies): Janice Adamson; Richard Bourne; Kirsty Cameron; Mike Chase; Donna Clark; Galo Ceron; Mike Cressey; Topher Dagg; Sheila Duthie; Ivy Hancock; Kati Kohler and Bandi; Hazel MacFarlane; Gordon MacIntyre; Catriona McKeowan; Fergus MacLeod; Murdo Nicholson; John Patrick; Kath Small; Ian Sudderby; Kirsten Thompson; John Tutt; John Fulcher; Alison MacLeod; Kati Kohler and Bandi; Bill Ramsay; and Ann Wakeling.

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With regard to the report on the crab fragments Nicky Milner is grateful to Terry O’Connor, Lindsay Allason-Jones and Geoff Bailey for discussion of this topic. She would also like to thank Eva Laurie for helping macerate the crabs in the lab, and to acknowledge that much of her personal knowledge is a result of learning at a young age from her aunt, Patty Posnett, who taught her how to procure crabs from rock pools. She is also grateful to Adrian Nash for schooling her on how to prepare and eat crab.

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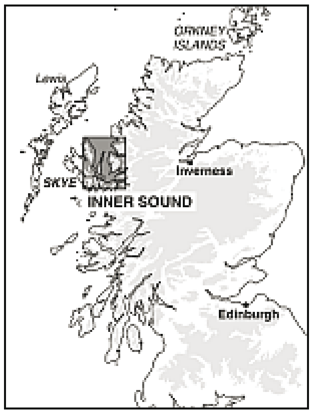
1 Introduction | Karen Hardy & Caroline Wickham-Jones

The archive version of the text can be obtained from the project repository on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports`. From here you can download the file '`WJ,_Introduction.pdf`'. The main ADS archive page also contains a small version of the introductory map.

1.1 Background



Illus 1: Location map of the Inner Sound

Scotland's First Settlers (SFS) was set up in 1998 to provide a detailed study of the Mesolithic around the Inner Sound and Sound of Raasay, between Skye and the west coast of Scotland (see Illustration 1, right; Finlayson *et al* 1999 & Hardy & Wickham-Jones 2002). The Inner Sound is a closely defined area and the project was designed on a small-scale regional basis. Given the importance of the sea in the Mesolithic, both as a resource and for transport (Fischer 1995), SFS was conceived and organised as a seascape project. This means that work was targeted around the varied coastline and many islands (see Illustration 2, lower left. Taken from the Crowlin Isles towards the hills of Skye. The sea has been crucial to the inhabitants around the Inner Sound in both past and present and the mountainous landscape provides many prominent landmarks that would have aided early seafarers. In the event, boats played an important role, even for the 21st-Century archaeologists, but more importantly the focus of the project was implicitly that from the sea as opposed to the more conventional land-based approaches of previous work (for example Mithen 2000; Wickham-Jones 1990).

1.2 Aim and chronological focus

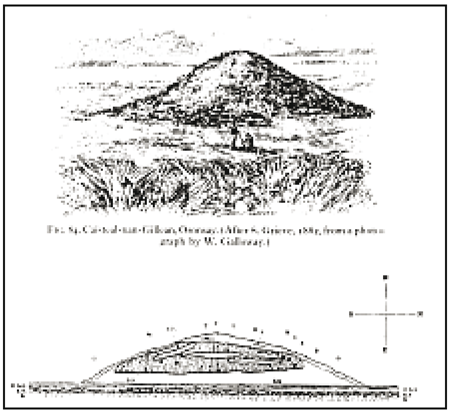

Illus 2: View across the Inner Sound westwards

The project was designed to examine issues of local mobility, resource exploitation and climate in the Early Holocene (Hardy & Wickham-Jones 2002; 2003). The aim was to shed light both on the initial incursions of people into the area and on the transition to farming.

The project thus focused on the Mesolithic and the earliest evidence for the Neolithic; however, the significance of cultural and economic continuity was recognised. This meant that more recent developments could not be ignored, especially during survey work which, not surprisingly, led to the recognition of many later sites even when midden sites, caves and rockshelters and lithic scatter sites were explicitly targeted. An early decision was taken to ignore, for the purposes of the project, those more recent sites that did not fall within the targeted list, such as sheilings or other structural remains. Where appropriate, new sites of this nature were recorded and notified separately to the National Monuments Record for Scotland and to the local Sites and Monuments Record.

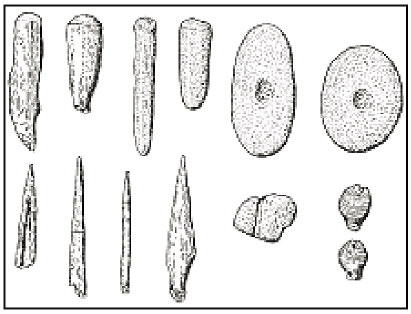
1.3 General archaeological context and research issues

Although the Mesolithic as a whole was targeted, from the outset one specific type of site was seen as of particular importance to SFS. That site type was the shell midden, long regarded as one of the defining characteristics of Mesolithic Scotland. One of the attractions of the Inner Sound lay in the recognition that several unrecorded shell midden sites existed around its shores. Midden sites were regarded as important for several reasons, discussed below, but in order to maintain a balanced view of Mesolithic settlement, information on other types of site, such as lithic scatter sites, was integral to the success of the project.



Illus 3: The shell midden at Caisteal nan Gillean, Oronsay

The west coast of Scotland is well known for the preservation of a series of shell middens dating to the later Mesolithic (see Illustration 3, right. Drawing from the time of the first excavations in 1882, after Grieve 1882; Bonsall 1996, Pollard 1996 & Mellars 2004). Shell middens and the finds recovered from them have long been regarded as one of the most common site types and best sources of information relating to Mesolithic Scotland. This is partly because the remains from these middens tend to be particularly rich and include organic material, (see Illustration 4, below right. Finds included organic material that is usually not preserved elsewhere. Bone bevelled tools and points, and shell beads, are found along with stone bevelled tools, and hammerstones as well as worked pumice), both artefacts and ecofacts, while other Mesolithic sites are usually heavily biased towards lithic assemblages (for example Wickham-Jones 1990). In addition, midden sites (especially those of Oronsay which form upstanding monuments; (see Illustration 3, right). are in general more easily visible than lithic scatter sites. Even in the early 21st century the speed and mechanisation of much development work mean that the recognition of new lithic scatter sites can be difficult, while the eye is drawn more naturally to the collections of shells that form the basis of a midden site.



Illus 4: The finds from the middens in Oronsay

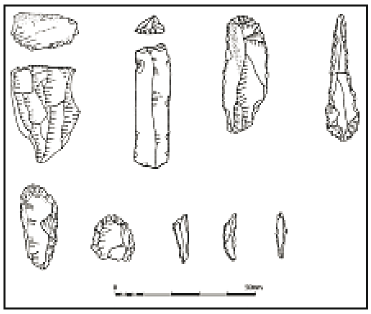
The exact role of the midden sites, and their place in relation to non-midden Mesolithic remains (generally known as lithic scatter sites from the quantity of stone tools and stone tool waste found on them), is still a matter of debate (Bonsall 1996; Mellars 2004). Some archaeologists have identified specific types of tools and technologies which they regard as confined to the midden sites and this has been used to argue that these sites should be considered separate from other open air sites (Lacaille 1954). Midden sites have thus been referred to as 'Obanian' after the town of Oban where a number of middens were located, though the precise explanation for the differences in make-up (or a combination of the two) is still a matter of debate (Bonsall 1996). Few archaeologists would now argue that the Obanian exists as a distinct cultural entity. Most people prefer to consider the distinct remains from the midden sites as part of a single Mesolithic culture, possibly representing a functional grouping (or groupings) of artefacts and environmental material with some regional input (Saville 2003). It is also clear that differential preservation conditions have played an important role in the differences between the organic rich middens and predominantly lithic open air sites.

Elsewhere in Scotland midden sites do exist, for example Morton in Fife (Coles 1971) and along the Firth of Forth (Sloan 1985). They are generally fewer in number, however, and their place as a distinct site type within Mesolithic remains is less clear. For this reason, and also because they are locally relevant, the project concentrated on the west coast sites.

Dating programmes have been used to infer that the organic artefacts preserved in the west coast middens are chronologically indistinct from the microlith-rich lithic scatters that are the most common type of site from this period (Ashmore 2004a). Nevertheless, prior to the dates from Sand (Section 4) the dates from most middens fell into the later part of the Mesolithic (Mellars 1987) whereas many lithic scatter sites yielded dates from the earlier Mesolithic (for example Kinloch, Rùm; Wickham-Jones 1990). In the east of Scotland the dates from Morton, though early (Coles 1971) were based on a large mixed sample of material and are not generally regarded as reliable.

Nevertheless, the well-preserved organic material, which includes artefacts, economic and environmental data, means that midden sites remain important as one of the best resources for studying the Mesolithic in Scotland and the Mesolithic environment. Perhaps not surprisingly, however, the abundance of data has not yet solved all of the archaeological problems so that several questions remained to be tackled, if possible, by the project.

One of the most striking features of the early midden excavations was the complete absence of a very characteristic Mesolithic stone tool – the microlith (see Illustration 5, right. A variety of types of flaked stone tools were recorded including cores, blades, scrapers and awls. The three tools on the lower right are microliths, and are generally seen as the stone components of composite tools that served a variety of purposes). despite the intensive sieving for environmental data which should have picked them up (Pollard 1990). At the same time, the absence of 'Obanian-type' organic artefacts from the lithic scatter sites was more easily explained as a result of poor preservation conditions. In the 1990s, however, work highlighted possible exceptions to the microlith distribution along the west coast of Scotland:



Illus 5: Flaked stone tools from Kinloch, Rùm

- The lower layers at Ulva Cave contain a few blades and associated lithics, indicating a technology similar to that of the microlith makers (Russell *et al* 1995).
- Early accounts of work at Risga indicated that a microlith might have been found in the midden, and recent excavations have located a microlithic lithic scatter beside the original location of the midden (Pollard *et al* 1996). At present, the relationship between the midden and the lithic scatter is not clear – nor is it clear whether enough of the site survives for excavation to determine this.
- Recent rescue excavations at An Corran discovered microliths within a midden (Hardy *et al* forthcoming a). Although the circumstances of the excavation mean that only a small sample of the relevant layers was excavated, and the interpretation of their stratigraphy is difficult, microliths did occur in the midden at An Corran in some numbers, together with a bone tool assemblage of 'Obanian' type including bevel-ended tools.

While examining the lithic tools on Mesolithic sites another question which occupied the project was the availability and use of varied stones suitable for knapping around the Inner Sound. The previous work in Rùm and at An Corran highlighted a number of local raw materials used in the past to supplement varying supplies of flint. These include chert, quartz, Rùm bloodstone and baked mudstone (Wickham-Jones 1990; Hardy *et al* forthcoming b). SFS was particularly interested in the use of baked mudstone because it appeared to come from a source in the cliffs immediately above An Corran, and it is found on sites around the Inner Sound, though it can be hard to recognise today in excavated contexts, due to the considerable degradation the material undergoes in the ground. Initially it was hoped to examine the individual raw materials and their sources in detail, with a view to the possibility that the use of different materials might track human movement in and around the Inner Sound (and beyond; for example Clarke & Griffiths 1990). In the event, finances did not cover detailed raw material analysis and sourcing (Section 5), but it was still possible to gain a general overview.

In general there has been an absence of recent excavation conducted to answer modern research questions relating to midden sites. The most famous excavations on midden sites, those on Oronsay in the 1970s, were conducted against a background of little other Mesolithic research in Scotland (Mellars 1987). Their excavation was undertaken with the specific goal of recovering economic data, so that questions concerning some of the artefactual content, the immediate context of the sites and their relationship with other Mesolithic facies were largely left unexplored, though they have been picked up in more recent papers (for example Mellars 2004). In nearly all other cases excavations of west coast middens have either been carried out before the development of modern archaeological methods (most of the Oban sites, Pollard 1990; and early work at Risga, Pollard *et al* 1996), initiated by amateur projects (Raschoille Cave, Pollard 1990; Carding Mill Bay, Connock *et al* 1992), taken place where little survived of the midden (Carding Mill Bay 2, Connock *et al* 1992), or in less than ideal 'rescue' conditions (An Corran, Hardy *et al* forthcoming a). In eastern Scotland Coles' excavations at Morton (Coles 1971) provided a classic example of how to maximise the information from midden excavation, but the site lay in local isolation (and has since been destroyed), and there were few other published sites locally with which to provide a context. Work at Fife Ness (Wickham-Jones & Dalland 1998a; 1998b) and East Barnes (Gooder 2003) has started to remedy that, together with the recognition of Mesolithic material in local field collections, though detailed publication is still awaited for much of this. Occasional sites now exist in the Highlands and Central Scotland (for example Ben Lawers, Atkinson 2000; Chest of Dee; Fraser *pers comm*), but overall the spread of Mesolithic sites across Scotland is still patchy and strongly affected by local preservation and development. SFS hoped to remedy this by looking at one (albeit small) area in detail.

There were, therefore, a number of basic problems within the Mesolithic archaeological resource which the SFS project hoped to tackle:

Illus 6: SFS 2, Crowlin 1

- The cultural relationships of middens to other sites within the Mesolithic remained problematic.
- The dating of midden sites remained simplistic, with a general assumption that they were a single phenomenon that lasted throughout the Mesolithic.
- On the other hand, midden sites seemed to be rare in the early Mesolithic. Was this an accurate reflection, or could changing shorelines have removed the earlier sites? (See Illustration 6, right, shows that the relationship between sites and the sea was of crucial importance. The midden at Crowlin 1 lies in the cave and, in the event, yielded historic dates suggesting that sea-level is likely to have been where it lies today).
- The strategies of human activity behind the formation of the middens remained unclear. Were they the result of a specific attempt for structural shelter? Did they represent the result of changing economics (for example as the result of resource intensification, or, conversely, the paucity of some resources)? Or, perhaps more likely, did they result from a mixture of reasons?
- The relationship of middens to the shoreline is interesting – most (but not all) middens appear to lie just above the old shore line, suggesting the transport of resources to sheltered spots away from the immediate vicinity of the sea, but not away from the coast – was there any evidence to support this? The Oronsay midden deposits, on the other hand, are in some instances interleaved with storm gravels (Mellars 1987) – what is the relationship between midden sites and environment?
- The Mesolithic is well documented as a time of significant climate change (Edwards 2004; Tipping 2004). Is this reflected within the environmental record preserved within the middens, and if so can information be derived on how it affected the human population?

It is clearly impossible to get a balanced view of Mesolithic activity by concentrating on one type of site, though that has often been the approach in the past, particularly where projects were based around a single site. With this in mind, information from lithic scatter sites was regarded as important as that from middens, if perhaps different in scale. At the outset only two lithic scatters were known in the area: Redpoint (Gray 1960) and Shieldaig (Walker 1973). Only Shieldaig had been excavated, though not published by the excavator (a typed report was available and the recent publication by Ballin & Saville (2003) has gone some way to remedying that). Nevertheless, both sites do comprise Mesolithic material including microliths and blades. Neither site has been accurately dated, though Ballin & Saville suggest that Shieldaig may include particularly early Mesolithic, or even Late Glacial elements (Ballin & Saville 2003). Unfortunately the site at Shieldaig has been destroyed since excavation, though material is still eroding out of the sand dunes at Redpoint (Section 2.2).

Lithic scatter sites provide their own suite of archaeological questions. Although existing information relating to the Mesolithic in Scotland has been derived largely from scatter sites, there has been little consideration as to how representative that information might be. Does the lack of certain types of find on the scatter sites (for example bone) reflect different preservation conditions, or have the different types of site been built up by different activities? Just how do lithic scatter sites and midden sites interact? Information relating to the quantity, types, and variety of stone tools present on the individual sites is very relevant here.

At the same time, lithic scatter sites do not occur evenly across Scotland, so there are problems of visibility. Because of the lack of upstanding remains, lithic scatter sites are hard to see and they have tended to occur in areas of agricultural development such as the eastern coastlands, or in areas of high erosion, such as managed, and fluctuating, loch shores. By and large lithic scatters are less common in western Scotland where there has been less development, and where erosion, though common, is smaller in scale. Nevertheless, a few recent projects such as Southern Hebrides Mesolithic Project (SHMP, Mithen 2000) and Rùm (Wickham-Jones 1990) have shown that they do exist here, while earlier work by Mercer in Jura yielded many lithic sites with classic Mesolithic tools (Mercer 1970; 1971; 1974; 1978; 1980). How then to find the west coast scatter sites if they are there? This question was tackled by SFS using a variety of methods including coastal walking and shovel pitting (Section 2.1).

Having found the lithic scatters, SFS was not only interested in their contents, but also in other questions related to their position in the landscape. Only in this way would it be possible to look at the patterns of Mesolithic activity in the study area. It is also important to remember that not all lithic scatter sites are Mesolithic, so that basic dating evidence is, if possible, necessary. In this respect the presence of blades, resulting from a specific blade technology, and/or microliths, was taken as indicative of Mesolithic activity on both midden and lithic scatter sites. Although it is notoriously difficult to separate Mesolithic stone assemblages from later material (for example Zetterlund 1990), the making of blades, in particular narrow blades, and the use of microliths (usually based on the alteration of narrow blades) are to be found on all sites with early Holocene dates.

In the event it seems that the separation of these characteristics may lead to an under-representation of later Mesolithic sites (see Section 3.3). Various suggestions have been made regarding chronologically diagnostic lithic types such as that the use of bipolar cores tends to be later (Finlayson 1990b; Saville 2004a), larger horseshoe type scrapers tend to be Neolithic (Edmonds 1995), while smaller thumbnail scrapers tend to be Bronze Age (Edmonds 1995). Other pieces while apparently securely stratified on Neolithic sites, such as leaf-shaped arrowheads (Edmonds 1995), also occur well stratified in early Mesolithic contexts on a few sites such as Rùm (Wickham-Jones & McCartan 1990) so that it is obvious that the search for clear cut Mesolithic artefact types is not going to be simple. Interestingly, few of these possible type fossils were found on any of the SFS sites, whereas there were several sites with nondescript lithic assemblages that lacked microliths (for example An Corran B, An Corran D & Brogaig; Section 2.2). Is it possible that this type of material could represent the later Mesolithic assemblages? Clearly further work including detailed excavation and dating would be necessary to test this.

Other questions concerned general interpretational issues. Mobility is crucial to many recent interpretations of the Mesolithic lifestyle (Wickham-Jones 2005), but it is, in fact, very difficult to show archaeologically. The identification of a number of Mesolithic sites, of whatever type, within a closely defined area, such as the Inner Sound, should help to throw light on the nature of Mesolithic mobility. The presence of Mesolithic sites on islands such as Rùm, Oronsay, Jura and Skye indicates that marine transport definitely existed, and the nature of the relationship between the early settlers of Scotland and the sea is the subject of increasing interest. Whereas this was once regarded as a purely economic theme (Clarke 1978), in recent years study has expanded to include aspects of marine technology and general perception. There are now increasing arguments for the importance of the sea and the skill of Mesolithic seamanship (Warren 1997; 2000; Pollard 2000). However, there has been little close study of the detailed requirements and use of marine transport in Scottish prehistory, and no evidence of Mesolithic boats has been found in recent times in Scotland (Mowat 1996), though examples of dugouts have been found from this period elsewhere (see for example Malm 1995). A better understanding of this would have important ramifications for our understanding of elements such as resource procurement, regionalisation and social behaviour.

Issues regarding group size and territoriality are other commonly asked Mesolithic questions. The project hoped to consider whether the middens around the Inner Sound might represent a single coastal Mesolithic group, and if so whether it was possible to infer group size. Or were they more likely to represent the coastal activities of land-based people, perhaps in larger groups? The issues of territoriality and territory size are related to this and SFS hoped to approach these through analyses such as resource exploitation.

Illus 7: SFS field surveyors at work

By undertaking global field survey (see Illustration 7, right. The view across the Inner Sound from Applecross. The mountains of Skye may be seen in the background, bounding the western shores. In the middle distance lies the island of Raasay. See also below), SFS realised that many sites that did not relate to the Mesolithic would be encountered, even if work was confined to midden sites and lithic scatters. Middens continued to be formed into more recent periods, including historic times, and this was not something that the project wished to ignore. A decision was taken to record later sites only where they comprised shell middens, rockshelters or caves. In line with the co-directors' expertise, analysis would concentrate on the Mesolithic. In this way it was hoped to collect a useful body of information for other research.

Recent research at Carding Mill Bay (Connock *et al* 1992), An Corran (Hardy *et al* forthcoming a) and Ulva Cave (Russell *et al* 1995) has confirmed earlier suggestions (Pollard 1990) that middens continued to be formed into the Neolithic. Furthermore, many of these sites show evidence of use as burial sites in the Bronze Age (Pollard 1990). A final prehistoric question, therefore, was related to this: if middens continue into the Neolithic, do they show evidence of continuity between the Mesolithic and the Neolithic, or are there detectable changes in the activities and resources represented at different times?

Finally, there was the matter of more recent sites. Structural remains without visible midden that appeared to include only Iron Age or historical material, such as hut circles, steadings and sheilings, were noted by the surveyors, but not incorporated into the project. Where they were previously unrecorded, information was supplied separately to the National Monuments Record of Scotland. These sites do not appear in the Active Sites Report (Section 2.2). There were, however, many rockshelter and cave sites which contained more recent material in addition to midden or other remains such as lithics that suggested prehistoric activity. These were included in the database of sites that gradually built up for SFS analysis, and many were test pitted and material sent for radiocarbon determinations. In the event many of these sites produced later, particularly historic, dates (Sections 2.2, 3.2 and 4).

Although the project did not set out to examine more recent sites in detail, in the event it has provided an interesting record of activity in caves and rockshelters through time (Section 3.2). Other projects have looked at cave and rockshelter use (for example Tolan-Smith 2001), but long-term chronological analysis, even at the basic level applied by SFS, has not usually been applied.

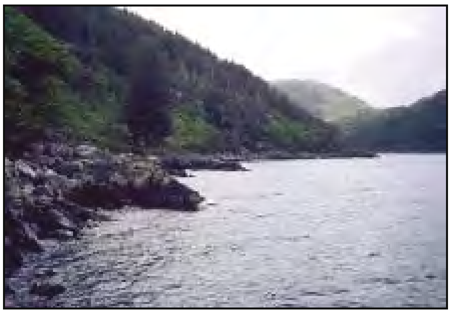
1.4 Geographical setting

From the outset the regional approach was considered to be most suited to studying the Mesolithic, a period where mobility was important, and where the examination of isolated sites is likely to result in a very partial picture. The mountains of Skye may be seen in the background, bounding the western shores, in the middle distance lies the island of Raasay. The Inner Sound (see Illustration 8, right) was selected for study for a variety of reasons:

Illus 8: View across the Inner Sound from Applecross.

- it presents a clearly defined, self-contained area with a variety of resources
- three Mesolithic sites were already known here (An Corran, Redpoint and Shieldaig). It could thus be assumed that the area had been occupied during the Mesolithic, and there was a likelihood of further Mesolithic sites
- it is an area which focuses on the sea, already considered to be a resource of significance in the Mesolithic.

In comparison with much of the Scottish coastline, the waters of the Inner Sound are relatively enclosed. Exit by sea to the south is possible only through the narrow and fast-flowing straights at Kyle Rhea, while to the north lie the open waters between Staffin and Torridon. The coastline of the Inner Sound makes for a clearly defined area.



Illus 9: The sea lochs penetrate into the Scottish mainland

Illus 10: Staffin Bay opens into the heartland of north Skye

At the same time, the Inner Sound also offers access to a wide hinterland. The two sea lochs of Loch Torridon and Loch Carron penetrate deeply into the Scottish mainland (see Illustration 9, left). Wide glens run from the head of each loch to facilitate land transport whether to loch, upland, or further on to the lowlands of eastern Scotland. To the south, Kyle Rhea opens to the islands and coastlands of south-west Scotland, apparently a fertile stamping ground for various Mesolithic groups (for example Wickham-Jones & Hardy 2004; Wickham-Jones 1990). Skye itself is a large island with much to offer, and locations such as Staffin Bay (see Illustration 10, right. The island of Raasay lies in the background in front of the Skye coastline) and Loch Sligachan provide access to the interior for those on the coast. Further north and west lie a variety of islands as well as the shores of north-west Scotland. Transport by sea would be necessary to reach these outer isles, and the Mesolithic population of western Scotland has already demonstrated its ability to use boats by virtue of the Mesolithic settlement sites on various islands, and the evidence for transport and use of different raw materials.

The landscape of the Inner Sound presented a variety of resources to its Mesolithic inhabitants. It is an area of deep and volatile sea speckled with islands of varying sizes (see Illustration 11, right, shows later settlement and cultivation remains. The present landscape is an amalgam that has

Illus 11: View across the Inner Sound from Sand

been shaped by the interaction of past physical, economic and environmental change. The Cuillins of Skye lie across the Inner Sound in the background). Much of the coastline is steep-sided, mountainous and rocky, and slopes quickly downwards into deep water; but there are areas of gentler shore and, in many places, rocky foreshores are exposed for long periods. The underlying geology is mixed: predominantly sandstones to the east in the Applecross area; and a combination of Tertiary volcanic rocks and Lewisian gneisses as well as sedimentary rocks from the Torridonian and Jurassic periods across the central islands and in Skye to the west (Johnstone & Mykura 1989). The geology has not only influenced the appearance of the land, it has also had a marked effect on vegetation and other resources such as fresh water. In general, however, the population of the Inner Sound inhabited a world made up of various ecological niches, from grassy sheltered bays to more exposed uplands. There was more woodland cover than today (Green, Section 8.1; Shiel, Section 8.2), though open glades and grassy pastures were also important, with a knock on effect on local animals and plants. Offshore the Inner Sound is today a fertile area, both for fish and shellfish, and this was clearly the case in the past despite sea-level change. The deep sea lying so near the coast was well used from early times, as attested by the number of deep water fish remains in some middens, while the shallower waters and rocky shores offered a rich variety of fish and shellfish. Sea birds and mammals would also have been abundant.

From the point of view of the late 20th-century archaeologist with an interest in the Mesolithic, the Inner Sound had much to offer. Of the three known Mesolithic sites (An Corran, Hardy *et al* forthcoming a; Shieldaig, Walker 1973; Redpoint, Gray 1960), work in the early 1990s suggested that An Corran, in Staffin, comprised an early midden site with exceptional preservation and some interesting artefacts (Hardy *et al* forthcoming a). Midden sites in the area were rare, so An Corran was of particular interest, and this was compounded by the suggestion that other unrecorded midden sites existed around the shores of the Inner Sound (M Wildgoose & S Birch, *pers comm*). A brief visit in 1998 confirmed the presence of further sites, and thus Scotland's First Settlers was born. This basis was confirmed by initial fieldwork in 1999 which revealed two definite new Mesolithic sites (SFS 4, Sand; SFS 8, Loch a Sguirr) as well as several other promising midden sites and rockshelters.

The decision to focus SFS around the sea and the coast offered an interesting contrast to previous studies and was felt to be particularly important on three counts. Firstly, there was the realisation that the presence of midden sites around the Inner Sound offered the possibility of enhanced levels of preservation that might include information relating to the harvest of the sea and coastal resources. This was a particular attraction for those who had mainly worked on sites where lithic material provided the main (limited) form of evidence. Secondly, there was the increasing awareness of the role of the sea in the Mesolithic, not only as a resource, but also as a means of transport vital to a community that was at least partly mobile. Thirdly, there was the feeling that the sea acts as a unifying element rather than as a boundary. This was an important difference to previous studies such as that based on Rùm in which the shores of the island were regarded as an impenetrable boundary so that the project concentrated on the Mesolithic remains on land rather than turning attention to the sea and neighbouring coasts (perhaps due to the nature of the evidence; Wickham-Jones 1990). Rather than being a landscape study with a rigid boundary, SFS was set up as a seascape study where the boundaries led on to other things.

1.5 Environmental background and considerations

In addition to the archaeological information *per se*, SFS was considered from the start to be an environmental study in the widest sense. The Mesolithic population of western Scotland did not live in isolation. They inhabited the land and their actions and reactions were affected by both the landscape around them and by the environmental conditions of the time. The early Holocene, the setting of the Mesolithic, is known to be a time of dynamic environmental change (Edwards 2004; Tipping 2004). Its people were not, however, mere puppets. There is, as yet, little information on the means by which the inhabitants of Mesolithic Scotland coped with the changes that were going on around them, but they are unlikely to have reacted unthinkingly to their circumstances. The people of the Mesolithic, in their turn, influenced the environment in which they lived.

Illus 12: Late-Glacial shoreline features at Lonbain, Applecross

Environmental change is not just a theme for the Holocene, it has continued at various rates, and with varied causes, into the present day (see Illustration 12, right, shows later settlement and cultivation remains. The present landscape is an amalgam that has been shaped by the interaction of past physical, economic and environmental change. The Cuillins of Skye lie across the Inner Sound in the background). Given that SFS would cover more recent sites as well as Mesolithic material (Finlayson *et al* 1999), the development of the environment of the Inner Sound through time, both at a local level (Shiel, Section 8.2) and on a wider scale (Green, Section 8.1) was important.

1.6 Objectives and constraints

The overall objectives of the project as set out at the beginning (Finlayson *et al* 1999) were thus:

1. To conduct survey in order to identify additional midden sites, to record rockshelters and caves, and to identify any other traces of Mesolithic activity.
2. To conduct a series of small-scale soundings on a number of midden sites to obtain material for dating in order to determine their broad chronological affinities and to assess preservation (see Illustration 13, right).
3. To undertake excavations on suitable middens to obtain information regarding their composition, complexity and chronological phasing. Excavation was planned to focus on sites under threat, and the extent of excavation was carefully controlled to avoid the collection of unmanageable quantities of material.
4. To recover and analyse environmental data and to look for evidence of environmental change through time within the middens.
5. To examine the areas around the middens for evidence of associated Mesolithic settlement or other activity.
6. To obtain management information regarding the sites, regarding both their archaeological value and their long-term stability.
7. To undertake post-excavation analysis to establish dates, economic data and cultural information.
8. To provide a showcase project for wider public consumption, both at the level of community council and local involvement, and at the level of national interest.

Illus 13: SFS test pitting in 1999

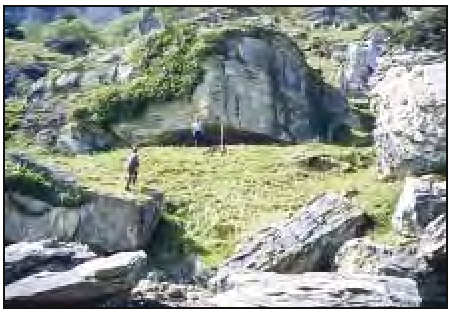
Despite generous support from Historic Scotland and a number of other bodies and private individuals, SFS did not secure adequate funding to carry out all of the early objectives. Excavation was thus confined to one site and work on individual specialisations such as lithic raw materials had to be abandoned early on. Funding from the British Academy allowed survey to be continued up the adjoining sea lochs of Loch

Torridon and Loch Carron. This had been regarded as vital to the success of the project form the start, but it meant that that work had to be presented as an add-on, and initially recorded as the Sea Loch Survey. For the purposes of this report the results of the Sea Loch Survey have been fully integrated into the overall picture and considered as SFS.

1.7 Methods

Fieldwork comprised three elements:

- coastal survey, to identify potentially Mesolithic sites; midden deposits, lithic scatters, and both rockshelters and caves were targeted
- test pitting to assess the preservation and dating of survey sites
- detailed examination through excavation of a few selected sites.



Illus 14: SFS survey work

Prior to fieldwork, existing maps and sites and monuments records were searched for known sites. In addition, local knowledge comprised an important element of information both prior to and during field survey.

Illus 15: SFS test pitting at SFS 8, Loch a Sguirr

The coastal survey was designed to cover the entire modern coastline as well as any visible raised beaches. To this end the coastline was walked by a team of three experienced surveyors (see Illustration 14, left; Section 2.1). They recorded all rockshelters and caves (both with and without obvious archaeological remains), lithic scatters and any identifiable open middens. Sites were recorded on standard sheets (Section 2.1) and SFS numbers were allocated on a 'first come first served' basis.

Illus 16: Excavation at Sand

The test pitting programme was designed to sample as many of the sites identified in the coastal survey as possible, with the aim of characterising their deposits and collecting samples for dating (see Illustration 15, right). The aim was, where possible, to dig two test pits at any one site, usually in contrasting locations. This usually involved return visits to sites and the transport of sample material (100% of fill) back to base for processing. In some cases, however, test pits had to be dug and material processed on site during the survey work (see Section 2.1 for more details of method).

Illus 17: Post-excavation work in the field

Detailed excavation was only possible on one site, that at Sand (see Illustration 16, left). Sand was identified as a midden site of Mesolithic date in 1999, the first year of fieldwork. Excavation took place over a four-week period in 2000. The excavation was designed to assess the size of the midden, the character of the deposits both within and outwith the midden, the relationship of the midden to the non-midden deposits around it, and to obtain archaeological and paleoenvironmental samples relating to the archaeological occupation of the site, for dating and wider analysis (see Section 3 for more detail).

Post-excavation work (see Illustration 17, right) took place from 2000 to 2004 and involved a wide range of specialists from many different Institutions (see List of Contributors).

1.8 Finds and archive disposal

All of the finds from the project, whether from Sand or other sites, have been passed to the Finds Disposal Panel administered by Historic Scotland for allocation to a suitable Institution. The full archive has been deposited in the National Monuments Record for Scotland in Edinburgh where it is freely accessible to the public. Copies of all reports and databases have been deposited with the Highland Regional Archaeology Service in Inverness.

1.9 Site management and the future

Prior to SFS there had been no detailed examination of the wealth of sites around the Inner Sound. The only exceptions to this relate to occasional studies of individual sites (Gray 1960; Walker 1973; Hardy *et al* forthcoming a). Indeed, the precise size of the resource that was revealed has been surprising. Many of the sites lie dormant, but others are still in use, and much of the resource is threatened both by natural and human factors. Although it was not in the power of the project to manage any of the sites recorded, SFS did work with Historic Scotland to produce information relating to condition and threat which has been played into Historic Scotland's coastal erosion database.

1.10 Community archaeology

Illus 18: April 2000 open day at the excavations at Sand

Illus 19: Open day, processing

Illus 20: Display panel for local exhibitions

Archaeology is a profession dominated by specialists. Nevertheless, since the 1980s there has been a growing understanding that the past is a communal resource in which many people wish to participate (Binks *et al* 1988). In common with many other projects SFS sought to open up both the work and the results to all, irrespective of age or training (see Illustration 18, top left). We benefited from this in that local volunteers carried out much useful work including both excavation and post-excavation work (see Illustration 19, bottom left). Local information was a constant source of data, and lectures both around the Inner Sound and elsewhere have been well attended (see Illustration 20, right). The Scotland's First Settlers website, set up in 2000, has provided a popular source of information and resulted in many contacts to the project. It was updated in 2003, but there are no resources for further or final upgrades. In choosing Applecross as a base in 2000 we unwittingly chose an area with a high degree of interest in the past. In 2003 this culminated in the opening of a community-driven Heritage Centre in Applecross in which SFS information is well represented. From the current specialist publication in SAIR will come a popular work to try to give an idea to all those who participated, and to those who are interested, of how their hard work has paid off.

1.11 Report structure

The first part of the report, Section 2, considers the wider work of the project: survey and test pitting. After Section 2.1, which provides a discussion of method and general results regarding site location and use, Section 2.2 provides information regarding every site where there was some invasive archaeological action. This includes test pitting, shovel pitting and surface collection. This is set out by site, alphabetically by name. Relevant specialist reports have been included here. Information from these sites is also summarised and discussed in the final discussion, Section 9. Section 2.2 does not include those sites with visible midden but where no invasive action occurred. These are listed in Appendix 1, the catalogue of all sites.

Section 3 considers the excavation at Sand. Subsections consider the geographical background, excavation and results, finds, ecofacts and environmental analysis specific to Sand.

The following sections consider material relating to the project as a whole. The radiocarbon determinations are presented and discussed in Section 4. Section 5 considers lithic raw material use and Section 6 pumice-like material. Sea-level change is presented in Section 7 and palaeobotanical evidence in Section 8. Finally, the findings of the project are drawn together in Section 9. This is followed by a number of appendices which provide specific data: context information, laboratory measurements and catalogues. In accordance with common practice radiocarbon dates are given in calibrated years BC in all the sections that deal with the human archaeology; in the natural science sections dealing with the past environment and landscape however, conventional, uncalibrated, radiocarbon years BP have been used. The reason for this is that over the time scales involved (the last 10,000 years) dates refer to very general age divisions such as the Younger Dryas or Holocene, and to use calibrated BC dates would add a spurious accuracy to the general period nomenclature.

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… > Images > Work in Progress > Open_Day_1.jpg [Illustration 19]
… > Images > Panels > Panel1.gif [Illustration 20]

2.1.1 Introduction

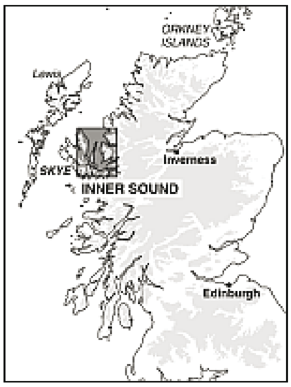
The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports. From here you can download the file 'Hardy,_Survey_and_Test_Pitting.pdf'.

The aim of the SFS survey work was to examine the coastline of the Inner Sound for evidence of past human activity. As the project was primarily focussed on the Mesolithic, upstanding sites that were obviously of a later date, such as cairns, hut circles, shielings and so on were excluded, though new sites were notified to the NMRs on a separate basis by Martin Wildgoose.

Illus 21: The rocky coastline of Toscaig, Applecross peninsula

Illus 22: View along Loch Torridon from the south side of the Redpoint peninsula

Though the Inner Sound is a relatively small area, both the topography and the seascape vary considerably (see Illustrations 21 & 22). Prior to SFS work there were only three known Mesolithic sites in the area (An Corran, Hardy *et al* forthcoming a; Saville & Miket 1994a; 1994b; Shieldaig, Walker 1973; Ballin & Saville 2003; Redpoint, Gray 1960) though local knowledge suggested that similar sites existed elsewhere in the Inner Sound.



Illus 1: Map of survey area

The area covered is described in Section 1 (and see Illustration 1, right). To aid consistency, all survey work was carried out by the same team of three: Martin Wildgoose, Steven Birch and George Kozikowski. In the end most of the Inner Sound and its islands was walked over and visually surveyed. The only parts not included were some areas of rhododendron and woodland plantation where survey was impossible (a small area to the west of Kyleakin and several small enclosures in the northern part of the Applecross peninsula).

Illus 23: Sand rockshelter. There is no sign within the rockshelter of the archaeological deposits and the outer vegetation reflects

An original aim of SFS was to extend the walkover survey by test pitting sites in order to characterise their deposits, assess their age and examine preservation (Hardy & Wickham-Jones 2002). The large number of sites found by SFS survey work meant, however, that not all could be test pitted. This included many with visible evidence of past human activity. Selection for test pitting was carried out according to a combination of potential for past human activity, accessibility and an assessment of threat. It included both sites with visible archaeological remains and some without. Sand is a good example of a site with no visible evidence of past human use: the shell midden lies in a natural hollow completely below the present ground surface and the vegetation of grass and bracken does not reflect the underlying midden (see Illustration 23, left).

past cultivation on the apron before the shelter rather than earlier activity

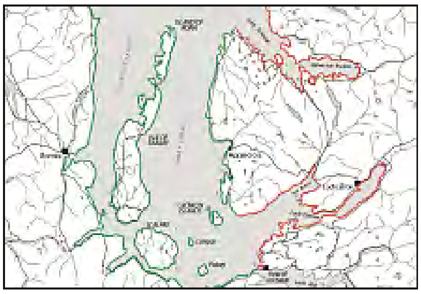
In some areas, notably those that were particularly remote and difficult to access, small shovel pits were dug in an attempt to determine whether archaeological deposits were present. The island of Rona is a case in point; there is no public transport to Rona and access is difficult. The island is very overgrown and working conditions are not easy. Sites in Rona were thus shovel pitted whether or not they had visible evidence of past human use (see Illustration 24, right). Where archaeological potential was revealed, a test pit was then dug during the course of the survey work. This method also took place in rockshelter sites on the island of Raasay and around the sea lochs where access was difficult.

Illus 24: Shovel pitting at SFS 152, Doire na Guaile, Rona. The interior of Rona was rocky and inaccessible so that shovel pitting was carried out on all sites. Back to Rona

Illus 25: Shovel pitting, Applecross Manse

Around all the coastlines, there are many raised beaches. The archaeological potential of these was assessed by the excavation of transects of small shovel pits (200–300mm²) across a small sample (between 10% and 25% depending on location, see below) of the beaches (see Illustration 25, left and see below).

The survey work was split into two (see Illustration 26, right). Between 1998 and 2002 the main coastlines of the Inner Sound, including all the islands, were surveyed. In 2002 a separate project, the Sea Loch Survey (SLS) was established for the survey of the sea lochs Carron and Torridon. This division was based purely on the need to differentiate the sea lochs by area in order to obtain support for that part of the work. The results of both projects are combined in this report.



Illus 26: Survey areas, SFS and the Sea Loch Survey (SLS)

2.1.2 Method

An initial desk-based search was undertaken comprising searches in the local Sites and Monuments records and in the National Monuments Record of Scotland. This desk-based survey produced very little so that fieldwork became crucial to an understanding of the early settlement of the area.

Field survey methods

2.1.2.1 Walkover

Most of the modern coastline and all raised beaches were walked (see above). The survey area comprised the intertidal zone and the visible coastal fringe to an average width of 150m. Surface lithic material, evidence of middens, caves and rockshelters, were all recorded. In addition, examination was made of all erosion, this included natural erosion scars, paths, mole-hills, animal rubs, service trenches, excavations for new buildings, breakdown of coastal cliffs and ploughed fields.

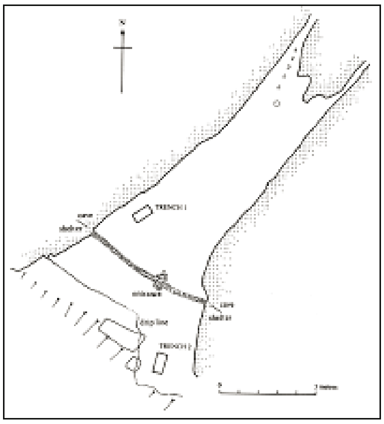
Caves and rockshelters have traditionally been associated with early prehistoric finds in Scotland (for example Lacaille 1954; Coles 1983; Bonsall *et al* 1994). It was therefore decided to visit, examine and record, every visible cave and rockshelter in the survey area and assess their archaeological potential. Given the records of their use in later periods (Tolan-Smith 2001), later material was also recorded where it occurred. For the purposes of this study a site was considered a rockshelter when an overhanging roof gave shelter to an open area below. A cave comprised a site which could be entered – with roof, sides and back to define a potential area of use.

2.1.2.2 Test pitting

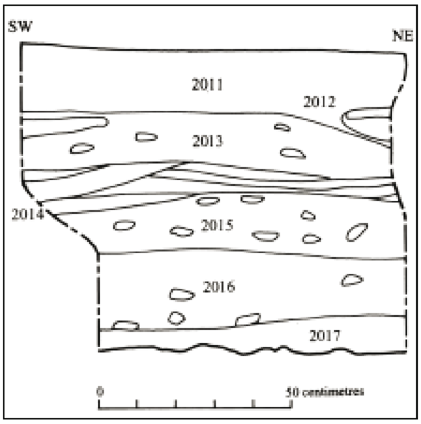
The aim of the test pitting was to evaluate each site by taking the test pit down to bedrock in order to look for datable or diagnostic material, and assess preservation. Test pits measured 1×0.5m and where possible two test pits were dug at each site, one inside the rockshelter or site, and one outside. Test pits were dug by context; the contents were usually returned to base to be wet-sieved through Endicott sieves (where this was not possible they were dry-sieved through 3mm wire mesh on site) and sections and floors were drawn and photographed (see Illustration 27, right and Illustrations 28 & 29, below left).

Illus 27: A typical test pit, on to bedrock at SFS 104, Fearnmore 1

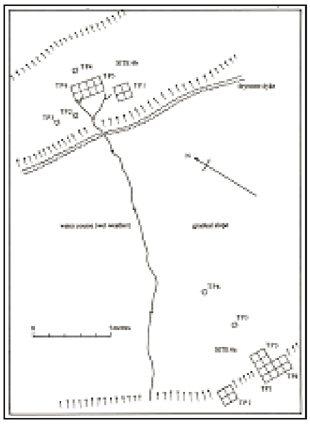
In addition, three open-air lithic scatters on the island of Scalpay (SFS 33, SFS 195, SFS 198), were test pitted by a local member of the survey team. This involved more intensive test pitting of areas up to 3m² across the scatter sites (see Illustration 30, below mid right). Additionally, one line of ten shovel pits was run on a north-west/south-east transect across the find spot of an isolated lithic on Scalpay (SFS 197) (see Illustration 31, below right). This level of fieldwork would not have been undertaken had not one of the SFS surveyors lived on Scalpay adjacent to the lithic scatter sites, but it has provided an unusually detailed window onto the early remains of one part of the SFS study area.



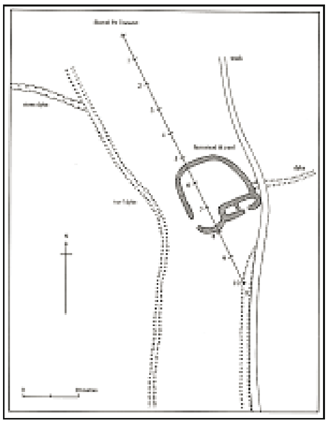
Illus 28: Typical plan – SFS 20, Toscaig 2



Illus 29: Typical section drawing – SFS 20, Toscaig 2



Illus 30: Plan of test pit layout, SFS 195 & 198, Scalpay 6a & b



Illus 31: Shovel pit transect and location of isolated find (x), SFS 197, Scalpay

2.1.2.3 Shovel pitting

Shovel pits dug as part of the survey in caves and rockshelters, measured between 250 and 300mm each side. Where possible, two shovel pits were dug at different places in or just outside the cave or rockshelter. There was no attempt to reach basal layers, though sometimes bedrock was encountered. The shovel pits were undertaken as a way of extending the survey in certain areas (see above) to determine whether archaeological deposits existed and to provide a simple characterization of these deposits. Contents of the shovel pits were dry-sieved and examined on site.

A selection of raised beaches was shovel pitted (see Section 2.2 and also Illustration 32, right). Sites were chosen on the basis of a combination of features conducive to human settlement (fresh water, access to resources and so on). In the Inner Sound area, 10% of identified raised beaches were shovel pitted while in the Sea Loch area the sample was increased to 25%. Shovel pitting comprised the laying out of a transect across the area of interest and then pits were dug every 10m. The shovel pits measured between 250 and 300mm each side and were dug down to the underlying layers, usually beach gravels. The interval was reduced to 5m intervals where surface lithic scatters occurred (see Illustration 25, above). The contents of each shovel pit were dry-sieved on site through a 3mm wire mesh. Where lithics were recovered, the pit was recorded as a hit and marked as such on plan.

Illus 32: SFS 188, Camas an Leim, Shovel pitted raised beach

2.1.2.4 Recording

In order to locate sites, national grid references were taken using a Garmin 12XL hand-held GPS (global positioning system) with an accuracy of around 10m.

The survey database (Appendix 1) provides a catalogue of all sites visited, with or without visible archaeology. Sites with no archaeological evidence have been retained in the database and can be identified (Appendix 1, column H), though they are not discussed in detail. In this way it is possible to assess the differential selection of caves and rockshelters and, furthermore, it is possible for future research to check the state of any location at the time of the SFS visit. In addition, this database provides the record of sites with visible remains, for example walling or midden, but where further work such as test pitting was not possible. These sites are not covered in Section 2.2.

Test pitting was carried out between 1999 and 2003. Shovel pitting was carried out in 2000 and 2002. Full details of all sites that were test or shovel pitted are recorded, together with sites from which finds were collected, for example surface collections, in the Active Sites Report, Section 2.2.

Information regarding each site was recorded in the field on a standard survey sheet (Illustration 33). Threats to the sites were included according to Historic Scotland's coastal survey threat categories (see Illustration 34 & Ashmore 1994). The survey sheets were filled in at individual sites, photographs taken and sketch maps made where appropriate (Appendix 1).

2.1.3 Results

Table 1

Site types	Numbers
Caves	37
Lithic scatters/find spots	37
Open air sites	9
Rockshelters	103
Shovel pitted areas, raised beaches	11
Total	197

Table 1: Type of site visited during survey

Altogether, 140 rockshelters or caves, seven stone tool find spots, 30 lithic scatters, nine open-air sites or shell middens and 11 shovel pitted raised beaches were recorded (Table 1, above).

Table 2

Location	Number of caves/rockshelters	Lithic scatters	Find spots	Shovel pitted	Open Midden

				raised beaches	
Loch Torridon	12	3	2	4	
Loch Carron	17	3		3	
North Applecross	13		2		
Mid Applecross	17		1	3	3
South Applecross	25			1	1
Islands	53	11			
Trotternish	3	11	1		1
South Skye		2	1		4
Total	140	30	7	11	9

Table 2: Survey sites by type and area

Lithic scatters, middens and find spots are by their nature defined by their archaeology, while caves, rockshelters and raised beaches are defined by their topography. The physical geography around the study area varied and was divided into eight sub-areas (see Illustration 35, right, and see below). Physical geography had clear implications which are considered below (Table 2, above; Section 2.1.3.3). Just over half of the caves, rockshelters and raised beaches have evidence for past human activity (Table 3, below) in addition to those sites which were defined by their finds such as existing lithic scatters.

Table 3				
Site types	Evidence		No evidence	
Caves	18	(49%)	19	(51%)
Rockshelters	59	(58%)	42	(42%)
Shovel pitted areas, raised beaches	6	(55%)	5	(45%)
Total	83	(56%)	66	(44%)

Table 3: Archaeological evidence by type of site
NB: sites which were defined by the existence of finds, such as lithic scatter sites have been excluded.

When the caves, rockshelters and shovel pitted areas with no archaeological evidence are removed, 129 sites remain (Table 4, below). In all following discussions of sites, only those containing archaeological material will be included (as in Illustration 34).

Table 4	
Site types	Numbers
Caves	18
Lithic scatters/find spots, raised beaches	43
Open middens/sites	9
Rockshelters	59
Total	129

Table 4: Sites with archaeological evidence by site type

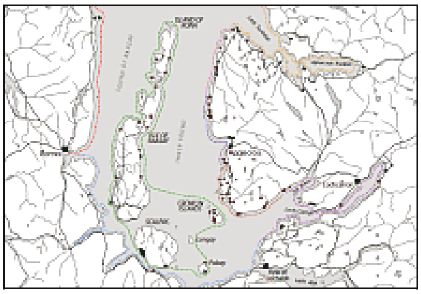
The archaeological evidence in these 129 caves, rockshelters and shovel pitted areas comprises mainly lithic scatters, shell middens and walls (Table 5, below). Sixty shell middens were recorded, seven of which are open-air sites, and 53 are in caves or rockshelters. Several sites had shell middens that were visible but inaccessible as they lay below rock fall (or, in one instance, water). Although these were recorded as middens they could not be test pitted. Rock fall also prevented test pits reaching bedrock on 23 occasions.

Table 5

Site types	Numbers of sites
Shell middens	61
Lithic scatters, find spots, rockshelters with surface lithics	45
Walls	23
Slab floors	2
Total	131

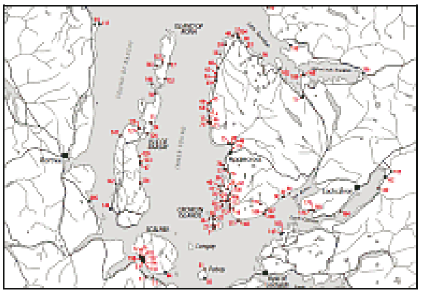
Table 5: Types of archaeological evidence
NB: total = more than 129 as some sites have both middens and walls.

2.1.3.1 Walkover survey – techniques of analysis and results



Illus 35: Map of Inner Sound with the sub-areas defined and those sites with archaeology

The study area was subdivided into eight sub-areas in order to examine the distribution of sites (see Illustration 35, right). These areas are defined on a purely geographical basis and do not reflect parishes.



Illus 36: Map of the Inner Sound showing site types and the SFS numbers for all sites with archaeology

A total of 197 locations was visited. Sites were sub-divided into five categories as follows (see Illustration 36, left):

- caves and rockshelters, with or without midden and other archaeological evidence
- open-air sites including shell middens
- lithic scatters – surface lithic finds of more than one artefact, including those found in sand dunes
- find spots – one artefact only (usually a flaked stone tool)
- open sand dune sites with material later than flaked lithic remains

In addition, raised beaches which had been shovel pitted were recorded, whether or not they produced artefacts.

2.1.3.2 Test and shovel pitting – techniques of analysis and results

Seventy-six sites were test pitted or shovel pitted while three rockshelter sites were both test and shovel pitted. For the sake of clarity, sites that were both test and shovel pitted will be included in the test pitting category for analysis.

Forty-nine sites were visited with the aim of test pitting. All were accessible with midden or other apparent remains that were not obscured beneath rockfall. Of these, five cave and rockshelter sites were discounted as inappropriate for test pitting, due to being too wet, too small or too exposed for human occupation. In the event it was not possible to dig two pits in every site so that a total of 86 test pits were dug in 44 sites (Table 6, below). Of these, 41 (93%) contained archaeological remains. (Full details of individual test pitted sites are given in Section 2.2 and Appendix 1.)

Table 6

Type of site	No of sites test pitted	No of sites shovel pitted	Total

Rockshelter / cave	34	23 (+3)	57
Open midden	4		4
Lithic scatter / raised beach	6	9	15
Total	44	32 (+3)	76

Table 6: Types of site test pitted or shovel pitted

Thirty-five sites were shovel pitted: 26 caves and rockshelters, and nine areas of raised beach (Table 6, above). Three rockshelter sites were revisited and test pitted following shovel pitting. In total, 16 (61%) shovel-pitted sites were found to contain evidence for past human activity: one cave, nine rockshelters and six areas of raised beach. Of the 26 caves and rockshelters that were shovel pitted, a total of ten (38%) were found to contain archaeological deposits and the remaining 14 appeared to contain no archaeological deposits. Shovel pitting was thus a good technique by which to assess the archaeological potential of a site as it provided useful information regarding the presence/absence of archaeological remains. Efficient test pitting could then take place.

With respect to the raised beaches, two sites (Applecross Manse, Nead an Eoin) were identified prior to shovel pitting by the presence of surface lithics; the other sites had no previous indication of archaeology. The high number of positive determinations, five of seven unrecognised sites (71%) highlights the value of shovel pitting as a survey technique. This is something that has been seen elsewhere (Bang-Andersen 1989), but it is little used in Scotland. In this case shovel pitting helped to identify the resource of lithic material that lies hidden on the raised beaches, and to raise awareness of the value of these parts of the landscape in prehistory.

2.1.3.3 Geographical distribution

The locations of the test pitted and shovel pitted sites are shown in Table 7 (below), which also highlights the value of test and shovel pitting by sub-area. All sites with archaeology are presented in Illustration 36 (above).

Table 7

Location of sites	Number of test pitted sites	Number of shovel pitted sites	Positive evidence for past human use	
Loch Torridon	2	9	4	(36%)
Loch Carron		6	3	(50%)
North Applecross	6		6	(100%)
Mid Applecross	9	2	11	(100%)
South Applecross	13		13	(100%)
Islands	13	15	21	(75%)
Trotternish				
South Skye	1		1	(100%)
Total	44	32	59	

Table 7: Locations of test and shovel pitted sites and the contribution of the technique to the recognition of archaeological sites by sub-area

2.1.3.4 Caves and rockshelters

Illus 37: SFS 19, Toscaig 1 –

Despite the potential for skewed data because of a slight change in method, whereby caves and rockshelters were routinely shovel pitted on the islands of Rona and Raasay and also around Lochs Carron and Torridon (see above), there may be a difference in the use of caves and rockshelters around the sea lochs, in particular around Loch Torridon, where the use of caves and rockshelters is substantially less than elsewhere (Table 8, below). This is supported by the number of caves and rockshelters containing visible remains of middens, floors or walls (see Illustration 37, right).

rockshelter enclosed by wall

Table 8							
Location of caves and rockshelters	Total number of caves and rockshelters in area	Number of caves and rockshelters with visible archaeological evidence	Test pitted caves and rockshelters with visible evidence		Test pitted caves and rockshelters without visible evidence		Total number of test pitted caves and rockshelters by area
Loch Torridon	12	4	1	(16%)	5	(84%)	6
Loch Carron	17	5	1	(33%)	2	(66%)	3
North Applecross	13	9	5	(100%)	0		5
Mid Applecross	17	10	6	(86%)	1	(14%)	7
South Applecross	25	23	12	(100%)	0		12
Islands	53	25	17	(71%)	7	(29%)	24
Trotternish	3	1	0		0		0
South Skye			0		0		0
Total	140	77	42		15		57

Table 8: Archaeological remains in caves and rockshelters by area and the contribution of test pitting

2.1.3.5 Open middens

Illus 38: Open midden at SFS 100, Fraser's Croft

Four open middens were test pitted (see Illustration 38, right). In each case, test pitting enabled at least one part of the midden to be assigned to a cultural phase, but the basal layer was reached in only two sites. For two sites, thus, the midden was thought to extend substantially below the base of the test pits so that the period determination ascribed here is likely to be minimal.

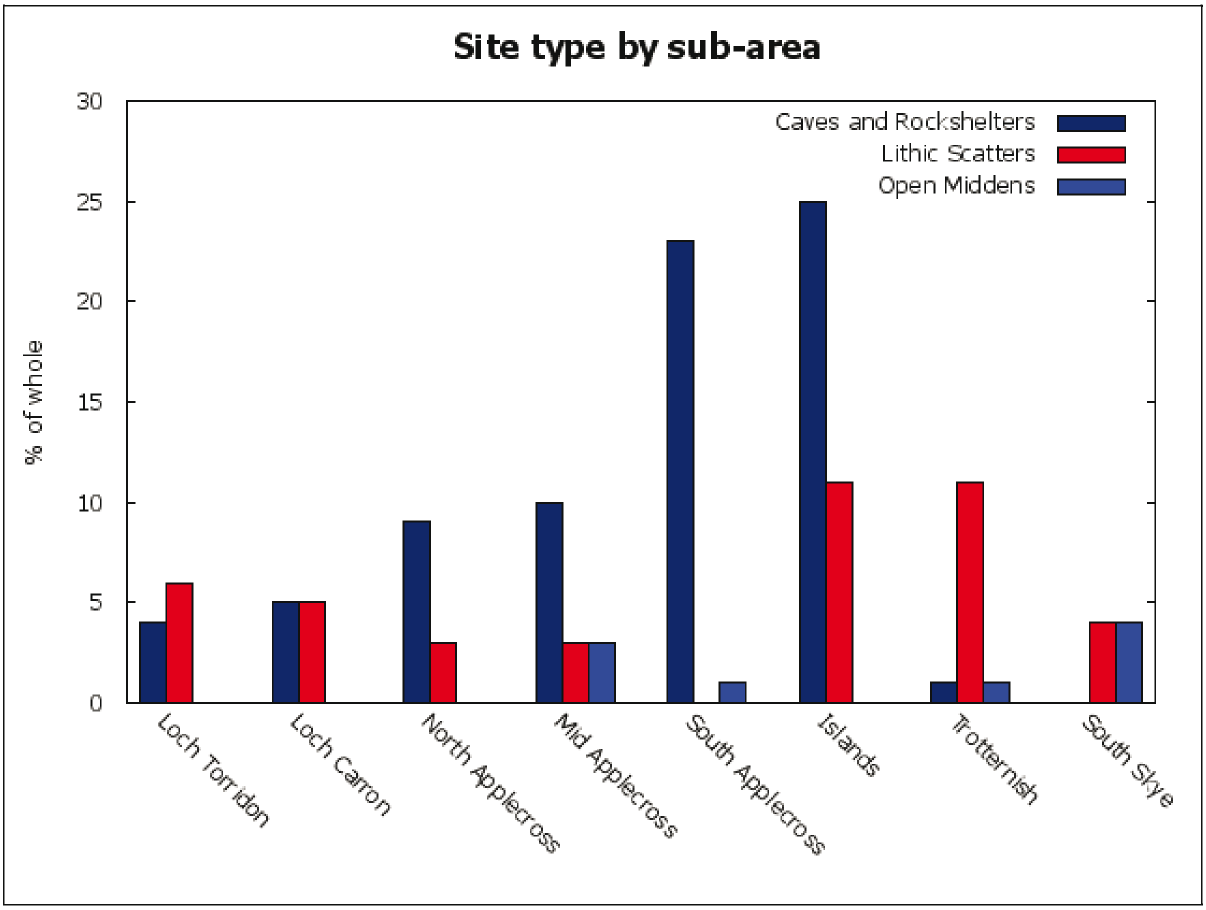
2.1.3.6 Overall distribution of sites

The distribution of sites reflects the local geology and topography (see Table 9, below; Illustration 35, above & 39, below). The coastline between Portree and Kyleakin, for example, comprises low-lying, open ground and does not contain caves and rockshelters.

Table 9					
Sub areas	Caves & rockshelters	Lithic scatters & find spots	Open middens	Total	
Loch Torridon	4	7		11	(8.5%)
Loch Carron	5	5		10	(8%)
North Applecross	9	2		11	(8.5%)
Mid Applecross	10	3	3	16	(12.4%)
South Applecross	23		1	24	(18.6%)
Islands	25	11		36	(28%)
Trotternish	1	11	1	13	(10%)
South Skye		4	4	8	(6%)

Total	77	43	9	129	(100%)

Table 9: Sites with evidence for past human use



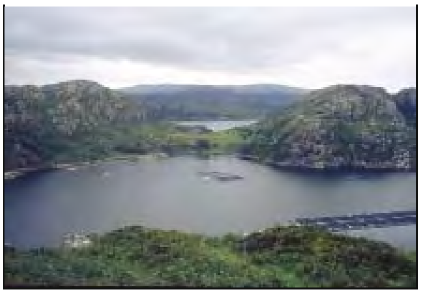
Illus 39: Site type by sub-area (in %)

To the south of An Corran, and round the coast of Skye to Kyleakin, few sites were found. This is partly due to the geology, in that the coastline between An Corran and Portree is made up of steep cliffs with few available caves and rockshelters. Only one natural landing place exists in this stretch of coastline, at Port Earlish, where a prehistoric lithic scatter site is recorded. To the south of Broadford there is a wide coastal plain. This is the busiest area of Skye today and the lack of sites here is likely to be a reflection of the destruction of archaeological sites by longstanding developments such as farming and building.

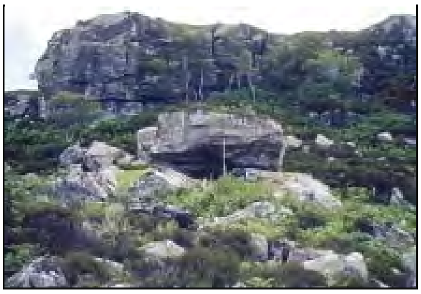
2.1.4 Loch Torridon

Loch Torridon lies at the northern-eastern corner of the survey area (see Illustration 35, above). A total of six definite prehistoric sites was found as well as two indeterminate open-air lithic sites. Two (undated) Mesolithic lithic scatter sites were already known – SFS 15, Shieldaig, near the head of the loch; SFS 9, Redpoint, on the northern tip of the loch (see Illustration 40, below). A find spot containing one prehistoric lithic artefact was also found near the northern shore of the Loch (SFS 190, Diabeg; see Illustration 41, below). A rockshelter with shell midden containing lithic artefacts characteristic of an early prehistoric date was identified halfway up the northern side of the loch (SFS 10, Allt na h Uamha; see Illustration 42, below), almost directly opposite Fearnmore (SFS 104; see Illustration 43, below), an open-air site with an extensive lithic scatter of general Mesolithic period on the south side of the loch. Additionally, an indeterminate lithic find spot (SFS 102, Ardheslaig 1) and one lithic scatter (SFS 186, The Mains) are also located near the loch shore.

Illus 40: The blow out at SFS 9, Redpoint



Illus 41: Loch Diabeg, Upper Loch Torridan, general view



Illus 42: SFS 10, Allt Na Uamha, Loch Torridon

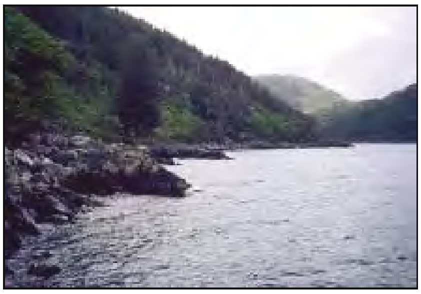
Illus 43: SFS 104, Fearnmore, general view, the site lies on the hill to the left of the small inlet

The number of sites suggests that Loch Torridon and its environs may have been quite intensively occupied in prehistory. However, the evidence does suggest some differences with that elsewhere. Although 12 caves and rockshelters were located here, only four showed any evidence for past human use (see Illustration 39, above). There are, however, six open-air lithic sites of prehistoric or indeterminate date and this suggests that activity may not have been tied to the presence of caves or rockshelters in this area.

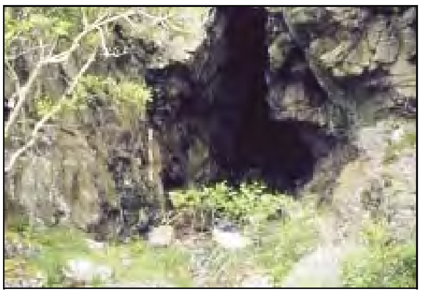
No sites later than the prehistoric period were recorded in this area.

2.1.5 Loch Carron

Of the 17 caves and rockshelters recorded in the Loch Carron sub-area, only five have evidence of use. One cave has been dated as prehistoric (SFS 171, Meall-nalh-Airde 2; see Illustrations 9, right & 44, below left), the other four are currently undated. An additional four lithic scatter sites were located in Loch Carron, all of which are prehistoric (see Illustration 45, below right) on the grounds of the types of artefact recovered. The proportion of lithic scatters to used caves is high and suggests that, in prehistory, occupation was less tied to the use of caves and rockshelters than in other places around the main Inner Sound coastline.



Illus 9: Staffin Bay opens into the heartland of north Skye



Illus 44: SFS 171, Meall-na-h-Airde 2, close up view of entrance

Illus 45: SFS 185, Achintee, general view of the raised beach on which shovel pits revealed a lithic scatter of general prehistoric date

2.1.6 North Applecross

Illus 46: The North Applecross shoreline showing SFS 58, Rubha Chuaig

Much of the North Applecross coastline is very exposed, with few natural harbours and landing places (see Illustration 46, left). Nine caves and rockshelters contain evidence of past human occupation, out of a total of 13, and two indeterminate lithic find spots were recorded. No sites were identified as early prehistoric, though one cave site contains evidence of use in later prehistory (SFS 49, Creag na h Uamha; see Illustration 47, right). The lack of prehistoric sites, despite the lack of modern development in this area, is notable and may be linked to the relatively exposed coastline.

Illus 47: SFS 49, Craig-na-h-Uamha rockshelter showing the walling across the entrance

Three cave and rockshelter sites have evidence for occupation during the medieval period or later, such as Rubha Chuaig (see Illustration 46, right), while the remaining five produced no diagnostic or datable material.

2.1.7 Mid Applecross

The sub-area of Mid Applecross centres on the main shell midden site of Sand and the modern village of Applecross. Here, both the bay at Sand (see Illustration 48, below left) and Applecross Bay offer excellent and protected environments for human settlement, and have done so since early prehistory. Seven sites were confirmed as prehistoric, two of which yielded Mesolithic artefacts (see Illustration 49, below mid left). In addition to the midden site associated with the rockshelter at Sand (dated by radiocarbon determination to the earlier part of the Mesolithic in Scotland, Section 4), a Mesolithic lithic scatter was found in Applecross Bay (undated; SFS 75, Applecross Manse; see Illustration 50, below mid right). Five other sites contain evidence of activity in prehistory: two rockshelters, two lithic scatters and one find spot.

Illus 48: General view of Sand bay, in the foreground lies the steep and active sand dune

Illus 49: The rockshelter at SFS 4, Sand

Illus 50: SFS 75, Applecross Manse Mesolithic site, lithics were first noted in the disturbance caused by a digger and the site was subsequently shovel pitted

Illus 51: SFS 99. Clachan Church. Test Pit 2, post excavation general view

Nine other sites had archaeological evidence. These include one cave, five rockshelters and three open-air sites. The artefacts and radiocarbon determinations confirm a range of use throughout history, using both open-air and rockshelter sites, including an Iron Age rockshelter, two sites with Norse artefacts (one rockshelter and one open-air midden), and medieval and post-medieval material on two more open-air sites (see Illustration 51, above right) and four rockshelters.

2.1.8 South Applecross

Illus 52: SFS 105. Uags 1, view of rockshelter and coastline

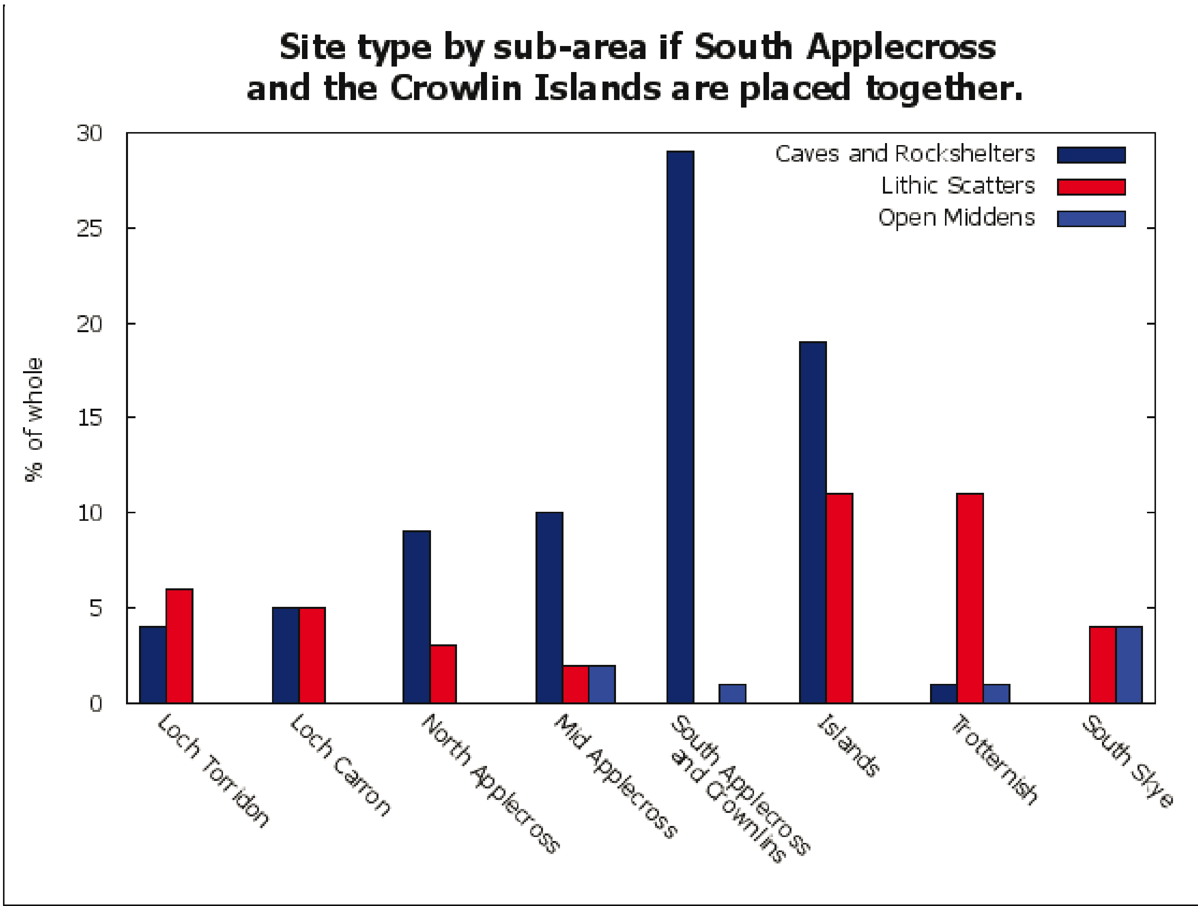
South Applecross has more sites containing evidence for past human use than any other sub-area. Interestingly, all of these are caves and rockshelters (see Illustration 52, right) except for one open midden (SFS 100, Fraser's Croft). Parts of the South Applecross sub-area, particularly around Toscaig, have more evidence of relatively recent land use and development, and this may well have affected the survival of open-air sites here. South Applecross contains several very sheltered marine environments and must have afforded a protected and resource-rich landscape throughout the past so that the apparent emphasis on cave and rockshelter sites is noteworthy and may be a consequence of a bias of preservation (see Illustration 21, in 2.1.1 Introduction, above).

Illus 53: SFS 88, Kishorn 4, internal view showing shell midden exposed on the surface

Two rockshelters have evidence indicating prehistoric activity, while eight suggest medieval or post-medieval use. All sites contain shell middens (for example see Illustration 53, left).

Though for the purposes of the SFS study the Crowlin islands were separated to be part of the islands group, they lie very close to the South Applecross coastline and show a similar level of use of caves and rockshelters to South Applecross. Indeed the pattern of site use also appears similar (see below Section 2.1.11.6). It is thus possible that the Crowlin islands should be linked more naturally into the South Applecross sub-area. Although the Crowlin islands are currently uninhabited, there is an historical basis for a link to the east as they used to be settled by previous generations of current Toscaig residents. Indeed the Crowlin islands today are farmed and fished from Toscaig.

If, therefore, the distribution of sites around the Inner Sound is re-examined with the Crowlin islands and South Applecross brought together, then this sub-area stands out for the importance of caves and rockshelters (see Illustration 54, below), particularly during the post-medieval period.



Illus 54: Site type by sub-area if South Applecross and the Crowlin Islands are placed together

2.1.9 Trotternish

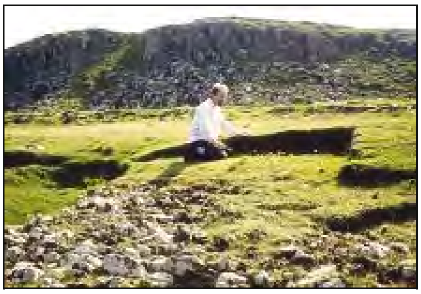
Although the Trotternish sub-area covers the whole of the north-east coast of Skye, most of the sites are focussed in a very restricted area, around An Corran, at the south end of Staffin Bay (see Illustration 55, below left. The excavated site lies among the screes in the centre background. The outcrops above the site include seams of baked mudstone which also occurs as pebble nodules in the lower screes and gravels. Flaked lithics may be picked up from exposures along the shore to the left of the picture). This is due partly to topography and partly to geology in that the coastline to the south of Staffin has few caves and rockshelters and relatively little sheltered or habitable land. In contrast, Staffin Bay provides a remarkable concentration of useful resources together with both shelter and space (see Illustration 56, below mid left; and see below. In the background lie the deposits of baked mudstone which occurs both as seams in the outcrops high up in the crags and as pebble nodules in the lower gravels).

From the perspective of the Inner Sound as a whole, An Corran and Staffin stand out because of the number of sites in the vicinity and the density of the lithic assemblages recovered there. Ongoing erosion means that flaked lithic material is still being recovered (see Illustrations 57, below mid right & 58, below right, shows the eroding turf with lithics are to the right of the coin). In all, a total of seven open-air sites has been recorded, in an arc stretching northwards along the bay, from just below the excavated rockshelter of An Corran (SFS 1; Hardy *et al* forthcoming a), which lies at the south-east of the Bay (see Illustration 10, right). All sites contain lithic artefacts generally characteristic of early prehistory (Mesolithic and/or Neolithic). The spread of the scatters means that it is difficult to define the extent of individual sites and it may be that a single large and widespread scatter has been identified in distinct places where it happens to be visible due to erosion.

Illus 10: View across the Inner Sound from Sand; the island of Raasay lies in the front of the Skye coastline

The intense use of this area in prehistory is likely to be linked to its resources. Both baked mudstone (as a primary source in local rock outcrops) and chalcedonic silica (as a secondary source in local beach and river gravels) occur here in abundance (Section 5), but the resources are not just lithic. Staffin is a sheltered bay with plentiful fresh water. There is safe, easy access to the sea and also into the Skye hinterland. It is a fertile spot, likely to have offered a variety of vegetation (see Green, Section 8.1). The An Corran rockshelter is the only accessible cave or rockshelter in the area, and it has a record of human occupation dating from the mid seventh millennium BC to the first century AD (Hardy *et al* forthcoming a).

Illus 55: View towards An Corran, from west.



Illus 56: Find spot of SFS 29, An Corran B, in Staffin Bay

Illus 57: SFS 29, An Corran B – general view of the erosion

Illus 58: SFS 29, An Corran B – close up view of eroding turf

Staffin Bay was visited on numerous occasions by the SFS survey team, particularly following an upgrade to the nearby road and consequent disturbance, as well as an increase in the use of the area by cattle. As at Scalpay (see Section 2.1.11 below), sites would appear and disappear and each visit revealed different material so that it was only through the frequency of visits to this area that such a detailed picture of the lithic distribution could be built up. This is obviously a location that should be prioritised for further work.

No sites later than the prehistoric period were recorded for this area.

2.1.10 South Skye

Illus 59: SFS 13, Strollamus 1 – general view of site

Only eight sites were found in this sub-area. This is largely due to the lack of caves and rockshelters here but, in addition, the amount of modern development in the coastlands between Broadford and Kyleakin must be taken into account. A number of caves lie in the cliffs to the north of Portree, but they are only accessible from the sea and all are washed by the sea. They were not included in the SFS survey as it was thought unlikely that any surviving archaeological deposits would be found in them. Four open midden sites were found in this area, two of which are linked to old chapel sites and are likely to be medieval (SFS 6, Ashaig 1; SFS 14, Skeabost). The midden at Ashaig 1 (SFS 6), was test pitted and has been radiocarbon dated to cal AD1240–1297 (Section 2.2). Two open oyster middens lying adjacent to house ruins are located at Strollamus (see Illustration 59, left. The midden is visible as a low mound in the background from which midden erodes in the foreground).

Two lithic scatters occur at Ashaig near to the midden site (SFS 92, Ashaig 3; SFS 93, Ashaig 4); both suggest prehistoric activity which is also supported by SFS 7 (Ashaig 2), a single find spot. The final lithic scatter, at Achnahannait Bay, once again has material that suggests a prehistoric presence.

2.1.11 Islands

The islands sub-area is made up of the islands that lie within the Inner Sound, rather than the sea lochs, and they have very individual characteristics. SFS survey work recorded a total of 18 sites in the islands, of which 13 are prehistoric and five are medieval or later. Although the islands were originally grouped together into one sub-area, it is more instructive to examine them individually.

2.1.11.1 Rona

Rona is a long, thin, rugged island that lies in a north-east/south-west direction at the northern tip of the central island chain. There is little fresh water here and it is currently intermittently inhabited by only one household. Although there is an active submarine sounding base at the northern end, employees are flown in and out by helicopter on a daily basis.

Illus 60: SFS 17, Church Cave, Rona – general view

Illus 61: SFS 17, Church Cave, Rona – view of entrance during test pitting

Twelve caves and rockshelters were visited on Rona, but only four had evidence of past human use, two had middens and one contained a wall. One of the shell midden sites (SFS 152, Doire na Guile; see Illustration 24, in 2.1.1 Introduction, above) contained a sizeable lithic assemblage and, though the lithics are undiagnostic, the balance of evidence suggests that this site is prehistoric. Only one other site (SFS 17, Church Cave; see Illustration 60, right) produced diagnostic evidence. This substantial cave was used as a church until 1912 and still contains pews, a font and an altar. A test pit revealed evidence of its use from the Iron Age onwards (see Illustration 61, left). No open-air sites were recorded on Rona.

The lack of evidence from Rona suggests that it has never been as intensively occupied as other parts of the Inner Sound. One of the reasons for this may be the lack of fresh water on the island. It is also relatively infertile and difficult of access with a mountainous interior and a steep rocky coastline. There are only two safe landing spots, Big Harbour and Dry Harbour, both on the west coast.

2.1.11.2 Raasay

Raasay, to the south of Rona, is another long, thin island; the biggest of all the Inner Sound islands and the only one with a permanent population today. Fresh water is more abundant here and, though it too becomes more mountainous towards the north (see Illustration 62, below left), it is more fertile and more easily accessible than Rona. Thirty-three caves and rockshelters were recorded here (see Illsutration 63, below middle), of which 14 contain evidence of past human use, in the form of both middens and walls.

Illus 62: The east coast of Raasay

Illus 63: SFS 136, Raasay – rockshelter

Illus 64: SFS 8, Loch a Sguirr, Raasay – showing banding in the rock

The site at Loch a Sguirr in the far north of Raasay has been confirmed as Mesolithic on the basis of both the lithics and radiocarbon determinations. This is an interesting site because it is not particularly easy to access, but is a highly visible rockshelter halfway up a cliff face on which there are striking bands of red and white rock (see Illustration 64, above right). No other sites here provided diagnostic artefacts but several rockshelters contain obvious middens that were not test pitted.

Illus 65: SFS 144, Clachan harbour – general view; the site lies in the intertidal zone

There were no open-air sites, but an intertidal site at SFS 144, Old Clachan Harbour in the south of the island, was recorded (see Illustration 65, left). This site comprises mainly environmental material: peat and the preserved remains of trees (see Illustration 66, right), but it is interesting because there is a strong local tradition that 'stone tools' were found among them. One mudstone flake was found in situ during project work, but sadly this was not diagnostic and the earlier finds could not be traced by the project. Sediment cores taken from here form the basis for detailed sea-level and environmental work (Sections 7.1 and 7.2).

Illus 66: SFS 144, Clachan harbour – close up of preserved tree trunk among the inter-tidal deposits

2.1.11.3 Scalpay

Scalpay is a relatively large, round, high island located to the south-east of Raasay, very close to Skye. It is currently inhabited by only one household. There were no cave and rockshelter sites in Scalpay, and no later sites, but an interesting concentration of open-air, lithic scatter sites was discovered. At the time of survey work, one of the SFS surveyors lived in Scalpay and it is likely that the concentration of lithic scatters here (nine) has been biased by his work. The effect of enthusiasts who find sites in the vicinity of their homes is well known (Wickham-Jones 2004a; Woodman forthcoming) and Scalpay was walked regularly over a period of four years. This intensive survey means that Scalpay provides an idea of the potential of other areas. The regular nature of work in Scalpay has also provided a vivid illustration as to how archaeological visibility in a given landscape can change from day to day. Sites were recognised as the surface cover and daily conditions altered; factors such as animal activity and the weather all play a part (see Illustration 67, right). At no time were all of the sites visible and no sites were visible all of the time. There were times when no sites were visible, while on other days much material was to be found.

Illus 67: Scalpay, general view of the location of the lithic scatters

All nine sites are prehistoric, and all but one was classified as early prehistoric. Three sites contained microliths, which confirms them as generally Mesolithic.

Though survey work in Scalpay was more intensive than elsewhere, it still took in the whole of the island on a regular basis so that the concentration of sites on the west coast can safely be assumed to represent the focus of prehistoric, probably Mesolithic, activity in Scalpay.

No other sites were found on Scalpay.

2.1.11.4 Pabay

Pabay is a small low-lying island slightly to the east of Broadford. It is currently uninhabited except for one holiday home. It has abundant fresh water and is used for grazing, with an area in the east of the island under woodland. Two sites were found here: a large shell midden in the north-east corner (SFS 51, Pabay 2) and a lithic scatter, in the south-east (SFS 50, Pabay 1). The shell midden did not contain any diagnostic material but the lithic scatter is likely to be prehistoric.

2.1.11.5 Longay

Longay is a small, high island lying to the east of Scalpay. It is rugged and has no fresh water. The vegetation is largely overgrown heather. No archaeological evidence was found here.

2.1.11.6 Crowlin

Crowlin comprises two islands linked together at low tide. Both islands are overgrown with heather and bracken, and there is a fresh water loch in the middle of the main island. There are seven caves and rockshelters, six of which contained evidence of past human use; there were no open-air sites. One site (SFS 2, Crowlin 1; Illustration 6, right: The midden at Crowlin 1 lies in the cave and, in the event, yielded historic dates suggesting that sea-level is likely to have been where it lies today) produced a small lithic assemblage, all of which was undiagnostic except for a single gunflint, as well as some undistinguished metalwork and enough organic material for four radiocarbon determinations. The latter suggests sporadic activity from the early centuries AD, throughout the historic period and into the 16th century AD.

Illus 6: SFS 2, Crowlin 1 – the relationship between sites and the sea was of crucial importance

Three other sites on Crowlin also produce evidence for post-medieval occupation (SFS 22, Crowlin 3; SFS 23, Crowlin 4; SFS 26, Crowlin 7). All contained undiagnostic lithics, though only Crowlin 3 produced a sizeable assemblage (60 pieces). A variety of other finds, including glass and metalwork, was recovered from the sites (Section 2.2). As a group the Crowlin sites are interesting not only because they produced coherent evidence for later activity, but because they yielded by far the best body of evidence relating to the use of firearms, in the form of shotgun pellets, pistol balls and gunflints, as well as strike-a-lights. Other metal finds at Crowlin 3 related to small-scale metalworking, perhaps involving boat repair.

Crowlin is not a fertile place, though it does provide shelter and easy access to the mainland of Scotland. The nature of the evidence suggests that its caves and rockshelters were in demand in historic times and it is not hard to imagine that it might have provided a safe base for groups such as poachers or Jacobites who wished to avoid the gaze of local authority.

2.1.12 Use of caves and rockshelters

Many of the caves and rockshelters with no evidence for past use were uninhabitable at the time they were visited (Table 10, below), though it is important to remember that elements such as sea ingress and waterlogging vary with time. In one case, a shell midden was clearly visible beneath the fresh water within a rockshelter (SFS 170, Meall-na-h-Airde 1).

Table 10	
Inaccessible	1
Too small	1
Wet or water filled	14
Sea ingress	7
Too exposed	1
Total	24

Table 10: Natural explanations for caves and rockshelters with no archaeological evidence

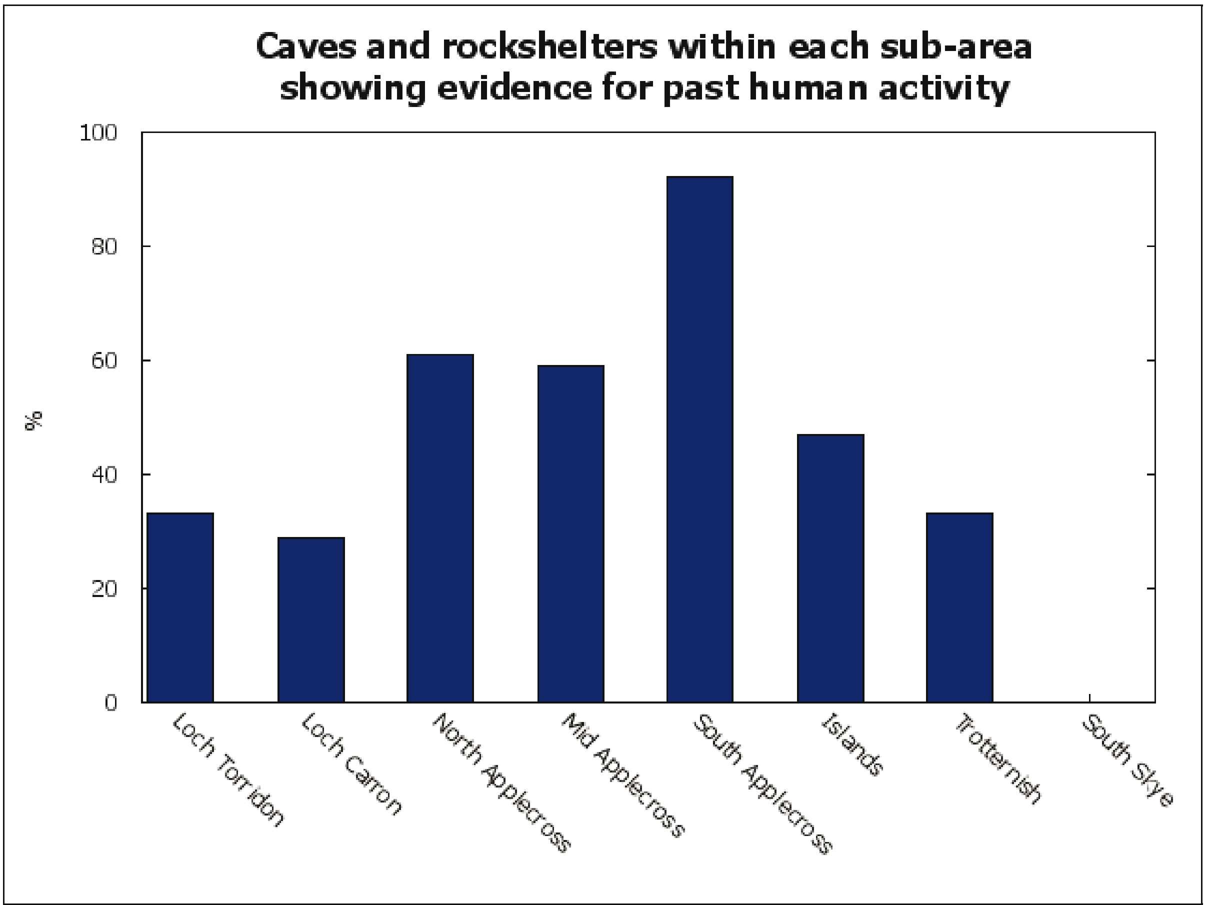
Even within areas of naturally occurring caves and rockshelters their use is uneven (see Table 11, below; Illustration 68, below). The sea loch coastlines of Loch Carron and Loch Torridon, for example, have potential sites that are both dry and of a good size but they were less frequently selected for use than other types of site. In contrast, in South Applecross almost every cave and rockshelter contained evidence of past human use.

Table 11

Location	Number of caves/rockshelters	Number of caves/rockshelters with evidence of past human occupation	Percentage with evidence for past human occupation
Loch Torridon	12	4	33

Loch Carron	17	5	29
North Applecross	13	9	69
Mid Applecross	17	10	59
South Applecross	25	23	92
Islands	53	25	47
Trotternish	3	1	33
South Skye	0	0	0
Totals (579)	140	77	362

Table 11: Past human use of caves and rockshelters, by sub-area



Illus 68: The percentage of caves and rockshelters within each sub-area that show evidence for past human activity

Examination of the islands shows that, in the Crowlin islands, proportionately more caves and rockshelters have evidence for use than the main mid islands of Raasay and Rona (see Table 12, below). This is interesting because Crowlin lies adjacent to the South Applecross coast which it mirrors. The similarity between the occupation levels of caves and rockshelters in South Applecross and the Crowlin islands (see Tables 11, above & 12, below) suggests that they should be considered as one coherent geographical unit. This is supported by the similarity of evidence from the two areas both of which contain mainly post-medieval sites.

Table 12

Location	Number of caves/rockshelters	Number of caves/rockshelters with evidence of past human use	Percentage with evidence of past human use
Crowlin	7	6	86%

Raasay	31	13	42%
Rona	12	4	33%
Totals (73)	50	23	

Table 12: Caves and rockshelters with evidence for past human use in islands

The evidence shows clearly that caves and rockshelters have been used throughout the period of human settlement around the Inner Sound from the earliest times to the present day (see Section 2.1.13 below). Not surprisingly some sites have evidence of repeated, if sporadic, use.

2.1.13 Relative age of sites

Seventy-two sites contain lithic material; 45 of these can be confirmed as generally prehistoric, while 27 are undiagnostic. These sites occur in all of the survey areas (see Table 13, below). It is clear that the islands and Trotternish have more prehistoric material than elsewhere, though this may have been biased by the more intensive survey methods here. Only sites that contained microliths were classified as Mesolithic, other prehistoric assemblages were separated into those that appeared to be early prehistoric (Mesolithic / Neolithic) and those that appeared to be prehistoric but without a specific date. Within the Mesolithic it is as yet impossible to separate sites that fall within the earlier part of the period from those relating to the later Mesolithic in Scotland without secure radiocarbon dates (Section 9) so that only a general Mesolithic affiliation can be given to most of the SFS sites.

Table 13

Location	Number of microlithic sites	Number of early prehistoric sites	Number of indeterminate prehistoric sites	Total number of prehistoric sites
Trotternish	4	1	5	10
South Skye			3	3
Loch Carron			5	5
South Applecross			2	2
Mid Applecross	2		4	6
North Applecross				
Loch Torridon	4		2	6
Islands	4	5	4	13
Totals	14	6	25	45

Table 13: Prehistoric sites by sub-area

Stone tools are obviously a common find on earlier prehistoric sites, but the presence of lithics is not a secure indicator of a prehistoric date, so that the number of sites with lithics is greater than the estimate of early sites. Flint and other lithic materials have been used on an occasional basis until well into historic times, for example to make strike-a-lights. Pieces that are not culturally diagnostic are therefore of little help in dating a site. It is, however, interesting to note that a prehistoric lithic presence has been identified in every sub-area except North Applecross (see Table 13, above).

The use of caves and rockshelters is clearly not limited to the prehistoric period in the survey area. Table 14 (below), highlights the later human presence. This table suggests that a concentration of medieval and post-medieval sites occurs in mid and South Applecross. This ties in with work by Hardy (2002; 2003), Tolan-Smith (2001) and Mercer (1978), who have all identified the use of caves and rockshelters in more recent periods.

Table 14

Location	Iron Age	Medieval	Later medieval and historic

Trotternish			
South Skye			
Loch Carron	1		
South Applecross			7
Mid Applecross	1	4	4
North Applecross		2	1
Loch Torridon			
Islands	1	2	3
Totals (26)	3	8	15

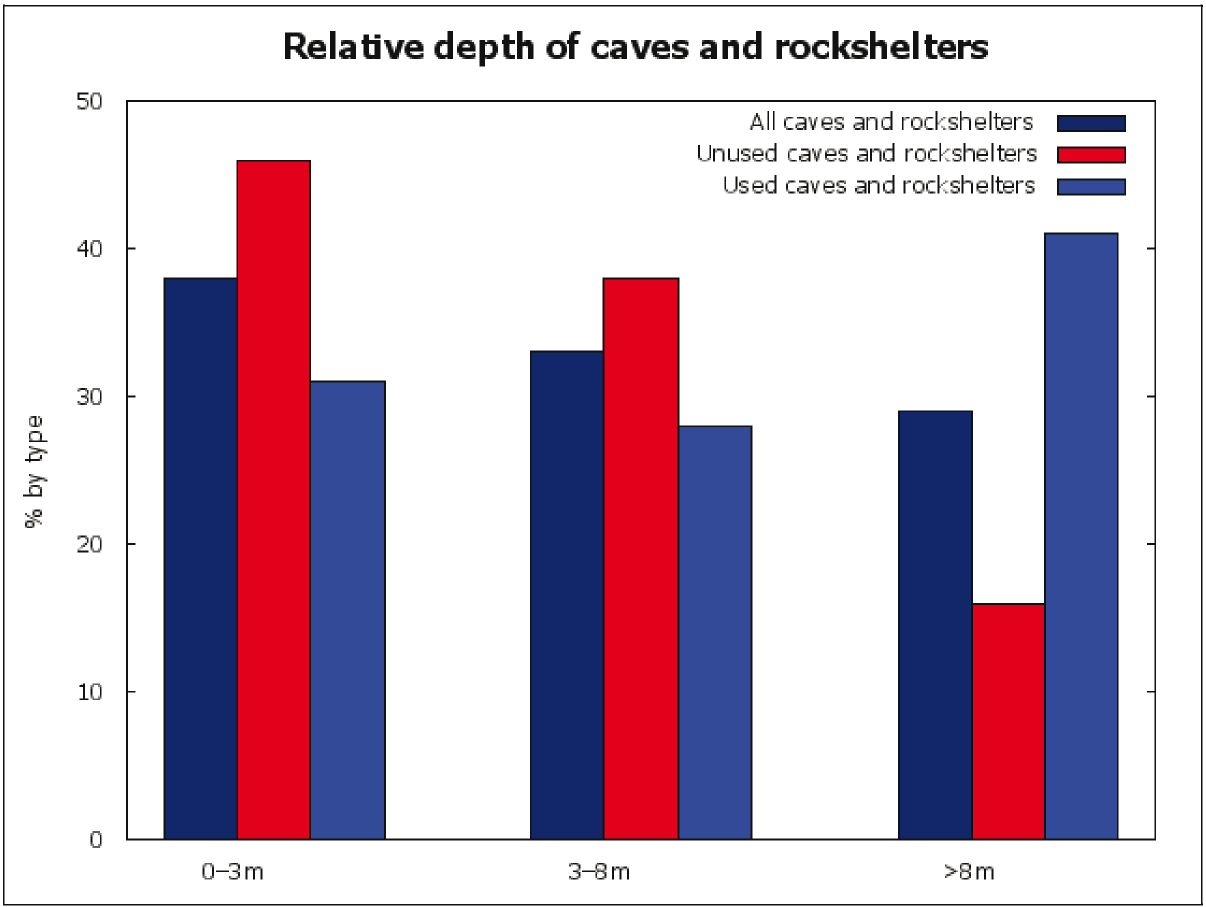
Table 14: Later and post prehistoric sites by sub-area

2.1.14 The selection of caves and rockshelters

Various aspects of the used caves and rockshelters can be examined by comparing them to the entire assemblage of caves and rockshelters. This enables the assessment of preferences in the past selection of caves and rockshelters.

2.1.14.1 Size: Cave and rockshelter depth

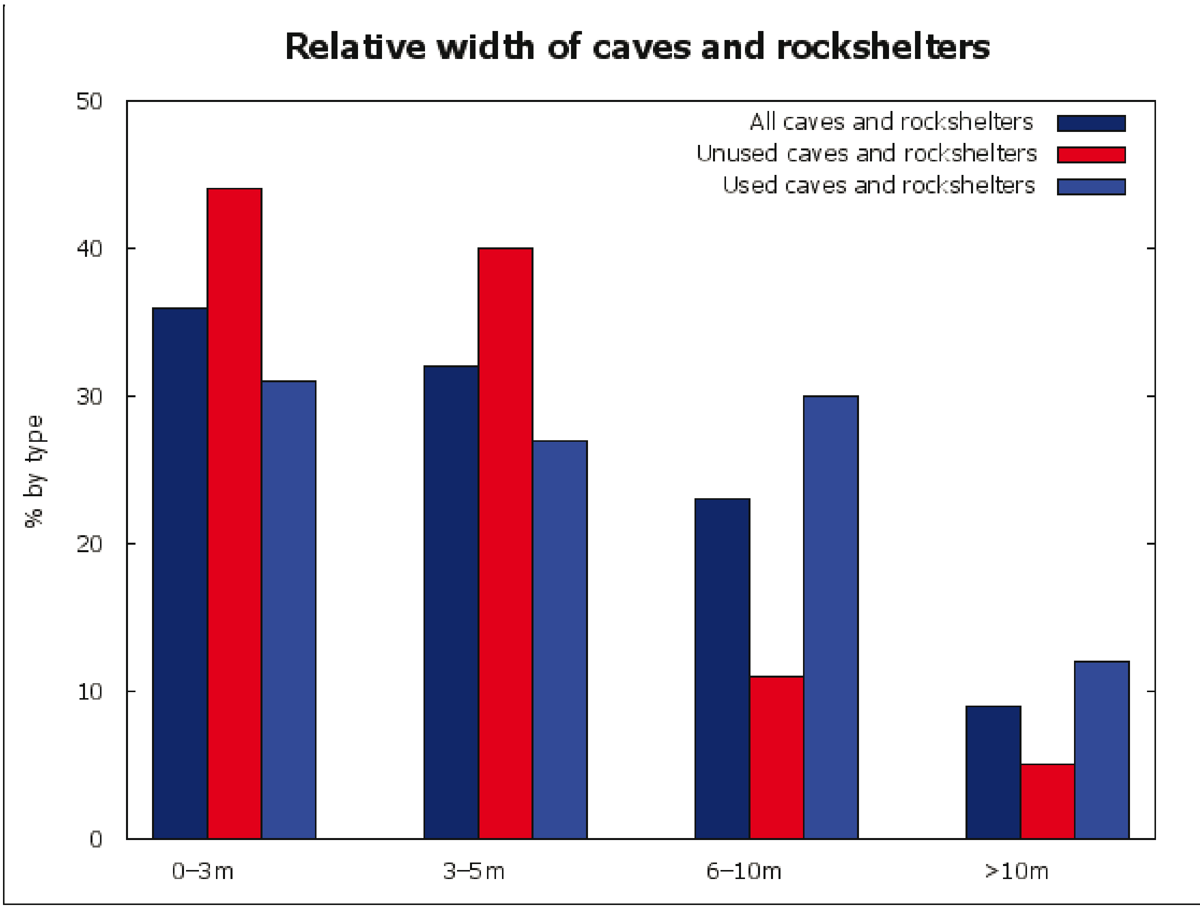
Illustration 69 (below) suggests that while sites of any size were selected for use, where possible people seem to have chosen sites that extended deeper into the hillside. This could also be influenced by enhanced preservation in deeper sites.



Illus 69: Relative depth of caves and rockshelters

2.1.14.2 Size: Cave and rockshelter width

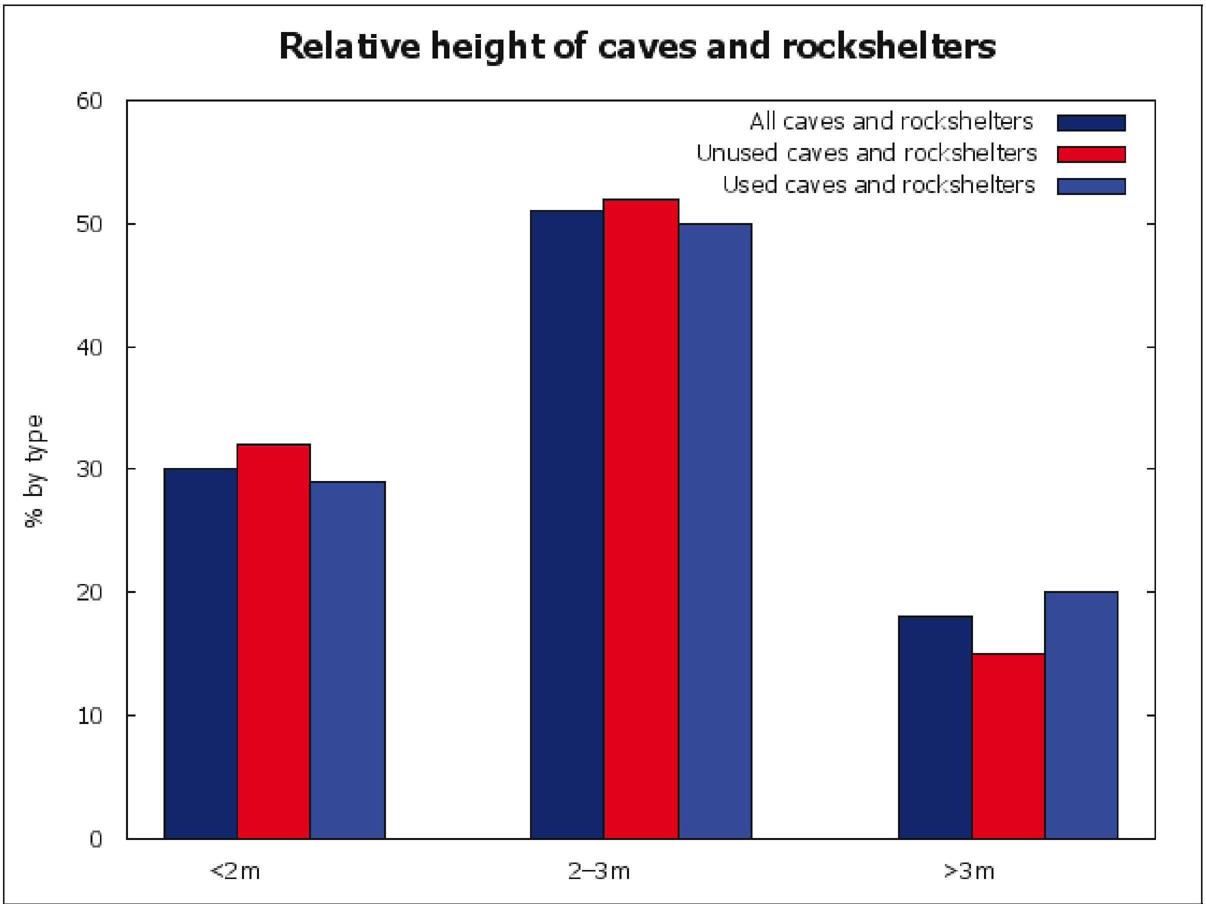
Illustration 70 (below) also suggests that, though sites of any size may be selected for use, there is a clear preference for larger caves and rockshelters.



Illus 70: Relative width of caves and rockshelters

2.1.14.3 Size: Cave and rockshelter height

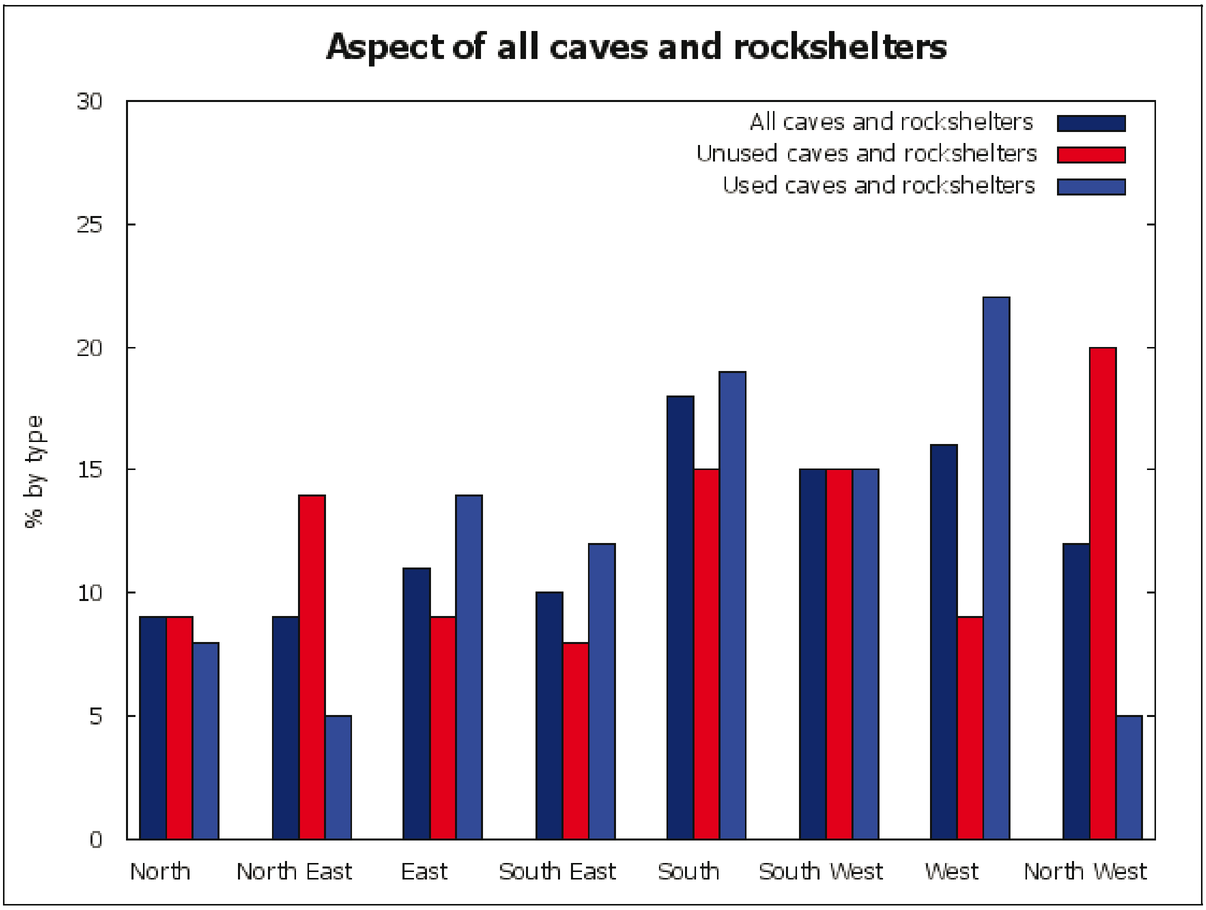
Illustration 71 (below) suggests that, though the height of a cave or rockshelter had very little influence as to whether or not a site was selected for use, there is a slight preference against low caves and rockshelters.



Illus 71: Relative height of caves and rockshelters

2.1.14.4 Aspect

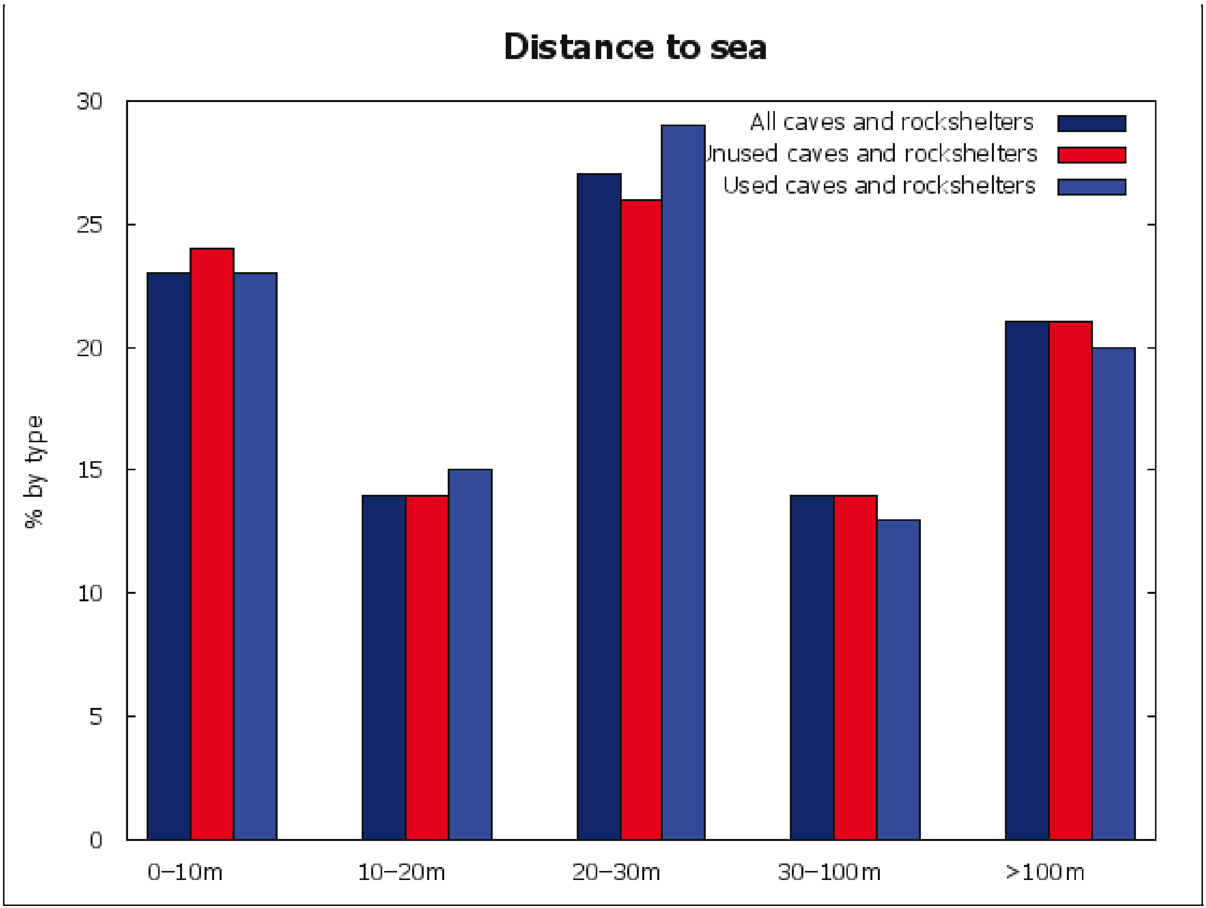
Aspect was defined as the direction faced from the mouth of the cave or rockshelter. This is interesting because it shows, perhaps not surprisingly, a very clear preference for sites that get more sun (see Illustration 72, below). Caves and rockshelters that face west, south, south-east and east were preferred. Sites that face north, and particularly north-east and north-west, were much less likely to be used.



Illus 72: Aspect of all caves and rockshelters

2.1.14.5 Distance to sea

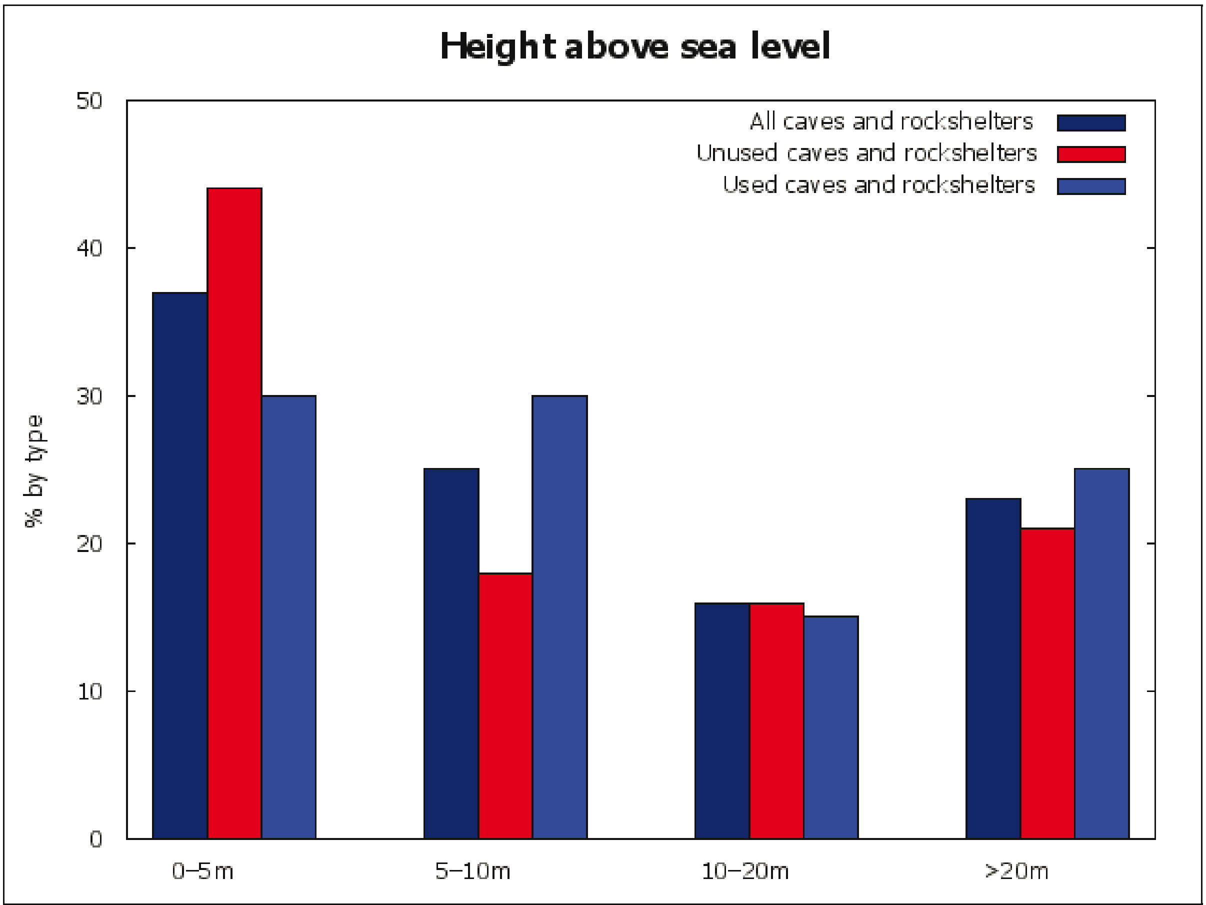
Illustration 73 (below) suggests that distance to the sea was not a strong criterion for cave and rockshelter selection.



Illus 73: Distance to sea

2.1.14.6 Height above sea-level

Illustration 74 (below) suggests that a selection for sites between 5 and 20m OD is apparent, though this may also have been influenced by the washing out of lower sites at times of relatively higher sea-level.



Illus 74: Height above sea-level

2.1.14.7 Discussion

The evidence suggests that the use of caves and rockshelters was subject to certain simple criteria. Caves and rockshelters that are deeper and wider were more likely to be selected for use, though height is less important. The distance to the sea was not an important criterion, but sites that lie below 5m above sea-level are less likely to have archaeological remains. This criterion should be viewed with caution, however, because these low sites may well have been washed out by the sea at some point. Light was also a factor and sites that face west, thus getting the long afternoon and evening sunlight, were particularly likely to be selected, while south- or east-facing sites were also commonly chosen. Locations that are very small, face north, north-east, or north-west, and lie close to the sea are least likely to contain archaeological remains.

2.1.15 The location of open-air sites

Lithic scatters occur in all sub-areas except South Applecross. Concentrations occur in Trotternish and Scalpay. Though the sites at Trotternish are likely to represent a genuine focus due to the raw material sources here, the concentration in Scalpay and the high success rate following the shovel pitting of raised beaches is interesting and suggests that more intensive or invasive survey methods are of value for locating scatter sites. It also suggests that scatter sites are likely to occur in higher numbers elsewhere within the research area. This has implications for any assessment of prehistoric population and landscape use. Based on the evidence from the lithic scatters, it is reasonable to propose that the prehistoric population of the area was widely spread across the landscape and may well have been greater in numbers than previously thought. It is likely that use of the Inner Sound in prehistory was both intensive and diverse.

Of the nine open middens recorded, five are of medieval or later age and the remaining four are directly linked to church sites. None are recorded as Mesolithic.

2.1.16 Threats

Threats to the sites were recorded according to Historic Scotland's coastal survey threat categories (Ashmore 1994).

Table 15 (below) shows that, while over half of the archaeological deposits in caves and rockshelters appear to be stable, the lithic scatter sites are far more vulnerable, as are the open midden sites. Almost every lithic scatter and open midden for which threat was recorded is currently eroding. Together these sites represent an irreplaceable resource that is clearly at risk.

Table 15

Erosion categories	Caves / rockshelters		Find spots, lithic scatters		Open middens	
Accreting, and definitely eroding	22	(31%)	32	(76%)	7	(88%)
Eroding or stable	8	(11%)	3	(7%)	1	(12%)
Stable	37	(51%)	4	(10%)	0	
No data	5	(7%)	3	(7%)	0	
Totals (122)	72		42		8	

Table 15: Threat catagories

2.1.17 Discussion

Although SFS was targeted at an understanding of the Mesolithic period, the interpretation of survey work for Mesolithic sites is notoriously imprecise, especially in Scotland. The ground surface of the Mesolithic is rarely visible, and fieldworkers are subject to both local ground conditions and the weather, both of which may change from day to day (Mithen 2000). In order to gain a detailed understanding of Mesolithic sites in a landscape, survey needs to be a long-term commitment with visits planned at different times of the year and following different weather, particularly heavy rain. This is something that has been confirmed by other projects (Mithen 2000; Richards 2005).

Illus 12: North Applecross coastal scene by Lonban looking south down the Inner Sound. SFS survey work involved walking landscape such as this.

The SFS survey was primarily undertaken by walking across the landscape and looking for material. Illustrations 12, (right) shows later settlement and cultivation remains. The present landscape is an amalgam that has been shaped by the interaction of past physical, economic and environmental change. The Cuillins of Skye lie across the Inner Sound in the background (see also Illustration 75, below left). This proved very effective for the location of caves and rockshelters and also in identifying lithic scatters. As noted above, however, the lithic sites found in this way reflect only those that were visible on the day of survey. Sites recorded thus reflect an unknown percentage of the original number of sites. To supplement this, test pitting and some shovel pitting were undertaken (see Illustration 76, below right). Together with the more intensive and repeated surveying of two specific areas, notably Scalpay and Staffin Bay, these indicate that many more sites are likely to exist. In this way, though the project has undoubtedly led to a better understanding of the human history of the landscape, it is difficult to quantify early settlement across the study area.

Illus 75: The coast at Toscaig gives an idea of the variety of landscape encountered by the surveyors

Illus 76: SFS 75, Applecross Manse: shovel pitting and dry sieving

Illus 77: SFS 152, Doire na Guaile, Rona: test pitting; test pits could only sample a site

An assessment was made of the value of the test pitting and shovel pitting as archaeological techniques. The aims of the test pitting programme included the recovery of information on site preservation, and diagnostic or datable material and it certainly produced a range of finds from many sites, from different archaeological periods and including much datable material. While test pitting was invaluable to highlight the broad sweep of human use of caves and rockshelters across the area, it did, however, have its limitations.

From a total of 44 sites test pitted, 41 contained archaeological material. Of these, 38 were either radiocarbon dated or contained diagnostic material, or both. While it was well worthwhile as an indicator of human activity, test pitting could not, however, provide a full picture of the archaeology of a site. Spatially, test pits only sampled a small proportion of any one site (see Illustration 77, above right) so that it only provided a partial view of the archaeology, and in 23 cases (27% of all test pits dug), the SFS test pits did not reach the basal layers. This was normally due to roof fall which prevented further excavation. Test pitting is thus a useful technique by which to provide preliminary information about a site in advance of (or instead of) full-scale excavation as long as its limitations are fully understood (and see below).

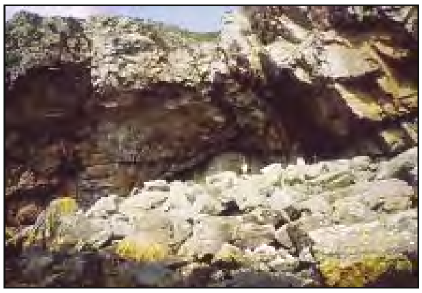
Although it was more limited in extent than the test pitting, shovel pitting also proved to be a useful technique, though in a different way. With regard to raised beach areas, shovel pitting was very successful at providing information on early prehistoric sites, in particular regarding lithic sites where no surface evidence was visible (67% hit rate). This is a particularly useful result as lithic scatters rarely leave surface traces in areas of pasture or wild land such as north-west Scotland and the use of geophysical techniques or aerial photography is in its infancy for these sites (see Finlay, Section 3.17; McCullagh 1989). Shovel pitting is labour-intensive and time-consuming, but it clearly has great potential, both within the SFS study area and outside it. Around the Sea Lochs and in Applecross, the high success rate of this method suggests that many more sites await discovery, especially given the small sample size examined.

In caves and rockshelters, shovel pitting was found to be a good way to assess the presence or absence of archaeological deposits. It was less successful in providing cultural or chronological information, and achieved this at only eight sites out of 35. In more remote areas, the shovel pitting of rockshelters and caves that appeared of archaeological potential proved to be very useful in assessing the presence of archaeological deposits and potential for further work. Although it was of limited value in determining the age of a site, shovel pitting eliminated the need for further visits on numerous occasions.

Dating posed a common problem with regard to the interpretation of the survey and test pitting work. This was not only because of the limited information derived from some test and shovel pitting. In some cases the radiocarbon determinations do not correspond with the diagnostic material from a site (for example SFS 66, Ard Clais Salacher 2). While this emphasises the repeated re-use of caves and rockshelters which thus leads to a build up of deposits, it does highlight the limitations of keyhole techniques for the full unravelling of the complex human histories of sites like these.

The survey has produced definitive cultural determinations for a total of 68 sites. Of these, 48 are confirmed as prehistoric, out of which 19 can be assigned to the Mesolithic or early prehistory. Twenty-four sites were found to contain material diagnostic of the medieval or post-medieval period. The total number of cultural assignations is higher than the total number of sites as several sites had diagnostic deposits from more than one period.

Archaeologically, though the deposits in caves and rockshelters can be protected to a certain extent, it was found that other factors such as rock fall and later use had often mixed the deposits, so that work was rarely simple (see Illustration 78, right). With regard to the Mesolithic sites, though caves and rockshelters were clearly often used, there are specific processes relating to the early Holocene environment that have posed their own problems for archaeologists (for example the build up of rock fall from roof collapse; Ballantyne 2004). These problems are compounded by an increase in current activity at many sites. The popularity of the area, easy access and an increase in passing boat traffic have all led to an increase in modern disturbance that includes the lighting of fires and rearrangement of stones and walling for barbecues and shelter.



Illus 78: SFS 2, Crowlin 1: interior view showing rockfall. The archaeological deposits lie among the rocks

With regard to the caves and rockshelters that had evidence of past human use, certain preferences were identified that could be used as indicators in future survey work to assist in the detection of sites likely to have been used. The clearest indicator of all was that positive selection was taking place, in all periods, for sites that received more sun. Sites that lay in full shade or right down at sea-level were more likely to be smaller or totally avoided. These factors are unsurprising but they do create a link to the past inhabitants of the Inner Sound who shared many basic human needs with those of today.

It is also important to remember that many of the caves and rockshelters with no surface evidence of past human use may have deposits. Bedrock was only visible in a few cases and sites like Sand are a useful reminder that the absence of surface evidence is not always an indication of archaeological sterility.

SFS information on the use of the Inner Sound during the later prehistoric and more recent periods targeted the use of caves and rockshelters and open-air middens. Sites that may be specifically dated include two sites in Mid Applecross with evidence of Norse settlement (SFS 77, Camusteel 2; SFS 96, Meallabhan), while there are many sites around the Inner Sound that contain material from the medieval and later medieval periods.

Of course, caves and rockshelters form only a part of the suite of later sites that exists around the Inner Sound. South Applecross and the Crowlin islands stand out for the emphasis on cave and rockshelter sites in the medieval and post-medieval periods. The evidence here suggests that they continued to be a useful human resource into recent times. There is clearly a range of possible uses, from storage and workshops to overnight shelter. There is a concentration of finds relating to firearms and metalwork in Crowlin which may have its own explanation in the sheltered and secluded nature of the sites here, while still allowing easy access to both sea routes and the Mainland.

Around the Inner Sound many caves and rockshelters have been enhanced by walling (see Illustration 79, right), perhaps suggesting more permanent use for stock or domestic purposes. In addition, almost 60 sites contain shell middens, many of which were not examined so that their period is unknown. Although SFS information does not always allow precise determination of the use of a site (and many will have changed through time), it does emphasise the importance of this oft neglected resource.

Illus 79: SFS 114, Fergus' Shelter: a series of rockshelters that have been enhanced with a long stretch of walling at the break in slope, below the entrances

Interestingly, the results suggest that caves and rockshelters were less likely to be used around the Sea Lochs in any period. No clear reason for this emerged from the SFS work, and it is likely that reasons will have changed with time. It is possible that the slightly more sheltered environment of the Sea Lochs meant that refuge from the elements was less important as a factor in site choice. Equally, the increased emphasis on open-air sites here may reflect different activities or seasonal sites to those around the outer coastlines. Of the caves and rockshelters in this area with information on period, very few have evidence from early prehistory.

The success of the SFS survey and test pitting programmes lies in highlighting a substantial prehistoric presence in the area and the extensive use of caves and rockshelters, not only early on but also into the post prehistoric period. Although this has been recognised elsewhere in Scotland (Mercer 1978; Tolan-Smith 2001; Hardy 2002; 2003), their use in more recent times has not been well studied. Hopefully this project has highlighted the need to incorporate caves and rockshelters into future assessments of landscape use, whatever the time period.

The survey has shown that there is a substantial early prehistoric presence around the Inner Sound. In a few locations there is a concentration of early prehistoric sites that may reflect both a more intensive use of an area, such as near the raw material sources at Staffin Bay, or may be the result of more intensive survey, such as on the west coast of Scalpay. Elsewhere, in many cases, specifically Mesolithic material was lacking though small numbers of undiagnostic lithics occurred amongst deposits of a later date. The problems of getting detailed information from all sites are discussed above and mean that many of these unspecific lithic assemblages are likely to reflect prehistoric activity, while some will be Mesolithic. The sites recorded thus reflect only the tip of the prehistoric iceberg around the Inner Sound. In addition, numerous middens and other cave and rockshelter sites remain to be characterised.

The continuation of the use of lithics well into the historic period is another point of interest. On excavations of historic sites, occasional lithic finds tend to be marginalised or even thrown away. The results of the SFS project have provided a comprehensive body of information regarding later sites with flint strike-a-lights and other lithic finds that shows clearly that lithics continued to have a role in everyday life well into the post-medieval period, which cannot be ignored.

With regard to the early prehistoric period, the distribution of surveyed and test pitted sites provides a picture of use that covers the Inner Sound, with increased densities of activity at the south end of Staffin Bay, up Loch Torridon and Loch Carron, on the mid islands and in Mid Applecross. This is of course only a partial picture, as discussed above. However, it provides a framework for future work, and does already show an unexpected density of sites (see Illustration 80, right). From a patchy start with three known Mesolithic sites, the project has been able to show that this area provided the focus of settlement for a dynamic population in early prehistory.

Illus 80: The bay at Coire Sgamhadail, location of several rockshelters (SFS 89–90), with evidence for both prehistoric and historic

Furthermore, it is worth noting that the Inner Sound does not stand out with regard to resources or topography. The west coast of Scotland has a favourable resource base that stretches well beyond the bounds of the SFS study area. The work of SFS has provided an unusually detailed archaeological picture of this small area and this is matched wherever equivalent archaeological work has taken place, for example the southern Hebrides (Mithen 2000; Hardy 2002, 2003). Although Scotland has often been regarded as sparsely settled in the Mesolithic (Smith & Oppenshaw 1990; Smith 1992), the sites recorded around the Inner Sound and in other locations surely suggest that Mesolithic population levels, for the west of Scotland at least, should be increased from previous estimates.

activity

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with contributions by Steve Ashby (bone comb report), Phil Austin (charcoal), Ann Clarke (coarse stone tools), Fraser Hunter, Andrew Heald & David Caldwell (metal and glass), Ann MacSween (pottery), Nicky Milner (shellfish), Jacqui Mulville & Adrienne Powell (animal bone), and Rachel Parks (fish bone).

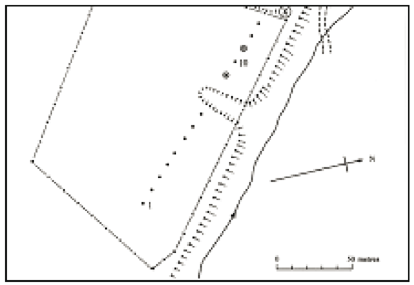
This section provides information on all sites where artefactual material was recovered. It includes sites that were test pitted, shovel pitted or sites where surface collections took place. It does not include sites with surface midden that were not test pitted. These are listed in the catalogue of all sites (Appendix 1) and discussed in Section 2.1.

2.2.1 SFS 185: Achintee, Strathcarron, NGR NG 9430 4180

Type of Site: Open-air lithic scatter site
SFS Record: 2002
Survey Area: Loch Carron
Size: Unknown
Aspect: North-west
Height OD: 20m
Ground Cover: Grass/boggy
Distance to Sea: 300m
Distance to Fresh Water: On-site
Threats: Ploughing/grazing
Description: A lithic scatter located on a massive river terrace (20m OD) to the south-east of the river delta at the point where the River Taodail and the Allt an t-Sagairt join the River Carron (see Illustration 45, right; raised beach on which shovel pits revealed a lithic scatter of general prehistoric date)
Archaeology: Shovel pitting

Illus 45: SFS 185, Achintee, general view of the raised beach

Two transects of 12 and 18 shovel pits were laid out in adjoining fields (see Illustration 81, right). Achintee has not been ploughed in recent memory and no beach material was found. A well-sorted plough soil 90–300mm deep overlay the river gravels.



Illus 81: SFS 185, Achintee: plan of shovel pits

Finds

Lithics: There were three lithic finds: two regular flakes (one of bloodstone and one of chalcedonic silica) and one piece of bloodstone debitage. These pieces formed a distinct group on a slightly raised section of the terrace, though they were few in number. Not far away, Shovel Pit 30 produced a heavy concentration of charcoal at the interface between plough soil and the underlying deposit.

Discussion

The lithics and charcoal suggest that activity has taken place at Achintee in the past, probably in prehistory. The lack of material suggests that the archaeological potential of the site is limited.

2.2.2 SFS 95: Achnahannait Bay, NGR NG 5140 3755

Illus 82: SFS 95, Achnahannait Bay, general view of site, the area of erosion in middle of the photo

Type of Site: Open-air lithic scatter site
SFS Record: 2000
Survey Area: South Trotternish, Skye
Size: Unknown
Aspect: North-east-facing
Height OD: 10m
Ground Cover: Grass
Distance to Sea: 25m to north-east; open pebble beach
Distance to Fresh Water: 25m to south-east
Threats: Erosion is occurring along the cliff edge and there is a danger of additional damage due to animal pressure as this is an area of enclosed grazing
Description: A small lithic scatter located on eroding edge of a raised beach above a small bay (see Illustrations 82, right; and 83, lower right)
Archaeology: Surface collection

Finds

Lithics: There were four lithic finds: Three regular flakes of chalcedonic silica and a debitage flake of baked mudstone. Collection was made during survey and all finds came from the surface.

Illus 83: SFS 95, Achnahannait Bay, general view of site and surroundings

Discussion

The lithics suggest human activity, probably in prehistory.

2.2.3 SFS 68: Allt na Criche, NGR NG 6828 5037

Illus 84: SFS 68, Allt na Criche, general view of site

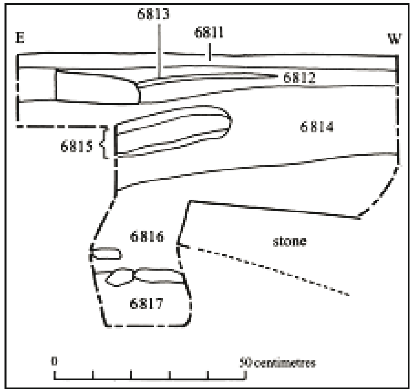
Type of Site: Multiple rockshelters with midden
SFS Record: 2000
Survey Area: Mid Applecross
Size: Various
Aspect: North-facing on a 30° slope
Height OD: 50m
Ground Cover: Grass and bracken
Distance to Sea: 150m to the north-west; shelving rock
Distance to Fresh Water: 200m to the south-east

Illus 85: SFS 68, Allt na Criche, general view during

Threats: Both accreting and eroding, excavation
animal grazing and use of shelters
Description: An extensive area of sandstone gullies, platforms and rockshelters at a height of at least 30m OD (see Illustrations 84, left; and 85, right). A minimum of five small shelters was recorded, with varied aspects but spatially close together. Shell midden and lithics were visible on the surface at two of the shelters
Archaeology: Survey, test pitting

Three test pits were excavated here in two overhangs and on an open terrace some 10m away.

Test Pit 1: (1m×0.5m). This test pit (aligned east—west) was excavated on top of a possible artificial platform formed by an arc of grass-covered stones outside a north-facing rockshelter. The shelter itself is 1.5m high×2m wide×1.5m deep. Crushed shells were visible on the grass and clover surface prior to excavation.

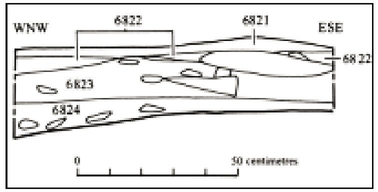


Illus 86: SFS 68, Allt na Criche: Test Pit 1, north-facing section

- Context 6811 Daisies and grass
- Context 6812 Broken shells in a black peaty matrix
- Context 6813 As 6812 with a mid brown matrix
- Context 6814 Periwinkles in a black peaty matrix
- Context 6815 Laminated ash lenses within 6814
- Context 6816 Brown silty sand and cobbles

The top four contexts are all part of an occupation zone comprising artefacts, shells, crushed shells, ash lenses and periwinkles in variations of peaty matrix. Context 6816 is possibly a construction layer associated with the building of the platform. Bedrock was not reached in this trench due to the presence of large stones (rockfall?), which hindered further excavation (see Illustration 86, above right).

Test Pit 2: (1m×0.5m) was positioned in a separate rockshelter some 15m to the west of and facing the first. The shelter faces east and is of a similar size to that on the site of Test Pit 1. The test pit was aligned WNW—ESE.



Illus 87: SFS 68, Allt na Criche: Test Pit 2, South-west-facing section

- Context 6821 Turf
- Context 6822 A thin shell midden of periwinkles and limpets
- Context 6823 A layer of black silty sand and angular cobbles
- Context 6824 Clean sand and cobbles
- Context 6825 Bedrock
- Context 6822 is part of an occupation zone containing midden material with finds. This lies on a natural beach directly overlying bedrock (see Illustration 87, right).

Test Pit 3: (1m×0.5m) was positioned on an open west-facing slope between a small rockshelter and an area of surface shells some 10m to the south of Test Pit 1 but separated from it by a ridge of sandstone bedrock and jumbled slabs (see Illustration 88, right).

- Context 6831 Turf and jumbled surface cobbles
- Context 6832 A series of turf-lines and occasional stones indicating gradual accumulation of material
- Context 6833 A layer of natural sand, probably beach-derived
- Context 6834 Bedrock

The stratigraphy of Test Pit 3 was natural. There was no shell midden or other sign of human activity within any of the contexts but the presence of shells at the surface nearby suggests that activity took place somewhere close.

Illus 88: SFS 68, Allt na Criche: Test Pit 3

Finds

Lithics: There were 59 lithic finds from two test pits (Test Pit 1 and Test Pit 2; Table 16, below). All were of chalcedonic silica or quartz. Interestingly, Test Pit 1 yielded mainly regular flakes while Test Pit 2 yielded mainly debitage. It would seem that tool manufacture and use was carried out.

Coarse stone: The finds from Allt na Criche include a worn faceted cobble (ST26), which has parallels on other later prehistoric sites.

Table 16

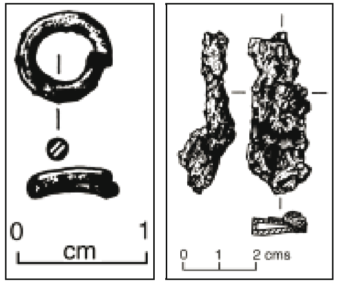
SFS 68	Test Pit 1	Test Pit 2
Quartz debitage	1	42
Quartz regular flakes	4	
Chalcedonic silica debitage	3	5
Chalcedonic silica regular flakes	2	2
Totals (59)	10	49

Table 16: Lithics from SFS 68, Allt na Criche

Illus 89: SFS 68, Allt na Criche; [Return]

Bone tools: Two bone tools were found. One very fine point (BT133) was found in Test Pit 1, Context 6814 (see Illustration 89, right: Fine point number five in illustration – from left to right, SFS 58 (BT136), SFS 105 (BT134), SFS 20 (BT132), SFS 17 (BT135), SFS 68 (BT133)). A piece of long bone (BT140) with one end badly abraded was found in Test pit 2, Context 6821.

Metalwork: A possible buckle or brooch pin of copper-alloy was found in Test Pit 2. It is broken at both ends and bent, but rectangular in section and tapers along its length, with four V-shaped notches on one edge at the articulating end; this has solder on the reverse from fastening the return of the pin round a bar. There are burnished areas and file marks on both faces. From the same test pit came a circular-sectioned fine rod bent into a circle, the ends slightly overlapping (see Illustration 90, near right; metal no 41). The alloy is brass and it appears to have been tinned or silvered (this could not be confirmed analytically given the small areas involved). Test Pit 1 Spit 2, yielded a knife fragment of iron with a stepped tang and the remains of a wooden handle (see Illustration 91, far right; metal no 42). The edge shape is unclear but the rapid taper suggests that it has been heavily re-sharpened.



Illus 90 & Illus 91: Metal piece and knife from SFS 68, Allt na Criche

Bone: There was some red deer but it derived from surface layers and shows evidence of root etching, associated with surface material. Sheep bones comprised a radius, charred humerus and tooth fragments. The only other material was from small mammals, some of which was charred: water vole, bank vole and mouse. The burnt material was recovered from four contexts (6812, 6814, 6822 and 6823), suggesting anthropogenic activity.

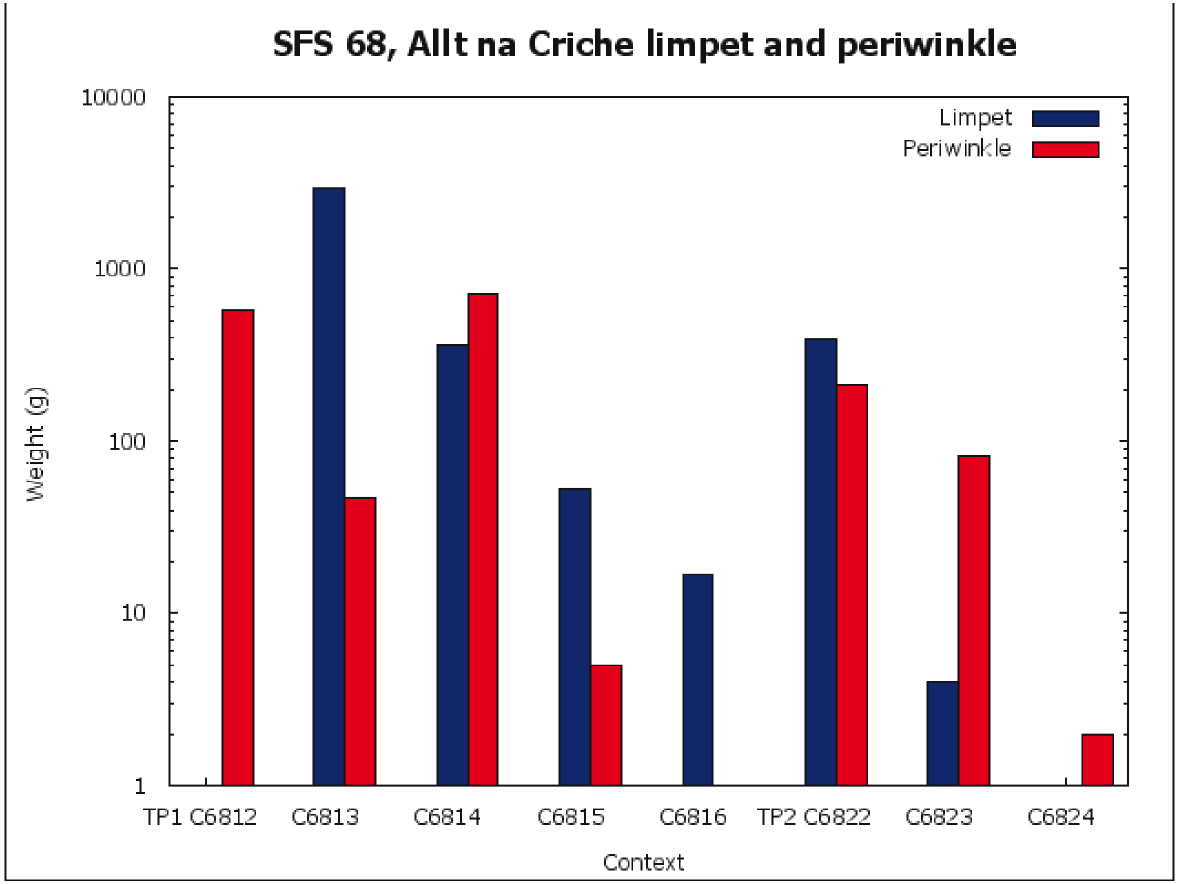
Shell: Limpet and periwinkle dominate throughout (Table 17, below). A number of other species are present but in very small numbers (see Illustration 92, below).

To access a printable version of this table, please go to the separate page `table017.html` and set to LANDSCAPE mode.

Table 17

SFS 68	limpet	periwinkle	dogwhelk	mussel	oyster	clam	topshell	residue
Test Pit 1:								
Context 2		573		59	2	1		7106
Context 3	2925	47		2				2224
Context 4	367	725						1624
Context 5	53	5						108
Context 6	17							60
Test Pit 2:								
Context 2	387	211						712
Context 3	4	83	6					225
Context 4		2						7
Test Pit 3:		<1					<1	1

Table 17: SFS 68, Allt na Criche, marine molluscs, weight in grams for individual species by context



Illus 92: SFS 68, Allt na Criche, limpet and periwinkle, weight in grams for individual species by context

Dates

There were three radiocarbon determinations from this site (see Table 18, below). One came from Test Pit 1 and was securely stratified within context 6814 which was a layer of periwinkles in a black peaty matrix. The two others came from Test Pit 2, both from context 6823, a layer of black silty sand underlying shell midden. Two dates point to activity in the latter years of the first centuries BC or early decades AD and one date suggests much later activity in the 16th century AD.

Table 18

SFS 68 Context	Reference	Material	Date BP	Age
TP1 C6814	AA-50687	hazelnut shell	2095±40	210BC–10AD
TP2 C6823	AA-50685	hazelnut shell	2060±40	180BC–30AD
TP2 C6823	AA-50686	hazelnut shell	340±30	1470–1640AD

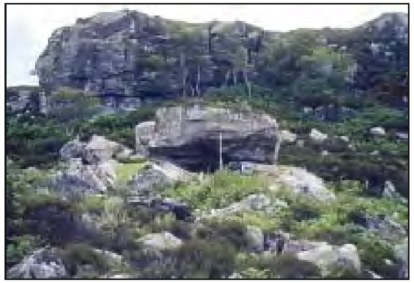
Table 18: SFS 68, Allt na Criche, Radiocarbon dates, see Section 4

Discussion

The lithics are undiagnostic, the coarse stone might be later prehistoric and the metalwork suggests activity between the Early Historic and the post-medieval periods. The radiocarbon determinations support activity in the Early Historic period, with some separate later activity. The local topography means that this site affords considerable protection from the elements and this is likely to have been so in early as well as in more recent times.

2.2.4 SFS 10: Allt na Uamha (also known as Craig), NGR NG 7679 6490

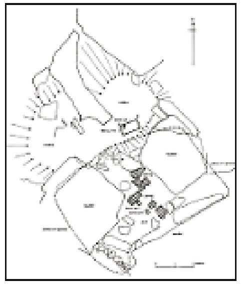
Type of Site: Rockshelter with midden
SFS Record: 2000
Survey Area: Torridan
References: Gourlay 1984; Pollard 1994
Size: 3m×3m×3m
Aspect: North-west-facing on a 25° slope
Height OD: 85m
Ground Cover: Grass
Distance to Sea: 500m
Distance to Fresh Water: 10m to north-west
Threats: Animals
Description: A north-west-facing boulder shelter with a large shell midden in front (see Illustration 42, right)
Archaeology: Shovel pitting, test pitting



Illus 42: SFS 10, Allt Na Uamha, Loch Torridon

Illus 93: SFS 10, Allt na Uamha: excavation in progress, showing low height of cave

SFS 10 was visited on three occasions. During the first visit, two shovel pits (SP1 and SP2, 300mm×300mm) were dug in the shell midden and in the centre of the rockshelter to attempt to assess nature of the midden. Shovel pits were stopped at 330 and 320mm deep after revealing that the midden was 98% limpet shell. Finds included small fragments of bone. Based on the interpretation that the midden might well be early, it was decided to return to excavate a single test pit. During a second visit, one test pit was dug in the shell midden just outside the rockshelter overhang (see Illustrations 93, left & 94, right). A third visit took place during which intensive surface survey within the shelter revealed flaked lithics. During this visit, a third shovel pit (SP3) was dug, in the boulder shelter. This extended to a depth of 620mm. Further lithics were encountered at the base of this shovel pit.



Illus 94: SFS 10, Allt na Uamha, plan of cave

Test Pit 1: (1m×0.5m) was dug in the shell midden; it contained five contexts (see Illustration 95, right).

- Context 1 Immediately below the turf: a layer of crushed shell (limpet and periwinkle)
- Context 2 Whole limpet and periwinkle midden in a black soil matrix. Contains charcoal, pottery and bone fragments
- Context 3 Clean whole limpets and periwinkle, possibly lying in stacks, in a matrix of soft greyish ash. Contains bone and charcoal
- Context 4 Black gritty soil with large stone and shell. Contains charcoal and bone
- Context 5 Stone blocks with some voids set in a matrix of decayed sandstone. Basal deposit

Illus 95: SFS 10, Allt na Uamha, Test Pit 1, after excavation

Finds

Lithics: No lithics were initially visible here, and the test pit did not yield stone tools, but on a third visit lithics were recorded from the surface of the midden within the shelter, and a third small shovel pit was made from which further material was recovered. There were eight lithic finds, all, with one possible exception (a flake that may be of baked mudstone), of chalcedonic silica. There were two debitage pieces; four regular flakes; and two small thumbnail scrapers.

Bone tools: BT139 was found in Shovel Pit 1. It is a badly eroded piece that was possibly a point.

Coarse stone: There was a rounded hammerstone made on a large cobble.

Pottery: The test pit yielded 14 small sherds of sandy pottery.

- Context 1:
  - 11 body sherds, slightly abraded. The fabric is fine sandy clay with occasional rock fragments which has fired hard and is grey with a brown exterior margin. Interior surface sooted. Th 4mm; Wt 8g.
- Context 2:
  - One body sherd, fresh. The exterior surface is smoothed. The fabric is sandy clay which has fired hard and is grey with a red interior surface. The exterior surface is sooted. Th 6mm; Wt 5g.
  - One body sherd, abraded. The exterior surface is smoothed. The fabric is sandy clay with occasional mixed rounded and angular rock fragments which has fired hard and is grey. The interior surface is sooted. Th 7mm; Wt 4g.
  - One body sherd, fairly fresh. The exterior surface is smoothed. The fabric is fine sandy clay which has fired hard and is red. Th 7mm; Wt 2g.

Bone: Mammal and fish bone was recovered from the test pit and Shovel Pit 3 (see Tables 19, 20, 21, 22 & 23, all below; and Hardy & Wickham-Jones 2002:18). Mammal bone (NISP of 109) was recovered from four of the excavated contexts from the test pit; main identified species were cattle and red deer. Specimens of medium-sized mammal and small mammal were also recorded. A small amount of fish bone (NISP of 17) was recovered from Contexts 1, 3 and 4. This included single specimens of cod, either cod, saithe or pollack and a member of the cod family. The shovel pit contained 170 mammal bone fragments including diagnostic mammal elements of sheep, and a member of the deer family. Slightly more fish bone was recovered from the shovel pit than the test pit (NISP of 35); species recorded were cod, either cod, saithe or pollack, Atlantic herring and members of the cod, wrasse and plaice families. Root etching was noted on three unidentified mammal bone fragments and carnivore gnawing on one unidentified mammal fragment. Chop marks were recorded on one unidentified mammal fragment and one cattle radius, cut marks were also noted on one unidentified mammal fragment. Skip Tables.

Table 19

Taxon	Context				Test pit total NISP	Shovel pit NISP
	1	2	3	4		
Mammal						
Sheep						2
Cow		2	1		3	
Red deer		1	1		2	
Deer family						1
Medium mammal 1	1				1	1
Small mammal		1			1	

Total QC1	1	4	2		7	4
Total QC0 and QC4	29	27	34	12	102	166
Total mammal	30	31	36	12	109	170
Fish						
Cod			1		1	3
Cod/saithe/pollack				1	1	2
Cod family	1				1	1
Atlantic herring						1
Wrasse family						3
Plaice family						1
Unidentified fish						1
Total QC1 and QC2	1		1	1	3	12
Total QC0 and QC4	1		12	1	14	23
Total fish	2		13	2	17	35

Table 19: SFS 10, Allt na Uamha, test pits and shovel pits, mammal bones and fish, number of identified specimens (NISP)

Table 20

SFS 10 York system texture	Description	TP mammal	TP fish	S. pit mammal	S. pit fish
Excellent	Majority of surface fresh or even slightly glossy; very localised flaky or powdery patches	1			
Good	Lacks fresh appearance but solid; very localised flaky or powdery patches	3			2
Fair	Surface solid in some places, but flaky or powdery on up to 49% of specimen	1	2		8
Poor	Surface flaky or powdery over 50% of specimen	1	1		
	Totals (19)	6	3	0	10

Table 20: SFS 10, Allt na Uamha, mammal bones and fish, texture of QC1 elements from test pits and shovel pits (all contexts)

Table 21

Taxon	Element	Context					Total
		1	2	3	4	shovel pit	
Mammal							
Sheep	2nd phalanx					1	1
	scapula					1	1
Cow	mandible		1				1
	2nd phalanx			1			1
	radius		1				1
Red deer	calcaneum			1			1
	mandible		1				1
Deer family	humerus					1	1
Medium mammal 1	scapula	1					1
	phalanx					1	1
Small mammal	humerus		1				1
	Total QC1	1	4	2		4	11
Fish							
Cod	articular			1		1	2
	dentary					1	1
	posttemporal					1	1
Cod/saithe/pollack	ceratohyal					1	1
	posttemporal					1	1
	opercular				1		1
Cod family	articular	1				1	2
Atlantic herring	vertebrae/av					1	1
Wrasse family	cleithrum					2	2
	hyomandibular					1	1
Plaice family: vertebrae	av					1	1
Unidentified fish	articular					1	1
	Total QC1	1	0	1	1	10	13
	Total QC2	0	0	0	0	2	2

Table 21: SFS 10, Allt na Uamha, test pits and shovel pits, mammal bones and fish QC1 and QC2 element representation

Table 22

SFS 10 Bone ID	Provenance	Taxon	Element	Criteria
SFS10-7834	Context 1 (Test Pit)	scapula	medium mammal 1	juvenile cortex
SFS10-7865	Shovel Pit 2	scapula	sheep	distal epiphysis unfused, juvenile cortex
SFS10-7863	Shovel Pit 2	phalanx	medium mammal 1	distal epiphysis unfused, juvenile cortex
SFS10-7861	Shovel Pit 2	humerus	deer family	distal epiphysis unfused, juvenile cortex

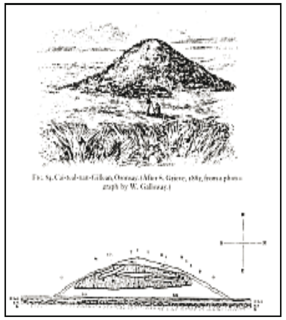
Table 22: SFS 10, Allt na Uamha, test pits and shovel pits, pre-adult mammal juvenile QC1 elements

Table 23

SFS 10 Taxon	Size category	Context				Test pit total	Shovel pit
		1	2	3	4		
Cod	extra large			1		1	
	large						1
	medium						1
	small						1
Cod/saithe/pollack	large						1
	medium						1
	small				1	1	
Cod family	large	1				1	
	medium						1
Wrasse family	medium						3
Totals	0	1		1	1	3	9

Table 23: SFS 10, Allt na Uamha, size of QC1 elements by species and context for test pits and shovel pits; (see Appendix 27 for definitions of the York System size categories)

Shell: The predominant species is limpet followed by periwinkle (see Illustration 96, below). The ratio of species is consistent through the test pit (see Illustration 97, below). There are a few other species but these have a very low MNI: dogwhelk, flat periwinkle and the otter shell, (see Tables 24 & 25, both below). Razor shell, topshell and scallop were also present but could not be included in the MNI due to lack of apices or umbones. These other species have very low weights and may represent few individuals, in some cases only one. Significantly perhaps there are more dogwhelks in Pit 2 (N=8; see Illustration 3, right). Measurements of the length:height ratio of limpets from the different contexts suggest that limpets were harvested from the middle to lower shore zones. The results of fragmentation analysis can be seen in the chart below (see Illustration 98, 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 so that the results may be skewed. Nevertheless there



Illus 3: The shell midden at Caisteal nan Gillean, Oronsay, at the time of the first

does seem to be quite a drop in the number of whole shells in Shovel Pit 3 (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. Skip Tables & Charts.

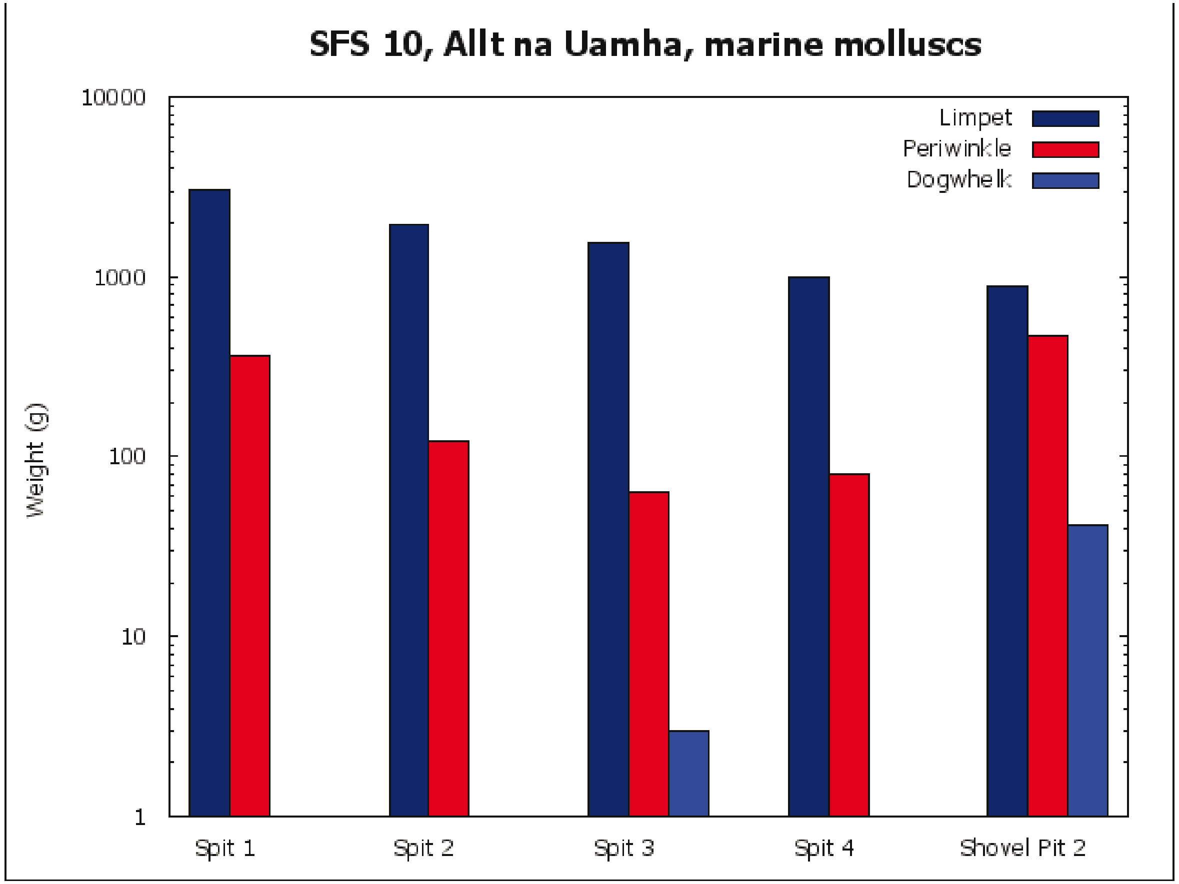
excavations in 1882 (after Grieve 1882)

To access a printable version of this table, please go to the separate page table024.html and set to LANDSCAPE mode.

Table 24

Allt na Uamha SFS 10	limpet	periwinkle	dogwhelk	flat periwinkle	otter shell	topshell	razor shell	scallop
Test Pit 1								
Context 1	3075	366		2		1	5	
Context 2	1972	122						5
Context 3	1565	64	3		3			
Context 4	996	80						

Table 24: SFS 10, Allt na Uamha, marine molluscs, weight in grams

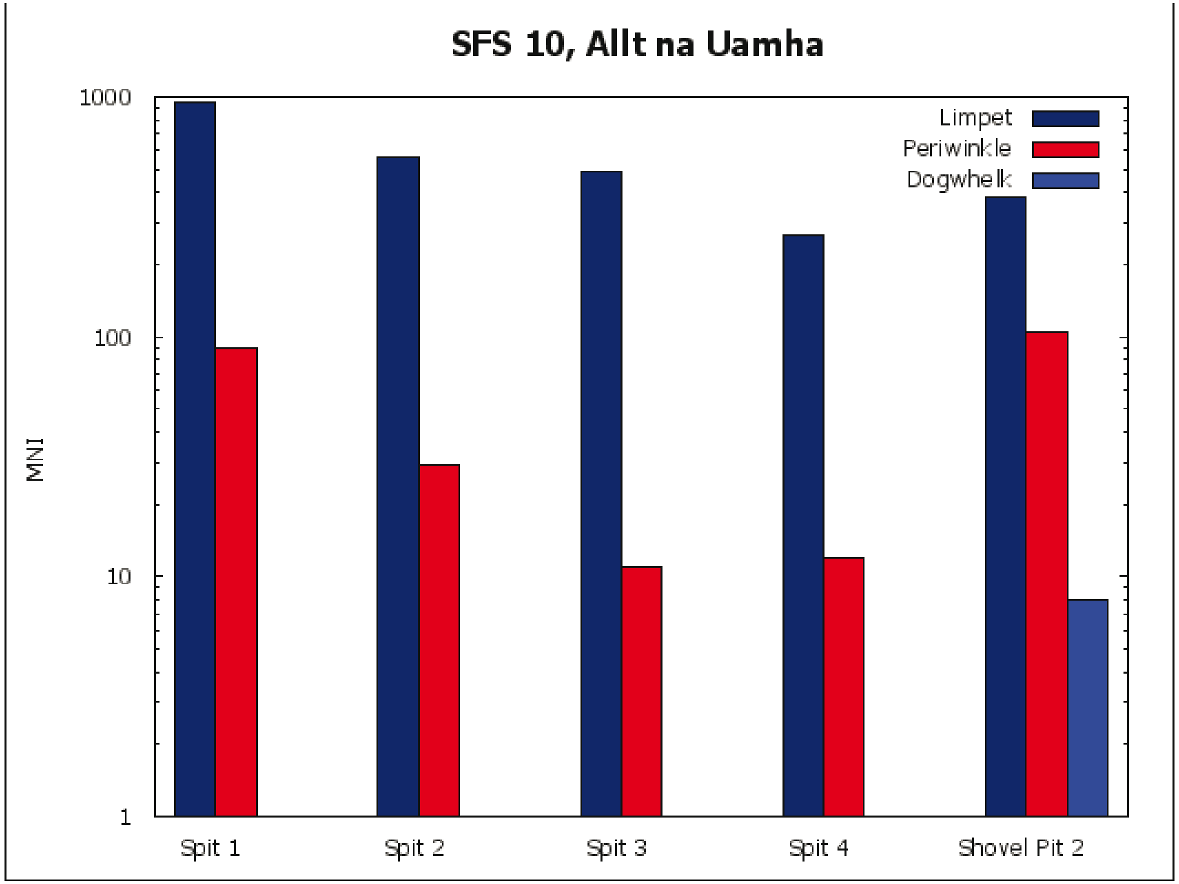


Illus 96: SFS 10, Allt na Uamha, marine molluscs, weight in grams for individual species by context for each species

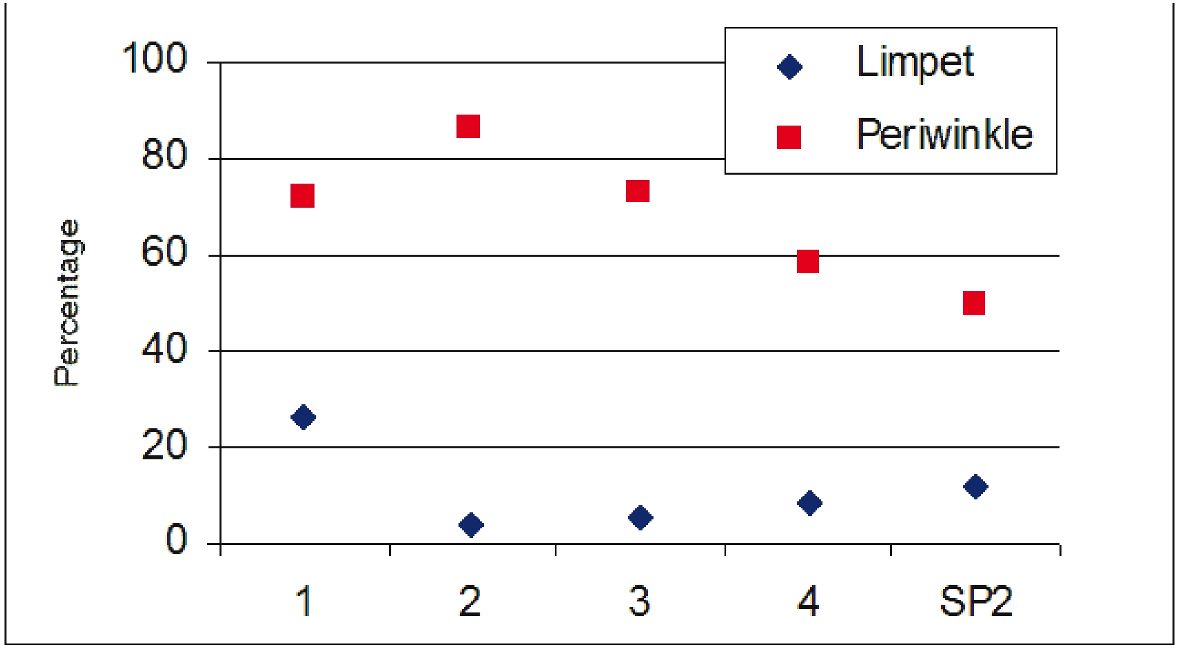
Table 25

SFS 10 context	limpet	periwinkle	dogwhelk	flat periwinkle	otter shell
Test Pit 1:					
Context 1	941	89		2	
Context 2	560	29			
Context 3	489	11	1		1
Context 4	264	12			

Table 25: SFS 10, Allt na Uamha, the MNI of marine mollusc species by context



Illus 97: SFS 10, Allt na Uamha, marine molluscs, MNI by context for each species



Illus 98: SFS 10, Allt na Uamha, marine molluscs, fragmentation of limpets and periwinkles by context

Charcoal: Charcoal from two contexts was recovered for analysis (see Table 26, below). Though only a small quantity, this comprised predominantly birch, with some hazel and one possible fragment of alder. As the charcoal was associated with midden deposits it is likely that it represents hearth debris, thus suggesting that birch and hazel formed the principal fuel.

Table 26

Site	SFS 10 Test Pit 1	SFS 10 Test Pit 1	SFS 171 Test Pit 1	SFS 171 Test Pit 1
Context	2: shell midden	4: black gritty soil	1: loose shell and dry black soil	2: loose stones, mixed with context 1
Alnus glutinosa (Alder)		1		
Betula spp (Birch)	18	21	6	3
Calluna vulgaris (Heather)			3	1
Corylus avellana (Hazel)	7	3	5	4
Fraxinus excelsior (Ash)			1	3
Pinus sylvestris (Scots Pine)			6	5

Quercus spp (Oak)			4	9
Totals	25	25	25	25

Table 26: SFS 10, Allt na Uamha and SFS 171, Meall na h'Airde 2, charcoal remains; [Return to Section 2.2.45]

Discussion

The lithic assemblage suggests activity in early prehistory, while the pottery has been assigned to the Iron Age or later. The remains of domestic cattle suggest that activity here can have been no earlier than the introduction of this species to Britain, traditionally associated with the Neolithic. The limited butchery evidence suggests that some mammal processing or consumption took place at the site. Likewise, the range in fish size rules out the fish being derived from otter spraint deposits.

2.2.5 SFS 60: Allt na H Eirigh, NGR NG 6958 5645

Type of Site: Findspot
SFS Record: 2000
Survey Area: North Applecross
Size: N/A
Height OD: 50m
Ground Cover: None
Distance to Sea: 200m to west
Distance to Fresh Water: 0m (found on boulder in centre of stream)
Threats: N/A
Description: Findspot
Archaeology: Surface collection (see Illustration 99, right)

Illus 99: SFS 60, Allt-na-h-Eirigh, artefact found on boulder in centre of stream

Finds

Lithics: One chunk of chalcedonic silica was picked up from a boulder in the centre of the stream.

Discussion

The find of a single undiagnostic lithic which may well represent background noise, though it would be worth monitoring sites like this to check whether further archaeological finds erode out.

2.2.6 SFS 150: Alt Cadh an Eas, NGR NG 8761 3294

Type of Site: Open-air lithic scatter site
SFS Record: 2002
Survey Area: Loch Carron
Size: Unknown
Aspect: North-west
Height OD: 25m
Ground Cover: Under cultivation
Distance to Sea: 3500m
Distance to Fresh Water: 50m to north
Threats: Cultivation, ploughing
Description: Lithic scatter adjacent to chambered cairn (NG 8755 3296) in ploughed field in valley bottom

Archaeology: Surface collection

Finds

Lithics: Four lithics were recovered together 40m east of the cairn. All are broken regular flakes, two of chalcedonic silica and two of quartz.

Discussion

Isolated finds like this are hard to interpret. They may indicate activity in prehistory but flakes of stone were also in use in later periods, for example as strike-a-lights and gun flints, so that they may be more recent.

2.2.7 The An Corran sites

SFS 1 An Corran A NGR NG 490 685; SFS 101 An Corran E NGR NG 4890 6838; SFS 193 An Corran F NGR NG 4861 6827; SFS 194 An Corran G NGR NG 4853 6815

Illus 100: General view of An Corran from the sea (NW). The rock outcrops and shelf below the screes may be seen clearly

Illus 10: View across the Inner Sound from Sand; the island of Raasay lies in the background in front of the Skye coastline

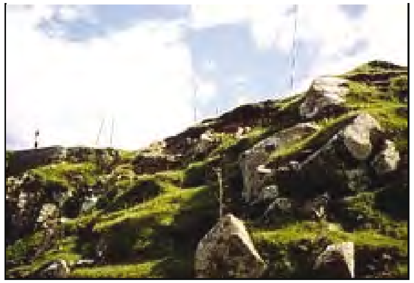
Illus 101: Staffin Bay, view across the area of eroding lithics at An Corran towards the excavated site of An Corran A

Illus 102: Collecting lithics from the An Corran sites (Portrait)

Illus 57: SFS 29, An Corran B: general view of the erosion; NGR NG 4885 6851

Type of Site: Open-air lithic scatter sites
SFS Record: 1999, 2000, 2001
References: Hardy *et al* forthcoming; Miket & Saville 1994; Saville & Miket 1994a & 1994b
Survey Area: Trotternish
Size: Unknown
Aspect: North-west
Height OD: 8–50m
Ground Cover: Grass/bracken
Distance to Sea: 5–75m to north-west, rocky coast
Distance to Fresh Water: Various
Threats: Grazing, erosion
Description: The Mesolithic site of An Corran at Staffin Bay was excavated in the early 1990s and publication is due (SFS 1, An Corran A; Hardy *et al* forthcoming). The SFS survey work resulted in the recording of a suite of lithic scatter sites around the bay at Staffin,

Illus 104: SFS 31, An Corran D: general view looking towards sea; NGR NG 4864 6836



Illus 103: SFS 30, An Corran C: view of erosion face from below; NGR NG 4877 6840

starting from the area between An Corran rockshelter and the sea and working northwards. These have been named An Corran B-G. In addition there is a site at Brogaig, also in Staffin Bay. The An Corran sites and Brogaig are still eroding so that most visits result in the recovery of further material. Monitoring took place at irregular intervals throughout the project but, due to the constraints of time and money, a halt to monitoring work was called with the result that the catalogue of lithic material is only a sample of what was recovered (and what might be found in future)

Archaeology: Surface collection

Illus 105: SFS 32, Brogaig: area of erosion lies adjacent to the figure; NGR NG 4730 6871

Finds

Lithics: The quantity of lithic finds from each site varies greatly (see Table 27). Raw materials reflect the local availability of baked mudstone and chalcedonic silica, though it is interesting that some assemblages have more baked mudstone, while others have more chalcedonic silica (see Table 28, below). Quartz is present in a very small quantity and in addition there are a few pieces of Rùm bloodstone and volcanic glass. Each site was monitored by the same team so that the variations in content are likely to reflect the original nature of each assemblage. Most of the sites have both debitage and regular pieces. Narrow blade microliths were recovered from three sites – An Corran C, E and F – and most sites also had larger modified tools as well, mainly edge-retouched pieces and scrapers. In addition,blades were found on all sites except for F, G and A, though at G and A the assemblage only comprised of isolated finds.

To access a printable version of this table, please go to the separate page table027.html and set to LANDSCAPE mode.

Table 27

Site	Pebbles	Cores	Debitage	Regular Flakes	Blades	Microliths	Edge Retouched	Scraper	Broken Retouched	Total
An Corran A							1			1
An Corran B		2 (1 P; 1 Bip)	39	31	1		2	1 (end)		76
An Corran C	6	3 (2 P; 1 Bip)	273	223	19	2 backed blades 1 crescent		1	1	529
An Corran D	2	2 (2 Bip)	32	20	2					58
An Corran E	3		320	191	36	1 fine point 1 crescent 1 broken	1	1		555
An Corran F			10	15		1 fine point				26
An Corran G			2				1			3
Brogaig	6	2 (2 P)	50	40	2		2			102

Total	17	9	726	520	60	7	7	3	1	1350

Table 27: Lithic finds from the An Corran sites, Staffin

Table 28

Site	Baked Mudstone	Chalcedonic Silica	Rùm Bloodstone	Quartz	Volcanic Glass	Total
An Corran A		1				1
An Corran B	34	41		1		76
An Corran C	299	217		12	1	529
An Corran D	10	45	1	2		58
An Corran E	249	284	5	17		555
An Corran F	8	18				26
An Corran G		3				3
Brogaig	52	47		3		102
Totals	652	656	6	35	1	1350

Table 28: Lithic raw material use at the An Corran sites, Staffin

Coarse stone tools: A single, facially pecked cobble was found at An Corran C.

Pottery: There were three sherds of pottery:one from An Corran C and two from An Corran E. A single, undiagnostic, rimsherd was found at An Corran C, but the two pieces from An Corran E include a sherd of Unstan ware, dating to the earlier part of the Neolithic (for example, pottery from Bharpa Carinish, North Uist; MacSween 1993, SFS 373, Illustration 8, right & V54).

Illus 8: The sea lochs penetrate into the Scottish mainland

Discussion

Although the amount of lithics varies considerably from site to site at An Corran, the whole area of Staffin Bay is clearly very interesting. Ongoing erosion means that the archaeological resource here is under considerable threat. It would be useful to get some further characterisation and dates from the open-air sites around the Bay. Dating material was not recovered during SFS work apart from the general characterisation of the flaked lithics. Mesolithic material, in the form of microliths, came from three of the sites (C, E & F), while three others had blades, but no microliths. Although it is obvious that by and large the microliths came from the larger assemblages (C & E), sites B, D and Brogaig also had good-sized collections and it is likely that microliths would have been spotted had they been present. The rockshelter site at An Corran A has evidence of activity from the Early Mesolithic into the Neolithic and in this respect the generally undiagnostic nature of several of the lithic assemblages is noteworthy.

One of the characteristics of Mesolithic sites around the Inner Sound, indeed further afield on the west coast of Scotland, is that when radiocarbon determinations are obtained they tend to come out early in the Scottish Mesolithic. There are very few later Mesolithic dates from this area, and one is forced to consider why. It is unlikely that the area became depopulated in the latter half of the Mesolithic and it may be that the archaeological record has been biased by the use of microliths to identify 'Mesolithic' sites. The possibility of a non-microlithic period towards the end of the Mesolithic has been raised on several occasions (for example Woodman 1989; Wickham-Jones 2004a). Late dates exist for microlithic sites in east Scotland (for example Warren forthcoming), but as yet they are rare in the west. Is it possible, therefore, that the Later Mesolithic of the Inner Sound area made much less use of microliths? If this were so, the main element by which we usually recognise Mesolithic sites would be removed.

The many sites of An Corran at Staffin Bay hold very great potential because of the alternate ‘Mesolithic’ and ‘nondescript’ natures of their assemblages. Mesolithic activity is clearly indicated and it seems reasonable to assume that occupation may well have continued into more recent times. This would be supported, if tentatively, by the finds of pottery including a single sherd of ‘probably’ Unstan ware from An Corran E. The same raw material sources would continue to be important in later times; the area is sheltered, has good supplies of fresh water and safe access to the sea for fishing and transport. Is it possible that ‘undiagnostic’ assemblages like that at An Corran B and Brogaig hold the key to an understanding the Later Mesolithic of the area?

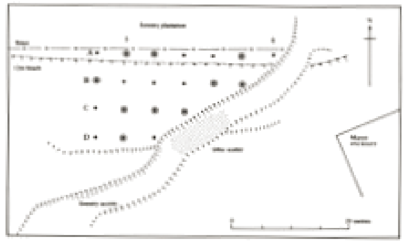
2.2.8 SFS 75: Applecross Manse, NGR NG 7120 4571

Illus 106: SFS 75, Applecross Manse: original disturbance; the find spot is adjacent to the figure

Type of Site: Open-air lithic scatter site
SFS Record: 2000
Survey Area: Mid Applecross
Size: Unknown
Aspect: South-east
Height OD: 8–10m
Ground Cover: Grass
Distance to Sea: 50m to south-east to sandy bay
Distance to Fresh Water: 30m to west
Threats: Partly destroyed by building work, further disturbance likely, including forestry
Description: A lithic scatter revealed when lithics were recovered from the erosion scars left by the excavation of a track below the lip of the 12m raised beach (see Illustration 106, right) (Applecross Local Datum). The shovel pitting was designed to investigate both the extent of the scatter and its location
Archaeology: Shovel pitting

Illus 107: SFS 75, Applecross Manse, shovel pitting across the site

Four transects were laid out and a total of 20 shovel pits was dug (see Illustration 107, left & 108, right). Shovel pit depth was 400–600mm through slopewash down to a mixed sand and pebble beach deposit. The lithics were recovered from the interface of slopewash and the beach deposit.



Illus 108: SFS 75, Applecross Manse, plan of shovel pits; circles indicate shovel pits from which lithics were found

Finds

Lithics: There were 97 finds here (see Table 29, below) from a combination of shovel pitting and surface collection. Apart from the surface collection, most material was collected from Shovel Pits D 4–6.

Table 29

SFS 75	Chalcedonic silica	Rùm bloodstone	Quartz	Total
Debitage	17	15	29	61
Regular flakes	9	1	23	33
Blades	1	1		2
Microliths: crescents	1			1
Totals	28	17	52	97

Table 29: SFS 75, Applecross Manse, lithics

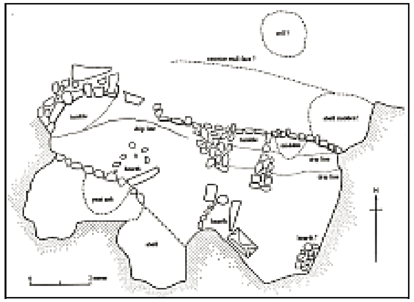
Discussion

The lithic assemblage is interesting because of the lack of baked mudstone. It is likely that the proportion of Rùm bloodstone reflects the distance of the source in contrast to sources of chalcedonic silica and quartz both of which are likely to be local. The microlith suggests a Mesolithic date for the activity which apparently included both tool manufacture and use. Interestingly, there are no later finds from this site.

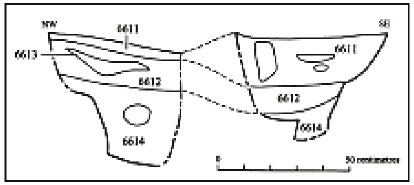
2.2.9 SFS 66: Ard Clais Salacher 2, NGR NG 6829 5123

Illus 109: SFS 66, Ard Clais Salacher 2, general view of site

Type of Site: Rockshelter with midden and structures
SFS Record: 2000
Survey Area: Mid Applecross
Size: 10m deep×4.5m wide×2m high
Aspect: North-facing
Height OD: 4–5m
Ground Cover: Heather and bracken
Distance to Sea: 30m to north-west, open rocky shore
Distance to Fresh Water: 10m to west
Threats: Stable
Description: A rockshelter situated in the sheltered base of an old sea cliff (see Illustration 109, left). A storm beach lies between the site and the sea: many of the rocks near the shelter are moss and heather covered and they have dangerous voids between them. Some recent rockfall from the cliff face is also visible though the undulating interior, deepest in the north, is dry and stable. A substantial drystone wall runs under the drip line and shell midden material is eroding out here, indicating either that the midden has been used as packing or insulation in the wall core or that it has been thrown up against the wall. The wall is of massive construction, built of large angular stones with a distinct and narrow entrance towards its southern end and it has traces of circular remains on the outside; these may be natural voids. Inside it has drystone piers, forming rough cubicles. Two recent hearths are visible inside the cave with shell and animal remains scattered around.
Archaeology: Only one test pit was dug as no excavations were possible on the rocky exterior (see Illustration 110, upper right). Test Pit 1 was aligned north-east—south-west and lay in the northern interior. It contained four clear contexts in well defined stratigraphy (see Illustration 111, lower right).



Illus 110: SFS 66, Ard Clais Salacher 2, plan of cave



Illus 111: SFS 66, Ard Clais Salacher 2, Test Pit 1, south-west-facing section

Test Pit 1: (1m×0.5m) aligned north-east—south-west, in the northern interior, around the lowest part.

- Context 6611 A mixed shell midden comprising *c*20% mixed limpets and periwinkles in a black, rich, peaty matrix. Glass was found in this layer.

- Context 6612 Midden with a much greater shell content than 6611.
- Context 6613 Within 6612, a lens of creamy yellow peat ash overflowing from one of the visible hearths.
- Context 6614 A further shell midden layer containing charcoal and a few lithics. This extended beyond the limit of excavation. It comprised mainly limpets and included hammer stones and fire cracked rocks in a sparse brown matrix.

All of the contexts thinned out away from the hearth and may be associated with it. Neither the base of the midden or any sign of bedrock were seen.

Finds

Lithics: Twelve lithics were recovered mostly of chalcedonic silica and flint, but there were two pieces of quartz. Half of the assemblage was debitage, but there were also four regular flakes, a gunflint and a fragment of a retouched tool which had been reused as a strike-a-light. The presence of the latter two pieces together with several pieces that were undoubtedly flint, including one fine black flake, suggests that this assemblage has resulted from relatively recent stone tool use. The gunflint is an irregular piece, made of orange flint and probably of local manufacture.

Pottery: There were eight sherds of pottery, including a piece of modern glazed pottery. Sherds of various different types of coarse pottery were present including a fragment of a rounded base, body sherds and a decorated neck sherd. The nature of the decoration on the latter – a band of incised decoration around the neck of the vessel – is indicative of an Iron Age date (such as decoration on a vessel dating to the earlier Iron Age from Kebister, Shetland; Dalland & MacSween 1999:181, illus 159.1).

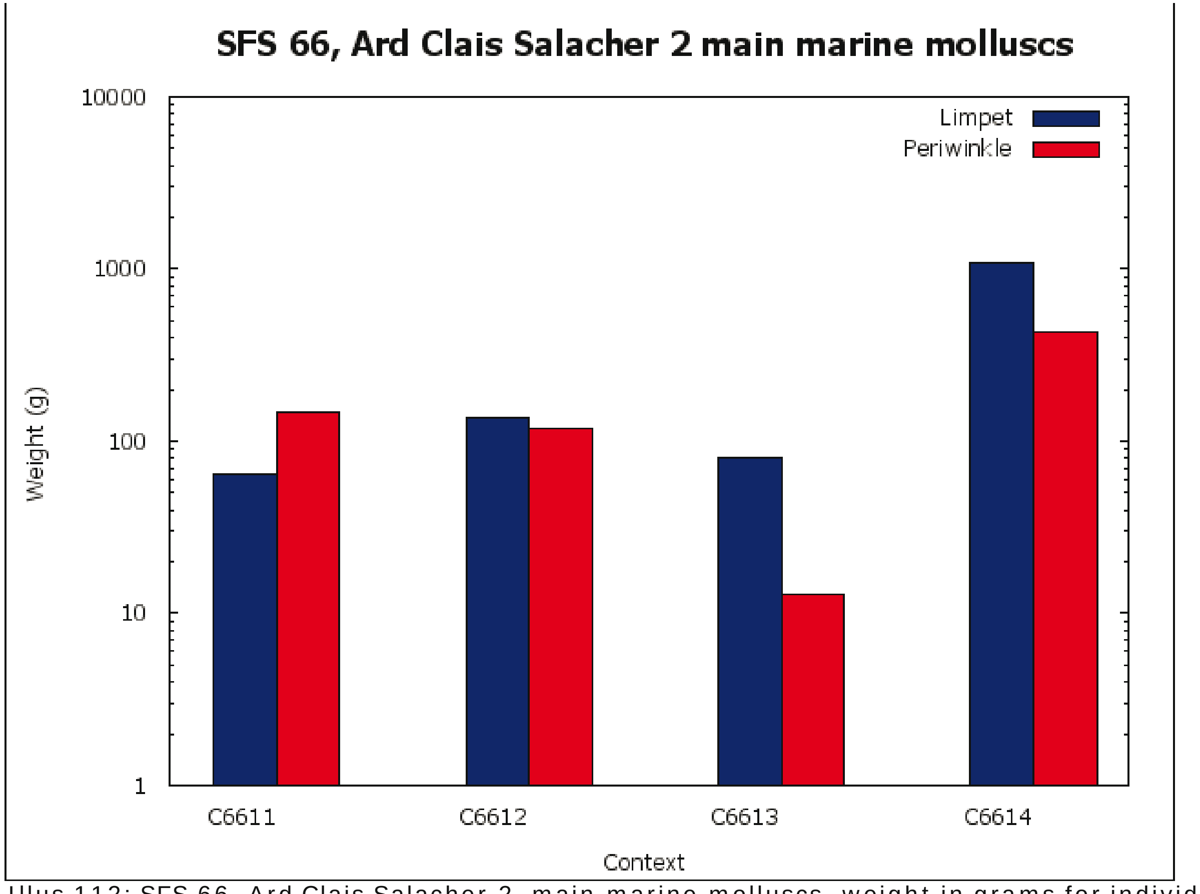
Glass: Two sherds of olive-green glass from Test Pit 1, Spit 1.

Bone: Domestic species, cattle, sheep and pig dominated the bone assemblage. There were smaller quantities of bone from small mammals with a single amphibian bone. There was also an assemblage of fish bone, including saithe or pollack, cod, wrasse and other gadids. This suggests both inshore fishing using lines, nets or traps and deeper water fishing.
Shell: Limpet and periwinkle predominate throughout (see Table 30, below; Illustration 112, below). Mussel, razor shell and flat periwinkle occur in very small amounts.

Table 30

SFS 66	limpet	periwinkle	mussel	Razor shell	flat periwinkle	residue
Test Pit 1						
Context 1	65	147				135
Context 2	137	120				144
Context 3	81	13	<1	<1		173
Context 4	1087	431			1	658

Table 30: SFS 66, Ard Clais Salacher 2, marine molluscs, weight in grams for individual species by context



Illus 112: SFS 66, Ard Clais Salacher 2, main marine molluscs, weight in grams for individual species by context

Dates

This site has three radiocarbon determinations from the mid 15th to mid 17th centuries AD (see Table 31, below). The samples were all taken from context 6614, a shell midden layer low down in the stratigraphy in a sparse brown matrix.

Table 31

SFS 66 Context	Reference	Material	Date BP	Age
TP1 C6614	AA-50682	pig bone	355±35	AD1450–1640
TP1 C6614	AA-50683	cow bone	355±45	AD1450–1640
TP1 C6614	AA-50684	hazelnut shell	375±55	AD1440–1640

Table 31: SFS 66, Ard Clais Salacher 2, radiocarbon dates, see Section 4

Discussion

This site has deep, well-preserved archaeological deposits, the base of which was not reached. The dates indicate a focus of activity in the post-medieval period, but the pottery might indicate earlier, Iron Age, activity. Some of the lithic material would clearly support later activity, though it is possible that some of it relates to Iron Age use. The glass is post-medieval in date and this agrees with the radiocarbon determinations.

2.2.10 SFS 102: Ardheslaig 1, NGR NG 7846 5624

Type of Site: Findspot
SFS Record: 2000
Survey Area: Loch Torridan
Size: Unknown
Aspect: South-east
Height OD: 30m
Ground Cover: Bare soil
Distance to Sea: 150m to south-east, rocky coastline
Distance to Fresh Water: 500m
Threats: Enclosed grazing area, erosion
Description: Findspot (see Illustration 113, right)
Archaeology: Surface collection

Illus 113: SFS 102, Ardheslaig 1, general view of findspot

Finds

Lithics: There was one surface find from this site, a regular flake of Rùm bloodstone.

Discussion

Findspots of single finds are hard to interpret. They may represent general prehistoric background noise, but it is worth monitoring the sites for further information.

2.2.11 SFS 6: Ashaig 1, NGR NG 6866 2420

Illus 114: SFS 6, Ashaig, general view of eroded area revealing shell midden

Type of Site: Open-air midden
SFS Record: 1999
Survey Area: South Skye
Size: Unknown
Aspect: North-east
Height OD: 5m
Ground Cover: Short mown turf
Distance to Sea: 20m to north, indented marsh and shingle
Distance to Fresh Water: 30m to east
Threats: Grazing, rabbit burrowing
Description: A substantial open shell midden associated with an ancient cemetery (see Illustrations 114, left & 115, right)
Archaeology: One test pit (1m×0.5m) was opened to assess the depth of midden deposits

Illus 115: SFS 6, Ashaig, general view during excavation

- Context 1 Turf
- Context 2 Midden material, mostly periwinkle
- Context 3 A series of large boulders with midden material in the soil matrix, lying between the boulders. Excavation was stopped at 76mm as the boulders impeded further work.

Finds

Lithics: There were three lithic finds at Ashaig 1, all came from Test Pit 1 and all were debitage. There were two pieces of baked mudstone and one of quartz.

Metalwork: 15.9g unclassified ironworking slag.

Shell: Oyster, limpet, periwinkle and cockle were all found.

Dates

This site has three radiocarbon dates, all taken from Test Pit 1 (see Table 32, below). All relate to activity in the 13th century AD.

Table 32

SFS 6 Context	Reference	Material	Date BP	Age
TP1 Spit 4	OxA-9278	Hazel charcoal	771±32	AD1215–1290
TP1 Spit 6	OxA-9279	Birch charcoal	723±33	AD1220–1390
TP1 Spit 12	OxA-9277	Birch charcoal	769±36	AD1210–1295

Table 32: SFS 6, Ashaig 1, radiocarbon dates, see Section 4

Discussion

The large boulders uncovered in Test Pit 1 appear to have been displaced from further up the slope and may have originated from a collapsed revetment from earlier structures pre-dating the present cemetery. The lithics are likely to relate to general background 'noise', but the dates and general proximity to the graveyard suggest that this was a site of some interest in more recent times. Metalworking at such locations would not be unexpected.

2.2.12 SFS 92: Ashaig 3, NGR NG 6922 2410

Type of Site: Open-air lithic scatter site
SFS Record: 2000
Survey Area: South Skye
Size: 10m×4m
Aspect: South-east
Height OD: 17m
Ground Cover: Grass and heather
Distance to Sea: 500m to north-west to sheltered sandy beach
Distance to Fresh Water: 5m to south-east
Threats: Open grazing, erosion
Description: Surface lithic scatter
Archaeology: Surface collection

Finds

Lithics: There were eight lithic finds here, mainly regular flakes of chalcedonic silica, but there were also single pieces of Rùm bloodstone and quartz, and an edge retouched flake of chalcedonic silica.

Discussion

The lithics are undiagnostic but they suggest prehistoric activity in the vicinity and this would be supported by the lack of other recent finds such as pottery or metal.

2.2.13 SFS 93: Ashaig 4, NGR NG 6880 2390

Type of Site: Open-air lithic scatter site
SFS Record: 2000
Survey Area: South Skye
Size: Unknown
Aspect: South-east at foot of low limestone cliff
Height OD: 22m
Ground Cover: Grass
Distance to Sea: 500m to north-west sheltered sandy bay
Distance to Fresh Water: 25m to east
Threats: Grazing, erosion
Description: Surface lithic scatter
Archaeology: Surface collection

Finds

Lithics: There were three lithic finds from Ashaig 4, two regular flakes of quartz and chalcedonic silica and a piece of chalcedonic silica debitage.

Discussion

The lithics suggest unspecified prehistoric activity.

2.2.14 SFS 32: Brogaig, NGR NG 4730 6871

Description: There were 102 finds from Brogaig. This assemblage is discussed with the material from the An Corran sites (above), of which it is a part

2.2.15 SFS 168: Camas-an-Leim 1, NGR NG 8186 5531

Type of Site: Findspot
SFS Record: 2002
Survey Area: Loch Torridan
Size: 2m deep×3m wide×2m high
Aspect: North
Height OD: 12m
Ground Cover: Nettles and bracken
Distance to Sea: 30m to north, open shingle beach
Distance to Fresh Water: 50m to north
Threats: Stable
Description: Rockshelter

Archaeology: Surface collection

Finds

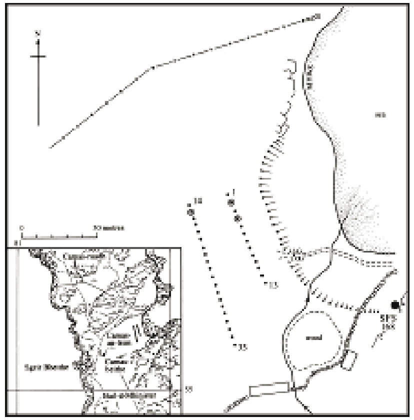
Lithics: A single flake of chalcedonic silica was recovered from the surface here.

Discussion

The isolated find suggests human activity, though more work is needed to provide any detail. This site may well be part of a wider complex including SFS 188, Camas an Leim 2.

2.2.16 SFS 188: Camas-an-Leim 2, NGR NG 8180 5540

Illus 32: SFS 188, Camas-an-Leim 2, general view of site



Illus 116: SFS 188, Camas-an-Leim 2: plan of shovel pits

Type of Site: Open-air lithic scatter site
SFS Record: 2002
Survey Area: Loch Torridan
Size: Unknown
Aspect: North-east
Height OD: 10m
Ground Cover: Grass
Distance to Sea: 50m to north-east
Distance to Fresh Water: 20m to south
Threats: Storm tides and grazing
Description: A lithic scatter located in a small, sheltered raised beach (10m OD) with a north-easterly aspect looking into Loch Torridan (see Illustration 32, left). This site is well drained and has been heavily cultivated; there is surviving evidence of lazy bed cultivation
Archaeology: Two transects of 13 and 20 shovel pits were laid out at 25m intervals on a north-west—south-east alignment, along the crest of the raised beach (see Illustration 116, right). A well formed plough soil, 100–320mm deep, lay directly on the beach material

Finds

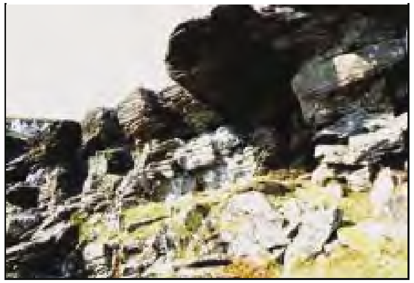
Lithics: There were three lithic finds from the base of the plough soil: two regular flakes and one piece of debitage, all of chalcedonic silica. In addition another flake of chalcedonic silica was found from the surface of an eroding path across the site.

Discussion

This site is near to SFS 168, a rockshelter from which a single flake of chalcedonic silica was recovered. Even taken together finds are not abundant, but it is likely that some sort of prehistoric activity is indicated.

2.2.17 SFS 76: Camusteel 1, NGR NG 7077 4207

Type of Site: Rockshelter
SFS Record: 2000
Survey Area: Mid Applecross
Size: 2m deep×2m wide×1m high
Aspect: South-west-facing
Height OD: 7–8m



Illus 117: SFS 76, Camusteel 1, general view of the site

Ground Cover: Grass and bracken
Distance to Sea: 25m to south-west to open rocky pebble beach
Distance to Fresh Water: 150m to south-east
Threats: Stable
Description: This rockshelter is situated on the east of Camusteel bay close to SFS 77. Small, open and exposed, this site has a considerably overhanging roof, but little in the way of walls or side protection (see Illustrations 117, left & 118, right)
Archaeology: One test pit was excavated just inside the shelter

Illus 118: SFS 76, Camusteel 1, view of rockshelter

Test Pit 1: (1m×0.5m) aligned east—west under the overhang but without side protection.

- Context 7610 A thin turf of grass
- Context 7611 A band of limpets and shattered stone with a few modern finds
- Context 7612 Bedrock at a maximum depth of 0.28m

Finds

Lithics: A quartz pebble was recovered from Test Pit 1
Pottery: There were 19 sherds of glazed pottery in Test Pit 1, context 7611
Glass: Nine clear glass sherds, some decorated were found in Test Pit 1, context 7615
Metalwork: The rim and body fragment of a cast iron vessel (probably a three-legged cooking pot) with everted rim was recovered from Test Pit 1, context 7611. It was originally *c*210mm in diameter, but is broken just above the shoulder.

Discussion

The pottery and the glass are modern in date, but the metalwork suggests post-medieval activity.

2.2.18 SFS 77: Camusteel 2, NGR NG 7050 4217

Illus 119: SFS 77, Camusteel 2, view of rockshelter, from north-east

Type of Site: Cave with midden
SFS Record: 2000
Survey Area: Mid Applecross
Size: 3m deep×5m wide×2m high
Aspect: South-facing
Height OD: 8m
Ground Cover: Nettles and grass
Distance to Sea: 8m to rocky shore
Distance to Fresh Water: 150m to north-east
Threats: Stable
Description: A small cave on the west side of Camusteel Bay. The cave lies in an unusual position, halfway down the cliff face (see Illustrations 119, left & 120, right). It has an open, southerly aspect but is sheltered

Illus 120: SFS 77, Camusteel 2, view of rockshelter interior

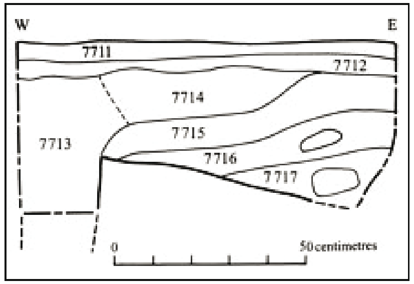
and reached from above by a narrow and difficult path and from below by a steep slope to the beach. Shell midden and lithics were visible on the surface before excavation. A second, smaller and bramble infested shelter lies below, but was not investigated because of the impracticalities of access

Archaeology: One test pit was excavated. Test Pit 1, aligned east—west, lay at the western side of the shelter, well within the drip line

Illus 121: SFS 77, Camusteel 2, Test Pit 1, after excavation

Test Pit 1: (1m×0.5m) aligned east—west at the western side of the shelter, well within the drip line (see Illustrations 121, left & 122).

- Context 7711 Surface shells which produced modern glass and pottery
- Context 7712 A similar layer in terms of content, but without the modern finds
- Context 7713 Loose rounded and sub-angular cobbles and shells with a few lumps of charcoal
- Context 7714 Similar to Context 7713
- Context 7715 A layer of unusual small shells forming a possible floor
- Context 7716 A series of ash and charcoal lenses
- Context 7717 A small area of a larger context, comprising mainly limpets, exposed at the base of the section



Illus 122: SFS 77, Camusteel 2, Test Pit 1, south-facing section

A deep fissure in the bedrock ran obliquely across the trench making excavation and interpretation of the layers difficult. Test Pit 1 was excavated to almost 0.5m.

Finds

Lithics: There were five lithic finds, all of chalcedonic silica. As well as pieces of debitage and regular flakes there was a small broken scraper

Pottery: Six sherds of glazed pottery were recovered from context 7711

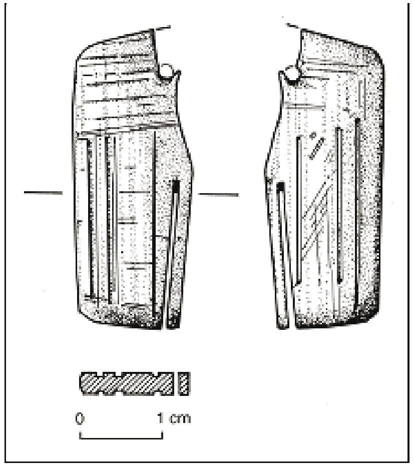
Glass: 15 clear glass sherds (including base), some decorated, context 7711

Metalwork: There were two small eyelets of copper-alloy flanking organic remains; probably eyelets around a perforation in cloth or leather. In addition there was an iron staple and two iron nail fragments, all from context 7711.

2.2.18 Comb fragment | Steven Ashby

An endplate from a single-sided composite comb made of bone (see Illustrations 123, left & 124, right). It is of average size (maximum height 35.4mm; maximum width 13.5mm; maximum thickness 2.8mm) and of rectangular shape with straight edges, and a lentoid cross-section. It seems likely that there was a single pair of connecting plates. The sloping back of the piece indicates that the comb’s back profile was more likely to have been bowed than straight. A small round hole surrounded by oxide corrosion suggests that the connecting rivets were of iron, and that this plate (and possibly any others from the original comb) was riveted at the edge, rather than through the centre. This has been noted as a common western European tradition (Smirnova 2002:38).

Only a single tooth of the comb is preserved, but its low height suggests



Illus 123: SFS 77, Camusteel 2, comb fragment, BT05 drawing

Illus 124: SFS 77, Camusteel 2, comb fragment, BT05 photo

that tooth cutting may have been slightly gradational. The tooth shows no evidence of wear, but closer examination shows that it was cut with an obliquely held saw, creating marked striations on internal tooth faces. Indeed, the quality of preservation of the working marks is extraordinary. Fine transverse and longitudinal saw cuts are visible, presumably used in marking up, as well as deeper cuts. The overall finish of the comb is highly polished, but one edge is broken vertically, along the longitudinal 'grain' of the material. There is also some evidence of post-depositional damage in the form of pitting.

Decoration is difficult to assess on the basis of this single fragment. Three straight, vertical incised lines are evident, and these finish short of the back of the comb. This might be taken to suggest that the connecting plates extended to, or close to the extremities of the comb.

The raw material is skeletal bone rather than antler (Terry O'Connor, *pers comm*). The use of bone billets (tooth and endplates) is unusual in British Viking Age contexts (though see Mann 1982), but less so in late pre-Viking England and Scotland (see for example Riddler 1992), and the later Middle Ages (though by this time the trend was generally for single-piece combs). However, it is not feasible to use this to date the piece. Nonetheless, it is noteworthy that the comb is not of antler, the material of choice in the heyday of the composite comb maker.

It is not clear what type of comb is represented because of the lack of distinguishing details on the surviving fragment. The plate is not inconsistent with endplates attributed to the early medieval period from Orkney (Curle 1982; Porter 1997), York (Ambrosiani 1981; Rogers 1993), Haithabu (Ulbricht 1978) and Birka (Ambrosiani 1981), but nothing about the fragment is clearly diagnostic, and comparisons are dangerous.

This was part of a straight-ended, probably bow-backed comb, decorated with incised lines (though additional ornament may have been present on other parts of the comb).

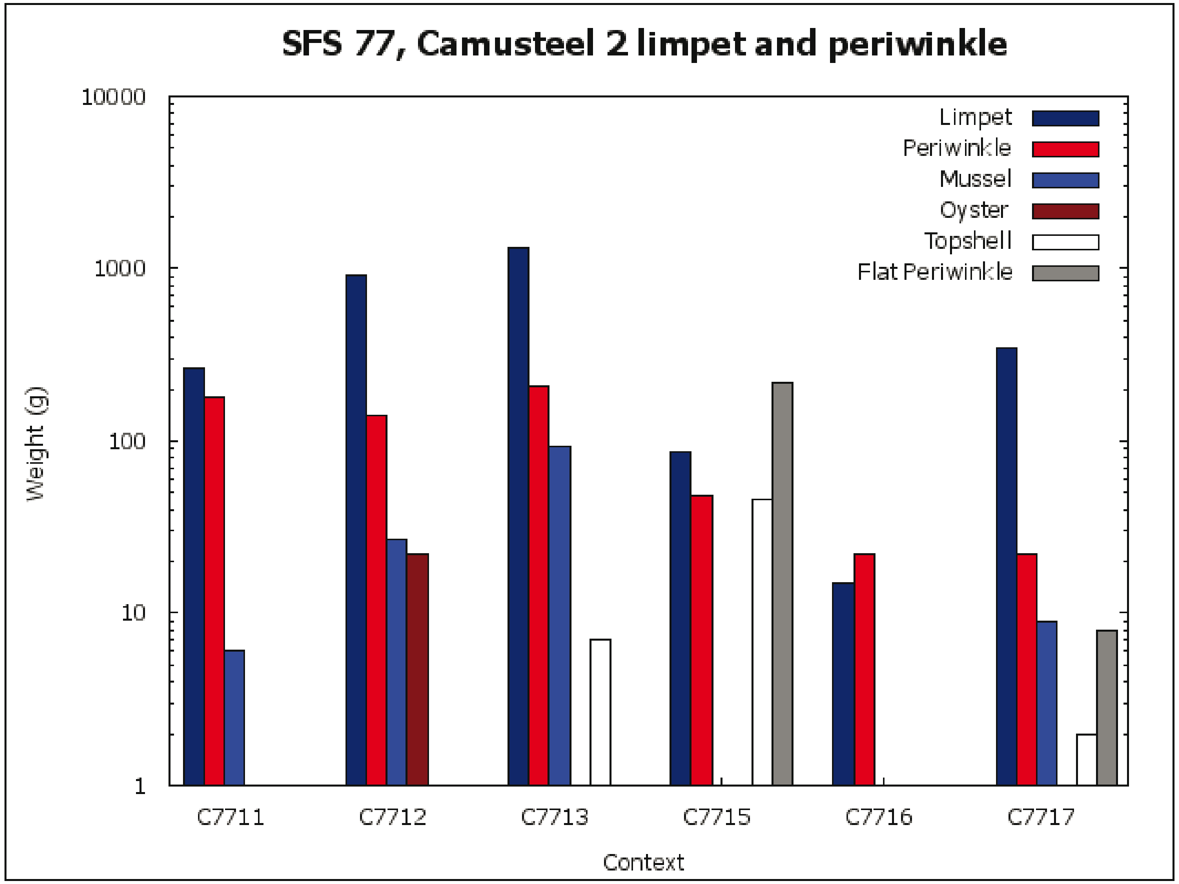
Shell: Limpet predominates throughout the midden (see Table 33; Illustration 125, below). Periwinkle is present but in much smaller quantities. A number of other species are present, including an unusual number of flat periwinkle and topshell in context 5.

To access a printable version of this table, please go to the separate page `table027.html` and set to LANDSCAPE mode.

Table 33

SFS 77: Test Pit 1	limpet	periwinkle	mussel	oyster	topshell	flat periwinkle	razor shell	clam	cockle	scallop	residue
Context 1	265	178	6								755
Context 2	927	142	27	22	1						1506
Context 3	1332	207	94		7		21	21			897
Context 5	87	48	1		46	217		3	12	4	342
Context 6	15	22									212
Context 7	345	22	9		2	8					

Table 33: SFS 77, Camusteel 2, marine molluscs, weight in grams for individual species by context



Illus 125: SFS 77, Camusteel 2, limpet and periwinkle, weight in grams by context

Dates

Four radiocarbon determinations were obtained from this site, all from Test Pit 1 (see Table 34, below). Two dates came from context 7715, a possible floor, and two from context 7717, a shell midden. Three of the dates fall into the late 1st millennium AD while the fourth is earlier.

Table 34				
SFS 77 Context	Reference	Material	Date BP	Age
TP1 C7715	AA-50688	hazelnut shell	1205±40	AD920–960
TP1 C7715	AA-50689	pig bone	1130±35	AD780–1000
TP1 C7717	AA-50691	hazel charcoal	1235±35	AD680–890
TP1 C7717	AA-50690	charcoal	2365±55	800–250BC

Table 34: SFS 77, Camusteel 2, radiocarbon dates, see Section 4

Discussion

The lithics suggest some prehistoric activity, the pottery and the glass are modern, and the metalwork could date to anything between the post-medieval to modern periods. The comb cannot be dated precisely but it would not contradict other early medieval indications. The dates confirm activity in the late prehistoric and medieval period, but clearly this shelter has been used, on and off, into recent times.

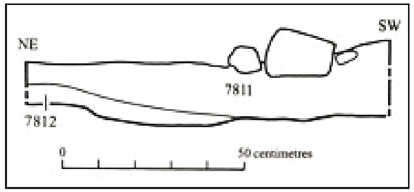
2.2.19 SFS 78: Camusteel 3, NGR NG 7041 4264

Type of Site: Rockshelter with midden and structures
SFS Record: 2000
Survey Area: Mid Applecross
Size: 8m deep×4m wide×2m high
Aspect: West
Height OD: 5m
Ground Cover: Bracken
Distance to Sea: 12m to west, rocky open shoreline
Distance to Fresh Water: In rockshelter
Threats: Stable
Description: A small rockshelter which provides some protection from the elements in spite of an open westerly aspect (see Illustration 126, right). It is situated in the base of an old sea cliff. Two ruinous walls and a patchy surface shell midden are present
Archaeology: One test pit was excavated

Illus 126: SFS 78, Camusteel 3, general view of rockshelter entrance

Test Pit 1: (1m×0.5m), aligned north-east—south-west and set across one of the ruinous walls inside the shelter (see Illustrations 127, left & 128, right).

- Context 7811 Surface midden which contained mainly limpets in good condition
- Context 7812 A thin layer of limpets and abundant fish bones
- Context 7813 Bedrock



Illus 128: SFS 78, Camusteel 3, Test Pit 1, east-facing section

Illus 127: SFS 78, Camusteel 3, Test Pit 1, after excavation

Finds

There were no artefacts

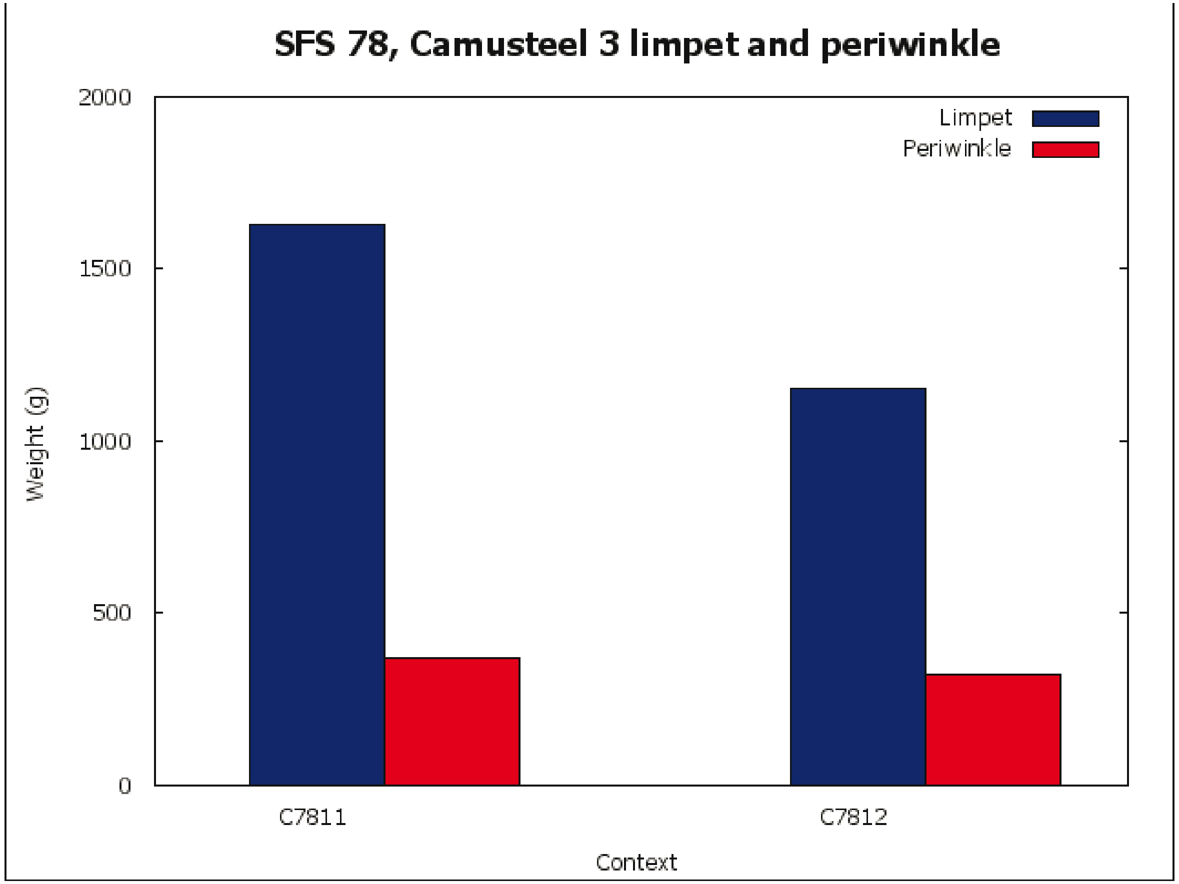
Bone: Fragments of cancellous bone, possibly cetacean, suggest anthropogenic activity. In addition there were bones of frog, vole and other amphibia as well as small mammals, all of which are likely to have a natural origin.

Shell: Limpet predominates, periwinkle is present in smaller quantities and very small quantities of mussel appear (see Table 35, below; Illustration 129, below).

Table 35

SFS 78 Test Pit 1	limpet	periwinkle	mussel	residue	Total
Context 1	1632	369	4	1159	3164
Context 2	1156	321	7	774	2258
Totals	2788	690	11	1933	5422

Table 35: SFS 78, Camusteel 3, marine molluscs, weight in grams for individual species by context



Illus 129: SFS 78, Camusteel 3, limpet and periwinkle, weight in grams by context

Discussion

The visible wall proved to be insubstantial and without obvious foundations. This is clearly a boulder wall for shelter, possibly in conjunction with a protective screen, rather than a substantial, load bearing wall. The lack of artefacts suggests transient activity.

2.2.20 SFS 17: Church Cave, NGR NG 6270 5696


Illus 60: SFS 17, Church Cave, Rona, general view of

Type of Site: Cave with midden and structures
SFS Record: 2002
Survey Area: Islands (Rona)
Size: 28m deep×17m wide×4m high
Aspect: South-east at foot of massive cliff
Height OD: 40m
Ground Cover: Grass and bracken
Distance to Sea: 30m to south-east, open rocky shore
Distance to Fresh Water: 50m to north-east
Threats: Human activity (occasional services)
Description: A large cave, Church Cave (40m OD, 30m from sea), was used as the island church regularly until 1912, and is still occasionally

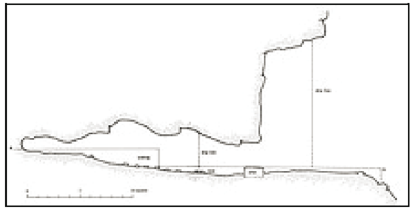
rockshelter

Illus 61: SFS 17, Church Cave, close-up view of rockshelter

used for services (see Illustrations 60, top left & 61, bottom left). It is a large east-facing cave, 28m deep×17m wide×4m high. It contains rows of stone used as pews and a low stone pillar at the entrance which was used as a pulpit (see Illustrations 130, top right & 131, bottom right). Towards the rear of the cave is an area of shell midden and another area, currently empty with a floor of cave earth. One test pit was dug in each of these areas

Illus 130: SFS 17, Church Cave, plan of cave

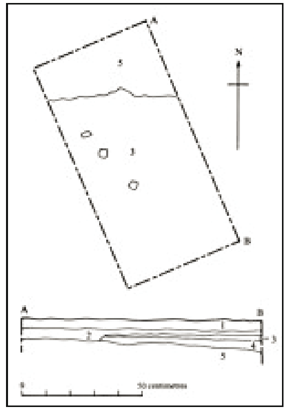
Archaeology: Two test pits were excavated towards the rear of the cave (Illustration 130, top right)



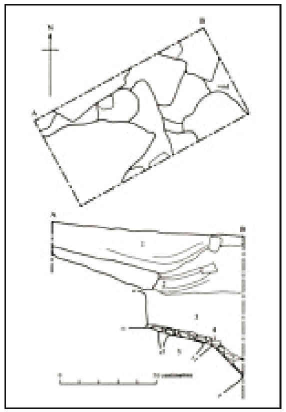
Illus 131: SFS 17, Church Cave, north-west-facing section of cave

Test Pit 1: (1m×0.5m) was located in the area of cave earth immediately in front of the rows of seating. It contained five contexts (see Illustration 132, right).

- Context 1 Sheep dung
- Context 2 Black ash and charcoal, burnt shell, bone fragments and pieces of quartz (unworked)
- Context 3 White ash, part burnt shell and charcoal fragments
- Context 4 Black ash and charcoal with burnt shell and bone. Quartz (unworked)
- Context 5 Compacted stone fragments of parent rock in clean sandy matrix



Illus 132: SFS 17, Church Cave, Test Pit 1, plan and section



Illus 133: SFS 17, Church Cave, Test Pit 2, plan and

Test Pit 2: (1m×0.5m) was located in the shell midden. It contained five contexts (see Illustration 133, left)

- Context 1 Loose dry midden material containing stones and bones
- Context 2 Loose midden material, slightly wet, containing pot sherds, bone and stones
- Context 3 Loose, dark compact midden material containing bones and stones
- Context 4 Angular stone fragments lying on bedrock
- Context 5 Bedrock

Finds

Lithics: There were four finds, two regular flakes of quartz and two pieces (a regular flake and a debitage flake) of chalcedonic silica.

Bone tools: A fine point, smoothed and rounded (BT135), was found in Test Pit 2, context 2 (see Illustration 89 in 2.2.3 SFS 68, above: SFS 17, Church Cave, fine point (number four in illustration)).

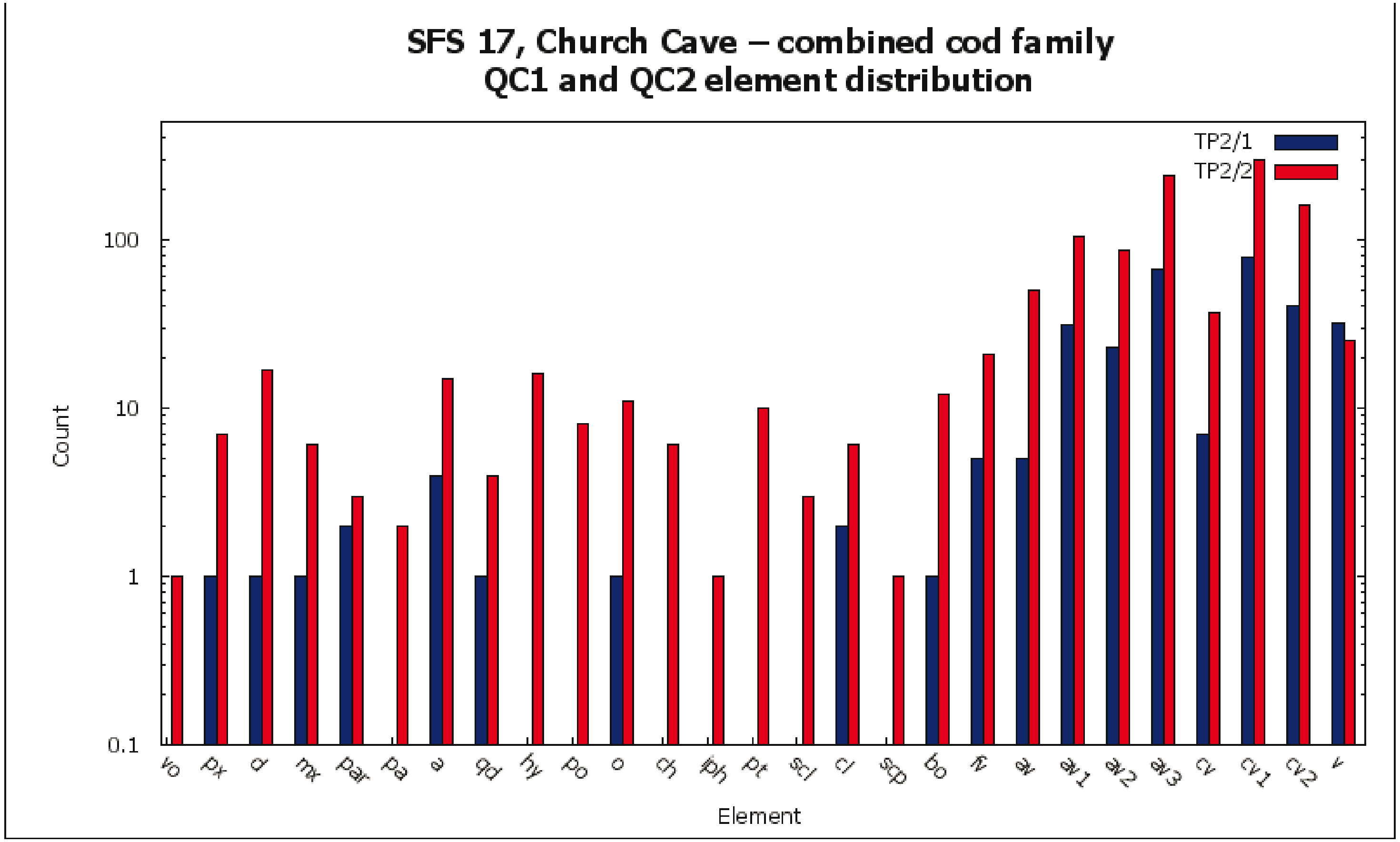
section

Pottery: There were four sherds of coarse pottery in Test Pit 2. One is decorated with incised lines probably forming a chevron pattern.

Test Pit 2, Context 1: One body sherd, slightly abraded. The fabric is coarse sandy clay which has fired hard and is grey with a red interior margin. Th 7mm; Wt 4g
Test Pit 2, Context 2: One body sherd, slightly abraded. The exterior surface is smoothed and possibly burnished. The fabric is sandy clay which has fired hard and is grey with a brown interior surface. Th 4mm; Wt 2g.
One body sherd, slightly abraded. The fabric is sandy clay which has fired hard and is grey with red surfaces. Th 6mm; Wt 1g.
Test Pit 2, Context 2: One body sherd, abraded. The exterior surface is smoothed and decorated with incised lines probably forming a chevron pattern. The fabric is fairly coarse sandy clay which has fired hard and is grey. Th 6mm; Wt 3g.

Metalwork: Test Pit 2, Context 3: Lace end made of copper-alloy. Strip of sheet rolled into a tight cylinder, probably for use as a rivet. L 30mm, D 3mm. Alloy: gunmetal.

Bone: Bone was recovered from both test pits. A total of 153 bones weighing 238.37g was recovered from Test Pit 1, and 3524 bones weighing 2130.53g from Test Pit 2. A subset of 19 diagnostic elements (QC1) was analysed in detail from Test Pit 1 and 229 QC1 elements from Test Pit 2. Preservation of the mammal bone is generally fair and fish bone is fair to good (see Table 36, below). Preservation of the mammal, bird and fish QC1 elements from Test Pit 2 is generally fair to good (see Table 37, below). In Test Pit 1 four of the five contexts yielded 84 specimens of mammal bone, one specimen of bird bone and 68 of fish bone (see Table 38, below). Both domestic (sheep and pig) and wild (otter and deer) mammalian taxa are sparsely represented and there is only one (unidentified) specimen of bird bone. The majority of the fish remains from Test Pit 1 are found in Context 4 and are dominated by species belonging to the cod family (gadidae). The salmon, sea bream and gurnard families are also represented. In Test Pit 2 bone was recovered from the upper three contexts, mostly Context 2. Both domestic (sheep, cattle, pig) and wild (red deer, deer family, seal, otter) mammalian taxa, with a combined NISP of 1173 were recorded (see Table 39, below), together with water vole, a species of vole and a species of rat. In addition there was a small amount of bird bone (NISP of 28) including single specimens of woodcock and either razorbill or guillemot (Table 39). Fish bone was mainly recovered from Context 2, as in Test Pit 1, gadid species, predominately saithe, dominate and other cod family species include pollack, cod, haddock and ling. Atlantic herring, mackerel and species from the wrasse, salmon, scorpion fish and plaice family were also recorded. There was a single amphibian specimen from SFS 17: the trunk vertebrae of a toad (*Bufo* sp). The small number of QC1 elements in Test Pit 1 means that it is hard to comment on element representation, species are represented by single QC1 elements only (see Table 40, below). In Test Pit 2 the sample sizes of mammal and bird bone are also too small to make any meaningful comment on element representation (see Table 41, below), but the fish bone provides a larger sample (see Table 42, below). Illustration 134, (below), shows the combined cod family diagnostic elements and vertebrae from Contexts 1 and 2. From both contexts the majority of elements are vertebrae; however, there are differences in the element distribution. Context 1 has relatively fewer appendicular elements than Context 2 but this could be a reflection of sample size rather than a real difference in fish processing. Skip Tables.



Illus 134: SFS 17, Church Cave, combined cod family QC1 and QC2 element distribution (for element codes see Appendix 24)

To access a printable version of this table, please go to the separate page table143.html and set to LANDSCAPE mode.

Table 36

SFS 17: York system texture	Description	mammal	bird	fish	Total
Excellent	Majority of surface fresh or even slightly glossy; very localised flaky or powdery patches	0	0	0	0
Good	Lacks fresh appearance but solid; very localised flaky or powdery patches	1	0	4	5
Fair	Surface solid in some places, but flaky or powdery on up to 49% of specimen	3	1	9	13
Poor	Surface flaky or powdery over 50% of specimen	1	0	0	1
Totals	0	5	1	13	19

Table 36: SFS 17, Church Cave, Texture of QC1 elements from Test Pit 1 (all contexts)

To access a printable version of this table, please go to the separate page table143.html and set to LANDSCAPE mode.

Table 37

SFS 17: York system texture	Description	mammal	bird	fish	Total
Excellent	Majority of surface fresh or even slightly glossy; very localised flaky or powdery patches	2	0	5	7
Good	Lacks fresh appearance but solid; very localised flaky or powdery patches	31	5	59	95
Fair	Surface solid in some places, but flaky or powdery on up to 49% of specimen	30	2	84	116
Poor	Surface flaky or powdery over 50% of specimen	1		10	11
	Totals	64	7	158	229

Table 37: SFS 17, Church Cave, texture of QC1 elements from Test Pit 2 (all contexts)

Table 38

Taxon	Context 1	2	3	4	Total
Mammal					
Sheep		1			1
Pig		1			1
Deer family				1	1
Otter	1				1
Small mammal				1	1
Total QC1	1	2	0	2	5
Total QC0	0	19	11	49	79
Total mammal	1	21	11	51	84
Bird					
Total bird: QC0	0	1	0	0	1
Fish					
Saithe		1	1	14	16

Pollack				1	1
Saithe/pollack				4	4
Cod/saithe/pollack				3	3
Cod family			2	6	8
Salmon family				4	4
Sea bream family				2	2
Gurnard family				1	1
Unidentified fish			2		2
Total QC1 & QC2	0	1	5	35	41
Total QC0 & QC4	0	0	2	25	27
Total fish	0	1	7	60	68
Total NISP	1	23	18	111	153

Table 38: SFS 17, Church Cave, number of identified specimens (NISP) from Test Pit 1

Table 39

	Context			
Taxon	1	2	3	Total
Mammal				
Sheep		6	3	9
Sheep/goat	2		1	3
Cow	1	2	1	4
Pig		1	1	2
Red deer	2	4	1	7
Deer family		4		4
Seal sp.	1	1	1	3
Otter		1		1
Watervole	1	3		4
Vole sp.		2		2
Rat sp.		1		1
Small mammal		8	1	9
Medium mammal 2			1	1
Medium mammal 1		4	1	5
Large mammal		4	1	5

Unidentified mammal	2		2	4
Dog		+		
Total QC1	9	41	14	64
Total QC0	124	903	82	1109
Total mammal	133	944	96	1173
Bird				
Razorbill/Guillemot		1		1
Woodcock		1		1
Unidentified bird	1	4		5
Total QC1	1	6	0	7
Total QC0	2	18	1	21
Total bird	3	24	1	28
Fish				
Saithe	117	598		715
Pollack		15		15
Saithe/pollack	39	68		107
Cod		5		5
Cod/saithe/pollack	43	231		274
Haddock		1		1
Haddock?		1		1
Ling		1		1
Rockling sp.		1		1
Atlantic herring	6	26		32
Atlantic mackerel		1		1
Conger eel		4		4
Cod family	103	227		330
Wrasse family	1	11		12
Salmon family		3		3
Scorpion fish family	1			1
Unidentified fish	42	1		43
Plaice		+		
Plaice family		+		
Total QC1 & QC2	352	1194	0	1546
Total QC4 & QC0	73	703	0	776

Total fish	425	1897	0	2322
Amphibian				
Toad sp.		+		
Total QC0	0	1	0	0
Total amphibian	0	1	0	1
Total NISP	561	2866	97	3524

Table 39: SFS 17, Church Cave, number of identified specimens (NISP) from Test Pit 2. + = present

Table 40

Taxon	Element	Context 1	2	3	4	Total
Mammal						
Sheep	humerus		1			1
Pig	mandible		1			1
Deer family	radius				1	1
Otter	2nd phalanx	1				1
Small mammal	skull				1	1
	Total QC1	1	2	0	2	5
Bird						
Unidentified bird	tarsometatarsus					
	Total QC1	1	2	0	2	5
Fish						
Saithe	articular				1	1
	cleithrum				1	1
	opercular				1	1
	preopercular				1	1
	premaxilla			1		1
vertebrae:	av2				2	2
	av3				6	6
	cv1		1		1	2

	cv2				1	1
Pollack	premaxilla				1	1
Saithe/pollack	basioccipital				1	1
	parasphenoid				1	1
vertebrae:	av2				2	2
Cod / saithe / pollack						
vertebrae:	av1				1	1
	cv1				1	1
	cv2				1	1
Cod family	dentary			2		2
	hyomandibular				1	1
vertebrae:	av3				1	1
	cv				1	1
	cv1				3	3
Salmon family						
vertebrae:	cv				4	4
Sea bream family						
vertebrae:	av				1	1
	cv				1	1
Gurnard family	dentary				1	1
Unidentified fish						
vertebrae:	v			2		2
	Total QC1	0	3	9	12	
	Total QC2	1	0	26	29	1

Table 40: SFS 17, Church Cave, Test Pit 1 mammal, bird and fish QC1 and QC2 element representation

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Table 41

Taxon	Element	Context				Total
		1	2	3	4	
Mammal						
Sheep	femur		1			1
	humerus		1	1		2
	1st phalanx		2			2
	3rd phalanx		1			1

	radius		1	2		3
Sheep/Goat	astragalus			1		1
	humerus	1				1
	radius	1				1
Pig	mandible		1			1
	scapula			1		1
Cow	femur			1		1
	humerus		1			1
	mandible	1	1			2
Red deer	astralagus		1			1
	metapodial		1			1
	metatarsal	1	1	1		3
	1st phalanx	1	1			2
Deer family	astralagus		1			1
	mandible		1			1
	2nd phalanx		1			1
	3rd phalanx		1			1
Seal sp.	metapodial	1				1
	3rd phalanx		1			1
	tibia			1		1
Otter	2nd phalanx		1			1
Watervole	mandible	1	3			4
Vole	mandible		2			2
Rat sp.	mandible		1			1
Small mammal	femur		1			1
	humerus		4			4
	mandible		1			1
	skull		1			1
	tibia		1	1		2
Medium mammal 2	humerus			1		1
Medium mammal 1	metapodial			1		1
	metatarsal		1			1
	1st phalanx		2			2
	2nd phalanx		1			1
Large mammal	femur		1			1
	metatarsal			1		1

	mandible		1			1
	phalanx		1			1
	scapula		1			1
Unidentified mammal	metatarsal			1		1
	phalanx	1				1
	scapula	1		1		2
	Total QC1	9	41	14	0	64
Bird						
Razorbill/guillemot	carpometacarpus			1		1
Woodcock	tarsometatarsus			1		1
Unidentified bird	humerus		1	1		2
	tarsometatarsus			2		2
	ulna			1		1
	Total QC1	0	1	6	0	7

Table 41: SFS 17, Church Cave, Test Pit 2 QC1 element distribution for mammal and bird

Table 42

Taxon	Element	Context				Total
		1	2	3	4	
Fish						
Saithe	articular	2	5			7
	basioccipital		7			7
	ceratohyal		3			3
	cleithrum	1	2			3
	dentary	1	6			7
	hyomandibular		8			8
	infrapharygeal		1			1
	maxilla		1			1
	opercular		6			6
	palatine		2			2
	preopercular		2			2
	posttemporal		4			4
	premaxilla	1	3			4

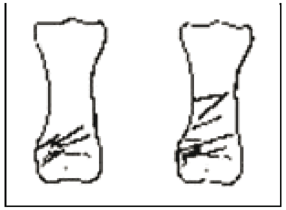
	quadrate	1	3			4
	supracleithrum		1			1
	vomer		1			1
vertebrae:	fv	3	5			8
	av		3			3
	av1	14	57			71
	av2	10	46			56
	av3	28	137			165
	cv	1	2			3
	cv1	40	198			238
	cv2	15	95			110
Pollack						
vertebrae:	av2		1			1
	av3		11			11
	cv1		3			3
Saithe/pollack	articular	1	1			2
	basioccipital	1	3			4
	dentary		6			6
	hyomandibular		3			3
	maxilla	1				1
	opercular	1	2			3
	preopercular		1			1
	posttemporal		2			2
	premaxilla		3			3
vertebrae:	av1	9	7			16
	av2	8	15			23
	av3	15	16			31
	cv1	2	4			6
	cv2		2			2
	fv	1	3			4
Cod						
vertebrae:	av1		1			1
	av3		1			1
	cv1		1			1
	cv2		2			2
Cod/saithe/pollack	articular		3			3

	basioccipital		2			2
	ceratohyal		1			1
	cleithrum	1	2			3
	dentary		2			2
	maxilla		3			3
	opercular		1			1
	parasphenoid		1			1
	preopercular		2			2
	posttemporal		4			4
	premaxilla		1			1
	supracleithrum		1			1
vertebrae:	av	1	12			13
	av1	3	21			24
	av2	1	14			15
	av3	13	51			64
	cv		14			14
	cv1	10	59			69
	cv2	14	33			47
	fv		4			4
Haddock	dentary		1			1
Haddock?	cleithrum		1			1
Ling						
vertebrae:	cv1		1			1
Rockling sp.						
vertebrae:	av1		1			1
Atlantic herring						
vertebrae:	av	2	14			16
	cv	3	12			15
	fv	1				1
Atlantic mackerel						
vertebrae:	cv		1			1
Conger eel						
vertebrae:	av		2			2
	v		2			2
Cod family	articular	1	6			7
	ceratohyal		2			2

	cleithrum		1			1
	dentary		2			2
	hyomandibular		5			5
	maxilla		2			2
	opercular		2			2
	parasphenoid	2	2			4
	posttemporal		3			3
	quadrate		1			1
	supracleithrum		1			1
	scapula		1			1
vertebrae:	av	4	35			39
	av1	5	17			22
	av2	4	10			14
	av3	11	21			32
	cv	6	21			27
	cv1	26	32			58
	cv2	11	29			40
	fv	1	9			10
	v	32	25			57
Wrasse family	infrapharyngeal	1	4			5
	vomer		1			1
vertebrae:	av		3			3
	cv		3			3
Salmon family						
vertebrae:	av		1			1
	cv		2			2
Bullhead family						
vertebrae:	v	1				1
Unidentified fish	articular		1			1
vertebrae:	v	42				42
	Total QC1	15	135	0	0	150
	Total QC2	337	1059	0	0	1396

Table 42: SFS 17, Church Cave, Test Pit 2 QC1 and QC2 element distribution for fish

The majority of juvenile bone was from the limbs of medium to large mammals (see Tables 43 & Table 44, below). Unfortunately, no butchery data are recorded from these specimens but presumably they are the result of human consumption. The seal tibia and metapodial are probably from adult individuals as the



Illus 135: SFS 17, Church Cave, no larger version

epiphyses fuse relatively late (Ericson & Storå 1999). The majority of the fish QC1 elements are from fish of medium size (*c*30–50cm estimated total length), but there are also specimens from large and small fish. Although there are a range of sizes, the emphasis on medium-sized fish suggests that most fishing was carried out beyond the shore zone. Bone modification was only recorded from Test Pit 2. Two of the mammal bones had evidence of carnivore gnawing (see Table 45, below) and three gadid fish bones were crushed, though there was no sign that this was due to ingestion. Butchery evidence was also only recorded from Test Pit 2. Table 46, below, describes the evidence recorded, which was mostly cut and chop marks on mammal limb elements. The cut marks on two otter phalanges, shown in Illustration 135 (right; skinning marks on otter phalanges (as described in Table 46). Drawn by R Parks, no larger version; (left) SFS17-8556 (actual length = 12.01 mm); (right) SFS17-8567 (actual length = 12.92 mm)), are of particular interest as the fine parallel marks are consistent with skinning. Skip Tables.

To print this table page, you may wish to set your printer to LANDSCAPE mode via the separate page `table043.html`.

Table 43

Bone ID	Test pit	Context	Taxon	Element	Criteria
SFS17-7918	TP1	2	unidentified bird	tarsometatarsus	distal epiphysis unfused, juvenile cortex
SFS17-7923	TP1	4	deer family	radius	distal epiphysis unfused, juvenile cortex
SFS17-7903	TP2	1	red deer	1st phalanx	juvenile cortex
SFS17-8533	TP2	1	seal sp.	metapodial	distal epiphysis fusing
SFS17-8534	TP2	1	unidentified mammal	phalanx	proximal and distal epiphysis fusing
SFS17-8548	TP2	2	small mammal	humerus	distal epiphysis unfused
SFS17-8549	TP2	2	small mammal	femur	distal epiphysis unfused
SFS17-7963	TP2	2	medium mammal 1	1st phalanx	proximal epiphysis unfused
SFS17-7964	TP2	2	medium mammal 1	2nd phalanx	proximal epiphysis unfused
SFS17-7965	TP2	2	medium mammal 1	3rd phalanx	proximal epiphysis fusing, juvenile cortex
SFS17-7957	TP2	2	deer family	2nd phalanx	proximal epiphysis fusing
SFS17-7951	TP2	2	sheep	femur	proximal epiphysis unfused
SFS17-7940	TP2	2	large mammal	phalanx	juvenile cortex
SFS17-7895	TP2	3	small mammal	tibia	proximal epiphysis unfused
SFS17-7874	TP2	3	seal sp.	tibia	proximal epiphysis fusing
SFS17-7870	TP2	3	large mammal	metatarsal	distal epiphysis unfused, juvenile cortex
SFS17-7871	TP2	3	unidentified mammal	scapula	distal epiphysis unfused, juvenile cortex
SFS17-7872	TP2	3	cow	femur	distal epiphysis unfused

Table 43: SFS 17, Church Cave, QC1 elements pre-adult bird and mammal bone from Test Pit 1 and Test Pit 2

Table 44

Taxon	Size category	Context 1	2	3	4	Total
Test pit 1						
Saithe	large				1	1
	medium				3	3
	small			1		1
Pollack	large				1	1
Saithe/ollack	large				2	2
Cod family	medium			2	1	3
Gurnard family	large				1	1
	Total test pit 1	0	0	3	9	12
Test pit 2						
Saithe	large		1			1
	medium	6	41			47
	small		12			12
	tiny		1			1
Saithe/pollack	large	1				1
	medium	3	19			22
	small		2			2
Cod/saithe/pollack	large		2			2
	medium	1	16			17
	small		4			4
Haddock	medium		1			1
Haddock?	medium		1			1
Cod family	large		2			2
	medium	3	20			23
	small		5			5
	tiny		1			1
Wrasse family	large		1			1
	medium	1	4			5
Unidentified fish	medium		1			1
	Total test pit 2	15	134	0	0	149

Table 44: Size of QC1 elements by species and context for SFS17, Church Cave, Test Pit 1 and Test Pit 2 (see Appendix 21 for definitions of the York System size categories)

Table 45

Site/Bone ID	Provenance	Taxon	Element	Modification
SFS17-7879	TP2/3	large mammal	rib	carnivore gnawing
SFS17-7937	TP2/2	cow	mandible	carnivore gnawing
SFS17-8015	TP2/2	cod family	first vertebra	crushed
SFS17-8052	TP2/2	cod family	caudal vertebra	crushed
SFS17-8053	TP2/2	cod family	caudal vertebra	crushed
SFS10-7824	TP1/1	unidentified mammal	unidentified	root etching
SFS10-7829	TP1/1	unidentified mammal	unidentified	carnivore nawing
SFS10-7831	TP1/1	unidentified mammal	unidentified	root etching
SFS10-7832	TP1/1	unidentified mammal	unidentified	root etching

Table 45: Bone modification from all sites

To print this table page, you may wish to set your printer to LANDSCAPE mode via the separate page `table046.html`.

Table 46

Site/ Bone ID	Provenance	Taxon	Element	Butchery	Area	Notes
SFS10-7833	TP1/1	Mammal	Unidentified	cut		
SFS10-7830	TP1/1	Mammal	Unidentified	chop		
SFS10-7841	TP1/2	Cattle	Radius	chop	15	
SFS17-8567	TP2/1	Otter	Phalanx 2	cut	tp	medio-lateral fine cut mark on plantar surface in middle of shaft
SFS17-8567	TP2/1	Otter	Phalanx 2	cut	tp	6 fine cut marks extending medio-laterally above distal articulation on dorsal surface. Consistent with skinning.
SFS17-7907	TP2/1	Red deer	Metatarsal	cut	tp	cut mark on dorsal surface of shaft just underneath proximal articulation
SFS17-	TP2/1	Red deer	Metatarsal	cut	fp	cut on proximal surface of proximal articulation

7907						
SFS17-7900	TP2/1	Mammal	Vertebra	chop	sp	
SFS17-8556	TP2/2	Otter	Phalanx 2	cut	tp	4 fine roughly parallel cut marks extending medio-laterally on dorsal surface just above the distal articulation
SFS17-7948	TP2/2	Red deer	Metapodial	cut	tp	small cut mark above distal condyle
SFS17-7977	TP2/2	Cattle	Humerus	chop	tp	chop off of most distal part of distal condyle
SFS17-7953	TP2/2	Sheep	Humerus	cut	tp	4 cut marks on ventral surface (opp of dorsal)
SFS17-7892	TP2/3	Sheep/goat	Astragalus	cut	34	2 fine cut marks across the dorsal surface
SFS17-7880	TP2/3	Sheep	Radius	cut	tp	series of 7 roughly parallel medio-laterally cut marks on side of shaft
SFS17-7871	TP2/3	Mammal	Scapula	cut		2 parallel cut marks just below articular facet

Table 46: Butchery marks from all sites (tp = transverse plane, sp = sagittal plane, fp = frontal plane); Back to phalanges

SFS 17, Church Cave, served as the island church into the 20th century (Hardy & Wickham-Jones 2002, 11) and it is difficult to ascertain whether the bone assemblages are related solely to this, or to an alternative and perhaps earlier use. Certainly the fish bone assemblage from Test Pit 2, in the midden, implies the processing or consumption of fish at the site.

Shell: Periwinkle predominates in Test Pit 1 but the numbers are very small and unlikely to be statistically valid (see Tables 47 & 48, below). Limpet predominates in Test Pit 2, though there is a lot of periwinkle here too (see Illustrations 136 & 137, both below). Other species present include a significant amount of oyster and mussel in Test Pit 2 (see Table 49, below). The results of fragmentation analysis can be seen in the chart (see Illustration 138, below). The limpets are fairly fragmented (mostly between 20 and 40%), though 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 (also Illustration 138, below). The periwinkles in Test Pit 2 also tend to be whole (between 75 and 94%), whereas those in Test Pit 1 are more fragmented. Skip tables.

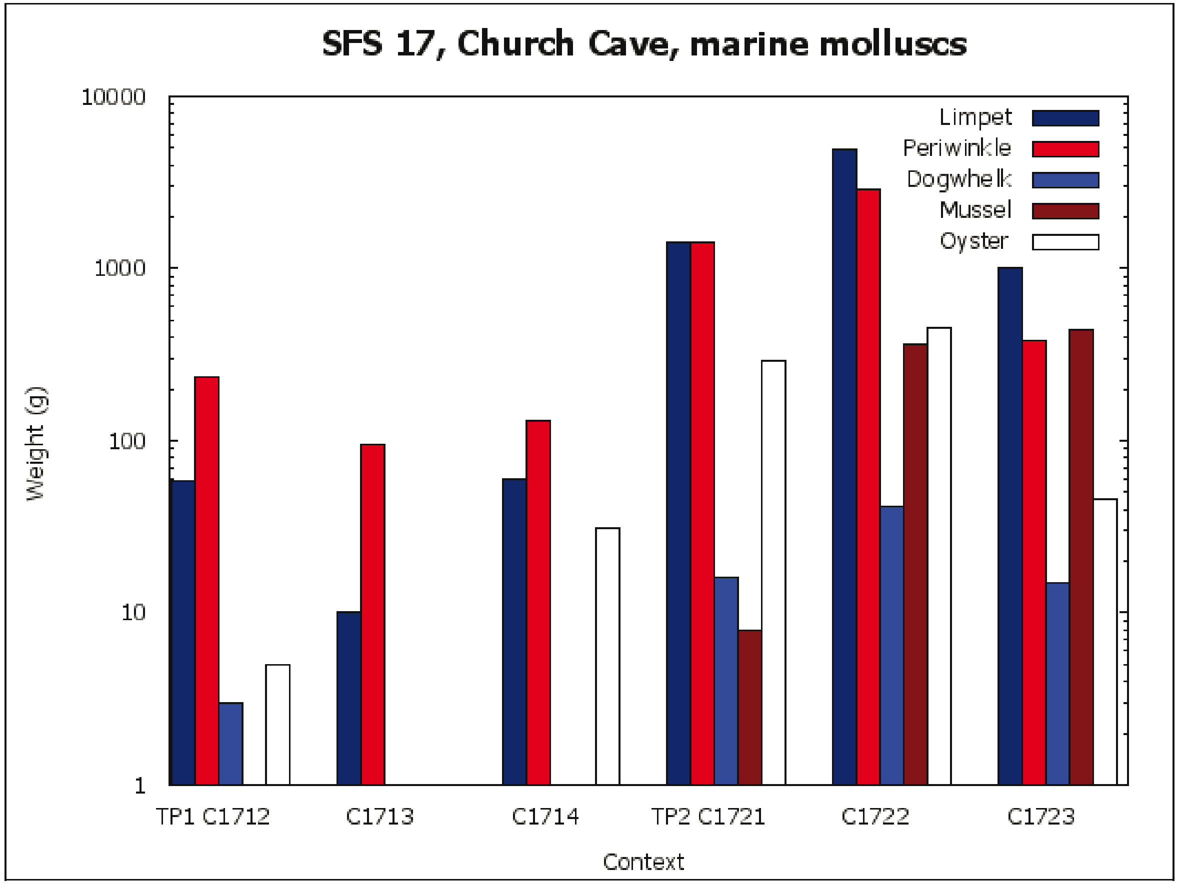
To access a printable version of this table, please go to the separate page table047.html and set to LANDSCAPE mode.

Table 47

Church Cave: SFS 17	limpet	periwinkle	dogwhelk	mussel	oyster	venus	topshell	flat periwinkle	carpet shell
Test Pit 1									
Context 2	58	232	3		5	1			
Context 3	10	95							

Context 4	60	132			31				
Test Pit 2									
Context 1	1412	1427	16	8	293		1	1	
Context 2	4934	2868	42	364	453	5		4	4
Context 3	1005	386	15	437	46				

Table 47: SFS 17, Church Cave, marine molluscs, weight in grams for individual species by context



Illus 136: SFS 17, Church Cave, limpet and periwinkle, weight in grams for individual species by context

Table 48				
SFS 17: Test Pit 1	Limpets	Periwinkle	Dogwhelk	Oyster
Context 2	13	23	1	1
Context 3	4	7		
Context 4	12	16		1

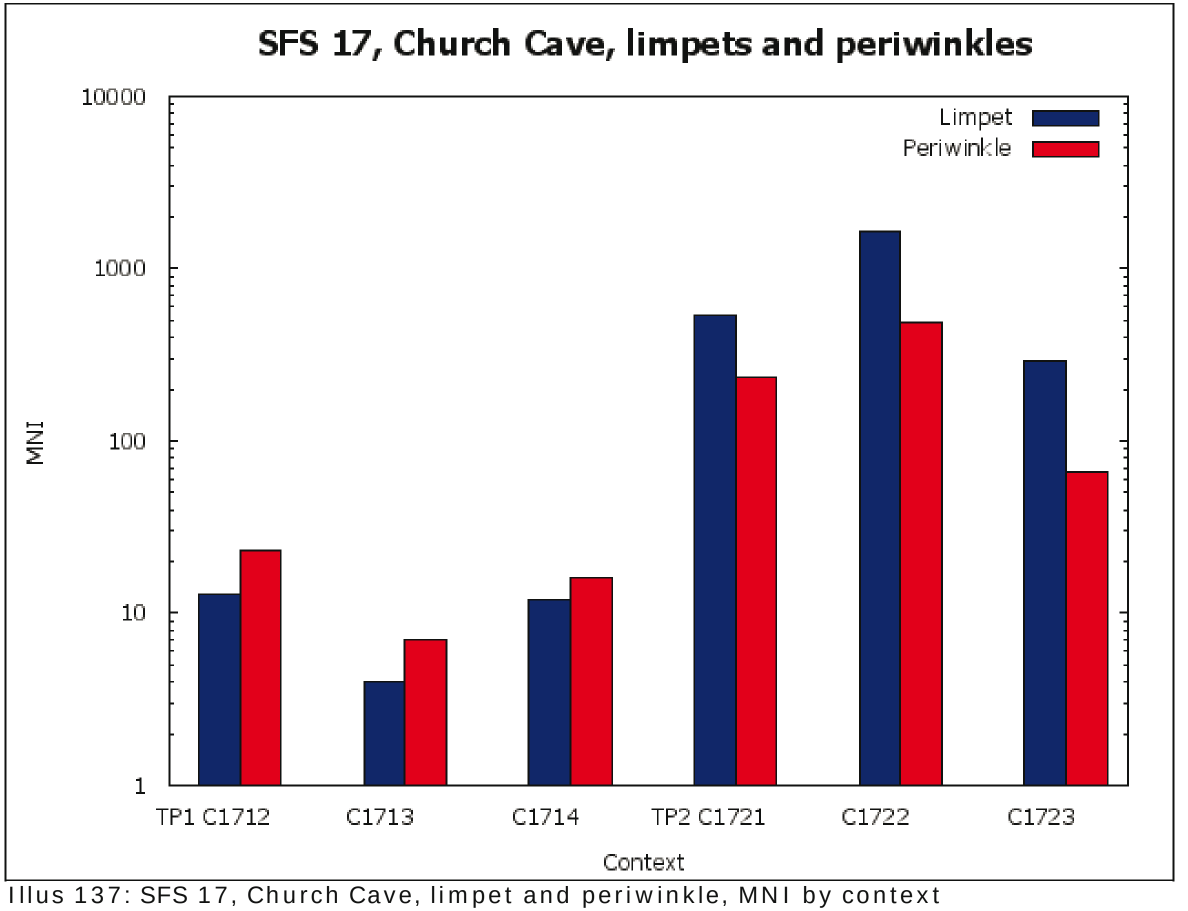
Table 48: SFS 17, Church Cave, marine molluscs, MNI of species by context in Test Pit 1

To access a printable version of this table, please go to the separate page table049.html and set to LANDSCAPE mode.

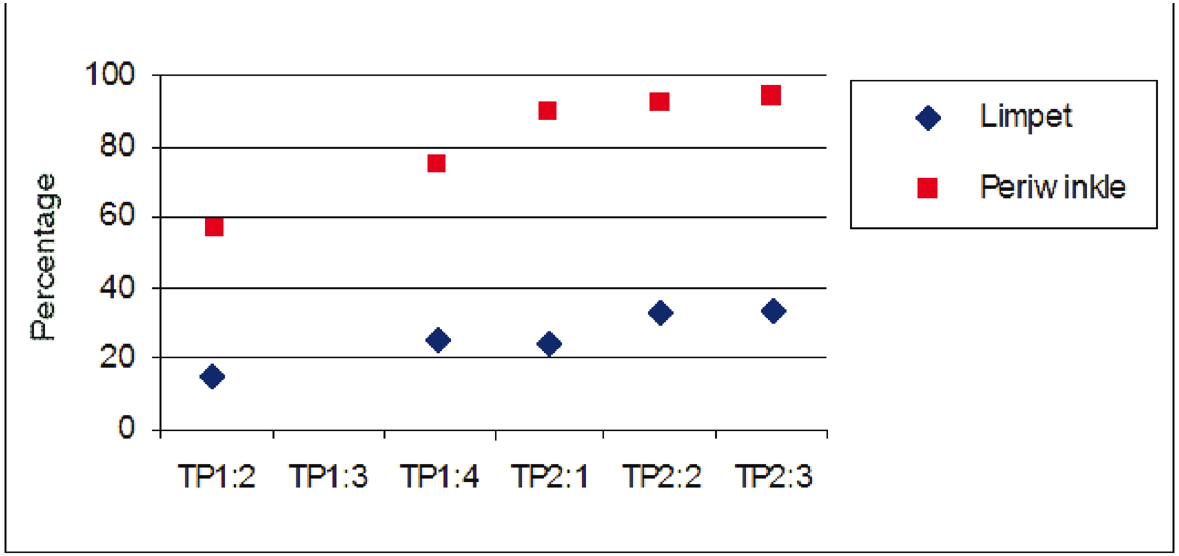
Table 49

SFS 17: Test Pit 2	Limpets	Periwinkle	Dogwhelk	Flat periwinkle	Top shell	Oyster	Mussel	Carpet shell
Context 1	535	234	4	3	1	10	1	
Context 2	1632	484	9	6		13	20	1
Context 3	293	66	3			1	12	

Table 49: SFS 17, Church Cave, marine molluscs, MNI of species by context in Test Pit 2



Illus 137: SFS 17, Church Cave, limpet and periwinkle, MNI by context



Illus 138: SFS 17, Church Cave, limpet and periwinkle, fragmentation by context for both Test Pits

Discussion

SFS 78, Church Cave, was visited late on in the project and it was not possible to obtain C14 dates for the remains. The pottery is indicative of an Iron Age or later date, while the lace end is a common find from 15th–17th century contexts elsewhere in Scotland. This is a prominent cave which has clearly been of significance in recent times but it would not be surprising to find that it also has evidence for earlier activity.

2.2.21 SFS 46: Clachan Church, NGR NG 7139 4588

Type of Site: Findspot
SFS Record: 2000
Survey Area: Mid Applecross
Size: N/A
Aspect: N/A
Height OD: 7m
Ground Cover: Soil
Distance to Sea: 100m to west, open sandy bay
Distance to Fresh Water: 10m to west
Threats: Eroding molehill
Description: Findspot; a molehill just outside and beside the boundary wall to Clachan Church
Archaeology: Surface collection

Finds

Lithics: Three regular flakes were found in the molehill, two of quartz and one of chalcedonic silica.

Discussion

Finds like this are hard to interpret but they suggest prehistoric activity in the vicinity and this is supported by other nearby evidence such as SFS 75, Applecross Manse.

2.2.22 SFS 99: Clachan Church Midden, NGR NG 7137 4576

Illus 51: SFS 99, Clachan Church, midden, general view of the site with Test Pit 2 in the foreground

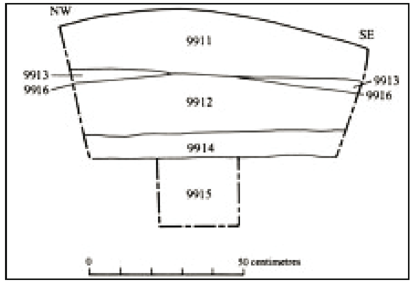
Type of Site: Open-air midden
SFS Record: 2000
Survey Area: Mid Applecross
Size: 3m deep×3m wide
Aspect: Open
Height OD: 2m
Ground Cover: Logged trees
Distance to Sea: 100m to west, open sandy bay
Distance to Fresh Water: 10m to west
Threats: Eroding, logging
Description: An open midden in an area of recently felled conifer trees just south of the church (see Illustration 51, left). There was considerable ground disturbance from felling and several patches of shells were visible. The church site has early Christian origins and the midden may relate to that

Illus 139: SFS 99, Clachan Church, midden, Test Pit 1, after excavation

Archaeology: One test pit was excavated, aligned north-west—south-east, some 12m from the southern graveyard wall. It contained six clear contexts which were surprisingly undisturbed below the surface (see Illustrations 139, top right & 140, bottom right)

Test Pit 1: (1m×0.5m).

- Context 9911 Thick shell midden, disturbed by the planting of the trees
- Context 9912 Undisturbed shell midden lying below contexts 9911, 9913 and 9916. This contained many oysters, periwinkles and a few limpets, all firmly packed
- Context 9913 A thin lens of accumulated silt on either side of context 9911, relating to the furrow between the rows of trees
- Context 9914 An OGS of brown sand and degraded charcoal, below context 9912. This contained pottery
- Context 9915 Natural sand and gravel which lay at the base of the section
- Context 9916 A cut, below context 9913, no doubt created by the planting of the trees. Root damage was much less than expected and all context boundaries were fairly clear. Excavation proceeded to a depth of 0.7m. The shell midden and the OGS were sampled.



Illus 140: SFS 99, Clachan Church, midden, Test Pit 1, after excavation

Finds

Lithics: One piece of debitage of chalcedonic silica.

Pottery: A single sherd of sandy fabric and a small fragment of similar pottery.

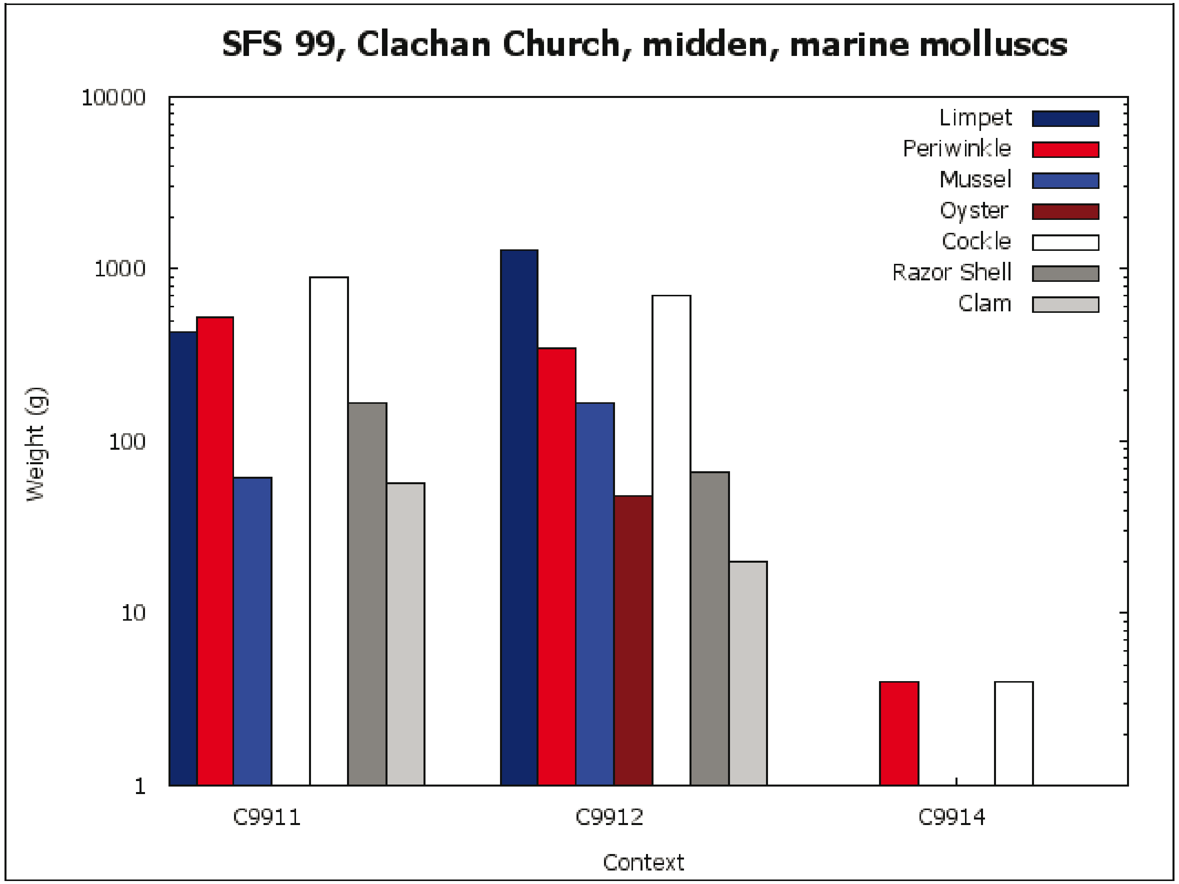
Glass: Two sherds of olive-green glass (one rim) and a clear modern sherd.

Shell: Limpet, periwinkle and cockle were all present in significant quantities at this site (see Table 50, below; Illustration 141, below). A number of other species were also found including razor shell, clam and mussel.

Table 50

SFS 99	limpet	periwinkle	mussel	oyster	cockle	razor shell	clam	residue
Context 1	427	530	62		906	168	57	1308
Context 2	1290	345	168	48	694	66	20	3184
Context 4		4			4			22

Table 50: SFS 99, Clachan Church Midden, marine molluscs, weight in grams for individual species by context



Illus 141: SFS 99, Clachan Church Midden, marine molluscs, weight in grams for individual species by context

Dates

Two dates were obtained from this site (see Table 51, below), both from context 9914, a sealed OGS low down in the stratigraphy, containing the pottery. Both lie in the Historic period.

Table 51				
SFS 99 Context	Reference	Material	Date BP	Calibrated Age

TP1 C9914	AA-50694	hazelnut shell	475±45	AD1415–1441
TP1 C9914		hazelnut shell	295±35	AD1521–1631

Table 51: SFS 99, Clachan Church Midden, radiocarbon dates. Calibration carried out using CalPal, see Section 4

Discussion

The church site here has well-referenced Early Christian origins (Canmore, NMRS nos: NG74NW 1 & 7) and it was thought that the midden might relate to that. In the event it appears to be more recent. Finds were scarce and generally undiagnostic, though the glass is post-medieval. The radiocarbon dates indicate activity in Historic times. This is a fertile location close to one of the main points of activity in Applecross, and it is not surprising to find general background debris from human settlement through the ages.

2.2.23 SFS 144: Clachan Old Harbour, NGR NG 5441 3640

Illus 66: SFS 144, Clachan Old Harbour, close-up view of preserved timbers

Illus 142: SFS 144, Clachan Old Harbour, general view of site from the west

Illus 143: SFS 144, Clachan Old Harbour, general view, looking across the Inner Sound to the hills of Raasay

Type of Site: Inter-tidal site
SFS Record: 2001
Survey Area: Islands, Raasay
Size: Unknown
Aspect: South
Height OD: Intertidal
Ground Cover: Seaweed, shallow water at high tide
Distance to Sea: 0m
Distance to Fresh Water: N/A
Threats: Eroding due to marine action and human interference
Description: In the inter-tidal zone a shallow depression in the surface of the bay reveals preserved tree remains (boles and roots) as well as peat deposits (see Illustrations 66, left, 142, top right & 143, bottom right). This has been visible since about 1995, during which time it has been dug as a source of peat for the fire. A local source describes deposits of hazelnuts as well as layers of ash and charcoal-like material though none of this is now visible. The peat layer seems to comprise compressed leaf mould and is some 300–600mm thick. It is not possible to assess the original size of the site
Archaeology: Walkover and coring for palaeoenvironmental studies (Sections 7.2 & 8.1)

Finds

Lithics: Local accounts describe a number of stone tools recovered among the peat and tree deposits here. At the time of the SFS visit one piece of flaked mudstone was collected; a broken regular blade with edge damage.

Discussion

The site provides clear evidence of alterations in relative sea-level, though the pattern of sea-level change around the Inner Sound is complex (Section 7.1). The records of lithics tantalisingly suggest that there might once have been more archaeological material here. It was not possible to obtain radiocarbon determinations from this site, but it is likely to be early.

2.2.24 SFS 147: Cnoc Na Celpeirein, NGR NG 7865 3296

Type of Site: Open-air lithic scatter site
SFS Record: 2002
Survey Area: Loch Carron
Size: 28m deep×17m wide×4m high
Aspect: North-west on steep slope
Height OD: 10–2m, open beach
Ground Cover: None
Distance to Sea: 50m to north-west
Distance to Fresh Water: 10m to north-west
Threats: Disturbed by digging for new sewer main, definitely eroding
Description A lithic scatter exposed by digging for a sewer pipe. This has cut through the 2m and 10m raised beaches. The lithic scatter was found on the crest of the 10m beach
Archaeology: Surface collection

Finds

Lithics: There were 41 lithic finds, all from the surface (see Table 52, below).

Table 52

SFS 147	Chalcedonic Silica	Quartz	Rùm bloodstone	Volcanic glass	Total
Debitage	3	6	1		10
Regular flakes	4	19	3	1	27
Blades	1	1			2
Edge retouched	1	1			2
Totals	9	27	4	1	41

Table 52: SFS 147, Cnoc na Celpeirein, lithics

Discussion

The lack of baked mudstone among the lithics is interesting, especially in view of the presence of a flake of volcanic glass and some Rùm bloodstone, both of which must have been brought in from further afield. The assemblage suggests activity in prehistory, perhaps during the earlier Neolithic, given the blades and retouched tools, though further work is necessary to confirm this.

2.2.25 SFS 89a & b: Coire Sgamhadail 1, NGR NG 7906 3826

Type of Site: Multiple caves with midden and structures
SFS Record: 2000
Survey Area: South Applecross
Size: 28m deep×17m wide×4m high
Aspect: South-west at foot of old sea cliff, steep slope to sea
Height OD: 10m
Ground Cover: Grass and bracken
Distance to Sea: 25m to south-west, open rocky and shingle

Illus 80: SFS 89a & b, Coire Sgamhadail 1, general view of site and surroundings

Illus 144: SFS 89a & b, Coire Sgamhadail 1, close-up view of cave 2 entrance

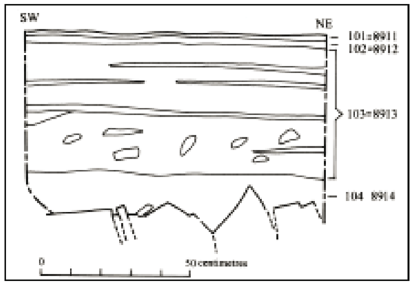
Distance to Fresh Water: In cave mouth
Threats: Stable
Description: A series of three caves lying adjacent to one another (see Illustrations 80, left, 144, top right & 145, bottom right). SFS 89a is a substantial cave sheltered to the east and largely dry. A drystone wall runs in an arc across the entrance. A rich soil with occasional periwinkles on the surface occupies the slope between the cave and the sea. SFS 89b is a smaller cave with no obvious midden. The interior is on two levels, only a couple of metres above the sea. The roof is high and the site is exposed to the west. It is situated 15m south, downhill and towards the sea from SFS 89
Archaeology: Two test pits were opened in SFS 89a, one inside the cave and one outside on the slope

Illus 145: SFS 89a & b, Coire Sgamhadail 1, general view of cave entrances from the south

Illus 146: SFS 89a & b, Coire Sgamhadail 1, general view of cave entrance with Test Pit 1 in background

Test Pit 1: (1m×0.5m) lay inside the cave at a central point near to its mouth (see Illustrations 146, top left & 147, bottom left). It had five well-defined contexts.

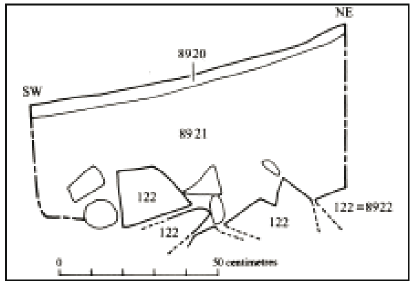
- Context 8911 Modern and ancient sheep droppings
- Context 8912 Modern and ancient sheep droppings
- Context 8913 An occupation zone of the usual crushed shell and ash lenses, almost 0.5m deep. This contained iron slag
- Context 8914 A layer of whole and well preserved limpet shells
- Context 8915 Basal layer comprising large natural angular roof fall which prevented further progress



Illus 147: SFS 89a, Coire Sgamhadail, Test Pit 1, south-east-facing section

Test Pit 2: (1m×0.5m) lay outside the cave, on the slope midway (*c*15m) to the sea (see Illustration 148, top right).

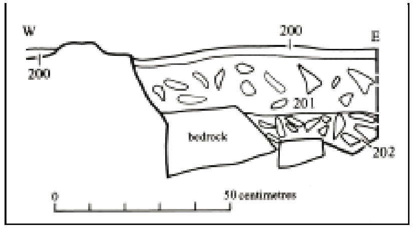
- Context 8920 Surface vegetation of herbs
- Context 8921 A rich, peaty soil with abundant periwinkles and occasional bones and charcoal
- Context 8922 Natural tumble and rockfall



Illus 148: SFS 89a, Coire Sgamhadail, Test Pit 2, south-east-facing section

Test Pit 3: (1m×0.5m) was dug within the smaller cave SFS 89b. It was aligned east—west on an upper level within the cave (see Illustration 149, bottom right).

- Context 9010 Loose surface sheep droppings
- Context 9011 A sticky zone of ash, shell and shattered stone, not unlike context 8913 in SFS 89a
- Context 9012 Heated and shattered bedrock



Illus 149: SFS 89b, Coire Sgamhadail, Test Pit 3, south-facing section

Finds

Lithics: Six lithics were recovered from the test pits in SFS 89a; all are regular flakes. There were two pieces of chalcedonic silica, three of quartz and one of baked mudstone. The test pit in SFS 89b yielded one broken retouched piece of chalcedonic silica.

Coarse Stone: There were also two finds of coarse stone from SFS 89a: a bevelled pebble (ST18); and a faceted cobble (ST34).

Metalwork: A quantity of vitrified hearth/furnace lining with slag.

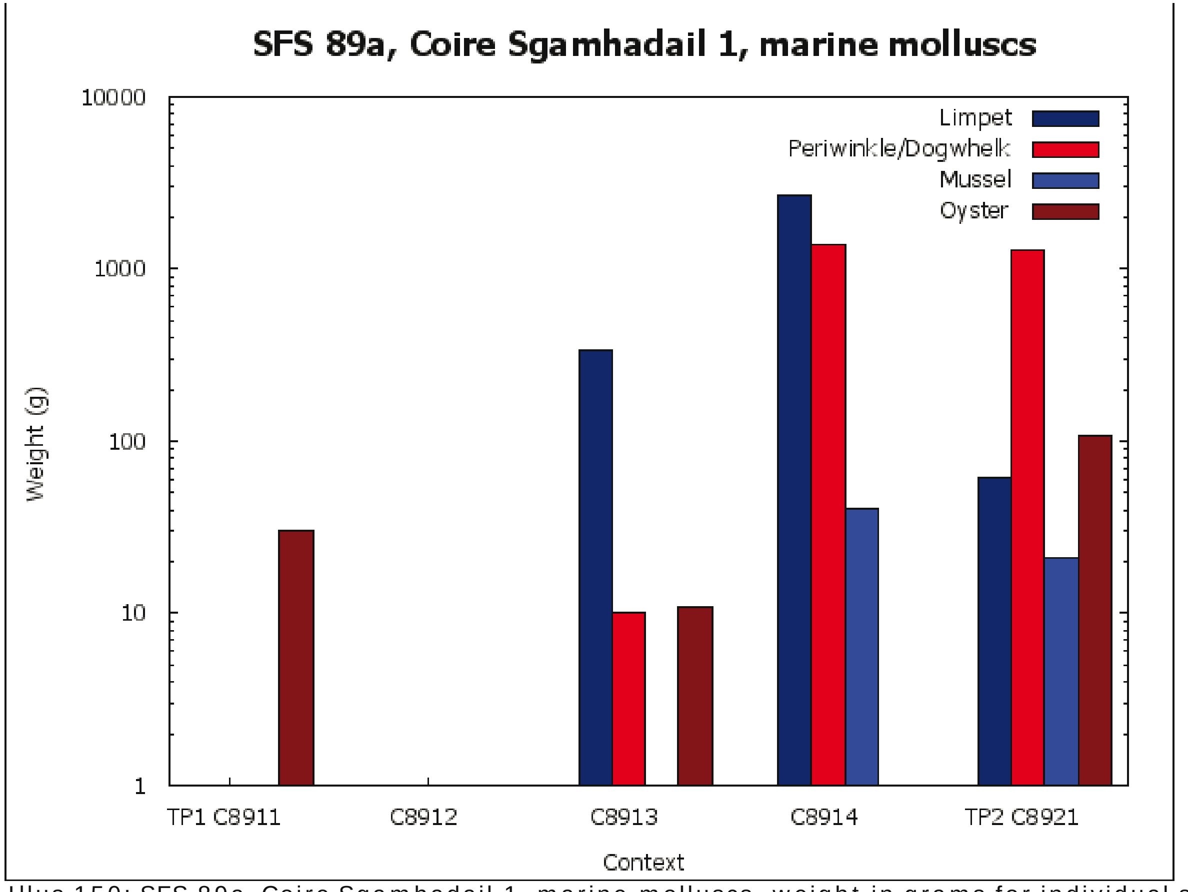
Bone: There were both cattle and red deer bone in equal amount, with a lesser amount of other domestic mammals: pig and sheep/goat. Of note is a juvenile badger left humerus shaft from context 8921, which bore cut marks, and a roe deer radius. In addition, Test Pit 1 yielded a mixed assemblage of fish bone including saithe or pollack, cod, Norway pout, bib or poor cod. In addition, taxa such as the corkwing wrasse, herring, and species belonging to the sea scorpion family were represented.

Shell: Limpet predominates in SFS 89a, followed by periwinkle/dogwhelk (see Table 53, below; Illustration 150, below). There are a variety of other species present but these occur in very small numbers. Context 4 also yielded 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. There was little shell from SFS 89b – limpet predominated with periwinkles, mussel and scallop at the top of the test pit (see Table 54, below). Skip Tables & Chart.

Table 53

SFS 89a	limpet	periwinkle / dogwhelk	mussel	oyster	scallop	razor shell	clam	residue
Test Pit 1								
Context 1				30				
Context 2								21
Context 3	336	10		11	9			1485
Context 4	2681	1374	41		17			3518
Test Pit 2								
Context 1	62	1293	21	108		7	7	297

Table 53: SFS 89a, Coire Sgamhadail 1, marine molluscs, weight in grams for individual species by context



Illus 150: SFS 89a, Coire Sgamhadail 1, marine molluscs, weight in grams for individual species by context

Table 54

SFS 89b	limpet	periwinkle	mussel	scallop	residue
Test Pit 1					
Context 1	112	4	1	11	391
Context 2	56				67

Table 54: SFS 89b, Coire Sgamhadail 2, marine molluscs, weight in grams for individual species by context

Dates

Two radiocarbon determinations were obtained from Test Pit 1 C8914 which was a shell midden overlying angular rockfall (see Table 55, below). Both indicate activity in the 3rd millennium BC.

Table 55

SFS 89 Context	Reference	Material	Date BP	Age
TP1 C8914	AA-50692	hazel charcoal	3815±90	2550–1950BC
TP1 C8914	AA-50693	mammal bone	3695±65	2290–1880BC

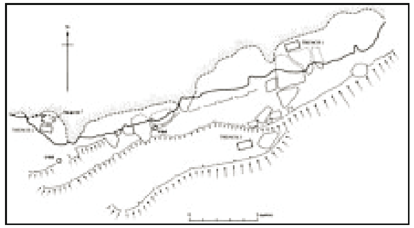
Table 55: SFS 89a, Coire Sgamhadail 1, radiocarbon dates, see Section 4

Discussion

The flaked tools are undiagnostic regarding date or period, though the coarse stone tools have been associated with both Mesolithic and later material elsewhere. The radiocarbon dates lie in the 3rd millennium BC and this is in general agreement with the stone finds, but the metalwork is an indication that this site continued to be used into more recent times.

2.2.26 SFS 90: Coire Sgamhadail 3–6, NGR NG 7880 3820

Illus 151: SFS 90, Coire Sgamhadail 3–6, general view of sites and surroundings

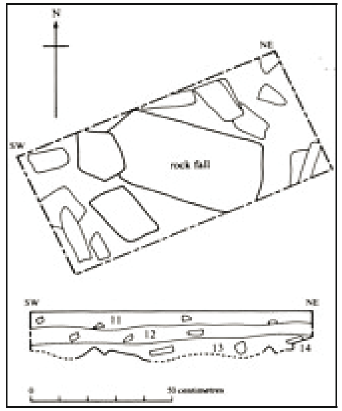


Illus 152: SFS 90, Coire Sgamhadail 3–6, plan of cave

Type of Site: Multiple rockshelters with midden
SFS Record: 2000
Survey Area: South Applecross
Size: 3–4m deep×30m wide×1.5m high
Aspect: South
Height OD: 18m
Ground Cover: Bracken
Distance to Sea: 25m to south, open rocky and shingle
Distance to Fresh Water: 10m to west
Threats: Stable
Description: A series of prominent conjoined rockshelters containing several areas of shell midden (see Illustrations 151, left & 152, right). These sites have a bright southerly aspect and overlook a shingle beach. Within the rockshelters and on the terrace below it are several trees and lots of large jumbled angular boulders containing very few level areas
Archaeology: Three test pits were excavated, Test Pits 1 and 2 were located inside two different rockshelters and Test Pit 3 was located on the terrace in front of the rockshelters.

Test Pit 1: (1m×0.5m) Aligned north-east—south-west near the eastern end of the shelter (see Illustration 153, right).

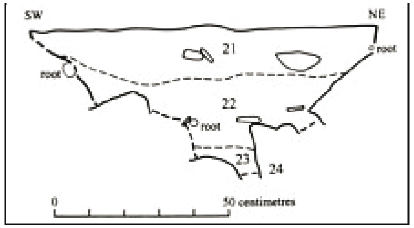
- Context CS11 Dispersed and degraded mixed shells, periwinkle, oyster and limpet in a dark brown matrix
- Context CS12 Dispersed and degraded mixed shells, periwinkle, oyster and limpet in a brown creamy matrix
- Context CS13 Dispersed and degraded mixed shells, periwinkle, oyster and limpet in a brown silty matrix
- Context CS14 Rockfall and clean wind blown sand. Bedrock was not reached



Illus 153: SFS 90, Coire Sgamhadail 3–6, Test Pit 1, south-east-facing

Test Pit 2: (1m×0.5m). Aligned east—west at the western end of the shelter, just south of a possible hearth (see Illustration 154, left).

- Context CS21 Dispersed and degraded mixed shells, periwinkle, oyster and limpet in a black silty matrix
- Context CS22 Dispersed and degraded mixed shells, periwinkle, oyster and



Illus 154: SFS 90, Coire Sgamhadail 3–6, Test Pit 2, south-east-facing section

section

limpet in a light brown matrix

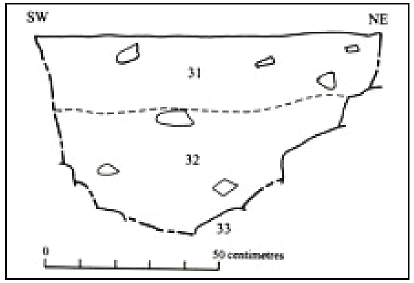
- Context CS23 Light brown sterile gritty sandy soil, the matrix within CS24
- Context CS24 Angular rock-fall

Bedrock was not encountered and root action was intense in this trench.

Test Pit 3: (1m×0.5m). Aligned north-east—south-west, outside and slightly below the main rock-shelter terrace (see Illustration 155, right).

- Context CS31 Crumbly dark brown soil, intensely rooted and containing varied shell and bone remains
- Context CS32 Crumbly black rich soil, intensely rooted with many varied shells and bone fragments
- Context CS33 Angular blocks of sandstone, probable roof fall

Bedrock was not reached.

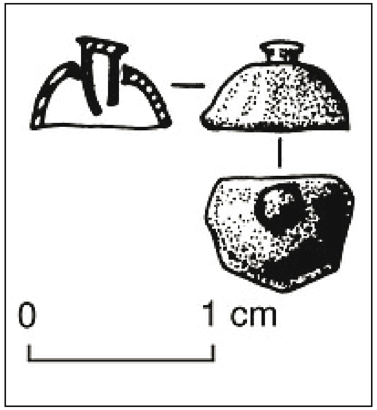


Illus 155: SFS 90, Coire Sgamhadail 3–6, Test Pit 3, south-east-facing section

Finds

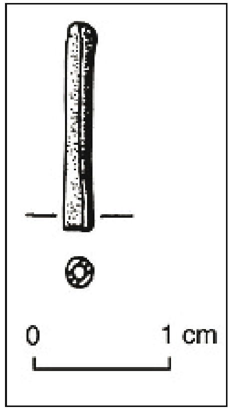
Lithics: There were eight lithic finds, all of chalcedonic silica. Three are regular flakes and the rest is debitage.

Clay: A sub-rectangular object with uneven surfaces, presumably an accidentally-fired piece of clay, Test Pit 2.



Illus 156: SFS 90, Coire Sgamhadail 3–6, metal stud

Metalwork: There were several pieces of copper-alloy including a pin tip (probably from a medieval or post-medieval buckle or brooch pin), a stud (see Illustration 156, left) and a broken lace end (see Illustration 157, right), all from Test Pit 2. The stud comprises a hollow dome fastened by rolled sheet rivet. The gap between the stud and the flattened end of the rivet is very small (*c*1mm), implying that it ornamented a thin organic medium such as leather. The type is not chronologically diagnostic, although the zinc levels indicate a post-Iron Age date. There are also two pieces of iron from the same test pit: a small iron collar; and a heavily concreted and highly fragmented object which appears to comprise fragments of a small knife.



Illus 157: SFS 90, Coire Sgamhadail 3–6, lace end

Bone: This assemblage is dominated by the remains of more than one leveret, (young hare); these demonstrate no evidence of butchery marks or carcass division and are probably non-anthropogenic in origin. The remainder of the assemblage comprises the loose teeth of sheep/goat, with lesser amounts of red deer, pig and cattle teeth present. This bias toward teeth may be a result of poor preservation. Some evidence of small mammals was recovered, including field vole.

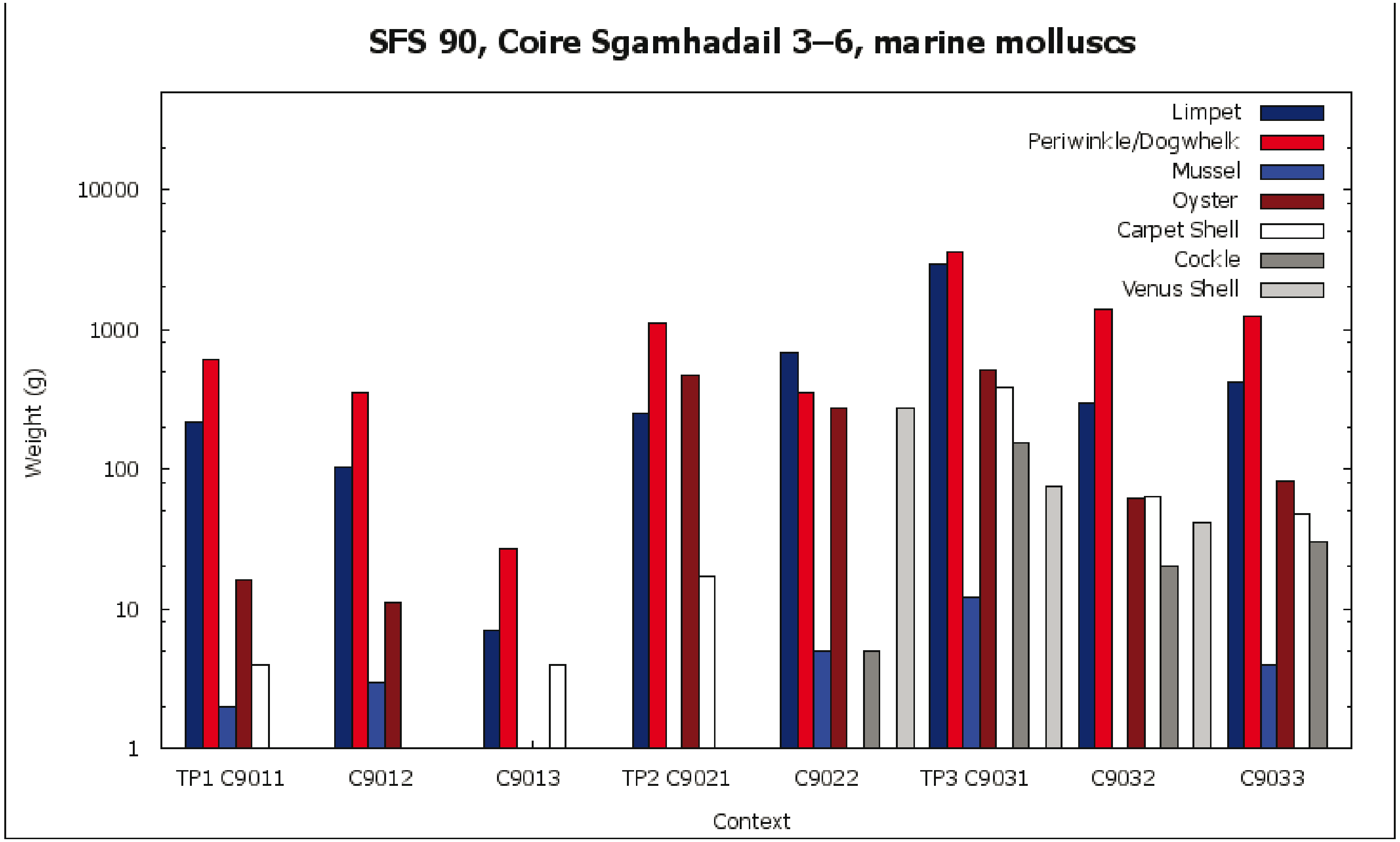
Shell: Periwinkle predominated at this site, followed by limpet (see Table 56, below; Illustration 158, below). A wide variety of other species were present, particularly in the lower levels. Oyster was found throughout, though it was more prevalent in Test Pits 2 and 3. In Test Pit 3 significant quantities of carpet shell, cockle and venus shell were also found.

To access a printable version of this table, please go to the separate page `table056.html` and set to LANDSCAPE mode.

Table 56

SFS 90	limpet	periwinkle / dogwhelk	mussel	oyster	carpet shell	cockle	venus shell	common otter shell	razor shell	residue
Test Pit 1										
Context 1	215	614	2	16	4					713
Context 2	102	349	3	11						290
Context 3	7	27			4					29
Test Pit 2										
Context 1	250	1112		474	17					2108
Context 2	678	357	5	273		5				3988
Test Pit 3										
Context 1	2936	3591	12	513	388	152	277	7	2	10810
Context 2	300	1401		62	63	20	75	3		1513
Context 3	415	1246	4	82	48	30	41	3	3	1590

Table 56: SFS 90, Coire Sgamhadail 3, marine molluscs, weight in grams for individual species by context



Illus 158: SFS 90, Coire Sgamhadail 3, marine molluscs, weight in grams for individual species by context

Discussion

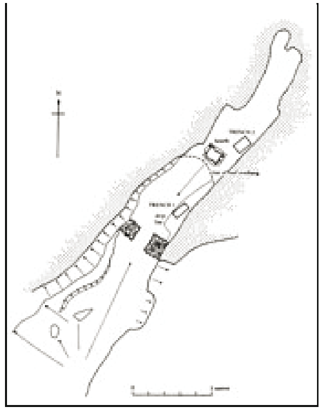
Most of the material is undiagnostic though probably post-medieval. Some craft activity may have taken place on site, perhaps non-ferrous sheet metalworking, though the stud might suggest production or repair of ornamental leatherwork. The quantity of material implies a small-scale activity, and repair work rather than production.

2.2.27 SFS 49: Creag Na-H-Uamha, NGR NG 7174 6092

Illus 47: SFS 49, Creag na-h-

Type of Site: Cave with midden and structure
SFS Record: 2000
References:Canmore NMRS Number: NG76SW 1&6
Survey Area: North Applecross
Size: 15m deep×4.5m wide×2.5m high
Aspect: South-west to slope
Height OD: 4–5m
Ground Cover: Grass and nettles
Distance to Sea: 30m to south-west, rocky, sheltered bay
Distance to Fresh Water: 200m to south-east
Threats: Open grazing, used as sheep shelter, erosion

Uamha, general view of rockshelter and surroundings



Illus 159: SFS 49, Creag na-h-Uamha,plan of cave

Description: A known cave that is recorded on current Ordnance Survey maps (see Illustration 47, left). A recent, low, rubble-built wall stands to a height of 1.5m at the entrance of the cave (see Illustration 159, right). Midden and lithics were visible when the site was visited and the remains of a recent hearth with fire darkened stones lay in the centre of the cave

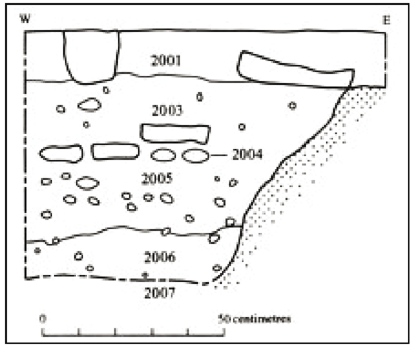
Archaeology: Two test pits were excavated inside the rockshelter

Test Pit 1: (1m×0.5m) was placed behind the enclosure wall where midden was exposed at the surface.

- Context 1001 A loose layer of midden which included modern pottery and an iron nail
- Context 1002 The basal layer of the midden. The maximum depth of the midden was established at 0.50m

Test Pit 2: (1m×0.50m) was located close to the eastern wall of the cave approximately midway between the entrance and the rear of the cave. It was dug to a depth of 0.70m (see Illustration 160, right).

- Context 2001 A humic plastic layer, rich in sheep excrement to a depth of 0.15m. Modern iron, glass and wood were recovered
- Context 2002 Large angular boulders derived from roof fall
- Context 2003 Shell rich midden underlying the boulders with limpet and periwinkle shells and occasional fragments of animal bone
- Context 2004 A layer of sea-rounded cobbles at a depth of 0.35m
- Context 2005 Midden intermixed with angular fractured stones
- Context 2006 Loose stones increasing in frequency intermixed with soil rich in shell
- Context 2007 The basal layer of the cave



Illus 160: SFS 49, Creag na-h-Uamha, Test Pit 2, south-facing section

Finds

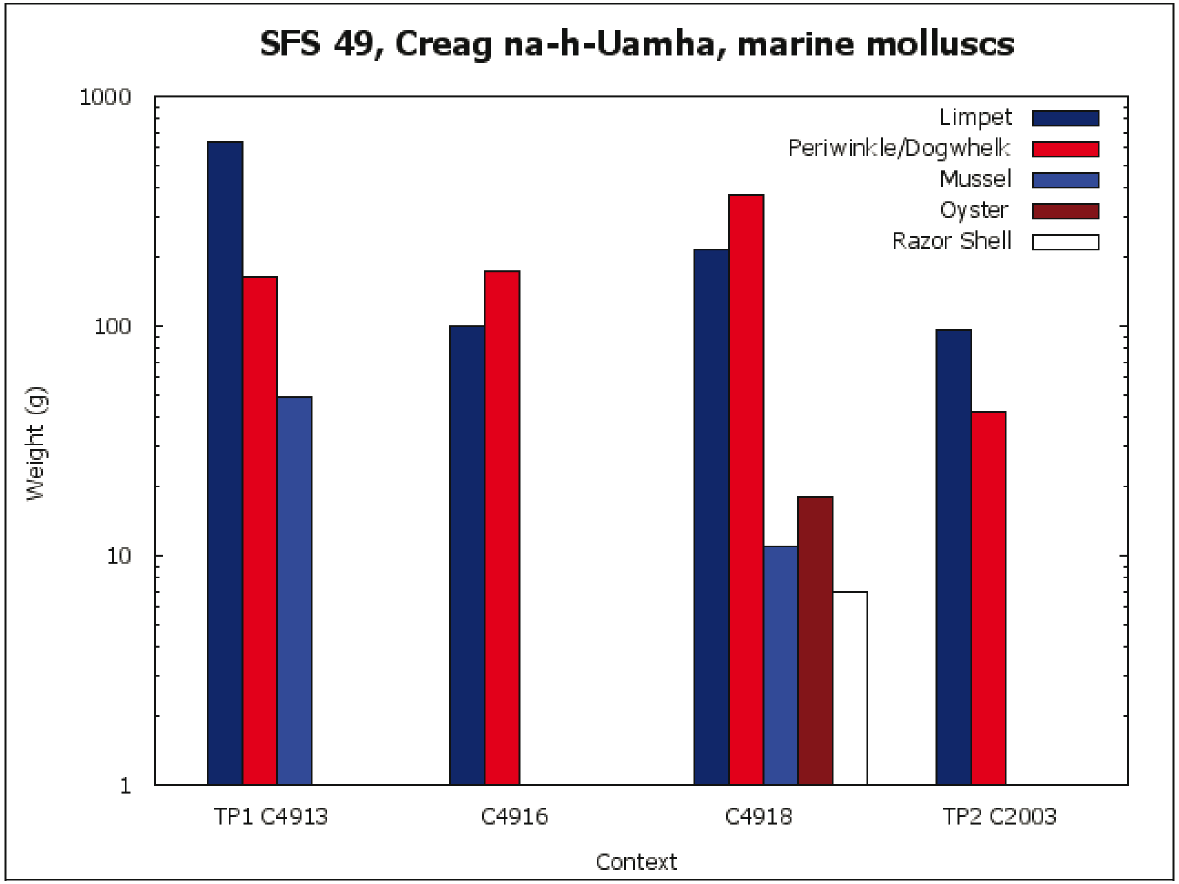
Lithics: Two pieces of chalcedonic silica were recovered from Test Pit 1. One was a regular flake and the other was debitage.

Shells: Test Pit 1 had some variation through the contexts as limpet predominated towards the top of the midden and periwinkle at the bottom (see Table 57, below; Illustration 161, below). Dogwhelk was only present in Context 3 and was weighed with the periwinkles. The limpet shells were very large. There was very little shell material from Context 2. In Test Pit 2 shell was only found in Context 3, and comprised mainly limpet with some periwinkle and dogwhelk.

Table 57

SFS 49	limpet	periwinkle / dogwhelk	mussel	oyster	razor shell	residue
Test Pit 1						
Context 1						3
Context 3	637	165	49			395
Context 6	100	172				117
Context 8	215	374	11	18	7	323
Test Pit 2						
Context 3	97	42				308

Table 57: SFS 49, Creag na h-Uamha, marine molluscs, weight in grams for individual species by context



Illus 161: SFS 49, Creag na h-Uamha, marine molluscs, weight in grams for individual species by context

Dates

Three samples were taken for dating, from Test Pit 1, context 1002, and Test Pit 2, context 2003 – a shell-rich midden underlying roof fall and overlying a layer of sea-rounded cobbles (see Table 58, below).

Table 58

SFS 49 Context	Reference	Material	Date BP	Age
TP1 C1002 Spit 8	AA-50679	hazel charcoal	625±35	AD1290–1410
TP1 C1002 Spit 8	AA-50680	alder charcoal	620±35	AD1290–1410
TP2 C2003	AA-50681	mammal bone	2165±45	370–50BC

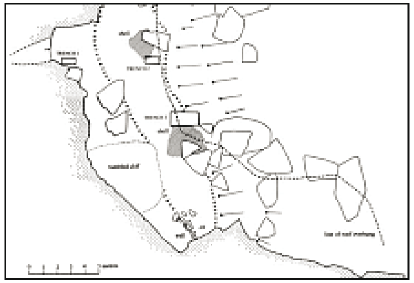
Table 58: SFS 49, Creag na h-Uamha, radiocarbon dates, see Section 4

Discussion

The dates suggest two distinct periods of activity, represented in the two different test pits. Test Pit 2 had the older indication – in the first three centuries BC, while Test Pit 1 yielded 14th-century AD dates. There were no finds except for the two lithics from Test Pit 1 which are undiagnostic. They may represent earlier background ‘noise’, or the later use of stone flakes. The wall across the entrance of the cave suggests that the site was used as a livestock enclosure in the recent past. Additionally, a hearth setting with fire darkened stones near the entrance suggests that the cave has recently been used as a camp site.

2.2.28 SFS 2: Crowlin 1, NGR NG 691 338

Illus 6: SFS 2, Crowlin 1, general view



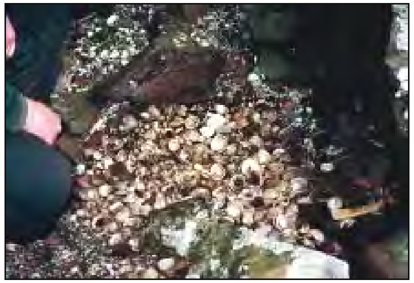
Illus 162: SFS 2, Crowlin 1, plan of cave

Type of Site: Rockshelter with midden
SFS Record: 1999
Survey Area: Islands (Crowlin Islands)
Size: 10m deep×25m wide×7m high
Aspect: South-west
Height OD: 6m
Ground Cover: Rocky boulders
Distance to Sea: Adjacent
Distance to Fresh Water: None
Threats: Human
Description: A large highly visible rockshelter with a large overhang that shelters a small level platform with evidence for numerous rockfalls (see Illustrations 6, top left; 162 lower left & 163, top right). Midden material was abundant on the surface, mostly comprising loose material with apparent clusters of oysters and limpets (see Illustration 164, lower right). Some shell midden material was also visible between and below some of the larger rockfall
Archaeology: Three test pits were opened. Test Pit 1 to the rear of the rockshelter, and Test Pit 2 and Test Pit 3 just outside

Test Pit 1: (1×0.5m) was located at the back of the rockshelter (see Illustrations 165, left & 166, lower right).

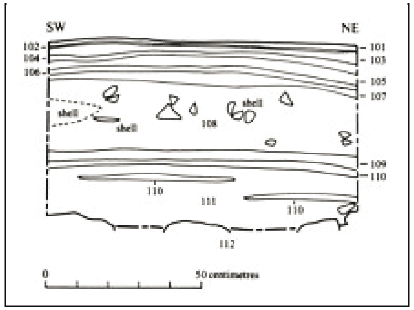
- Context 101 The surface layer consisted of dung *c*0.5m thick
- Context 102 A compact, dark greasy layer was exposed. This layer consisted of a series of laminated deposits alternating between organic-rich layers and largely mineral layers. The upper organic layers were largely sterile of shell and bone but both became more frequent with

Illus 163: SFS 2, Crowlin 1, general view of work in progress



Illus 164: SFS 2, Crowlin 1, Test Pit 1, top of midden, Spit 5

Illus 165: SFS 2, Crowlin 1, Test Pit 1, after excavation

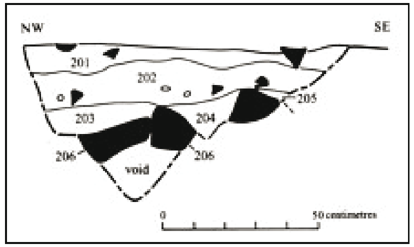


Illus 166: SFS 2, Crowlin 1, Test Pit 1, south-east-facing section

depth

- Context 103 Under these alternating layers, lay a shallow mixed deposit of clay silts containing grit, the occasional small angular stone and an occasional fleck of shell
- Context 104 A shallow band of dark organic material, possibly dung
- Context 105 A deposit of organic material with occasional ash lenses, charcoal flecks and occasional stones and some inclusions of decaying shell
- Context 106 A shallow layer of organic material
- Context 107 A shallow layer of organic material with small angular stones
- Context 108 A thick deposit of shell-rich organic material containing bone and some angular stones, charcoal flecks and some large stone fragments. The shells, most of which are intact, are mainly limpet with oyster, scallop and whelk
- Context 109 A shallow layer of crushed shell and occasional grit fragments
- Context 110 A shallow layer of dark grey midden material, with mainly crushed shell
- Context 111 A damp sandy grey deposit containing the occasional fragment of shell and some small and medium angular stones
- Context 112 Basal deposit, natural bedrock

Illus 167: SFS 2, Crowlin 1, Test Pit 2, view of section



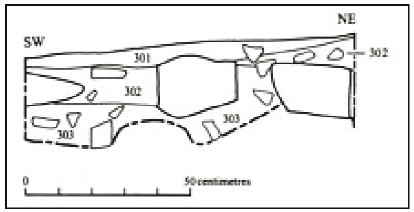
Illus 168: SFS 2, Crowlin 1, Test Pit 2, south-west-facing section

Test Pit 2: (1m×0.5m) was located at the front of the cave to create a 1m wide section in the talus slope (see Illustrations 167, left & 168, right).

- Context 201 Large angular boulders with large voids
- Context 202 Dry and loose crushed shells, charcoal, bone and angular small stones
- Context 203 Shell-rich midden layer containing oyster, limpet, periwinkle and land snails in a fine organic silty-sand matrix. Contains small angular sandstone pieces, charcoal, animal and fish bones
- Context 204 Semi-compact layer of small to medium angular cobbles
- Context 205 Shell-rich midden layer containing oyster, limpet, periwinkle and land snails in a fine organic silty-sand matrix. Contains small angular sandstone pieces, charcoal, animal and fish bones

Test Pit 3: (1×0.5m) was opened in the area where some flaked stone pieces, including a gunflint, and limpet shells were found on the surface (see Illustrations 169, below left; 170, below middle left; 171, below middle right & 172, right).

- Context 301 A layer of midden composed of various shells broken and whole, mammal and fish bones in a silty matrix with small angular stones
- Context 302 A shell-rich layer containing charcoal and animal and fish bone. Shells include limpet, winkles and a few oysters
- Context 303 Red sandstone cobbles and boulders. With some broken shells in voids



Illus 172: SFS 2, Crowlin 1, Test Pit 3, south-east-facing section

Illus 169: SFS 2, Crowlin 1, Test Pit 3, pre-excavation

Illus 170: SFS 2, Crowlin 1, Test Pit 3, top of Spit 2

Illus 171: SFS 2, Crowlin 1, Test Pit 3 and general view

Finds

Lithics: There were 31 lithic finds from Crowlin 1 (see Table 59, below).

Table 59

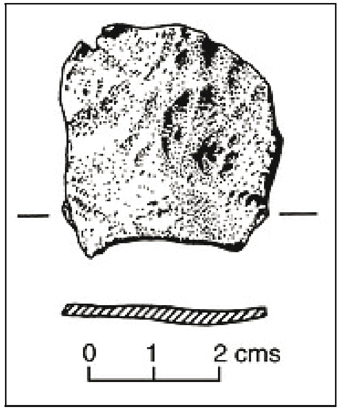
SFS 2	Chalcedonic silica and flint	Quartz and quartzite	Baked mudstone	Total
Debitage	19	3		22
Cores		1 bipolar		1
Regular flakes	6		1	7
Gunflint	1			1
Totals	26	4	1	31

Table 59: SFS 2, Crowlin 1, lithics

Coarse Stone tools: There were three coarse stone tools, a plain hammerstone (ST23), a bevelled pebble (ST21) and a ground stone tool (ST40). The ground stone tool is a piece of tabular sandstone which appears to have been ground on both faces to form an acute edge angle with a curved outline. It is very similar in shape and dimensions to a piece from the Mesolithic site at Kinloch, Rùm (Clarke 1990, illus 78.4) though the grinding is not as obvious as that on the Rùm piece.

Bone tools: A trapezoidal piece (BT23) with a smooth rounded end was found in Test Pit 1.

Metalwork: There were two metal finds both from Test Pit 1: a single shank fragment of an iron nail, and an irregular sub-square sheet of lead with one edge broken (see Illustration 173, right). The slightly undulating surface suggests it may have been a patch shaped to fit an underlying object.



Illus 173: SFS 2, Crowlin 1, lead sheet

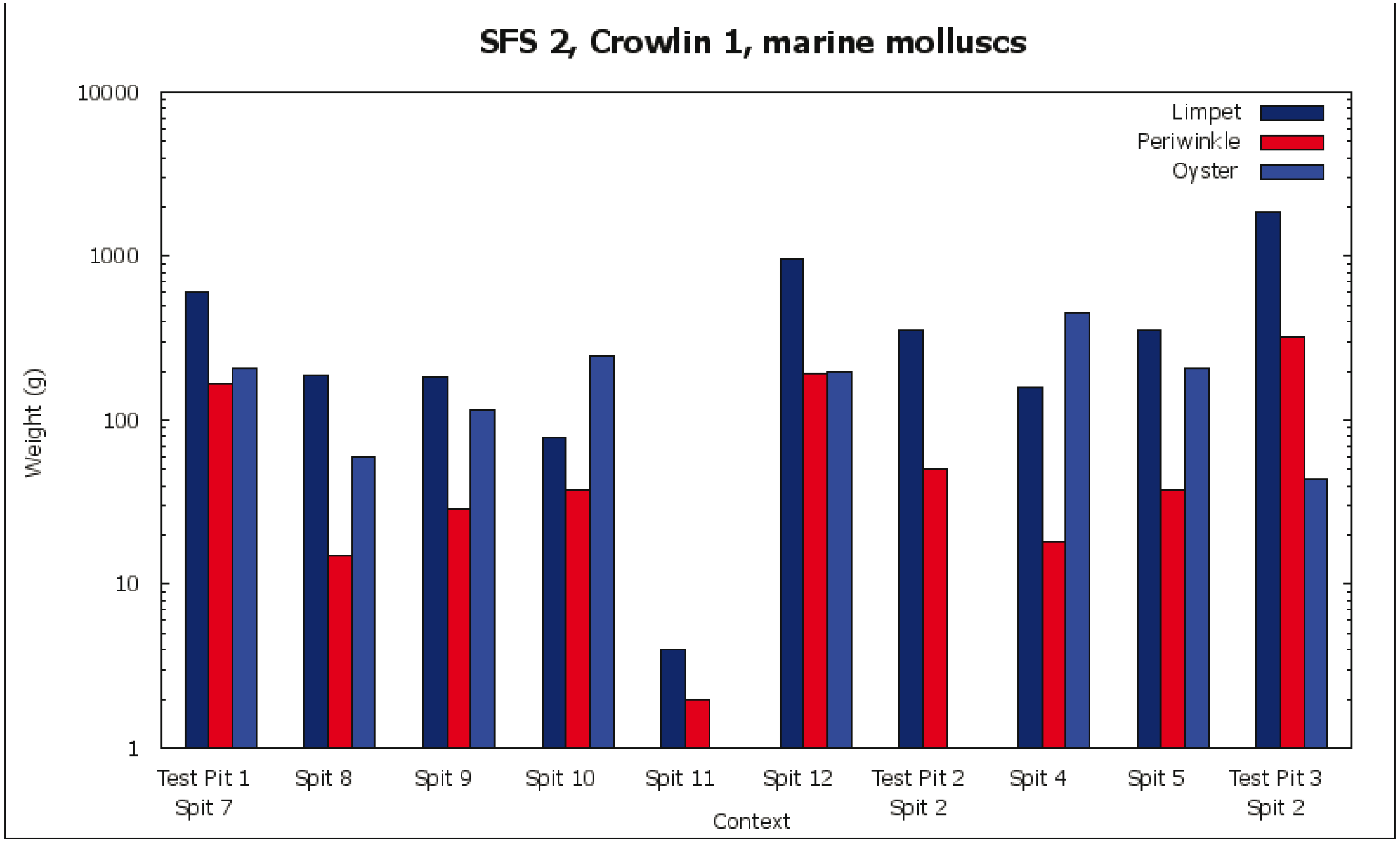
Bone: There was a mixed assemblage of fish bones including saithe or pollack, herring and cod.

Shell: Limpet predominates with some oyster and periwinkle (see Illustration 174, below; Table 60, below).

Table 60

Crowlin 1 SFS 2	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

Table 60: SFS 2, Crowlin 1, marine molluscs, weight in grams for individual species by context



Illus 174: SFS 2, Crowlin 1, marine molluscs, weight in grams for individual species by context

Dates

Crowlin 1 yielded four radiocarbon determinations (see Table 61, below). Test Pit 1 yielded a wide spread of determinations: one in the 2nd century AD; and two in the 15th–16th centuries AD. Test Pit 3 yielded a date in the 8th century AD.

Table 61

SFS 2 Context	Reference	Material	Date BP	Age
TP3 Spit 4	OxA-9250	Birch charcoal	1296±39	AD650–810
TP1 Spit 11	OxA-9251	Birch charcoal	1799±37	AD120–340
TP1 Spit 6	OxA-9252	Birch charcoal	477±35	AD1400–1480
TP1 Spit 5	OxA-9253	Worked point of deer bone	316±39	AD1480–1560

Table 61: SFS 2, Crowlin 1, radiocarbon dates, see Section 4

Discussion

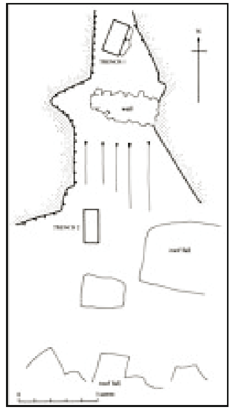
The evidence from Test Pits 2 and 3 suggests that the visible remains of the midden material post-date the rockfall events. Time constraints and safety issues prevented removal of the substantial quantities of rockfall that would have been required to demonstrate an earlier use of the site. Test Pit 1 indicates that the midden is a complex accumulation of material with periods of abandonment probably over a long period of time. With the exception of the gunflint, the lithics are not diagnostic: it is possible that they suggest early activity, but they might equally have resulted from the later use of flaked stone. Two of the coarse stone tools (ST21 & ST40) might be early; parallels exist on other Mesolithic sites. The dates, however, are all post-prehistoric and Crowlin 1 has clearly attracted attention over the years. Interestingly, one of the debitage chunks has damage suggesting that it was later used as a strike-a-light, so that it may be that later occupants of the shelter came across relics of earlier users. The gunflint is small, and of dark flint, it obviously fits happily into the period of use suggested by the later dates, and this is supported by the lead sheet as lead is uncommon before the medieval period. It is not hard to imagine various scenarios whereby a rockshelter like this would be useful.

2.2.29 SFS 22: Crowlin 3 Sea Cave, NGR NG 6902 3415

Illus 175: SFS 22, Crowlin 3, entrance to rockshelter, note location in cliff base (portrait)

Type of Site: Cave with midden and structures
SFS Record: 1999
Survey Area: Islands (Crowlin Islands)
Size: 2m deep×2m wide×2m high
Aspect: South at foot of small cliff
Height OD: 5m
Ground Cover: Scree and heather
Distance to Sea: 25m to west to sheltered rocky coast
Distance to Fresh Water: 200m to north
Threats: Stable
Description: A former sea cave that has collapsed to form a V-shaped cleft (see Illustrations 175, top left; 176, bottom left & 177, right). About 3m from the rear of the cave are the collapsed remains of a drystone wall. A narrow entrance on the eastern side allowed access into the cave's interior. Sheep excrement inside the cave suggests it has been used to pen livestock. Traces of midden material were visible on the surface of the floor at the rear of the cave
Archaeology: Two test pits were excavated

Illus 176: SFS 22, Crowlin 3, general view, pre-excavation

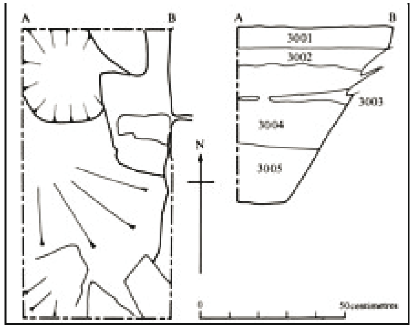


Illus 177: SFS 22, Crowlin 3, plan of cave

Test Pit 1: (1m×0.50m) was placed at the back of the cave and contained five contexts (see Illustration 178, right).

- Context 3001 A surface layer of decayed sheep excrement with varying amounts of flotsam, 0.12m deep
- Context 3002 A blacker humified layer lying beneath a large stone measuring 0.42m×0.40m. This layer was very wet and contained charcoal flecks, flint and quartz flakes and a copper-alloy

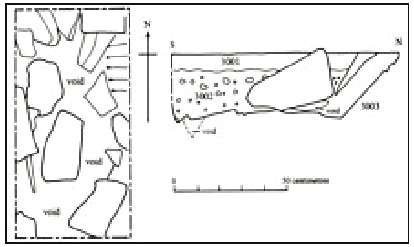
shirt button
- Context 3003 A cream-coloured layer probably of animal fat, to a depth of 0.25m, with no finds
- Context 3004 A compacted deposit of charcoal rich soil containing occasional fragments of animal bone and limpet shell and fragments of non-carbonised wood
- Context 3005 Basal sequence which attained a depth of 0.60m. Waterlogged with fine laminations of the cream deposit identified in Context 3003



Illus 178: SFS 22, Crowlin 3, plan and Test Pit 1, south-facing section

Test Pit 2: was placed outside the entrance approximately 6m outside the collapsed wall (see Illustration 179, right).

- Context 3001 Turf
- Context 3002 A midden deposit with a maximum depth of 0.20m. Limpet shell dominated; a possible worked flint and an iron nail were recovered from this layer
- Context 3003 Large angular blocks of talus material at a depth of 0.20m. The voids between the boulders were partially infilled by fractured shell. No excavation was undertaken beyond this depth



Illus 179: SFS 22, Crowlin 3, plan and Test Pit 2, west-facing section

Finds

Lithics: There were 60 lithic finds from Crowlin 3 (see Table 62, below).

Table 62			
SFS 22	Chalcedonic silica and flint	Quartz and quartzite	Total
Debitage	35	3	38
Regular Flakes	20	2	22
Totals	55	5	60

Table 62: SFS 22, Crowlin 3, lithics

Pottery: There were three pieces of glazed pottery, all from Test Pit 1.

Glass: 11 fragments of glass were recovered from Test Pit 1, Spits 2 and 3.

Metalwork: A shotgun pellet and a pistol ball, both of lead, were recovered from Test Pit 1 (Spits 2 & 3). Interestingly, the pistol ball appears to have been fired. In addition there were several iron objects: a circular button; three boat nails and a rove; three small tacks; and 44 nail fragments, all of which came from Test Pit 1, Spits 2 and 3. There was also a small amount of ironworking slag.

Bone: The remains of juvenile rabbits dominate and probably represent material of non-anthropogenic origin. Domestic mammals were represented by a few pig and sheep bones and a fragment of goat jaw. A tiny piece of red deer antler was recovered and evidence for seabird exploitation was demonstrated by the cut mark on a shag ulna found in association with a shag humerus. Also present were the bones of other small- and medium-sized examples of the auk species. Finally, fragments of a mouse (probably common dormouse) were also recovered. Test Pit 1 also yielded a mixed assemblage of fish bone including saithe or pollack, ling and conger eel, suggesting deep water fishing.

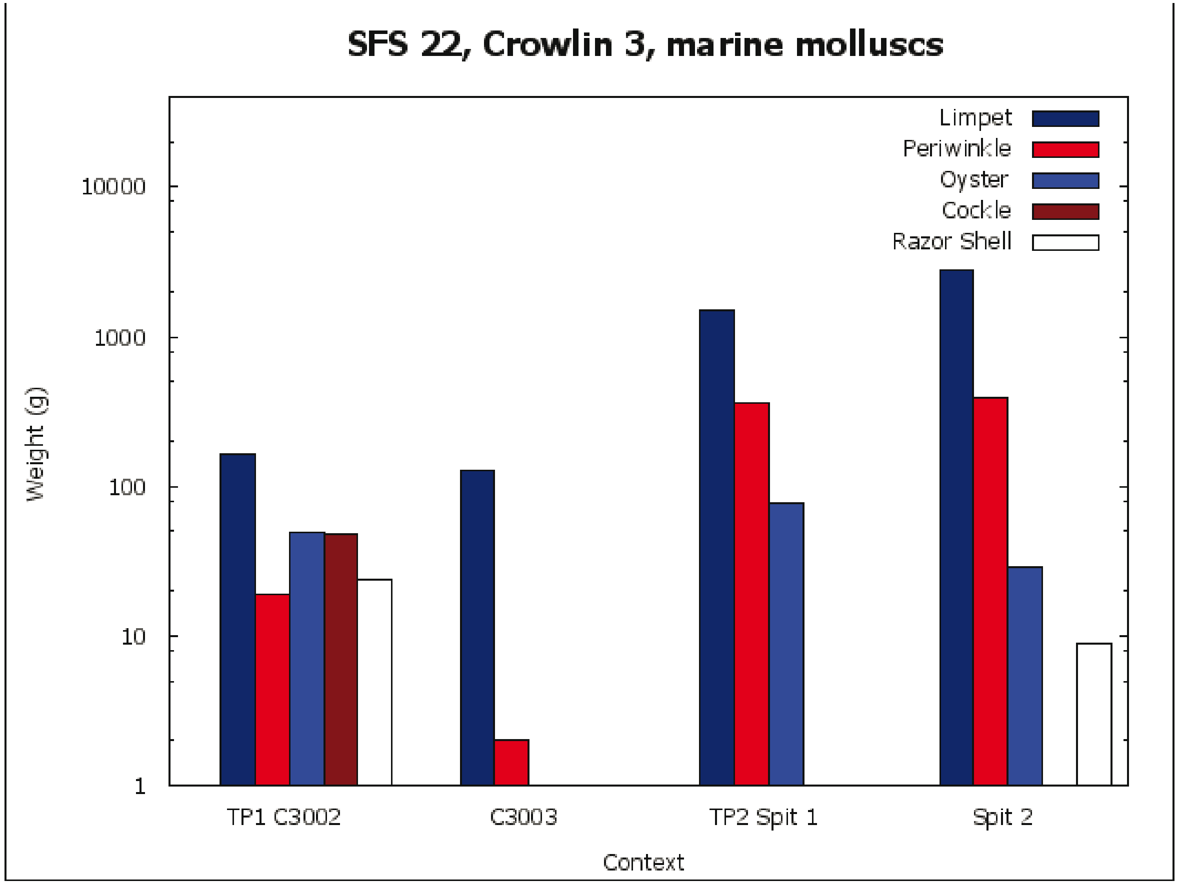
Shell: In all contexts there is a predominance of limpets (see Table 63, below; Illustration 180, below). There is a greater variety of species in Test Pit 1 but on the whole fewer shells compared with Test Pit 2.

To access a printable version of this table, please go to the separate page table063.html and set to LANDSCAPE mode.

Table 63

SFS 22	limpet	periwinkle	oyster	mussel	scallop	cockle	razor shell	clam	residue
Test Pit 1									
Context 2	166	19	49	7	15	48	24	7	514
Context 3	127	2							26
Test Pit 2									
Context 1	1511	361	78	4					567
Context 2	2828	390	29	11			9		892

Table 63: SFS 22, Crowlin 3, marine molluscs, weight in grams for individual species by context



Illus 180: SFS 22, Crowlin 3, marine molluscs, weight in grams for individual species by context

Dates

Two radiocarbon dates indicate activity in the late 2nd millennium AD (see Table 64, below).

Table 64

SFS 22 Context	Reference	Material	Date BP	Age
TP1 C3005	AA-50671	Pig bone	340±40	AD1450–1650
TP1 C3005	AA-50672	hazelnut shell	145±55	AD1660–1960
TP1 C3002	AA-50670	Ungulate bone	75±30	AD1680–1960

Table 64: SFS 22, Crowlin 3, radiocarbon dates, see Section 4

Discussion

The lithics are an undiagnostic assemblage, but it is interesting to note that most of the pieces are fairly chunky and six have damage suggestive of their use as strike-a-lights while one may be a crude gunflint. The assemblage might well represent later stone working activity: a limited amount of stone working went on into historic times to produce strike-a-lights and gunflints, the results of which are found in small numbers on many later sites. This would agree with the radiocarbon determinations and evidence of the metalwork and other finds, much of which is post-medieval. The slag suggests that small-scale metalworking may have taken place here, perhaps to do with boat repair. It seems that a working gun or pistol was part of the possessions of those who were using this site.

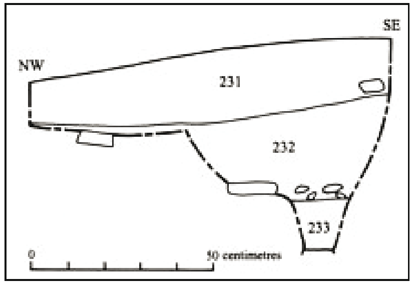
2.2.30 SFS 23: Crowlin 4, NGR NG 6909 3496

Type of Site: Rockshelter
SFS Record: 1999
Survey Area: Islands (Crowlin Islands)
Size: 10m deep×3m wide×1.5m high
Aspect: South in front of slope to sea
Height OD: 30m
Ground Cover: Heather and bracken
Distance to Sea: 200m to west to sheltered rocky coast
Distance to Fresh Water: 50m to south
Threats: Stable
Description: A small rockshelter that has been enhanced by walling, but with no visible shell midden (see Illustration 181, right)
Archaeology: One test pit was excavated inside the rockshelter

Illus 181: SFS 23, Crowlin 4, Test Pit 1

Test Pit 1: (1m×0.5m). The test pit was aligned north-west—south-east and attained a depth of 0.6m (see Illustration 182, right). No occupational remains were found apart from charcoal flecks. The dark brown silty peat contained few stones. No samples were taken.

- Context C231 Damp, gritty peat with bracken roots
- Context C232 Damp, black silty peat with charcoal flecks and a granular feel. Possibly manganese deposits
- Context C233 Sticky mid-brown silty clay with charcoal flecks, containing rock slabs from roof fall



Illus 182: SFS 23, Crowlin 4, Test Pit 1, west-facing section

Roof fall prevented further excavation.

Finds

Lithics: There was one piece of flaked stone from Crowlin 4, a debitage flake of chalcedonic silica.

Pottery: Four fragments of glazed pottery were recovered from Test Pit 1, Spit 1.

Copper-alloy: Belt mount (Test Pit 1, Spit 1), with figure-of-eight piercing for engaging a stud fastening. The mount was secured to a strap or bolt by being bent over the top of it. The mount still has some mineralised leather adhering to its back. Possibly 19th or 20th century.

Bone: The incisor and femoral proximal epiphyses of a sheep/goat were the only two fragments identified.

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

Discussion

There is nothing to suggest early use of this cave: the lithic find is undiagnostic; the belt mount is relatively recent as is the glazed pottery. Sporadic activity in recent times is indicated.

2.2.31 SFS 24: Crowlin 5, NGR NG 6899 3535


Illus 183: SFS 24, Crowlin 5, general view, after excavation

Type of Site: Rockshelter with midden and structures
SFS Record: 1999
Survey Area: Islands (Crowlin Islands)
Size: 10m deep×5m wide×3.5m high
Aspect: South-west at foot of sea cliff
Height OD: 5m
Ground Cover: Bracken
Distance to Sea: 25m to west to sheltered rocky coast
Distance to Fresh Water: 200m to north
Threats: Stable
Description: A large, damp rockshelter with a walled area to the south which remains dry and contains a small shell midden (see Illustration 183, right)
Archaeology: Two test pits were excavated

Test Pit 1: (1m×0.5m), excavated in the walled area.

- Context 2411 Surface sheep droppings
- Context 2412 A dark brown peaty soil without artefacts or shell remains
- Context 2413 Light brown sand containing occasional charcoal, again without artefacts or shell
- Context 2414 Bedrock

Test Pit 2: (1m×0.5m) excavated outside beyond the drip line. Test Pit 2 contained a natural soil profile of sphagnum moss overlying a mass of roots with bedrock below. There was no archaeological content.

Discussion

Apart from the walling, there are no significant archaeological remains on this site. One interesting feature was present however: a series of branches hammered into cracks and fissures in the roof of the shelter and projecting outwards. These may have supported a screen against the weather. They were not seen at other sites, but it may be that the remoteness of this shelter has saved them from extraction.

2.2.32 SFS 26: Crowlin 7, NGR NG 6840 3500

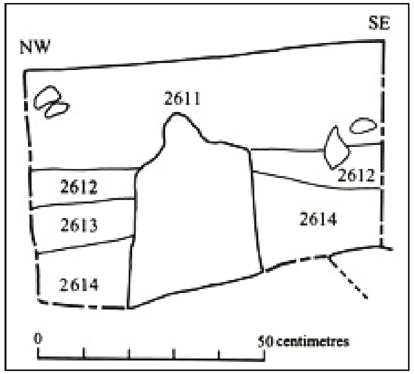
Type of Site: Rockshelter with midden
SFS Record: 1999
Survey Area: Islands (Crowlin Islands)
Size: 20m wide×6m deep
Aspect: South above slope to sea
Height OD: 6m
Ground Cover: Scree and heather
Distance to Sea: 20m to south to rocky coast
Distance to Fresh Water: Unknown

Threats: Stable

Description: A large, open rockshelter offering a degree of protection from the elements. To the rear of the shelter there are a series of blocked tunnels in which otters live. These may have formed a sheltered small cave or secondary rockshelter at some time in the past. The site extends for some 25m at right angles to the sea. Two test pits were excavated here in the most likely points within the extensive shelter
Archaeology: Two test pits were excavated within the shelter, Test Pit 1 within the small area of visible midden and Test Pit 2 to the rear of the shelter adjacent to the otters' habitation Test Pit 1 contained five contexts

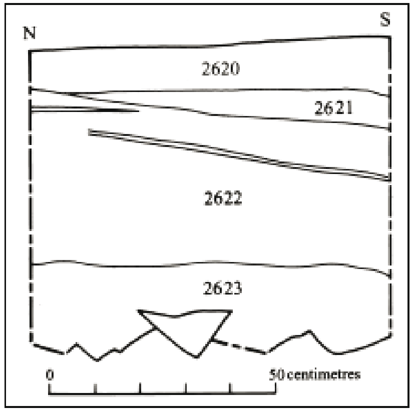
Test Pit 1: (1m×0.5m), aligned north-west—south-east within the small visible shell midden (see Illustration 184, right).

- Context 2611 A thick surface layer of loose sand and occasional shells
- Context 2612 Sand and peat lenses which contained shells as well as fish and animal bones
- Context 2613 An organic rich lens of shell, bone and charcoal in a burnt looking matrix, located in the north-west of the trench, the burning was reflected on the bedrock it abutted
- Context 2614 An orangey perhaps heat-affected sand underlying context 2612 on the south-east
- Context 2615 A bedrock pillar occupying the central part of the trench



Illus 184: SFS 26, Crowlin 7, Test Pit 1, south-west-facing section

Apart from the bedrock pillar which divided the trench, no certain natural layer was reached.



Illus 185: SFS 26, Crowlin 7, Test Pit 2, west-facing section

Test Pit 2: (1m×0.5m) Aligned north—south outside the otters' tunnels in the highest part of the shelter (see Illustration 185, left).

- Context 2620 Loose sand and angular rockfall
- Context 2621 A thin lens of shells, bones and charcoal in a brown matrix
- Contexts 2622/2623 A rapid accumulation of random angular roof-fall with voids and no occupational remains

Neither trench reached bedrock.

Finds

Lithics: There were four pieces of chalcedonic silica from Crowlin 7. In addition to a blade segment there was a regular flake and two pieces of debitage.

Bone: The majority of material at this site was identified as sheep comprising at least three individuals: one older animal over 3.5; one between 2 and 3.5 years; and one neonate. A couple of rabbit bones were also recorded. There is no evidence for cultural modification of any of the elements present. Some material was identified, by preservation, as modern, and the presence of articulated ribs and vertebra suggest that these may be the remains of natural deaths.

Shell: Limpet predominates and the limpets from this site are large, but in Test Pit 1 Context 3 there is a variety of species (see Table 65, below).

To access a printable version of this table, please go to the separate page table065.html and set to LANDSCAPE mode.

Table 65								
SFS 26 Test Pit 1	limpet	periwinkle	buckie	mussel	scallop	oyster	flat periwinkle	residue
Context 1	699						1	116
Context 2	246	1						60
Context 3	473	23	3	2	10	61	2	138

Table 65: SFS 26, Crowlin 7, Test Pit 1, marine molluscs, weight in grams for individual species by context

Dates

One radiocarbon determination was obtained from a secure stratification within Context 2613, an organic rich lens of shell, bone and charcoal abutting bedrock (see Table 66, below). This suggests activity in the later 18th century AD.

Table 66				
SFS 26 Context	Reference	Material	Date BP	Age
TP1 C2613	AA-50673	hazelnut shell	315±60	AD1780–1800

Table 66: SFS 26, Crowlin 7, radiocarbon dates, see Section 4

Discussion

There was a general lack of finds from this site, apart from a few undiagnostic lithics. The dates suggest recent activity.

2.2.33 SFS 190: Diabeg, NGR NG 7998 5968

Type of Site: Findspot
SFS Record: 2002
Survey Area: Loch Torridan
Size: N/A
Aspect: West
Height OD: 50m
Ground Cover: Scree and heather
Distance to Sea: 100m to west, cliffs
Distance to Fresh Water: Unknown
Threats: Stable
Description: Findspot
Archaeology: Surface collection

Finds

Lithics: A single regular flake of quartz was found on the footpath at Diabeg.

Discussion

Isolated finds such as this support a general low level of activity across the area from prehistoric times.

2.2.34 SFS 152: Doire Na Guaile, NG 6211 5487

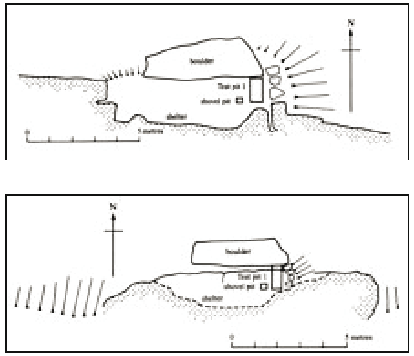
Illus 24: SFS 152, Doire na Guaile, general view of rockshelter and surroundings

Illus 77: SFS 152, Doire na Guaile, close-up view of rockshelter, excavation in progress

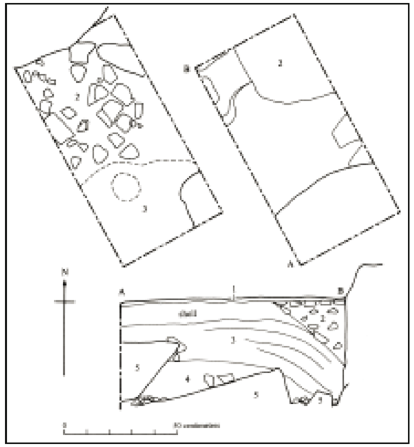
SFS 152, Doire na Guaile: plan of cave

Type of Site: Rockshelter with midden
SFS Record: 2002
Survey Area: Islands (Rona)
Size: 2m deep×6m wide×2m high
Aspect: North, level ground surface
Height OD: 35m
Ground Cover: Heather and grass
Distance to Sea: 10m to north
Distance to Fresh Water: Unknown
Threats: Stable
Description: This is a north-facing rockshelter containing shell midden (see Illustrations 24, top left; 77, bottom left; & 186, top right).
Archaeology: Following an initial shovel pit, in which lithics were found, one test pit was excavated at the entrance to the rockshelter, in the midden, to the east of the shovel pit. It contained five contexts (see Illustration 187, bottom right).

- Context 1 Turf and soil
- Context 2 Build up of stones and soils between and over the shell midden
- Context 3 Shell midden containing mix of limpet and periwinkle. Finds include lithics, pottery and bone
- Context 4 Stone fragments lying between massive rocks
- Context 5 Bedrock



Illus 186: SFS 152, Doire na Guaile, plans of cave



Illus 187: SFS 152, Doire na Guaile, Test Pit 1, plan and section

Finds

Lithics: There were 79 flakes from Doire na Guaile, all of quartz with the exception of three pieces of baked mudstone. Twenty are debitage flakes and the rest are regular flakes.

Coarse Stone: A fragment of a rounded hammerstone.

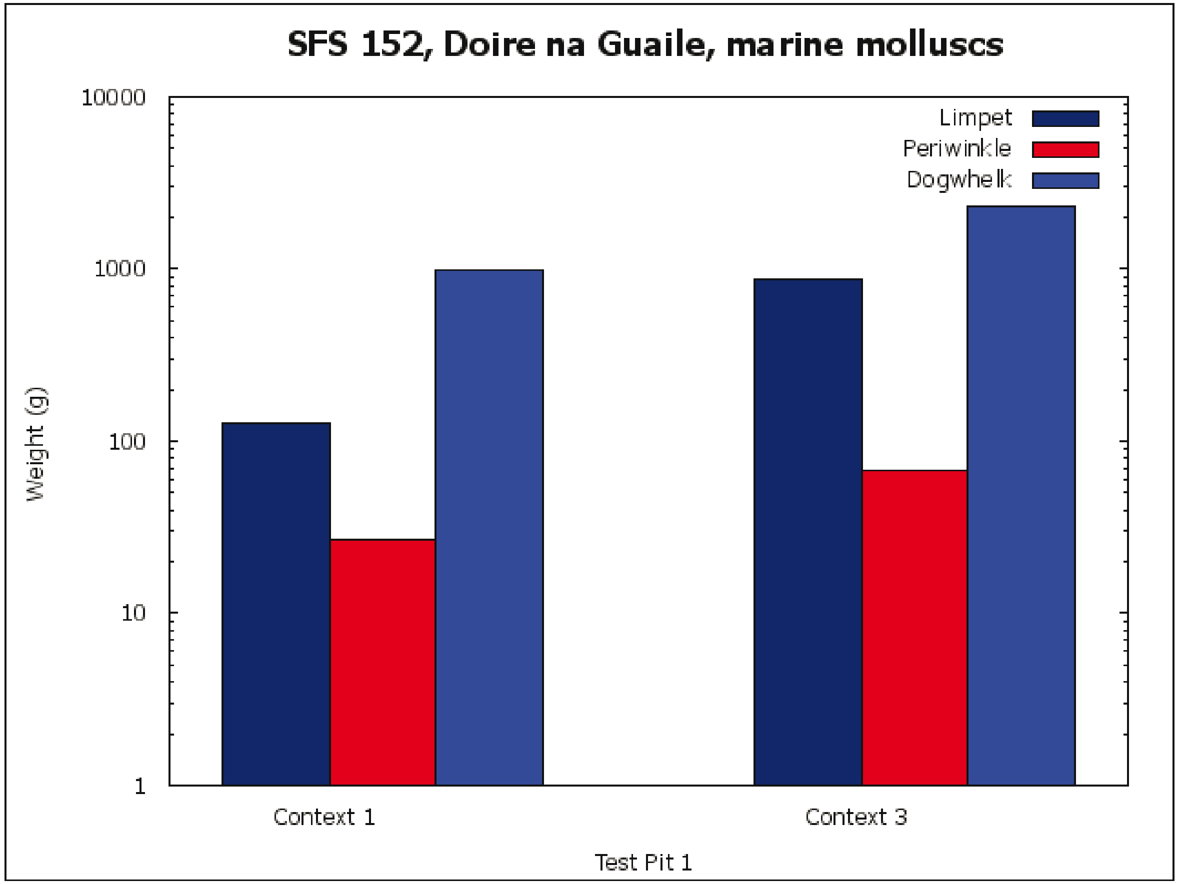
Shell: Limpet predominated here (see Illustrations 188 & 189, both below; Tables 67 & 68, below). This is shown by the MNI, but the fragmentation shows that the limpets are highly fragmented while the dogwhelks are more or less whole (see Illustration 190, below) so that it is possible that some of the limpet shell has been lost to taphonomic processes and therefore the weights are under-representative. There is also a significant amount of dogwhelk and some periwinkle. Skip Table & Charts.

Table 67

SFS 152 Test Pit 1	limpet	periwinkle	dogwhelk

Context 1	128	27	978
Context 3	868	67	2292

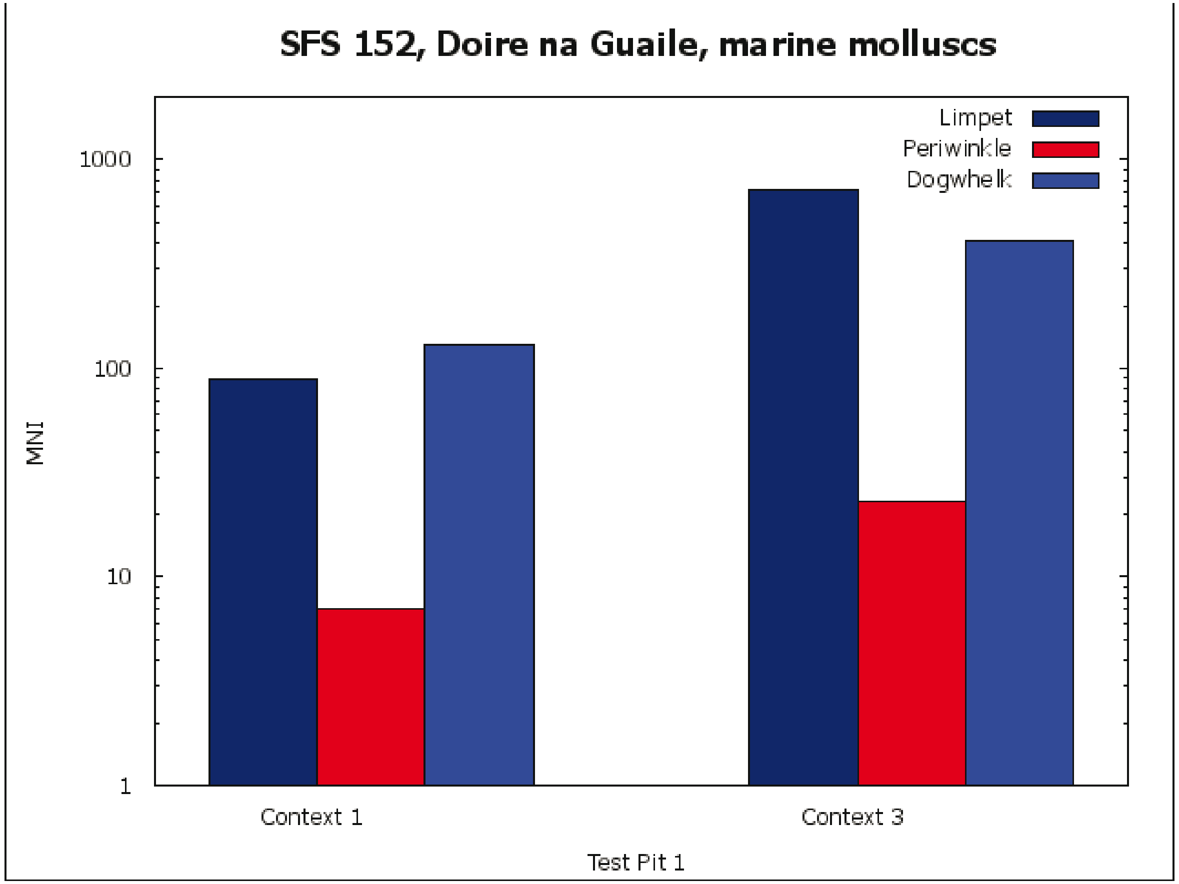
Table 67: SFS 152, Doire na Guaile, marine molluscs, weight in grams for individual species by context



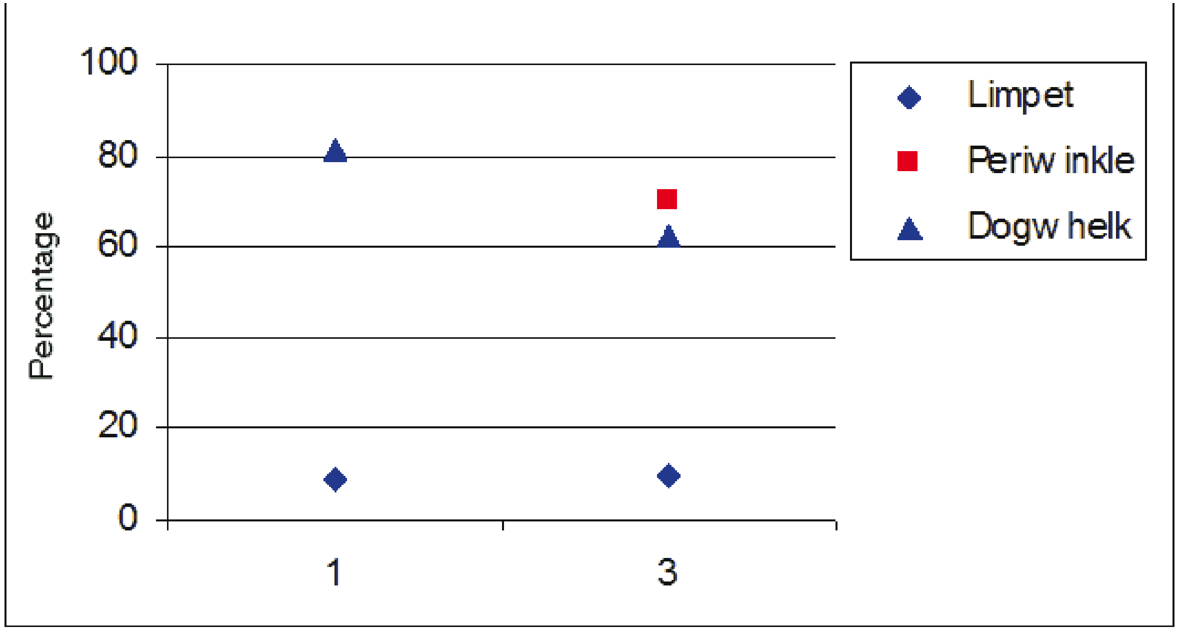
Illus 188: SFS 152, Doire na Guaile, marine molluscs, weight in grams for individual species by context

Table 68			
SFS 152	Limpets	Periwinkle	Dogwhelk
Context 1	88	7	131
Context 3	712	23	405

Table 68: SFS 152, Doire na Guaile, marine molluscs, MNI for individual species by context



Illus 189: SFS 152, Doire na Guaile, marine molluscs, MNI for individual species by context



Illus 190: SFS 152, Doire na Guaile, fragmentation of marine molluscs. Calculations were only made for context 3 in the case of the periwinkles because the sample size was too small for context 1

Discussion

The finds are undiagnostic and could represent activity at any time from prehistory into recent times, though the size of the lithic assemblage, and lack of other finds, suggest a prehistoric date.

2.2.35 SFS 117: Dun Hasan 2, NGR NG 5274 6270

Type of Site: Findspot
SFS Record: 1999
Survey Area: Trotternish
Size: N/A
Aspect: South-east on grassy level terrace
Height OD: 40m
Ground Cover: Grass
Distance to Sea: 40m to south-east, high cliffs
Distance to Fresh Water: 25m to west
Threats: Open grazing, eroding
Description: Lithic scatter on top of cliffs (see Illustration 191, right)

Illus 191: SFS 117, Dun Hasan lies at the top of these cliffs

Finds

Lithics: Three pieces of debitage were recovered from the surface of this site. Two are chalcedonic silica and the third is baked mudstone.

Pottery: One abraded body sherd of well-fired sandy clay.

Discussion

The finds are few in number and undiagnostic. They may relate to prehistoric activity, but further work would be needed to clarify this.

2.2.36 SFS 104: Fearnmore 1, NGR NG 7247 6081

Illus 43: SFS 104, Fearnmore 1, general view

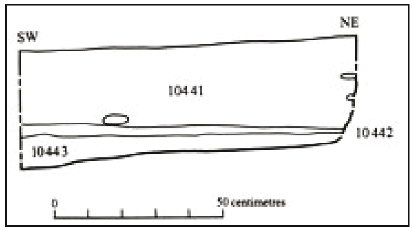
Illus 192: SFS 104, Fearnmore 1, general view of the site from SFS 80

Type of Site: Open-air lithic scatter site
SFS Record: 2000
Survey Area: North Applecross
Size: Unknown
Aspect: South-south-east on grassy slope
Height OD: 8–10m
Ground Cover: Bracken, grass, nettles
Distance to Sea: 60m to east, sheltered rocky cove
Distance to Fresh Water: 30m to south
Threats: Eroding, footpath and grazing
Description: Fearnmore is on the south side of Loch Torridon and has good views to the north across the water to Craig and Redpoint (see Illustrations 43, left & 192, right). This open site comprises a lithic scatter which appears to be centred on an isolated knoll to the north of a sheltered bay, inland and to the west of the shore. A modern cruck-framed house stands on the summit of the knoll and the test pits were located to the south of it
Archaeology: Six test pits were excavated

Test Pits 1, 2, 3: (all 1m×0.5m) These three test pits were situated on a sloping terrace that would have run down to the water when the sea-level was higher. The test pits were positioned in bracken and grass and all contained homogeneous plough soil overlying bedrock (Contexts 10411-12, 10421-2, 10431-2). Lithics were recovered from all locations.

- Test Pit 1 aligned east—west
- Test Pit 2 aligned north-east—south-west
- Test Pit 3 aligned north-west—south-east

Test Pit 4: (1m×0.5m) was positioned below a giant boulder on the lip of the plateau, in a shallow gully that runs erratically down the terrace (see Illustration 193, right).



Illus 193: SFS 104, Fearnmore 1, Test Pit 4, east-facing section

- Context 10440 Surface grass and reeds
- Context 10441 A deeper homogeneous topsoil
- Context 10442 A granular peaty lens
- Context 10443 Stained but clean sand
- Context 10444 Bedrock

Large numbers of lithics were recovered from this trench

Test Pit 5: (1m×0.5m) was positioned just below the edge of the upper terrace, close to the giant boulder (see Illustration 194, left).

- Context 10450 Surface grass and bracken
- Context 10451 A deep plough soil, homogeneous and heavily rooted

- Context 10452 An older plough soil
- Context 10453 Bedrock

Some lithics were recovered but fewer than in Test Pit 4.

Illus 194: SFS 104, Fearnmore 1, Test Pit 5, showing the west-facing section

Test Pit 6: (1m×0.5m) was positioned on the lip of the upper terrace to ascertain the quantities of lithics here (see Illustration 195, right). A similar number to those found in Test Pit 5 were found, again in plough soil overlying bedrock.

Illus 195: SFS 104, Fearnmore 1, Test Pit 6, showing the south-west-facing section

- Context 10460 Grass and bracken
- Context 10461 Homogeneous mid brown plough soil
- Context 10462 Bedrock

Finds

Lithics: A large assemblage, of 754 lithics, was recovered from Fearnmore 1 (see Table 69, below). Retouched pieces comprise the three microliths: one broken crescent, a fine point, and a fragment. The greatest concentration of material was found in Test Pits 4–6 (see Table 70, below).

Table 69

SFS 104 Fearnmore 1	Baked mudstone	Rùm bloodstone	Chalcedonic silica	Quartz	Total
Debitage	50	33	95	339	517
Blades	2		1		3
Regular flakes	63	6	33	129	231
Microliths		1	2		3
Totals	115	40	131	468	754

Table 69: SFS 104, Fearnmore 1, lithics

Table 70

SFS 104	Quantity of lithics
Surface	137

TP1	6
TP2	6
TP3	31
TP4	166
TP5	269
TP6	139

Table 70: SFS 104, Fearnmore 1, lithics per test pit

Coarse Stone: A single facially pecked cobble tool (ST35).

Glazed pottery: Twenty-one sherds and fragments of glazed pottery, including a pipe stem, were recovered. These came from the surface spits in Test Pits 1–4 and from the surface of the site generally.

Glass: An olive-green sherd from Test Pit 3 Spit 1; and two clear sherds from Test Pit 4, Spit 1.

Discussion

The lithic assemblage comprises material from both the manufacture and use of stone tools. Although it includes all of the raw materials commonly used around the Inner Sound, the dominance of local material, quartz, is notable, as is the lesser use of Rùm bloodstone which had to be brought in from further away. The baked mudstone is likely to have come from Staffin Bay across the Inner Sound while the chalcedonic silica may be local though there are also good sources of it in Staffin.

It is interesting that baked mudstone was clearly preferred for the manufacture of regular flakes, though the local knappers were also able to make many good flakes of quartz. Only three modified tools were recovered from this site and all are microliths. There is one broken crescent, a fine point, and an unidentifiable fragment, all from a narrow-blade industry.

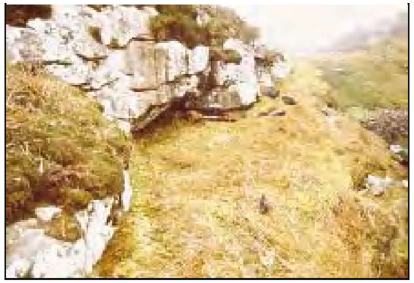
The general cultural characteristics of the lithic assemblage suggest a Mesolithic date for the site, though the possibility of later activity as well cannot be ruled out. Fearnmore 1 is a good location for occupation. This is a site that would repay more detailed investigation.

The pottery and glass are all more recent, post-medieval to modern, and probably reflect the presence of a well used footpath across the site.

The lithic scatter is widely spread but appears to be concentrated around the boulder and in the gully or ditch running down the terrace. Few finds seem to be in situ, due to considerable slopewash and plough action; the more recent finds could have come from manuring or from the house on the hill.

2.2.37 SFS 80: Fearnmore 2, NGR NG 7258 6077

Type of Site: Rockshelter with midden
SFS Record: 2000
Survey Area: North Applecross
Size: 8m wide×1.5m deep×0.5m high
Aspect: West
Height OD: 4–5m
Ground Cover: Bracken
Distance to Sea: 5m to west



Illus 196: SFS 80, Fearnmore 2, general view of site showing the location of Test Pit 1

Distance to Fresh Water: 50m to west
Threats: Stable
Description: This rockshelter has very little protection from the elements and the mossy surface outside is wet but without standing water (see Illustration 196, right). Access is restricted by a low roof and the shelter is no more than 0.5m high and occurs in a raised old sea cliff at 4m OD. A sparse shell midden is visible at the rear but cannot be reached for sampling due to very wet ground and the low roof. A second possible shelter lies about 25m to the north and was not test pitted.
Archaeology: One test pit was excavated

Test Pit 1: (1m×0.5m) aligned east—west and excavated just outside the low overhang on a surface of mosses and bracken (see Illustration 197, right).

Illus 197: SFS 80, Fearnmore 2, Test Pit 1, after excavation

- Context 8001 Bracken, moss and patchy grass
- Context 8002 A thin silty sand with charcoal flecks and heavily rooted peat
- Context 8003 Bedrock

Finds

Lithics: A chunk of quartz was found on the surface of this site.

Discussion

The difficulty of access means that the shells are likely to have blown into the shelter but could have been thrown in from outside. Once inside movement would be restricted to lying down. No human activity can be demonstrated on this site at present.

2.2.38 SFS 114: Fergus' Shelter, NGR NG 7571 3714

Illus 79: SFS 114, Fergus' Shelter, general view

Illus 198: Fergus' Shelter, rockshelter

Type of Site: Multiple rockshelters with midden and structures
SFS Record: 2000
Survey Area: South Applecross
Size: 10m deep×2m wide×2m high
Aspect: North-east
Height OD: 240–250m
Ground Cover: Moss and grass
Distance to Sea: 1500m to south east
Distance to Fresh Water: 10m to north
Threats: Stable
Description: One of a series of conjoined rockshelters with much repaired walls along their perimeters, below the drip lines (see Illustration 79, left & 198, top right). A large number of small circular and sub-circular structures lay outside and below the shelters. This site lies *c*1.5 miles from the sea

but it contains a large shell midden (see Illustration 199, bottom right)
Archaeology: One test pit was excavated
Notes: The site of Fergus' Shelter is unusual in being one of the only rockshelter sites that lies inland

Illus 199: Fergus' Shelter, general location

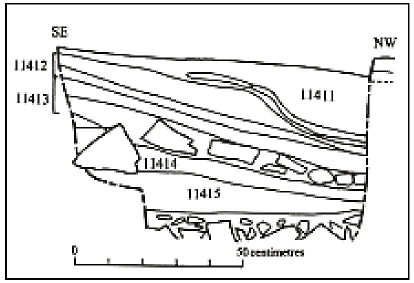
Illus 200: SFS 114, Fergus' Shelter: Test Pit 1

Test Pit 1: (1m×0.5m) aligned north-west—south-east on a north-west-facing slope within the lowest rockshelter (see Illustrations 200, left & 201, lower right). It contained five contexts:

- Context 11411 Dry surface peat, shell and fish bones
- Context 11412 Peat, shell and ash lenses, an occupation zone
- Context 11413 Irregular stones with a matrix of peat and degraded shells. Possible floor layer. Lithic finds

The above contexts can be taken as one occupation horizon

- Context 11414 A separate layer of limpet shells
- Context 11415 A deep layer of angular sharp stone chips in a sandy matrix at a depth of 0.6m. This can be interpreted as natural roof failure and it precluded excavation to bedrock



Illus 201: SFS 114, Fergus' Shelter, Test Pit 1, east-facing section

Finds

Lithics: Eighty-one pieces of flaked stone, mainly of chalcedonic silica but with 13 pieces of quartz were recovered from Fergus' Shelter (see Table 71). All came from Test Pit 1.

Table 71

SFS 114	Chalcedonic silica	Quartz	Total
Debitage	53	4	57
Regular flakes	15	9	24
Totals	68	13	81

Table 71: SFS 114, Fergus' Shelter, lithics

Glass: An olive-green sherd from Test Pit 1 Spit 2.

Metalwork: An iron rove with the surviving tip of a clenched nail came from Test Pit 1, Spit 1, and the same context also yielded a small iron bar, perhaps a tang, and five modern nails and a possible horseshoe nail.

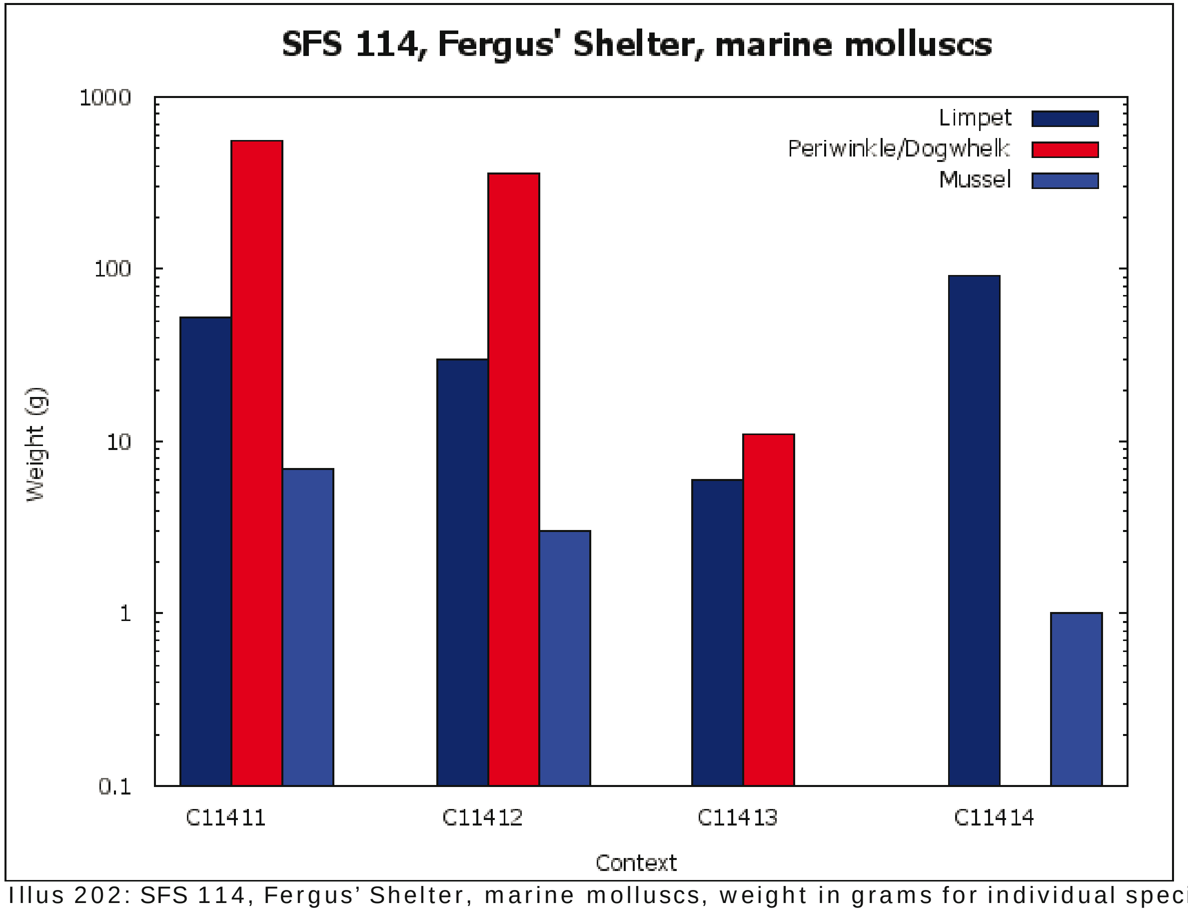
Bone: All the bones from this site were sheep/goat. The surface peat layers contained loose teeth and juvenile bones, whilst the lower occupation layer held a jaw, a lower tooth and an unfused first phalange.

Shell: Periwinkle and dogwhelk were not separated for this site but combined these species predominated (see Table 72, below; Illustration 202, below). Much smaller quantities of limpet, mussel and oyster were present. Skip Tables & Chart.

Table 72

SFS 114: Test Pit 1	limpet	periwinkle / dogwhelk	mussel	oyster	residue
Context 1	53	553	7		271
Context 2	30	357	3	2	231
Context 3	6	11			5
Context 4	92		1		26

Table 72: SFS 114, Fergus' Shelter, marine molluscs, weight in grams for individual species by context



Illus 202: SFS 114, Fergus' Shelter, marine molluscs, weight in grams for individual species by context

Dates

There are two radiocarbon determinations, both securely stratified within a distinct layer of limpet midden lying on natural roof fall which precluded excavation to bedrock (see Table 73, below). They suggest activity in the late 14th-early 15th century AD.

Table 73

SFS 114 Context	Reference	Material	Date BP	Age
TP1 C11414	AA-50696	birch charcoal	575±30	AD1380–1420
TP1 C11414	AA-50697	deer bone	580±30	AD1380–1420

Table 73: SFS 114, Fergus' Shelter, Radiocarbon dates, see Section 4

Discussion

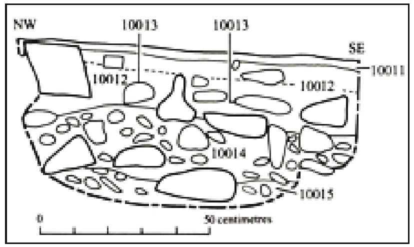
There are no diagnostic pieces in the lithic assemblage. The glass is post-medieval and the metalwork relatively recent. Given the dates from Fergus' Shelter, it is possible that later stoneworking took place to produce simple tools and strike-a-lights.

2.2.39 SFS 100: Fraser's Croft, Toscaig, NGR NG 7126 3863

Illus 38: SFS 100, Fraser's Croft, general view

Type of Site: Open-air midden
SFS Record: 2000
Survey Area: South Applecross
Size: 8m diameter
Aspect: Open, level
Height OD: 5m
Ground Cover: Grass
Distance to Sea: 100m to south
Distance to Fresh Water: 10m to north
Threats: Eroding, chicken action
Description: A patch of broken shells exposed by chickens scratching on the east side of a low and probably plough damaged cairn which lies on an old raised beach (10m OD; see Illustration 38, right). A silage clamp has been built into the western end of this cairn. This site stands in what is now good and sheltered grazing land
Archaeology: One test pit was excavated

Illus 203: SFS 100, Fraser's Croft, Test Pit 1



Illus 204: SFS 100, Fraser's Croft, Test Pit 1, east-facing section

Test Pit 1: (1m×0.5m) aligned north-west—south-east within the eroded shells (see Illustrations 203, left & 204, right).

- Context 10011 A thin turf layer
- Context 10012 A thin layer of whole and broken shells
- Context 10013 Cairn material into which some shells from context 10012 had fallen
- Context 10014 An OGS under the cairn; sterile
- Context 10015 Natural rounded beach gravels at the base of the section

The test pit reached a total depth of 0.5m. Mixed shells were present and a sherd of modern pottery was also found.

Finds

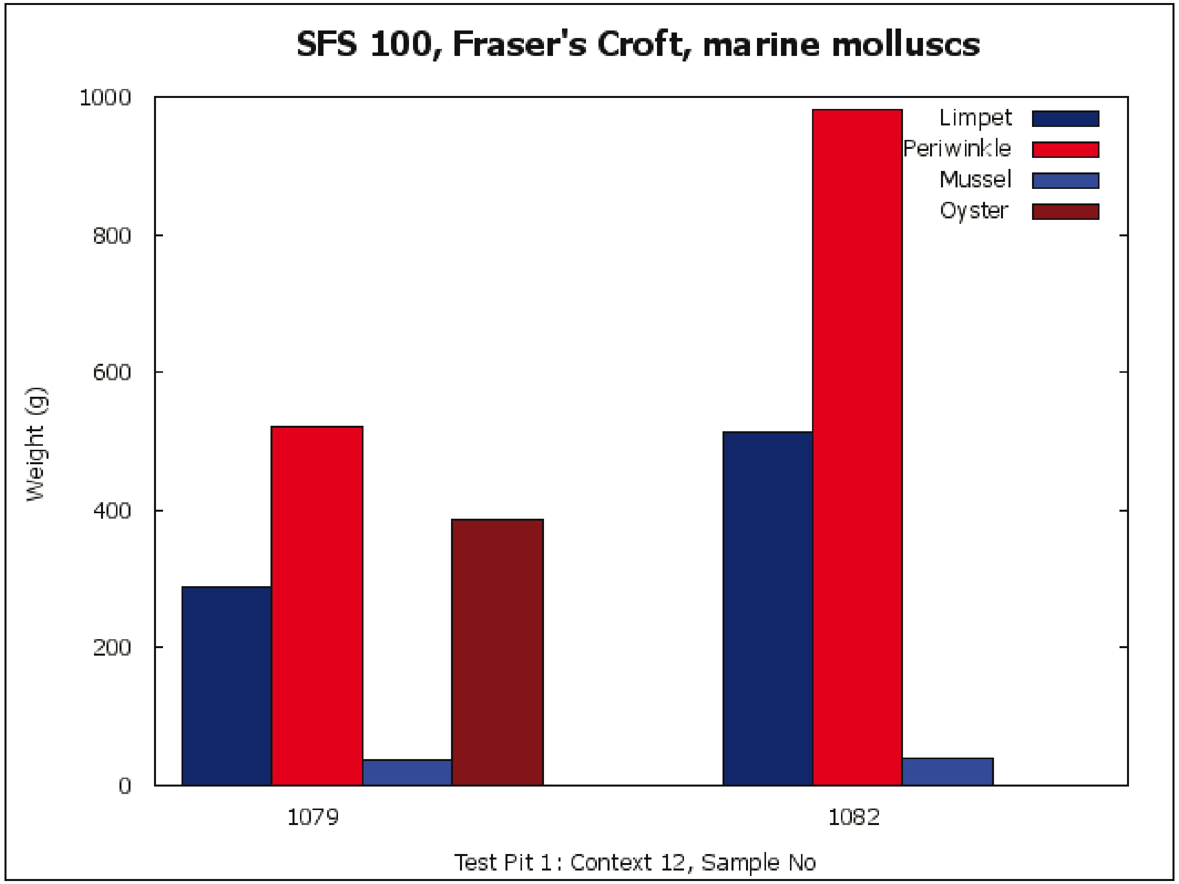
Pottery: Two pieces of glazed pottery, including a handle, were found in Test Pit 1, Spit 2.

Bone: Sheep, a single right upper molar.

Shells: Limpet and periwinkle predominated here though oyster was also present in the top layer (see Table 74, below; Illustration 205, below). There were also small amounts of mussel and razor shell.

Table 74						
SFS 100	limpet	periwinkle	mussel	oyster	razor shell	residue
Test Pit 1, Context 2						
Sample 1079	288	520	36	385	<1	1118
Sample 1082	514	982	40		<1	1377

Table 74: SFS 100, Fraser's Croft, marine molluscs, weight in grams for individual species by context



Illus 205: SFS 100, Fraser's Croft, marine molluscs, weight in grams for individual species by context

Discussion

Daisies on the surface seem to be a good indication of alkaline soils below and, if they represent the extent of the site, it measures 8m×7m. It seems likely that this is a recent shell deposit, possibly a midden or the result of shell dumping prior to liming the fields.

2.2.40 SFS 88: Kishorn 4, NGR NG 7974 3865


Illus 206: SFS 88, Kishorn 4, view of entrance from east

Type of Site: Rockshelter with midden
SFS Record: 2000
Survey Area: Loch Carron
Size: 4m deep×8m wide×2m high
Aspect: South-east in a sea cliff
Height OD: 6m
Ground Cover: Bracken
Distance to Sea: 20m to south-east, rocky boulder shore
Distance to Fresh Water: Unknown
Threats: Erosion
Description: A small, shallow, well sheltered rockshelter (see Illustration 206, right). A modern but not recently used hearth and surface shell midden with a few bones occupy most of the interior
Archaeology: Only one test pit was dug as rocks and trees preclude digging outside the shelter


Illus 207: SFS 88, Kishorn 4, Test Pit 1 after excavation, plan view

Test Pit 1: (1m×0.5m) aligned north—south within the midden in the south west of the interior (see Illustration 207, left).

- Context 8810 A thin spread of loose surface shells from a mixed shell midden overlying large tumbled rocks
- Context 8811 More shells in a peaty matrix, a total of only 0.14m at most
- Context 8812 Large rocks with voids between them

Finds

There were no finds at this site

Discussion

The lack of finds and surface nature of the deposits suggests recent activity.

2.2.41 SFS 8: Loch a Sguirr 1, NGR NG 6084 5286


Illus 208: SFS 8, Loch a Sguirr, general shot of the rockshelters


Illus 210: general working shot of the interior during test pit excavations

Type of Site: Rockshelter with midden
SFS Record: 1999
Survey Area: Islands (Raasay)
Size: 1.5m deep×4m wide×1.4m high
Aspect: West
Height OD: 25m
Ground Cover: Bracken
Distance to Sea: 50m to west steep small cliffs
Distance to Fresh Water: 1000m south-west
Threats: Erosion, animal
Description: SFS 8, Loch a Sguirr 1, lies adjacent to SFS 18, Loch a Sguirr 2, and is the smaller of two rockshelters that lie above the sea cliff at the north-western edge of Raasay (see Illustration 208, top left &

Illus 209: SFS 8, Loch a Sguirr, showing the position of the rockshelters (in top right of photo) high above the sea

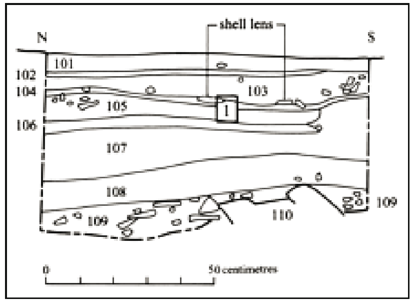
209, bottom left). The entrance is situated on a rock ledge with a 2m drop to the open platform below and has a large boulder to the front. The boulder restricts access to the shelter, although it also provides some shelter from the prevailing winds. The shelters are cut into the vertical rock face and appear quite distinctive because of the coloured bands running through the rock. Midden is visible in both shelters. Loch a Sguirr lies at the heart of the area of study and has views to all directions from the hills above the site

Archaeology: Two test pits were excavated within the shelter, one deep inside and the other in the south-east sector of the shelter where shellfish, bone and lithics had previously been recovered (see Illustration 210, right). Both test pits produced archaeological material. Test pits were numbered in conjunction with those of SFS 18, Loch a Sguirr 2

Test Pit 1: (1m×0.5m) was located at the back of the shelter where lithics had been recovered on an earlier visit (see Illustration 211, top right & 212, lower right).

Illus 211: SFS 8, Loch a Sguirr, Test Pit 1, after excavation

- Context 101 A layer of sheep droppings with small angular stones and some weathered limpet and winkle shells and one baked mudstone flake found on surface
- Context 102 A thin layer of limpet and winkle shell with some small bones
- Context 103 A layer of dark, compact soil with some small angular stones
- Context 104 A thin layer of black, rich, compact soil, with small bones and mudstone/quartz chips, containing a bevel-ended bone tool. Layer also contains two lenses of creamy decayed shell
- Context 105 A discontinuous layer of gritty/sandy soil with small stones
- Context 106 A lens of organic nature, containing well preserved shell and bone and some charcoal. Layer fragmented into chunks on trowelling
- Context 107 An organic-rich layer containing shells and bone. A fine, dark, sandy soil containing charcoal lumps, some stones and flint/baked mudstone chips
- Context 108 An organic-rich, crumbly layer of shell and limpet and bone. Matrix is fine, dark and loose sandy soil containing a small chip of flint/baked mudstone
- Context 109 A layer of shattered rock and sandy soil. Small angular stones and voids in layer. Layer cut by fallen blocks (context 110)
- Context 110 Large angular blocks, lying on a sterile layer of shattered stone, cutting through Context 109



Illus 212: SFS 8, Loch a Sguirr, Test Pit 1, west-facing section

Illus 213: SFS 8, Loch a Sguirr, Test Pit 3, after excavation

Test Pit 3: (1m×0.5m) was located towards the front, in the south-east sector of the shelter (see Illustration 213, left).

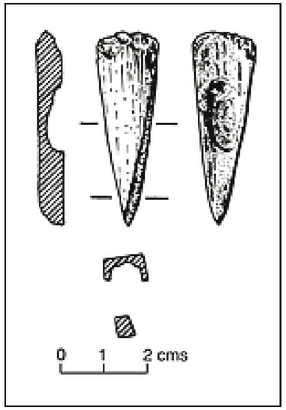
- Context 201 A surface deposit of sheep droppings, shell, bone and fragmented stone
- Context 202 A dense layer of medium coarse gritty sand with loose and fragmented rock with patches of shell (Context 304), underlying fallen stones
- Context 203 A layer of angular fractured fallen rock forming a solid barrier across the trench at a depth of 0.2m
- Context 204 Pockets of shell rich deposits, crushed limpet and whelk, containing small bones, under and around larger stones within Context 302

Finds

Lithics: The test pitting at SFS 8, Loch a Sguirr 1, resulted in the recovery of 149 lithics (see Table 75, below). The knappers here worked both quartz and baked mudstone. Some chalcedonic silica was used at this site, but there is no Rùm bloodstone. There are some pieces of fine quartz, including six regular blades, but the quartz is of such variable quality that much of it has flaked into small chunky pieces, hence the general over-representation of debitage. There are no retouched artefacts from this assemblage.

Table 75				
SFS 8	Baked mudstone	Chalcedonic silica	Quartz	Total
Debitage	35	15	48	98
Regular flakes	24	12	8	44
Blades	1		6	7
Total	60	27	62	149

Table 75: SFS 8, Loch a Sguirr 1, lithics



Illus 214: SFS 8, Loch a Sguirr, bevel-ended tool, BT1 (drawing)

Bone tools: Three bone tools were found here, all bevel-ended tools. Two pieces came from Test Pit 1, Spit 2 and a third piece came from Test Pit 3, Spit 2. One piece (BT40) was broken, the other two (BT1 and BT41) were complete. Both these pieces had proximal ends that tapered into a point. BT1 (see Illustrations 214, left & 215, right) was examined and photographed in an SEM microscope and the results are discussed below in Section 3.4.

Illus 215: SFS 8, Loch a Sguirr, bevel-ended tool, BT1 (photo)

Pottery: A single sherd of undiagnostic pottery was found in Spit 1 of Test Pit 1.

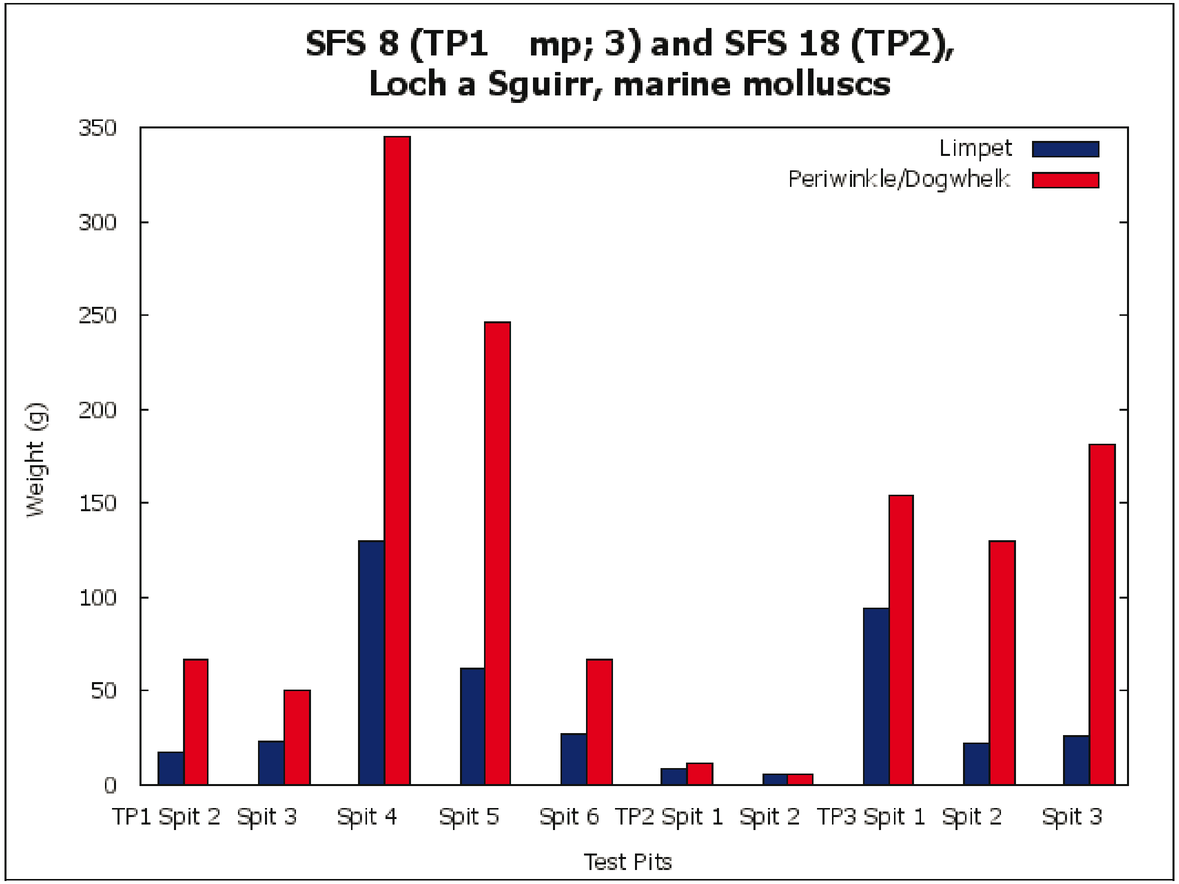
Bone: A single cattle metacarpal and a neonatal sheep/goat femur and navicular cuboid were the only remains of food species. Frog and amphibia bones were also identified. In addition a quantity of fish bone was recovered. This included saithe or pollack and ballan wrasse probably as a result of inshore fishing.

Shell: Periwinkle and dogwhelk dominate (see Illustration 216, below), followed by limpet (Table 76).

Table 76			
Loch A Sguirr: SFS 8	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 3			
Spit 1	94	154	
Spit 2	22	130	179
Spit 3	26	181	424

Table 76: SFS 8, Loch a Sguirr, marine molluscs, weight in grams for individual species by context



Illus 216: SFS 8, Loch a Sguirr, marine molluscs, weight in grams for individual species by context

Dates

There are three radiocarbon determinations from SFS 8, Loch a Sguirr 1, all from Test Pit 1 (see Table 77, below). They confirm activity in the Mesolithic, in the 7th millennium BC, though the presence of a more recent determination (late century BC–first century AD) from charcoal within a lower spit suggests that there may have been some disturbance to the layers.

Table 77				
SFS 8 Context	Reference	Material	Date BP	Age

TP 1 spit 6	OxA-9254	Birch charcoal	2055±39	170BC–AD50
TP 1 spit 2	OxA-9255	Bevel tool of deer bone	7245±55	6230–6000BC
TP 1 spit 3	OxA-9305	Birch charcoal	7620±75	6640–6250BC

Table 77: SFS 8, Loch a Sguirr 1, radiocarbon dates, see Section 4

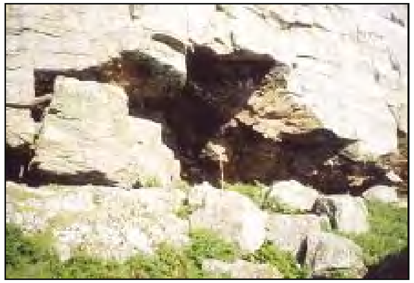
Discussion

Only a small amount of archaeological material was recovered from SFS 8, Loch a Sguirr 1, but such as it is it indicates that the rockshelter was occupied in the Mesolithic. The lithic assemblage is generally undiagnostic but does include some regular pieces (32%). The six blades together with the bevel-ended bone tools all suggest Mesolithic activity and this is supported by the radiocarbon determinations, two of which date to the 7th millennium BC.

The third radiocarbon determination from SFS 8 is interesting in view of the later material (pottery) from SFS 18. It indicates activity around or later than the mid second century BC to the mid first century AD and the two may well be related.

Erosion appears to have removed many of the archaeological deposits here. Neither the talus slope nor the platform in front of the shelters contained any archaeological material.

2.2.42 SFS 18: Loch a Sguirr 2, NGR NG 6084 5286



Illus 217: SFS 18, Loch a Sguirr, general view from west

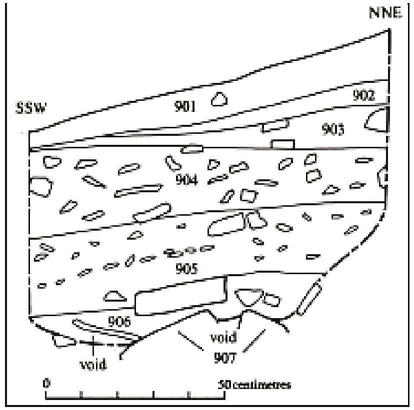
Illus 218: SFS 18, Loch a Sguirr, general working shot inside rockshelter

Type of Site: Rockshelter with midden
SFS Record: 1999
Survey Area: Islands (Raasay)
Size: 4m deep×8m wide×2m high
Aspect: West
Height OD: 25m
Ground Cover: Bracken
Distance to Sea: 50m to west steep small cliffs
Distance to Fresh Water: 1000m south-west
Threats: Erosion, animal
Description: SFS 18 is a substantial rockshelter with a large platform above the sea cliff at the north-western edge of Raasay (see Illustration 217, left). The shelter is cut into the vertical rock face, which has distinctive coloured bands running through it. Inside the shelter, the floor is level, with some shell visible towards the back of the cave. The entrance to the shelter has a lip of large boulders, in front of which is a talus covered with nettles
Archaeology: Eight test pits were excavated within the shelter (see Illustration 218, right), and on the platform in front. All test pits were archaeologically sterile except those described below. Test pits were numbered in conjunction with those of SFS 8, Loch a Sguirr 1

Test Pit 9: (1m×0.5m) outside the rockshelter (see Illustrations 219, left & 220, right).

- Context 901 Surface vegetation with many fleshy roots and sheep droppings. A few angular cobbles in section, thickest below shelter, decreasing towards the west
- Context 902 A homogenous, peaty lens with many roots and flecks of

Illus 219: SFS 18, Loch a Sguirr, Test Pit 9, after excavation



Illus 220: SFS 18, Loch a Sguirr, Test Pit 9 SSE-facing section

mica occurring towards the rockshelter

- Context 903 A homogenous grey-brown peaty layer with roots and mica fragments, thickest towards the rockshelter
- Context 904 A peaty matrix containing many stone chips and cobbles. Charcoal and burnt peat occur in small quantities
- Context 905 Similar to context 904 but with smaller stones, gravel flakes and some large cobbles, all laid flat. Substantial amounts of charcoal and some pottery
- Context 906 Angular cobbles, small amounts of charcoal and two flint flakes
- Context 907 Natural cliff-fall

Illus 221: SFS 18, Loch a Sguirr, Test Pit 10, after excavation

Test Pit 10: (1m×0.5m) inside the rockshelter (see Illustration 221, left).

- Context 1001 A shallow surface layer of sheep droppings with occasional shells and angular stone
- Context 1002 An organic layer of mixed small angular stones with fragments of shell
- Context 1003 Small pockets of crushed fish bone in a sandy matrix
- Context 1004 A layer of degraded fallen rock, angular stones and coarse gritty sand
- Context 1005 A layer of fallen rock

Finds

Lithics: Five flaked lithics were found, one in Test Pit 4, and four in Test Pit 9 (see Table 78, below). All are of quartz.

Table 78	
SFS 18	Quartz
Debitage	2
Regular flakes	3
Total	5

Table 78: SFS 18 Loch a Sguirr 2, lithics

Pottery: There were seven sherds and fragments of pottery, all from Test Pit 9. All are of a coarse ware with no distinguishing characteristics. They do not suggest any specific date.

Bone: Test Pit 10 yielded a quantity of what appears to be otter spraint.

Shell: there was very little shell, mainly limpet with periwinkle and dogwhelk (see Table 79, below).

Table 79

Loch A Sguirr: SFS 18	limpet	periwinkle / dogwhelk	residue
Test Pit 2			
Spit 1	9	6	36
Spit 2	12	6	48
Test Pit 10			
Spit 1			32
Spit 2	2		

Table 79: SFS 18, Loch a Sguirr 2, marine molluscs, weight in grams for individual species by context

Discussion

SFS 18 contains only a very small area of shell midden towards the back. The remainder of the cave has shallow level deposits and it appears that the rockshelter has been repeatedly scoured out by water so that the midden material is all that survives of former occupation. The pottery and lithics are undiagnostic, but the presence of a radiocarbon determination indicating activity at some time between mid 2nd century BC to the mid 1st century AD in the adjacent smaller rockshelter (SFS 8) may provide a rough indication of activity in the two shelters. The complete lack of early prehistoric material in this shelter is interesting, given that it was found in SFS 8, but it may well have been lost through erosion.

2.2.43 SFS 106: Loch Toscaig 3, NGR NG 7116 3769

Type of Site: Rockshelter
SFS Record: 2000
Survey Area: South Applecross
Size: 12m deep×6m wide×1.5m high
Aspect: West at foot of old sea cliff
Height OD: 1–3m
Ground Cover: Rowan tree, ferns, bracken
Distance to Sea: 5m to west. rocky coast
Distance to Fresh Water: 300m to north
Threats: Sea ingress
Description: A low lying rockshelter at the foot of an old sea cliff, partly washed out
Archaeology: Surface collection

Finds

Pottery: A small abraded fragment of well fired fine sandy clay.

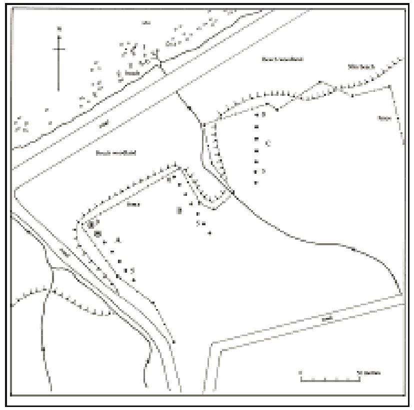
Discussion

There was little evidence of human activity here, though it is possible that material has been washed out by the sea. The isolated find of pottery suggests that the rockshelter has not gone unnoticed in the past.

2.2.44 SFS 116: Mains of Applecross, NGR NG 7140 4455

Illus 222: SFS 116, Mains of Applecross, shovel pitting area, general view

Type of Site: Open-air lithic scatter site
SFS Record: 2000
Survey Area: Mid Applecross
Size: N/A
Aspect: North-west
Height OD: 30m
Ground Cover: Grass
Distance to Sea: 60m north-west
Distance to Fresh Water: On site
Threats: Stable
Description: A lithic scatter located in a sharply defined raised beach with two deeply cut burns running south-east to north-west, down to the sea (see Illustration 222, left)
Archaeology: Shovel pitting. Three transects of seven shovel pits were laid out to test the areas around the burns for lithic scatters (see Illustration 223, right). Shovel pit depth was 200mm through a worm sorted plough soil to a mixed pebble and sandy silt beach deposit



Illus 223: SFS 116, Mains of Applecross, plan of shovel pits

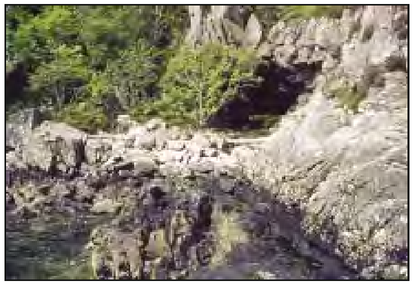
Finds

Lithics: There were ten finds from the shovel pits here; seven are of chalcedonic silica and the rest of quartz. Six are regular flakes and four are debitage.

Discussion

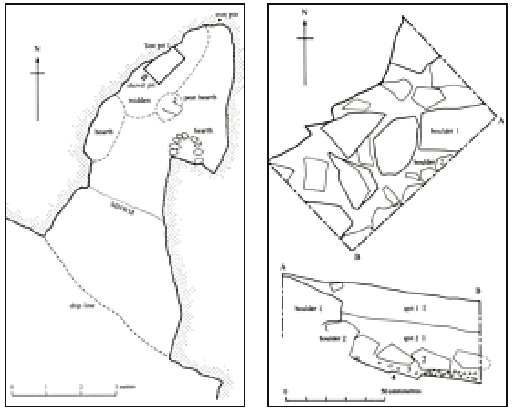
The lithics suggest prehistoric activity. They were not abundant, but further work might well produce more evidence.

2.2.45 SFS 171: Meall Na h'Airde 2, NGR NG 8269 3629



Illus 224: SFS 171, Meall na h'Airde 2, close-up view of rockshelter

Type of Site: Cave with midden
SFS Record: 2002
Survey Area: Loch Carron
Size: 8m deep×5m wide×5m high
Aspect: South-west in foot of sea cliff
Height OD: 2m
Ground Cover: boulders
Distance to Sea: 5m to south-west, open rocky coast
Distance to Fresh Water: Unknown
Threats: Sea ingress
Description: This is a south-west-facing sea cave lying at the foot of old sea cliffs (see Illustration 224, left). A small area of midden lies at the rear of the cave (see Illustration 225, right), but it is possible that this may be all that remains of a larger midden that has been washed out. Three hearth sites lie inside the cave
Archaeology: A test pit was dug into the midden and contained four contexts (see Illustration 226, lower right). As the site is



Illus 225 & 226: SFS 171, Meall na h'Airde 2; *left*: plan of cave; *right*: plan and section of test pit remote and difficult to access, samples were dry sieved on site. A 50% sample of excavated material was sieved using a 3mm sieve

- Context 1 Loose shell and dry black soil containing lithics, bone fragments and charcoal
- Context 2 Loose stones with Context 1 running through voids
- Context 3 Small pebbles and marine gravels
- Context 4 Bedrock

Finds

Lithics: There were 27 lithic finds: 23 of chalcedonic silica and four of quartz. Seven pieces are debitage, 18 are regular flakes, and there is one blade and one edge-retouched piece.

Pottery: Test Pit 1, Context 2. One body sherd, slightly abraded. The fabric is sandy clay which has fired hard and is grey with a red exterior margin. The exterior is sooted and the interior is sooted with a residue. Th 6mm; Wt 14g.

Bone: A total of 100 bones weighing 28.91g was recovered (see Tables 80, 81, 82 & 83, all below). This included mammal, fish and one bird bone from two contexts, 001 and 002, which were combined for study. From a NISP of 28 only three diagnostic elements, all of field vole, were recorded. Of the fish bones (NISP of 71), 32 were identifiable to species; these included cod, saithe, haddock, conger eel and species from the cod and plaice families. Skip Tables.

Table 80

SFS 171	York system texture Description	mammal	bird	fish
Excellent	Majority of surface fresh or even slightly glossy; very localised flaky or powdery patches	2		
Good	Lacks fresh appearance but solid; very localised flaky or powdery patches	1		2
Fair	Surface solid in some places, but flaky or powdery on up to 49% of specimen			16
Poor	Surface flaky or powdery over 50% of specimen			1
Total		3	0	19

Table 80: SFS 171, Meall na h'Airde 2, bone, texture of QC1 elements

Table 81

Taxon	Total
Mammal	
Field vole	3
Total QC1	3
Total QC0	25
Total mammal	28
Total bird (QC0)	1

Fish	
Cod	1
Saithe	2
Haddock	17
Cod family	8
Conger eel	1
Plaice family	2
Total QC1 and QC2	32
Total QC0 and QC4	39
Total fish	71
Total NISP	100

Table 81: SFS 171, Meall na h'Airde 2, bone, number of identified specimens (NISP)

Table 82

Taxon	Element	Total
Mammal		
Field vole	mandible	2
	skull	1
Total QC1		3
Fish		
Cod		
vertebrae	uv	1
Saithe	hyomandibular	1
	premaxilla	1
Haddock	articular	1
	cleithrum	1
	dentary	1
	maxilla	1
	opercular	5
	posttemporal	1
	quadrate	1
vertebrae:	av1	1
	cv1	2

	cv2	3
Cod family	cleithrum	2
	hyomandibular	1
	maxilla	1
	opercular	2
vertebrae:	cv2	1
	v	1
Conger eel		
vertebrae:	av	1
Plaice family		
vertebrae:	av	1
	cv	1
Unidentified		
vertebrae	v	1
Total QC1		19
Total QC2		13

Table 82: SFS 171, Meall na h'Airde 2, mammal and fish QC1 and QC2 element representation

Table 83

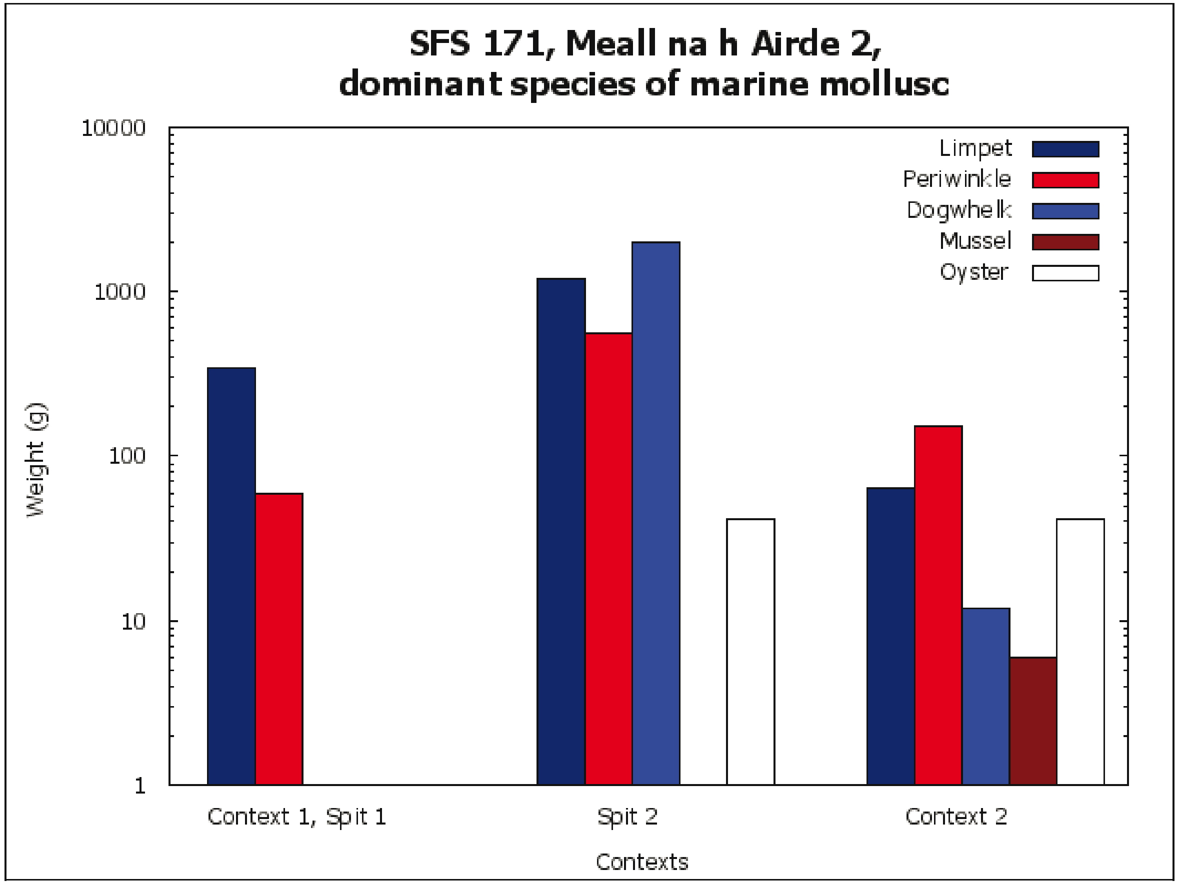
SFS 171 Taxon	Size category	Total
Saithe	extra large	1
	large	1
Haddock	large	1
	medium	10
Cod family	medium	6
Total		19

Table 83: SFS 171, Meall na h'Airde 2, size of QC1 elements by species
(see Appendix 27 for definitions of the York System size categories)

Marine molluscs: The main species in this midden were limpets, followed by dogwhelks and then periwinkle (see Tables 84 & 85, below; see Illustrations 227 & 228, both below). There were also a small number of oysters and topshells and there were some mussels. The limpets were very fragmented (less than 20% are whole; see Illustration 229, below) and about 50% of the dogwhelks were broken, but the periwinkles in general tended to be whole (70% and above). The size ratios of the limpets suggest that they were collected from the middle to lower shore zones. The dogwhelks were fairly elongate with small apertures and this is common on more sheltered shores. An elongate form also provides a defence against crabs which are more abundant on these shores. Skip Tables & Charts.

Table 84						
SFS 171 Test Pit 1	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	

Table 84: SFS 171, Meall na h'Airde 2, marine molluscs, weight in grams for individual species by context.

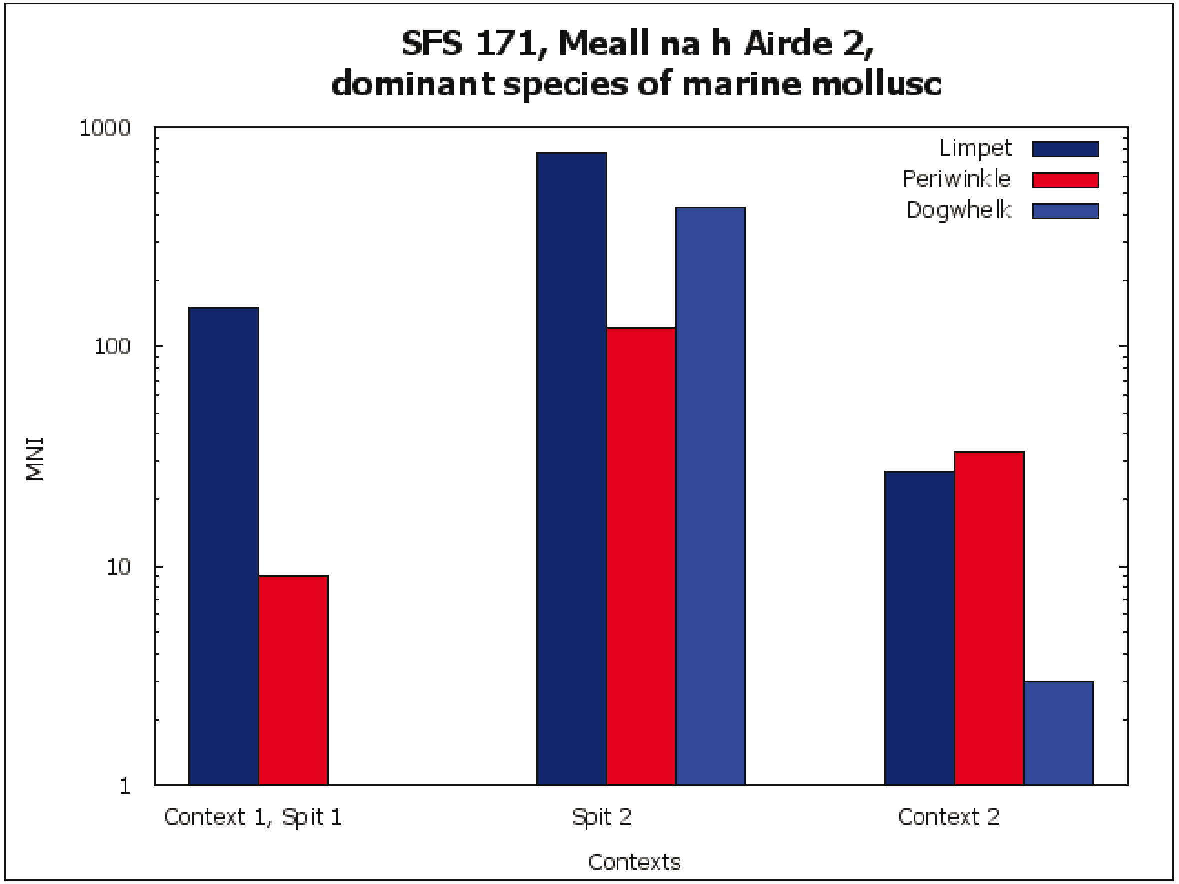


Illus 227: SFS 171, Meall na h'Airde 2, marine molluscs, weight in grams for individual species by context

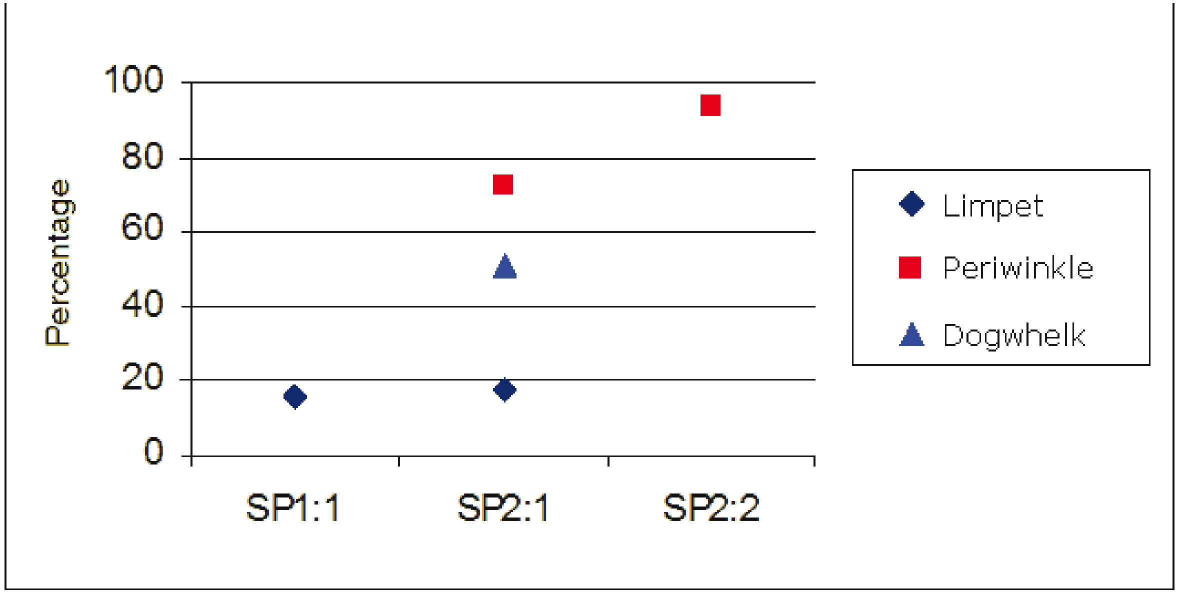
Table 85					
SFS 171	limpet	periwinkle	dogwhelk	oyster	topshell

Test Pit 1					
Spit 1	150	9			
Spit 2	765	123	434		3
Test Pit 2	27	33	3	2	

Table 85: SFS 171, Meall na h'Airde 2, MNI counts for marine molluscs.



Illus 228: SFS 171, Meall na h'Airde 2, marine molluscs, MNI for individual species by context



Illus 229: SFS 171, Meall na h'Airde 2, fragmentation of limpets, periwinkles and dogwhelks; though calculations were not made for every context because the sample sizes were too small

Charcoal: Charcoal from two contexts was considered for analysis (see Table 26, in Section 2.2.4, above). Though small in quantity, this is likely to have been derived from hearth deposits. It is possible that the occupants of Meall na h'Airde 2 were able to draw on a diverse vegetation for their fuel needs including both mixed woodland and open heathland with some Scots pine.

Discussion

The lithics suggest activity in prehistory and the pottery may tentatively be assigned to the Iron Age. The lack of identifiable mammal bone, other than the field vole cranial elements, together with the small fish bone assemblage, suggests that the site was only used for limited fishing and shell-fish collection. The large sizes of fish caught would be consistent with either a prehistoric or a historic date. The large fish sizes of the gadid species suggest that deep-water fishing was used.

2.2.46 SFS 96: Meallabhan, NGR NG 6848 4878

Illus 48: SFS 96, Meallabhan, the site lies on the shelf visible mid way down the dune in the left centre of the photograph

Type of Site: Eroding dune with occupation material
SFS Record: 2000
Survey Area: Mid Applecross
Size: Open
Aspect: West over sand dune
Height OD: 3m
Ground Cover: boulders
Distance to Sea: 10m to west, open sandy bay
Distance to Fresh Water: 20m to north
Threats: Erosion, human impact
Description: This site is eroding out of the dunes *c*50m to the east and slightly above SFS 71 (see Illustration 48, right). A scatter of shells, bones, pot-boilers, metalwork and occasional lithics denote an eroding lens of occupational material from a presumably buried site below the cliffs.

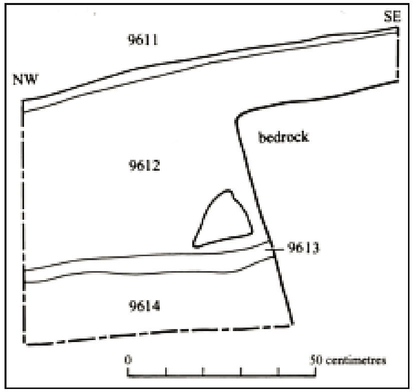
Archaeology

Illus 230: SFS 96, Meallabhan, Test Pit 1

Test Pit 1: (1m×0.5m) aligned north-west—south-east within the eroding occupational layer.

- Context 9611 Surface midden
- Context 9612 A deep and sterile light yellow sand, homogeneous and without finds
- Context 9613 An old ground surface (OGS) consisting of a mid brown silty sand
- Context 9614 A sterile clayey mustard-brown medium gravel

A knoll of bedrock restricted access to the lower levels of this trench (see Illustrations 230, left & 231, right).



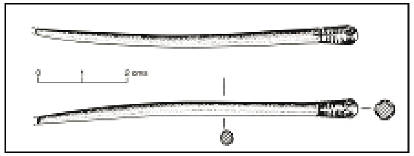
Illus 231: SFS 96, Meallabhan, Test Pit 1, south-west-facing section

Finds

Lithics: 24 lithics were recovered from the site at Meallabhan and with the exception of one piece of debitage from Test Pit 1, all came from the surface. Most are of chalcedonic silica, but there are also two pieces of baked mudstone and one piece of quartz. 50% of the assemblage is debitage, but there are seven regular flakes and four retouched pieces. There are no conventional modified tools, and all of the modified pieces have considerable edge damage, perhaps from use as strike-a-lights.

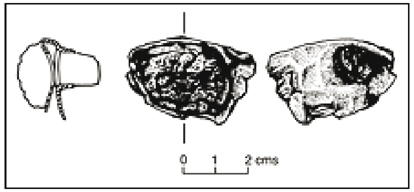
Coarse Stone: There is one small bevel-ended tool of coarse stone, similar to a limpet scoop.

Pottery: An assemblage of 92 sherds and fragments of coarse pottery was recovered from Meallabhan. This comprised a mix of body sherds, neck and rim pieces. The fabric was mainly sandy clay but some was fine and there was a mix of firing from soft to well fired pieces.

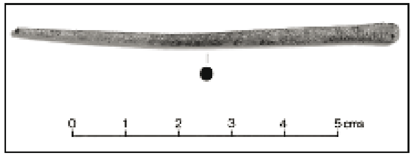


Illus 232: SFS 96, Meallabhan, metal pin (portrait)

Metalwork: A stick pin of copper-alloy with ring-and-dot decoration on the head which may once have been inlaid (see Illustrations 232, top left & 233, bottom left). In addition there were fragments of a copper vessel with an iron handle rivet (see Illustration 234, right). There were several fragments of iron objects: a thin strip or bar with a punched hole, a possible knife fragment, a circular button, four nail fragments and two undiagnostic flakes. A small amount of unclassified ironworking slag was also recovered. All of this material was picked up from the surface of the site.



Illus 234: SFS 96, Meallabhan, vessel fragment



Illus 233: SFS 96, Meallabhan, metal pin

Bone: Three red deer teeth, a juvenile cow calcaneum, three sheep/goat teeth, an unfused distal humerus epiphyses and metapodia, as well as a rabbit vertebra were present. All of the bone was found on the surface, or in the surface midden.

Shell: A range of shell was recovered from this site, all from context 1: 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).

Discussion

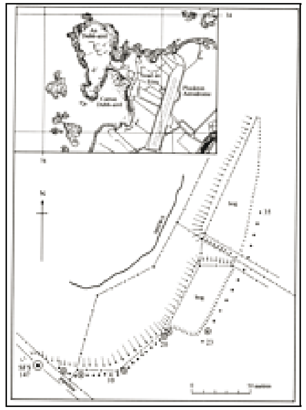
Meallabhan is an interesting site with a long history of activity, and considerable evidence of metal and metalworking. The lithics are not culturally diagnostic and it is possible that the later use of stone tools is represented. Some of the pottery may be medieval in date (Julie Franklin, pers comm), see for example, the form of a vessel of the Scottish White Gritty ware, 13th–14th century, from Kirkwall (MacAskill 1982, reproduced in McCarthy & Brooks 1988, 210, illus 114, no 525).

Much of the metal is likely to be post-medieval in date, particularly the iron work, though some pieces may be earlier. The stick pin is a Hiberno-Norse pin of 'undifferentiated' type (O'Rahilly 1998:27–8, Class 7), where the head is a continuous part of the shaft; the decoration is of her type A. There are close parallels from Garry Lochdrach, North Uist (Beveridge & Callander 1932:41; NMS GT 489) and from Norse levels at Jarlshof, Shetland, the latter being nearly identical (Curle 1936:263–4, illus 11.6; NMS HSA 853). Examples from Dublin date from *c*AD1100–1225 (Curle 1936, 28, 33). The vessel fragment comes from a copper-alloy vessel, probably a small bowl or dish with iron suspension handles. The alloy composition (with its zinc content) indicates a Roman or later date, and such vessels are known from the Early Historic and medieval periods (for example Hunter 1994, 57–62).

2.2.47 SFS 183: Nead An Eoin, Plockton, NGR NG 7890 3310

Illus 235: SFS 183, Nead an Eoin, Plockton, general view of shovel pits

Type of Site: Open-air lithic scatter site
SFS Record: 2002
Survey Area: Loch Carron
Size: Unknown
Aspect: Open
Height OD: 10m
Ground Cover: Grass
Distance to Sea: 30m
Distance to Fresh Water: 100m to north
Threats: Agriculture, ploughing
Description: This is a small, sheltered, raised beach with a westward aspect (see Illustration 235, left). It is close to the site of Cnoc na Celpeirein (SFS 147) from which 37 lithics were collected earlier in the survey
Archaeology: A single transect of 35 shovel pits was laid around the bay, just behind the crest of the beach (see Illustration 236, right). The first 22 pits were at 5m intervals while the remaining 13 pits were at 10m intervals. The sampled area had been heavily cultivated, probably in recent times so that the plough soil was deep (190–380mm) and finds were limited



Illus 236: SFS 183, Nead an Eoin, Plockton, plan of shovel pits

Finds

Lithics: Hits were recorded in two distinct groups: Pits 2, 5 and 12 close to SFS 147; and Pits 21, 22 and 24 located 115m to its north-east. In all there were 11 finds: Five of bloodstone, three of chalcedonic silica and three of quartz. Seven pieces were debitage (including all but one of the bloodstone), and there were four regular flakes. Two regular flakes and three pieces of debitage were located in the first group and two regular flakes and four pieces of debitage in the second.

Discussion

The finds suggest low level prehistoric activity but no precise date.

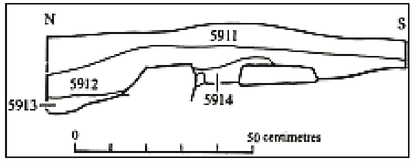
2.2.48 SFS 59: Ob Chuaig, NGR NG 7066 5972

Type of Site: Cave
SFS Record: 2000
Survey Area: North Applecross
Size: 10m deep×10m wide×4m high
Aspect: West sloping to shore

Height OD: 2–3m
Ground Cover: Grass and nettles
Distance to Sea: 100m to north
Distance to Fresh Water: Unknown
Threats: Sheep (used as sheep shelter)
Description. A large and airy cave, inaccessible except at low tide and only a couple of meters above high water mark (see Illustration 237, right). This cave is presently used as an occasional sheep shelter and a few limpets are spread around on the surface
Archaeology: One test pit was excavated

Illus 237: SFS 59, Ob Chuaig, general view of site from east

Test Pit 1: (1m×0.5m) this trench was aligned north—south in the southern part of the cave (see Illustration 238, left).



Illus 238: SFS 59, Ob Chuaig, Test Pit 1, west-facing section

- Context 5911 Very hard sheep droppings
- Context 5912 Natural lenses of sand and a type of flowstone
- Context 5913 Shells and a few bones within a granular matrix of flowstone type material. This coats the walls of the cave and flakes off onto the floor
- Context 5914 A very hard natural iron and manganese concretion
- Context 5915 Bedrock, partially uncovered

Finds

There were no artefacts

Bone: A single shrew jaw.

Shell: There was very little shell from this site: limpet (148g), periwinkle (29g) and residue (9g).

Discussion

The deposits suggest that occupation at this site is unlikely, the shells and bones appear to be natural. There was no charcoal or signs of a hearth: this site is remote and easily bypassed by coastal travellers.

2.2.49 SFS 50: Pabay 1, NGR NG 6771 2657

Type of Site: Open-air midden and lithic scatter
SFS Record: 1999
Survey Area: Islands (Pabay)
Size: 100mm thick×16m long, 350mm below present surface
Aspect: South-east level
Height OD: 8m
Ground Cover: Dense bracken and bushes
Distance to Sea: 10m to south-east
Distance to Fresh Water: 400m to west

Threats: Erosion, rabbit burrows
Description: A lithic scatter eroding out of a cliff edge and lying adjacent to a large shell midden on the north-facing coast of the small island of Pabay (see Illustration 239, right). Lithics and fire-cracked stone lay in and close to a black occupation layer
Archaeology: Surface collection

Illus 239: SFS 50, Pabay 1, the site is in the area of erosion in the centre of the picture

Finds

Lithics: There were 14 lithic finds from the shell midden at Pabay 1. Interestingly, there is no baked mudstone, though there was a regular flake of Rùm bloodstone, together with four pieces of quartz and nine of chalcedonic silica. Half of the assemblage is debitage, and there are six regular flakes as well as a rough edge retouched piece of chalcedonic silica.

Discussion

The lithics, and lack of more recent material, suggest that the site is prehistoric.

2.2.50 SFS 94: Port Earlish, NGR NG 5206 6260

Type of Site: Open-air lithic scatter site.
SFS Record: 2000
Survey Area: Trotternish
Size: Unknown
Aspect: North-east
Height OD: 50m
Ground Cover: Dense bracken and bushes
Distance to Sea: 10m to south-east, rock and shingle
Distance to Fresh Water: 5m to north-east
Threats: Erosion (at side of burn), ploughing and enclosed grazing
Description: A lithic scatter was found eroding out of the side of a burn (see Illustration 240, right)
Archaeology: Surface collection

Illus 240: SFS 94, Port Earlish, general view

Finds

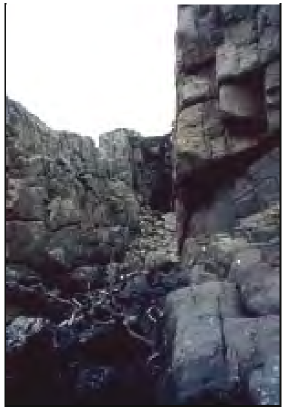
Lithics: There were six lithic finds, all of chalcedonic silica with the exception of one piece of baked mudstone. Most of the assemblage is debitage but there is one regular flake and a single blade.

Discussion

The lithics indicate activity in prehistory, but it is not possible to date a small assemblage like this in more detail.

2.2.51 SFS 141: R1/25, NGR NG 5577 4675

Type of Site: Rockshelter with midden
SFS Record: 2001
Survey Area: Islands (Raasay)
Size: 15m deep×4m wide×3m high
Aspect: South
Height OD: 8–10m
Ground Cover: Grass



Illus 241: SFS 141, view of site entrance

Illus 242: SFS 141, close-up view of site

Distance to Sea: 25m to south, rocky
Distance to Fresh Water: 150m to south
Threats: Stable, possible threat from animals
Description: A rockshelter with surface limpet and winkle midden (see Illustrations 241, left & 242, right)
Archaeology: Surface collection

Finds

Lithics: There were two regular flakes of chalcedonic silica from the surface at this site.

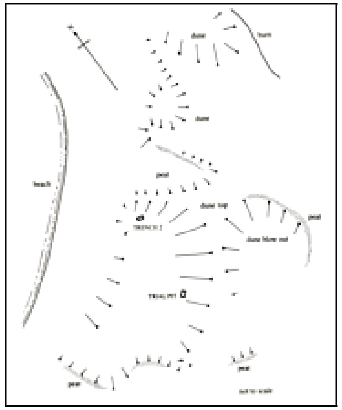
Shell: Limpet and periwinkle were recorded.

Discussion

The lithics and midden indicate past human activity, though it is not possible to date it.

2.2.52 SFS 9: Redpoint, NGR NG 7275 6855

Type of Site: Eroding dune with lithic scatter
SFS Record: Gray 1960
Survey Area: Torridan
Size: Unknown
Aspect: North-west, north-east, south
Height OD: 20–40m
Ground Cover: Clumps of heather, juniper, grass, moss, sand
Distance to Sea: 50–60m to north, open sandy beach
Distance to Fresh Water: 30–100m to north
Threats: Eroding sand dunes, wind, grazing, human impact
Description: Redpoint is a site that has long been known to archaeologists interested in the early prehistory of the western Highlands (Gray 1960). It comprises an area of unstable dunes with lithic material visible in the blowouts (see Illustrations 243, below left; 244, below middle & 245, right). In addition there are two nearby cave sites: SFS 115, Redpoint Headland 1; and SFS 176, Redpoint Headland 2, both sites have visible midden, though no lithics were found
Archaeology: Two test pits were dug in the main dune blow out, but there was no depth to the archaeological deposits (Illustration 246, below right)

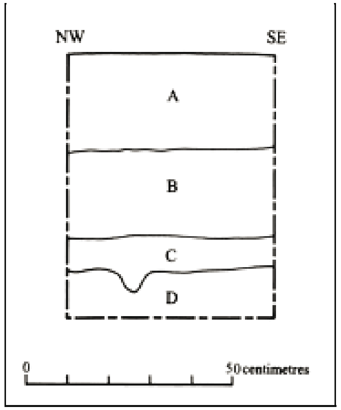


Illus 245: SFS 9, Redpoint, Sketch plan of dunes

Test Pit 1: (1m×0.5m) aligned north-east—south-west, below the steep eroding scarp (Illustration 247, lower right).

- Context 911 Light brown iron mottled medium sand
- Context 912 Mid-brown medium sand with iron staining and vertical yellowish mottling

Context 913 Orange-grey wet sand, clay and gravel
- Context 914 Bright orange brown coarse sand and gravel below thick iron pan



Illus 247: SFS 9, Redpoint, general view of test pit location in sand dunes

This test pit produced a natural sand stratigraphy over a layer of glacial gravels and reached a depth of 0.65m. There was no archaeological content except surface finds.

Test Pit 2: (1m×0.5m) aligned east—west.

- Context 921 Laminated medium sands, light grey brown with yellowish streaks
- Context 922 Grey natural sand and gravel. Iron stained and mottled

Interpretation: This second test pit also showed a natural sand stratigraphy overlying glacially derived gravels up to a depth of 0.78m. No archaeological content except surface finds.

Illus 243: SFS 9, Redpoint, general view of site and surrounding area

Illus 244: SFS 9, Redpoint, close-up view of sand dunes

Illus 246: SFS 9, Redpoint, general view of test pit location in sand dunes

Finds

Lithics: Redpoint is actively eroding and has been frequently visited by Steven Birch of the SFS team. Many bags of flaked lithics have been collected. A total of 847 lithics has been catalogued from this collection (see Table 86, below), but as the dune continues to erode every year, further material is collected at each visit and it was not possible to catalogue all of the material collected in the period to 2004 when fieldwork stopped. In the 1980s, however, 1356 lithics from Redpoint held in the National Museums of Scotland collection were catalogued by Ann Clarke (Clarke & Griffiths 1990) and their figures have been added to the table in brackets.

Table 86

SFS 9 Redpoint	Baked Mudstone	Bloodstone	Chalcedonic silica	Chert	Quartz	Total (*grand total*)
Core	(2)				1bip (14)	1 (*17*)
Debitage	11 (192)	23 (36)	21 (34)		592 (1055)	647 (*1964*)

Blades	(1)		1		13 (14)	14 (*29*)
Regular Flakes	19	11	2	4	145	181 (*181*)
Crescent			1			1 (*1*)
Fine point			2			2 (*2*)
Obliquely blunted			1			1 (*1*)
Retouched	(2)	(1)	(1)		(4)	(*8*)
Totals	30 (197)	34 (37)	28 (35)	4	751 (1087)	847 (*2203*)
Overall total	*227*	*71*	*63*	*4*	*1828*	*2203*

Table 86: lithic assemblage from SFS 9, Redpoint
(x) assemblage recorded by Ann Clarke; (*italics*) – grand total

Discussion

Overall, the lithic assemblage from Redpoint indicates activity in prehistory, including the Mesolithic. Interestingly, the range of raw materials used is well in line with other Mesolithic sites recorded by SFS in the Inner Sound and sea loch areas and this may add weight to putative arguments for a 'sphere of influence' perhaps even a territory that stretches as far as Staffin Bay in the north and the island of Rùm in the south. The lack of organic remains on this site is noteworthy.

2.2.53 SFS 58: Rubha Chuaig, NGR NG 6992 5839

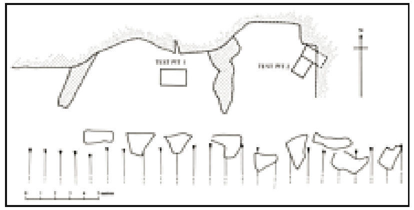
Illus 46: SFS 58, Rubha Chuaig, general view of site

Illus 248: SFS 58, Rubha Chuaig, close-up view of rockshelter

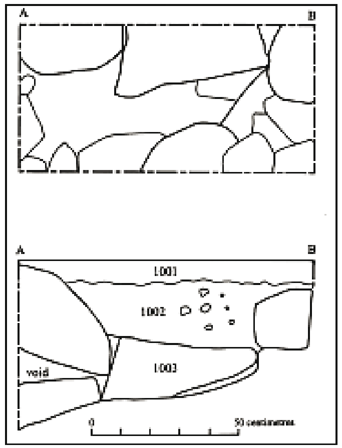
Type of Site: Rockshelter with midden
SFS Record: 2000
Survey Area: North Applecross
Size: 10m deep×2.5m wide×2m high
Aspect: South-west slope down to sea
Height OD: 4m
Ground Cover: Nettles and bracken
Distance to Sea: 25m to south-west rocky open bay
Distance to Fresh Water: 500m to south
Threats: Stable
Description : This site is situated at the head of Chuaig Bay (see Illustration 46, top left & 248, mid left). A large accumulation of talus slopes steeply to the shoreline. Vestigial traces of midden were identified to the rear of the shelter which is approximately 10m long with an oblique recess further back that is about 3m wide
Archaeology: Two test pits were excavated (see Illustration 249, lower left & 250, top right)

Test Pit 1: (1m×0.50m) was positioned over a flat area in the centre of the shelter where limpet shells and two sherds of pottery were visible (see Illustration 251, mid right). Two contexts were identified:

- Context 1001 Upper midden comprising loose friable soil with periwinkle and limpet present to a depth of 0.10m
- Context 1002 Lower midden which attained a maximum depth of 0.30m



Illus 250: SFS 58, Rubha Chuaig, plan of cave



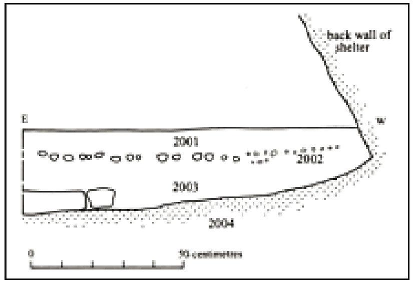
Illus 249: SFS 58, Rubha Chuaig, rockshelter excavation in progress

Towards the base of the midden angular boulders were intermixed with well-preserved limpet shell and animal bone.

Test Pit 2: (initially 1m×0.5m eventually extended by 0.5m to avoid a large boulder that impeded access below a depth of 0.15m) was located at the eastern end of the shelter where limpet shells were exposed (see Illustration 252, right).

- Context 2001 The surface layer of humic silt with bracken roots
- Context 2002 A midden which attained a maximum depth of 0.16m
- Context 2003 The basal layer of the midden which contained an assortment of shell and animal bone
- Context 2004/2005 Natural sandstone

Illus 251: SFS 58, Rubha Chuaig, plan and Test Pit 1, south-facing section



Illus 252: SFS 58, Rubha Chuaig, Test Pit 2, north-facing section

Finds

Lithics: There were only two lithic finds, one from each test pit. There was a piece of debitage of chalcedonic silica, and a fragment of sandstone with marked use-wear, suggesting that it had been used as an awl.

Bone tools: Three bone tools were found here, all in Test Pit 1. A long piece of bone with a rounded end (BT138) was found in Spit 1, a long piece of bone with a stubbed end (BT137) was found in Spit 4 and a fine point (BT136) was found in Spit 18 (see Illustration 89, above).

Pottery: There were seven sherds of coarse pottery, five of which, all from Test Pit 1, came from one vessel.

Metalwork: There were two nail fragments and an undiagnostic piece of iron.

Bone: A charred otter second toe was recovered from the midden; the modification suggests that it may be anthropogenic in origin.

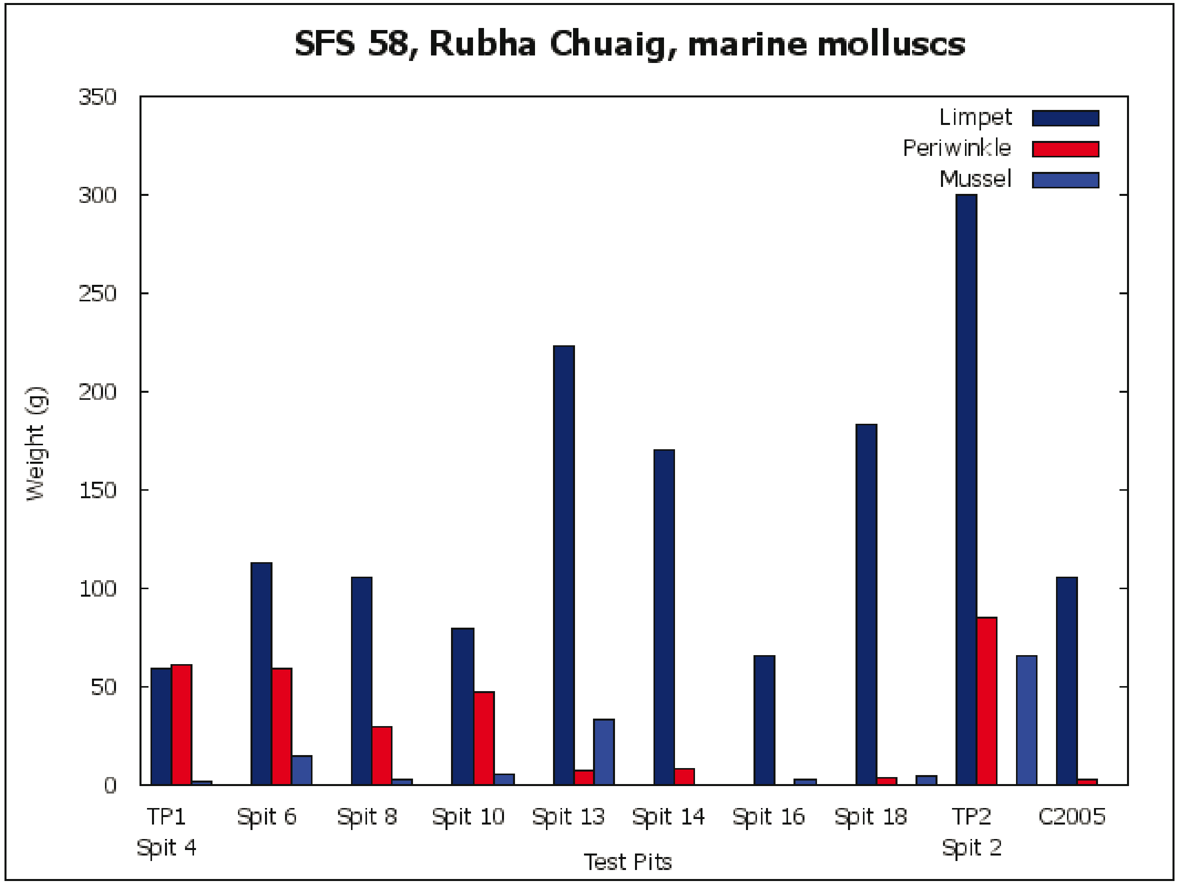
Shell: Limpet, periwinkle and mussel occurred in Test Pit 1 with limpet predominating, and small numbers of other species in some contexts (see Table 87, below; Illustration 253, below). There appears to be some difference in midden composition between contexts 10 and 13. Test Pit 2 is very similar with limpet predominating, some periwinkle, mussel and very small quantities of dogwhelk, flat periwinkle and razor shell.

Table 87

SFS 58 Rubha Chuaig	limpet	periwinkle	mussel	oyster	razor shell	topshell	residue
Test Pit 1							
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
Test Pit 2							
Spit 2	300	85	5				485
C2005	106	3	66		<1		71

Table 87: SFS 58, Rubha Chuaig, marine molluscs, weight in grams for individual species by context



Illus 253: SFS 58, Rubha Chuaig, marine molluscs, weight in grams for individual species by context

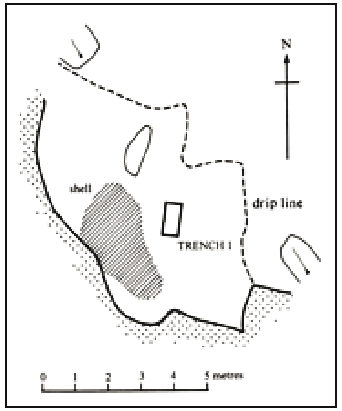
Discussion

The finds from this site are sparse and indicate a low level of human activity. The coarse pottery and metalwork suggest that this took place in historic times.

2.2.54 SFS 57: Rubha A Ghair, NGR NG 7230 6121

Illus 254: SFS 57, Rubha a Ghair, general view of rockshelter entrance

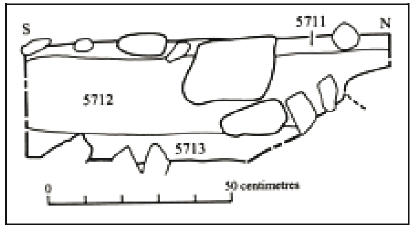
Type of Site: Rockshelter with midden
SFS Record: 2000
Survey Area: North Applecross
Size: 10m deep×5m wide×2m high
Aspect: North-east slope to sea
Height OD: 5–6m
Ground Cover: Grass, nettles and bracken
Distance to Sea: 20m to north-east, rocky
Distance to Fresh Water: Unknown
Threats: Stable
Description: This low, damp rock-shelter faces roughly north across Loch Torridon towards Craig and Redpoint (see Illustration 254, left). It lies in the eastern end of an old sea cliff that trails westwards down to the water. There is a very small deposit of midden at the rear of the cave, but no walls or other occupation traces are apparent
Archaeology: Only one test pit was excavated because the midden is relatively inaccessible (see Illustration 255, upper right)



Illus 255: SFS 57, Rubha a Ghair, plan of cave

Test Pit 1: (1m×0.5m) aligned north—south in the nearest accessible point to the midden (see Illustration 256, right).

- Context 5711 Grass and thin topsoil
- Context 5712 A firmer black peat with many charcoal fragments
- Context 5713 Firmly packed angular stones in a gritty sand matrix, almost certainly natural



Illus 256: SFS 57, Rubha a Ghair, Test Pit 1, east-facing section

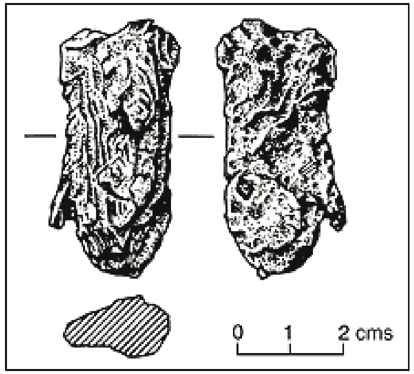
Lithics were found in both the upper layers (contexts 5711 & 5712) with sandstone lumps and flakes from the roof. This trench was only 0.3m deep in total.

Finds

Lithics: There were 13 pieces from Rubha a Ghair, and interestingly no baked mudstone. There are six pieces of quartz and six of chalcedonic silica, and a debitage flake of Rùm bloodstone. Seven pieces are debitage, and the rest are regular flakes.

Coarse Stone: The finds also included a single bevelled pebble (ST15), a type of tool which has been linked with Mesolithic sites elsewhere.

Iron: The tip fragment of a knife with remains of an organic scabbard (?leather) was recovered from Test Pit 1. It has a convex curving back with a concave upturned tip. The blade has been repeatedly re-sharpened to give it a concave profile (see Illustration 257, right).



Illus 257: SFS 57, Rubha a Ghair, knife fragment

Discussion

The lithics are undiagnostic, the coarse stone tool may be Mesolithic, and the knife is of Early Historic or medieval date.

2.2.55 SFS 44: Rubha'an Droma Bhain, Scalpay, NGR NG 6218 2742

Type of Site: Findspot
SFS Record: 1999
Survey Area: Islands (Scalpay)
Size: Unknown
Aspect: South, steep front edge of raised beach
Height OD: 6–8m
Ground Cover: Grass
Distance to Sea: 50m to south-west—south-east, boulders
Distance to Fresh Water: 500m to east
Threats: Edge of raised beach eroding and collapsing, animal and wind erosion
Description: Lithics were found eroding out of the steep front edge of a raised beach
Archaeology: Surface collection

Finds

Lithics: There were three lithic finds, all from the surface. They comprise two regular flakes of chalcedonic silica and a piece of baked mudstone debitage.

Discussion

The finds suggest human activity, probably in prehistory, though they are few in number and undiagnostic.

2.2.56 SFS 11: Sand 3, NGR NG 6840 4878

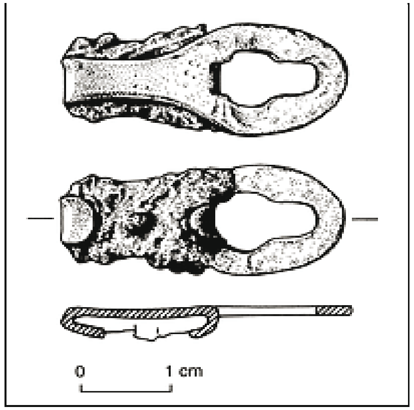
Type of Site: Findspot in eroding dune
SFS Record: 1999
Survey Area: Mid Applecross
Size: 6m deep×6m wide×2m high
Aspect: Open, slope to sea
Height OD: 85m
Ground Cover: Nettles, bracken, heather
Distance to Sea: 500m to south-west open, rocky
Distance to Fresh Water: 10m to north-west
Threats: Grazing, eroding
Description: Open sand dune
Archaeology: Surface collection

Finds

Metal: A strap buckle of copper-alloy made by winding and hammering together a strip of sheet metal. The two ends have been joined at the pivot bar by 'key holing' one end into an aperture in the other and it is at this point that the buckle has broken. The pivot bar has iron staining from the pin. Decorated with v-shaped indentations at 90 intervals, similar decoration occurs on other brooches and buckles from Scotland (see Illustration 258, right).

Discussion

The strap buckle is dated to the late medieval period.



Illus 258: SFS 11, Sand 3, buckle

Illus 259: SFS 71, Sand 5, general view of rockshelter from north-east

2.2.57 SFS 71: Sand 5, NGR NG 6833 4873

Type of Site: Rockshelter
SFS Record: 2000
Survey Area: Mid Applecross
Size: 10m wide×5m deep×2.5m high
Aspect: North-west slope down to sandy beach
Height OD: 6–7m
Ground Cover: Grass and bracken
Distance to Sea: 15m to north-west, sandy beach
Distance to Fresh Water: 200m to north
Threats: Stable, human impact
Description: This is a moderately-sized rockshelter alongside the beach at Sand and close to the dune sites (SFS 96, Meallabhan and SFS 11, Sand 3; see Illustration 259, right). It has good views of the main Sand site as well as of Raasay, but is exposed to the north and north-west. The site is currently used for barbecues and beach activities and no archaeological remains are visible
Archaeology: One test pit was excavated

Test Pit 1: (1m×0.5m) aligned north-east—south-west in the central part of the interior of the rockshelter.

- Context 7111 Surface vegetation of grass and herbs giving way to layer of modern fairly clean sand containing bottle glass
- Context 7112 A series of thin occupation lenses containing degraded charcoal, pot-boilers and greasy lenses
- Context 7113 A thick layer of intense occupation remains, a black, greasy silty sand with lots of pot-boilers and charcoal in poor condition. In places this merged with the overlying layer, Context 7112
- Context 7114 Fractured bedrock, at a depth of 0.8m

No bone or pottery was recovered. Both 7112 and 7113 were sampled.

Finds

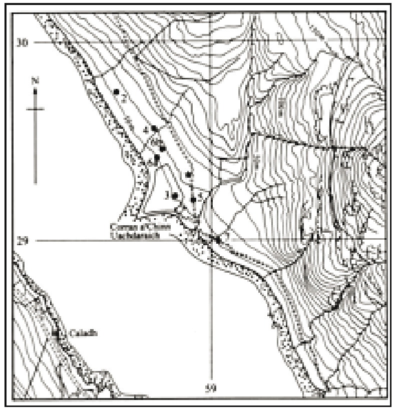
Lithics: A chunk of debitage of chalcedonic silica was recovered from Test Pit 1 at this site.

Discussion

Finds from this site are almost non-existent. Although it has obviously been used in the past, transient and possibly relatively recent activity would seem to be represented, perhaps not unlike the barbecues that take place here today.

2.2.58 FS 012: SCALPAY 2, NGR NG 5853 2974

Type of Site: Open-air lithic scatter site (see Illustration 260, left)
SFS Record: 2000
Survey Area: Islands (Scalpay)
Size: Unknown
Aspect: South-west in steep front edge of raised beach
Height OD: 12m
Ground Cover: Grass, bracken
Distance to Sea: 100m to south-west, reef and shingle
Distance to Fresh Water: 10m to north-west
Threats: Animal and water, eroding
Description: A surface scatter collected from washed-out animal track in area of lazy beds (see Illustration 261, right)
Archaeology: Surface collection



Illus 260: SFS 12, Scalpay, map of the lithic scatter sites

Illus 261: SFS 12, Scalpay 2, general view of the site

Finds

Lithics: There were 56 flaked lithics from Scalpay 2 (see Tables 88 & 89 in Section 2.2.65, below), over half were of quartz and quartzite, and the rest were of chalcedonic silica and Rùm bloodstone. Thirty nine pieces were debitage flakes and the rest were regular flakes.

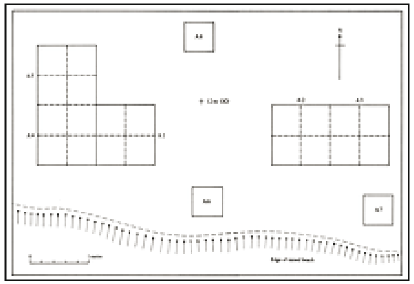
Discussion

The lithics are a clear indication of past human activity here, but they do not offer any precise indication as to date. It is likely that activity in earlier prehistory is represented.

2.2.59 SFS 33: Scalpay 3, NGR NG 5883 2920

Illus 262: SFS 33, Scalpay 3, general view from the south-west

Type of Site: Open-air lithic scatter site
SFS Record: 2000
Survey Area: Islands (Scalpay)
Size: Unknown
Aspect: South-west level
Height OD: 10–12m
Ground Cover: Grass, rushes
Distance to Sea: 120m to south-west, shingle beach
Distance to Fresh Water: 160m to south-east
Threats: Eroding, slope failure, animals
Description: Situated on distinct raised beach platform (see Illustrations 262, top left & 263, bottom left).
Archaeology: Surface collection from washed-out animal tracks and eroding ground surface on raised beach. Test pits: five 1m test pits and three 0.25m test pits were excavated down to the natural beach surface (see Illustration 264, right). The depth of the pits varied between 0.1m and 0.3m, due to the deflated and eroded ground surface. The test pits all had similar contexts:



Illus 264: SFS 33, Scalpay 3, test pit layout

Illus 263: SFS 33, Scalpay 3, general view of site location

- Context 1 Surface vegetation and associated dark, peaty soil, with small to medium angular and rounded stones
- Context 2 A compact surface of angular and rounded stones constituting the old raised beach platform surface. Possibly derived from alluvial deposits from nearby stream

Finds

Lithics: There were 152 lithics from Scalpay 3. Over half were of quartz and quartzite, most of the rest were of chalcedonic silica, and there were 10 pieces of Rùm bloodstone and one piece of volcanic glass. Most of the assemblage was debitage (see Tables 88 & 89 in Section 2.2.65, below), but there were 34 regular flakes, two blades and six retouched pieces (three scrapers, two broken pieces and a piece with miscellaneous microlithic retouch).

Discussion

The lithics indicate activity in the earlier part of prehistory, though it is not possible to tie them in to a specific period. There is broad evidence for both the manufacture of tools, using mainly local materials, and for tool use.

2.2.60 SFS 56: Scalpay 4, NGR NG 5872 2956

Type of Site: Open-air lithic scatter site
SFS Record: 2000
Survey Area: Islands (Scalpay)
Size: Unknown
Aspect: South-west, level
Height OD: 12m
Ground Cover: Heather, grass and moss
Distance to Sea: 100m to south-west, shingle beach
Distance to Fresh Water: 5-19m to south-east
Threats: Eroding, animals
Description: Surface scatter collected from washed-out animal track, on flank of raised beach platform to north-west of small stream
Archaeology: Surface collection

Finds

Lithics: There were 26 lithics from Scalpay 4 (see Tables 88 & 89 in Section 2.2.65, below). Most were of quartz and quartzite and there were five pieces of chalcedonic silica and one piece of Rùm bloodstone. Half of the pieces were debitage, and there were 11 regular flakes and one bifacially retouched flake of indeterminate type.

Discussion

The lithics indicate activity in prehistory.

2.2.61 SFS 118: Scalpay 5, NGR NG 5891 2915

Type of Site: Open-air lithic scatter site
SFS Record: 2003
Survey Area: Islands (Scalpay)
Size: Unknown
Aspect: South-west with gentle slope
Height OD: 12m
Ground Cover: Heather, grass and moss
Distance to Sea: 100m to south-west, shingle beach
Distance to Fresh Water: 5–19m to south-east
Threats: Eroding, animals
Description: Surface scatter collected from eroding vehicle access track, passing over a double raised beach feature
Archaeology : Surface collection

Finds

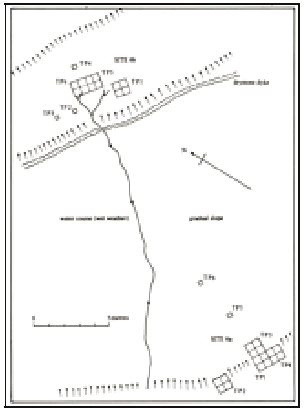
Lithics: Scalpay 5 yielded 202 lithics (see Tables 88 & 89 in Section 2.2.65, below). 148 pieces were of quartz and quartzite, 36 of chalcedonic silica and 18 of Rùm bloodstone. Most of the assemblage (156 pieces) was debitage, but there was one bipolar core, 41 regular flakes, three blades and a broken retouched piece.

Discussion

It is not possible to tie the lithics to a specific period but they are clearly representative of human activity in prehistory.

2.2.62 SFS 198: Scalpay 6a, NGR NG 5874 2939

Type of Site: Open-air lithic scatter site
SFS Record: 2003
Survey Area: Islands (Scalpay)
Size: Unknown
Aspect: South-west with gentle slope to sea
Height OD: 8–10m
Ground Cover: Grass, rushes and heather
Distance to Sea: 100m to south-west, shingle beach
Threats: Erosion by animal movement
Description: Situated at base of sloping ground with lazy-beds, a surface collection was initially made from ground disturbed by livestock and an eroding animal track
Archaeology: Six 1m² test pits were excavated down to the natural beach deposits, which had been washed down-slope (see Illustration 265, right). The maximum depth of test pits was 0.35m and lithics were recovered throughout the stratum



Illus 265: SFS 198, Scalpay 6a, test pit layout

Test Pits 1, 2, and 4

- Context 1 Shallow top soil, light brown, quite friable containing pea gravel to 0.12m
- Context 2 Mixed dark brown soil and gravel averaging 0.13m deep, with angular small to medium stones
- Context 3 Thin (0.01m) layer of iron pan immediately overlying compacted angular gravels, with some rounded beach pebbles

Test Pit 3

- Context 1 Shallow light brown topsoil with small pea gravel mix to maximum depth 0.08m
- Context 2 Mixed soils and gravel average 0.12m deep, gravel is small to medium and angular
- Context 3 Layer of iron pan 0.01m thick, immediately overlying compacted angular gravels, with some rounded beach pebbles

Test Pits 5 and 6

- Context 1 Homogeneous layer of dark, wet peaty soil, containing small to medium angular gravel. Average depth: 0.4m
- Context 2 Lightly compacted layer of small to medium angular gravel
- Context 3 Compact layer of small to medium angular gravel containing a few rounded pebbles

Finds

Lithics: There were 659 lithics recovered from Scalpay 6a. Most were of quartz and quartzite and chalcedonic silica (see Tables 88 & 89 in Section 2.2.65, below), but there were 16 pieces of Rùm bloodstone, three pieces of baked mudstone, two pieces of volcanic glass and one fragment of flaked coarse stone. Over 500 pieces were debitage, but there were 87 regular flakes as well as 27 blades, one platform core and ten retouched pieces. The latter included five narrow-blade microliths as well as a scraper, an edge-retouched piece, an awl and two bifacial pieces.

Discussion

The lithics provide abundant evidence for human activity and the presence of microliths and blades suggests that this site is Mesolithic. Predominantly local raw materials were used and it would seem that both tool manufacture and tool use are represented.

2.2.63 SFS 195: Scalpay 6b, NGR NG 5877 2943

Type of Site: Open-air lithic scatter site
SFS Record: 2003
Survey Area: Islands (Scalpay)
Size: Unknown
Aspect: South-west with gentle slope to sea
Height OD: 17m
Ground Cover: Grass, heather and moss
Distance to Sea: 110m
Threats: Animal action, water action
Description: Situated upslope from Scalpay 6a, to north of drystone dyke on a higher raised beach platform. Wet, eroding surface through animal ponding and run-off, produced the initial surface collection of lithics
Archaeology: Three 1m² test pits and three 0.25m² test pits were excavated to the natural beach terrace. The maximum depth of the pits was 0.13m. There was evidence of lazy bed cultivation rigs overlying site

Test Pits 1, 5, and 6

- Context 1 Fibrous, dark, peaty soil averaging between 0.08–0.12m deep
- Context 2 Thin mineralised light brown soil, containing small to medium angular and rounded gravels. Maximum depth: 0.01m
- Context 3 Compact former raised beach ground surface comprising angular and rounded gravels

Test Pits 2 and 3

- Context 1 Fibrous, dark, peaty soil averaging between 0.1–0.15m deep
- Context 2 Thin mineralised light brown soil, containing small to medium angular and rounded gravels. Maximum depth: 0.01m
- Context 3 Compact former raised beach ground surface comprising angular and rounded gravels

Test Pit 4

- Context 1 Fibrous, dark, wet, peaty soil averaging 0.2m deep maximum
- Context 2 Thin mineralised light brown soil, containing small to medium angular and rounded gravels. Maximum depth: 0.01m
- Context 3 Compact former raised beach ground surface comprising angular and rounded gravels

Finds

Lithics: There were 1578 lithics from Scalpay 6b (see Tables 88 & 89 in Section 2.2.65, below). Most of the material comprised local quartz and quartzite, but there were also 55 pieces of chalcedonic silica and three of Rùm bloodstone. Most of the assemblage was debitage but there were 188 regular flakes and two blades, as well as two bipolar cores and a single retouched piece: a microburin.

Discussion

The lithics indicate human activity in early prehistory, mainly flint-knapping, but it is impossible to tie them down to a specific period.

2.2.64 SFS 196: Scalpay 7, NGR NG 5905 2896

Type of Site: Open-air lithic scatter site
SFS Record: 2003
Survey Area: Islands (Scalpay)
Size: Unknown
Aspect: South-west undulating ground
Height OD: 10m
Ground Cover: Bracken, heather and grass
Distance to Sea: 60m to south-west
Distance to Fresh Water: 1m to north-west
Threats: Erosion from surface of vehicle access track
Description: Surface scatter collected from washed-out vehicle access track, located immediately above small stream
Archaeology: Surface collection

Finds

Lithics: There were 30 lithics from Scalpay 7 (see Tables 88 & 89 in Section 2.2.65, below). Most were of quartz and quartzite, but there were six pieces of chalcedonic silica and two of Rùm bloodstone. Scalpay 7 differed from the other Scalpay sites in that most of the assemblage comprised regular flakes (22 pieces), with only seven pieces of debitage and one retouched piece: a narrow blade microlith (a fine point).

Discussion

The lithics provide clear evidence of human activity which may be of Mesolithic date, though dating on the basis of one artefact is weak.

2.2.65 SFS 197: Scalpay 8, NGR 5890 2934

Type of Site: Findspot
SFS Record: 2003
Survey Area: Islands (Scalpay)
Size: Unknown
Aspect: South-west with gentle slope
Height OD: 10m
Ground Cover: Bracken, heather and grass
Distance to Sea: 220m to west
Distance to Fresh Water: 160m to south-east
Threats: Stable
Description: Two isolated finds
Archaeology: Transect of ten shovel pits aligned north-west—south-east

Finds

Lithics: There were two lithics, a platform core of Rùm bloodstone and a scalene triangle of chalcedonic silica (see Tables 88 & 89, below).

To access a printable version of this table, please go to the separate page table088.html and set to LANDSCAPE mode.

Table 88

Site	Cores	Debitage	Regular Flakes	Blades	Microliths	Other Retouched	Total
Scalpay 2		39	17				56
Scalpay 3		110	34	2	1 (microlithic retouch)	3 (scrapers) 2 (broken)	152
Scalpay 4		14	11			1 (bifacial indet)	26
Scalpay 5	1 (bipolar)	156	41	3		1 (broken)	202
Scalpay 6a	1 (platform)	534	87	27	3 (crescents) 1 (scalene tri) 1 (microlithic ret)	1 (scraper) 1 (edge ret) 1 (awl) 2 (bifacial indet)	659
Scalpay 6b	2 (bipolar)	1385	188	2	1 (microburin)		1578
Scalpay 7		7	22		1 (fine point)		30
Scalpay 8	1 (platform)				1 (scalene tri)		2

Table 88: the Scalpay sites, lithic content

To access a printable version of this table, please go to the separate page table089.html and set to LANDSCAPE mode.

Table 89						
Site	Baked Mudstone	Chalcedonic Silica	Rùm Bloodstone	Quartz and Quartzite	Other	Total
Scalpay 2		16	11	29		56
Scalpay 3		59	10	82	1 (volcanic)	152
Scalpay 4		5	1	20		26
Scalpay 5		36	18	148		202
Scalpay 6a	3	314	16	323	2 (volcanic) 1 (coarse stone) 1 (pumice)	660
Scalpay 6b		55	3	1520		1578
Scalpay 7		6	2	22		30
Scalpay 8		1	1			2

Table 89: Scalpay sites, lithic raw materials

Discussion

The lithics suggest human activity in the Mesolithic, though the small quantity of evidence, despite shovel pitting, suggests that this may be an ephemeral site.

2.2.66 SFS 15: Shieldaig, NGR NG 8162 5227

Illus 266: SFS 15, Sheildaig, general view of quarry face

Type of Site: Open-air lithic scatter site
SFS Record: 1999
References: Walker 1973; Saville & Ballin 2000; Ballin & Saville 2003
Survey Area: Torridan
Size: Unknown
Aspect: North-west slope down to sea
Height OD: 15m
Ground Cover: Scrub, birch, pine, willow, heather, grass
Distance to Sea: 250m to north-west, narrow inlet
Distance to Fresh Water: 8m to west
Threats: Very disturbed site, ongoing threats from erosion, wind, animals, footpath, electricity sub station and buildings
Description: A roadside gravel quarry contains all that is left of Shieldaig, a Mesolithic site excavated in the 1970s (see Illustration 266, right). The lithic assemblage has been examined and elements published on various occasions (Walker 1973; Clarke & Griffiths 1990; Saville & Ballin 2000; Ballin & Saville 2003) but the site has never been fully published. Lithics may still be collected from the upper levels of the erosion faces around the edge of the quarry
Archaeology: The site at Shieldaig was excavated in 1973. At that time a basic report of the site was prepared, though nothing was published (Walker 1973). Shieldaig itself is now destroyed and there is little to see on the ground, but the lithic assemblage was examined briefly in 1986 as part of the Rùm Excavations Project (Clarke & Griffiths 1990)

Finds

Lithics: The excavations in 1973 yielded a microlithic scatter of some 6000 pieces. When the site was visited by the surveyors for the SLS, 45 lithics were collected. Over half of these were of quartz, and there were 14 pieces of chalcedonic silica, one of baked mudstone, and one of Rùm bloodstone. Half of this material is debitage, there are 18 regular flakes, one blade, and three retouched pieces: a scraper and two edge-retouched pieces.

Discussion

Shieldaig is an area with other sites of some antiquity including a chambered cairn of Neolithic date that was excavated, but not published, in the 1980s by Melia Hedges (CANMORE NG85SW 3). The lithic assemblage provides abundant evidence of human activity in the Mesolithic, though comprehensive analysis and discussion awaits further study.

The material from the lithic scatter at Shieldaig is currently part of a much wider study focussed on quartz assemblages in Scotland, and though the final results are not yet available (Saville & Ballin 2000) one of the artefacts has been singled out for publication and detailed discussion (Ballin & Saville 2003). This is a tanged point of flint which was recovered from the disturbed surface layers of the site. Tanged points would conventionally point to early, pre-Mesolithic activity perhaps in the 10th millennium BP, but, as the authors point out, there is a general lack of context at Shieldaig and indeed at other putative tanged point sites in Scotland (Ballin & Saville 2003) so that the precise interpretation of this find is currently uncertain.

The rest of the assemblage from Shieldaig includes both Mesolithic and more recent type material including narrow blade microliths and bifacial leaf shaped points of conventionally Neolithic type (but see Wickham-Jones 1990). As part of the 1986 Rùm project, Clarke examined 6001 pieces from Shieldaig, of which 88% was made of quartz. There was a small amount of Rùm bloodstone (1%) and some chalcedonic silica (11%) (Clarke & Griffiths 1990), but it is likely that baked mudstone would not have been recognised at that time due to the considerable amount by which it can degrade over the millennia. By far the greatest proportion of the assemblage was debitage, but there were some narrow blades and microliths suggesting that tools were used at Shieldaig as well as made in the vicinity of the site.

2.2.67 SFS 36: Staffin Island

Type of Site: Open-air lithic scatter site
SFS Record: 1999
Survey Area: Trotternish
Size: N/A
Aspect: South
Height OD: 3m
Ground Cover: Grass
Distance to Sea: 4m to south, pebbly beach
Distance to Fresh Water: 200m to north
Threats: Erosion, animals, grazing, wave action
Description: Staffin Island lies just offshore from Staffin Bay and the excavated site of SFS 1, An Corran (see Illustration 267, top right). It comprises a soil cliff with lithics eroding out (see Illustration 268, bottom right)
Archaeology: Surface collection

Illus 267: General view of An Corran with Staffin Island to the left of the picture

Finds

Lithics: There were seven surface finds from SFS 36, all of chalcedonic silica except for a regular flake of baked mudstone. They included six regular flakes and a large platform core which had not been exhausted.

Illus 268: SFS 36, Staffin Island, general view of the eroded face of the site

Discussion

The lithics indicate activity in the past, perhaps in prehistory.

2.2.68 SFS 191 & SFS 192: Suarbie Burn, NGR NG 4825 6565 & NG 4855 6590

Illus 269: SFS 191 & SFS 192, Suarbie Burn, general view

Type of Site: Multiple findspots
SFS Record: 2001
Survey Area: Trotternish
Size: Unknown
Aspect: N/A
Height OD: 70m OD
Ground Cover: Peat and heather at edge of burn
Distance to Sea: 3km to east
Distance to Fresh Water: At edge of burn
Threats: N/A
Description: The Suarbie Burn flows down to the northern shores of Staffin Bay. As it drops on to the lower land it cuts through deposits of till which are overlain by peat in the upper reaches
Archaeology: The burn was walked to look for samples of raw material because pebbles of chalcedonic silica had been reported along its exposures (see Illustrations 269 & 270, right). In addition to numerous raw material samples (Section 5; Appendix 13) a few pieces of struck stone were found in the erosion scars along the bank

Illus 270: SFS 191 & SFS 192, Suarbie Burn, view of exposure

Finds

Lithics: Seven pieces of chalcedonic silica were recovered. They came from two different stretches of the bank and so have been allocated separate SFS numbers. There are three pieces of debitage, and four regular flakes.

Discussion

The lithics are the result of human activity, but they may well be in a secondary location in the bank deposits of the burn.

2.2.69 SFS 162: Teanga Fhiadhaich, NGR NG 9351 4094

Type of Site: Open-air lithic scatter site
SFS Record: 2002
Survey Area: Loch Carron
Size: 10m deep×5m wide×2.5m high

Illus 271:SFS 162, Teanga Fhiadhaich, general view

Aspect: North-west, on 30m raised beach
Height OD: 40m
Ground Cover: Trees
Distance to Sea: 160m to north-west, open river mouth
Distance to Fresh Water: 200m to north
Threats: Enclosed grazing, erosion
Description: A lithic scatter site on the raised beach (see Illustration 271, right)
Archaeology: Surface collection

Finds

Lithics: There were 13 lithic finds. There was one debitage flake and 12 regular flakes. Most was of quartz (11 pieces) with one piece of Rùm bloodstone and one of chalcedonic silica.

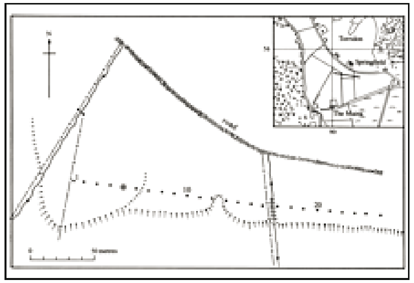
Discussion

This assemblage certainly suggests prehistoric activity, but it is not large and there is no period specific material.

2.2.70 SFS 186: The Mains, Torridon Village, NGR NG 9020 6670

Illus 272: SFS 186, The Mains, Torridon village, general view of raised beach

Type of Site: Open-air lithic scatter site
SFS Record: 2002
Survey Area: Torridan
Size: Unknown
Aspect: South-west
Height OD: 12m
Ground Cover: Grass
Distance to Sea: 100m to south-west
Distance to Fresh Water: 30m to north-west
Threats: Cattle grazing, waterlogging
Description: A well-defined raised beach site lying on the north shore of the eastern end of Loch Torridon (see Illustration 272, top right). Although the site has not been ploughed in recent memory, the ground bore signs of cultivation
Archaeology: A single transect of 25 shovel pits was laid to run east to west across the level surface of the raised beach (see Illustration 273, bottom right). Shovel Pits 1–6 lay on a slightly raised green knoll while the remainder of the pits ran through an area of wet, rush covered, ground. The underlying deposit differed across the site with Pits 1–6 lying over a sorted pebble beach deposit, while the remainder of the pits lay over compacted yellow sand with occasional boulders. Pits were dug through a well sorted plough soil, 80–300mm deep



Illus 273: SFS 186, The Mains, Torridon village, plan

Finds

Lithics: There were three finds all from the same pit, SP5: a blade and a flake of chalcedonic silica; and a piece of quartz debitage. The recovered lithics lay at the interface of the plough soil and the underlying pebble beach.

of shovel pits

Discussion

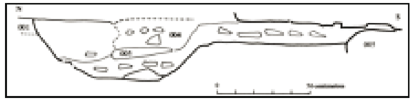
The lithics certainly indicate past human activity, but they are few in number and not period specific.

2.2.71 SFS 19: Toscaig 1, NGR NG 7168 3649

Illus 275: SFS 19, Toscaig 1, interior view

Type of Site: Rockshelter with midden and structures
SFS Record: 1999
Survey Area: South Applecross
Size: 2m deep×8m wide×1.5m high
Aspect: South-east at foot of sandstone cliffs
Height OD: 50m
Ground Cover: Bracken and brambles
Distance to Sea: 500m
Distance to Fresh Water: 5m to east
Threats: Stable
Description: The site is located within a cleft formed in a large outcrop of sandstone within a region of moorland approximately 0.8 km from the coast (see Illustrations 274, top right & 275, left). Two shieling huts, both of which are marked on the current Ordnance Survey maps, lie 300m to the north. A drystone wall blocks the entrance to the cleft providing shelter from the north. The field survey identified the presence of a hearth, cooking pot and vestigial remains of a midden within the cleft
Archaeology: A single test pit was dug (see Illustration 276, bottom right)

Illus 274: SFS 19, Toscaig 1 (portrait)



Illus 276: SFS 19, Toscaig 1, Test Pit 1, west-facing section

Test Pit 1: (2m×0.5m) was placed against the east side of the cleft wall.

- Context 1 Organic peaty soil with bracken roots
- Context 2 A layer of angular stones derived from the side of the wall
- Context 3 An organic layer, interpreted as burnt peat with charcoal flecks
- Context 4 A midden deposit sealed by Context 3. Within this layer, fragments of a cast iron cooking pot were found in situ alongside rim sherds of a bone china bowl. The midden comprised 95% limpet shell with occasional periwinkle and oyster shell and attained a depth of 0.27m resting on a layer of boulders measuring 0.50m in length×0.20m wide. A small antechamber, large enough to lie in, had been formed below a large rock and it is not clear if boulders had been deliberately placed to form a level platform. Midden material was present within the fissures between the boulders that could not be removed

Finds

Pottery: There were four sherds of glazed pottery, all from Context 1 of Test Pit 1.

Metalwork: There were two fragments of iron nails from Test Pit 1, Context 4.

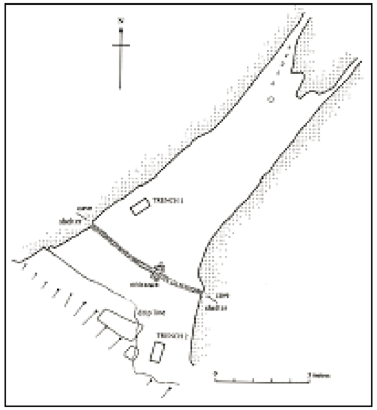
Bone: Two field vole teeth were found in the midden deposit.

Shell: 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 Context 4 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).

Discussion

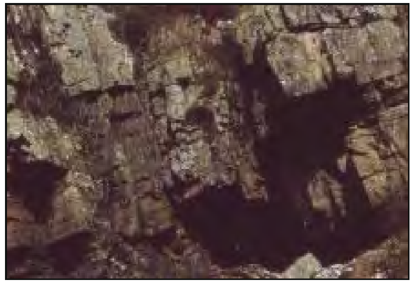
The finds suggest fairly recent activity at this site.

2.2.72 SFS 20: Toscaig 2, NGR NG 7010 3758



Illus 28: SFS 20, Toscaig 2, plan of cave

Type of Site: Cave with structures
SFS Record: 1999
Survey Area: South Applecross
Size: 15m deep×15m wide
Aspect: West at foot of sea cliffs
Height OD: 8m
Ground Cover: Nettle and bracken
Distance to Sea: 25m to west, rocky, open small pebble beach
Distance to Fresh Water: 108m to south
Threats: Stable
Description: This deep and dry cave site is situated on a rough exposed rocky coast below cliffs (see Illustrations 28, left & 277, top right). An insubstantial wall curves across the mouth of the cave with no obvious entrance but it is tumbled in the centre. Hammerstones, possible bone tools and modern debris lie on the surface. Occasional shells are visible and hard packed sheep droppings form the floor
Archaeology: Two test pits were dug (see Illustration 278, bottom right). Test Pit 1 lay inside the cave, and had deep well preserved stratigraphy with eight clearly defined contexts. Test Pit 2 lay outside cave, under a rocky overhang, and had deep well preserved stratigraphy with seven well-defined contexts



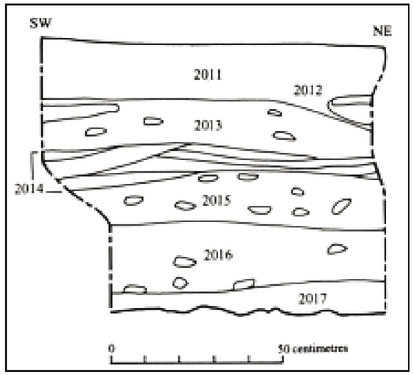
Illus 277: SFS 20, Toscaig 2, general view of rockshelter (portrait)

Illus 278: SFS 20, Toscaig 2, interior view during excavation

Illus 279: SFS 20, Toscaig 2, Test Pit 1

Test Pit 1: (1m×0.5m) aligned north-east—south-west, 2m inside the cave mouth and 1m from the wall of the cave (see Illustrations 279, left & 280, right). Deep and well preserved stratigraphy was encountered, with up to 0.8m of deposits.

- Context 2011 Sheep droppings
- Context 2012 A modern informal hearth or burnt area within context 2011
- Context 2013 A mixed shell layer with abundant organic remains
- Context 2014 A series of interleaved occupation lenses, comprising ash, charcoal and crushed shell
- Context 2015 A further deposit of shell midden, fire cracked stones and organic remains
- Context 2016 Clean, voided, well preserved limpet midden
- Context 2017 A natural layer of gritty sand
- Context 2018 Bedrock



Illus 280: SFS 20, Toscaig 2, Test Pit 1, south-east-facing section

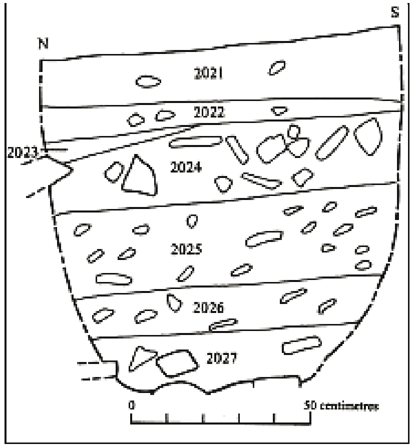
Test Pit 2: (1m×0.5m) positioned 3m from the mouth of the cave but still under the rocky overhang (see Illustrations 281, left & 282, right). Again, deep stratigraphy was encountered with around 0.8m of deposits, as in Test Pit 1. Test Pit 2 was aligned north—south.

- Context 2021 Surface vegetation of grass and bracken with loose

Illus 281: SFS 20, Toscaig 2, Test Pit 2

stones

- Context 2022 A mixed shell midden with bones, organic lenses and modern finds (glass)
- Context 2023 A layer of natural sand accretion following an episode of rapid slopewash and tumble with angular stones randomly lying in sand
- Context 2024 Gradual tumble and slopewash with the stones being deposited in a more level fashion
- Context 2025 Gradual tumble and slopewash with the stones being deposited in a more level fashion
- Context 2026 Bones and fragmentary shell remains in a matrix of stony slopewash
- Context 2027 Large angular rocks which precluded further excavation at a depth of just over 0.8m



Illus 282: SFS 20, Toscaig 2, Test Pit 2, west-facing section

Finds

Lithics: There were four lithic finds, all debitage, from the two test pits. Test Pit 1 yielded three pieces of chalcedonic silica, and Test Pit 2 yielded a flake of quartz.

Coarse Stone: There were two coarse stone tools: a bevelled pebble (ST17) and a whetstone/rubber (ST30). While the bevelled pebble might indicate Mesolithic activity, the whetstone is more likely to indicate a later prehistoric date. Though its shape is natural and the faces appear unworn it does have streaks of residue, which may indicate that it was used to sharpen a metal blade, or as a rubber.

Bone tools: One piece, a carefully made point on an articulation (BT132), was found in Test Pit 2, Spit 3 (see Illustration 89, above).

Glass: The neck of an olive-green bottle from Test Pit 2, Spit 2.

Bone: Red deer, cattle, pig, seal and vole were all present. The assemblage was dominated by deer bone, the majority of which was derived from the extremities with bones of the head, feet and lower limbs present. There is also the rodent gnawed tip of an antler tine. Cattle are also represented by the extremities, with only a fragment of cattle tibia representing the main limbs. Two red deer bones, one cattle bone, three pig bones and two sheep teeth were burnt, indicating human activity. Seal is present at this site as a jaw fragment, a loose tooth and proximally unfused toe present. The seal jaw comprised only the left ascending ramous which bore a cut mark, probably associated with disarticulation. The loose tooth was identified as Common seal.

Non-anthropogenic species recorded include bank and field vole teeth (two teeth are associated with a modern hearth) and a number of amphibia longbones. In addition there was a mixed assemblage of fish bones, including much burnt material (especially from Test Pit 2). These included saithe, pollack, gadids, wrasse and plaice.

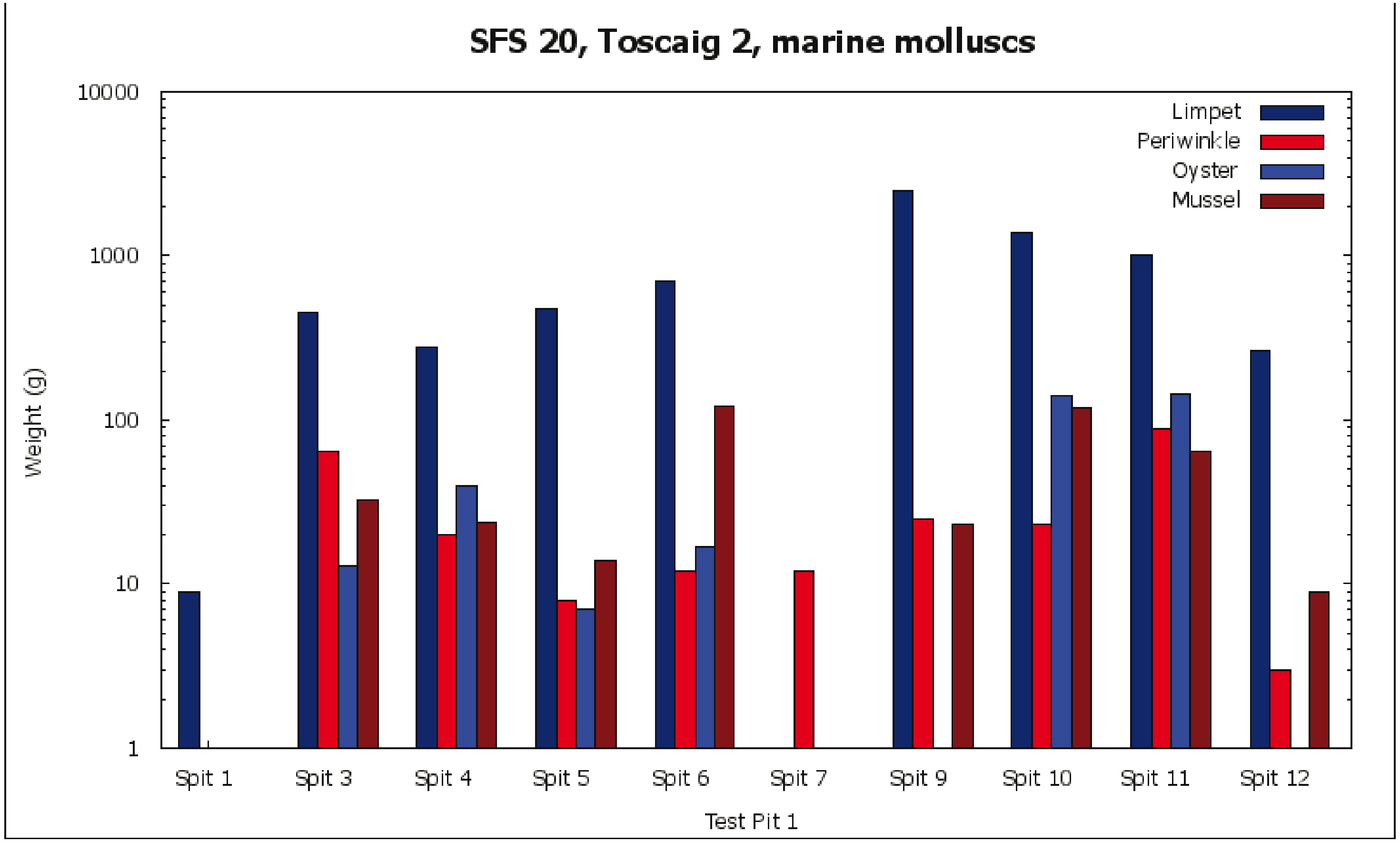
Shell: In both test pits limpet predominates (see Table 90; Illustrations 283 & 284, both below). There are a number of periwinkles in most contexts. There are also a number of other species present but only in very small numbers. Oyster occurs through Test Pit 1 but only in context 4 in Test Pit 2, and in Test Pit 2 there are a 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.

To access a printable version of this table, please go to the separate page table090.html and set to LANDSCAPE mode.

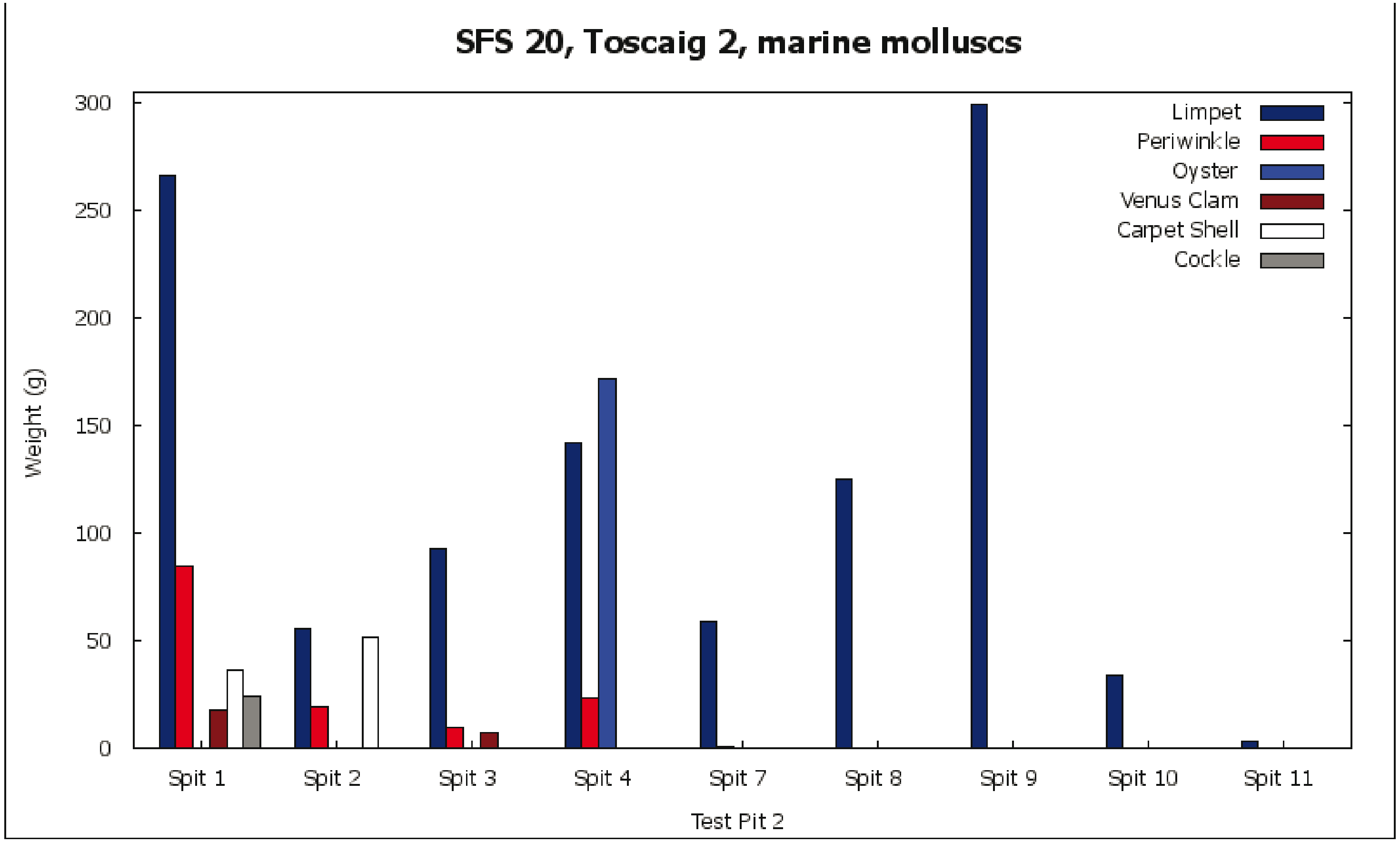
Table 90

SFS 20 Toscaig 2	limpet	periwinkle	oyster	mussel	razor shell	flat periwinkle	scallop	venus clam	dogwhelk	carpet shell	cockle	residue
Test Pit 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
Test Pit 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											

Table 90: SFS 20, Toscaig 2, marine molluscs, weight in grams for individual species by context



Illus 283: SFS 20, Toscaig 2, marine molluscs, weight in grams for individual species in Test Pit 1 by context



Illus 284: SFS 20, Toscaig 2, marine molluscs, weight in grams for individual species in Test Pit 2 by context

Dates

There were three radiocarbon determinations from Toscaig 2, all from samples well stratified within the lower contexts of the Test Pits (see Table 91, below). They cover a range of some 300 years from the early 1st and 2nd century BC to the early years AD.

Table 91

SFS 20 Context	Reference	Material	Date BP	Age
TP1 C2025	AA-50667	mammal bone	2095±40	210BC–AD10
TP1 C2025	AA-50668	deer bone	2055±35	170BC–AD30
TP1 C2017	AA-50669	hazelnut shell	2195±45	140BC–110BC

Table 91: SFS 20, Toscaig 2, Radiocarbon dates, see Section 4

Discussion

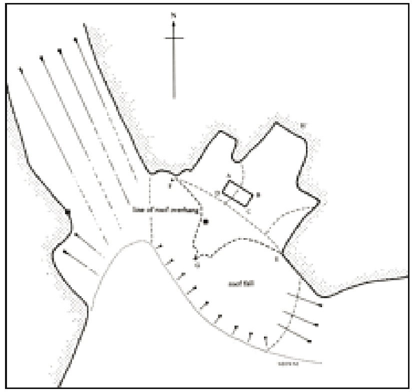
Toscaig 2 is an interesting cave site. The stratigraphy inside the cave comprises intense laminated occupation deposits. The layers of midden within the cave do not relate to corresponding midden outside. This site has had an unstable history outside and around it that contrasts with the stability within; and episodes of slopewash and rockfall dominate the external stratigraphy. Inside, the occupation layers continue, uninterrupted by abandonment or rockfall until very recent times.

The lithics are undiagnostic, though the coarse stone tools suggest both early and later prehistoric activity. The latter is in line with the radiocarbon determinations. The glass is post-medieval in date. This was the only site to produce a bone assemblage of any size and activities in the cave seem to have involved the processing of animal carcasses, perhaps to do with hide removal or preparation.

2.2.73 SFS 34: Toscaig 3, NGR NG 7085 3772

Illus 285: SFS 34, Toscaig 3, general view of rockshelter and surroundings

Type of Site: Cave with midden
SFS Record: 1999
Survey Area: South Applecross
Size: 4m deep×4m wide×1.5m high
Aspect: South-east in sea cliffs
Height OD: 6m
Ground Cover: Scrub woodland
Distance to Sea: 5m to east, rocky sheltered
Distance to Fresh Water: 30m to north-west
Threats: Disturbed, human activity
Description: This sheltered site is situated at the head of Loch Toscaig (see Illustration 285, left). The interior is low and rocky and contains modern debris of metal and glass with shell midden visible but difficult to access at the rear of the cave (see Illustration 286, right)



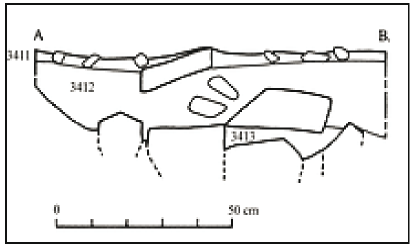
Illus 286: SFS 34, Toscaig 3, plan of cave

Archaeology: Only one test pit was opened as the rocky exterior area precluded test pitting outside

Test Pit 1: (1m×0.5m) was aligned ESE—WNW and lay inside the cave (see Illustration 287, right).

- Context 3411 Surface shells and modern rubbish
- Context 3412 A natural peaty cave earth with grit and occasional shells
- Context 3413 A layer of beach pebbles with a matrix of clean sand at the base of the test pit

Bedrock was not reached.



Illus 287: SFS 34, Toscaig 3, Test Pit 1, south-west-facing section

Finds

Lithics: Test Pit 1 yielded five lithic finds. There was a piece of quartz and four pieces of chalcedonic silica. All but one of the finds were regular flakes.

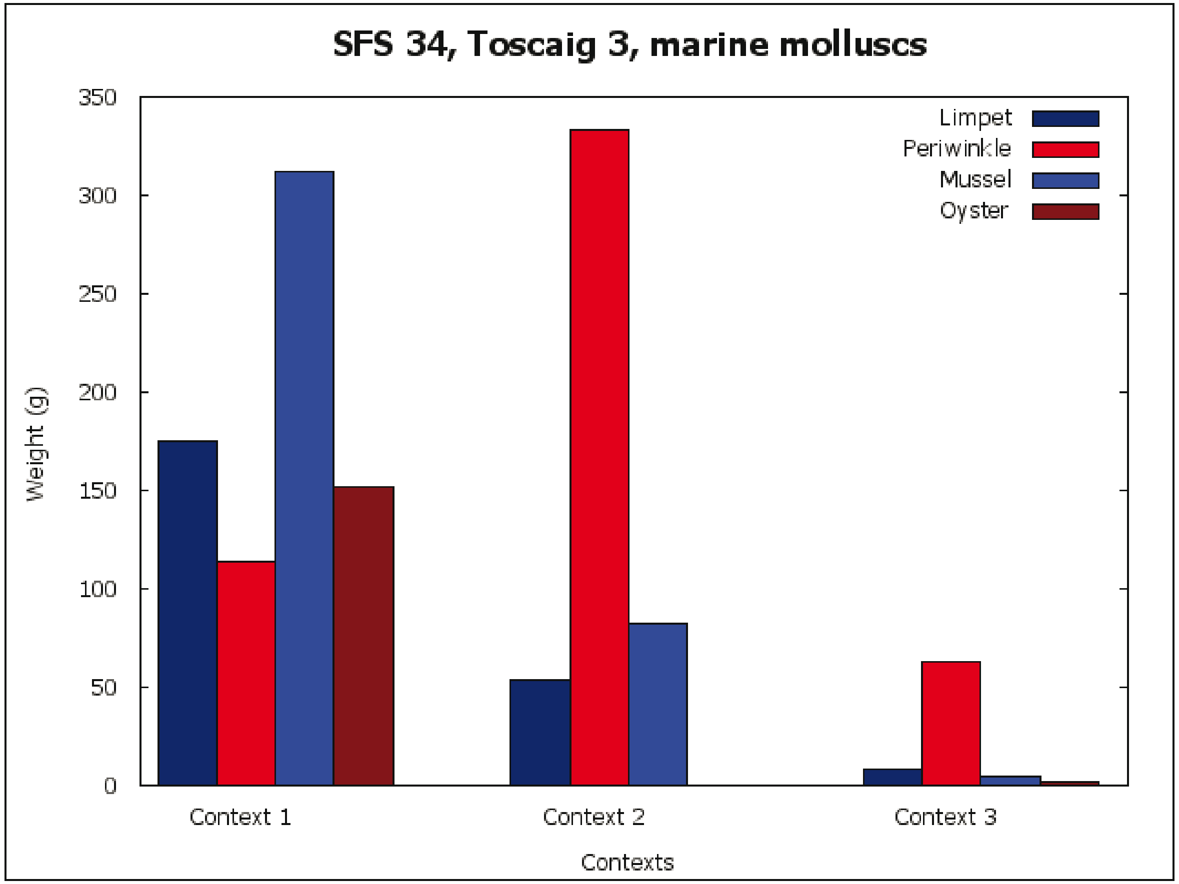
Bone: A cattle lower molar was recovered.

Shell: Mussel predominates here with some limpet, periwinkle and oyster (see Table 92, below; Illustration 288, below). The shells in the top context were very fresh looking and are probably not particularly old. They have also been exposed and are green. The shells in context 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 generally smaller.

Table 92

SFS 34	limpet	periwinkle	mussel	oyster	residue
Context 1	175	114	312	152	
Context 2	54	333	82		243
Context 3	8	63	5	2	18
Context 4					11

Table 92: SFS 34, Toscaig 3, marine molluscs, weight in grams for individual species by context



Illus 288: SFS 34, Toscaig 3, marine molluscs, weight in grams for individual species by context

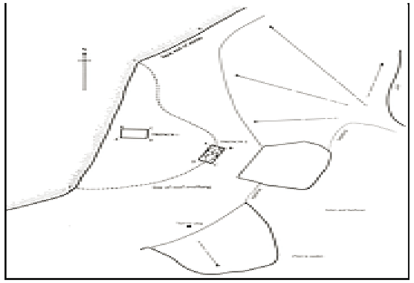
Discussion

Toscaig 3 has limited evidence of past human activity, but it has clearly been used over the years. The lithics are not diagnostic.

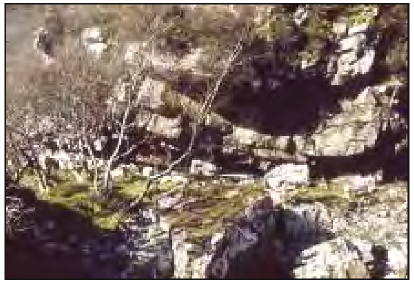
2.2.74 SFS 35: Toscaig 4, NGR NG 7071 3759

Type of Site: Rockshelter with midden and structures
SFS Record: 1999

Survey Area: South Applecross
Size: 8m deep×4m wide×3m high
Aspect: East in sea cliffs
Height OD: 6m
Ground Cover: Grass and birch
Distance to Sea: 25m to east, rocky, sheltered
Distance to Fresh Water: 150m to north
Threats: Eroding, human activity
Description: This small rockshelter contains surface shell midden, fire cracked stones and charcoal (see Illustrations 289, below left; 290, below middle; & 291, right). A modern hearth and stone bench seat testify to recent visitors, as perhaps do pecked marks on a slab inside the shelter (see Illustration 292, below right)
Archaeology: Two test pits were opened



Illus 291: SFS 35, Toscaig 4, plan of cave



Illus 289: SFS 35, Toscaig 4, general view

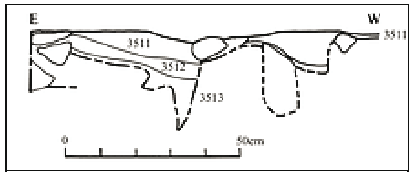
Illus 290: SFS 35, Toscaig 4, view of exposed area of shell midden at surface

Illus 292: SFS 35, Toscaig 4, markings on vertical rock, 8m north of Test Pit 1

Illus 293: SFS 35, Toscaig 4, Test Pit 1, after excavation plan view

Test Pit 1: (1m×0.5m) aligned north-east—south-west and located over the area of exposed midden within the shelter (see Illustrations 293, left & 294, right).

- Context 3511 Surface shell and dry peat
- Context 3512 Similar to context 3511 but firmer and damper
- Context 3513 A layer of gritty peat and large stones at the base of the test pit



Illus 294: SFS 35, Test Pit 1, north-facing section

Test Pit 2: (1m×0.5m) situated on the terrace outside the drip line and aligned north—south (see Illustration 295, right).

- Context 3521 Sterile peat and turf
- Context 3522 Angular cobbles with voids and a clay matrix

Finds: There were no artefacts

Shell: In Test Pit 1, limpet predominates throughout (see Table 93, below; Illustration 296, below). The limpets are fairly large in context 1, and in contexts

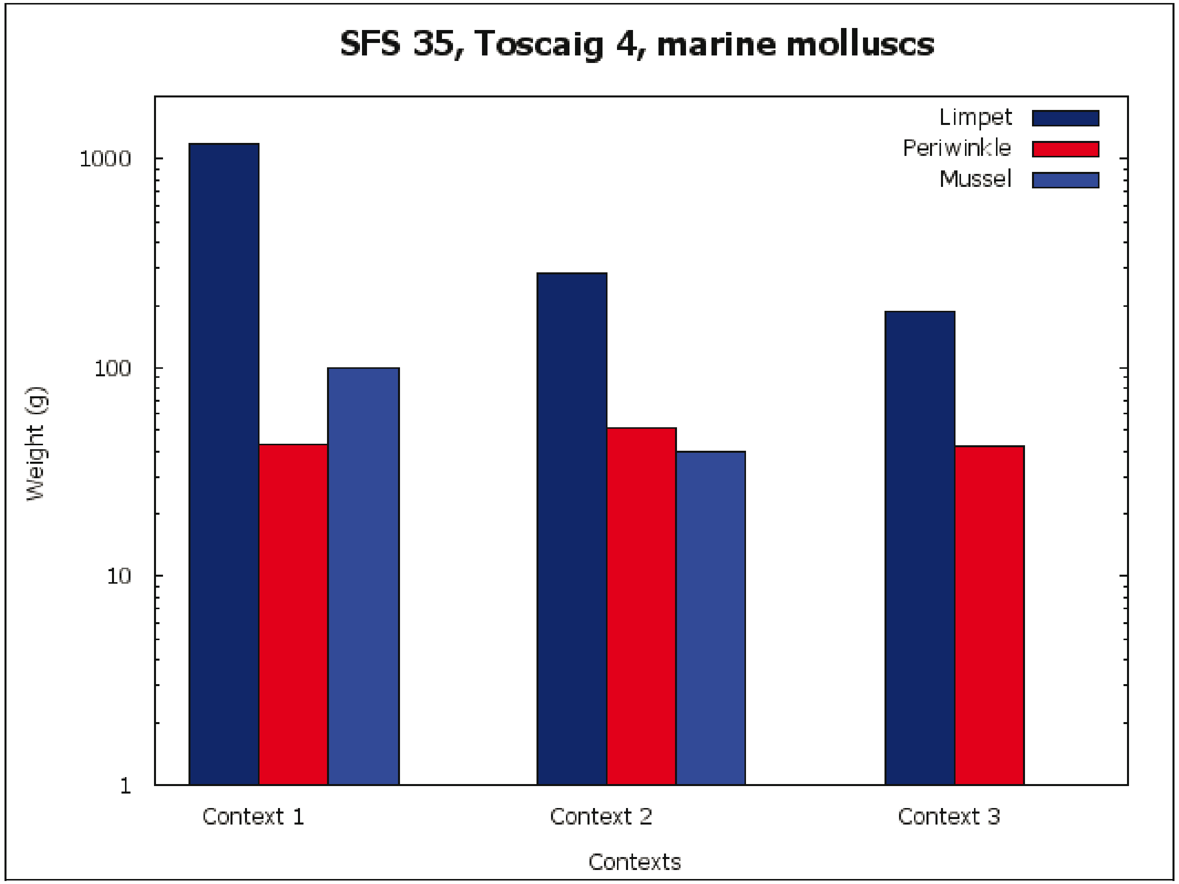
2 and 3 the shells are in quite a fragmentary state.

Illus 295: SFS 35, Toscaig 4, Test Pit 2, after excavation

Table 93

SFS 35 Test Pit 1	limpet	periwinkle	dogwhelk	mussel	residue
Context 1	1191	43	2	100	453
Context 2	287	51		40	124
Context 3	185	42			48
Context 4	<1	<1			

Table 93: SFS 35, Toscaig 4, marine molluscs, weight in grams for individual species by context

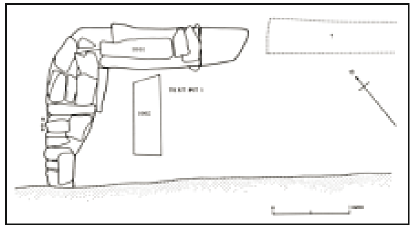


Illus 296: SFS 35, Toscaig 4, marine molluscs, weight in grams for individual species by context

Discussion

This site offers no great shelter from the weather and though it has clear sign of recent activity, the archaeological remains are not significant.

2.2.75 SFS 38: Toscaig 6 Rockshelter, NGR NG 7095 3925



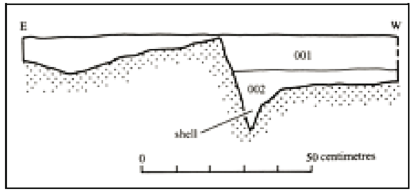
Illus 298: SFS 38, Toscaig 6, plan of cave

Type of Site: Rockshelter with midden and structures
SFS Record: 1999
Survey Area: South Applecross
Size: 30m deep×3m wide
Aspect: North-east, at foot of outcrop
Height OD: 8m
Ground Cover: Heather
Distance to Sea: 500m to north-west, rocky open
Distance to Fresh Water: On site
Threats: Stable
Description: A midden within a rockshelter with a large build up of roof fall. It contains a low wall (1.95m long, 0.35m high, aligned east—west; see Illustration 297, left), of at least four courses, constructed from roof fall material. Vestigial traces of another wall running at right-angles and comprising one course of stone were present (see Illustration 298, right)
Archaeology: Two test pits were excavated

Illus 297: SFS 38, Toscaig 6, general view of wall

Test Pit 1: (1m×0.5m) positioned 1.1m to the east of the north-south trending wall. At a depth of 1m large fragments of rock-fall prevented further work. Two contexts were identified (see Illustration 299, right):

- Context 1 Dark friable loam with abundant fragmented shell
- Context 2 Dark friable loam. Dry sieving confirmed the presence of limpets and oyster shell but no flint or pottery



Illus 299: SFS 38, Toscaig 6, Test Pit 1, north-facing section

Test Pit 2 was positioned 11m to the east, still within the shelter. It had to be abandoned owing to the size of the rockfall. Fragmented marine shell was present within the humified surface soil. Dry sieving confirmed that no artefacts were present.

Finds

There were no finds. A very small amount of un-stratified shell was recovered from Test Pit 1 composed of an MNI of five oysters (five upper and four lower valves and two fragments) and four limpets. The oysters are much worn and look like they have been exposed to the wind and rain. A surface sample of shell (only 315g) was also taken 11m from the corner of the building and this is made up of limpet and oyster

Discussion

The wall appears to represent the remains of a small shieling structure enclosing the midden material. A limiting factor in establishing the true depth of the midden was the amount of rockfall. No dating material was recovered but in all probability the shieling structure is of recent historical age and the lack of finds suggests that the midden may be of similar date.

2.2.76 SFS 39: Toscaig 7, NGR NG 7044 3975

Type of Site: Rockshelter with midden

SFS Record: 1999
Survey Area: South Applecross
Size: 3m deep×4m wide×1.5m high
Aspect: Under small outcrop above slope to sea
Height OD: 6m
Ground Cover: Bracken
Distance to Sea: 30m to north, rocky and sheltered
Distance to Fresh Water: Unknown
Threats: Stable
Description: A small rockshelter containing midden material
Archaeology: One test pit was excavated

Test Pit 1: (1m×0.5m) positioned 0.40m from the rear wall of the shelter. Two contexts were identified.

- Context 1001 Bracken roots were present to a depth of 0.10m mixed within a layer of loose silty loam. Bedrock was visible near to the surface
- Context 1002 Midden material confined to the fissures formed within the bedrock. The midden attained a maximum depth of 0.27m where this material could be excavated between the natural rock fisures

Finds

Lithics: There were four pieces of debitage from Test Pit 1. Two are of quartz and two of chalcedonic silica.

Shell: A small amount of limpet and oyster shell was recovered, together with some unidentified fragments. These shells are eroded and have a chalky appearance.

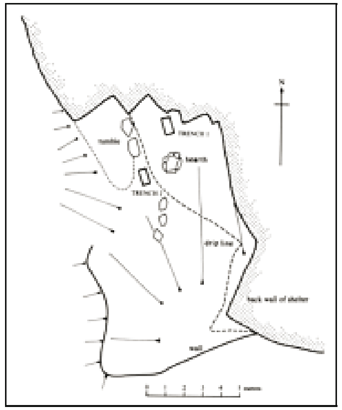
Discussion

The presence of midden with lithics is a clear sign of human activity, though the lithics are few and not diagnostic.

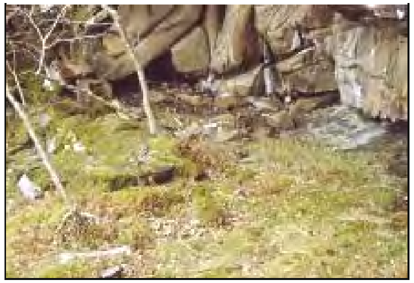
2.2.77 SFS 41: Toscaig 9, NGR NG 7009 3896

Illus 300: SFS 41, Toscaig 9, general view

Type of Site: Rockshelter with midden and structures
SFS Record: 1999
Survey Area: South Applecross
Size: 10m deep×6m wide×4m high
Aspect: West at foot of sea cliffs
Height OD: 6m
Ground Cover: Grass and bare soil
Distance to Sea: 15m to west, sheltered sandy beach
Distance to Fresh Water: 100m to south
Threats: Human activity
Description: A large airy rockshelter containing a modern hearth and camping remains that are visible on the surface of patchy moss and grass as is an extensive midden of limpets and periwinkles (see Illustrations 300 & 301, left). An irregular line of boulders runs roughly below the drip line at the edge of the overhang and may represent the remains of a sheltering wall (see Illustration 302, right)
Archaeology: Two test pits were dug



Illus 302: SFS 41, Toscaig 9, plan of cave

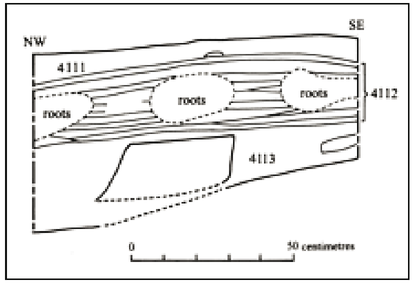


Illus 301: SFS 41, Toscaig 9, close-up view

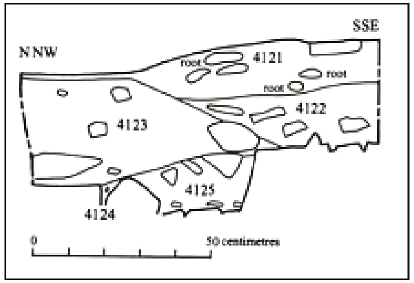
Test Pit 1: (aligned SSE—NNW) lay within the shelter and contained deep stratigraphy and well preserved deposits (see <u>Illustration 303</u>, right).

- Context 4111 Peat and crushed shell
- Context 4112 A thick occupation layer of laminated or interleaved ash and charcoal rich lenses with broken shell throughout
- Context 4113 Well-preserved shell midden of mainly limpets with infrequent fire cracked stones and charcoal
- Context 4114 Bedrock lay below these layers

Parts of these deposits had been disturbed by root action.



Illus 303: SFS 41, Toscaig 9, Test Pit 1, SSW-facing section



Illus 304: SFS 41, Toscaig 9, Test Pit 2, south-west-facing section

Test Pit 2: (1m×0.5m) aligned south-east—north-west and was positioned on relatively level ground, outside the drip line and just outside the protective wall in an area of mosses and grasses (see <u>Illustration 304</u>, left).

- Context 4121 Topsoil and turf
- Context 4122 Peat and angular tumbled stones
- Context 4123 A shell midden of periwinkles in a peaty matrix spread down the hill from the interior of the rock-shelter
- Context 4124 Angular natural tumbled stones
- Context 4125 Black peaty soil and stone chips
- Context 4126 Bedrock. The upper three contexts were sampled

Finds

Lithics: Test Pit 2 yielded seven pieces of baked mudstone. Three are regular flakes and four are debitage.

Glass: One sherd of clear iridescent glass, Test Pit 1, Spit 1.

Metalwork: A plain annular ring of iron to which a surface sheet of tin has been soldered was found in Test Pit 1, Spit 1. In addition, Test Pit 1 (Spits 1&2) contained 34 small fragments from a flat sheet mount of iron, the edges of which have been turned over and flattened to form a raised border 5mm wide. The surviving corner has stamped decoration, there is a rivet hole 2mm in diameter punched from the front (border) side. Rivets survive in two sheet fragments, both with sub-square heads c 4×4mm and short flat shanks; one joined two sheets together. Few fragments join, but the overall length of surviving border is 120mm. There were also several small fragments of iron from Test Pit 1 including: three fragments of an unidentified flat sheet object with part of one straight edge; a single tack; and five nail fragments.

Bone: The assemblage includes both domestic and wild species. There were a few cattle bones as well as remains of sheep/goat. Wild food species include red deer and Common seal. Other material includes frog, modern rabbit and small mammal. Both test pits yielded considerable quantities of fish bone including saithe, pollack, cod and wrasse. The fish bone possibly suggests that the processing of fish took place here.

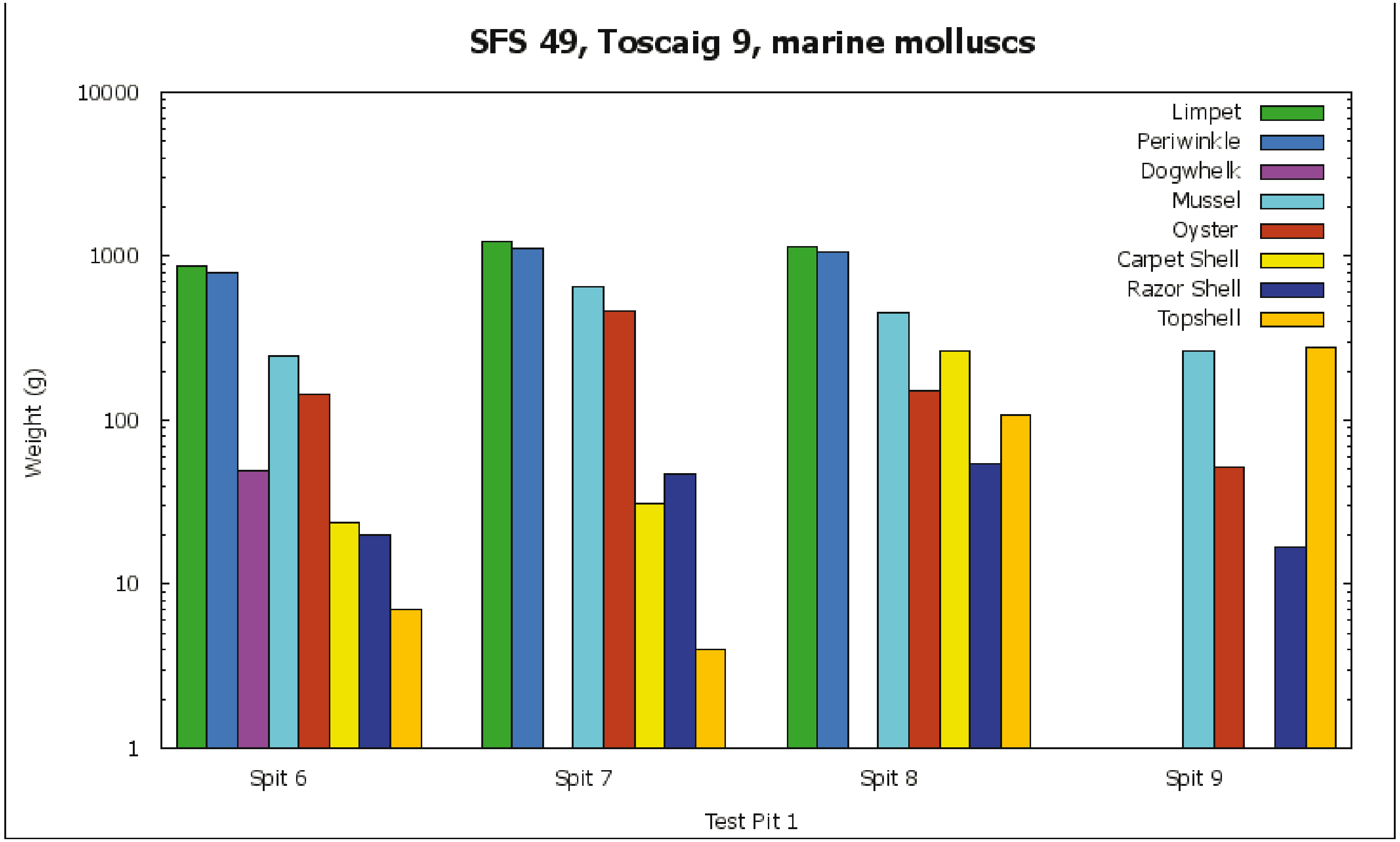
Shell: Limpet and periwinkle predominate with some mussel and oyster but there is also a mixture of other shells, especially in Test Pit 1 (see Table 94, below; Illustrations 305 & 306, both below). A few shells are not presented in the table because it is not clear what species they are, but it is possible they are warty venus (*Venus verrucosa*) and rayed artemis (*Dosinia exoleta*). This site is unique because of the quantity of topshell in the lower levels. These are very small: 30 shells weigh about 9g so in context 8 there are about 360 shells and in Context 9 almost 1000. 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 Context 8. In Test Pit 1, context 6 it was noted that the shells appear to be very robust, especially the mussel which is well preserved and probably fairly recent in date. In Test Pit 2, context 1 the limpets are fairly eroded and look like they have been exposed; they are light in weight and fairly bleached.

To access a printable version of this table, please go to the separate page table094.html and set to LANDSCAPE mode.

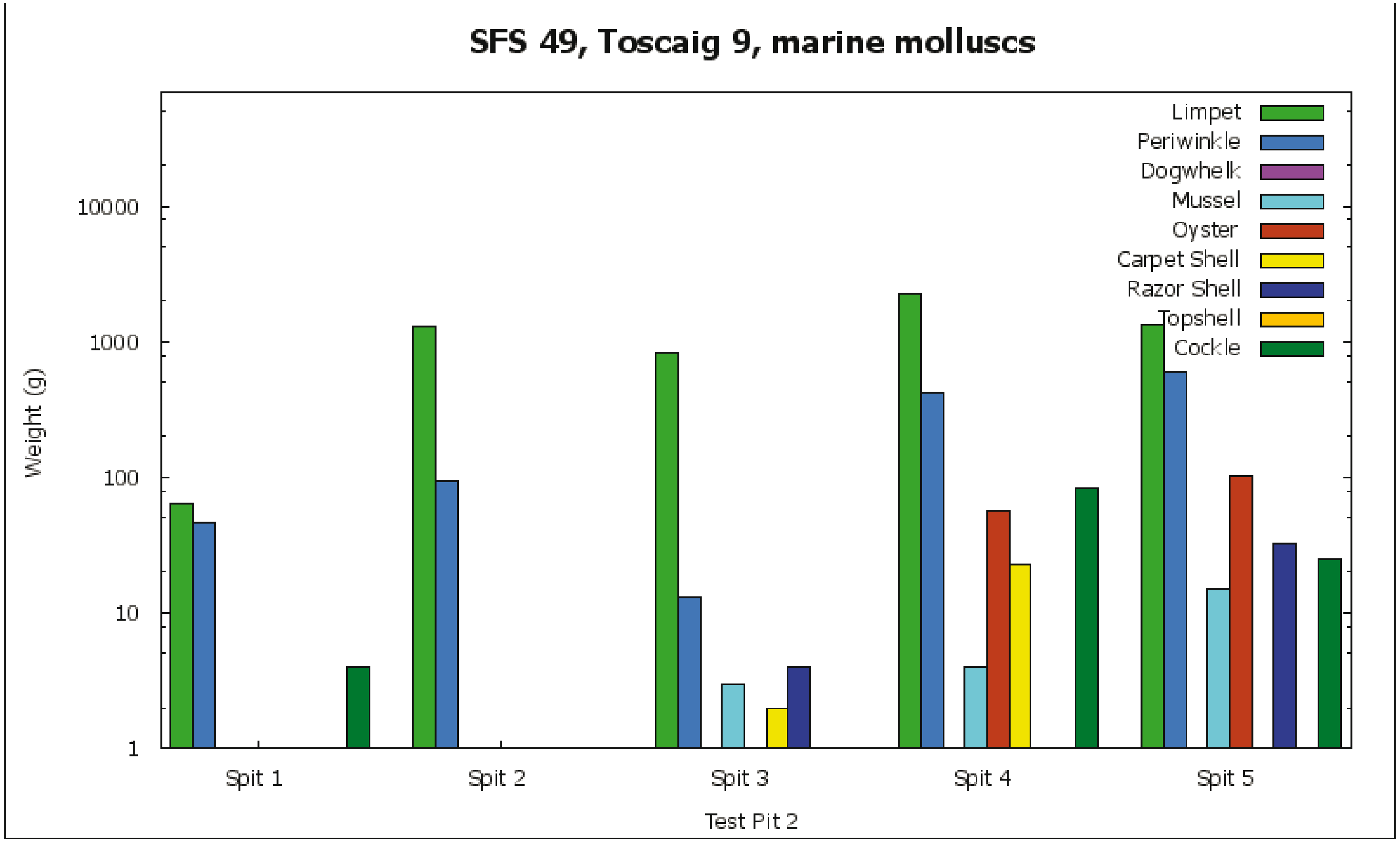
Table 94

SFS 41 Toscaig 9	limpet	periwinkle	dogwhelk	mussel	oyster	clam / carpet shell	razor shell	topshell	cockle	cowrie	residue
Test Pit 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
Test Pit 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

Table 94: SFS 41, Toscaig 9, marine molluscs, weight in grams for individual species by context



Illus 305: SFS 41, Toscaig 9, marine molluscs, weight in grams for individual species in Test Pit 1 by context



Illus 306: SFS 41, Toscaig 9, marine molluscs, weight in grams for individual species in Test Pit 2 by context

Dates

Three samples were taken from a thick occupation layer of laminated ash with shell (see Table 95, below). They lay towards the base of this context. Samples of birch charcoal were also taken from the underlying context, context 4113, shell midden. The results suggest at least two periods of activity in the shelter, one in the late 1st-early 2nd millennium AD and the second sometime between the late 15th-early 17th centuries AD.

Table 95

SFS 41 Context	Reference	Material	Date BP	Age
TP1 C4112	AA-50674	hazelnut shell	350±30	AD1460–1640
TP1 C4112	AA-50675	hazelnut shell	325±35	AD1480–1650
TP1 C4112	AA-50676	cow bone	525±35	AD1380–1450
TP1 C4113	AA-50677	birch charcoal	1255±95	AD630–990
TP1 C4113	AA-50678	birch charcoal	885±35	AD1030–1240

Table 95: Radiocarbon dates, SFS 41, Toscaig 9, see Section 4

Discussion

Extensive and well preserved archaeological deposits remain at this site where there appear to be two distinct periods of occupation. The lithics are undiagnostic. The glass and much of the metalwork suggests a post-medieval date which would be in line with the more recent dates.

2.2.78 SFS 42: Toscaig 10 (Allt Glas Nan Imireachain), NGR NG 7211 3975

Type of Site: Rockshelter
SFS Record: 1999
Survey Area: South Applecross
Size: 12m deep×4m wide×2m high
Aspect: South-west at foot of large outcrop
Height OD: 150m
Ground Cover: Heather and bracken
Distance to Sea: 750m to west
Distance to Fresh Water: 50m to south-west
Threats: Erosion, animals
Description: A large rockshelter, partly wet
Archaeology: Findspot

Finds

Coarse Stone: There was a plain hammerstone (ST24), comprising a rounded cobblestone with some pecking at the ends from this site.

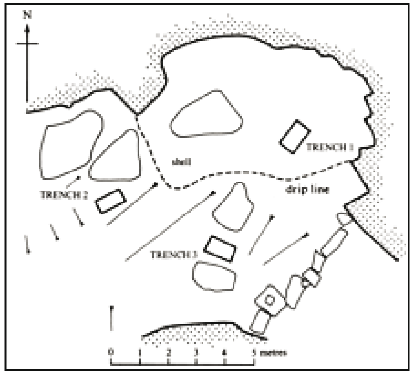
Discussion

Tools like this hammerstone might have been in use at any time up to and including the present day.

2.2.79 SFS 105: Uags 1, NGR NG 7266 3482

Illus 307: SFS 105, Uags 1, general view of rockshelter with TP2&3 visible

Type of Site: Cave with midden
SFS Record: 2000
Survey Area: South Applecross
Size: 8m deep×10m wide×2.5m high
Aspect: South at foot of sea cliffs
Height OD: 10–12m
Ground Cover: Nettles and bracken
Distance to Sea: 12m to south, sea cliffs
Distance to Fresh Water: Unknown
Threats: Stable
Description: A fairly dry cave near the south-west corner of the Applecross peninsula. The site has easy access from the abandoned settlement of Uags (see Illustrations 307, left & 308, right). An extensive shell midden is visible inside the cave, and this extends outside the drip line. A large lump of iron slag was found just outside the cave
Archaeology: Three test pits were excavated, two outside the cave and one inside

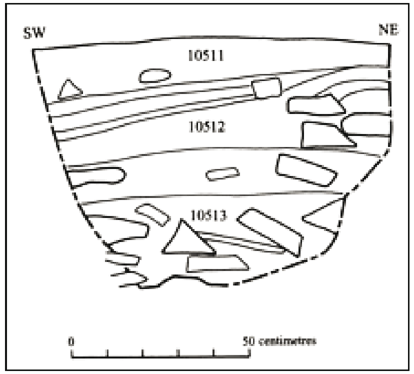


Illus 308: SFS 105, Uags 1, plan of cave

Illus 309: SFS 105, Uags 1, Test Pit 1, after excavation

Test Pit 1: (1m×0.5m) aligned north-east—south-west, was excavated in the centre of the cave where deep stratigraphy seemed to be most likely. It contained three well defined contexts (see Illustrations 309, left & 310, right).

- Context 10511 Sheep droppings and fragmentary shells: an abandonment layer
- Context 10512 An occupation zone of ash and shell lenses with peat and charcoal fragments
- Context 10513 Angular stones in a peaty matrix at a depth of 0.7m. The water table was reached at this point, in spite of the dry weather. This suggests a wet cave environment and may explain why no earlier deposits are apparent



Illus 310: SFS 105, Uags 1, Test Pit 1, east-facing section

Test Pits 2 and 3: (1m×0.5m) were both excavated outside the cave, beyond the drip line and away from the apparent spread of midden.

- Context 10520 Grass and wild flowers
- Context 10521 A rich organic soil overlying bedrock in Test Pit 2
- Context 10530 Grass and bracken
- Context 10531 A rich organic soil overlying bedrock in Test Pit 3

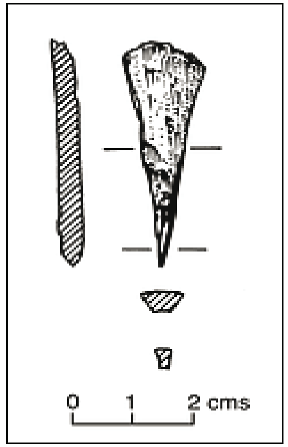
Finds

Lithics: There were ten lithic finds from Uags. Six came from the surface and Test Pit 1 yielded a further four. Seven pieces are of quartz, two of chalcedonic silica, and one of baked mudstone. There were four pieces of debitage, five regular flakes and a quartz blade.

Bone tools: One piece, (BT134) was found in context 10512. It is a fine point (see Illustration 311, right).

Bone: A cattle tooth and the vertebra of a small mammal were recovered from the surface layer context 10511.

Shell: Shell was only found in Test Pit 1 (see Table 96; Illustration 312, below). Limpet predominated, followed by periwinkle and a number of other species were present in much smaller quantities.

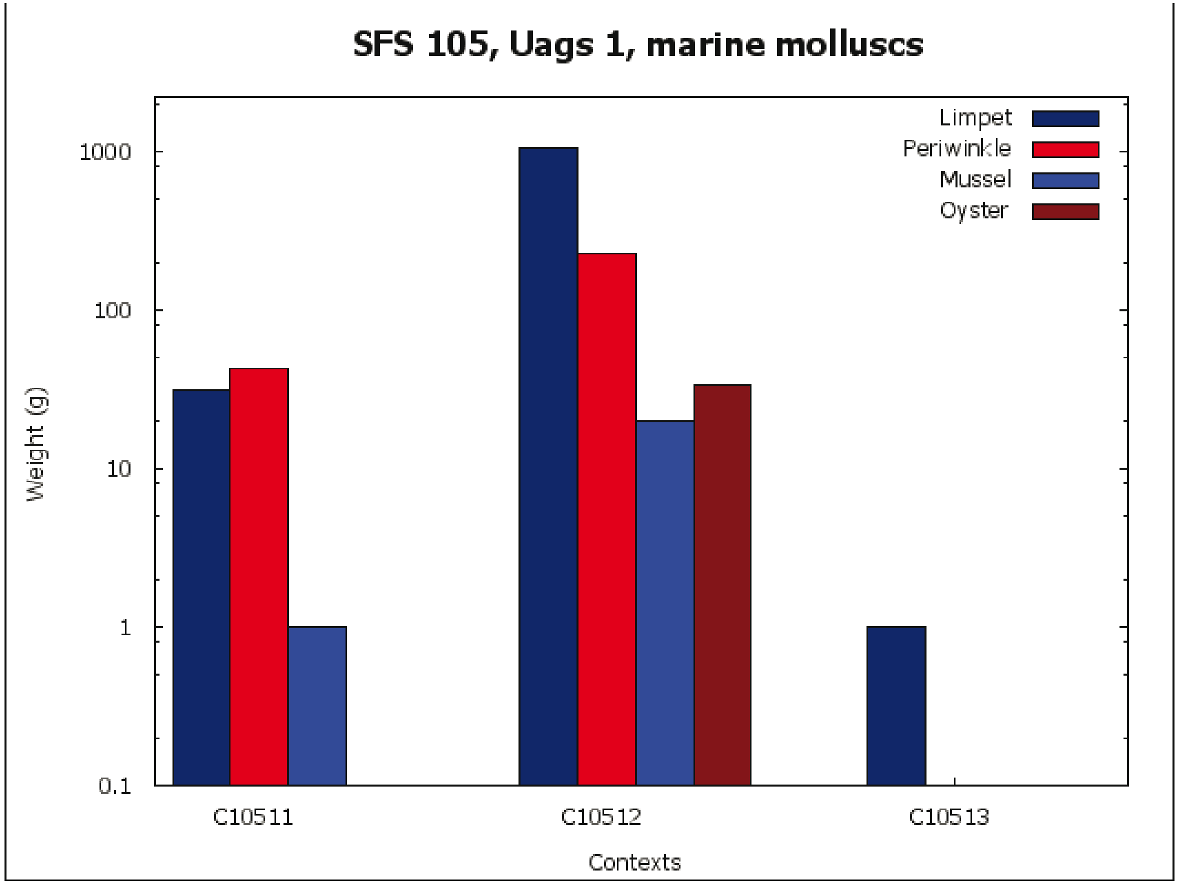


Illus 311: SFS 105, Uags 1, fine point

Table 96

SFS 105 Test Pit 1	limpet	periwinkle	mussel	oyster	cockle	clam	residue
Context 1	31	43	1				101
Context 2	1038	228	20	34	1	6	1406
Context 3	1						10

Table 96: SFS 105, Uags, marine molluscs, weight in grams for individual species by context



Illus 312: SFS 105, Uags, marine molluscs, weight in grams for individual species by context

Discussion

The coast here is exposed and rocky with little fresh water or agricultural land. Archaeological material was only found in one test pit and the remains are suggestive of a recent date, probably post-medieval, on comparison with other sites with similar stratigraphy. The lithics are not diagnostic and might be related to this or they could have come from earlier activity.

2.2.80 SFS 61: Uamh An Triall, NGR NG 6930 5472

Type of Site: Findspot
SFS Record: 2000
Survey Area: North Applecross
Size: Unknown
Aspect: N/A
Height OD: 15m
Ground Cover: Grass
Distance to Sea: 50m to west
Distance to Fresh Water: 20m to north
Threats: Grazing
Description: Molehill

Archaeology: A molehill in front of a natural rock fissure was found to contain a single quartz flake

Finds

Lithics: One quartz flake.

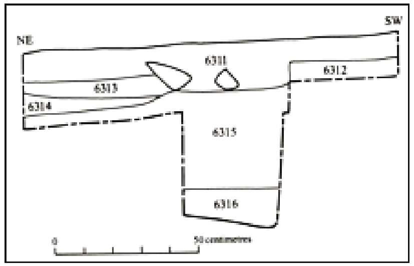
Discussion

There is little evidence of human activity here.

2.2.81 SFS 63: NGR NG 6935 5520

Illus 313: SFS 63, general view

Type of Site: Cave with structures
SFS Record: 2000
Survey Area: North Applecross
Size: 4m deep×4m wide×2m high
Aspect: South, level terrace at foot of cliffs
Height OD: 5–6m
Ground Cover: Grass and bracken
Distance to Sea: 30m to west, open shelving coast
Distance to Fresh Water: 10m to south
Threats: Human activity
Description: An easily found and sheltered site in an otherwise exposed coast (see Illustration 313, right). A waterfall splashes down the cliff outside the cave and the cave floor is wet and covered with liverwort and other mosses. A modern drystone wall has been erected outside the cave, well beyond the drip line.
Archaeology: One test pit was excavated



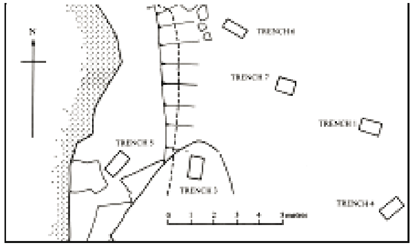
Illus 314: SFS 63, Test Pit 1, east-facing section

Test Pit 1: (1m×0.5m) aligned north-east—south-west inside the cave, with a depth of almost 0.7m (see Illustration 314, right).

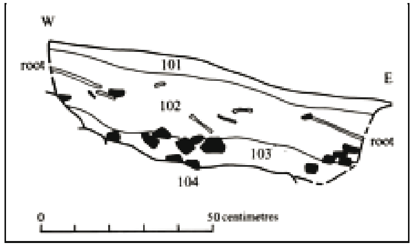
- Context 6311 A homogeneous charcoal rich surface soil
- Context 6312 An area of good flat paving which appeared to run around the periphery of the cave
- Contexts 6313, 6314, 6315 & 6316 A series of natural layers of silty sands and gravels
- Context 6317 Bedrock

Discussion

The only activity revealed in the cave was associated with the paved area, context 6312 and this surface midden layer contained modern pottery. It is possible that the paving represents a corn-drying kiln or an agricultural processing area with peripheral paving and a machine or implement in the centre. There were no other archaeological or prehistoric remains.



Illus 326: SFS 63, plan of Sand rockshelter with 1999 test pits



Illus 327: SFS 63, Test Pit 1, south-facing section

Illustrations 326 & 327 in Section 3.2 are repeated here for reference purposes.

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… > SFS_FD54.jpg [Illustration 86]
… > SFS_FD55.jpg [Illustration 87]
… > SFS_FD100.jpg [Illustration 94]
… > SFS_FD109.jpg [Illustration 108]
… > SFS_FD47.jpg [Illustration 110]
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… > SFS_FD107.jpg [Illustration 116]
… > SFS_FD62.jpg [Illustration 122]
… > SFS_FD61.jpg [Illustration 128]
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… > SFS_FD9.jpg [Illustration 166]
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… > SFS_FD65.jpg [Illustration 204]
… > SFS_FD12.jpg [Illustration 212]
… > SFS_FD13.jpg [Illustration 220]
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… > SFS_FD76.jpg [Illustration 250]
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… > SFS_FD43.jpg [Illustration 256]
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… > SFS_FD2.jpg [Illustration 327]

The following can be found at … > Artefacts > …

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… > Metal and Glass > SFS_M43.jpg [Illustration 91]
… > Worked Bone > SFS_BT5.jpg [Illustration 123]
… > Worked Bone > comb_photo.jpg [Illustration 124]
… > Metal and Glass > SFS_M48.jpg [Illustration 156]
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… > Metal and Glass > SFS_M13.jpg [Illustration 173]
… > Worked Bone > SFS_BT1.jpg [Illustration 214]
… > Metal and Glass > SFS_M52.jpg [Illustration 232]
… > Metal and Glass > pin_from_Meallabhan.jpg [Illustration 233]
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… > Metal and Glass > SFS_M37.jpg [Illustration 257]
… > Metal and Glass > SFS_M71.jpg [Illustration 258]
… > Worked Bone > SFS_BT134.jpg [Illustration 311]

3.1 Geographical background to Sand | Karen Hardy & Caroline Wickham-Jones with Mike Cressey

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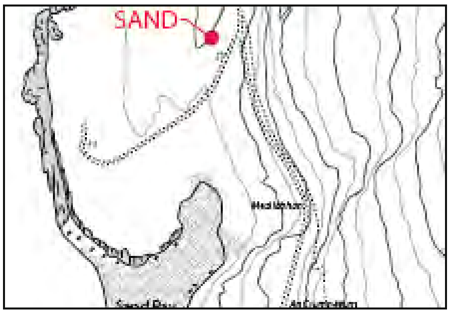
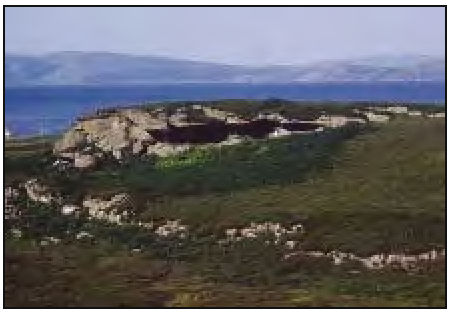
3.1.1 Introduction

The rock outcrop at Sand lies some 500m back from the sea, at the head of a small sandy bay on the west-facing coast north of Applecross (see Illustration 315, right). The shelter is an old sea cave that sits at a height of 27.7m above sea-level (asl) and faces north-east (see Illustration 316, below left. The island of Raasay lies across the Inner Sound behind Sand, with Skye in the background). It is shallow (see Illustration 317, below mid left. The site of SFS 96, Meallabhan, lies on the dune in the bay in the background), with considerable evidence of previous roof-fall, apparently prior to its use in the 7th millennium BC. The overhang today measures less than 3m deep at its maximum point; it is high enough for an adult to stand upright, and this is likely to have been similar in the past. Inside the shelter, dry sandy soil mixed with sheep faeces lies in a thin layer over bedrock and there is no archaeological preservation (see Illustration 318, below mid right).



Illus 315: Location map of Sand, contours at 10m intervals

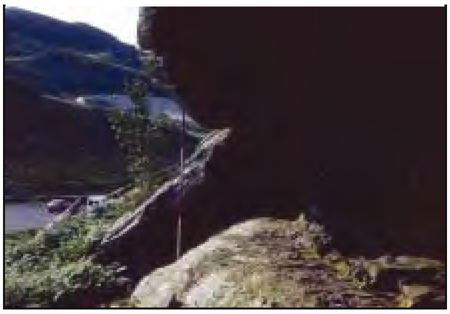


Illus 23: Distinct vegetation in front of the rockshelter at Sand in July

Outside the shelter, a gently sloping apron of land extends for some 20m, before dipping sharply down a craggy incline to a small burn that runs to the sea (see Illustration 319, below right. The slope of the apron may clearly be seen towards the left of the picture). This is likely to have formed the closest fresh water supply in prehistory; it is a short, steep walk uphill from the burn to the shelter. In spring the gentler slope of the apron is covered with close cropped turf; in summer a dense growth of bracken appears. There are surface indications that the apron may have been cultivated in times past. Even today the vegetation of the apron stands out sharply from the surrounding heather-clad moorland, though there is nothing to indicate the presence of midden deposits just below the surface across a part of it (see Illustration 23, right. The location of the apron is clearly to be seen but there is no indication of the midden deposits close to the rockshelter).

Illus 316: The rockshelter at Sand from the cliffs to the east

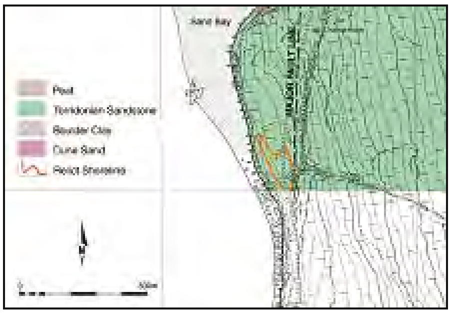
Illus 317: The rockshelter at Sand from the north



Illus 318: Interior of the rockshelter at Sand

Illus 319: Deturfing work across the apron in front of the rockshelter at Sand

3.1.2 Geology



Illus 321: Map of Sand area showing solid & drift geology

Illus 320: Outcrop at Sand during excavation

Illus 322: Bay at Sand with the dunes on the south side

The outcrop itself is made of calcium-rich sandstone in common with the Torridonian sandstones that dominate the Applecross peninsula and it is capped with peat (see Illustration 320, top right. Excavation was carried out on the apron infront of the rockshelter. The heather-covered peat capping to the rockshelter may be seen). The top of the outcrop lies at an altitude of about 36m asl. On the opposite side of the bay, a north-east—south-west trending fault line has uplifted the sandstone into an extensive cliff that rises to over 300m and overlooks the Sand rockshelter site (see Illustration 321, left, drawn by Mike Cressey). Towards the coast, the main lithology is marine alluvium and glacial till which is in turn covered by Holocene peat that varies in depth according to local topography. On the south side of Sand Bay, a spectacular migrating dune system rises against the sandstone cliff (see Illustration 322, bottom right. Also showing the site of SFS 96, Meallabhan). East of the Sand rockshelter, the valley is filled with fluvioglacial till where poorly sorted glacial sand, clay and gravels are extensive. Large, rounded boulders and cobbles are exposed within the base of a barrow pit opened up to build the nearby carpark and in the valley floor the deposits were noted to be rich in quartz pebbles, possibly a local source of raw material for tool manufacture in prehistory. Tertiary activity is represented by a series of east—west trending basalt dykes which are well exposed within the cliff overlooking the rockshelter.

3.1.3 Geomorphology

Illus 323: Track cutting across the platform to the west of the rockshelter at Sand

A track leads westwards away from Sand Bay to an old Royal Navy establishment on the coast to the north of the bay, and alongside this track lies a terrace associated with the Late Glacial Shoreline which extends northwards as a more distinct sinuous platform overlooking a level area leading to the sea (see Illustration 323, left. In the background lie the mountains of Skye, on the other side of the Inner Sound). The present shoreline consists of a rock platform with deep gullies formed as a result of continued erosion, the coast being exposed to wave impact from westerly and south westerly winds.

Illus 324: Close-up of the rocks along the outcrop at Sand

Dawson's research conducted as part of SFS indicates that the rockshelter itself was initially cut by marine action during the melting of the last (Late Devensian) ice sheet at a time when actual sea-level was in fact lower than it is today, but when the land lay even lower due to the weight of ice that had recently lain upon it (see Dawson, Section 7.1).

Since its emergence, the outcrop has been constantly weathered by the wind. The bedding planes within the sandstone trend north—south and continued attrition has lifted out the weaker areas within the beds (see Illustration 324, right). Cracks within the rockface have been further affected by freeze-thaw processes leading to frost-shattering and continued rockfall. This is attested by the talus slope running down from the mouth of the shelter. The talus consist of angular fragments of sandstone intermixed with soil derived from cover vegetation.

The wider geology and environment of the site and the Applecross peninsula are presented in detail by Shiel in Section 8.2.

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… > Documents > Final Reports > W-J,_Sand_Rockshelter_intro.pdf
… > Images > Maps > Location_map_for_Sand.pdf [Illustration 315]
… > Images > Maps > geomorph_map.jpg [Illustration 321]

3.2 Excavation at Sand, rockshelter | Karen Hardy

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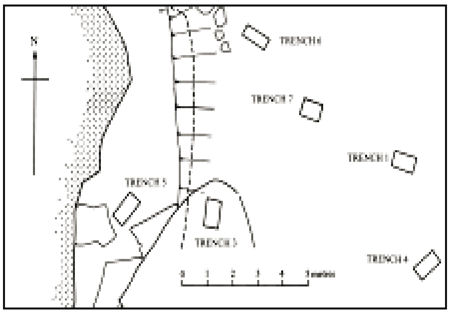
3.2.1 Introduction

Two seasons of excavation took place at Sand rockshelter (SFS 4), in 1999 and 2000 (see Illustration 325, right). The site was initially identified by the recovery of a microlith and shell midden material within a molehill in front of the rockshelter. Eleven test pits were placed in and around the rockshelter in 1999 in order to sample the midden, locate its extent and determine whether there was any evidence for activity beyond the midden limits. In 2000, two L-shaped trenches were opened in front of the rockshelter to examine in detail the shell midden, locate its limits more clearly and examine the area beyond the midden.

Illus 325: Sand rockshelter

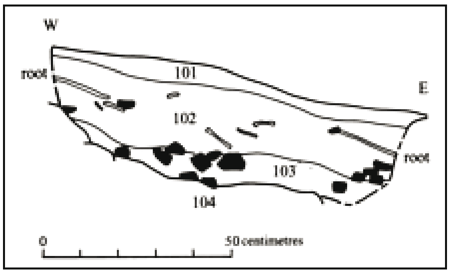
3.2.2 1999

Small numbers of shells were visible across the limited areas of bare soil within the overhang, while the terrace was entirely obscured by bracken and grass. The molehill containing the shells and lithics lay in the terrace area. The molehill disturbance was still visible, as were two distinct areas: one of nettles and one of yellowed bracken. A series of test pits was designed to locate and sample the midden across the terrace and to determine whether there was any evidence for prehistoric activity beyond the midden. A small number of additional test pits were excavated in front of a nearby shallow rockshelter (SFS 5: NG 6837 4936) and between the two shelters. All test pits measured 1m×0.5m. Further details of the lithics are contained in Section 3.3.1.



Illus 326: Plan of Sand rockshelter with 1999 test pits

Test Pit 1 was placed halfway down the gentle slope of the terrace to assess the extent of the midden. Little shell or bone was encountered, but lithics were common. A layer of what appeared to be fire-cracked rock was also encountered (Context 103; see Illustrations 327, bottom right & 328, left).



Illus 327: Test Pit 1, south-facing section

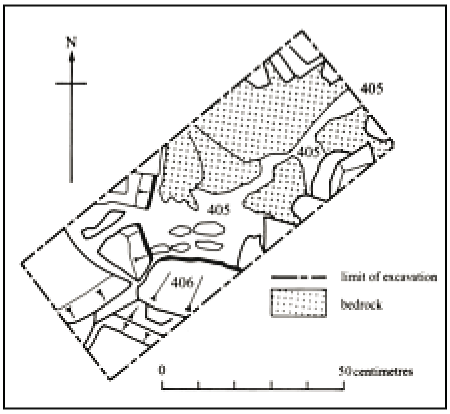
Test Pit 2 was placed beside the

Illus 328: Test Pit 1, layer of fire-cracked stone

molehill in order to examine the midden. Not surprisingly, the area was badly disturbed by moles, but some shell was found, together with a few lithics. The bottom of the trench comprised a sterile layer of rock.

Test Pit 3 was placed under an area of collapsed overhang to examine what was hoped might be an area with good preservation. There was, however, little archaeological material and bedrock was reached rapidly.

Test Pit 4 was placed near the edge of the terrace to determine the extent of the artefact spread located in Test Pit 1. Some artefactual material was recovered, along with a few fire cracked stones, but the density of material was considerably lower than in Test Pit 1 (see Illustration 329, right).

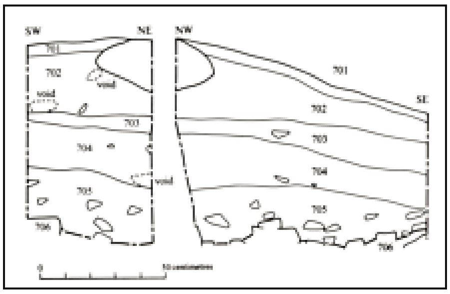


Illus 329: Plan of Test Pit 4

Test Pit 5 was excavated under the main rockshelter to assess the depth of deposits. There was little archaeological material and bedrock was reached rapidly.

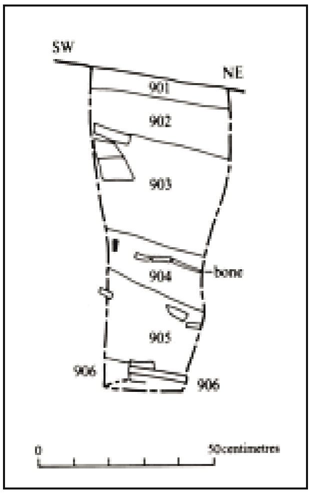
Test Pit 6 was excavated in front of the rockshelter. A thick layer of peat overlay a mineral soil. No artefacts were recovered.

Test Pit 7 was placed in an area of yellow bracken on the terrace. Shell material was encountered immediately. There was limited evidence of stratigraphic complexity (see Illustration 330, right), and excavation was stopped on reaching a sterile layer of rocks.



Illus 330: Test Pit 7, south-east- and south-west-facing sections

Test Pit 8 was excavated on the talus in front of the rockshelter. It revealed a shallow soil profile with no artefactual material.



Illus 331: Test Pit 9, south-east-facing section

Test Pit 9 was excavated in the nettle patch above Trenches 2 and 7 (see Illustrations 331 & 332, left). A very rich midden deposit was encountered. The shells included limpets and mussels; fishbones and crustacea were also identified. Other bone material included large fragments of antler and mammal bone, and there were small quantities of flaked lithics. At least one discontinuous layer of shattered rock was located within the midden. Excavation stopped at a layer that comprised fragments of rockfall with apparently no artefacts or ecofacts, though it was still dark and organic.

A second rockshelter nearby (SFS 5, Sand 2) was also test pitted (Test Pits 10 & 11), but contained no archaeological deposits.

Test Pit 10 was opened in front of the second rockshelter to reveal bedrock.

Test Pit 11 was excavated within the second rockshelter. Two pieces of quartz and one piece of modern china were recovered from a shallow soil profile.

A series of radiocarbon determinations taken on bone tools from the test pits relate to activity in the mid 6th millennium BC (Section 4), confirming the Mesolithic date of the site. Because of the spatial differentiation of the test pits and given the possibility of further excavation, no attempt was made to relate the stratigraphy one to

Illus 332: Test Pit 9, detail of east-facing section

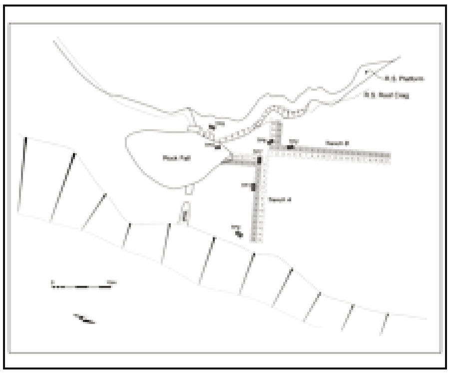
another, apart from to provide a general idea of the location and depth of midden material. This was used to inform the placing of excavation trenches in 2000.

3.2.3 2000

In April and May 2000 an extensive excavation was carried out at Sand I (SFS 4) over a period of four weeks.

3.2.3.1 Introduction

Excavation comprised the trenching of an open area in front (east) of the rockshelter at Sand 1, a shallow but wide overhang with a large terrace in front (see Illustration 333, below left). The excavation covered not only the midden but also an adjacent area of terrace to the north and east. Two conjoining L-shaped trenches (Trench A and Trench B) were laid out in order to give complete sections in two directions (north and east) across the site (see Illustration 334, right). The trenches ran out from the presumed location of the midden to provide a total coverage of *c* 90m² (see Illustration 335, below right).



Illus 334: Sand - the layout and numbering of the excavation trenches in front of rockshelter; B1 | B2

Illus 333: Sand - view of the interior of rockshelter

Illus 335: Sand - excavation work taking place in front of the rockshelter

3.2.3.2 Method

All work was conducted with regard to the Code of Conduct and Standards established by the Institute of Field Archaeologists.

Trench A measured 21m×2m, while Trench B measured 25m×2m. A metre grid was laid out over both trenches and each grid square was given a unique identifier comprising a combination of trench and square numbers: A1A, B16B, B8A etc. The first A or B corresponds to the trench, the number refers to the longitudinal location of the square in the trench and the second A or B refers to the lateral location of the square. From Spit 3, each square was divided into quadrants during excavation in order to locate sieved material more accurately (NW, NE, SW, SE) (see Illustration 336, right).

Illus 336: Sand - excavation taking place in front of the

rockshelter, view from the top of the shelter

Illus 337: Sand - overhead shot of the trenches at the end of excavation, showing those areas which had been subject to more detailed excavation

All finds and samples were recorded by grid square, quadrant and spit or, more rarely, Context (where obvious). Registers of all finds, drawings, samples and photographs were made. Turf was stripped right across the trenches to uncover the midden area and beyond. This allowed determination of the full extent and form of the midden. After removal of turf and the upper layers of topsoil over the entire trench areas, four specific areas of grid squares were selected for further investigation (Areas A, B1, B2, B3; Illustration 337, left; Area A1 runs away from the shelter to the right of the picture, Area B1 lies invisible below the overhanging rock; Area B2 comprises the central sector of midden, and Area B3 runs up to the left of the image).

The loose, shelly nature of the midden meant that contexts were difficult to discern in the trench so that excavation proceeded with the removal of arbitrary spits 50mm deep (see Illustration 338, right). The spits could then be tied into contexts using the information from the sections. The quadrant system allowed flexibility for contexts to change across the area of a metre square grid unit. In area B3 the clarity between some contexts was such that stratigraphic excavation could temporarily be adopted.

Illus 338: Sand - close up of the midden deposits. The loose nature of the midden meant that it was impossible to dig by context

Illus 339: Sand - the process of flotation

In area B1 an error was made when laying out the grid and the number B22 was omitted, this means that recording consistently labelled the grid squares one down so that B24 was labelled as B23 and so on. This error affected three grid numbers: B24, B25 and B26. It has been rectified in this text, in the catalogues and a memo to this effect put into all finds boxes (Appendix 3).

A 100% sieving strategy was adopted for all deposits below Spit 1. All residues were sieved through a flotation tank (see Illustrations 339, left & 340, right). The flot was caught by 1.0mm and 0.3mm sieves and the residue was retained by a 1mm mesh except for the first day when a 2mm mesh was used in the absence of the correct mesh. Individual samples were taken for specialist examination (soils and on site pollen). All sections were drawn and photographed and plans made of significant contexts as well as at the termination of excavation.

Illus 340: Sand - bags waiting to go into flotation tank. The speed of flotation determined the amount of on-site finds processing that could be done

On completion of excavation, the trenches were lined with heavy duty plastic, backfilled and returfed in order to stabilise the remaining deposits.

3.2.3.3 Results

In places, the midden reached to the surface turf layer. Consequently, as deturfing proceeded, all turf undersides were checked for artefacts and recorded to location, as far as possible. Eventually this proved too time-consuming and, as considerable disturbance was evident (for example in the form of bracken roots), the recording of artefacts from this deturfing layer (Spit 1) was abandoned (see Illustration 319, right).

Illus 319: Deturfing at Sand, removing bracken roots

A total of 29 contexts was identified. In order to clarify and simplify these and the relationships between them, they have been resolved into a table (see Table 97, below) that identifies their relationships to one another and their location in the excavated areas.

Table 97

Sand Context Description	Context Numbers	Area
Topsoil and turf in Trench A (incomplete)	1, 1/2, 1/3	ALL
Topsoil and Turf in Trench B, row B	1, 1 /2, 1/3	B2, B3 & to N
Main shell midden	13, 11, 12, 13/23, 13/24, 13/23/24, 24	B1, B2, B3
Shell midden	28	A
Slumped stony deposit between midden and sandy soil	27	A
Sandy soil with heat cracked stone	17, 18, 29, 17/27	A
Palaeo-channel and below	5, 14, 14/21	B3
Slopewash over palaeo-channel	7/8	B3
Lower organic rich silt (below midden)	22	A & B3
Natural	21, 26, 25	ALL

Table 97: Sand, Resolution of Contexts

Trench A consisted of 41 grid squares (A1A–A21A, A1B–A20B) and extended southwards along the terrace to terminate in the south at a substantial rockfall, and east down to the edge of the sloping apron in front of the rockshelter. Bedrock was encountered at the eastern end of the trench at a depth of 0.3–0.4m, while subsoil was encountered at the southern end of the trench at a depth of 0.3–0.4m. The topsoil in the western half of the trench contained large quantities of fragmented shell. Animal burrows were noted throughout the topsoil.

Area A

Six grid squares (A1B–A6B) positioned close to the edge of the shell midden, and stretching for six metres downhill (E) away from the midden, were fully excavated to natural or bedrock. Mesolithic deposits (mainly shell midden Contexts 6 & 28) were visible to a depth of almost one metre throughout the area. In squares A1–A4, a natural paleosol (Context 25) lay below more presumed Mesolithic material (Context 22) that did not comprise midden (see below). Context 25 lay over the bedrock (Context 3), while in

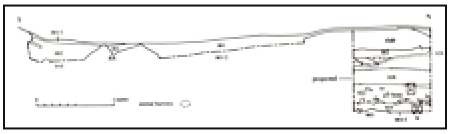
Illus 342: Sand - Trench A, south-facing section

Illus 341: Sand - Trench A, final shot

squares A5 and A6 rockfall (Contexts 3/4) interspersed with sandy silt containing 30–40% mostly fire-cracked stone (Context 17), and darker coloured silt with no stones or artefacts (Context 18), was encountered below the Mesolithic deposits.

The surface layers, Contexts 1/1 (a thin band of turf and dense root matter) and 1/2 (shell-mixed topsoil), covered the whole excavated area to a depth of between 50mm and 150mm.

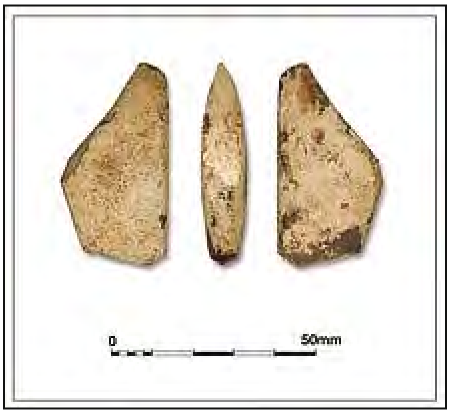
Illus 343: Sand - Trench A, east-facing section



Illus 344: Sand - Trench A, east-facing section showing a fallen slab towards the top of the section

Illus 345: Sand - Trench A, north-facing section showing slab in place to right of picture

In the highest squares (A1B, and A2B quadrants NW, SW), adjacent to Trench B in front of the rockshelter, midden deposits were quickly uncovered below the turf. Initially the material was stony and loose (Context 27), but this gave on to dark shelly material (Context 28). Context 28 appeared to represent slump from the sloping front edge of the midden. The shell deposits extended for over one metre into the trench and had a maximum depth of 0.4m. Two different episodes of slumping (Contexts 28/1 & 28/5) could be discerned within the slumped midden deposits (Context 28) (they are not differentiated on the section). Context numbers 28/2 and 28/3 are thin layers of degraded shell overlying and underlying Context 28/1 while Context 28/4 is a layer of crushed shell overlying Context 28/5 (see Illustration 343, left). It is possible that these layers represent a time when the slump lay open for a brief period. One of these episodes was clearly related to a single large stone slab which had fallen from the rockshelter area onto the top of the midden (see Illustrations 344 & 345, both right), though the mechanics of the movement of this slab remain unclear.



Illus 346: Sand - polished stone axe

The shell midden deposits (Context 28) overlay organic-rich, silty deposits (Context 22), but were also both overlain (uphill) and underlain (downhill) by a slumped stony deposit (Context 27). Context 27 sloped down to the east and at its lower end it was overlain in turn by a layer of sandy soil with heat-cracked stone (Contexts 17/29). Below the shell midden (Context 28), the organic-rich deposit (Context 22) lay directly over a sterile palaeosol (Context 25) and had a length within the trench of 1.35m and a maximum depth of 0.25m. During excavation, it was thought that Context 22, a substantial shell-free midden-like deposit of dark silt with large quantities of mammal bone and antler, and Context 27, a slumped stony shell-free deposit, must pre-date the shell midden (Contexts 6 & 28) because of their position downslope and partially underneath it. In this respect, the presence of a polished stone axe, of generally Neolithic type, at the juncture of Contexts 27 and 22 was not well understood (see Illustration 346, right). During post-excavation, the determination of two radiocarbon dates from mammal bones within Context 22 has served to clarify the situation. Both dates relate to the mid 6th millennium BC and are thus considerably younger than dates obtained from the shell midden (Section 4), so that the shell midden is now understood to have slumped over Context 22 at some point soon after the deposition of Context 22.

Overlying the midden deposits in A2–A4 were two layers of sandy soils (Contexts 29 & 17) and a slumped stony deposit lay between

Illus 347: Sand - Trench A, showing slabs downslope

the midden (Context 28) and the sandy soil (Context 27). Both Contexts 29 and 17 contained a high percentage of small and fragmented stones, many of which were fractured from exposure to extreme heat. These sandy soils with heat-fractured stones (Contexts 29 & 17) are interpreted as slopewash and they extended for *c*2.5m downslope to the east where the heat-fractured stones built up against a number of large fallen boulders (Contexts 19 & 3/4) which had acted as a dam to further downslope movement (see Illustration 347, left). Context 27 was hard to interpret and is best understood as representing the disturbed separation between the midden (Context 28) and the mobile slopewash layers above (Contexts 29/17).

To the east of the fallen boulders, no archaeological deposits were identified; Contexts 25 and 26 are both natural deposits.

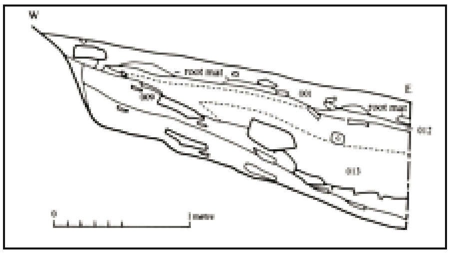
Trench B: Trench B consisted of 51 grid squares (B1A-B25A, B1B-B26B) and extended from the rockshelter platform eastwards down the steeply sloping talus and northwards across the width of the bracken-free terrace. Although the whole of Trench B was deturfed, only three blocks of grid squares (Areas B1-3) were excavated in detail. Fragmented shells were prevalent throughout the topsoil in the southern part of the trench overlying the midden area. Molehills had been noted within and immediately adjacent to the trench and excavation was hampered by severe animal disturbance within the shell midden deposits.

Area B1

Area B1 consisted of seven grid squares (B24B–B27B, B24A–B26A) forming the west arm of Trench B and extending west to the edge of the rockshelter platform (see Illustration 334, above)

Illus 348: Sand - Trench B, Area B1, shell midden (013) showing the build up of angular slabs (009) between it and bedrock

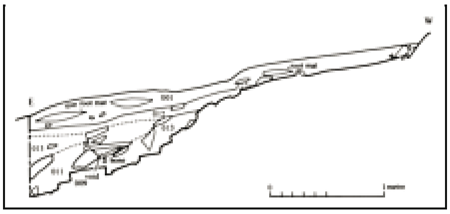
At the west edge of the rock platform, bedrock lay at a depth of 0.6m below current ground level and it then sloped steeply to the east to a depth of almost 1m below ground level. A series of sterile natural sand and silt layers (Contexts 20 & 21) lay above bedrock, and above these was a considerable natural deposit of angular stone slabs (Context 9) which had eroded from the roof of the rockshelter and lay within a layer of rock and sand (Context 10) 0.25m deep (see Illustration 348, left). The voiding between many of the stones suggests that this layer was formed relatively quickly.



Illus 349: Sand - Trench B, Area B1, south-facing section, showing bedrock to the west

The shell midden deposits (Contexts 6/13) had accumulated directly on top of the fallen rock. Excavation exposed the western edge of the midden where it had formed just below the rockshelter (see Illustration 349, right). The midden deposits had a maximum depth of*c*0.6m and there was little stratigraphical variation (see Illustration 350, lower left; the midden deposits had little obvious stratigraphical variation, but a layer of crushed shell is visible at top to the east). Above a bottom layer of mixed rockfall and sand (Context 9/10), the bulk of the midden deposits

Illus 350: Sand - Trench B, Area B1, from the south-west

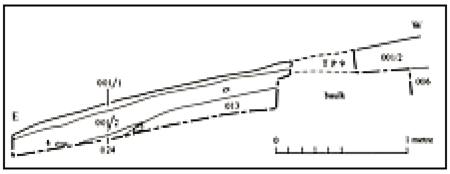


Illus 351: Sand - Trench B, Area B1, north-facing section, showing the position of context 11

comprised a dense mass of unconsolidated shell (Context 13), which appeared to consist mainly of intact limpet shells. Large fragments of mammal bone and antler lay near the base of this deposit, and a child's molar was recovered from higher up in this area (B25A NE, Spit 4, Context 13). Three radiocarbon determinations were made on bone tools from Context 13 in this area and all relate to the mid 6th millennium BC (Section 4). The shells became more degraded towards the top of the midden where a clear band of crushed shell (Context 12) 0.05m deep, was visible in section running along the top of the midden deposits, in particular at the extreme western (uphill) edge of the midden under the rockshelter. This Context is interpreted as a deposit affected by post-depositional pressures such as might result from its use as a path through the rock-shelter. Towards the south-eastern part of the area a darker grey and ashy layer of shells (Context 11), sloped in an east-west direction within Context 13, and provided the only stratigraphical variation visible within this part of the shell midden (see Illustration 351, right). Occasional rock slabs (Context 9) were visible within the shell midden but there was no pattern to these and they are likely to relate to natural roof fall. All of these deposits were overlain by a layer of shell-rich topsoil (Context 1/2) of 0.15–0.2m depth and substantial bracken root mat.

Area B2

Area B2 was made up of four squares at the centre of the excavated area (B1B, B2B, B1A, B2A), where the trench was presumed to overlie the midden (see Illustration 334, above). Due to pressures of time the area was excavated to a depth of only 0.35m, in a series of four spits, after initial cleaning of topsoil (see Illustration 352, right).

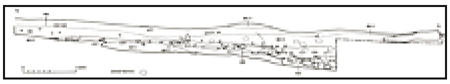


Illus 352: Sand - Trench B, Area B2, north-facing section

The excavation revealed the surface of the main midden deposit (Context 13) which sloped gently down to the east. Overlying this was a layer of mixed fragmented and intact shell (Context 24) which had tipped or washed down the front face of the midden. A human tooth (adult incisor) was recovered from B1A Spit 3 (the top of Context 13) and this has been dated to 2040–1880BC (AA-50698, Section 4) while some traces from metalworking including slag (Section 3.9) were also found here. Given the loose matrix of the midden, it is not surprising to discover that some material has percolated down and this is discussed further below. The midden deposits in Area B2 were overlain by shell-rich topsoil (Context 1/2) and a thin layer of cropped grass turf (Context 1).

Area B3

Area B3 consisted of seven grid squares (B3B—B8B, B8A; see Illustrations 353 & 354, right). These began at the northern extremity of the midden and continued along the terrace, roughly parallel with the line of overhang. The current ground surface is almost level; bedrock was identified at a depth of *c*0.2m to the north and *c*0.7m to the south.



Illus 353: Sand - Trench B. Area B3, west-facing section

Much of this trench (B3B–B4B)

Illus 354: Sand - Trench B, Area B3, east-facing section

Illus 355: Sand - Trench B, area B3, north-facing section showing the loose nature of the midden and animal disturbance

had been disturbed by mole activity (Context 23) to a depth of 0.4–0.5m below current ground surface (see Illustration 355, left). Shell midden (Context 13) was only identified in the south-western corner of the area beneath the animal disturbance (B3 NW, SW) and this sloped gently down to the south in a layer of 0.35m maximum depth. Above the midden a shell-rich mixed topsoil (Contexts 1/2 & 1/3) extended to B5B. A layer of tipped shells (Context 24) was visible to the east of Context 13 though the relationship between the two had been obscured by animal disturbance (B3 NE, SE, B4 NE).

Illus 356: Sand - Trench B, Area B3 from the south, showing the stony deposit of slopewash 7/8

The shell midden and related deposits (Context 13) in the SW of Area B3 partially overlay a thin layer of brown sandy-silt (Context 8) which contained numerous small stones of varying geological origin (Context 7) and has been interpreted as slopewash. This stony slopewash deposit (Context 7/8) stretched for over 4m towards the north (see Illustration 356, left). It thus continued away from the midden, and overlay Context 5, a palaeochannel. It had a maximum depth of 0.22m and contained many small stones, some angular and some smoothed beach pebbles. Significant quantities of degraded bone survived within the soil matrix of Context 7/8 despite the fact that there was no shell present within this layer.

Illus 357: Sand - Trench B, Area B3 from the north, showing the slopewash deposit 7/8, overlying 5 the palaeochannel in the foreground

An organic-rich palaeochannel (Context 5) was identified at the base of the trench from B5B-B7B, immediately below the slopewash Context 7/8 (see above), it ran from north-west to south-east across the bedrock (see Illustration 357, left). Beneath the palaeochannel deposits, bedrock was much degraded and fragments of stone were found within the overlying deposits (Context 3/2). In some places (B7B) wash from the bedrock had formed pockets of compacted fine sand (Context 14), the surface of which contained many tiny chips of worked stone.

Underlying all of the deposits in the southern metre square of the area (B3B) was a layer of dark silt containing large quantities of mammal bone and antler fragments, and stones (see Illustration 361, left). This seems to equate with the organic-rich deposits Context 22 that lay below the shell midden deposit Context 28 in Area A. Context 22 here lay directly on bedrock which dipped sharply to the south. Several angular rockfall slabs (Context 9) were also located here.

Illus 358: Sand - Trench B, base of Area B3 after removal of 7/8 and

3.2.4 Discussion

The excavation achieved the aim of obtaining information regarding the composition, complexity and chronology of the Mesolithic deposits at Sand. The excavated areas exposed the edge of a substantial shell midden on three sides (north, west and east) and uncovered enough information to suggest the original shape of the midden. Measuring some 8m×8m and

Illus 359: Sand - Area B1, top of Spit 5 from the E, showing the midden abutting the floor of the rockshelter

Illus 360: Sand - Area B3, east-facing section, showing the loose midden deposits as the bedrock floor drops downhill to the east

up to 1m deep, the surviving deposits comprise some 50m³, of which approximately 16% was excavated. Tip lines within the midden deposits indicate that there was a heaped mound of shell which has since been truncated by a variety of processes. On the uphill side, the shell seems to have built up against the edge of the rock platform within the shelter (see Illustrations 359 & 360, right) and 7m downhill (to the east) it comes to rest at a natural angle. There was no evidence for a retaining or revetting wall at the front (downhill) face of the midden. Indeed, the slumped deposits suggest that this may have been an unstable location. Fragmented shell towards the top of the midden reflects various crushing processes but a thin depressed band of crushed shell around the edge of the rock platform seems to represents a path over the shells. This process could have occurred at any time since the deposition of the midden (see below).

The general stratigraphy within the main shell midden is interesting. There was no indication of seasonal soil build up, nor of any vegetation regeneration within the midden despite the great quantity of shell. This would suggest that the main midden built up quickly and continuously and this is supported by the dates.

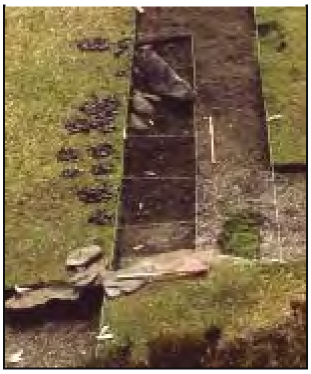
At the eastern edge of the midden (downslope) an area of shell free deposits lay below the shell midden and this was at first interpreted as an earlier, pre-midden deposit. The find of a polished stone axe and two mid 6th millennium BC radiocarbon dates contradict this (Section 4). It would seem that the midden has slumped over this deposit after to its deposition, thus covering deposits that appear to relate to early Neolithic activity.

Illus 361: Sand - Trench A from the east showing the deposits downslope of the midden

Fallen slabs of rock from the roof of the rockshelter were identified both within the shell midden and below it, between the shell (Context 13) and shell-free (Context 22) middens. It is likely that slabs like these had either slipped, or been pushed (or laid) from the areas of loose slabs around the rockshelter. Not surprisingly, the slabs indicate that material was constantly moving in a downslope direction and this makes the preservation of in situ early remains outside the midden unlikely (see Illustration 361, left). While it is also possible that material may have been buried and sealed as the midden moved downslope, there was no indication of this in the area investigated.

No structural evidence was revealed within the midden as excavated, and nothing survives in the rockshelter. The excavation also examined the areas around the midden to search for related features. Context 7/8 had the superficial appearance of an in situ cobbled layer, but the distribution of small stones throughout the deposit, and its characteristics seem to indicate that this material comprises slopewash derived from an area upslope, between the trench and the rockshelter. At the midden edge, the relationship between the slopewash and the midden was unclear; there was much disturbance from animals here.

The abundance of fire cracked stones in the area downslope of the midden deposits is noteworthy (see Illustration 362, left). These must relate to human action, perhaps indicating an activity area to the north or east of the excavation trenches on the terrace in front of the rockshelter. This would be in agreement with work on the use of caves and rockshelters elsewhere (see Pollard 1990). Unfortunately the one (albeit limited) trench that was excavated downslope of the midden found no sign of surviving in situ features.



Illus 362: Sand - Trench A, the top of Spit 4 from the west, showing the accumulations of fire cracked stone removed from Spit 3

There is, however, evidence from the quantity and type of artefacts away from the midden that would support activity both here and elsewhere across the terrace.

Finally, it is necessary to consider the possible disturbance to the Mesolithic deposits. Not surprisingly there are indications (albeit slight in comparison to the midden deposits) for activity in or around the rockshelter from most major periods of human history and prehistory. Perhaps clearest after the formation of the midden is the pathway of crushed shell (Context 12) which cuts across the surface of the midden just below the rockshelter and which may date to any time from the Mesolithic onwards. The presence of a polished stone axe in deposits of more recent (6th millennium BC) date attests to activity in the early farming period and the barbed and the tooth from area B2 (dated to the 2nd millennium BC), together with the barbed and tanged arrowhead suggest that people were around in the Bronze Age. Iron Age and later material includes some of the metal and metalworking evidence, as well as the glass beads (Section 3.9). Most recently, there are pot sherds and glass indicative of medieval and post-medieval activity.

Given the amount of later finds it is important to consider the integrity of the Mesolithic material. The summary table (see Table 98, below) suggests that though later material does occur in varied Context s, the majority lies in the upper spits. It is also notable that there was no major disturbance of the midden surface apart from the crushing which may have taken place shortly after it was deposited. In addition, the later material, though varied in date, comprises only small fragments and single artefacts. Perhaps the most prominent indications of more recent activity comprise those related to an episode of small scale smithing for which the shelter would have been eminently suited. These finds included small pieces of slag and a fragment of hearth bottom as well as droplets of copper alloy. They indicate a single episode of short lived duration that included both iron working and bronzesmithing (see Hunter, Section 3.9), probably in later prehistory. The smith (or smiths) did not, however, leave substantial trace of their passing.

Table 98

Find	Area / square	Spit / Context	Associated Date if present	Period
pathway	B1	Surface Context 12		Post Midden
Polished stone axe	A/A2B	Spit 8 Context 27	5630 to 5470 BC	Early Neolithic?
human upper left incisor	B2/B1A	Spit 3 Context 13	2150–1770 cal BC	Bronze Age
Barbed and tanged arrowhead		Surface		Bronze Age
Casting waste	A/A2B A/A1B	Spit 6 Context 17 Spit 2 Context 1/2		Bronze/Iron Age
Glass beads	A/A4B	Spit 2		Iron Age –

	B3/B5B B3/B8B	Context 17 Spit 4 Context 1/2 Spit 2 Context 1		post Roman
Slag	A/A2B B2/B2A B3/B5B B3/B21A	Spit 3 Context 29 Spit 4 Context 13 Spit 3 Context 1 Spit 2 Context 1		Iron Age?
Coarse pottery	A B1 B2 B3	Spits 2–6 Contexts 1/17/28/29 Spits 2–4 Contexts 11/12/13 Spits 1–4 Contexts 1/13/24 Spits 1–7 Contexts 1/7/8		?post-Medieval
Glass sherds	A/A5B A/A6B A/A6B	Spit 1 Context 1 Spit 2 Context 17 Spit 1 Context 1		post-medieval
Glass bead	B1/B25A	Spit 3 Context 13		15th–18th century AD
Fragments of metal	B1/B24B B3/B5B & B21B	Spit 6 Context 13 Spits 3 & 1 Context 1		?
Nails	A/A2B & A6B B2/B1B B3/B4B	Spits 3 & 2 Contexts 17/29 Spit 4 Context 24 Spit 1 Context 1		?
Knife tip	A/A6B	Spit 1 Context 1		?

Table 98: Summary of later material from the shell midden at Sand

The shell midden at Sand lies in a prominent and convenient spot and is by nature of a loose matrix. It is not surprising to find that over the years people have been attracted to the rockshelter and that debris has percolated down into the Mesolithic material. Parks and Barrett (see Section 3.11) discuss the presence of burrowing animals into the midden, but there is no evidence for any great disturbance of the midden apart from the obvious animal burrows noted above in Area B3.

It is interesting to note that all of the dated Mesolithic material relates to early in the Scottish sequence (see Section 4), though in one area, Area A, the presence of later deposits and a polished axe dated to the very latest Mesolithic / Early Neolithic (mid 6th millennium BC) provides a tantalising indication of activity relating to a particularly poorly known period.

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- … > Images > Artefacts > Coarse and ground stone tools > Axe_photo.jpg [Illustration 346]

The following are all within category … > Images > Plans and Sections > …

- … > SFS_FD6.jpg [Illustration 326]
- … > SFS_FD2.jpg [Illustration 327]
- … > SFS_FD1.jpg [Illustration 329]
- … > SFS_FD3,_4.jpg [Illustration 330]
- … > SFS_FD7.jpg [Illustration 331]
- … > Sand_explanatory.jpg [Illustration 334]
- … > SFS_FD16.jpg [Illustration 342]
- … > SFS_FD18.jpg [Illustration 344]
- … > SFS_FD26.jpg [Illustration 349]
- … > SFS_FD28.jpg [Illustration 351]
- … > SFS_FD22.jpg [Illustration 352]
- … > SFS_FD19.jpg [Illustration 353]
- … > SFS_FD20.jpg [Illustration 354]

3.3 Excavation at Sand, the flaked lithic assemblage | Caroline Wickham-Jones

3.3.1 Introduction

Over 16,500 pieces of flaked stone have been recovered from Sand, 451 pieces prior to excavation and over 16,000 pieces from the main excavation in 2000. Because of the different recovery methods, and recording systems, the pre-excavation material has been dealt with separately prior to consideration of the stratified material.

3.3.2 Pre-excavation lithics

This material includes the pieces of flaked stone recognised by Steven Birch when he first visited the site as well as the assemblage recovered from the 11 test pits dug across the site in 1999. Not surprisingly, it reflects the assemblage from the main (2000) excavation, both in content and raw material (see Tables 99 & 100, both below; and Illustration 363, below). See Section 5 for a full discussion of lithic raw material use around the Inner Sound. There is a slightly higher percentage of baked mudstone in the 1999 assemblage, but this may well be a reflection of one of the initial concerns of the project which dwelt on the use of baked mudstone. Skip Tables. Skip Chart.

Table 99

Sand Material	Quantity	Percent of Total
Chalcedonic Silica	70	15%
Baked Mudstone	192	43%
Rùm Bloodstone	32	7%
Quartz and Quartzite	143	32%
Agate, Jasper, Rock Crystal	8	2%
Coarse Stone	5	1%
Unknown	1	<1%
Total Assemblage	451	100%

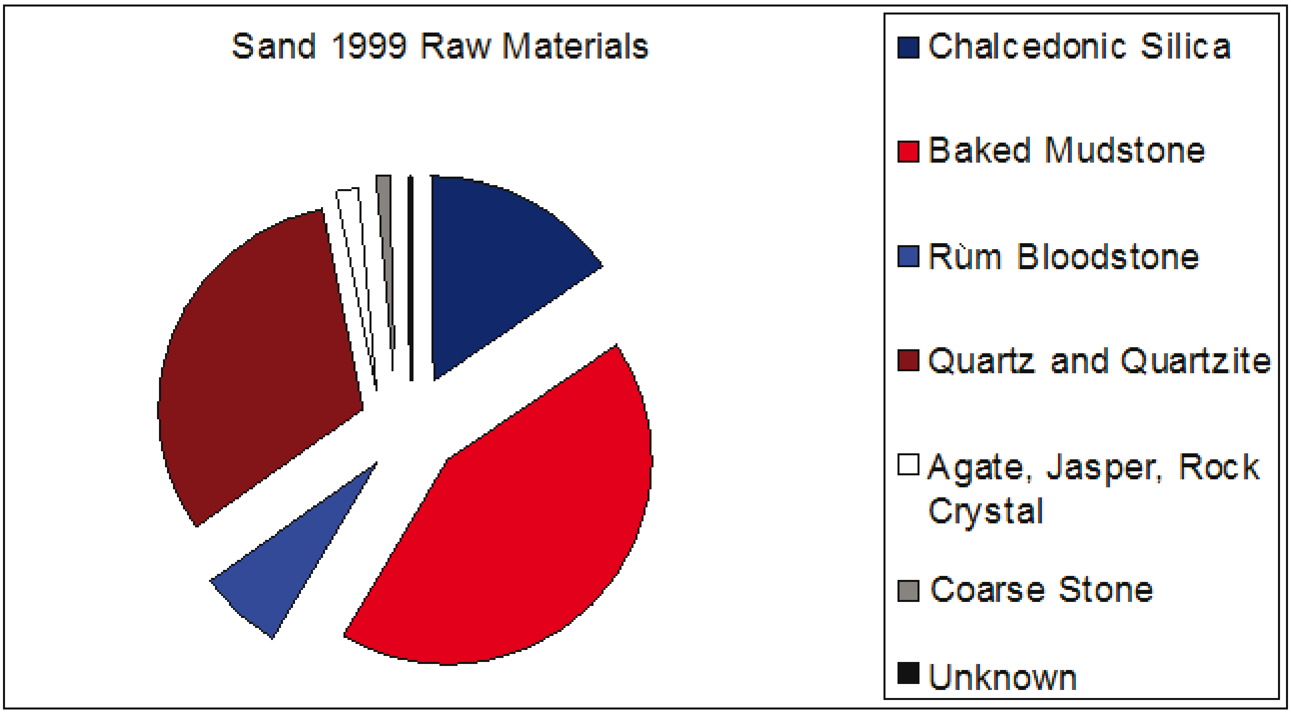
Table 99: Lithic raw materials in the Sand 1999 assemblage

Table 100

Trench	Quantity

Surface	122
TP1	81
TP2	110
TP3	2
TP4	2
TP5	7
TP7	77
TP9	48
TP11	2

Table 100: Sand, location of the 1999 lithics by test pit



Illus 363: Breakdown of lithic raw materials in the Sand 1999 assemblage

3.3.3 Location of the 1999 lithics

Table 101 (below) shows that the lithic assemblage was not evenly located across the test pits dug in 1999. In general it suggested, as was later found by excavation, that the lithic concentration was to be found on the apron immediately outside of the main rockshelter. As with the excavation in 2000, no lithics were found within the rockshelter where the ground was heavily eroded.

Table 101

Type	Quantity	Percent
Pebbles	11	2%
Cores	7 (1 plat; 6 bip)	1.5%
Chunks	121	27%
Debitage flakes	67	15%
Regular flakes	211	46.5%
Blades	18	4%
Microliths	8	2%

Edge retouched pieces	4	1%
Scrapers	2	0.5%
Barbed and tanged point	1	0.25%
Miscellaneous retouch	1	0.25%
Total	451	100%

Table 101: Breakdown of the flaked lithic assemblage from Sand, 1999

3.3.4 The nature of the lithic assemblage

The assemblage recovered in 1999 (see Table 102, below) reflects that recovered in 2000, with the exception that regular flakes and blades form a much more significant part of the 1999 assemblage. This is likely to be due to the collection techniques which unwittingly reduced the quantity of debitage.

Table 102

Sand Context	Type	No of Lithics
1	topsoil and turf*+	3,152
1/2	topsoil mixed with shell*	294
1/3	topsoil and turf*	47
5	Organic rich palaeo-channel, area B3	79
7/8	Sandy-silt, slopewash, over 5, area B3	1,052
11	Ashy layer of shells, within 13, area B1	74
12	Band of crushed shell, over 13, area B1	162
13	Main shell midden, over 6, under 12, area B1 & B2	903
13/23	Shell midden disturbed by moles, area B3	365
13/24	Shell midden and discrete tips disturbed by moles, area B3	48
13/23/24	Shell midden and discrete tips disturbed by moles, area B3	227
14	Fine sand washed from bedrock, under 5, area B3	76
14/21	Base of 14	3
17	Sandy soil, over 28, containing heat cracked stone, area A	3,389
17/27	disturbed	268
21	Natural, over bedrock	45
22	Organic rich silt, under 28 & 13, area A & B3	1,875
24	Fragmented shell, over 13, area B2	184
25	Sterile palaeosol, under 22 and 27, area A	113
26	natural	11
27	Stony slump, under 28, area A	504
28	Shell midden, over 22, various tips visible, area A	519
29	Sandy soil, over 28, containing heat cracked stone, area A	999
	Total	14,389

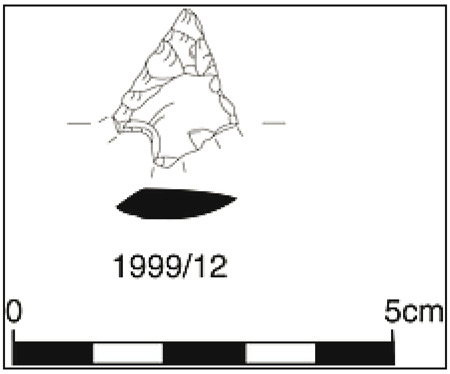
Table 102: Sand, lithics by context; Back to 'Sect 3.3.12 Context'

* = not completely catalogued; + = not all artefacts recovered

3.3.5 Significance of the 1999 assemblage

A discussion of the assemblage in terms of the interpretation of activity at Sand is to be found below. This assemblage is of additional significance, however, because it confirmed the presence of archaeological deposits at Sand and indicated that these included at least some Mesolithic activity (Finlayson *et al* 1999). The test pits provided basic information, but detailed excavation was necessary in order to look at the record of human history at Sand with more precision.

Finally, the presence of a single barbed and tanged point (see Illustration 364, right), recovered by Steven Birch from a molehill during his first visit, to the site is worth noting. This is indicative of activity in the Bronze Age and unlikely to have any relationship with the Mesolithic site. It is interesting to note that there is a Bronze Age date from one of the three human teeth recovered from the midden (B1A Spit 3, Context 13; 2150–1770 cal BC; AA-50698), especially in light of the insertion of burials into midden sites in the Bronze Age (Pollard 1990), though no other human bones occur, and whether three teeth really represent a burial is debatable. It is possible that some small-scale smithing work also took place on top of the midden in the Bronze Age (Sections 3.2 & 3.9) but this left no trace of deliberate alteration of the rockshelter or earlier deposits. In general, the paucity of evidence for Bronze Age activity suggests that this arrowhead represents an isolated loss in the field rather than a suite of settled domestic activities. This is, of course, a likely scenario for arrowheads and has been noted elsewhere, for example at Kinloch on Rùm where the similar find of an isolated Bronze Age arrowhead in advance of the excavation of Mesolithic remains must be dismissed as coincidence (Wickham-Jones 1990).



Illus 364: Sand – the barbed and tanged arrowhead, baked mudstone

3.3.6 The excavated assemblage

The excavations in 2000 yielded over 16,000 pieces of flaked stone, of which 14,389, from 23 contexts, have been catalogued. Due to limited time and money it was not possible to catalogue everything and so the analysis concentrated on pieces recovered from contexts below the topsoil and turf.

3.3.7 Stratigraphy

Lithics were recovered from a total of 23 contexts (see Table 102, above) and there were three contexts (6, 9 & 10) which yielded no lithics. In order to simplify understanding of the site the contexts were amalgamated into related units (see Table 103) and this forms the basis of the following discussion. Detailed analysis of Sand suggested that there was no major chronological or cultural divergence in the majority of the finds from the midden (Section 3.2.4), so that for the purposes of the technology and materials the lithic assemblage has been regarded as a unity. This assumption is supported by an examination of the individual aspects of the assemblage.

Table 103

Sand Context Description	Context Numbers	Area	No of Lithics
Topsoil and turf in Trench A (incomplete)	1, 1/2, 1/3	ALL	313
Topsoil and Turf in Trench B, row B *	1, 1 /2, 1/3	B2, B3 & to N	3,181

Main shell midden	13, 11, 12, 13/23, 13/24, 13/23/24, 24	B1, B2, B3	1,962
Shell midden	28	A	519
Slumped stony deposit between midden and sandy soil	27	A	504
Sandy soil with heat cracked stone	17, 29, 17/27	A	4,656
Palaeo-channel and below	5, 14, 14/21	B3	158
Slopewash over palaeo-channel	7/8	B3	1,052
Lower organic rich silt (below midden)	22	A & B3	1,875
Natural	21, 26, 25	ALL	169
		Total	14,389

Table 103: Sand, resolution of Contexts and lithic content
NB: * = A complete catalogue of material from B1B–B21B was made in order to assess lithic material away from the midden

3.3.8 Raw materials

The assemblage is made up of five types of raw material: chalcedonic silica, including flint, chert, agate and jasper; baked mudstone; Rùm bloodstone; quartz, quartzite and rock crystal; and coarse stone, including a variety of sandstones (see Illustration 365, right; and Table 104, below). Both local materials and materials from further afield were used and these are discussed in detail in Section 5. The sources exploited for raw material included both in situ deposits and redeposited materials found as pebble nodules in beach and river gravels.

Illus 365: The main raw materials used at Sand; From top left: Rùm bloodstone ×2, baked mudstone ×2, quartz ×3, with chalcedonic silica ×2 in the centre

Table 104

Material	Quantity	Percent of Total
Baked Mudstone	5,776	39%
Chalcedonic Silicas	2,555	17%
Rùm Bloodstone	1,061	7.5%
Quartz and Quartzite	5,345	36%
Coarse Stone	100	0.5%
Unknown	3	trace
Total	14,840	100%

Table 104: Sand, lithic raw materials, including material from the 1999 test pits

The main outcrops of baked mudstone occur at Staffin Bay on the north coast of Skye, across the Inner Sound from Sand (see Illustration 366, right). Recent blasting means that it is impossible to assess whether or not there was any prehistoric extraction from the outcrops of baked mudstone here, in the cliffs above the site at An Corran, but nodules of baked mudstone are abundant on the beach and in both till and top soil deposits below. It was impossible to tell from the cortex on pieces from Sand whether in situ material was preferred to pebble nodules, but both would have been easily available at Staffin. Baked mudstone

Illus 366: General view of

degrades easily once removed from the parent rock, and it does not occur naturally away from the Staffin Area.

Chalcedonic silica is also plentiful at Staffin, both as it erodes out along the coast and further inland where it may be collected from till deposits in exposures that have been cut by burns such as the Suarbie Burn. Pebble nodules of chalcedonic silica may also be collected from the river gravels and beach here. Elsewhere around the Inner Sound, pebble nodules of chalcedonic silica were not abundant in gravel deposits or on present day beaches, though they are often cited as a component of local rocks. Noteworthy, but isolated, nodules of chalcedonic silica were collected from Flodigarry in North Skye and the beach at Ob Gavascaig in the south. The piece from Flodigarry was found in till; it is a large piece and apparently of good quality flint. There are two much smaller nodules from Ob Gavascaig, both from the present beach and both also apparently of flint.

Rùm bloodstone also outcrops at various sites in the region though work in the 1980s sourced the archaeological material to the island of Rùm (Wickham-Jones 1990). The bloodstone from Sand and other sites of SFS is similar in nature to that from Kinloch on Rùm and is likely to have come from Rùm; a journey of some 60km by sea to the south. Rùm bloodstone was mainly collected as pebble nodules from screes and beaches on the west coast of Rùm (see Illustration 367, right).

Illus 367: Bloodstone Hill, Rùm

Quartz is to be found across the study area, but particularly in the east. It is common in the Applecross area around Sand, and quartz nodules may be collected from both gravels and near to outcrops and exposures of bedrock. There were plenty of quartz pebble nodules from Sand (see below), but the material of the assemblage suggests that some vein quartz was also used.

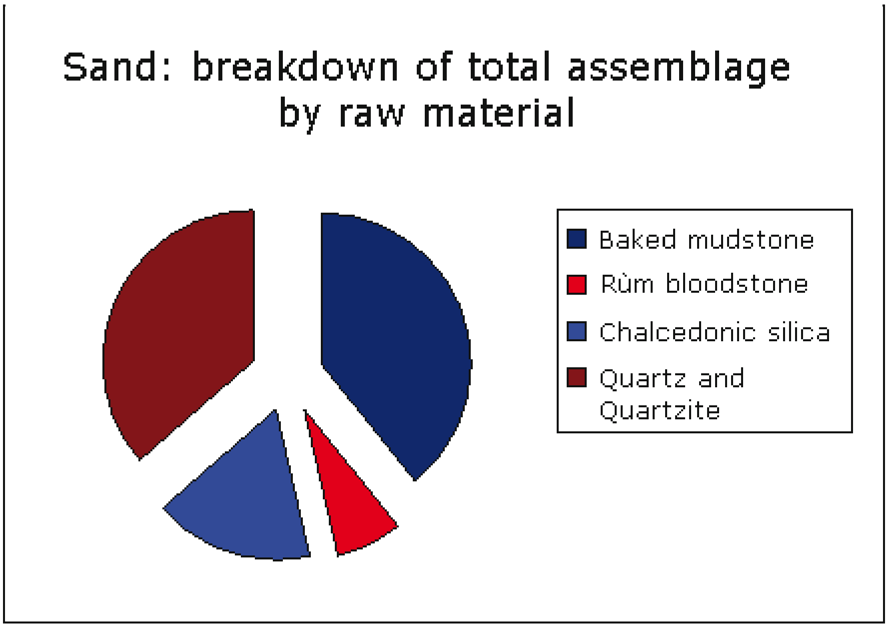
Finally, there were 100 pieces of flaked coarse stone. Most are of micaceous sandstone, a local material that was used for the cobble tools.

Illus 368: The marine transport of pebbles caught in the roots of seaweed, Sand beach 1999

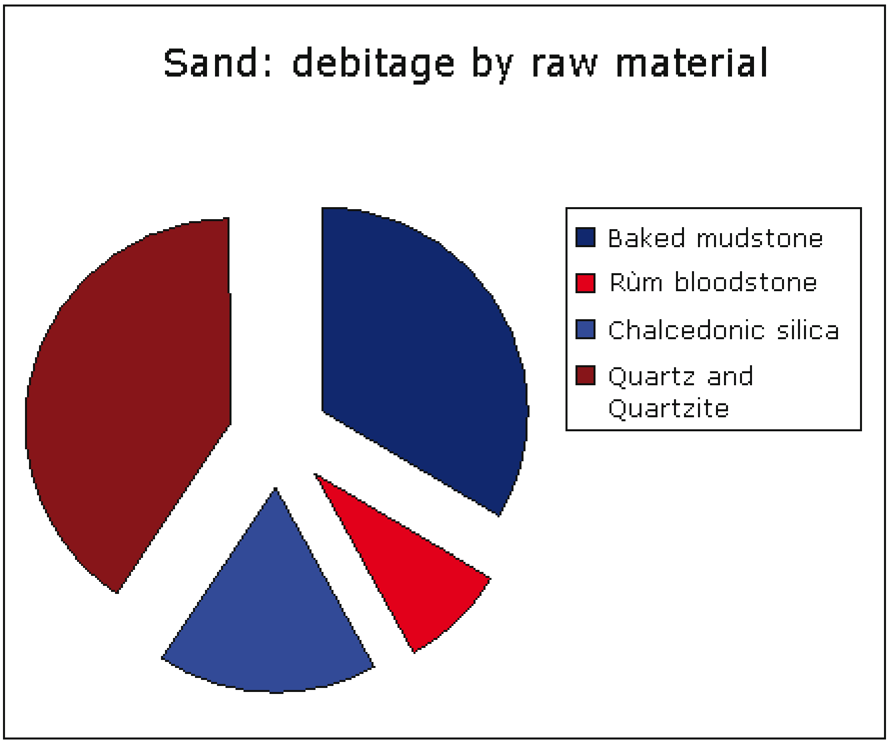
Beachcombing produced little material suitable for knapping from any part of the Inner Sound, though in the bay at Sand there was some evidence of the role of marine transport in the movement of raw materials in the form of stones caught up in the roots of seaweed (see Illustration 368, left). It does not seem, however, that either glacial transport or marine currents played a significant role in the long distance transport of lithic raw materials around the Inner Sound. Human transport has to be responsible for those raw materials found away from their sources.

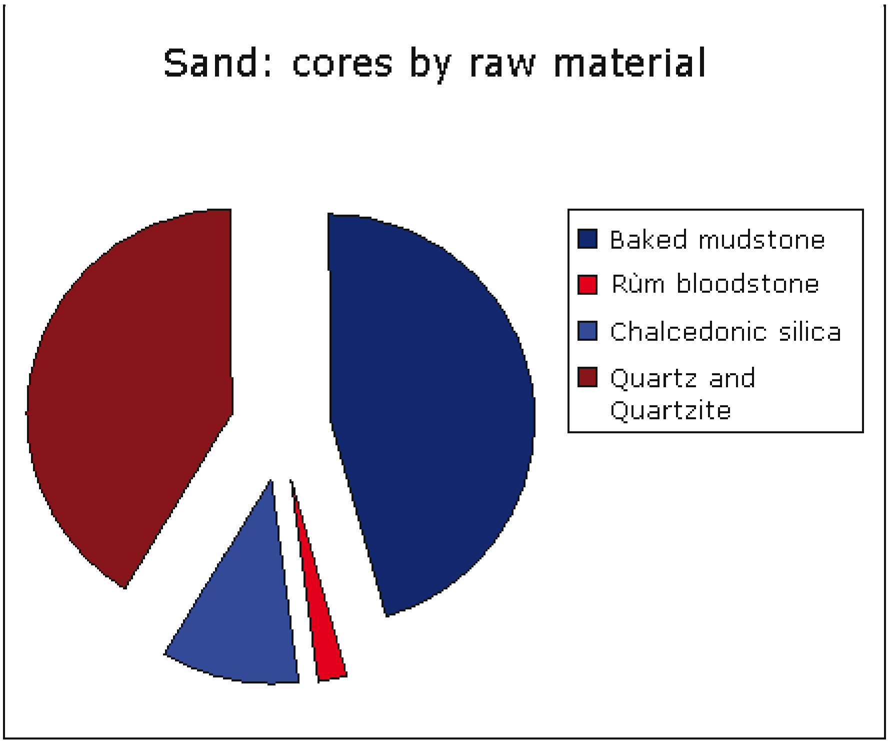
Interestingly, almost one third of the assemblage at Sand is made of baked mudstone, a material that had to be imported. It is likely that the regular flaking characteristics of baked mudstone made it an attractive material for the knappers at Sand, especially as they were keen to make particular types of tool that may well have been easier in mudstone. Blades, regular flakes and retouched pieces are all more common in mudstone (see Illustration 369, below), though it is necessary to look deeper to suggest whether this is a reflection of its more regular qualities or of conscious selection on the part of the knappers. In addition, Finlayson (1990b) has noted that raw material selection is also dependent on the different properties of the various stones when in use. Skip Charts.

Illustration 369: Sand, breakdown of the different categories of artefact by raw material

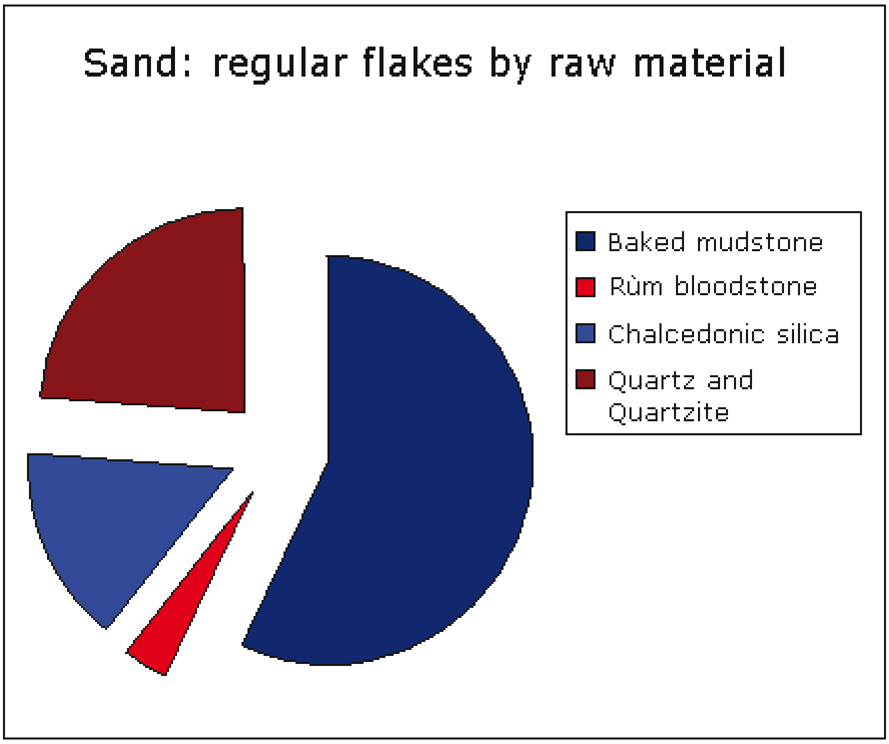


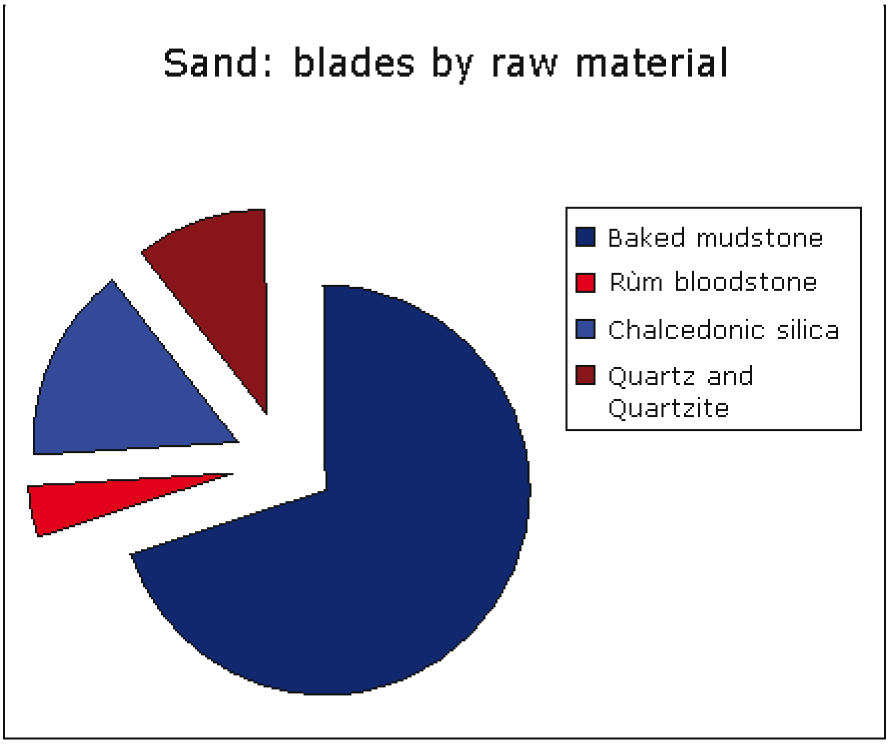
Illus 369a: Sand, breakdowns of total assemblage by raw material



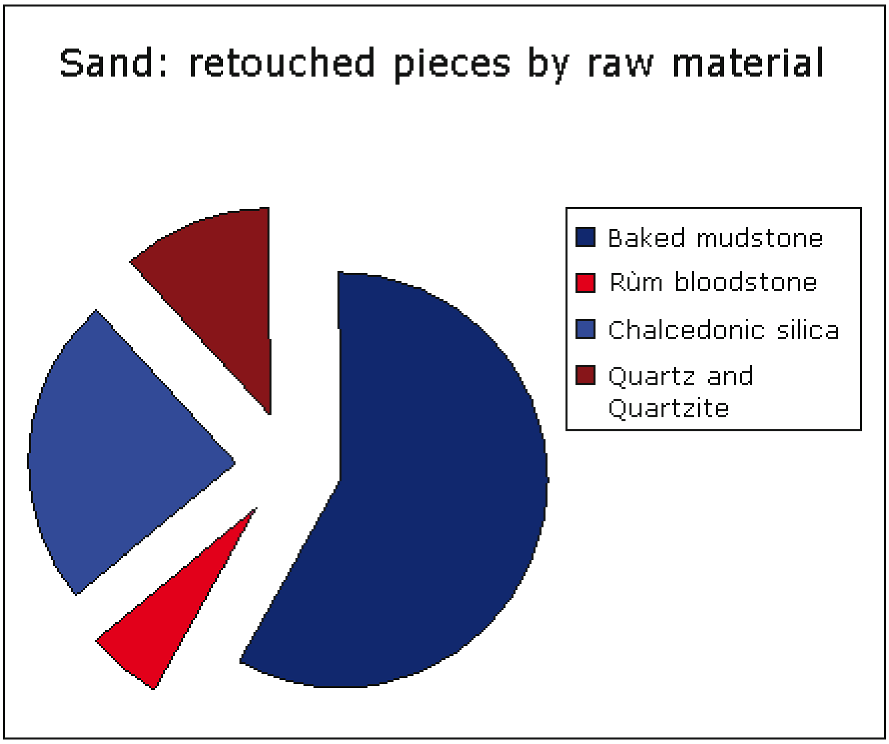


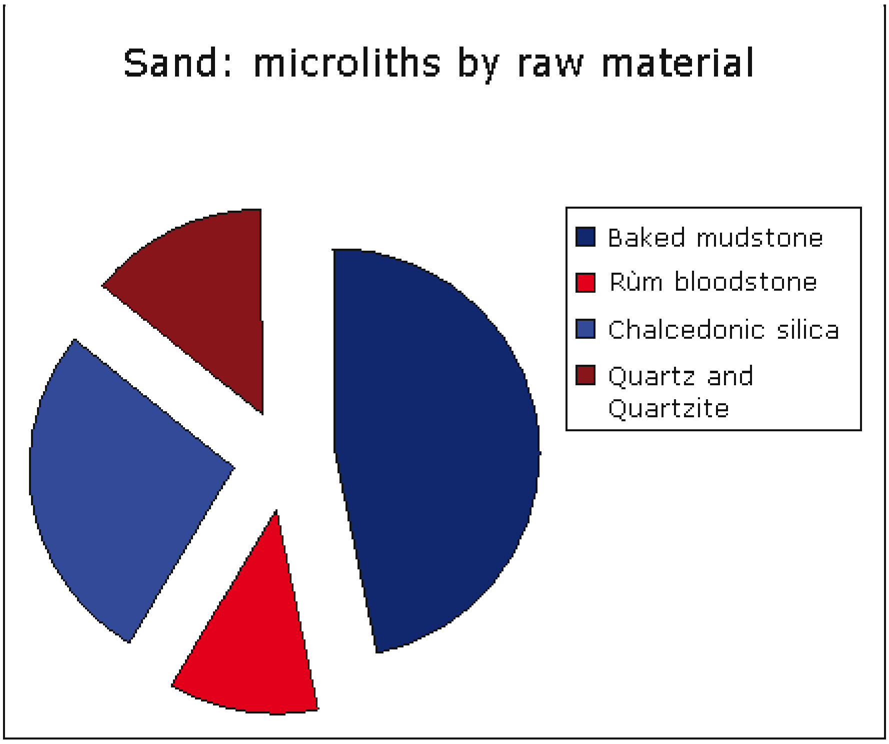
Illus 369 b & c: Sand, debitage and cores by raw material





Illus 369 d & e: Sand, regular flakes and blades by raw material



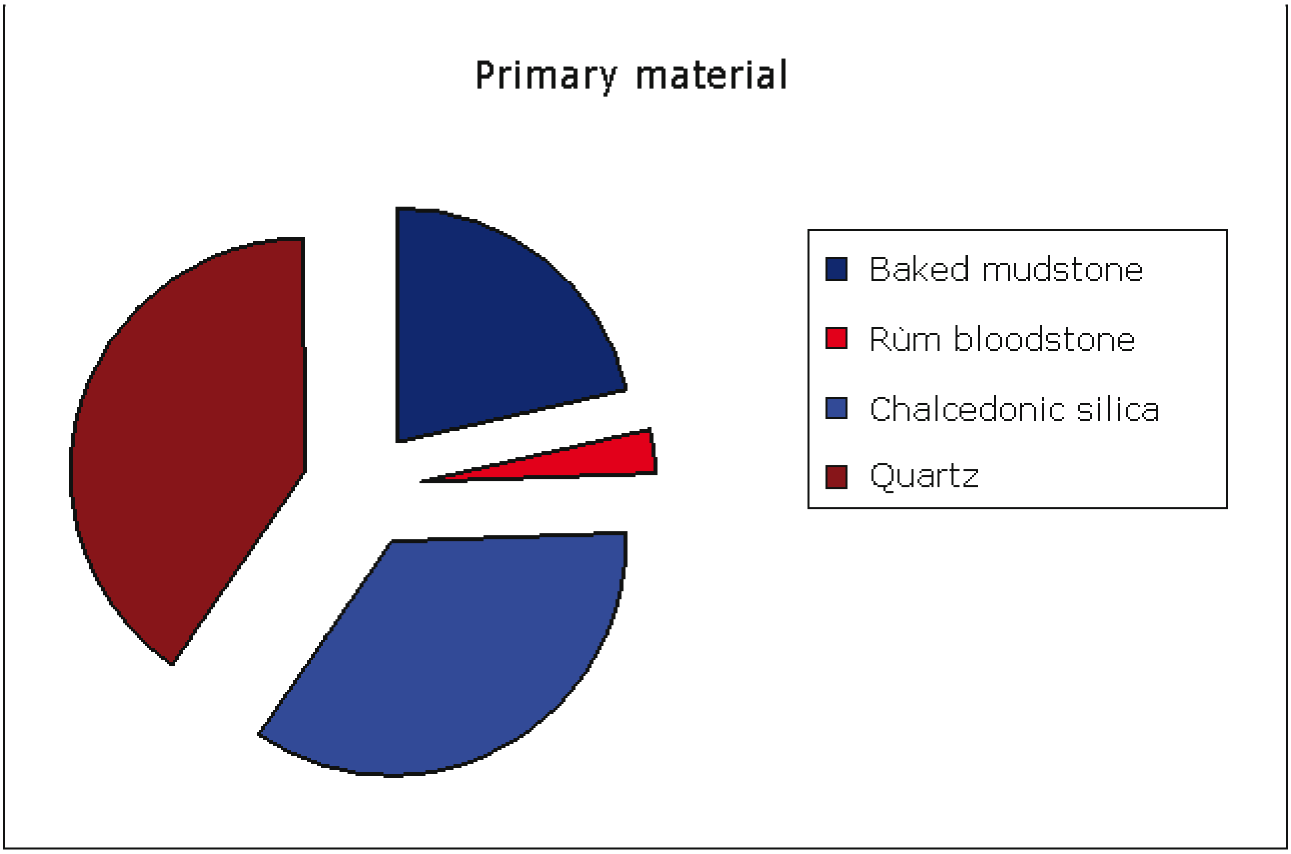


Illus 369 f & g: Sand, retouched pieces and microliths by raw material

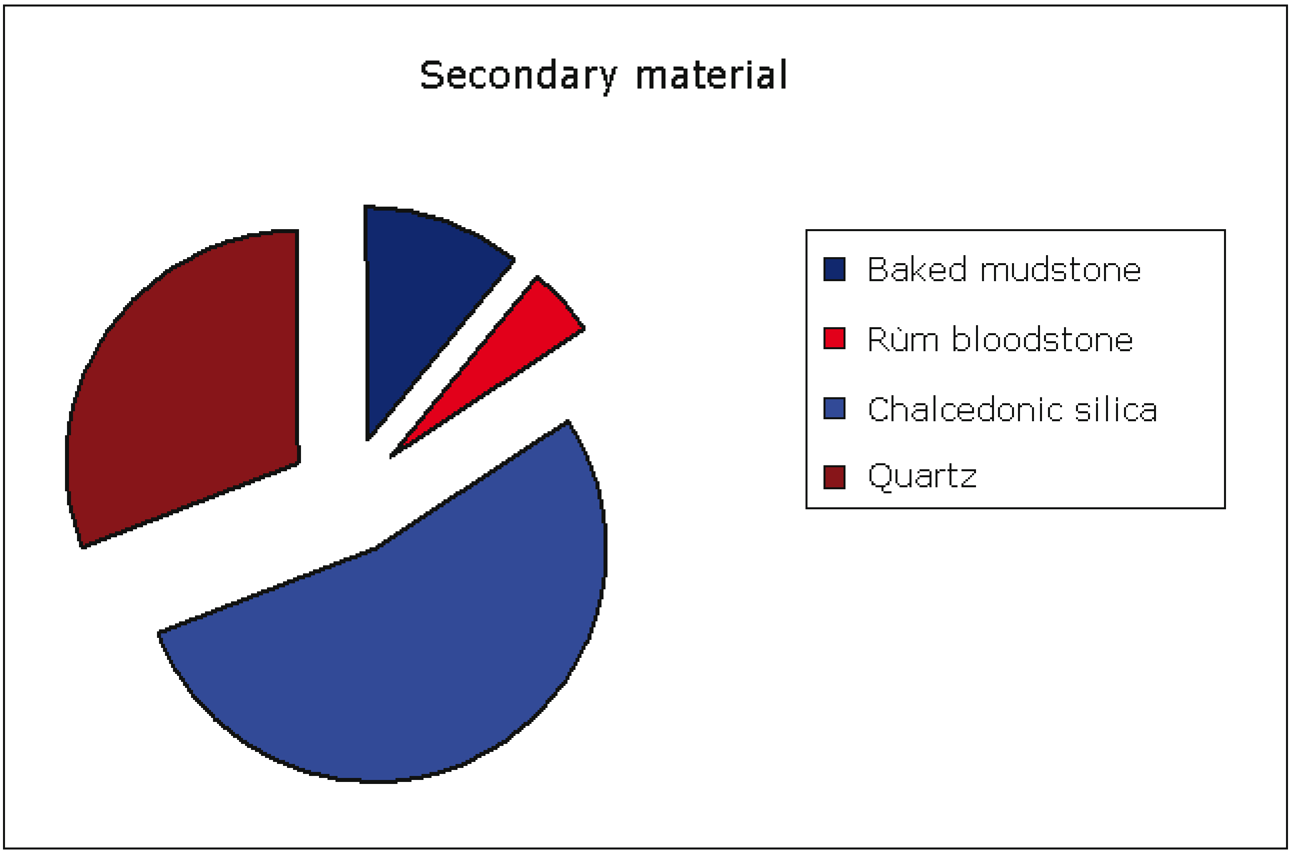
An examination of raw materials broken down by type does suggest some specific strategies on the part of the knappers (see Illustration 369, above). Quantities of debitage reflect the overall breakdown of raw material across the assemblage, and this is no doubt partly a reflection of different knapping characteristics, in that quartz is more friable and will lead to more debitage, as well as of the overall quantities of the different materials. Cores, however, provide an interesting contrast, as do, for different reasons, microliths.

Among the cores it is notable that there are very few cores of Rùm bloodstone, especially in comparison to the overall quantities of bloodstone in the assemblage, and this absence suggests that bloodstone was brought on to site as prepared material. In contrast, cores of baked mudstone, chalcedonic silica, and quartz all reflect the overall quantities of those materials and provide clear evidence of nodule preparation and knapping on site. In support of this there are few cortical pieces of Rùm bloodstone (see Illustration 370 & 371, both below). Most cortical pieces are to be found in chalcedonic silica, and there are also more in quartz, both of which are likely to be local materials. Although there are cores of baked mudstone, indicating that on-site knapping of this material clearly took place, there are not as many cortical pieces in mudstone, suggesting that cortex was removed at source. Distance may well have been a factor in the reduction of unnecessary waste prior to transport. Skip Charts.

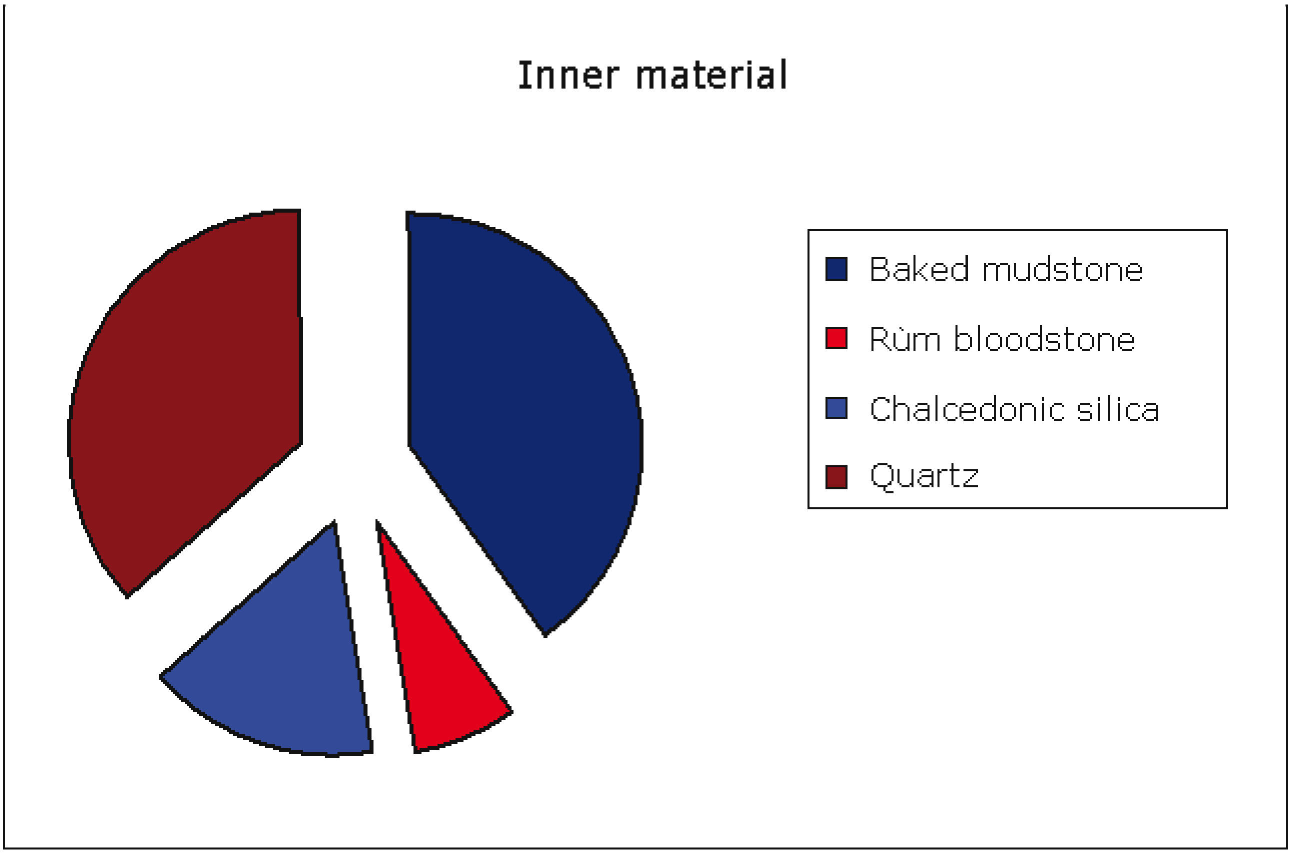
Illustration 370: Sand, breakdown of primary, secondary and inner pieces by raw material



Illus 370a: Sand, primary material

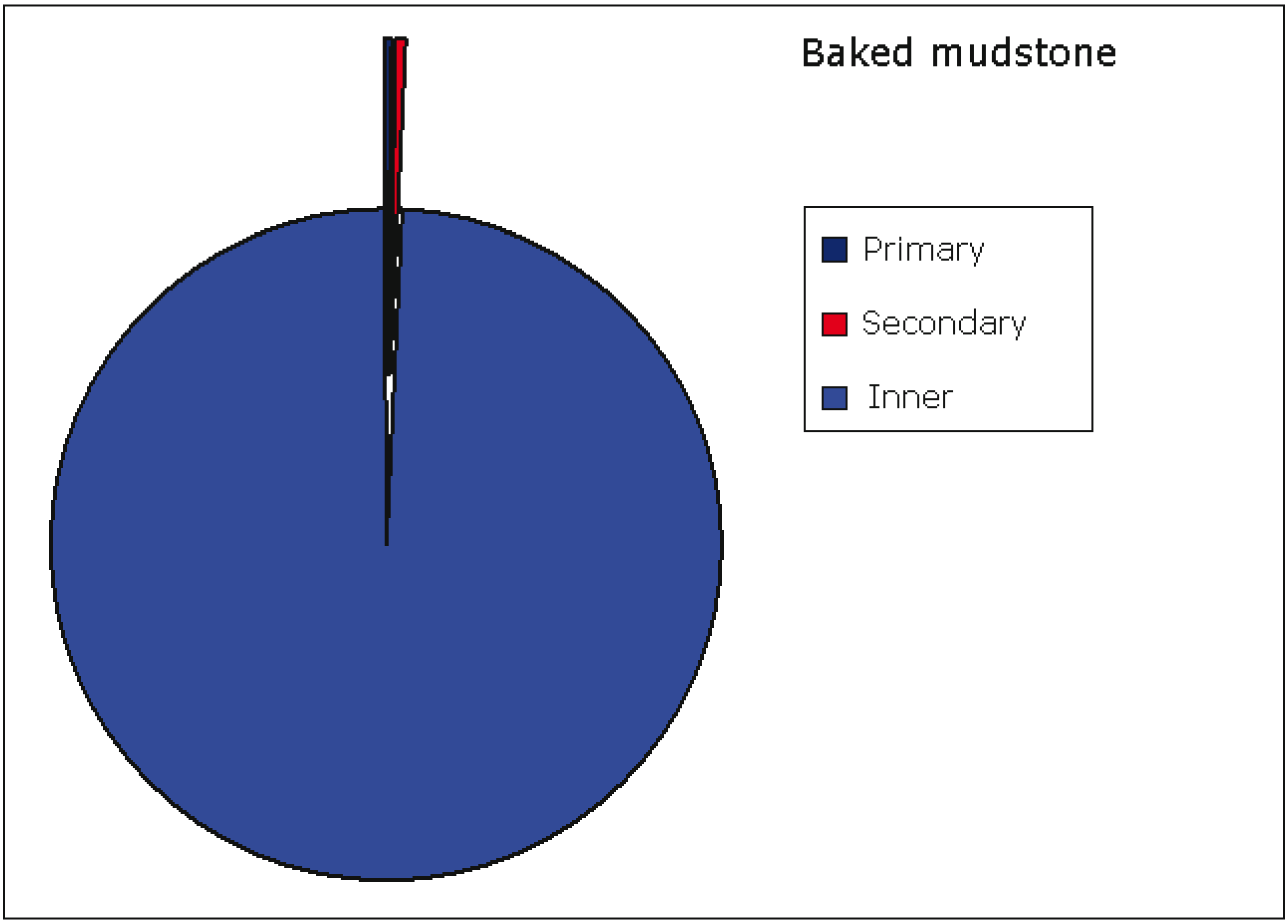


Illus 370b: Sand, secondary material

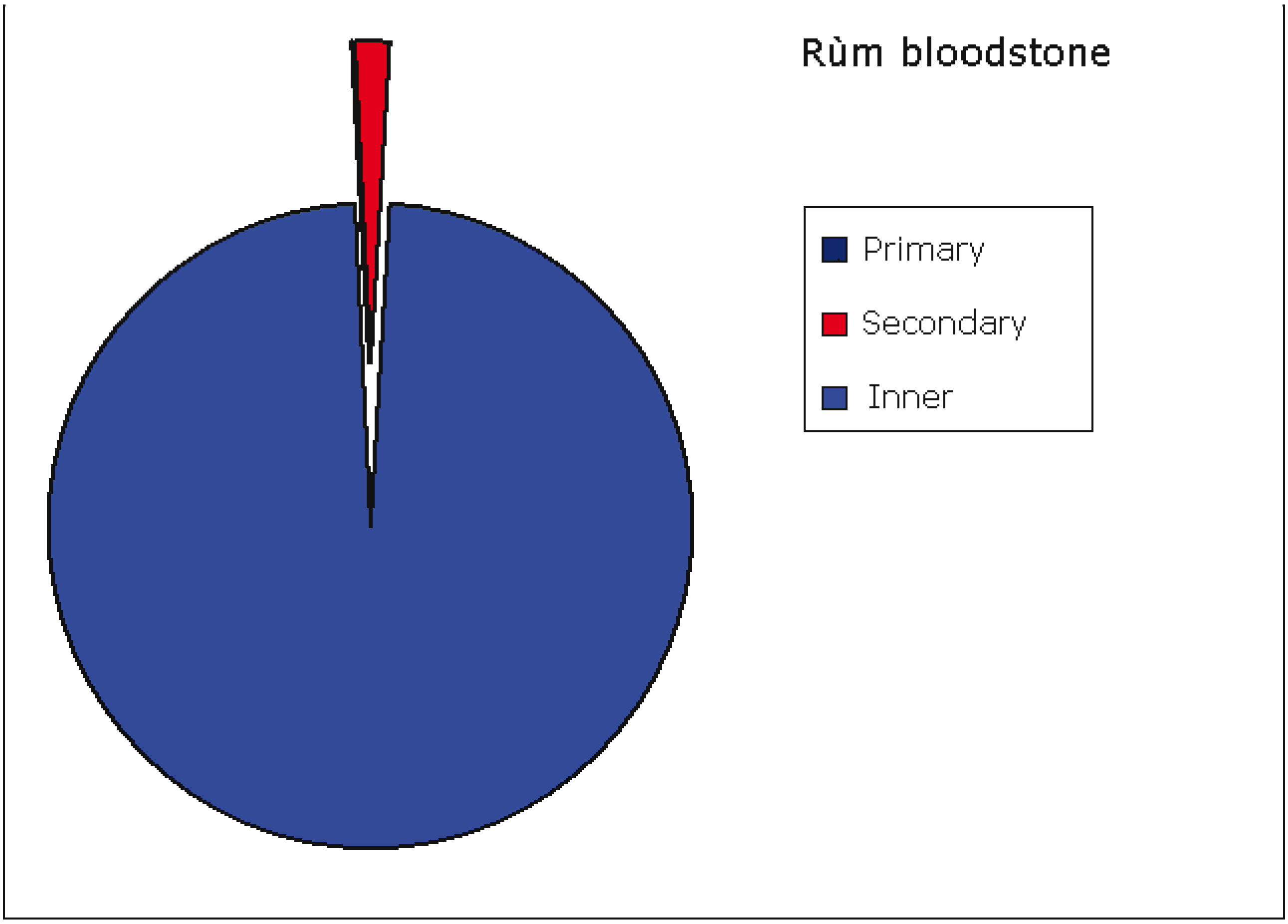


Illus 370c: Sand, inner material

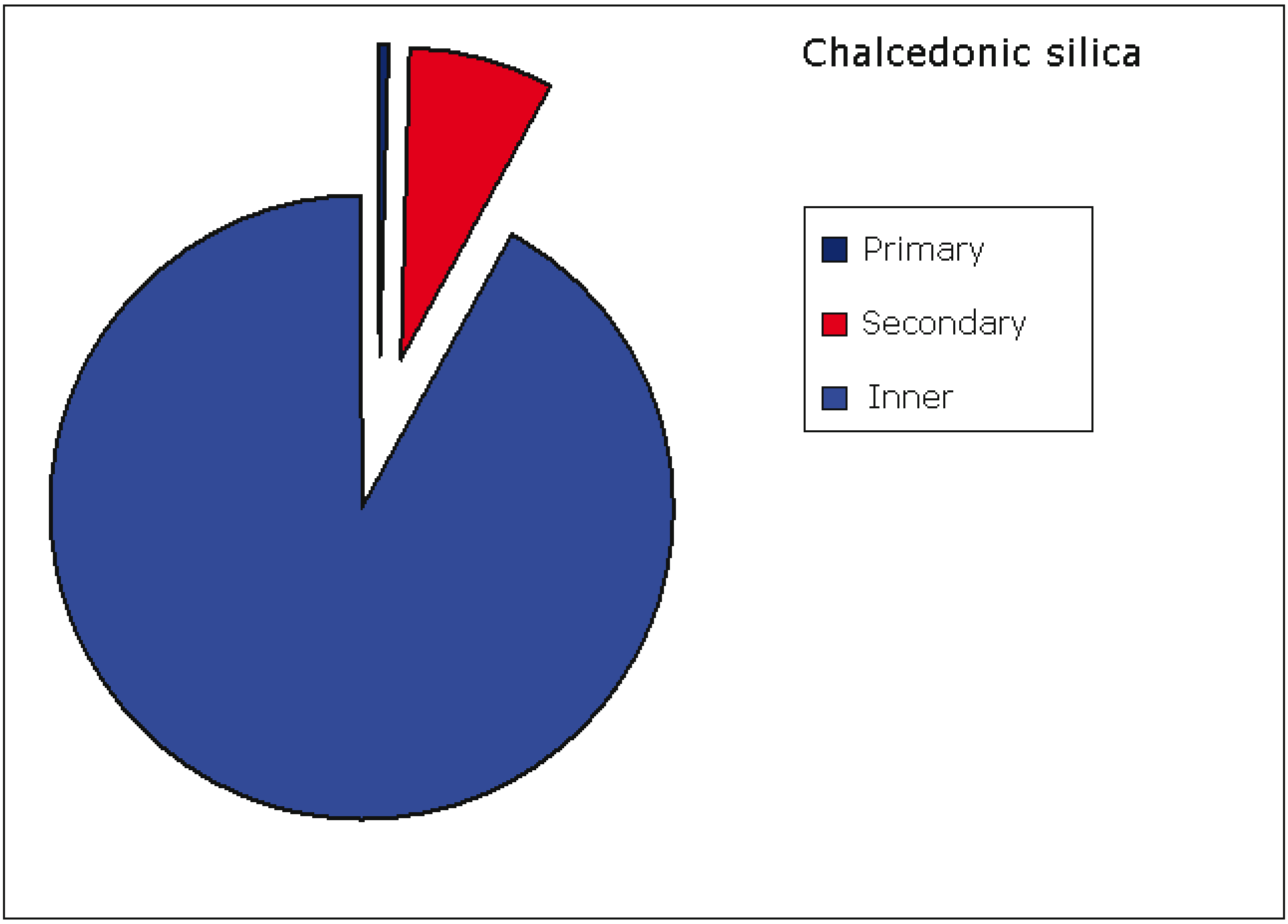
Illustration 371: Sand, breakdown of the cortical component of the different raw materials



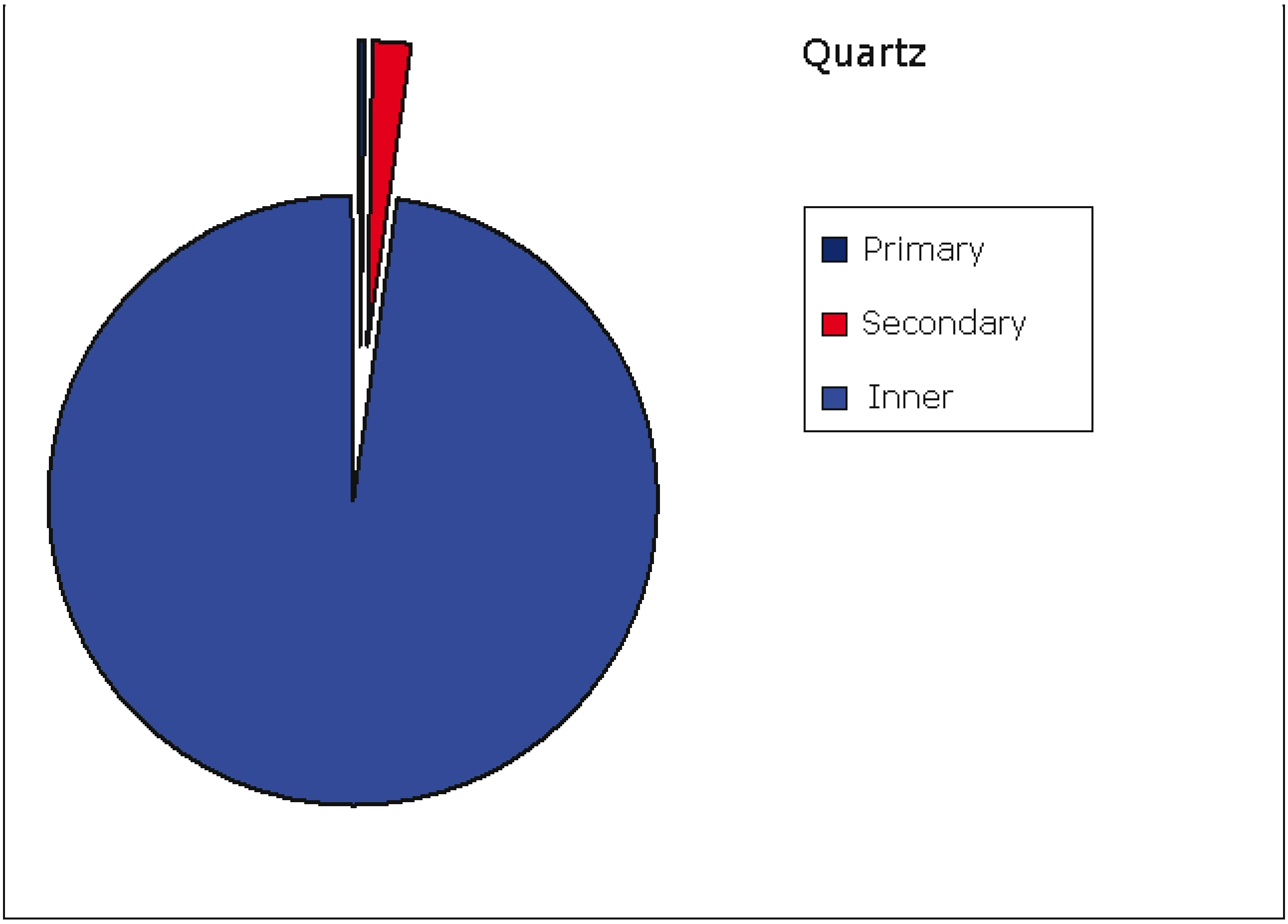
Illus 371a: Sand, baked mudstone



Illus 371b: Sand, Rùm bloodstone



Illus 371c: Sand, chalcedonic silica



Illus 371d: Sand, quartz

Blades, as discussed above, and regular flakes as well as retouched pieces, are most common in baked mudstone and there are relatively few blades and flakes of quartz. This no doubt reflects the relative problems of making regular pieces from quartz – something of which the knappers at Sand would have been only too aware. When possible, they chose to make pieces of better materials, even if they had to import those materials from further afield, but they were not averse to using quartz when they had to and could produce very respectable quartz tools.

In contrast to the other types of flaked tools, microliths are surprisingly common in Rùm bloodstone, even though it also had to be imported. Chalcedonic silica was also important for microlith manufacture, though baked mudstone still predominates. Interestingly, quartz was used very successfully to make some microliths and retouched pieces.

In any assemblage that deals with worked quartz it is important to note the general problems of recognising today those pieces of worked quartz that may have been considered suitable for use in the past. Work on the use-wear of quartz assemblages in Scandinavia has shown that a high proportion of apparent irregular waste has often been used (Broadbent 1979; Knutsson 1988). This is no doubt compounded by the irregular fracture of most quartz, and it is salutary to consider whether or not it might also be reflected in the irregular debitage of many flint and chert assemblages.

The evidence does suggest that the knappers at Sand had access to a variety of materials, both imported and local and that they exploited the different potential of each material for the individual types of tool that they needed.

3.3.9 Technology

The knappers at Sand were working with a variety of raw materials of varying quality. Some material was prepared to a certain extent before it arrived in that the more coarse outer material had been removed. Some came in fresh from the outcrops, some as rolled beach pebbles and there was a spectrum of material in between. There are 22 pebble nodules among the assemblage from Sand, mostly of quartz (15 pieces). All are small (some very small) and may represent natural background material, though a few are bigger (up to 44mm in length) and some have clearly been tested and flaked. There are six pebbles of chalcedonic silica, all are quite small (37mm in length is the maximum dimension) but they are of good quality material and some have had flakes removed. There are no pebbles of Rùm bloodstone (in accordance with the general lack of cortical material of Rùm bloodstone), but there is one pebble of baked mudstone. Interestingly, this is a large good quality pebble (70mm long) which has been split, suggesting that it was bought on to site as raw material.

These pebbles suggest that the knappers were dealing with small units of raw material and this is supported by the sizes of the cores, flakes and other artefacts (see below).

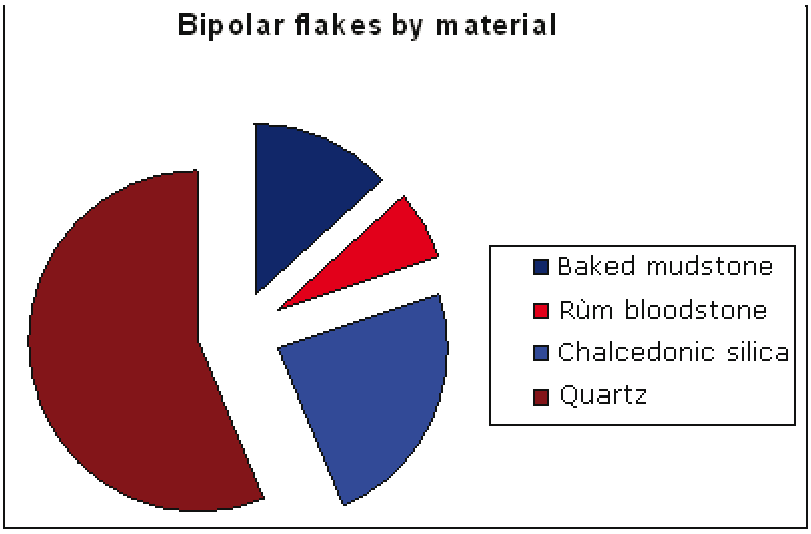
Time and money did not allow the recording of detailed information regarding the knapping techniques at Sand. This is a shame because it would be interesting to look at differences in knapping techniques between the different types of raw material. It is hoped that this may yet take place under some future project.

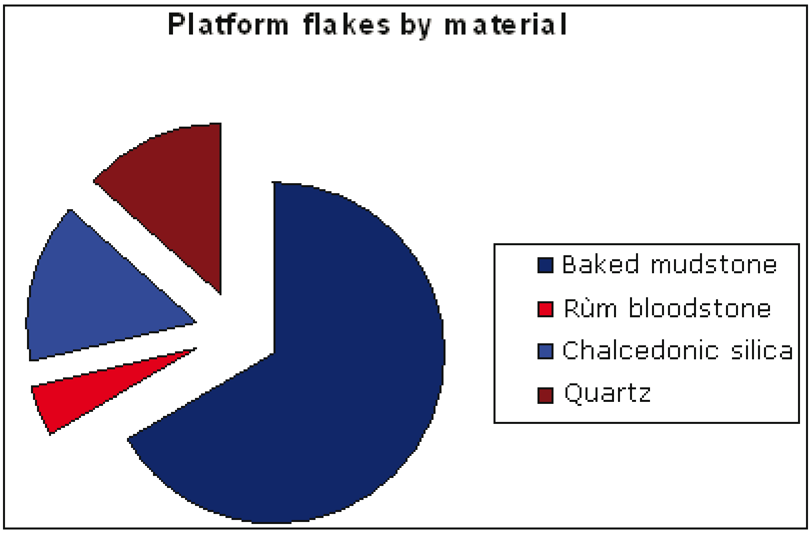
Basic information was recorded on core types, however, and this provides some detail. There are 39 cores in the assemblage, of all the main materials, though most are of baked mudstone or quartz: there are only two of Rùm bloodstone and three of chalcedonic silica. The cores are divided almost equally into platform (19) and bipolar (20) cores, though most of the cores of baked mudstone are platform cores (13 out of 19), while most of the quartz cores are bipolar (12 out of 15). This probably reflects the chosen way of dealing with the properties of these raw materials. Interestingly, three bipolar cores have signs of previous platform flaking, which supports theories that the two techniques were not mutually exclusive but part of a continuum of knapping techniques. The two types of core are of remarkably similar size: most are between 10 and 30mm in length. Some were clearly not exhausted, while others had been flaked down to fine spalls. Most of the cores have no cortical material, though there are 12 with some cortex (five platform; seven bipolar). One quartz core had clearly come from material taken directly from a vein (17/301) while others could clearly be seen to have come from pebble nodules (for example: 29/13).

In addition, a quick note was made where bipolar characteristics were observed on other artefacts. The record of bipolar characteristics on whole flakes adds to our understanding of the use of handheld percussion versus bipolar percussion. This is of interest given queries regarding the status of bipolar knapping in the Mesolithic (Wickham-Jones 1990:167). Furthermore, bipolar knapping is a technique that is sometimes preferred for the working of intractable materials or small pebble nodules such as many of those used at Sand.

Of 795 whole, regular, flakes in the assemblage, 151 (19%) show bipolar characteristics. Most of these are of quartz (see Illustration 372, below). Interestingly, while bipolar knapping was used for roughly half of the regular flakes of quartz, it only accounted for a third of those flakes of chalcedonic silica and Rùm bloodstone, and less than 5% of flakes of baked mudstone (see Illustration 373, below). Skip charts.

Illustration 372: Sand, whole regular flakes by platform type and material





Illus 372a & b: Sand, bipolar flakes and platform flakes by material

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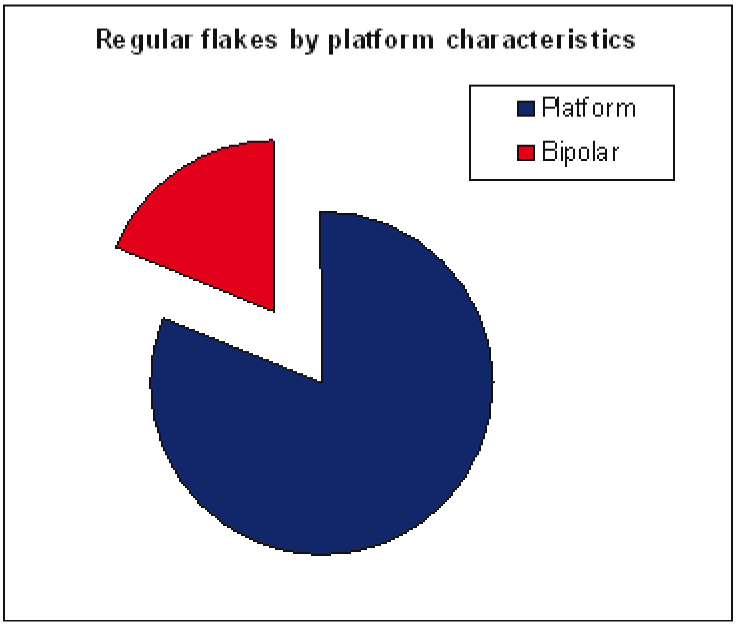
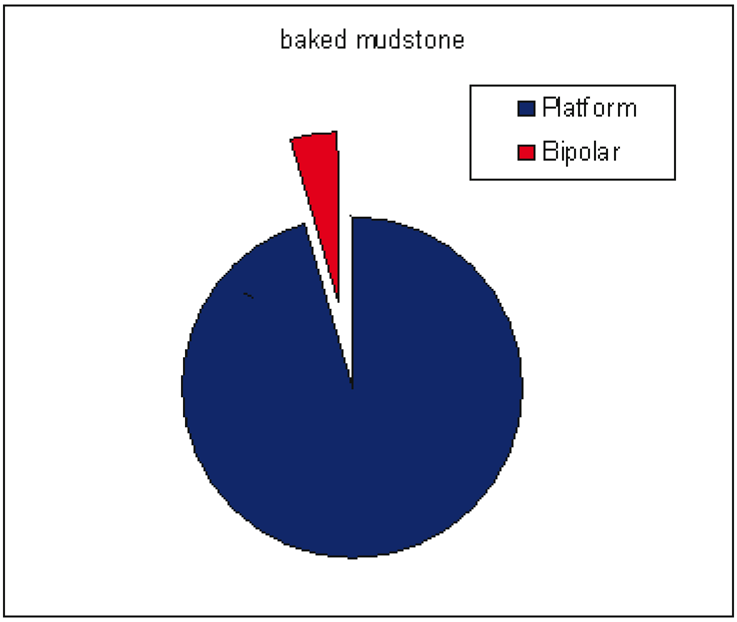
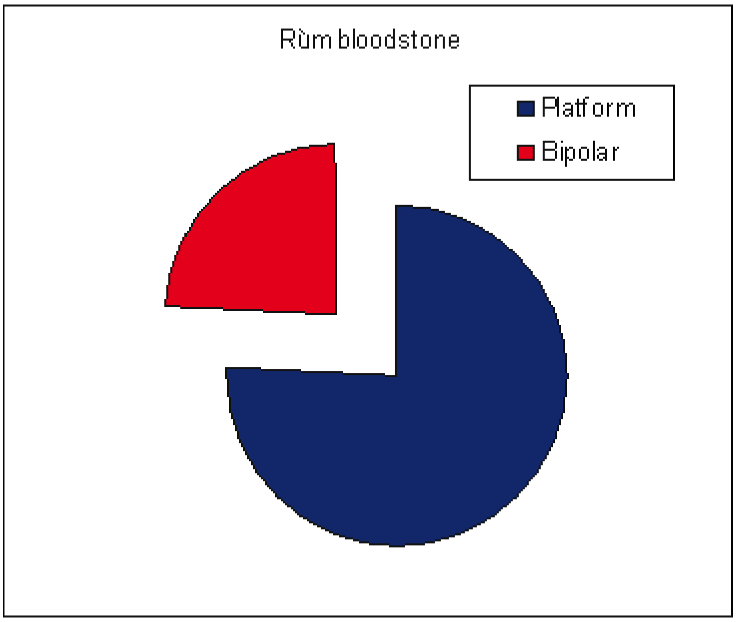
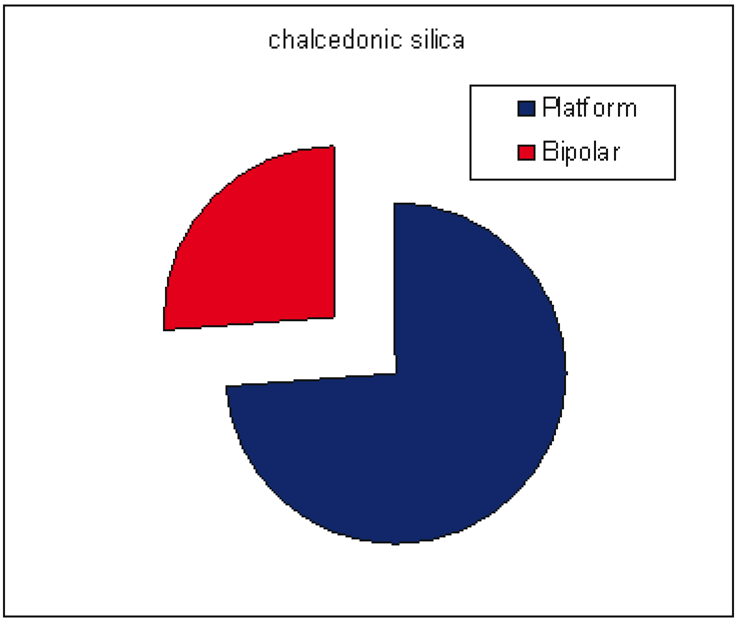
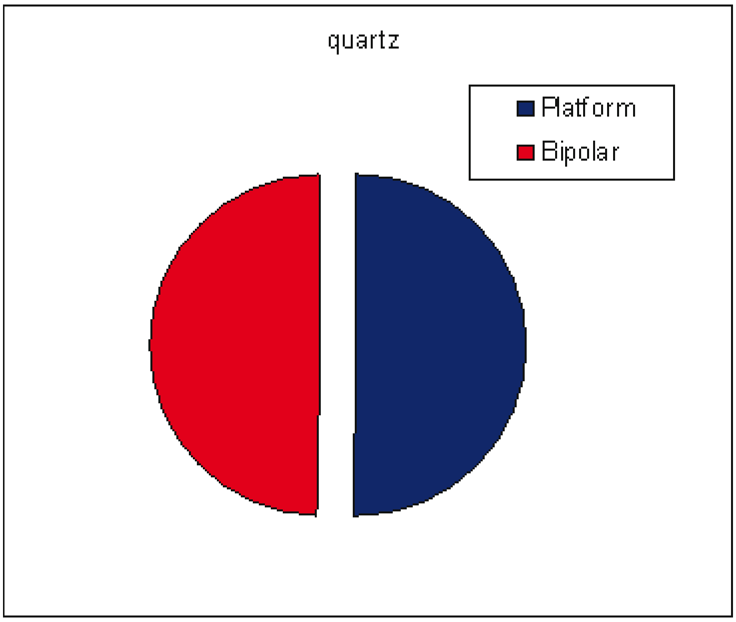
Illustration 373: Sand, breakdown of the regular flakes by platform characteristics and material



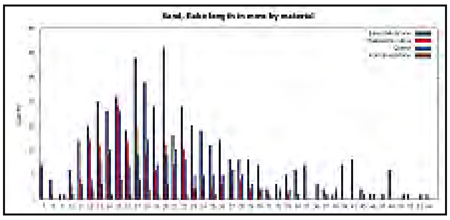








Not surprisingly, flake length shows a strong correlation with core length. Most flakes are between 10 and 30mm in length. Illustration 374 (right) shows that it was possible for the knappers to make more, longer flakes of baked mudstone and quartz. This was affected no doubt by the size of nodule available, as well as the better quality of the baked mudstone and abundance of quartz.



Illus 374: Sand, flake length in mms by material (Total 719); click for larger size

The evidence of both flakes and cores suggests that the knappers at Sand were using direct percussion in combination with both handheld cores and cores which were supported on an anvil. They were clearly varying their techniques to take account of the different qualities of the material with which they were working.

Finally, it is worth remembering that the knappers were also working coarse stone, a material that might be thought of as rather intractable. There are 100 pieces of this material, some of which are large and regular, and this should not be regarded as unusual in view of the presence of a number of cobble tools. Although few of the cobble tools have been modified by deliberate flaking, the patterns of breakage mean that some large flakes would have been produced as a by-product. Some of these flakes may well have been suitable for use and it would not take long for people to realise that similar flakes could be made deliberately. It is likely that the knappers were making use of the raw material available in out-of-use cobble tools rather than collecting this specifically for flaking. Knapping of the coarse stone is likely to have required more force and it would be harder to control the end product but the pieces here show that on occasion it could be a useful source of material.

3.3.10 Types

The knappers at Sand were making a range of artefacts (see Table 105). Seventy-seven percent of the assemblage is debitage, mainly debitage flakes, but there are also many regular flakes and blades, as well as the pieces with secondary working.

Table 105

Type	Quantity	Percent
Pebbles	22	0.1%
Chunks	323	2%
Cores	39	0.3%
Debitage Flakes	10,753	75%
Regular Flakes	2,795	19.5%
Blades	235	1.5%
Retouched Pieces	62	0.5%
Axe	1	trace
Scrapers	21	
Edge Retouched	27	
Awls	3	
Notched	3	
Bifacial Indeterminate	1	
Transverse Arrowheads	2	
Miscellaneous	5	
Microliths	159	1.1%
Microburins	6	
Backed Bladelets	14	
Rods	3	
Crescents	41	
Fine Points	36	
Scalene Triangles	5	
Obliquely Blunted points	1	
Miscellaneous Microliths	53	
Total Assemblage	14,389	100%

Table 105: Sand, breakdown of the whole assemblage by type

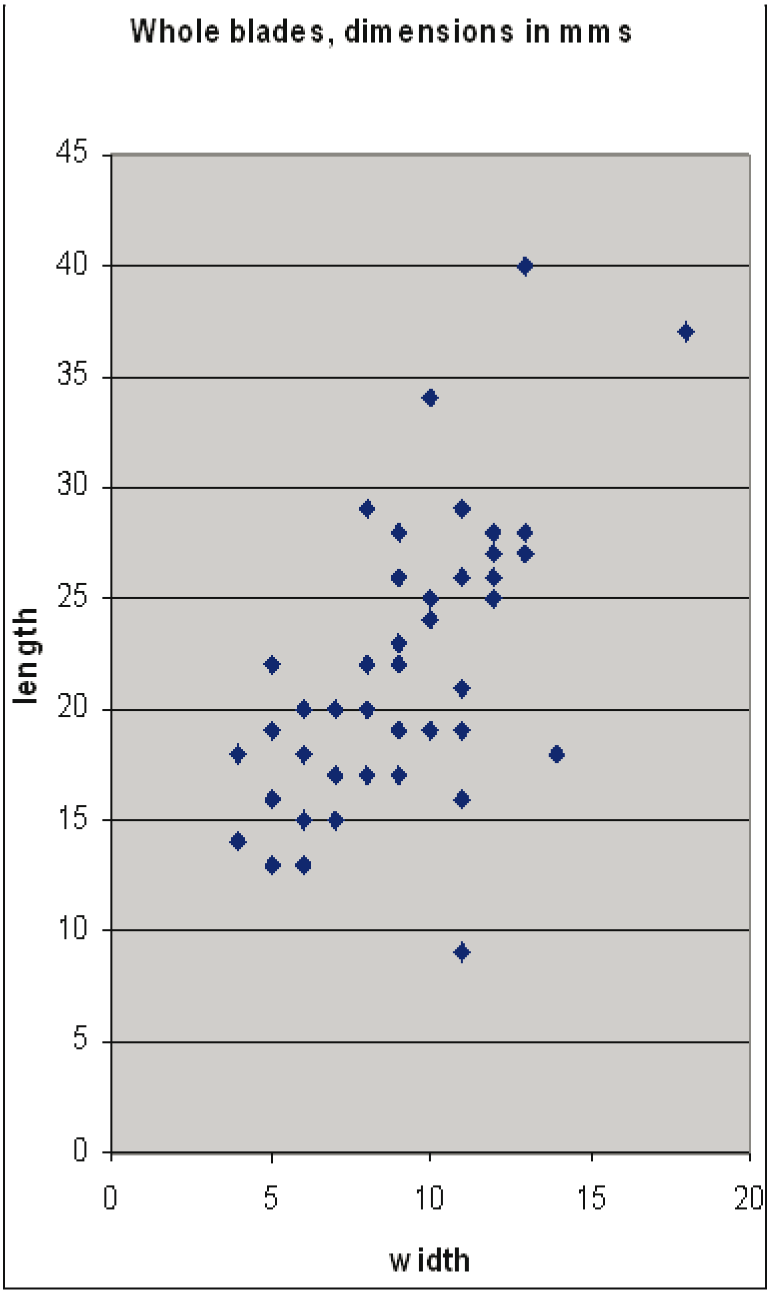
3.3.10.1 Flakes and blades

The measurements of whole flakes have been discussed in the previous section (Section 3.3.9, above). Many are broken. Resources were not available to undertake use-wear or residue analysis, but there were clearly plenty of pieces suitable for a range of tasks, and it is likely that many had been used. This applies equally to pieces without secondary working as well as to more elaborate tool types.

The ratio of flakes to blades, 8% (known as the lamellar index, Bordes & Gaussen 1970), does not suggest that blades were preferred over flakes, but they were clearly an important element of the knappers' repertoire. Most blades are made of baked mudstone (see Illustration 369, above) but if the lamellar index is worked out individually for each type of raw material (see Table 106, below), it does not alter the overall picture that blades, while important, were not preferred to flakes, though there is considerable variation between the different raw materials.

Table 106	
Raw Material	Lamellar Index
Baked Mudstone	10%
Rùm Bloodstone	11%
Chalcedonic Silica	9%
Quartz	4%

Table 106: Sand, lamellar index by raw material

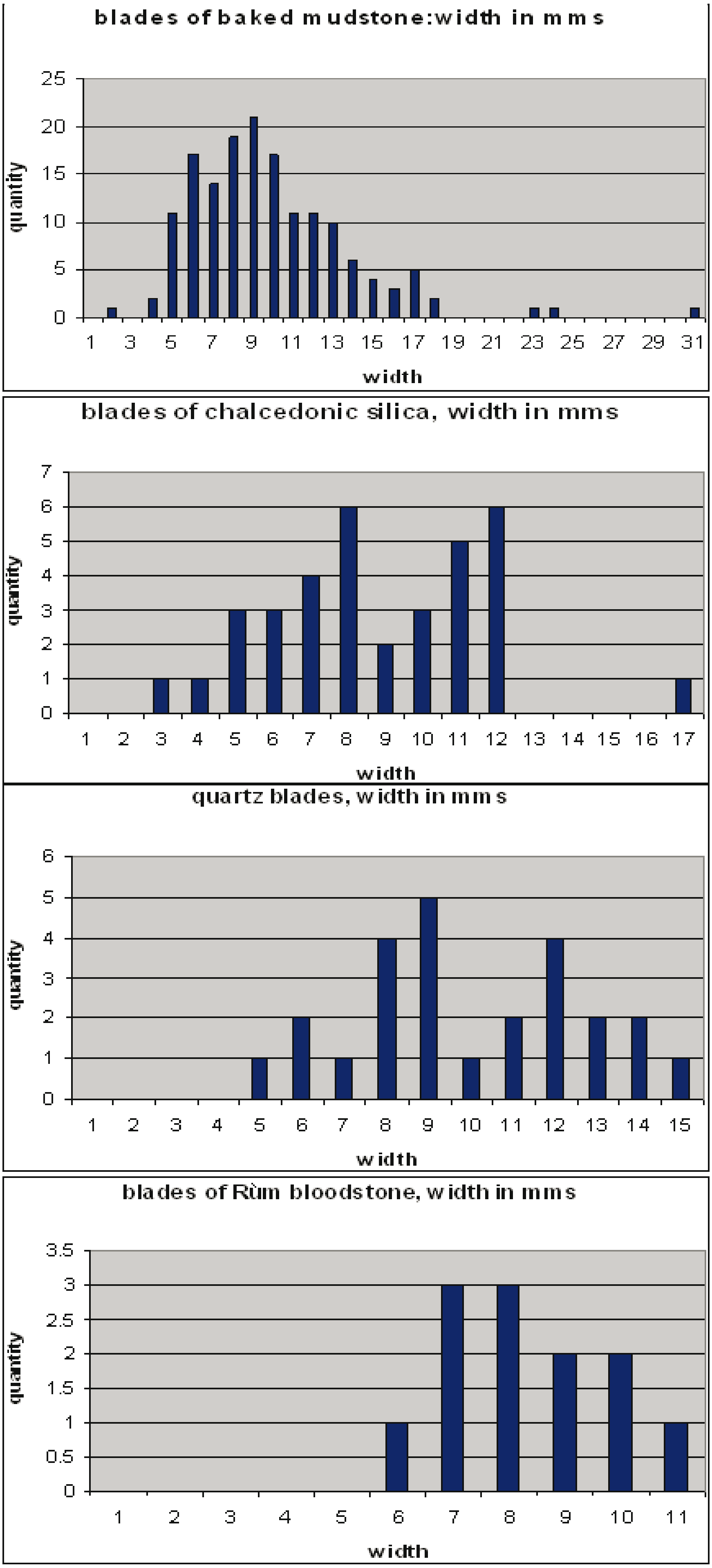


Illus 375: Sand, dimensions of whole blades in mm

An important feature of blades on Mesolithic sites is their size, in particular their width, which has been used to draw conclusions about the date or cultural affinities of the assemblage. The dimensions of whole blades at Sand (see Illustration 375, right) are remarkably similar to those from Kinloch, Rùm (Zetterlund 1990). The Kinloch blades were divided by width into chips (less than 5mm), narrow blades (5–8mm) and blades (over 8mm). If these divisions are applied to the Sand blades, then there are similar proportions of the different categories to those from Kinloch. Not surprisingly the dimensions of the Sand blades fall within the parameters of the flakes from Sand (see Illustration 374, above) and fit well within the lengths at which cores were abandoned.

An examination of the widths of all blades, by material (see Illustration 376, below) does not suggest that material had much effect on blade width, with the obvious caveat that there are more wider blades of baked mudstone, but there are more blades of mudstone anyway. There is some support among blades of chalcedonic silica and quartz for a specific group of wider blades, over 8mm in width.

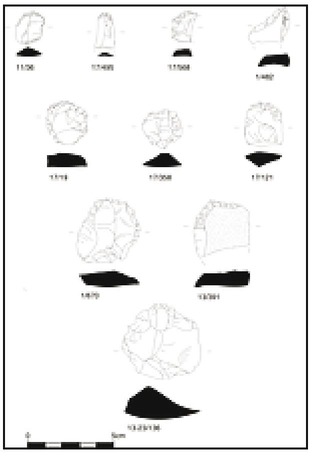
Illustration 376: Sand, blade width in mm by material



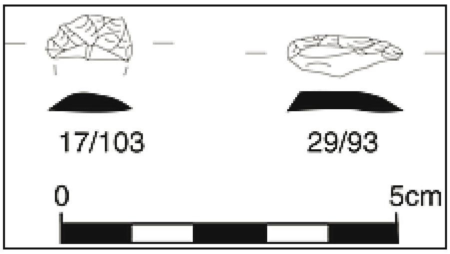
Illus 376: Sand, blade width in mm by material

It is clear that an important part of the repertoire of the knappers at Sand was the production of flakes and blades for use without modification. But they also made a variety of tools that incorporated secondary alteration by retouching. These included larger pieces like the scrapers and edge-retouched pieces, as well as many different types of microlith.

3.3.10.2 Scrapers



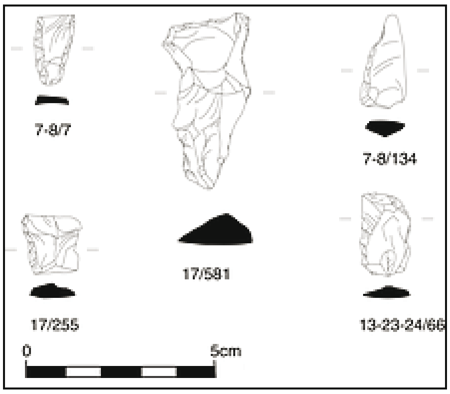
Illus 377: Sand, scraper re-sharpening flakes. Baked Mudstone: 17/495; 17/568; 17/19; 17/358; 17/121; 1/670; 13-23/136. Chalcedonic Silica: 11/36; 1/482. Quartz: 13/391



Illus 378: Sand, scraper re-sharpening flakes. Baked mudstone: 29/93; Chalcedonic silica: 17/103

There are 21 scrapers, all but two of which are made on flake blanks (see Illustration 377, right). Thirteen are made of baked mudstone, six of chalcedonic silica and two of quartz. Most (12) of the scrapers have retouch on the distal end to form an end scraper (Illustration 377, 17/495; 17/121), five of these also have some retouch on one side (Illustration 377, 17/568). There are three big horseshoe scrapers (Illustration 377, 1/670; 13/391; 13-23/136), and one tiny thumbnail scraper (Illustration 377, 17/358). In addition there is one broken scraper and four scraper re-sharpening flakes, struck across the scraper face in order to rework it (see Illustration 378, right). Angled scrapers such as those from Kinloch (Wickham-Jones & McCartan 1990) are absent – one of the end and side scrapers might fit into this category (Illustration 377, 1/482). Four scrapers have noticeable tangs opposite the scraper face (usually on the proximal end of an end scraper) which was another common trait among the scrapers at Kinloch, possibly resulting from preparation for hafting. There is considerable size variation among the scrapers, but it is worth remembering that, as a rule, archaeology deals with waste or accidental loss so that they may well have been changed through breakage or re-sharpening since they were originally made. In addition the knappers could only work within the confines of their raw material. In this respect it is worth noting that many of the scrapers are over 20mm long, suggesting that larger flakes were selected for alteration.

3.3.10.3 Edge-retouched pieces



Illus 379: Sand – edge-retouched pieces. Baked mudstone: 7–8/7; 7–8/134; 17/255; 17/581; Chalcedonic silica: 13–23–24/66

There are 27 edge-retouched pieces (see Illustration 379, left), most (20) are on flake blanks and the rest on blades. Seventeen are made of baked mudstone, five are chalcedonic silica, four are quartz and there is one of Rùm bloodstone. In general these pieces are broad, and often broken, they tend to be shorter than the scrapers, generally under 20mm long. Most have retouch on only one side (Illustration 379, 7–8/134; 17/255), but five have retouch on more than one side (Illustration 379, 7–8/7; 17/581; 13–23–24/66). In eight cases the right side has been altered, in nine the left side and three have retouch on one or both ends. The retouch is usually steep and tiny, there is considerable variation in both the shape and the configuration of the retouch among these pieces and it is likely that they were prepared for a number of tasks. The lack of use-wear analysis of any type means that this cannot be examined further.

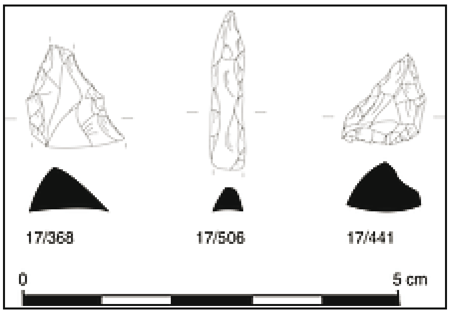
3.3.10.4 Notched pieces

There are three notched pieces (see Illustration 380, left), all from context 7/8 (the slopewash over the palaeo-channel). Two are of baked mudstone and one of

Illus 380: Sand – notched pieces. Baked mudstone: 7–8/135; Chalcedonic silica: 7–8/25

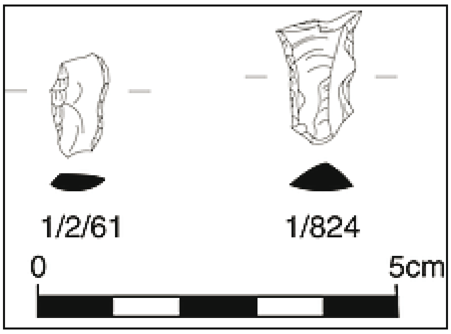
chalcedonic silica. All are on flake blanks and all are quite small. In each case the notch is formed of steep microlithic retouch, though they do not appear to be microburins.

3.3.10.5 Awls



Illus 381: Sand – awls. Baked mudstone: 17/506; Chalcedonic silica: 17/368; 17/441

There are three awls (see Illustration 381, right), all from context 017 (the Sandy Soil in Area A). One is on a blade of baked mudstone (17/506), the other two are on chunky flake blanks of chalcedonic silica (17/368 & 17/441). In each case the points are marked, formed at the convergence of steeply retouched sides.

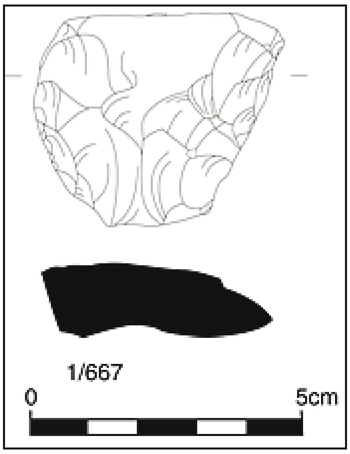


Illus 382: Sand – transverse arrowheads. Chalcedonic silica: 1/824; Rùm bloodstone: 1–2/61

3.3.10.6 Transverse arrowheads

There are two transverse arrowheads (see Illustration 382, left), both from the surface spits of Trench B running away from the midden. Both are on flake blanks, one of Rùm bloodstone and one of chalcedonic silica. Both pieces have steep retouch which has been used to blunt straight, snapped sides while a section of original flake edge has been used to provide a wide tip.

3.3.10.7 Bifacial point



Illus 383: Sand – bifacial indeterminate. Baked mudstone

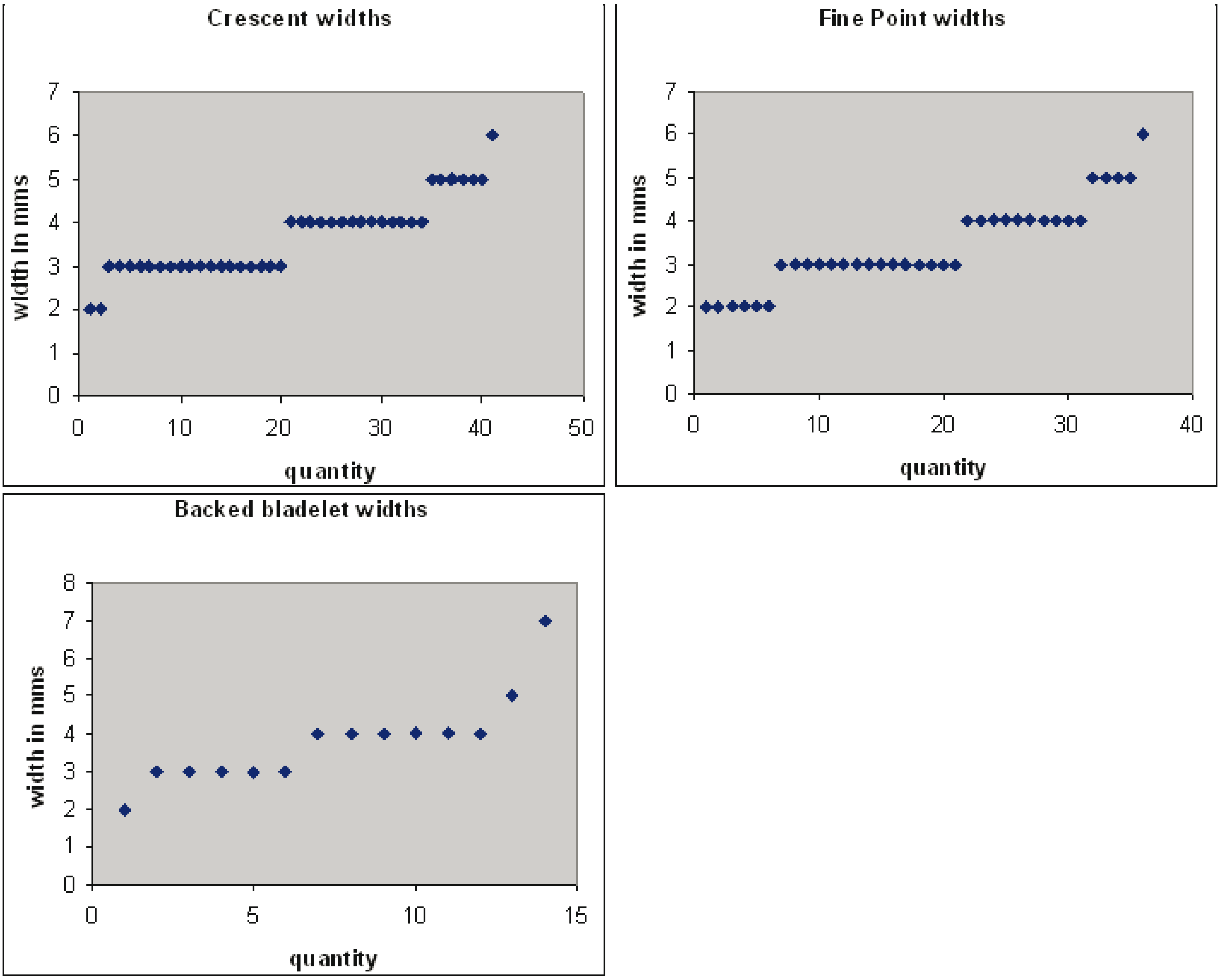
The bifacial tool is made on a large flake of baked mudstone (Illustration 383, right). There is shallow invasive retouch across both faces of the tool, but it is broken so that it is impossible to determine its original nature.

3.3.10.8 Miscellaneous and broken pieces

There are five miscellaneous pieces – made on a variety of blanks and from a variety of raw materials but all broken so that it is not possible to tell from what tools they originally came.

3.3.10.9 Microliths

There are microliths of all four material types; baked mudstone was most numerous, but tools of the other three materials are also common. The dimensions of both microburins and other microliths (see Illustrations 385, 387 & 389, below) show that they fit closely with the blade assemblage from Sand. Not surprisingly, the microliths are generally narrower than the blades. This is obviously an effect of their manufacture as all of the different microlith types have been retouched along at least one side and therefore reduced in width, but it would seem that the knappers may have been selecting blanks from among the narrower blades. This would be supported by the microburins.



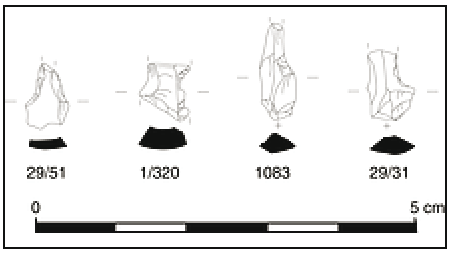
Illus 385, 387 & 389: Sand, widths of crescents, fine points and backed bladelets respectively, in mm

Microburins are traditionally regarded as a side product from microlith manufacture, though opinion is divided as to whether or not they played an essential role. The microburin technique involved the working of a notch towards one end of a blade blank. As this grew deeper it eventually resulted in the snapping of the blade, the remains of which could then be worked into a microlith. Occasionally, both ends were removed in this way. The microburin comprises the waste products, usually the proximal ends each with a characteristic half notch and 'burin' facet (see Illustration 384, below right). Microliths themselves were usually made to a strict 'pattern book' of specific types that occur in differing proportions across all Mesolithic sites. There is some gradation from one type to another and analysts have discussed how to allow for this (Finlayson *et al* 1996), but here more traditional microlith types have been adhered to. Definitions for the different microlith types follow the guidelines developed for Kinloch, Rùm (Wickham-Jones & McCartan 1990, 97–102) and subsequently used on other Scottish Mesolithic sites.

While a few people still see the use of the microburin technique as essential for all microlith manufacture (Ballin in prep), the small numbers of microburins on many sites suggest that microliths could very successfully be made without leaving obvious microburins as debris. This would be supported by the evidence from Sand and other sites (below) and is also the conclusion reached by Finlay in her research on microliths and their manufacture (Finlay 2000b). It is possible that the microburin technique was associated with the manufacture of specific microlith types, in particular scalene triangles (Brinch-Petersen 1966) and this would be supported by the small numbers of both microburins and scalene triangles at Sand (below), but there is not enough evidence to test this assumption here.

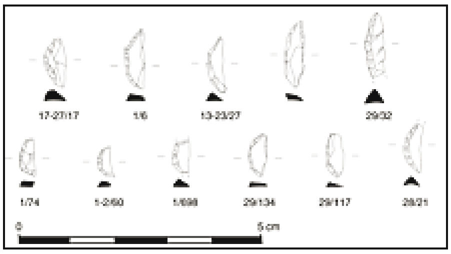
3.3.10.10 Microburins

There are six microburins (see Illustration 384, right). Three are made of baked mudstone, one of chalcedonic silica, one of Rùm bloodstone and one of quartz. Five have had a notch worked on the right side, one on the left side and one has a notch on both sides. On five the proximal end survives, the sixth has lost both ends. Five are between 5 and 7mm in width and one is 10mm, which suggests that the narrower blades were selected for alteration into microliths. This is in line with the widths of the microliths themselves (see below).



Illus 384: Sand – microburins. Baked mudstone: 1/320; 29/31; Rùm bloodstone: 29/51; Quartz: 1083

3.3.10.11 Crescents

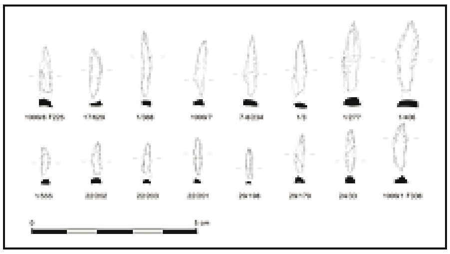


Illus 386: Sand – crescents. Baked mudstone: 13–23/27; 17–27/17; 28/21; 29/32; 29/117; 29/134; Quartz: 1/6; 1/74; 1/698; 1–2/60

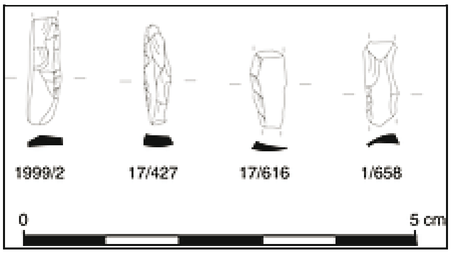
Crescents are most numerous among the recognisable microliths: there are 41 (see Illustration 385, above & 386, left) of which 23 are made of baked mudstone, eight of chalcedonic silica, seven of quartz and three of Rùm bloodstone. Most are worked on one side to leave a naturally sharp side, but several have microlithic retouch along both sides. The longest is 15mm long, but most (30) are between 6 and 10mm long, although 17 of these have lost a tip. Width varies from 2 to 6mm (see Illustration 385), with most between 3 and 4mm.

3.3.10.12 Fine points

There are 36 fine points (see Illustration 387, above & 388, right), of which 20 are of baked mudstone, ten of chalcedonic silica, four of quartz and two of Rùm bloodstone. There are a few long pieces (three fine points, each over 20mm long were found in the surface spits of trench B), but most are between 10 and 15mm long, with a few broken fragments as short as 4mm. Most are less than 5mm wide (Illustrations 387 & 388).



Illus 388: Sand – fine points. Baked mudstone: 1/3; 1/277; 1/388; 1/406; 1999/7; 24/33; 29/179; Chalcedonic silica: 1999/6; 7–8/234; 22/202; 22/203; 29/198; Rùm bloodstone: 1999/1; Quartz: 22/201



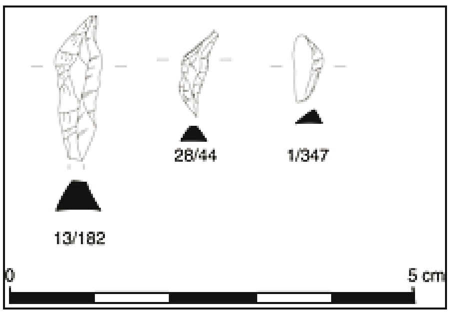
Illus 390: Sand – backed bladelets. Baked mudstone: 1/658; 1999/2; Rùm bloodstone: 17/616; Quartz: 17/427

3.3.10.13 Backed bladelets

There are 14 backed bladelets (see Illustration 389, above & 390, left), four of baked mudstone, four of chalcedonic silica, three of quartz and three of Rùm bloodstone. Over half of the backed bladelets are broken and have lost one or both ends, but tools of between 6 and 15mm seem to have been preferred. Most are 3–4mm wide (Illustration 389).

3.3.10.14 Scalene triangles

There are five scalene triangles (see Illustration 391, right), all but one are of baked mudstone, the other is of Rùm bloodstone. They vary between 8 and 17mm in length, and though two have lost one end they may have been generally longer than other microlith types. One is 6mm wide; the other four are 4mm wide.



3.3.10.15 Rods

Illus 391: Sand – scalene triangles. Baked mudstone 1/347; 13/182; Rùm bloodstone 28/44

There are three rods, two of quartz and one of chalcedonic silica. All are broken and they vary between 8 and 12mm long. Two are 4mm wide; one is 3mm wide.

3.3.10.16 Obliquely blunted points

There is one obliquely blunted point, made on a blade of chalcedonic silica that is 9mm wide. It has been snapped and microlithic retouch used to blunt the oblique snap, which lies to the left, as well as the rest of the left side. It is 14mm long. This piece clearly stands out from the rest of the microliths with regard to its width.

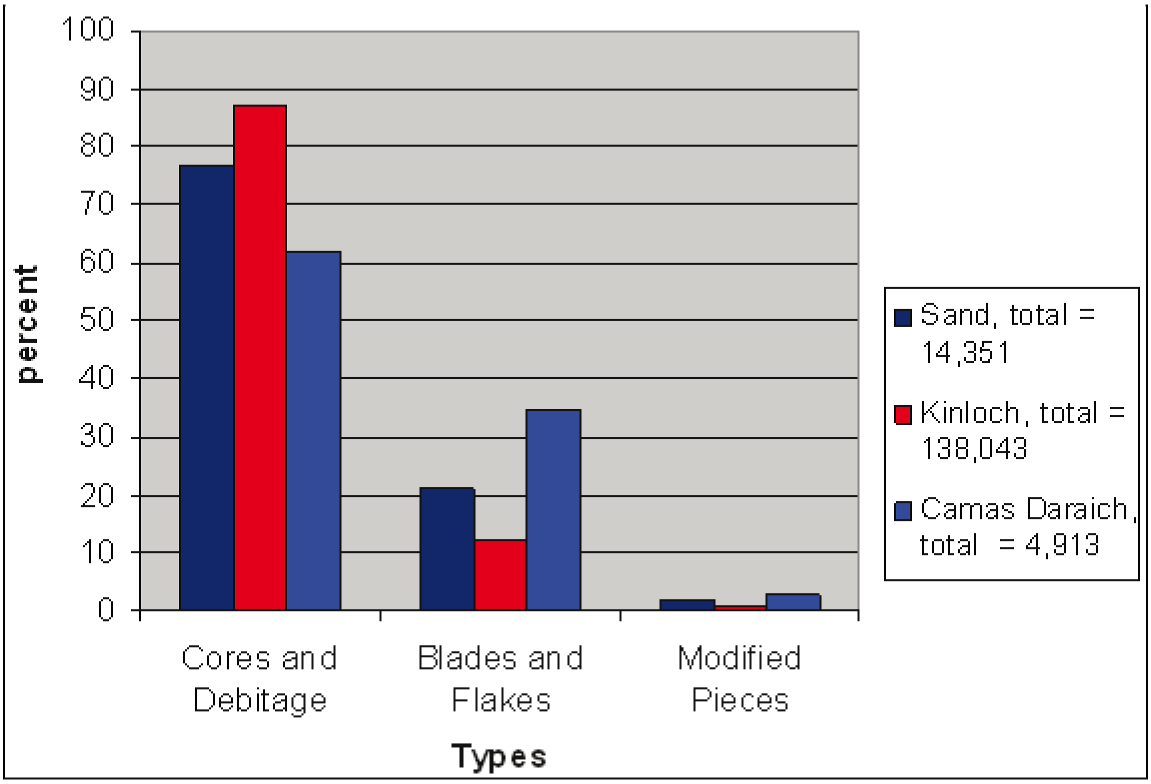
3.3.10.17 Miscellaneous microliths

Finally, there are 53 retouched pieces that have been defined as miscellaneous microliths. Most are parts of broken microliths. In some cases it is possible to suggest the original microlith type and this information is included in the notes to the catalogue but they have not been included in the discussions above, which are based on information drawn from more secure identifications.

3.3.11 Function

The flakes, blades and retouched pieces were important elements of the lithic tool kit needed by the inhabitants of Sand. They were suitable for a variety of tasks; some may well have been hafted. There are different ways in which it is possible to approach the study of the function of an assemblage of stone tools. One method is to carry out detailed use-wear and residue analysis of a sample of pieces, and this has been used to great effect in recent studies (Hardy forthcoming a; Hardy forthcoming b; Hardy *et al* forthcoming b). This was not possible at Sand, however, so that, while it remains a possibility for the future, it was necessary for this report to fall back on the more traditional, if limited, method of deducing task variability (if not task nature) from the types of piece present.

The composition of the assemblage certainly indicates that working tools are present as well as debris from the manufacture of such tools. Although there is plenty of evidence for manufacture in the form of the cores and debitage present on site, there are also plenty of pieces that suggest tool use in the form of flakes, blades and the modified pieces. Comparison of the relative proportions of these different categories gives a rough idea of the amount of material available for use – though it is of course likely that some suitable pieces were never used and work elsewhere shows that even some debitage was potentially useful (Knutsson 1988; Knutsson *et al* 1988). At Sand, cores and debitage make up 77% of the assemblage, flakes and blades comprise 21%, and retouched pieces and microliths are 2%. This overall pattern compares well with other sites such as Kinloch (Wickham-Jones 1990) and Camas Daraich (Wickham-Jones & Hardy 2004), though as Illustration 392 (below) shows it is possible that the proportion of debitage is artificially inflated as assemblages get larger. Comparisons with other assemblages are necessary to investigate this.



Illus 392: A comparison of the relative proportions of cores and debitage, blades and flakes, and modified pieces at Sand, Kinloch and Camas Daraich

Further information may be gleaned from patterns such as breakage. Breakage may occur for many reasons but it is noticeable that 80% of the blades at Sand were broken and it is likely that some of this was due either to breakage during use or to deliberate snapping as a form of modification before use. It is interesting to note that no particular part of the blade was preferentially retrieved: 34% of the snapped pieces were proximal ends, 21% distal ends and 36% the middle segment (9% odd fragments). It may be that distal ends figure less than expected but this is also the most vulnerable part of a blade. Overall the percentage of broken blades is comparable to that at Camas Daraich where 84% of the blades were broken, but it is hard to interpret the significance of this. More work is needed, especially to combine levels of breakage and particular survival patterns with use-wear analysis, before patterns of breakage at Sand can be used to add detail to our knowledge of the use of the pieces.

One final aspect of use is specialisation and it is interesting to consider whether or not there is any evidence for specialisation at Sand. Specialisation is something that has been touched upon in the analysis of other Mesolithic sites, in particular small sites such as Fife Ness (Wickham-Jones & Dalland 1998a; Wickham-Jones & Dalland 1998b), but also bigger sites, for example Kinloch (Wickham-Jones 1990:103–16). In general the lithic assemblage at Sand is a typical Mesolithic assemblage with something of everything that one would expect on a site like this. The microliths are interesting, however, in that some types that are common elsewhere, such as backed bladelets and scalene triangles, are not as common at Sand as other types that are less common elsewhere, such as crescents and fine points. Our interpretation of this depends on the meaning that we assign to the different microlith types but if we assume that the different shapes of microlith played different roles (whether within one tool or across a range of tasks), then it is likely that the differing quantities of various microlith types have functional and possibly specialist significance. This would suggest that there is an element of specialisation in the tasks undertaken at Sand. In this respect it is interesting that a high proportion of crescents also occurred at Fife Ness (Wickham-Jones & Dalland 1998a; 1998b) which has been interpreted as a specialist processing site probably in use in the autumn and exploiting a range of coastal and marine resources. This may well be the case at Sand (see below, Section 9).

Another type that is rare at Sand is the microburin. This is not the place to discuss the role of the microburin in detail, but it is worth noting that other sites such as Forvie (Warren forthcoming) and Oliclett (A Pannett, *pers comm*) had microburins in much greater quantity than Sand, so it would seem that they may have had some other role. This is supported by microscopic work by Hardy on the microburins from Forvie which suggests that they were used (G Warren, *pers comm*). Whatever the role of microburins, they were not needed at Sand.

3.3.12 Context

Although the assemblage may be divided into elements collected from a variety of specific contexts (see Table 102, above), the make-up of each context is remarkably uniform. Raw material use is similar across the different contexts, as is the broad percentage of debitage, and composition of artefact types. Microliths and other retouched pieces occur throughout the site including the midden layers. There are, however, small pockets of difference.

The notched pieces all come from context 7/8, the slopewash over the palaeo-channel away from the midden. The awls too were all found away from the midden, in context 17, the sandy soil of Area A. Context 022, the lower organic-rich silt below the shell midden, had a small concentration of six fine points of which three were particularly large. Both of the transverse arrowheads and the bifacial point came from the surface spits of Trench B away from the midden.

It is interesting that a relatively small proportion of the assemblage comes from specific midden deposits (17%). Though the composition of the assemblage recovered from the midden reflected that from the site as a whole, most of the flaked lithic assemblage was recovered from the trenches that ran away from the midden in both Area A and Area B. Furthermore, it is noticeable that, in contrast to the material outside of the midden, there were no obvious concentrations of material in the midden deposits. Perhaps this is not surprising. The midden is likely to be built up of deposits of waste which, given its loose friable nature soon became mixed into a fairly uniform whole. Away from the midden, however, the survival of odd concentrations of material perhaps suggest the presence of either specific deposits of waste, or the remains of small working areas.

3.3.13 Chronological and cultural connections

The assemblage from Sand is a standard Mesolithic assemblage and, not surprisingly, this is confirmed by the radiocarbon determinations. The lithics from Sand fit well into the picture of the early west coast Mesolithic. The raw materials were drawn from a pool of recognised lithic resources used across a well defined area. The styles of knapping and artefact types are quite in line with other west coast ‘narrow blade’ sites including Kinloch, An Corran and Camas Daraich: including the blades, microliths and other modified tools.

Much is made of the blade widths on individual sites. Some research workers examine the percentages of narrow (less than 8mm wide) and broad (8–12mm wide and over) blades, and this has been ascribed chronological, or cultural, significance (Ballin 2004). In general, however, most sites include a mixture of blades of both width categories and there is usually little evidence that they can be separated out in any way. Only at An Corran was there a suggestion that there might be an assemblage of broader, earlier blades, and full publication of this site is awaited. At Sand, the evidence certainly indicates that the different types of blade were part of a single assemblage: there was no contextual significance to their locations.

Further afield there is an increasing body of evidence from recent excavations in the east of Scotland. There are similarities in the use of narrow blade microliths on other early dated, and apparently specialised, sites such as Fife Ness (Wickham-Jones & Dalland 1998b), but other relevant assemblages include those from Morton (Coles 1971), Forvie (Warren forthcoming) and Oliclett (A Pannett, *pers comm*). All of these are coastal, though the dates vary considerably from potentially early material at Morton to much more recent dates at Forvie. Narrow-blade microliths have also been found in small numbers on inland and upland sites such as Nethermills (Kenworthy *unpublished*) and the Chest of Dee (Fraser, *pers comm*).

While Scottish Mesolithic sites clearly drew from a specific repertoire of stone tools there are, however, significant differences from place to place that may suggest regional differences. It is interesting, for example, that west coast microliths are often narrower than their east coast counterparts. The crescents from Fife Ness, for example, tend towards 6mm in width (Wickham-Jones & Dalland 1998b) in contrast to the 3–4mm width of the Sand crescents. This may be a reflection of the different uses to which pieces were put, the use of varying raw materials, or the facility with which different stones were knapped, but it might also reflect the growth of regional styles in tool production.

Many of these sites have still to be published in detail but it is now obvious that the Mesolithic of Scotland was more extensive and both started earlier and continued later than once believed. Together with this has come the realisation that it was a more complex period than originally recognised with its own local developments and idiosyncrasies over time. Only now are we starting to be in the position to review the lithic evidence as a whole.

3.3.14 Summary and discussion

The lithic assemblage from Sand is a typical Mesolithic assemblage and contains evidence for both the manufacture and use of stone tools in a variety of raw materials that were both drawn from local resources and from material that was brought in from further afield. With the exception of the Rùm bloodstone, which came from the island of Rùm 60km to the south, it is likely that all the material could be collected around the Inner Sound. Most of the raw material comprised pebble nodules, examples of which were found on site.

Although there is evidence that manufacture took place on, or near to, the site, the lack of cortical material of Rùm bloodstone and baked mudstone suggest that pebbles of these materials were prepared by the removal of outer material at source, before they were brought to Sand. Each material had its own knapping characteristics and the evidence indicates that the knappers were able to vary their techniques to make the most of these and produce a varied and useful assemblage including blades and fine microliths. Cores were carefully prepared and trimmed. It seems that knapping started with removals from platform cores but bipolar knapping was often used to make the most of a core before it was abandoned.

Blades and modified pieces were important end products for the knappers but regular flakes comprise a significant part of the assemblage. In general it is a typical Mesolithic assemblage from the west coast of Scotland with a variety of blades below 8mm wide and between 8 and 12mm wide, many regular flakes, and narrow-blade microliths (usually 3–4mm wide) of different types. Crescents and fine points are most numerous among the microliths.

The analysis was not able to include any detailed work on use-wear traces, but it would seem that many pieces were used. Composition and condition, as well as small pockets of deposition all point to a working assemblage. The high percentages of particular types of microliths, in contrast to other types, might suggest some degree of specialisation on site.

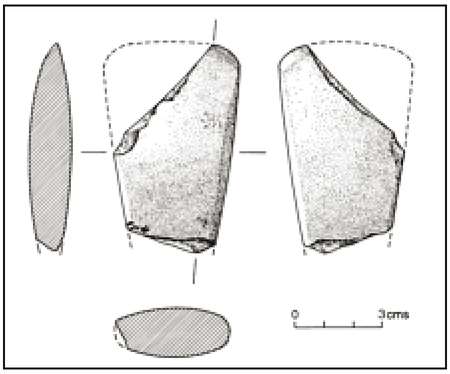
There was little significance to the different context locations of the assemblage. Tool types and raw material use were remarkably uniform across the site, though in general less lithic material came from the midden deposits than elsewhere. This is interesting in view of the problems encountered in interpreting midden sites in the past. It was long thought that midden sites and open-air sites related to separate cultural branches of Mesolithic Scotland (Lacaille 1954) on the grounds of their differing lithic assemblages. Pollard, among others, suggested that this might be due more to site function, preservation and varying excavation techniques (Finlayson 1990a ; Pollard 1990; Bonsall

1996) and his excavations at Risga (Pollard *et al* 1996) were some of the first to try and resolve the problem. We now know that shell midden sites themselves vary considerably in date and function (see below; Hardy & Wickham-Jones 2003; 2004; Hardy *et al* forthcoming b), but in brief many are associated with microlithic assemblages and it seems that they do sit quite happily within the main body of the Scottish Mesolithic as long as we accept that as a body it contained considerable variation. Chronology, function and regional differences all play a part in the record that is left to us and we, of course, add our own variations through our excavation techniques and methods of analysis. It is not hard to see how separate analysis of midden and deposits away from it might once have lead to differing conclusions, especially in a world that did not employ sieving and fine excavation techniques. As it is, the midden did contain a lithic assemblage with all the elements found elsewhere on site: debitage; flakes and blades; scrapers; edge-retouched pieces; and microliths. Most material, however, was found away from the midden.

Not only did the deposits away from the midden contain the majority of the lithic assemblage, there was also some evidence for the survival of small-scale specific deposits here as opposed to the general mixture within the midden. It was not possible, however, to determine whether these concentrations related to working areas or waste dumps.

3.3.15 The axe

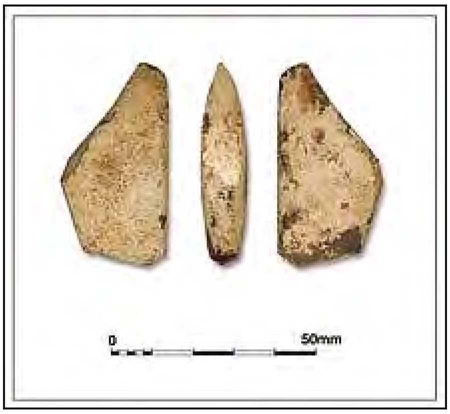
Also included within the assemblage is a small ground stone axe (see Illustration 393, right), recovered from context 27 (a slump of stony, midden-like material) at the juncture where it overlay context 22 (a sandy soil) and overlain by another slump, this time of midden.



Illus 393: Sand – stone axe, drawing

The axe is broken; a chunk has been removed diagonally across the blade, though a small length of blade survives. In addition, the butt end is damaged and it is likely that the axe was originally slight longer. The axe measures 71×39mm and is 17mm thick. It is made of a soft degraded stone, probably baked mudstone. It has squared sides and was originally ground all over; the striations from grinding are clearly visible. Tools like this were usually flaked into shape before grinding, but no trace of original flaking facets has survived. The face of the axe was slightly asymmetrical and curved in shape.

The axe from Sand is small (see Illustration 346, right), as axes go, though other examples of small axes do exist and they come from a variety of locations and contexts. A small axe of metamorphosed porphyry was recovered from a field collection at Kinbeachie in the Black Isle (Barclay *et al* 2001) and a steatite axe of similar size from beside a cist at Mousland in Orkney (Downes 1994). In Orkney there are other small axes from some of the Neolithic settlement sites such as Barnhouse (Richards 2005) and a new find in Wyre (N Card, *pers comm*). The Kinbeachie axe was associated with Neolithic material that probably related to settlement while that at Mousland related to burial and had a Bronze Age date. The dates from Context 22 at Sand are closely related to the context of the axe (Sections 3.2 & 4) and suggest an Early Neolithic date for it. Interestingly, in these examples of small axes, admittedly rather drawn at random, the materials used each relate to relatively local resources rather than stone imported long distance from an extraction centre.



Illus 346: Sand – stone axe, photo

It is difficult to see such a small axe fulfilling the traditional role of felling wood and other heavy tasks. It is of course possible that it played a lighter role in a woodworkers tool kit, especially in view of the asymmetrical profile of the edge, but it is also worth noting the 'ritual' nature often ascribed to many small axes such as this (Barclay *et al* 2001). There is not enough of the blade left to look at possible wear traces.

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Files cited in the text

All files start from ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > …

… > Documents > Final Reports > Wickham-Jones,_Sand_excavation_lithics.pdf
… > Images > Artefacts > Coarse and ground stone tools > Axe_photo.jpg [Illustration 346]

The following have the path … > Images > Artefacts > Lithics > …

… > Barbed_and_tanged_point_-_numbered.jpg [Illustration 364]
… > lithic_raw_materials_photo.jpg [Illustration 365]
… > marine_flint_bw.jpg [Illustration 368]
… > Scrapers_-_numbered.jpg [Illustration 377]
… > Scraper_resharpening_flakes_-_numbered.jpg [Illustration 378]
… > Edge_retouched_-_numbered.jpg [Illustration 379]
… > Notched_pieces_-_numbered.jpg [Illustration 380]
… > Awls_-_numbered.jpg [Illustration 381]
… > Transverse_arrowheads_-_numbered.jpg [Illustration 382]
… > Bifacial_retouch_-_numbered.jpg [Illustration 383]
… > Microburins_-_numbered.jpg [Illustration 384]
… > Crescents_-_numbered.jpg [Illustration 386]
… > Fine_points_-_numbered.jpg [Illustration 388]
… > Backed_blades_-_numbered.jpg [Illustration 390]
… > Scalene_triangles_-_numbered.jpg [Illustration 391]

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3.4 Worked bone from Sand | Karen Hardy

3.4.1 Introduction

A total of 67 pieces of worked bone has been recorded from the project as a whole. Most of the bone tool artefacts came from Sand (SFS 4) but some were found at other sites and information on them is given in the data report for each site (see Table 107, below; Section 2.2). This discussion concentrates on the 53 artefacts from Sand.

Table 107

Site	Number of tools
Sand (SFS 4)	53
Allt na Criche (SFS 68)	2
Allt na Uamha (SFS 10)	1
Camusteel 2 (SFS 77)	1
Church Cave (SFS 17)	1
Crowlin 1 (SFS 2)	1
Loch a Sguirr 1 (SFS 8)	3
Rubha Chuaig (SFS 58)	3
Toscaig 2 (SFS 20)	1
Uags (SFS 105)	1
Total	67

Table 107: Bone tools

In addition to the bone tools, four pieces of antler tine from Sand have what appear to be cut marks on them. These occur across the midden, with two pieces from square B25A, one piece from B1A and one piece from B3A. All pieces come from Context 13. All have transverse cut marks running across the tines. No tools of antler were found so it is possible that these 'cuts' relate to blunting down or smoothing of sharp edges of stone tools. It is also possible, however, that the processing of antler and main deposition of antler waste took place away from the midden so that these pieces might provide the only hint that tools of antler were used.

Most of the tools found were bevel ended tools; however, a number of other tool types were also represented. In addition, small flakes of bone with apparent flaking characteristics were recognised during excavation at Sand and recorded separately.

Although there was no detailed study of these, it would seem that people were making bone tools at Sand as well as using them. The technology of bone tools in the Mesolithic is still little studied (Foxon 1991), but there is clear scope for expansion in our understanding of bone tools in much the same way that lithic studies have developed over recent decades.

3.4.2 Distribution of Tools

3.4.2.1 Sand

Of the 53 bone tools from Sand, most were bevel ended but a fragment of harpoon and a possible knife were also found, as well as seven bone points (see Table 108, below). Of these 53 tools, five tools, all bevel ended, came from the 1999 test pits and they have been excluded from the discussion on artefact distribution.

Table 108

Sand: Bone Tool types	Numbers of tools
Bevel-ended	42
Knife	1
Harpoon fragment	1
Point	4
Indeterminate (broken)	5
Total	53

Table 108: Sand, Bone tools

The distribution of worked bone across the midden shows that tools are found across the whole excavated area with more items found in area B1, the area with the main concentration of midden (see Table 109, below).

Table 109

Sand: Areas	Nos of tools	
A	10	(21%)
B1	19	(39%)
B2	9	(19%)
B3	10	(21%)
Total	48	(100%)

Table 109: Distribution of bone tools, Sand; (Only artefacts excavated in 2000 included)

The distribution of artefacts through the contexts (see Table 110, below) shows that most were found in the main shell midden, or the topsoil immediately overlying it, with very few outside of this. This may well relate to patterns of discard, but it is also likely to have been influenced by the general lack of preservation of bone away from the midden environment.

Table 110

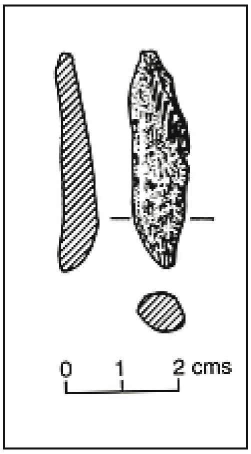
Sand: Context Description	Context Numbers	Area	No of worked bone
Topsoil and turf	1, 1/2, 1/3	ALL	12

Main shell midden	13, 11, 12, 13/23, 13/24, 13/23/24, 24	B1, B2, B3	26 (+ 4 pieces of cut antler)
Shell midden	28	A	2
Slumped stony deposit between midden and sandy soil	27	A	0
Sandy soil with heat cracked stone	17, 29, 17/27	A	5
Palaeo-channel and below	5, 14, 14/21	B3	0
Slopewash over palaeo-channel	7/8	B3	0
Lower organic rich silt (below midden)	22	A & B3	3
Natural	21, 26, 25	ALL	0
		Total	48 (52)

Table 110: Bone tools by context, Sand; (Only artefacts excavated in 2000 included)

3.4.3 Tool Types

Points



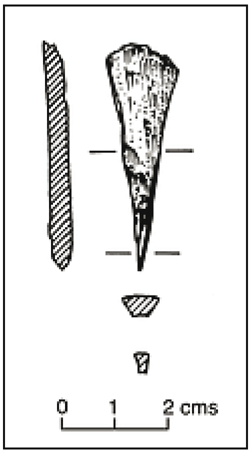
Illus 395: Sand – B2B SE 11. Tool No 22

3.4.3.1 Triangular points

Three long triangular points were found at Sand (see Illustration 394, right). One (BT22) is unusual in that it has a point at each end, but the points lie at right angles to each other (see Illustration 395, left). One (BT65) appears to be unbroken and has visible polish over its pointed end. BT115 is a broken piece with a thick triangular cross section and a long triangular point at one corner; it has no visible polish.

Illus 394: Triangular points (from left to right) – SFS 4; BT115, BT22, BT65)

3.4.3.2 Fine points



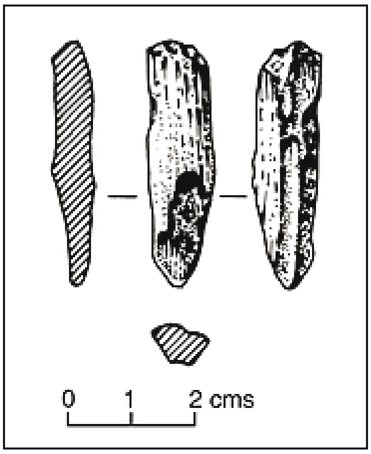
Illus 396: SFS 105 – fine point, Tool No 134

Illus 89: Fine points (from left to right) – SFS 58 (BT136), SFS 105 (BT134), SFS 20 (BT132), SFS 17 (BT135), SFS 68 (BT133)

There was one small fine point from Sand (BT56, B1BNE Spit 4, Context 24). It has been carefully made on a small round piece of bird bone. There were, in addition, five other bone points from the survey sites, though they were made on a range of different bone types (see Illustrations 396, lower left & 89, lower right), and had little in common beyond their long, fine points (see worked bone catalogue). All of the points were examined microscopically and only one point (from SFS 68, Allt na Criche, BT 133) was found to have evidence of use. This piece had a rounded end and step fractures on its tip, observable at 40 magnifications, suggesting a light percussive motion. The other pieces (BT132, SFS20; BT135, SFS17; BT134, SFS 105; BT136, SFS 58) had very sharp tips. Though these points have no visible evidence of use (see below) and probably represent pieces that were accidentally discarded, they appear most likely to have been made as piercers of some sort. Their location in shell middens suggests that they may be linked to winkle removal; however they could also have been used as bodkins.

There are plenty of periwinkles at many of the sites and, in order to remove meat from the shells, it is necessary either to break the shell or use a pointed instrument. None of the sites has any evidence for the breakage of winkle shells, yet there is also an absence of obvious pointed pieces likely to have been used for winkle extraction. The question of how these shellfish were exploited is thus pertinent. The lack of tools suggests that expedient use of fish or bird bones may have taken place, though it is possible that deliberately made points such as those discussed above were also used.

3.4.3.3 Indeterminate or broken



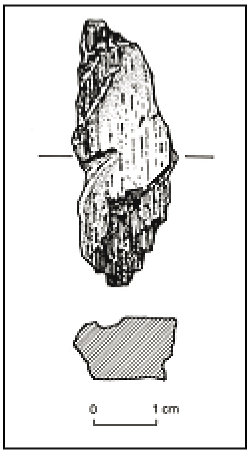
Additionally, five pieces from Sand were classed as indeterminate or broken. All have wide, flat triangular shaped points (BT12, BT37, BT64, BT69, BT111 (see Illustration 397, right) and were made on long bones; several have evidence of breakage across the shaft (see Illustration 398, left). It is not clear whether they represent a discrete group of points or whether they are proximal portions of broken bevel ended tools.

Illus 397: Sand – indeterminate bone points, BT12, BT64, BT37, BT69

Illus 398: Sand – B25B 12, Tool No 12 showing broken shaft

3.4.3.4 Harpoon

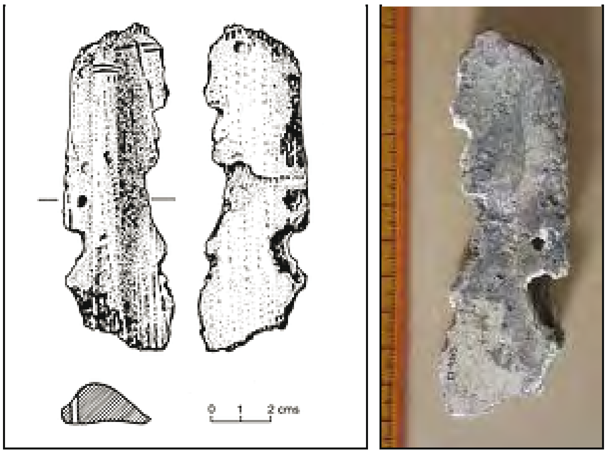
One fragment of harpoon was found at Sand (BT106, B3B SW, Spit 5, Context 13; see Illustration 399, right). This piece was found at the outer edge of the midden. It is a piece of the outer part of the head of the harpoon and it contains one diagonal indentation (see Illustration 400, far right). As the piece is small and fragmentary, it is not possible to identify the species used, nor to say whether it broke during manufacture or use. Harpoons occur on a number of Mesolithic sites across Scotland and can be uniserial, with one side barbed, or biserial with both sides barbed (Bonsall & Smith 1990; Smith & Bonsall 1991). The fragment of harpoon found at Sand is too small to be able to determine its type though Saville (2004c) suggests that most examples from Scotland are biserial.



Illus 399 & 400: Harpoon fragment, B3B SW 13, Tool No 106

3.4.3.5 Possible Knife

One piece of scapula seems to have been deliberately shaped (BT32, B25B SW Spit 6, Context 11/13; see Illustrations 401 & 402, both left). Although it has been broken recently, parts of the original edge remain. No definite use-wear could be observed microscopically, though fine lines exist along the sharp edge that may be related to use. A small amount of deep scratching perpendicular to the edge may or may not be



Illus 401 & 402: Possible knife. B25B SW Spit 6, Context 11/13, Tool No 32

deliberate. There is a small hole in the upper part of the artefact that may be artificial, and if so could have been related to hafting. It lies adjacent to a break in the bone that might relate to another small hole. There was, however, no polish or any other evidence of wear linked to the holes that could be detected either macro or microscopically. It is not clear whether this piece is actually a tool, but it is blade-like in shape and may well have been used.

3.4.3.6 Bevel ended tools

Bevel ended tools occur on stone as well as bone and, occasionally, antler. Current research suggests that the similarity of shape (that is the bevel end) has encouraged tools of stone and bone to be considered as a unity whereas it is likely that they are, in fact, different (Section 3.6). For this reason this discussion considers only tools of bone.

Illus 403: SFS 4, bevel-ended tools (from left to right) – BT4, B25A SW 13; BT2, B25A 13; BT14, B4B NW 1

3.4.3.6.1 Standard bevel ended tools

The bevel ended tools from Sand are formed from ungulate long bones. It was not possible to be specific as to species of the individual tools. They are elongated tools that have a rounded end at one or both extremities. Bevel ended bone tools tend to be associated with midden sites, though this may be a factor of preservation, and they have a wide age range in Scotland. Directly dated specimens go back to 7580–7180 BC at Druimvargie (OxA-4608, Bonsall *et al* 1995) while the most recent dates relate to a tool from Tiree, 1410–1080 BC (OxA-7887; Saville 1998b). Their function has been the subject of long standing debate (for example Connock *et al* 1992; Finlayson 1995; Bonsall 1996; Griffitts & Bonsall 2001).

Illus 404: SFS 4, bevel-ended tool BT30, B25B NE, 13

A total of 42 bevel ended pieces occurred at Sand (SFS 4). In addition there were three from Loch a Sguirr (SFS 8; also dated to the 7th millennium BC; Section 4) and they have been included in this discussion.

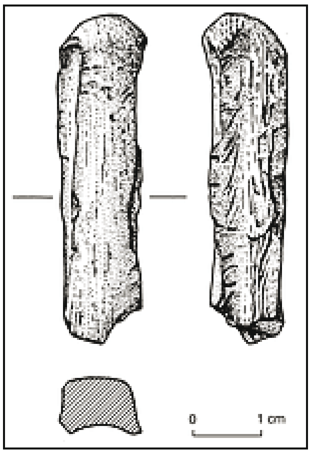
Bevel ended tools can be divided according to whether they are single ended, double ended, a bevel at one end and a point at the other, or indeterminate (see Table 111, below far right) (see Illustrations 403, upper left; 404, lower left; 405, below left; 406, below middle & 407, below right).

Table 111

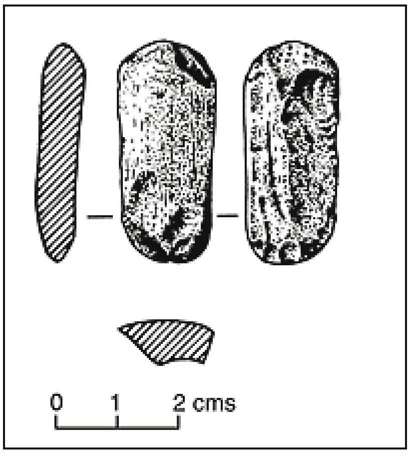
Tool types	Numbers of tools
Double bevel ended	3

Bevel and point	15
Single bevel	21
Broken or indeterminate	6
Total	45

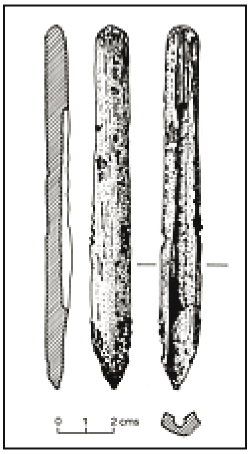
Table 111: SFS types of bevel ended tools



Illus 405: Single bevel-ended tool. B25A NE 13, Tool 3



Illus 406: Double bevel-ended tools, B4B NW Spit 3, Tool 14



Illus 407: Bevel and pointed tool. B25B NE 13, Tool 30

In general, the sides of bevel ended tools can either be straight or tapered (see Illustration 403, above). Two thirds of the bevelled and pointed pieces have tapered sides, leading to the point, while most single and all double bevelled pieces have straight sides (see Table 112, below). Bevel and pointed tools are on average wider, thinner and longer than single and double bevel ended tools (see Table 113, below). Together the morphological differences suggest that different blanks were used to create these different tool-types. Some bevel ended tools from other Mesolithic sites appear to be reused pieces of larger bevel ended tools or tools of other types such as harpoons (Saville 2004c), but this was not observed at Sand.

Table 112

	Single bevelled	Double bevelled	Bevel and point
Straight sides	16	3	4
Tapered sides	5	0	11

Table 112: morphology of the sides of bevel ended tools (only unbroken pieces included, n=39)

Table 113

Average size	Single bevel-ended (N=21)	Double bevel-ended (N=3)	Bevel and point (N=15)
Length	40.1	33.8	52.7
Width	13.4	13.6	14.2
Thickness	8.8	7.0	6.5
Length:width	2.9	2.48	3.83

Table 113: size of bevel ended tools in millimetres (only unbroken pieces included, n=39)

Among the bevel ended tools studied the double bevel ended pieces were generally squat, slightly wider on average than the single bevel ended tools, and on pieces of bone that are slightly thicker than the bevel and pointed pieces (see Table 113, above). This suggests that the small bevel ended tools from Sand are unlikely to have been reworked from larger pieces, as the blanks on which they were made are a different shape to the others.

The actual bevelled end can be either straight across or it can incline to one side or the other. Bevels can occur either on the dorsal or ventral surfaces of the bone (see Table 114, below). The position and angle of the bevel can help to elucidate use. Single bevel ended tools at Sand were more likely to be used on the dorsal surface and incline to the right (see Table 115, below), though some were used straight, thus causing the bevel to form in the middle. Bevel ended and pointed tools were used almost equally on both dorsal and ventral surfaces and the bevel is more commonly inclined to the left. The sample size is too small for detailed interpretation of these differences, but the difference suggest that it is worthy of further research, to elucidate, for example, the possible effect of handedness.

Table 114

	Dorsal	Ventral	Dorsal and ventral
Double bevel ended	2	1	0
Single bevel ended	16	6	1
Bevel-ended and pointed	6	7	0

Table 114: placing of bevel (only unbroken pieces included, n=39)

Table 115

	Left	Right	Middle
Double bevel ended	1	0	2
Single bevel ended	3	10	10
Bevel ended and pointed	8	3	2

Table 115: Angle of bevel (only unbroken pieces included, n=39)

The distribution of bevel ended tools mirrors that of all the bone tools. They are found in all areas but there is a concentration in area B1 and in the main shell midden (see Tables 116 & 117, below).

Table 116

Sand 2000: Areas	Nos. of tools
A	8
B1	15
B2	6
B3	8
Total	37

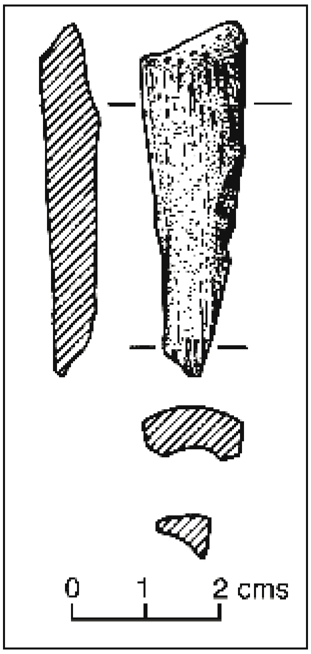
Table 116: Distribution of bevel ended tools, Sand; (Only artefacts excavated in 2000 included)

Table 117

Sand 2000 Context Description	Context Numbers	Area	Bevel ended tools
Topsoil and turf	1, 1/2, 1/3	ALL	10
Main shell midden	13, 11, 12, 13/23, 13/24, 13/23/24, 24	B1, B2, B3	19
Shell midden	28	A	1
Slumped stony deposit between midden and sandy soil	27	A	0
Sandy soil with heat cracked stone	17, 29, 17/27	A	4
Palaeo-channel and below	5, 14, 14/21	B3	0
Slopewash over palaeo-channel	7/8	B3	0
Lower organic rich silt (below midden)	22	A & B3	3
Natural	21, 26, 25	ALL	0
		Total	37

Table 117: Bevel ended tools by context, Sand; (Only artefacts excavated in 2000 included)

3.4.3.6.2 Non-standard bevel ended tools



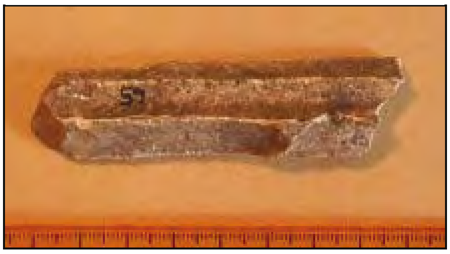
Illus 408: Concave-ended tool. A2B NW Spit 9, Tool No 63

Five pieces have been classified as non-standard bevel ended tools. Four are from Sand and one, from Loch a Sguirr (SFS 8), has also been included here.

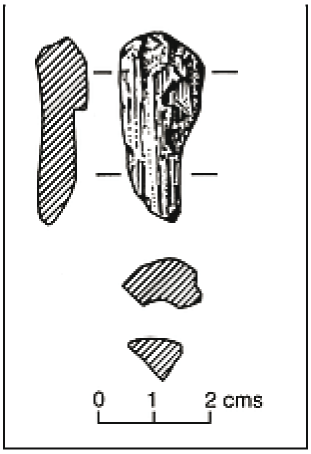
BT63 (Sand, A2B NW Spit 9 Context 22) is unusual in that it has a bevel that is concave rather than the normal convex (see Illustrations 408, left & 409, upper right). This suggests that it may have served a different purpose. Microscopically, the bevel surface was covered with fine horizontal lines, something that was not seen on any other piece.

BT59 (Sand, B25A SE, Spit 4, Context 13) is a large piece that is of the standard single bevel ended tool shape (see Illustration 410, lower right). The distal end has clearly been rounded into the shape of a bevelled tool, however no bevel exists. Instead two large flakes have been removed from the inside (ventral) face. This appears to be an artefact that has been shaped ready for use, but has not been used. It gives an insight into the way bevel ended pieces may have been manufactured; suggesting that the ends were roughly shaped by flaking

Illus 409: Concave-ended tool. A2B NW Spit 9, Tool No 63



Illus 410: Pre bevel, BT59, B25A SE 13

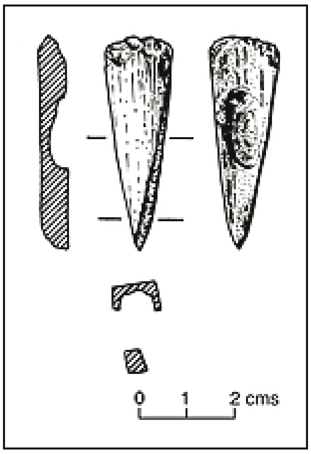


Illus 411: Possible reworked bevelled tool, B2A SE 13, Tool No 38

Illus 412: Possible reworked bevelled tool, B2A SE 13, Tool No 38

before use.

Artefact BT90 (Sand B25A NE Spit 8 Context 13) is a small distal piece of tool that may have been formed to a bevelled shape.

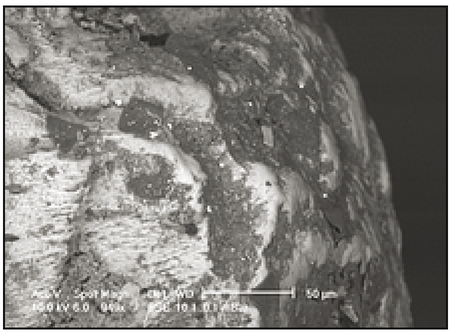


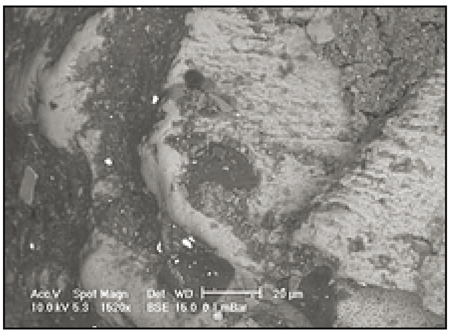
Illus 413: Loch a Sguirr – bevel-ended tool, Tool No 1

Illus 414: Loch a Sguirr – bevel-ended tool, Tool No 1

Artefact BT38 (Sand, B2A NE Spit 4, Context 13) is interesting (see Illustrations 411 left & 412, right). Its proportions are different to other pieces, being as wide as an average bevel and pointed piece but as short as an average double bevel ended piece. It has been roughly flaked at its distal end, and microscopically, it is possible to see that the flaking has eaten directly into a pre-existing bevelled end. It is possible that may be an example of a piece whose bevel had reached the end of its useful life and it was in the process of being reworked.

Artefact BT1 (Loch a Sguirr, SFS 8) has been radiocarbon dated to 6230–6000 BC (OXA-9255; Section 4). It appears to have been highly polished over its ventral surface and is almost symmetrical in shape with a long tapering end (see Illustrations 413, lower far left & 414, bottom right). Its form suggests that it was made with extreme care, far more so than other bevel ended pieces. On its distal end, it also has numerous small flake removals on both dorsal and ventral sides. This tool was examined using a scanning electron microscope (SEM). The fascinating result is illustrated (see Illustrations 415 & 416, both below) and clearly shows the onset of rounding across all the prominent tips of the flake scars. This suggests that bevels were indeed formed first of all by flaking, contrary to the suggestion by Reynolds (1983) and Foxon (1991) that the bevels were ground into shape before use. As the tools were used, clearly in a rounded, smoothing motion, the flake scars became slowly flattened out until they disappeared completely and the rounded bevel that is commonly found was produced. This suggests that the artefacts found in middens may represent bevels that have been used, perhaps to exhaustion.





Illus 415 & 416: SEM image (760× magnifications) of bevelled end of tool BT1 from Loch a Sguirr, showing rounding

Background

In order to try to throw some new light on the use of bone bevel ended tools, an experimental programme was undertaken to investigate both the possible manufacturing techniques and tool use. These tools occur on many Mesolithic sites along the west coast of Scotland (for example Connock *et al* 1992; Mellars 1987; Anderson 1898; Hardy *et al* forthcoming), and questions as to their use have been intensely debated for over 100 years (Anderson 1898; Bonsall 1996; Finlayson 1995; Griffitts & Bonsall 2001; Lacaille 1954). They have long been described as limpet hammers (Bishop 1914; Griffitts & Bonsall 2001), and this interpretation gained support from the fact that they only occur in shell middens, though there are other theories, one of which suggests that bevel ended tools were used to process animal hides (Foxon 1991; Finlayson 1995).

3.4.4.1 Experimental replication and use of bevel ended bone and antler tools

Illus 417: Fresh roe deer legs ready for use

Bevel ended bone tools are normally manufactured from splinters of bone, many of which have been identified as the metapodia of red deer (Saville 2004c). Based on an assessment of the breakage patterns of bone (Outram 2002:53–9), it seems likely that bevel ended tools were manufactured from both fresh ('green') and older bone, (see also Section 3.11).

Illus 418: Roe deer (fresh) and red deer metapodia (2 years old)

Prior to the experimental programme, metrical and morphological data were collected from various archaeological tools using a Leica Wild M28 Microscope at 10× and 20× magnification to look for traces of manufacture (flaking and cut marks), evidence of hafting and use-wear traces including striation marks, grooving and polish (Birch 2003).

A total of 28 'modern' tools was made using a mix of fresh red and roe deer leg bones (metapodia), as well as 'seasoned' two year old red deer bone (see Illustrations 417, left & 418, right); two year old red deer antler was used for the antler tools (see Table 118, below). Subsequently, 14 tools were used experimentally; five of antler and nine of bone.

Table 118

Tool No	Material	Reduction Method	Bevel Preform Method
1	Bone	Direct Percussion	Direct Percussion
2	Bone	Direct Percussion	Indirect Percussion
3	Bone	Wedge-Splinter	Direct Percussion
AT3	Antler	Groove & Splinter – Burin Tool	Corners rounded by grinding
4	Bone	Direct Percussion	Direct Percussion
6	Bone	Wedge-Splinter	Indirect Percussion
6	Bone	Wedge-Splinter	Indirect Percussion
7	Bone	Direct Percussion	Indirect Percussion
AT7	Antler	Groove & Splinter – Burin Tool	None

AT8	Antler	Groove & Splinter – Burin Tool	None
AT9	Antler	Groove & Splinter – Burin Tool	None
AT11	Antler	Groove & Splinter – Burin Tool	Corners rounded by grinding
15	Bone	Grooving Technique	Indirect Percussion
17	Bone	Grooving Technique	Direct Percussion
20	Bone	Direct Percussion	Direct Percussion

Table 118: Experimental tools; Back to Section 3.4.4.7

The experiments were designed to assess tool efficiency and any changes in tool morphology that might occur as a result of use. Tasks were designed to relate directly to the possible prehistoric setting of the Inner Sound. Work focused primarily on shellfish processing and animal skin scraping, though bark stripping and processing plant fibres were also carried out.

3.4.4.2 Primary reduction

Three methods were used to reduce the bone into potential blanks (see Table 118, above).

Illus 419: Bone fragments resulting from direct percussion

- Direct percussion using different sized hammerstones and a stone anvil. This reduced the bone into splinters, many of which served as potential blanks (see Illustration 419, right). This reduction method worked equally well on fresh and older bone. The resulting tool blanks display a similar morphology to the archaeological tools, some of which are tapered at one end. Some of the blanks also retained the epiphyseal or diaphysis end of the bone, similar to some archaeological tools.

- The 'wedge-splinter' technique. Here, the metapodia was placed on the anvil stone and a wedge of bone was placed in the anterior groove. This was then struck directly using a large hammerstone. This method was more successful than direct percussion at removing a more uniform blank on fresh bone, but no difference was found between the two methods when working older bone.

Illus 421: Grooving red deer antler with flint burin tool

Illus 420: Bone reduction using grooving and hammerstone

- A third form of bone reduction strategy was also attempted using techniques identified by David (2003: 651–6). This involves the grooving of the metapodia prior to removal of the epiphysis and diaphysis using combinations of dotted perforation, sawing and percussion (see Illustration 420, right). It offers more control over the morphology and size of the blank, and it worked well, but there is, as yet, no direct evidence that it was used in Mesolithic Scotland.

Analysis of the archaeological bevel ended tools manufactured from antler failed to reveal any evidence for a particular reduction strategy. During the experimental manufacture of antler tools however, control of the antler blanks was found to be almost impossible without prior grooving using a flint burin (see Illustration 421, left), though in reality burins were not found on any of the excavated sites and are indeed rare in the Scottish Mesolithic. The problems of working antler blanks could be reduced by soaking the raw material in water for up to five days prior to work (Wescott 1999:72–3).

3.4.4.3 Secondary reduction

The shaping of the bone blanks into pre-forms was carried out using direct percussion with a pebble hammer, much like striking a flint core. Older bone was shaped very quickly in this way, the brittle nature of the bone making it more suited to the finer finishing processes, but on fresh bone and smaller pieces of old bone indirect percussion was found to give more control. The fresh bone was difficult to work in a controlled manner, mainly due to the presence of fine membranes covering the bone surface and the relatively ductile properties of the bone itself.

To shape the bevel preform and working edge of the tool, a series of rough flakes were first removed in order to give a basic shape to the tool, and smaller flakes were detached to finish the piece. As in working flint, subsequent flake removals tended to follow previous scars. For the indirect percussion a sturdy flint flake that had been blunted at the tip was used as a punch in conjunction with a small hammerstone. Using these methods a sharp chisel edge could be manufactured which displayed very similar morphology to the archaeological tools that had not been subsequently rounded through use (see Illustration 422, right).

Illus 422: Tool AC50 from An Corran showing flaking

Due to a lack of evidence for any preliminary working of the antler blanks, the majority of the replicated antler tools were used experimentally without modification. If a bevel preform was required for a specific experimental task, such as that used to scrape animal skins or to remove tree bark, the bevelled edge could be created by first rubbing the end of the antler blank on a rough stone or pebble. The sharp corners of antler blanks could also be rounded with this method, to stop them puncturing the materials.

3.4.4.4 Tool hafting

It is unclear whether bevel ended tools were hafted. For the purpose of this study some tools were hafted (see Table 119). Hafts were made of bone, antler and wood (see Illustration 423, right). After use, tools were examined for damage or wear that could be related to hafting. At 20× magnification some of the bone tools showed areas of weak glossy polish on the proximal end of the tool, similar to use-wear traces observed on some archaeological tools.

Illus 423: Antler tool in hazel haft

Table 119

Tool No	Hafted / Not Hafted	Tool Use
1	Not Hafted	Scraping wet limpet shell
2	Hazel Handle	Breaking down nettle stems into fibres
3	Bone Metapodia haft	Scraping wet limpet shell
AT3	Antler Beam Handle	Removing pine bark from tree trunk
4	Antler Beam Handle	Detaching limpets from rocks
6	Hazel Handle	Scraping a fresh wild boar skin
6	Hazel Handle	Scraping a dry red deer skin
7	Not Hafted	Grinding down sorrel leaves
AT7	Hazel Handle	Scraping wet limpet shell

AT8	Antler Beam Handle	Removing limpets from rocks
AT9	Hazel Handle	Extracting limpet meat from shell
AT11	Antler Beam Handle	Scraping a dry red deer skin
15	Not Hafted	Scraping wet limpet shell
17	Not Hafted	Extracting limpet meat from shell
20	Not Hafted	Removing birch bark residues

Table 119: Experimental use of bevel ended tools

3.4.4.5 Experiment 1 – Tree bark processing

Ethnographic evidence and materials recovered from prehistoric sites, especially in Scandinavia (Schilling 1997:94; Östlund *et al* 2004) and South America, have revealed the importance of tree bark in hunter-gatherer communities. Bone tools in Tierra del Fuego for example (Bridges 1949; Scheinsohn & Ferretti 1995), were used to harvest bark from trees, specifically to lever the bark away from the trunk, and to scrape excess residues from the inner face of the bark. The following experiments were designed to replicate these tasks.

Method

Two tools were used; AT3 and 20. Antler tool AT3, hafted in a red deer antler handle, was used to prise bark from a pine tree (*Pinus sylvestris*, see Illustration 424, right & Table 120, below). A bevel was created on the tool before use by rubbing on a rough granite slab of rock. This was done to blunt the sharp corners. Bone tool No 20 was not hafted. It was used to remove resinous residues from the inner face of bark removed from a birch tree (betula pendula).

Illus 424: Using antler tool to prise pine bark from trunk

Table 120		
Tool No	Tool Use	Time in Use
AT3	Removing pine bark	25 mins
20	Birch bark residues	120 mins

Table 120: Tree bark processing

Tool Efficiency

AT3 was very effective at stripping continuous runs of pine bark from the trunk; a 7.5m length was extracted during this experiment. Few holes were punctured through the bark, most of these occurring where side branches were located. The tool was used for 25 minutes. Bone tool No 20 was efficient at removing the hard resin deposits from the inner face of the birch bark while it retained a sharp, chisel edge. However, the efficiency reduced dramatically as the tool became blunted through use (the tool was used for 120 minutes).

Results

The replicated antler tool (AT3) was effective at removing pine bark from the trunk and use-wear was slow to develop. The tool dimensions had not changed after the experiment, though the tool bevel had taken on a slightly convex profile. The working edge of the tool was still quite sharp, while the corners of the tool had blunted and taken on a slight polish. At 20× magnifications a limited amount of polish was visible down the sides of the tool, away from the working edge. The striations on the ventral face run parallel with the axis of the tool, while those on the dorsal face run diagonally across the bevel.

Bone tool No 20 showed slight bevelling after two hours of use on the birch bark, and its working edge was slightly convex in profile. Under low magnification a high gloss polish could be seen on the high points of the bevels with faint striation marks running at 90° to the tool edge. The bevelling of the tool through use was starting to obscure the initial flaking. With more time it is likely that a bevel form similar to those observed on the archaeological specimens could be replicated.

3.4.4.6 Experiment 2 – Plant Processing

It is possible that tools manufactured from bone and other materials may have been used to process plant materials during the Mesolithic. However, the limited evidence available for plant use during this time meant that the experimental programme was based on speculation rather than direct evidence.

Method

Illus 425: Tool No 2 in use on nettle stems

Illus 426: Processed nettle stems

Two experimental bone tools (Nos 2 & 7) were used for these experiments (see Table 121, below). Tool No 2 was hafted in a hazel handle and was used to break down nettle stems into fibres. An anvil stone of granite was used to support the plant stems, while the bevel ended tool was used at both ends, to run down the stem of the nettles, separating the fibres (see Illustration 425, left). A total of 22 nettle stems was processed, some of which were quite old and 'woody' (see Illustration 426, right). The experiment lasted for 80 minutes. Tool No 7 retained the articular end of the red deer metapodia and that proved a useful handle. The tool was used for 60 minutes to pulverise and grind sorrel leaves into a paste.

Table 121		
Tool No	Tool Use	Time in Use
2	Nettle stems/fibres	80 mins
7	Grinding Sorrel leaves	60 mins

Table 121: Plant processing

Tool Efficiency

Tool No 2 reduced the nettle stems to individual fibres effectively, while Tool No 7 was not efficient at processing the sorrel leaves into a paste, but did succeed in shredding the material.

Results

The use of tool No 2 resulted in a sharp and pronounced working edge with slightly convex bevels. The corners of the tool show little rounding, while the visible striations on the bevels are multi-directional. Both bevels are lightly polished. This polish extends for a short distance down the tool edges. An examination of the tool where it had been retained in the hazel handle shows light polish to high spots along the edges.

Tool No 7 had no clear wear pattern, though new striation marks were observed on the bevel faces, both of which were used in the experiment.

The final shapes of the bevels on these tools were quite unlike those observed on most archaeological tools. However, it is possible that this may be due to the relatively short duration of the experiment.

3.4.4.7 Experiment 3 – Shellfish Processing

Bevel ended tools have long been linked to shellfish collecting and processing. (Anderson 1898; Bishop 1914; Lacaille 1954; Mellars 1987; Bonsall 1996; Connock *et al* 1992; Finlayson 1995; Griffitts & Bonsall 2001; Birch 2003). Although the primary aim of the experiments was to assess the effectiveness of the tools in processing limpets, both in removing limpets from shoreline rocks and scooping meat from the shells, the use of the tools in a realistic environment also highlighted some of the difficulties inherent in limpet harvesting and processing.

Limpet harvesting and processing experiments were undertaken at Ashaig in Skye, where a sandy foreshore with numerous rocky reef structures, provided ideal conditions for limpet collection at low tide (see Illustration 427, right). All limpets harvested were subsequently used as bait.

Illus 427: Limpets attached to foreshore rocks at Ashaig, Skye

Method

Five bone and three antler tools were used (see Table 118, above). One coarse pebble tool was also used to remove limpets from the shoreline rocks, to compare the efficiency of stone with bone and antler (Experiment 3D below).

Experiment 3A

This experiment replicated the work undertaken by Griffitts & Bonsall (2001). Empty limpet shells, dipped in water, were scraped round their insides in a laboratory setting, in order to replicate the scooping motion understood to be the action required to remove limpet meat from its shell (see Table 122, below). Their other experiment, which involved holding an empty limpet shell against a flat surface with one hand while striking it with another, was not replicated.

Table 122

Tool No	Tool Use	No of Actions
1	Scraping wet limpet shell	1000 scoops
3	Scraping wet limpet shell	1000 scoops
15	Scraping wet limpet shell	3200 scoops
AT7	Scraping wet limpet shell	1400 scoops

Table 122: Wet limpet shell experiments

Experiment 3B

Antler and bone tools were used at Ashaig beach, Isle of Skye, to detach limpets from the shoreline rocks. It was found necessary to use hafts of red deer antler for the tools in order to provide the force required in completing this action. The most efficient technique required to remove the limpets is to strike with the tool, held at around 45 degrees to the rock surface, at the interface where the limpet shell is attached to the rock. Limpets were most easily detached when they were freshly exposed as the tide receded (see below).

Experiment 3C

Bone and antler tools were used to remove (scoop) limpet meat from the shell at Ashaig, Skye (see Illustration 428, right).

Illus 428: Bone Tool No 17 and extracted limpet meat

Illus 429: Sandstone pebble tool used to detach limpets at Ashaig

Experiment 3D

A coarse sandstone pebble tool (9.5cm long × 4.5cm wide, max × 3.8mm thick), similar in form to the stone bevel ended tools recovered from several Mesolithic shell midden sites (for example Mellars 1987; Mithen 2000), was used to detach limpets from shoreline rocks. The pebble had a naturally rounded end and was picked up on the foreshore at Ashaig, Skye. It was used without any prior modification (see Illustration 429, left).

Tool Efficiency

Experiment 3A. This experiment did not provide any useful data to complement the findings of this study, probably because it was undertaken in simulated laboratory conditions. Work with live limpets (see Experiment 3C) showed that the type of action required to remove the meat from a limpet shell was quite different from that inferred by the simulation. Nevertheless, the use-wear on all of the tools used for this experiment produced rounded bevels similar to the archaeological tools. The bevels were convex in profile and highly polished, with shallow multi-directional striations. The polish extended down the edges of the tool from the bevel edge.

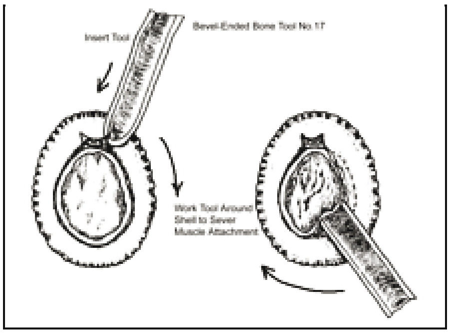
Experiment 3B. Bone tool No 4 was hafted in a piece of red deer antler beam and used to detach limpets from the shoreline rocks (see Table 123, below). After successfully removing five limpets, the tool was so badly damaged that it was no longer usable. Flakes of bone were detached through use from the working edge of the tool and the resulting bevel morphology was quite unlike that observed on archaeological tools. There was heavy and deep grooving visible on the bevels. The antler tool used for this experiment (AT8) was hafted in a section of red deer antler beam and was found to be very effective at removing limpets from the rocks, removing 700 shells in 45 minutes of foraging with a 95% strike rate. Very few limpets were damaged during this process.

Table 123

Tool No	Tool Use	Time in Use	No of Actions
4	Detaching Limpets	*4 mins	5 Limpets
AT8	Detaching Limpets	45 mins	700 Limpets
Pebble	Detaching Limpets	30 mins	350 Limpets

Table 123: Experiments 3B & 3D, Detaching limpet shells from rocks
NB: * Tool no 4 was damaged beyond further use after only five minutes

Experiment 3C. One bone tool (No 17) and one antler tool (AT9) were used to extract limpet meat from the shell (see Table 124, below). Tool AT9 was used to extract 230 limpets and this was achieved in 15 minutes. The width and thickness of the antler tool made it difficult to extract the



Illus 430: Method used to extract limpet meat

meat without damage and the side edges of the tool provided the cutting action required to sever the muscle attachment of the limpet. Bone tool No 17 was a better shape and very effective at removing meat, with 1100 limpets extracted in around 60 minutes (550 removed using each side/bevel of the tool). To remove a limpet the bevel of the tool is pushed between the meat and the shell at a point to one side of the muscle attachment. A circular motion is then used around the inside of the shell to detach the meat, including the muscle that attaches the meat to the shell (see Illustration 430, right). This process requires some force, especially if the tool bevel and edges are blunt. Using this method the limpet meat came out of the shell clean and undamaged.

Table 124

Tool No	Tool Use	Time in Use	No of Actions
17	Limpet meat extraction	60 mins	1100 meats
AT9	Limpet meat extraction	15 mins	230 meats

Table 124: Experiment 3C, Limpet meat extraction

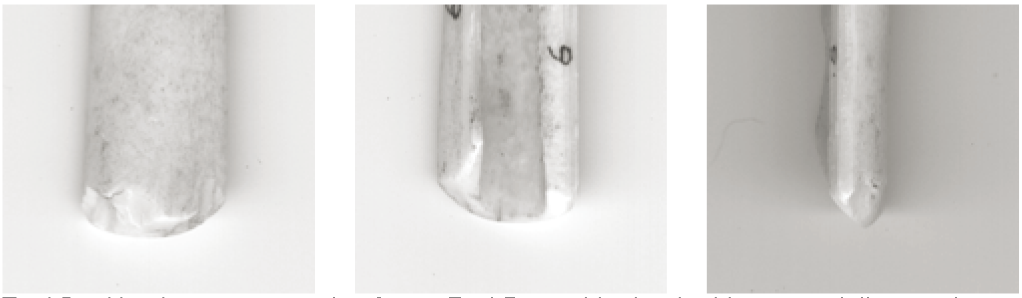
Illus 431: Limpets harvested using the unmodified pebble tool

Experiment 3D. The small unmodified elongated sandstone pebble used for this experiment was very effective at removing limpets from rocks, using a sharp tap at the junction of the shell and rock (see Illustration 431, right). Three hundred and fifty limpets were harvested during 30 minutes of foraging time, with a 98% strike rate. Only five limpets were damaged. There was also less impact generated through the body of the tool to the hand than experienced using the antler and bone tools.

Results

Harvesting limpets

The results suggest that it is unlikely that bevel ended bone tools were used to detach limpets from the shoreline rocks as they were ineffective for this work. However, antler tools mounted in antler beam handles were quite effective, though the impact shock transmitted to the hand of the user made working uncomfortable, and stone may have been a better medium. The harder, dorsal face of the antler was best for this task. Tool AT8 displayed a rounded profile (see Illustration 432, below) and convex bevels after use. The corners of the tool were also slightly rounded, but the bevel faces showed little polish; they were heavily grooved and pitted, especially on the dorsal bevel.



Tool 6 – Used to scrape and soften a Red Deer skin that had been partially cured

Illus 432: Scanned images of a selection of the replicated and used bevel-ended bone and antler tools (see individual captions in full image for descriptions)

Limpets on 'clean' shoreline rocks and on surfaces approaching the horizontal were easier to detach than those attached to rough, barnacle infested rocks with a more vertical angle. Barnacles made it difficult to strike at the interface between the base of the limpet and the rock. Limpets submerged below the surface of the water, such as in rock pools, were also relatively easy to remove.

The state of the tide has a clear influence on the ease of limpet harvesting. Not only does it directly dictate the amount of foreshore that is exposed at any one time, but also it became apparent that the most effective time to harvest limpets was during a spring tide, as the foragers follow the receding waterline. Below water, limpets are not so strongly attached to their rocky home. Between tides, when they are exposed above the waterline, they become increasingly attached to the rocks with time, especially on hot, sunny days. Working with the receding tide, it was rarely necessary to wade into the water in order to detach limpets effectively.

The small, elongated sandstone pebble was easy to procure and use. After use a distinctive bevel was starting to form at the working edge, very similar to those found on archaeological stone bevel ended tools.

Removing limpet meat

The antler tool (AT9) used to remove limpets from their shell formed little visible wear patterning, though the experiment was conducted over a relatively short period of time. The tool was not effective at removing the meat, however, and it caused damage to the product during the process. The bone tool used for this experiment (No 17) though well suited to the task did not develop a pronounced bevel, even after the removal of the meat from 1100 limpets. The small bevel that formed on the dorsal face of this tool is rounded in profile and does not resemble those on the archaeological tools. It is slightly pointed in profile and there is distinctive wear patterning extending down the sides of the tool for approximately 14mm. Shallow striations and areas of weak polish were also observed on the bevel. The absence of a prominent bevel is due to the fact that it is the sides of the tool rather then the end that form the 'working' edge. Extraction principally involves cutting through the muscle attachments.

3.4.4.8 Experiment 4 – Hide Preparation

Method

Two experimental tools were used (No 6 and AT11) (see Table 125, below). Tool No 6 was hafted in a hazel handle and was initially used to scrape fat and membranes from a fresh wild boar skin (see Illustration 433, right). The skin was not stretched, but was worked on a hard ground surface. The tool was then re-sharpened by flaking with a pebble hammer using direct percussion and was used to scrape dried membrane from a dry, partially cured red deer skin. Tool AT11 was also used to prepare the red deer skin,

Illus 433: Using bone tools on fresh wild boar hide at Lejre

scraping away the dried membrane on the inner face of the skin. The skin did not require stretching due to its rigidity, but was processed as it was laid out flat on hard ground.

Table 125		
Tool No	Tool Use	Time in Use
6	Fresh wild boar skin	50 mins**
6	Dry red deer skin	225 mins
AT11	Dry red deer skin	210 mins

Table 125: Experiment 4, Hide preparation
NB: **Tool 6 re-sharpened after 20 minutes

Tool Efficiency

Tool No 6 retained a sharp chisel edge and was quite effective at removing the meaty and fatty deposits from the fresh wild boar skin. A significant amount of force was required to remove these deposits, however, and after approximately 20 minutes the tool became blunt through use; this affected its efficiency considerably. To retain the tool's effectiveness, regular re-sharpening of the bevel-end was required. The tool was used for a total of 50 minutes on the wild boar skin. Stretching the skin out in a frame would have made this work easier.

Tool No 6 was then re-sharpened and was quite efficient when used on the dry and partially cured red deer skin, especially while a sharp chisel edge was retained (but see Results below). It was used to remove the fine, dried membrane from the inner face of the skin. Both bevels were used for a total of 3 hours 45 minutes without any further modification. Antler tool AT11, mounted in a section of red deer antler beam, also performed this same task effectively and was used for a total of 3 hours 30 minutes, without modification during use. It was necessary to use considerable force to process the red deer skin and the tools lost their useful working edge after 20–30 minutes of use (see Illustration 434, right).

Illus 434: Antler Tool No 11 used on partially cured red deer hide

Results

When used to process the fresh wild boar skin, tool No 6 took on steep, slightly convex bevels, with a dull gloss finish. Striation marks were faint and shallow, and multi-directional on the two bevels at 20x magnification. The tool soon lost its effectiveness on the skin as it became blunted through use, and regular re-sharpening was required. The most common bevel morphology recognised on the archaeological tools, comprising well rounded bevels, would not be effective at removing the fatty deposits from the skin. This suggests that is unlikely that bevel ended tools were used for this particular aspect of skin processing.

Both tools used on the partially cured red deer skin (No 6 and AT11; see Illustration 435, right) quickly lost their effectiveness at removing the dried membranes. However, the processing method used on the skin had unforeseen results, in that the consistency of the skin became more elastic and pliable as the experiment progressed. The tools were effective in this aspect of the process even after their edges became blunt through use, and they were particularly good at removing hard, creased areas from the skin. A 'scoring-type' motion was most effective at performing this task and this resulted in a flexible and supple hide.

Illus 435: Antler and bone tools used on red deer hide

During the experiment new flaking scars appeared on the bevels of tool No 6 near the working edge, and the more general flaking scars from tool manufacture started to be masked by the formation of rounding and polish. The bone tool also displayed areas of polish extending down the sides of the tool at the distal end for approximately 15mm. After the experiments, both replicated tools had distinctive convex bevels similar to those on archaeological tools. The bevels have a high, glossy finish with regular striations running diagonally right to left across their faces. It was found that during use the tool was used to score the hide diagonally, due to a combination of factors including where the operator was positioned in relation to the area of work on the skin and how the tool was manipulated.

The corners of the bevels are thus slightly rounded and polished. Examination of tool No 6 at 20 magnifications and after removal from the hazel handle, displayed areas of polish down the sides of the tool as well, especially on high spots, and this is most likely to be due to movement in the haft during use. Similar polish was observed on many bone tools from the archaeological collections analysed for this work.

3.4.4.9 The results of experiment: discussion

The experimental programme suggests that bone bevel ended tools were not used to process shellfish; they were inefficient at removing limpets from the rock, and while they were useful for extracting limpet meat from inside the shell, the morphology of the resulting bevel did not correspond with the archaeological samples. Antler tools were ineffective in extracting limpet meat from the shells, though they were capable of removing limpets from the rocks. The sandstone beach pebble was excellent for detaching limpets and quickly started to develop bevels that resemble the archaeological material. It seems more likely that stone was used for this in the past.

Exploration of the use of bevel ended tools for plant processing requires further experiment. Both antler and bone tools were effective for these tasks, but only weak use-wear patterns developed in the time allocated. The initial results suggest that bevel ended tools could have had a relatively long and efficient life in tasks such as removing bark and processing plant materials. Antler provides a tough, impact-resistant, material, and these superior qualities make it more suitable for bark removal.

The hide working experiments produced wear patterns and tool morphology similar to those on Mesolithic tools, especially the task of softening skins during the curing process. However, a significant amount of force and pressure was required to remove the fatty tissues and membranes, and this force was impossible to apply using shorter tools. Tools less than 40mm long were not capable of generating the energy required to break down the fibres during the curing process unless they were hafted.

The experiments suggest three possible uses for the tools: bark processing, plant processing and hide working. Of course different tasks may have been carried out at different sites, and other tasks may await detection. Microscopic analysis of the archaeological tools from Sand suggests that hide processing may have been the predominant task there (below). Work on other sites is necessary to refine this interpretation for other places.

Hand lens study

Forty-four bevel ended tools from SFS sites (SFS 4 Sand, & SFS 8 Loch a Sguirr) were examined using a hand-held magnifier (10× magnifications) for use-wear traces on their surface (see Table 126, below).

Table 126	
Longitudinal scratch marks	28
Other types of use-wear (polish etc)	7
Not visible, eroded etc	9
Total	44

Table 126: Wear traces at 10× on bevel ends

Almost two thirds (64%) of the tools had clear, well defined longitudinal scratch marks visible at 10× that ran the length of the bevel perpendicular to the working edge (see Table 126, above). These marks were generally very consistent as to depth and size of scratch. This suggests that most of the tools have been used in the same way and for the same purpose. Seven tools had other types of use-wear, notably polish and transversal scratching, while one tool had evidence of possible percussive activity. Nine tools were too eroded to identify use-wear.

Four of Birch's experimental tools (see Section 3.4.4) were examined in the same way (AT9, AT11, AT8 and AT3). Tool AT11 was the only tool that had longitudinal scratch marks, similar to those on 64% of the archaeological tools. This tool was used to scrape a red deer skin. There is clearly more work to be done, but this does add weight to the possibility that bevel ended tools may have been used for hide working.

Scanning Electron Microscope work

Thirty-seven archaeological tools from a range of Mesolithic sites (see Table 127) were examined using a Scanning Electron Microscope (SEM) with the aim of detecting any residues adhering to the tools and extracting any chemical information that might provide an indicator as to the possible materials worked. In addition six of the experimental tools described above (Birch above) (used on shell, limpet meat, birch bark, wood, hide, and seaweed) were also examined using the SEM. The experimental tools were analysed for organic residues (see below) in order to provide a useful modern analogue to the archaeological material. The individual raw materials themselves were also analysed separately to the tools that had been used to work them.

Table 127	
Sites	Bevel-ended tools analysed
Morton, Fife	1
Druimvargie, Argyll	2
Caiteal nan Gillean I, Oronsay	5
McArthur's Cave, Argyll	5
Sand	10
Loch a Sguirr	1
An Corran, Skye	13

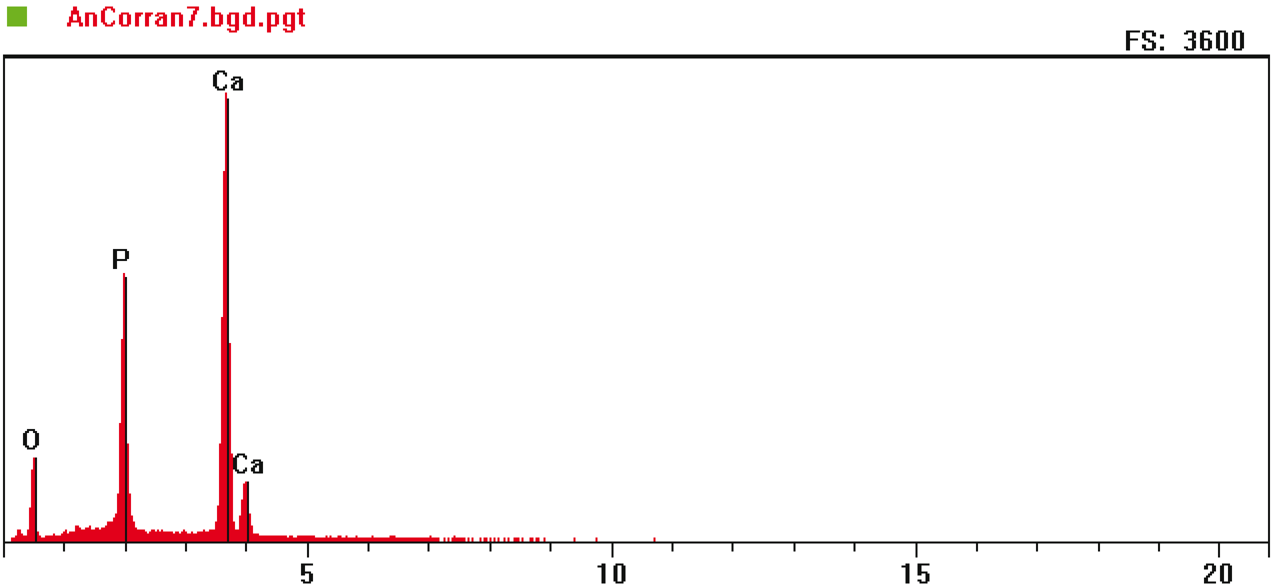
Total	37

Table 127: bevel ended bone tools from Mesolithic sites analysed using the SEM

3.4.5.1 Method

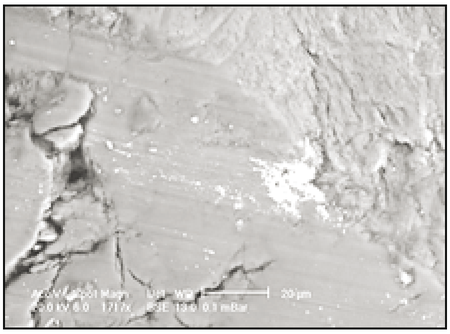
Each artefact was examined across one surface and a series of spectra was taken. The first spectrum for every piece was a background spectrum of the bone surface, without residue, which was used as a control. Following this, further spectra were then taken on representative samples of any residues. Samples were selected based on the ease with which they could be pinpointed (that is their location on the bevel relative to the beam) followed by how representative they were of the residues found across the tool surface. A total of 244 readings was taken across all 37 archaeological tools.

A Philips XL30CP SEM instrument with an analytical system capable of detecting light elements (down to C) was used. Imaging was carried out using back-scattered electron (BSE) mode, and point analyses were made of features on the rough surface of each tool. Analysis was carried out using PGT (Princeton Gamma Tech) analytical software, which provided an energy dispersive (ED) spectrum (see Illustration 436, below) that was used as a fingerprint to distinguish different material types, supported by a semi-quantitative analysis (fully quantitative analyses are impossible with rough samples). A background analysis was made on the residue-free bone surface to permit comparison with spectra and analyses obtained from the residues on the bone. In all cases, the peaks reported in the ED spectrum were identified using the analytical software, taking care to identify and label K_α, K_β, L_α and L_β X-ray peaks when observed.



Illus 436: Example of a background spectra, Tool An Corran 7

Bone tools were manually tilted to place the bevel in focus. This was then examined transversely across a section of the bevel as near to its mid point as possible. Spectra were recorded on a selection of different residue types located across the surface of the tool. At magnification, the surface of the bone ranges from very smooth to fibrous or very fibrous. The areas of very smooth bone are very compact and appear to be polished; even at high magnifications no pock marking was evident. Illustration 437 (right) shows a background of polished bone in the foreground, with a surface mineral residue (showing white), while in the background a more fibrous bone surface can be seen.



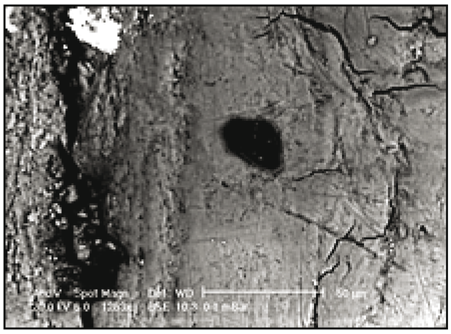
Illus 437: Bone surface with mineral residue. An Corran tool 7 (magnification 1717×. The mineral here is silver ore soil)

Using BSE (back-scatter electron) mode, residues show up as black for organic material and white for mineral material. An interpretation as to the nature of the residue was inferred from the energy dispersive spectra obtained from the SEM (Hardy *et al* forthcoming b).

3.4.5.2 Organic residues

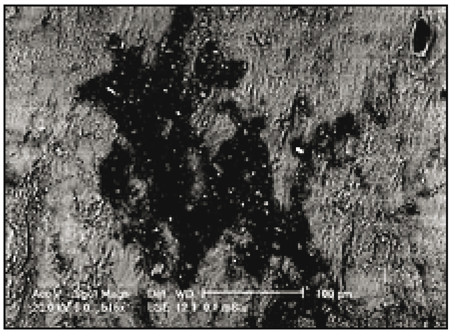
One idea was that bevel ended tools may have been used to grind up small quantities of plants, perhaps for medicine or for pigment. In order to characterise organic residues, the relative atomic proportions of carbon and nitrogen are required (Brady 1974). The proportions of nitrogen in relation to carbon in plant tissue are so small that it is clearly distinguished from animal tissue where the proportion is much greater. The atomic proportions of carbon:nitrogen are thus diagnostic of a range of natural materials including:

- Wood, straw, oils and fats = C/N >30
- Green plant tissue = C/N around 25
- Wheat and other seed grains = C/N around 15
- Soil and fungi = C/N around 10
- Animal protein, bacteria and actinomycetes = C/N 5 and below.



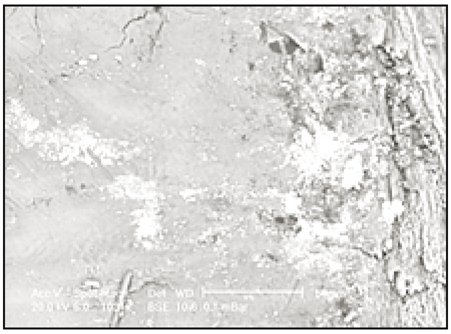
Illus 438: Example of an organic residue, Tool An Corran 10 (magnification 1253×). The residue is the black vertical line with mineral scratch overlying it

Though organic residues show up clearly in the SEM (see Illustrations 438 & 439, both right), there is currently no clear consensus as to the reliability of the relative carbon and nitrogen components as read by the SEM. This affected interpretation of the readings taken both on the experimental tools and on the archaeological pieces. While it is not possible without further investigation to allocate the residues to any of the above groupings (wood, soil etc) based on these readings alone, almost all of the organic residues measured on the archaeological bone tools had high percentages of nitrogen, suggesting that they were not of plant origin. An experimental check was carried out with samples of modern birch bark and wood and these all produced readings that showed percentages of nitrogen that were consistently very low as would be expected from plant residues. This indicates that the high proportion of nitrogen in the archaeological samples, though non-specific, is a good indication that their residues are not plant in origin. In the end, though readings were also obtained on the experimental tools, detailed comparative work to attempt to determine actual raw materials using the data obtained from the experimental tools was not undertaken because of the lack of consensus about the validity of the carbon:nitrogen ratios. This is obviously a fruitful topic for further study.



Illus 439: Example of an organic residue. Druimvargie 415. Magnification 516×

3.4.5.3 Mineral residues



Illus 440: Example of a mineral residue An Corran 7.

As the experimental tools had only been used on organic materials, they are not included in this section. Out of a total of 35 tools with ‘white’ residues, ten tools contained only spectra interpreted as calcium carbonate. These were discounted as most likely relating to the shelly matrix in which they were found. A total of 54 spectra on 25 tools was found to be mineral (see Illustration 440, left). Background checks were done on local soils and from this 12 spectra were interpreted as characteristic of standard ore soils and thus eliminated. Six tools contained only spectra representing ore soils, so that the total number of tools containing useful mineral data was reduced to 19.

Magnification 1031×

The overall results for the mineral spectra on these 19 tools can be found in Table 128, and the minerals are described below.

Tool	Residue
An Corran 18 (2 spectra)	rutile or ilmenite
An Coran 21 (2 spectra)	rutile or ilmenite
An Corran 28 (1 spectrum)	rutile or ilmenite
An Corran 57 (4 spectra)	rutile or ilmenite
An Corran 7 (1 spectrum)	copper carbonate
An Corran 7 (4 spectra)	chromite
An Corran 7 (1 spectrum)	zinc carbonate
McArthur's Cave 169 (3 spectra)	mercury ore and silver ore ?
McArthur's Cave 80 (1 spectrum)	zinc carbonate
Morton 434 (3 spectra)	rutile or ilmenite and zircon
Oronsay 279 (1 spectrum)	tin oxide
Oronsay 279 (1 spectrum)	barium sulphate
Oronsay 283 (1 spectrum)	barium sulphate
Oronsay 283 (1 spectrum)	tin oxide
Oronsay 335 (1 spectrum)	tin oxide
Oronsay 356 (1 spectrum)	monazite
Sand BT13 (4 spectra)	iron /manganese oxyhydroxide
Sand BT14 (2 spectra)	iron oxyhydroxide
Sand BT3 (4 spectra)	lead and tin oxide
Sand BT6 (2 spectra)	lead and tin oxide
Sand BT2 (1 spectrum)	manganese oxyhydroxide
Loch a Sguirr (SFS 8) BT41 (1 spectrum)	bismuth

Table 128: Mineral spectra on bone tools

Monazite (Oronsay 356) is a cerium and thorium phosphate which is common in granitic rocks. Today the thorium found in monazite is extracted and used to create a colour for ceramics.

Zircon (Morton 434) is zirconium silicate and is a common soil mineral. It is also used today to produce a pigment known as zirconium yellow. Zirconium salts are used today as tanning agents.

Rutile (TiO_2) and ilmenite ($FeTiO_3$) are titanium oxides (An Corran 18, 21, 28, 57, Morton 434). They can both be found in soils but also produce a white pigment when crushed into powder. Indeed rutile titanium oxide is described as producing "a richness of colour unmatched by any other pigment available today" (source: www.uic.com.au/nip25.htm).

Chromite (An Corran 7) The report of chromium suggests the presence of chromite ($FeCrO_4$), which is common in basic igneous rocks in the west of Scotland. All compounds of chromium are coloured (except $Cr(CO)_6$); Dichromates are used today in tanning leather. Chromium compounds are used in the textile industry today as mordants and tanning agents. Halides and oxides of chromium can produce a range of colours, including red, green, black, white and brown.

(www.chem.uwimona.edu.jm:1104/courses/chromium.html).
Copper carbonate (An Corran 7). Copper is a source of both blue and green pigment. The presence of copper residue has also been noted on a flint tool in association with some copper rich pebbles from the Mesolithic site of Howick in No rthumberland (Hardy *et al* forthcoming b).

Zinc carbonate (McArthur's Cave 80). Zinc is a source of white pigment.

Barium sulphate (Oronsay 279, Oronsay 283) Barium sulphate is used today in powder form as a pigment and produces white.

Tin Oxide (Oronsay 279, 283, 335, Sand 3, & 6). There is evidence that tin has been collected in Cornwall since the early Bronze Age. Tin was found in streams and riverbeds, as gravel or pebbles. The tinners would prospect, rather like gold panners, working on the open moorland and using the natural flow of water to wash away impurities, leaving the heavier tin to settle out in specially constructed pits (www.chycor.co.uk/tourism/tolgus/page2.htm). Today, tin oxide (Stannic Oxide SnO_2) is used in ceramic colours and produces a black pigment.

Bismuth. (Loch a Sguirr 41) Bismuth is used today to produce a yellow pigment.

Lead and tin oxide (Sand 3 and Sand 6). The presence of lead and tin together may indicate a solder or other soft metal (like pewter).

Iron and manganese oxide (Sand 2, Sand 13, Sand 14). Ochre and haematite are iron ores that have been used since the Palaeolithic to produce pigment. There is a lot of evidence for the prehistoric use of ochre and haematite in many parts of the world, for example in the Upper Palaeolithic Cave paintings and even earlier (Wadley *et al* 2004). Iron oxides are particularly useful for pigment as they do not fade with time in the way that pigments from animal and vegetable sources do. Ochre is particularly useful for tanning hide due to its antibacterial properties that protect and preserve. Lumps of both ochre and haematite have been found at Sand.

Sources of minerals

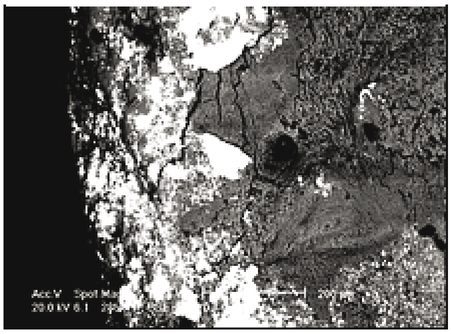
All the minerals described above, with the exception of tin and bismuth, are common in Scotland. Tin does occur, but rarely, and in specific locations in the north Highlands and the southern Uplands. The presence of bismuth is unusual as it is not common in Scotland. It occurs in small quantities near Dalbeattie in Kirkcudbrightshire, but it is more commonly associated with tin sources in Cornwall.

3.4.5.4 Discussion of use-wear examination

Bevel ended bone tools and pigment

The results of the study of mineral residues on the archaeological bone tools are intriguing. Every residue that was found, with the exception of the lead and tin, is used today to produce pigment or as a mordant or dye fixer. The precise mechanisms by which the minerals attach to the bevelled ends of the bone tools need further study, particularly given the loose, soil free, shell middens within which they were all found. Further background work, including for example analyses of rain water and local histories of sedimentation together with comparative sampling of non-artefactual bone, is clearly important. For the moment, the mere presence of the residues is a first, and a clear pointer to the value of more detailed analysis.

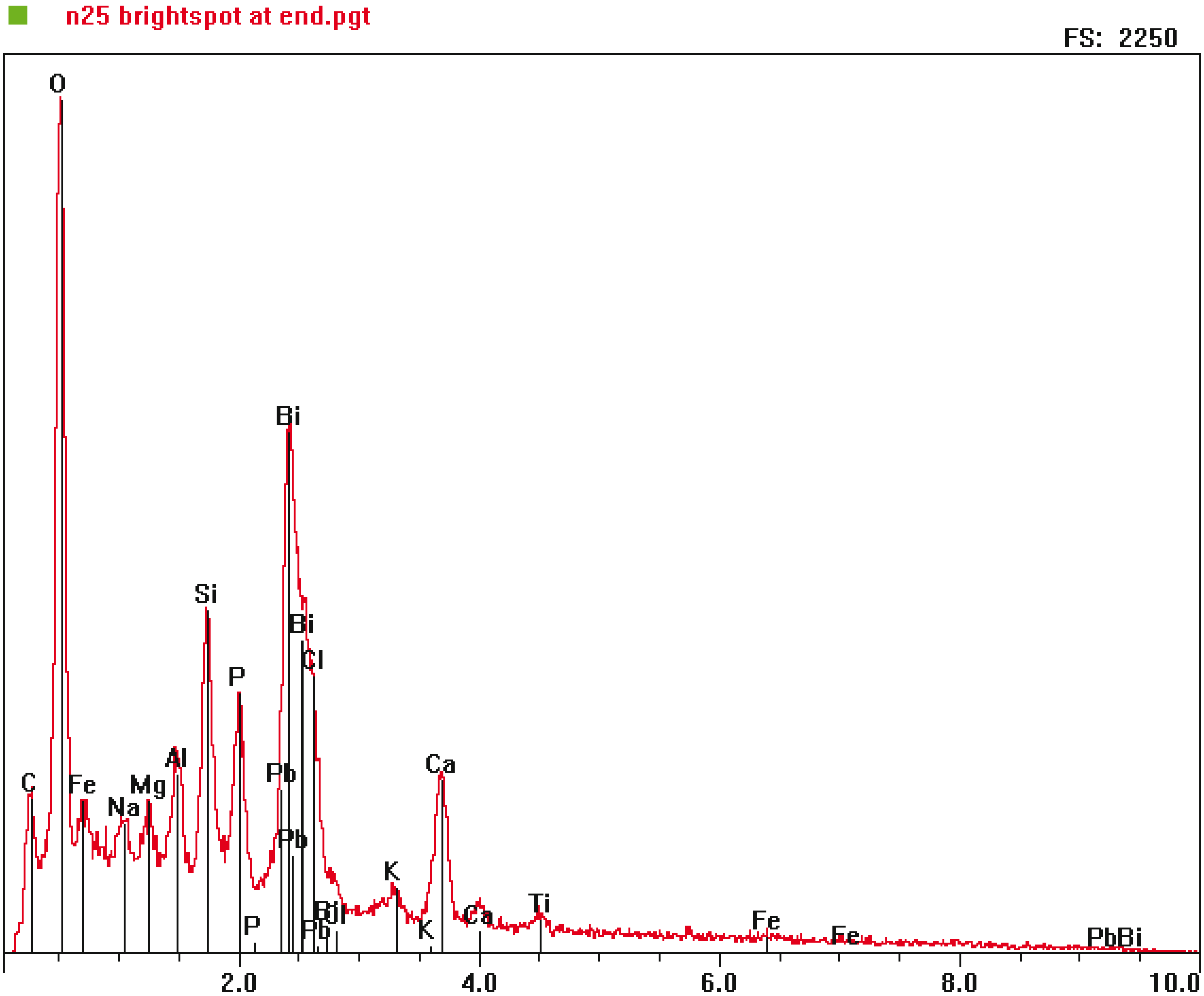
The presence of a lead and tin oxide suggesting solder at Sand may be contamination (see Illustration 441, right). Modern contamination can be ruled out; the bone tools were carefully treated and tracked since excavation. There is, however, evidence of an event of prehistoric metal working at Sand on top of the shell midden. Both of the tools with the lead and tin oxides (Sand 3 and Sand 6) come from the same area (B25A NE) but at different depths. The evidence for metal working occurs at a different part of the site, but it is conceivable that a drop of solder might have worked its way through the midden to contaminate these tools.



Illus 441: Sand BT35. Lead and tin mineral residue

Tin also occurs on three tools from Oronsay. These tools were excavated in the 19th century and the lack of a post-excavation history of the tools means that it is not possible to rule out modern contamination.

The presence of bismuth on one tool from Loch a Sguirr is intriguing as it is a mineral that is rare in Scotland (see Illustration 442, below). This tool has been tracked since excavation, and modern contamination can be ruled out.



Illus 442: Loch a Sguirr – BT1, Bismuth spectrum

Taken together the results suggest the exploitation of minerals during the Mesolithic, and one of the most likely explanations is that they served as pigments. The presence of colour has only recently begun to be accepted for prehistoric Scotland, let alone the Mesolithic. Ochre and haematite have recently been documented from Neolithic sites (Isbister 2000), and they occurred at Sand (Section 3.7). Other sources of colour may well have included dogwhelk which was plentiful at Sand (Section 3.12). Possible dye extraction from dogwhelks (they yield a purple dye) has been recorded from Smoo Cave

(Ceron Carrasco 2005) as well as in Mesolithic Ireland (Jackson 1917; Gibbons & Gibbons 2004). Copper too may have been used for its properties of colour. The use of copper as a pigment has been recorded in prehistoric America (Vermilion *et al* 2003) and the presence of a tool with copper residue at An Corran is interesting. Copper has also been recorded on a flint tool at the Mesolithic site of Howick, in No rthumberland on the east coast of England, in association with some lumps of coarse grained sedimentary rock with visible copper (Hardy *et al* forthcoming b). This suggests that the colouring qualities of copper may have been known and used from an early date.

Bevel ended tools as hide processors

The experimental work in processing hides with bevel ended bone tools (Birch above, Section 3.3.4) produced highly polished bevels and microscopic traces (longitudinal scratch marks) that correspond well to those on the archaeological tools. Although at first glance the archaeological tools might be thought small for this, the experimental replicas were very effective.

Many different processes of hide working have been described around the world, but each involves a series of well defined stages which employ different tools. A modern ethnographic account of goat hide working in Morocco can be found in Ibanez *et al* (2002).

Ibanez reports that the dead animal is left for a short time to swell so that the skin stretches and separates from the subcutaneous fat. The skin is then cut at the rear feet and pulled off from the back to the front of the animal. The skin is submerged in water for two to four days and then beaten against a stone to soften it. The skin is then submerged in a bath of water and quicklime for 10–15 days.

Illus 443: Hide tanning in Morocco (from Ibanez *et al* 2002)

The next stage consists of de-hairing and cleaning off the quicklime for which a flat stone is used to scrape both sides of the hide. Tanning is then carried out. Hides are composed of collagen in a fibrous structure and the aim of tanning is to form irreversible chemical cross links to the collagen matrix to prevent degradation by thermal, chemical or biological action. For this, the application of a tanning agent is necessary: in Morocco, one traditional tanning agent is green oak bark. The tool used to cover the skin with the tanning agent is small and the work is done carefully (see Illustration 443, right). Other traditional tanning agents include ochre and urine. Common modern tanning agents include rutile, chromium and zirconium. Following tanning, the hide is dried and washed in clear water and hung to dry. Finally, the skin is softened, by lightly wetting in water, (the water is blown onto the skin from the worker's mouth). The skin is folded and pressed for several hours, after which it is beaten with a stick, then pulled and stretched. Finally, the skin is placed on a wooden pole and scraped with a rounded pebble until soft.

A different account of hide tanning in northern Canada is described in the ethnographic work of Beyries (1999). Large bevelled and indented bone tools are used to deflesh and remove fat from the inner side of dry hides while they are stretched over a frame. Wet hides are processed differently using large concave tools, though Beyries found that only semi sedentary or sedentary people used this method (*ibid*, 1999). During dry hide processing two different convex tools of bone were used; one with a wide working edge (>350mm) and one with a narrow working edge (<30mm). The narrow tools (most similar in size and shape to the bevel ended tools of Mesolithic Scotland) are used to scrape dry hides of medium sized animals such as deer once they have been stretched over a frame. Beyries' explanation of the working method perhaps gives an insight into the non-symmetrical nature of the bevels on the archaeological bevel ended tools.

> "When a tool strikes the hide, it turns on its axis, and the stroke is not made

> by the middle of the working edge… but to one side, depending on which hand applied the pressure: it lies to the left if the left hand is close to the edge, and to the right, if the right hand does. Consequently, the edge wear is always off-centred”
>
> (Beyries 1999:125).

This observation was supported by Birch in his experimental work (above).

It seems likely that at least some of the archaeological bone bevel ended tools were used to process hides. Both the experimental work (Birch 2003 and above Section 3.4.4), and the wide range of ethnographic evidence for the use of this type of tool in hide working, lend support to this. The presence of potential tanning agents as residues on many archaeological pieces may be significant. Mineral pigments have a long history of use in Europe, and the population of Mesolithic Scotland will have had a deep understanding of the natural world.

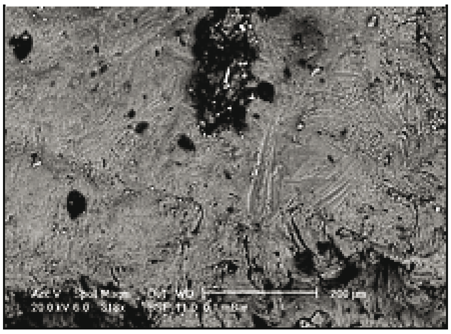
Bevel ended tools as limpet processors

The supposed use of limpet hammers involves two separate processes, the removal of limpets from the rocks, and the extraction of the meat from the shell (Griffitts & Bonsall 2001). Birch’s experimental programme looked at both with regard to bone and antler tools and discounted them. The use-wear on these experimental tools was examined with the SEM and compared to the archaeological samples. Interestingly, none of the traces on the experimental tools bore any comparison to those on the archaeological material. Use-wear traces from the tools that had been used on limpets were very irregular, comprising deep groove-like traces, while the archaeological samples mostly had a smooth finish on their bevelled surfaces. Equally, the bevelled shape created by the experimental work did not correspond to that found on the archaeological samples. Contrary to previous suggestions (Griffitts & Bonsall 2001), bone bevel ended tools are unlikely to have been used to process limpets. This may partly be due to procedural problems with earlier experiments, some of which sought to avoid the unnecessary killing of limpets (Birch’s limpets were used for bait).

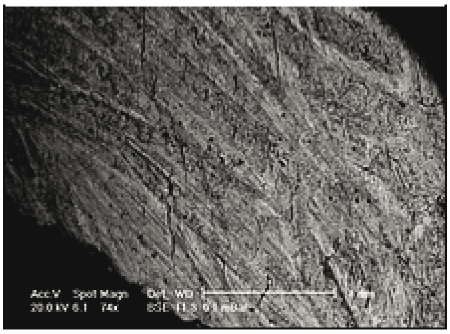
It is worth noting, however, that Birch did find pebble tools an effective means to harvest limpets from the rocks, particularly when they were still under water, and his pebble quickly began to develop a bevelled end similar to those on archaeological stone bevel ended tools (supporting work by Roberts 1987 & Mithen 2000). In addition, work at Sand in 2003 with children aged 6–11 showed that they were able to collect limpets easily in the ebbing tide, either by hand or with a small beach pebble. This perhaps adds weight to the argument that bone bevel ended tools are not a straight analogy for stone versions.

Use-wear traces

Several archaeological tools and some experimental tools were examined for use-wear under the scanning electron microscope. A comparison of the traces from the experimental tools used on limpets (see Illustration 444) and sorrel leaves (see Illustration 445) does not appear similar to the traces found on the archaeological tools examined (see Illustrations 446 & 447).

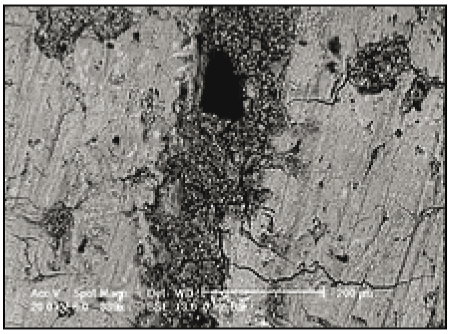


Illus 444: Experimental Tool 1. Used on limpets. 318× magnifications



Illus 445: Experimental Tool 7. Used on sorrel. 74× magnifications

Illus 446: Tool from Macarthur's cave, 923× magnifications



Illus 447: SFS 4, Sand: BT8, 339× magnifications

3.4.6 General Discussion

The assemblage of bone tools from Sand is similar to that from other Mesolithic shell midden sites in Western Scotland. Bevel ended tools are the most common bone tool type on many sites, both with points and without, and simple pointed tools are also found at many sites (Saville 2004c). Barbed points (harpoons) are less common in general and the one small fragment found at Sand is therefore significant, though sadly not enough has survived to draw any stylistic interpretations from it. No evidence for the working of antler was found, though the presence of four pieces of antler with cut marks does suggest that it was used. It seems that tools of antler may well have been used away from known archaeological sites as it is not uncommon for general evidence relating to antler working to be found in middens rather than the tools themselves (Saville 2004c). The only common Mesolithic tool type not to appear on site is the antler mattock, and this is interesting because fragments do appear on many other midden sites (Saville 2004c).

It is worth considering the bevel ended tools in more detail because of the previous debates over this tool type. Bevel ended tools have been found in all Mesolithic shell middens in Scotland (and beyond) and the examples from Sand fall well within their known age range. Because of their association with shell middens they were linked from early on to limpet working, and this is a view that it has been hard to shift, perhaps because of a general lack of familiarity with both bone tools and limpet processing. However, the archaeological distribution of bevel ended bone and antler tools is unlikely to be a true representation of their distribution in prehistory. Their presence in shell middens is linked to the precise conditions and protective environment of the shell midden; they would not survive elsewhere. At Sand this is highlighted by the level of degradation noted in the bone at the limits of the midden, both for artefacts and ecofacts. No bone tools were found beyond squares B4 or A3 which represent the extreme north and east limits of the shell midden respectively (see Table 129, below).

Table 129

Sand – State of bone	Good	Medium	Poor

In shell midden	18	19	3
Squares B4 and A3 at the limit of midden	1	8	2
Totals	19	27	5

Table 129: the condition of the bone tools at Sand

Though further work is required, it now seems likely that bevel ended bone tools such as those from Sand, and many other Mesolithic sites in Scotland, were not used for the processing of limpets. Using a range of data including ethnographic, morphological, use-wear analysis and experimental work, there is strong evidence to suggest that they are much more likely to be related to hide working. This adds support to some previous research on the subject (Foxon 1991; Finlayson 1995). It would also not be out of step with the possible wider presence of the tools than that indicated by the shell middens alone.

While the study of bone and antler bevel ended tools may be changing direction it is also worth noting that the evidence here suggests that previous assumptions that stone bevel ended tools served similar functions (for example: Saville 2004c) should also be questioned. This is borne out by Clarke's work on the coarse stone tools from Sand and elsewhere (Section 3.6).

Other uses of bone may not yet be recognised in Mesolithic Scotland. A number of small bone flakes with percussion bulbs were identified and this suggests that bone working was being carried out on site. A quick scan of the material culture from Mesolithic sites with better preservation elsewhere in Europe reveals a range of finely worked bone artefacts including arrowheads, knives and points (Oshibkina 1985; Zagorska & Zagorski 1985). Given the traditional emphasis of hunting and archery in our interpretations of the Mesolithic one obvious bone artefact type that is missing is the arrowhead. These might comprise not only the well documented broad tipped wild-fowling arrowheads (*ibid*), but also sharp slivers of bone for which there is considerable ethnographic documentation (Lee & Devore 1976; Hardy & Sillitoe 2003). Sharp bone arrowheads have the advantage over stone in that they can induce septicaemia. For this reason they were considered particularly efficient and deadly among the Wola of Papua New Guinea (Hardy & Sillitoe 2003). Arrowheads, of course, are less likely to occur on site, but it is interesting that they are found elsewhere in Europe, and the bone assemblage from Sand contains many slivers of bone that could have served this purpose. Bone tools were certainly an important part of the material culture at Sand and it is possible that there are elements of the bone tool assemblage that still lie unrecognised.

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… > Images > Artefacts > Worked Bone > SFS_BT134.jpg [Illustration 396]
… > Images > Artefacts > Worked Bone > SFS_BT12.jpg [Illustration 398]
… > Images > Artefacts > Worked Bone > SFS_BT106.jpg [Illustration 399]

… > Images > Artefacts > Worked Bone > SFS_harpoon_fragment_photo.jpg [Illustration 400]
… > Images > Artefacts > Worked Bone > SFS_BT32.jpg [Illustration 401]
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… > Images > Artefacts > Worked Bone > SFS_BT30.jpg [Illustration 407]
… > Images > Artefacts > Worked Bone > SFS_BT63.jpg [Illustration 408]
… > Images > Artefacts > Worked Bone > SFS_BT38.jpg [Illustration 411]
… > Images > Artefacts > Worked Bone > SFS_BT1.jpg [Illustration 413]

3.5 Worked and modified shell | Karen Hardy

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports. From here you can download the file 'Hardy_Worked_and_modified_shell.pdf'. See also the image files located at Downloads > Images > Artefacts > Worked Shell.

3.5.1 Introduction

A small assemblage of worked or decorative shell was found in the shell midden at Sand (SFS 4). It comprises scallop and cowrie shells and constitutes all the scallop and cowrie from Sand (see Table 130, below). In addition, a small assemblage of perforated limpet shells has been considered. It is not yet clear whether the limpet perforations are natural or artificial, but it is possible that these shells were deliberately collected.

Table 130

Artefact type	Artefact No	Square	Quadrant	Spit	Context	Condition
Cowrie	S1	A2B	NE	2	1/2	Whole, two opposing holes
Cowrie	S2	B1A	SW	4	13	Whole, two opposing holes
Cowrie	S3	A1B	SE	6	28	Whole, no holes
Cowrie	S4	B26B		3	1	fragment
Cowrie	S5	A2B	SW	6	27	fragment
Cowrie	S6	B3B	SE	5	13	fragment
Cowrie	S7	B2B		2	13	fragment
Scallop edge	S8	surface				Left side of scallop shell
Scallop point	S9	B1A	NE	4	13	two pieces
Cut scallop	S10	B25B	SE	6	11/13	whole
Whole scallop	S11	B26A	NW	5	1	two pieces

Table 130: Sand, catalogue of worked and decorative shells; Back to Section 3.5.3.2

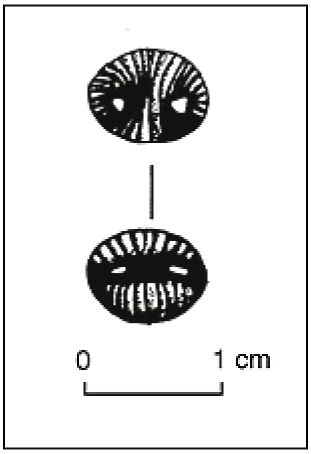
3.5.2 Method

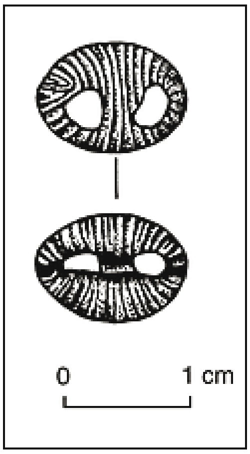
Study of shell use is difficult except in the case of obviously modified shells such as beads. Shell can be modified naturally in many ways, some of which may at first appear artificial; for example symmetrical, round holes can be made by predators, and birds and crabs also fracture shell. Waves and the sea can cause shells to split or become 'retouched' (Claassen 1998). The modified shells in this assemblage were examined by eye and also microscopically (up to 100× magnifications) using a Meiji ML 2305 incident and transmitted light optical microscope

3.5.3 Cowrie shells

Cowrie shells with opposing perforations have been found on several Mesolithic sites in west coast Scotland. These include Oronsay, (Mellars 1987), Carding Mill Bay (Connock *et al* 1992), Ulva Cave (Simpson 1996) and possibly Risga (Russel *et al* 1995). The cowrie shells found at Sand are similar to those found on other archaeological sites (see Illustrations 448, right; 449 & 450, both below).

Illus 448: Cowrie shells from Sand. Left shell A2B NE Spit 2; right shell B1A SW Spit 4 (13)



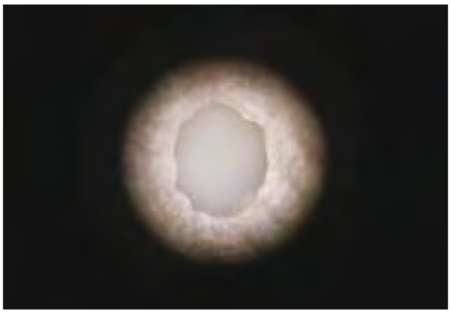


Illus 449 & 450: Cowrie shells, A2BNE Spit 2

It has been suggested (Simpson 2003) that cowrie shells only occur naturally in west coast Scotland. While cowries never appear to be common, they are recorded from around the north and west coasts of Britain and Ireland (MacDougall 2003, 2004) and can be collected from beaches today in many places including Skye, Orkney, Holy Island (Lindisfarne) and Howick, Northumberland. Hayward *et al* (1996) identify two types of cowries that occur on British beaches, the Spotted Cowrie (*Trivia monarcha*) that only occurs in western Britain and the Arctic Cowrie (*Trivia arctica*) that occurs all around Britain. Though these two species are difficult to distinguish when young, the arctic cowrie grows to a maximum of 10mm while the spotted cowrie grows to 12mm. Therefore all the cowrie shells found that are over 10mm in length are spotted cowries (*Pye pers comm*) Modern examples of spotted cowrie often have two clearly defined spots on their surface and they tend to be fawn in colour while the arctic cowrie is normally creamy white. Archaeological samples have usually lost the colours so that identification of species is normally impossible except by size. Cowries live on lower shores or in sublittoral zones and feed on ascidians, or sea squirts, that live attached to rocks or large areas of well established seaweed. They are therefore likely to be found on or near rocky shores.

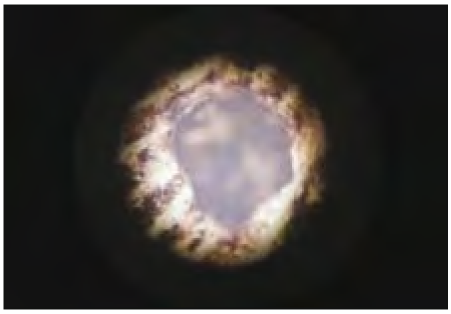
Although there is an assumption (for example Simpson 1996 & 2003) that the holes in cowrie shells are of human manufacture, this may not always be the case. Cowries, like many other species of shellfish, are attacked by predators. Though no cowrie shells with or

Illus 451: Modern cowrie shells found on beaches in Northumberland



Illus 453: Modern cowrie shell hole at 40× magnifications

Illus 452: Left, modern cowrie shell collected at Howick, Northumberland; right, cowrie shell from midden (A2B NE Spit 2)



Illus 454: Sand (A2B NE spit 2), cowrie shell hole at 40× magnifications

without holes, were found on the Applecross beaches near Sand, many other types of shell on these beaches did have holes; these are normally formed by gastropods. There are six gastropod families that feed by drilling through the shells of their prey. The most common of these, are the naticids and muricids (Hayward *et al* 1996), notably the dogwhelk. Species of both of these occur around Britain and both create characteristic holes in the shells of their prey. The method of attack involves drilling a hole with a characteristically symmetrical shape and sloping sides in order to get at the meat inside. Cowries with a single hole due to predator action are relatively easy to find on beaches today and an example of a cowrie shell with two opposing holes, identical to those found on archaeological sites, was collected recently on a beach in Northumberland (see Illustrations 451, left & 452, right), though the majority of cowries, (about 80%) from a modern reference collection at the National Museums of Scotland are whole.

Dogwhelk do figure among the archaeological shellfish from Sand (Section 3.12) and thus the nature and origins of the perforations in the archaeological samples remain uncertain. In order to shed light on this, the perforated cowrie shells from Sand, and some modern shells with natural perforations, were examined under an optical microscope (see Illustrations 453, left & 454, right)

3.5.3.1 Microscopic examination

An experimental study (d’Errico, *et al* 1993) examined the holes made by shellfish predators and compared them to experimentally manufactured holes. Using a scanning electron microscope they found very clear distinctions between holes made in different ways, for example by predators and by perforation. They were also able to identify areas of the holes where abrasion had occurred such as might follow from hanging on a piece of string. It was not possible to examine the shells from Sand using an SEM microscope as done by d’Errico *et al*.

Taborin (1993) examined macroscopic use wear traces on the holes of experimentally perforated shells including cowrie shells, and was able to recognise repeated patterns of macro use-wear that suggested different forms of attachment of the shell onto string or thongs. Comparing her results to those from the shells at Sand, it is clear that no use-wear was evident on any of the examples from Sand, neither at macro nor micro levels and it is fairly certain that these pieces were not used.

3.5.3.2 The cowrie assemblage from Sand

There are seven cowrie shells from Sand, two of which have two opposed perforations (see Table 130, above). Both of the latter cowries are whole and there is one more whole cowrie shell with no perforations. Additionally there are four fragments where it is not possible to tell whether or not the shell has been perforated. All four of the perforations have sharp irregular borders and there was no observable difference between them and the natural perforations in cowries collected from the beach (see Illustrations 448–454, various above). It is not clear whether the holes in the examples from Sand were perforated by predator or human action. However, even a natural perforation does not preclude human use, though the microscopic examination did not reveal any obvious wear traces. Although it was not possible to examine shells from other Mesolithic sites under the microscope (see below), the published photographs suggest that they too have no signs of wear. This is not inconsistent with their use for decoration; for example the archaeological material may well represent shells that were lost before use.

Illus 455: Perforated cowrie shells from Cnoc Coig

Sixty-eight cowrie shells from three shell middens in Oronsay (Cnoc Coig, Caisteal nan Gillean II and Cnoc Sligeach) were also examined by eye. Sixty-three of these shells had large double perforations and the uniformity of these double perforations suggests they were artificially manufactured (see Illustrations 455, left & 456, right).

Illus 456: Double perforated cowrie shells from Cnoc Coig

There are many ethnographic examples of cowries being used for decoration (for example Jackson 1917; Sillitoe 1988; Carey 1998), but cowries also had and still have many other uses in traditional societies. A variety of recorded uses of cowries exists around the world. They are or have been used as currency, for gift exchange, in medicine (particularly against smallpox), to convey messages or ideas in code, as charms, as net sinkers, as fertility objects particularly as marriage gifts, as amulets against sterility, for divination, and in China cowries were used with rice to stuff the mouths of the dead (Gaibole 2004; Claassen 1999; Jackson 1917; Mair 1969; Sciama & Eicher 1998). It seems likely that the archaeological perception of cowries in Mesolithic Scotland as simple decoration has been over simplistic.

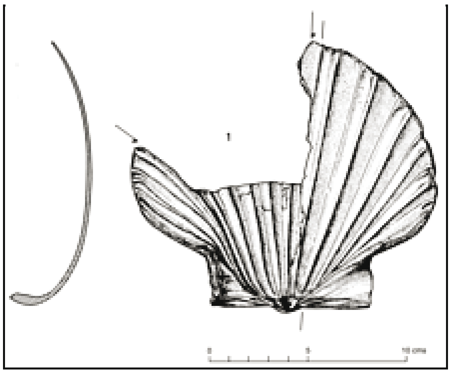
Whatever they were used for, cowries are likely to have been a valued resource. The small number of shells that are found on the archaeological sites might support this, suggesting that they were well looked after, though it is also possible that cowries were so rare that they were of little consequence. The poor quality in general of the organic record relating to the Mesolithic of Scotland means that many cowrie shells are likely to have disappeared along with their owners. If they were used for decoration or jewellery, they may well have been incorporated into the post mortem process, a process that has so far eluded archaeological discovery in Scotland (apart from the isolated human bones from Oronsay; Mellars 1987). Elsewhere, however, burials with large quantities of shells have been found, dating to the epi-palaeolithic (Vanahuren & d'Errico 2003) and the Mesolithic (Albrethsen & Brinch Petersen 1976). Though the shells were not always cowries, they do highlight the use of shells as personal ornaments, even if only in death. In the case of the epi-palaeolithic burial from La Madeleine, use-wear patterns on the shells suggested that they had been embroidered onto the surface of clothing, rather than strung as necklaces (Vanahuren & d'Errico 2003). Cowrie shells can have many different uses, many of which do not require perforation.

Illus 457: Rubbed holes in shells from Skara Brae

The use of cowrie shells in Scotland continued into the Neolithic. Perforated cowries are, for example, found on Grooved Ware midden sites in Orkney such as Skara Brae (Clarke & Shepherd forthcoming). In these cases the perforations are usually quite distinctive from those on Mesolithic cowries (see Illustration 457, above right) and this is the subject of on-going research (Hardy forthcoming a).

3.5.4 Scallop shells

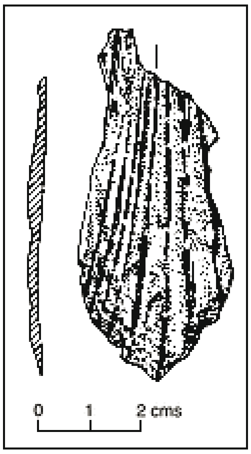
The small assemblage of three



Illus 458: Sand – cut scallop, B24B Spit 6, drawing

pieces of worked scallop from Sand comprises a 'core', that is a whole shell from which a segment has been removed, one piece of scallop edge, and one scallop point. In addition there is one whole scallop shell (S11; B26A NW Spit 5, Context 1), which though in pieces when found, was reconstructed and is a whole shell. This has been included here in view of the absence of any other scallop shell in the shell assemblage and the likelihood that it represents raw material.

Illus 459: Sand – cut scallop, B24B Spit 6, photo



Illus 460: Scallop edge, drawing

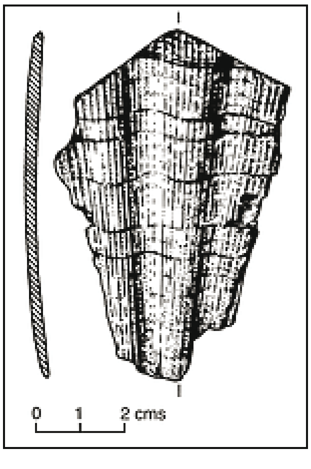
Illus 461: Scallop edge, probably unused, photo

3.5.4.1 Scallop core

S10 (B25B SE Spit 6 Context 11/13) has been cut to remove a segment of shell (see Illustrations 458, top left & 459, top right). Microscopic analysis of the cut edges (up to ×100 magnifications) does not reveal any cut marks, but breakage such as this is unlikely to be natural. In natural settings scallop shells keep their shape well, even in fairly rough conditions. Where breakage occurs it is usually along the lines of natural weakness, down the ray lines of the shell, or in the area near to the hinge where the shell is thin. This artefact has been broken across the ray lines and for this some form of scoring must have taken place, particularly across the ridges of the shell. This could not have occurred naturally.

3.5.4.2 Scallop edge (S8 surface find)

The scallop edge was initially thought to be a working point; however microscopic examination (up to 100×) did not reveal any use-wear traces. It may be a waster from the manufacture of something else, or perhaps an unused tool (see Illustrations 460, middle left & 461, middle right).



Illus 462: Scallop point, drawing

3.5.4.3 Scallop point (S9; B1A NE Spit 4, Context 13)

This piece is a point with marked use-wear and a very rounded edge. It has been shaped into a rounded point and was well used (see Illustrations 462, bottom left & 463, bottom right).

Neither of the latter two pieces had any evidence in the form of cut marks to indicate how they were removed from the main shell.

Illus 463: Edge of scallop fragment showing heavy rounding on pointed edge. B1A NE Spit 4, photo

3.5.5 Limpet shell

Although there was no clear evidence for the modification of limpets at Sand, limpets with holes in them were relatively common in the midden (see Illustration 464, below left). It is not clear whether the holes are natural or artificial, but they have been included here because, given the fact that the meat is likely to have gone by the time the limpet was collected, their collection and presence in the midden remains an enigma. Equally, if the holes were made on site, this is worthy of discussion.

Illus 464: Perforated limpet shells from Sand

Illus 465: Dogwhelk feeding on limpet

Approximately 3% of limpets from Sand are perforated, but the mechanisms of perforation remain unclear. None have clear signs of deliberate working despite microscopic study of a sample (40× magnifications). Limpet shells with holes are relatively abundant today on many beaches including those of the Inner Sound. There is, of course, an element of weathering here in that limpets erode naturally at their apex, but examples of this have been discounted from the present discussion. There are a number of limpet predators, including dogwhelk, starfish and crabs, but only the dogwhelk drills holes through the shells to reach the meat inside (see Illustration 465, above right). Dogwhelk perforations are normally sited to one side of the apex of the limpet, and they are small and symmetrical. A sample of perforated limpets collected from the beach at Sand today demonstrates that, though the holes in archaeological limpets are sited in the right place, they are generally both larger and less symmetrical than the holes made by predators. The perforations from other archaeological collections are remarkably similar. One explanation for this may lie in the friable nature of the shell as the perforations have become enlarged over time, by erosion.

Another possibility is that the holes result from one specific use of the limpets for bait. Fishermen in Guernsey used to knock holes in limpets and string them up to suspend in willow pots in order to catch crayfish (*Palinurus elephas*). Limpets were considered excellent bait for crayfish as they avoided loss of the prey to lobsters and crabs. Another use for the limpet was to thread them on to string for salting, after which they could be kept for up to two months and used in the pot (Richard Lord *pers comm*).

If the perforations are natural, the presence of the shells in an archaeological deposit raises a number of questions. Limpets with holes will not contain meat so they are unlikely to be collected for food. There is no record of extraction techniques that result in perforation and, though some erosion is likely to have taken place in the midden, this is unlikely to lead to the repeated pattern of side perforations as recorded on many of the shells from Sand. Perforated limpet shells do thus seem to have been targeted at Sand, whether the perforations were natural or deliberate. Several possible explanations for this exist. As mentioned above, they may have been perforated for use as bait. Perforated limpets might well have been used for jewellery or decoration though other archaeological examples of 'used' limpet shells are notoriously lacking (perhaps a reflection of archaeological ignorance). There are a few ethnographic accounts of limpets being used (mainly from California, for example: Claassen 1998; and see Island of the Blue Dolphins PDF). Closer to home, a series of limpet rings was found in a group at the Neolithic site of Isbister in Orkney (Henshall 1983). Although it has not been possible to examine them microscopically, they may have been strung for ornament but it is important to remember other possible uses such as for rattles in music or as ear, nose or hair rings (Stewart 1996).

The perforated limpets from Sand would obviously have lent themselves to a variety of uses. In general, archaeological studies such as those of the Oronsay middens, have not recorded the presence or absence of perforated limpet shells so that comparative Mesolithic material is lacking. However, small assemblages of perforated limpets also occur on several of the SFS survey sites (SFS 8 Loch a Sguirr; SFS 19 Toscaig 1; SFS 20 Toscaig 2; SFS 22 Crowlin 3; SFS 26 Crowlin 7; SFS 41 Toscaig 9; SFS 49 Creag Na H Uamha; SFS 58 Rubha Chuaig; SFS 66 Ard Clais Salacher 2; SFS 68 Allt na Criche; SFS 77 Camusteel 2; SFS 78 Camusteel 3; SFS 89 Coire Sgamhadail 1; SFS 90 Coire Sgamhadail 1; SFS 99 Clachan Church; SFS 100 Fraser's Croft, Toscaig; SFS 105 Uags 1; SFS 114 Fergus' Shelter). The wide range of dates from some of these sites (from the 7th millennium BC to recent times; Section 4) perhaps suggest a natural explanation for the perforations, though further work is clearly needed. Perhaps this discussion will lead to the recording of other examples from early Scottish sites.

3.5.6 Shell as a raw material

Throughout much of human history shell has been an important and often valuable resource to many communities across the world and it remains so today (see Illustration 466, right; for example Jackson 1917; Malinowski 1922; Mair 1969; Sillitoe 1988; Newell *et al* 1990; Eves 1998; Sciama & Eicher 1998; Carey 1998; Bradley Foster 1998; Saville 2004c; Henshilwood *et al* 2004). Not only is shell abundant to those who live by the coast, but the importance of shell as a resource is emphasised by evidence for the movement of shells into inland areas (for example: Sillitoe 1988; Claassen 1998; Jackson 1917).

Illus 466: Modern shell necklace from Mexico

In addition to the use of shells as jewellery and in various unmodified ways, shell provided a versatile raw material for tool manufacture, being both waterproof and susceptible to working. This point is emphasised by examples such as that of Tierra del Fuego where large mussel shells were used as recipients for collecting oils and animal fat as meat was being cooked, as containers in which to prepare paints, as tweezers to remove facial hair, as jewellery and as knives and scrapers (Bridges 1949; Orquera & Piana 1999; Mansur & Clemente in press). The mussels of southern Patagonia are much larger and more solid than those of Scotland, but scallops such as those from Sand would provide a similar resource.

3.5.7 Conclusion

Examples of modified shell are rare in the Scottish Mesolithic, and the use of shell as a raw material for tools has been largely ignored. Both are due, no doubt, to the general lack of preservation. Mussel shell, for example is particularly sharp when fresh. Mussel has been recorded from the midden at Sand (Section 3.12), and may well have been used, though as mussel decays faster than other shells little evidence remains. Ethnographic evidence from around the world provides a rich illustration of the importance of shell in a range of ways. The small assemblage of worked and used shell from Sand confirms the varied use of this resource in the Mesolithic. It also suggests that to consider shell only in terms of jewellery and decoration is to oversimplify the situation. Sand is a timely reminder of the potential value of shell, and our knowledge can only grow as further examples are found on other sites and the discussion broadens.

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… > Images > Artefacts > Worked Shell > SFS_S2.jpg [Illustration 450]
… > Images > Artefacts > Worked Shell > SFS_S10.jpg [Illustration 458]
… > Images > Artefacts > Worked Shell > cut_scallop_shell_photo.jpg [Illustration 459]
… > Images > Artefacts > Worked Shell > SFS_S8.jpg [Illustration 460]
… > Images > Artefacts > Worked Shell > SFS_S9.jpg [Illustration 462]

3.6 Coarse stone tools from the excavations at Sand rockshelter, Applecross | Ann Clarke

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports. From here you can download the file 'Clarke_Coarse_Stone_Report.pdf'.

A total of 40 coarse stone tools was recovered from the excavations at Sand and from the test pit sites around the Inner Sound, (see Table 131, below). They are all cobble tools of some form and, with two exceptions which have been ground to shape, they were unmodified before use. This report covers those coarse stone tools from the excavated site at Sand. Tools from the test pitted sites are referred to in the individual site entries in Section 2.2 (Active Sites Report). In the discussion below ST numbers refer to the catalogue of coarse stone tools (Appendix 5). Also collected from Sand was a quantity of fractured rock that was non-artefactual and this is discussed below.

Table 131

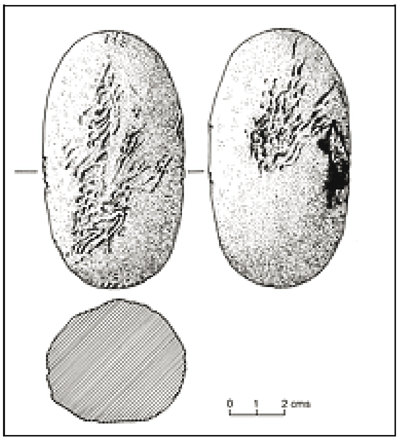
Site	Facially pecked cobble	Facially pecked /dished cobbles	Plain hammer-stone	Ground stone	Beveled pebbles	Faceted cobbles	Whetstone /rubber?
Sand	14	9	4	1			
SFS 2 Crowlin 1			1	1	1		
SFS 30 An Corran C	1						
SFS 20 Toscaig 2					1		1
SFS 42 Toscaig 10			1				
SFS 57 Rubha a Ghair					1		
SFS 68 Allt na Criche						1	
SFS 89 Coire Sgamhadail 1					1	1	
SFS 104 Fearnmore 1	1						

Table 131: The coarse stone tools from Sand in context, tool types by site around the Inner Sound

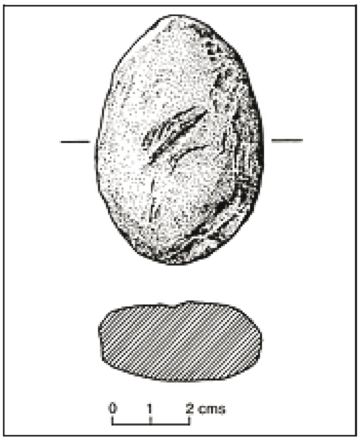
3.6.1 The artefacts from Sand

3.6.1.1 Facially pecked cobbles (T=14) and facially pecked/dished cobbles (T=9)

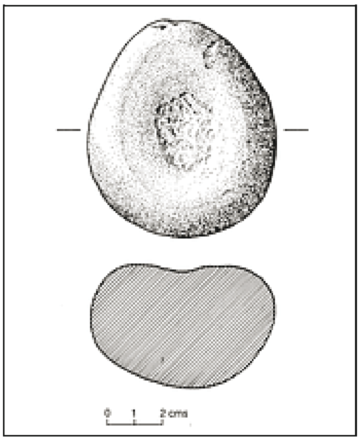
Facially pecked cobbles are the most numerous tool type. They are characterised by a spread of pecking on one or both faces. They are all made on rounded cobbles of sandstone with a sise range of 50–120mm in length. The pecking is generally very light and placed on one face only, either as a spread or as a circular patch (ST1, ST12, SF2, ST10; see Illustration 467), on two cobbles, however, there are linear patterns of pecking (ST9 and ST28, see Illustration 468). In contrast, the facially pecked/dished cobbles have more developed use-wear with a central depression formed on one (ST 5, ST31; see Illustration 469) or both faces (ST6, ST7, ST4; see Illustrations 470 & 471). This dished face is about 20mm in diameter and 2mm–3mm deep and is usually quite smooth. Coarser grained sandstones are preferred for these tools and their sise range is more limited than the facially pecked cobbles with a significant cluster 60–80mm long and 50–70mm wide. A cluster of facially pecked cobbles within these dimensions suggests that many simple facially pecked tools may in fact be underdeveloped forms of the dished cobbles.



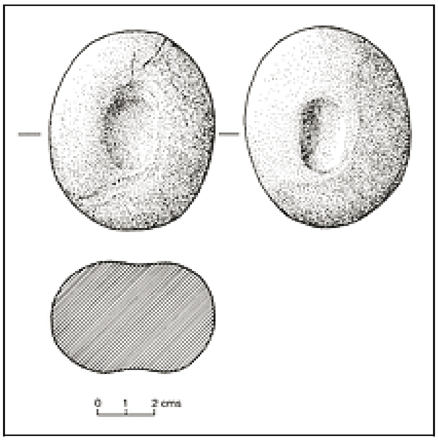
Illus 467: Sand – facially pecked cobble, ST10



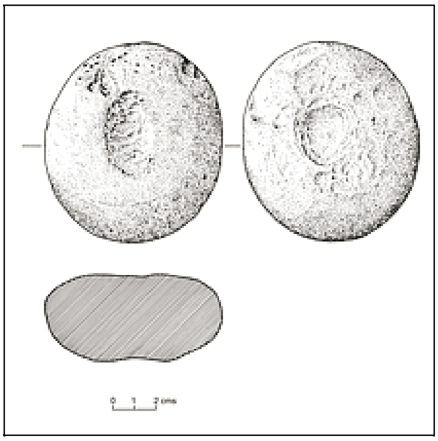
Illus 468: Sand – facially pecked cobble with linear pecking, ST28



Illus 469: Sand – facially pecked cobble, ST5



Illus 470: Sand – facially pecked/dished cobble, ST6

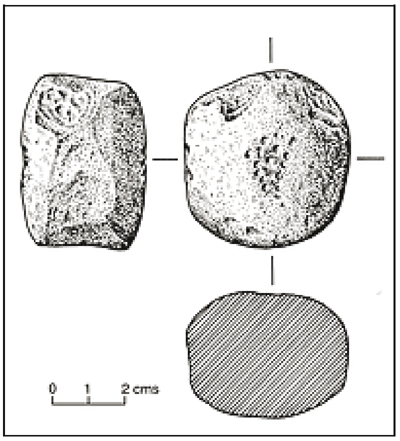


Illus 471: Sand – facially pecked/dished cobble, ST7

The function of these tools is not known. The location and amount of pecking on most of them makes it unlikely that they were used for flint knapping, though some cobbles such as the two with linear pecking may have been used for knapping with bipolar lithic reduction (see the discussion of lithic technology, Section 3.3). The rest of the facially pecked cobbles have much lighter wear patterns and the similarity of the wear patterns on individual tools suggests that they were probably all used for a similar purpose. The facially pecked cobbles with dished faces are likely to be more heavily used forms of the simple pecked tools. The small sise of these cobbles suggests that they were hand held and perhaps used as hammer stones rather than as anvils, and, given the relatively light wear patterns, they may have been used in tasks such as cracking nuts or shells, providing percussion for bone or wood piercers in leather working, or any repetitive job involving percussion of a small object. The dishing of the working surface on some pieces may well be due to the hardness of the stone since many of the dished cobbles are of coarse grained sandstone whilst those that are less worn are of a finer grain. Continuous hammering will form a hollowed area more quickly on the coarse grained stones which are of softer material and thus wear more rapidly.

3.6.1.2 Plain hammerstones (T=4)

These are simple cobble tools with wear in the form of pecking or flaking on the ends or sides. This wear is generally light, with no repetitive patterning to suggest specific actions. There are obviously many tasks requiring percussion to which tools like these might have been put.



Illus 472: Sand – ground stone tool, ST13

3.6.1.3 Ground stone (T=1)

There is one ground stone tool from Sand, a sandstone pebble (ST13; see Illustration 472, right) that has been ground around the perimeter to form two broad, smooth facets at either end that do not quite meet at the sides. The facets appear to have been deliberately ground to a slightly concave profile at the ends. On each face there is a small circular patch of pecking. It is impossible to tell whether the form of this piece results from use or whether it has been ground to a deliberate shape.

3.6.2 Discussion: coarse stone tools from Sand

The cobble tools from Sand comprise mainly facially pecked cobbles and dished cobbles with a few plain hammerstones and a single ground stone tool (see Table 132, below).

Table 132

Sand Context	Type	Facially pecked cobble	Facially pecked / dished cobble	Plain hammer-stone	Ground stone
1	Topsoil	3	1	1	1
13; 13/23/24	Shell Midden, Trench B	2	2		
7 & 7/8	Slopewash, Area B3	2	1		
14	Palaeo-channel, Area B3	1	1		
17	Sandy soil, Trench A	2	2	1	
22	Lower organic rich silt, Trench A	2	2		
27	Slumping, Trench A	2		1	
unstratified				1	

Table 132: Sand coarse stone tools by context

This is a narrow range of tool types and suggests a concentration on limited activities requiring coarse stone tools. It is interesting that bevelled tools were absent from Sand, though they are common elements of Mesolithic assemblages elsewhere (Clarke 1990). Recent research on bevelled stone tools indicates that there are different forms of wear at different sites, though the wider significance of this is still uncertain (Clarke *pers comm*).

Also discussions of bevelled tools do not often distinguish between bone and stone though it is important to keep this distinction clear. The narrow range of coarse stone tools at Sand contrasts with the wider range at Kinloch, Rùm (Clarke 1990). At Kinloch anvils, bevelled pebbles, knapping hammerstones and cobbles with modified sides were all present and, though one or two have circular patches of pecking like that found on the facially pecked cobbles from Sand (*ibid* Illus 78.2, Illus 80.2), it is likely that a wider range of tasks was represented. The evidence of the coarse stone tools from Sand suggests a more specialised site.

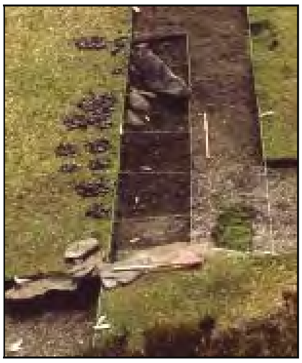
Ground stone tools are known from Mesolithic sites in Scotland, though they are very rare (Clarke 1990; Saville 1994). The ground stone tool from Sand (ST13; see Illustration 472) is sub-circular in shape and does not resemble any existing pieces. It was found away from the midden in the topsoil so that it is possible that it does not relate to Mesolithic activity at all.

There are no other illustrated examples of facially pecked/dished cobbles from published Mesolithic sites, though a counter-sunk hollowed stone with rather deeper hollows than those from Sand is illustrated from the Tweed Valley (Lacaille 1954:fig 61.2).

Although they are few in number, the coarse stone tools are spread evenly across the site at Sand and throughout the contexts. There is no difference in tool type between the midden deposits and those deposits away from the midden and no specific activity areas can be identified. This uniformity of stone tool types suggests that the deposits may have built up rapidly.

3.6.3 Fractured stone

Fractured stone was not collected uniformly across the site at Sand. In most areas, where it was rare, all pieces of apparently heat-fractured stone were recovered, though it was sometimes difficult to distinguish on site between this and natural shillet from the decomposition of the rockshelter so that heat-fractured stones may be under-represented. In Area A, however, heat-fractured stones were so abundant that they comprised the body of Contexts 17, 29 and 17/27. It was not practical to recover all fractured stone from this area so that it was laid out alongside the excavated quadrants and photographed in order to give a visual impression of quantity (see Illustration 362, right).



Illus 362: Sand – view of heat fractured stone recovered from one spit (Spit 3) laid out by the side of Trench A during excavation

For analysis, the fractured stone that had been recovered was divided according to whether it was a fractured cobble (defined by the presence of cortex) or whether there was no cortex, and then individual fragments were counted. The fractured cobbles were clearly broken by heat damage and it is most likely that they had been used in cooking. Though cobbles such as these are commonly termed pot boilers, whereby they are heated in a fire then plunged into a vessel of water in order to heat the water and/or contents of the pot, it must be remembered that clay vessels were not in use during the Mesolithic so that other containers such as troughs made out of wood, bark or even hides must have been used instead. Alternatively, a hole dug in the ground into which the wrapped food and hot stones were placed is another way to cook food without the direct heat of the fire (Wickham-Jones *et al* 1986). Whether it is possible to determine cooking method according to the way the stone has fractured remains a problem for experimental archaeology.

The fragments of non-cortical stone are mostly red sandstone and it is likely that these fell naturally from the rock mass of the rockshelter roof as it weathered.

Table 133 (below) indicates the quantities of fractured rock from Sand. Though not measured by volume, the total amount of fractured rock would fit into two wheelbarrows; it is not a huge amount. Contexts 1 and 2, topsoil, and 17 and 29 have the greatest quantity of fractured rock and the excavators interpreted the latter two contexts as slope wash. The precise derivation of the fragments is thus unclear, but it is likely that the use of the heat-fractured material occurred somewhere up-slope, towards, or perhaps into, the rockshelter. No putative related features were recovered during excavation. It is clear that the slope was unstable throughout this period because fractured rock, both heat-cracked and weathered occurs in small quantity throughout the Mesolithic midden deposits as well.

Table 133

Sand 2000 Context	Area	Burnt cobble fragments	Fractured rock – no cortex
1/2	Site	433	242
5	B3	2	
7/8	B3	17	23
11/12/13	B1	15	91
13	B2	57	32
13/23/24	B2	29	72
14	B3		23
17	A	427	294
17/27	A	8	5
21	A		7
22	A	19	81
24	A	19	10
25	A	17	43
26	A	1	6
27	A	16	18
28	A	75	94
29	A	265	110

Table 133: Fractured rock from Sand

Away from Sand, heat-fractured cobbles were also recovered from 17 of the test pitted sites including the sites with coarse stone tools (catalogue, Appendix 5).

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… > Documents > Final Reports > Clarke_Coarse_Stone_Report.pdf
… > Images > Artefacts > Coarse and ground stone tools > SFS_ST10.jpg [Illustration 467]
… > Images > Artefacts > Coarse and ground stone tools > SFS_ST28.jpg [Illustration 468]
… > Images > Artefacts > Coarse and ground stone tools > SFS_ST5.jpg [Illustration 469]
… > Images > Artefacts > Coarse and ground stone tools > SFS_ST6.jpg [Illustration 470]
… > Images > Artefacts > Coarse and ground stone tools > SFS_ST7.jpg [Illustration 471]
… > Images > Artefacts > Coarse and ground stone tools > SFS_ST13.jpg [Illustration 472]

3.7 Sand, Report on the Coarse Pottery | Ann MacSween

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports. From here you can download the file 'MacSween,_Sand_Pottery.pdf'.

This report presents the pottery finds from Sand. Because of the small amounts, it is presented as a catalogue. The more substantial sherds are recorded in full and small fragments and crumbs are listed. All of the sherds were small or abraded and had no diagnostic attributes. As has been commented on in various papers (for example Lane 1990; Campbell 2002; MacSween 2002) fabric has yet to be proved a reliable indicator of date. As can be seen from the catalogue below most of the pottery comes from high spits and topsoil contexts. As such it does not relate to the Mesolithic use of the site. It is not surprising to find that small fragments of more recent material would percolate through the loose matrix of a shell midden such as Sand.

NB: P numbers relate the catalogue entries back to the individual bags. For crumbs weighing less than 2g, no weight is recorded.

3.7.1 Surface, Molehill

P27 Three fragments from different vessels. Fine sandy clay with *c*10% of rock fragments which has fired hard and is grey with a brown exterior. Th 8mm.

3.7.2 TP7, Spit 3

P26 Abraded sherd. The fabric is sandy clay with *c*10% of rock fragments up to 5mm long which has fired soft and is grey with a brown interior margin. Th 6mm; Wt 4g.

3.7.3 B4B SE, Spit 6, Context 7/8

P21 Small abraded sherd. The fabric is fine sandy clay with occasional rock fragments which has fired hard and is grey with buff margins. Th 6mm; Wt 2g.

3.7.4 Sand, coarse pottery from sorting

No weight = total weight less that 1g.

Table: Section 3.7.4

P39	A1B NE	Spit 2, Context 1/2	1 sherd	fine sandy	5g
P40	A2B SE	Spit 3, Context 29	1 frag	sandy	5mm
P41	A2B SW	Spit 4, Context 28	3 crumbs	fine sandy	

P75	A2B NW	Spit 5, Context 28	2 crumbs	fine sandy	
P119	A2B SE	Spit 5, Context 29	1 crumb	fine sandy	
P120	A2B SW	Spit 6, Context 27	2 crumbs	fine sandy, occ rock	2g (possible rim frag)
P42	A3B NE	Spit 4, Context 17	1 frag	sandy	
P43	A3B NW	Spit 2, Context 29	1 frag	sandy, voids	
P118	A3B NW	Spit 6, Context 17	2 crumbs	fine sandy, organics	
P44	A6B	Spit 1, Context 1	1 frag	fine sandy	6mm
P45	B1A	Spit 2, Context 1/2	3 crumbs	fine sandy clay	
P46	B1A	Spit 2, Context 1/2	2 crumbs	sandy	3g
P115	B1A	Spit 2, Context 1/2	1 crumb	sandy, occ rock	
P77	B1A	Spit 2, Context 1/2	1 sherd	sandy	5mm; 3g
P47	B1A	Spit 3, Context 13	2 frags	fine sandy/sandy	
P48	B1B NE	Spit 4, Context 24	2 crumbs	fine sandy	
P49	B1B SE	Spit 1, Context 1/2	1 sherd	fine sandy	6mm; 4g
P50	B1B	Spit 2, Context 1/2	2 frags	sandy	7mm; 3g
P51	B1B NW	Spit 3, Context 1/2	1 frag	fine sandy, voids	
P52	B2	Spit 2, Context 1/2	1 crumb	fine sandy clay	
P53	B2B	Spit 2, Context 1/2	1 body	sandy	7mm; 2g
P54	B2B	Spit 3, Context 1/2	2 sherds	sandy	7mm; 3g
P55	B2B	Spit 3, Context 1/2	1 frag	fine sandy	7mm
P56	B2B NW	Spit 4, Context 13/24	1 frag	sandy	
P78	B3B	Spit 2, Context 1	2 frags	sandy	6mm; 3g
P57	B3B SW	Spit 3, Context 1	1 crumb	fine sandy	
P113	B3B SE	Spit 3, Context 1	1 crumb	sandy	
P114	B4B	Spit 2, Context	1 crumb	sandy	

	NW	1			
P58	B4B NE	Spit 7, Context 7/8	1 frag	fine sandy, occ rock, organics	
P59	B4B SE	Spit 7, Context 7/8	1 frag	fine clay	8mm
P60	B4B SW	Spit 2, Context 1	1 frag	sandy	
P61	B4B SW	Spit 5, Context 1/2	1 crumb	fine sandy	
P76	B4B SE	Spit 3, Context 1	1 crumb	fine sandy	
P62	B5B NW		1 crumb	sandy	
P63	B5B NE	Spit 2, Context 1	1 frag	sandy, occasional large quartz	
P64	B5B SE	Spit 4, Context 1/2	1 crumb	sandy clay	
P65	B5B SE	Spit 6, Context 7/8	2 sherds	fine sandy, voids	6g
		Context 7/8	2 frags	fine sandy, voids	
		Context 7/8	2 crumbs	fine sandy, voids	
P66	B6B SW	Spit 4, Context 1	1 crumb	fine sandy, occ rock, voids	
P67	B6B SE	Spit 5, Context 1	1 crumb	fine	
P68	B6B SE	Spit 6, Context 7/8	1 frag	sandy, voids	
P69	B20B	Spit 1, Context 1	1 frag	fine, sandy	7mm
		Context 1	1 crumb	fine, sandy	
P70	B24B	Spit 2, Context 12	1 crumb	fine sandy clay	
P117	B24B	Spit 2, Context 12	2 crumbs	sandy, occ rock	2g
P112	B25	Spit 2, Context 1	1 crumb	sandy	
P71	B25A	Spit 2, Context 1	1 frag	fine sandy clay	6mm
P72	B25A	Spit 3, Context 1	1 crumb	fine sandy clay	
P73	B25B SE	Spit 4, Context 1	1 frag	fine sandy	
P74	B24B SW	Spit 3, Context 13	1 tiny crumb	sandy	
P116	B25B	Spit 2, Context 1	1 crumb	sandy	

Sand, coarse pottery from sorting (all very abraded)

NB: finds from squares Area B1–B24/25 were affected by a recording error on site that makes their location uncertain

3.7.5 Sand, glazed pottery

Table: Section 3.7.5		
P91	SFS 4, Sand 1, Spit 1	1 piece glazed pottery
P92	SFS 4, Sand 1, TP11 Spit 2	1 piece glazed pottery
P93	SFS 4, Sand 1, B17A, Turf;	1 sherd

Sand, glazed pottery

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3.8 Pigment resources report: excavations at Sand, Applecross, 2000 | Arlene Isbister

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3.8.1 The finds and their context

One purplish-grey nodule of haematite and one of mudstone with an earthy-orange limonite cortex were identified from the excavations (Appendix 12). Both came from outside the main midden area: the haematite from Context 7/8, the slopewash over the palaeochannel; and the limonite from Context 17, the sandy soil with heat-cracked stone. Although these contexts are outside the main midden area, there is no reason to suggest the finds are not Mesolithic.

3.8.2 Possible origins

Iron bearing rocks and minerals including haematite and magnetite are found in the surrounding geology at Sand; in both the Sleat Group and the Applecross Formation of the overlying Torridon Group. Haematite is also found in the sediments around Diabaig (Stewart 1991:73&79).

3.8.3 Modification

Illus 473: Haematite nodule from Sand showing modification

Illus 474: Limonite cortex from Sand showing modification

Both nodules have worn surfaces and these suggest that they were primarily exploited and reduced for their pigment (see Illustrations 473, left & 474, right). Various techniques of reduction are apparent on each of the nodules; rubbing down or levigating against a hard surface and gouging or scoring using a sharp point.

Although the haematite nodule is dull in outward appearance, its streak is orangey-red. The modified surfaces provide evidence that fine, red spectrum pigment was created, which must have been as striking in the past as it is today (Isbister 2000:192–3). Wet abrasion against a pebble was used to work the pigment from the haematite nodule's largest face, as indicated by the type of surface abrasion and the convex profile of the modified area.

Experiments show that rubbing down a crystalline haematite nodule like this in water, against a rounded sandstone pebble, produces a smooth curved nodule face and in the process creates fine, brightly coloured pigment with a tacky paint-like consistency. Rubbing down the nodule in viscous clear liquid, such as gum or resin, cushions the grinding process while simultaneously binding the pigment to enable smaller pigment particles to scatter creating even finer, brighter pigment and a smoother nodule face (see Illustration 475, right). Either of these techniques may have been used.

Illus 475: Experimental haematite colour in gum

Fine orangey-red pigment was produced from the burnished narrow edge-ground facet on the haematite nodule. It is unclear whether coloured pigment was worked wet or dry from the facet and rubbed areas on the limonite nodule.

Illus 476: Experimental pieces compared with the archaeological haematite

Illus 477: Experimental piece of bone scored haematite

Both nodules also have evidence of scraping and various tools, such as bone or flint, would have been suitable to scrape the haematite and limonite from them (see Illustrations 476, left & 477, right). A sharper point was used to score the limonite cortex which produced earthy-orange, dry pigment powder. Pigment from the haematite when dry and crystalline adheres to the fingers like powdered graphite and appears bright orange and translucent when rubbed on the skin. Limonite pigments are hydrated and often appear dull. Experimental work shows that when limonite or ochre is heated, red iron oxide pigments are realised, but those are not equal in brilliance to crystalline haematite pigments. Experiments have also shown that dry pigment powder mixed with water does not create pigment material as fine as that produced by the more efficient wet abrasion techniques described above.

3.8.4 Possible applications

The abrasion and scoring techniques described above required concentration and precision, suggesting that the application of the material was equally focused.

Paints, chalks and cosmetics for personal adornment and artefact decoration are possible interpretations and the colour and healing properties of these pigments may have been also known and used. Ethnography tells us that the brilliance of colour was often used as a sensory stimulus to evoke spiritual or ritual power (Morphy 1989:30). In traditional cultures colour and cosmetics are infused with symbolism and meaning; the word 'cosmetics' comes from the Greek, 'cosmos' meaning order (Power 1999).

It is also possible that the excavated haematite nodules and pigment may have been associated both symbolically and practically with blood, the feminine and medicine. The antiseptic qualities of haematite and its ability to staunch bleeding are attested by both ancient and modern traditions; limonite is also used but high iron bearing red haematite is preferred (Budge 1970:314; Velo 1984:674). The Gugadja people in north-western Australia used haematite pigment as a medicine; after having moistened it with water or saliva it was applied to sores and burns and also used to treat internal pains (Peile 1979:217). There is evidence that the Mesolithic inhabitants of Scotland displayed an intimate knowledge of their surroundings and it is likely that this included information on the medicinal properties of minerals.

Chinese traditional medicine still uses haematite and limonite in the treatment of diseases and has done so for more than 5,000 years. It employs the healing properties of herbs, minerals and other natural materials and considers that every disease can arise from and/or influence our emotional state. Haematite is finely ground in water or vinegar for oral administration and is commonly used with limonite, oyster shell and white peony root. In light of the large amounts of burnt marine shell excavated from Sand, it may be worth noting that calcined oyster shell and haematite are often used as a major combination in medicinal preparations. Haematite and oyster shell are also used as sedatives to calm the mind and spirit (Reid 1987:120–4). Various other treatments using haematite include those for prolonged menstruation, nasal bleeding, infantile malnutrition, vomiting and belching, bronchial asthma and lacerations (Bensky & Gamble 1990:578).

3.8.5 Conclusion

The small sample size makes specific interpretations problematic, but it is clear that both haematite and limonite formed part of the material culture of the inhabitants of Sand. Whether for colour, healing properties, or perhaps both, they were an important addition to the use of local resources that has been recorded from the site.

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- … > Images > Specialists > Ochre > Ochre_illus_1.jpg [Illustration 473.jpg]
- … > Images > Specialists > Ochre > Ochre_illus_2.jpg [Illustration 474.jpg]
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- … > Images > Specialists > Ochre > Ochre_illus_4.jpg [Illustration 476.jpg]
- … > Images > Specialists > Ochre > Ochre_illus_5.jpg [Illustration 477.jpg]

3.9 Metal, slag and glass from Sand | Andrew Heald & Fraser Hunter *with contributions by Stuart Campbell & Dawn McLaren*

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3.9.1 Introduction

The material is first presented as a catalogue with wider discussion at the end. The following abbreviations are used: L = length, W = width, T = thickness, D = diameter, H = height, m = mass. In some cases pieces were catalogued on site and the original N numbers have also been recorded. For non-ferrous metals, the alloy type was determined by non-destructive energy-dispersive X-ray fluorescence (XRF) analysis. The results are from surface analysis only, and thus are affected by corrosion. Stuart Campbell kindly commented on some of the medieval and later non-ferrous material; his comments are incorporated as noted below. Iron work identifications and measurements were supplemented from X-rays. Appendix 9 contains a full summary of metal finds from all the SFS sites, and a full catalogue of nails and slag is in Appendix 10; only basic details are noted here. Square sectioned rod fragments with no other distinguishing features were assumed to be nail fragments.

3.9.2 Metal finds

3.9.2.1 Copper alloy

Casting waste irregular droplet, 5×3×3mm, m0.1g. Leaded bronze. A2B NE Spit 6, Context 17

Casting waste irregular droplet, 9×7×5mm, m0.7g. Leaded bronze. A1B SE Spit 2, Context 1/2.

3.9.2.2 Iron

Knife tip? Straight edge, shallow curving back. L26mm, H10mm, T4mm. A6B NE Spit 1, Context 1.

Nails four fragments A2B Spit 3, Context 29; A6B SW Spit 2, Context 17; B1B SW Spit 4, Context 24; B4B Spit 1, Context 1/3.

Flake 7.5×6×2mm. B24B SW Spit 6, Context 13.

Lump undiagnostic. 19×11×7mm. B5B NE Spit 3, Context 1.

Fragment undiagnostic. 11×7×4mm. B21B NE Spit 1, Context 1.

3.9.3 Glass beads | Dawn McLaren

Turquoise glass bead globular, slightly flattened at one end. The surface shows that the bead was formed by winding a glass rod around a core. Its iridescent surface suggests a potash glass and a late medieval – early post-Medieval date (?15th–18th century). D4.5mm, H4mm, hole D2mm. B25A SE Spit 3, Context 13.

Deep blue translucent glass bead cylindrical, short. Slightly uneven with a D-shaped section. D4.2mm, H2.6mm, central perforation D2.2mm. A4B NW Spit 2, Context 17.

Illus 478: Sand – glass beads

Deep blue translucent glass bead globular, D-shaped section. The surface of the bead is very eroded. D2.8mm, H1.5mm, central perforation D*c*0.8mm. B5B NE Spit 4, Context 1/2.

Deep blue translucent glass bead globular, slightly uneven D-shaped section. D1.3mm, H0.8mm, central perforation D*c*0.3mm. B8B Spit 2, Context 1.

3.9.4 Other glass

Post-medieval vessel glass, olive green: 2 sherds from A5B Spit 1, Context 1; 1 from A6B Spit 1, Context 1; 3 from A6B SE Spit 2, Context 17; 1 (N22) from Test Pit 1 (1999 excavations) Spit 5.

Modern clear glass: 2 sherds (N 30) from B1 turf, Context 1; 1 (N36) from B26B Spit 1, Context 1.

3.9.5 Vitrified material

Amorphous slag fragment L14mm, W12mm, T10mm. 1.2g. A2B NW Spit 3, Context 29.

Small amorphous slag fragment L3mm, T2.5mm. B2A SW Spit 4, Context 13.

Slag sphere L3.2mm, T2.8mm. B5B NW Spit 3, Context 1.

Fuel ash slag fragments 9.9g. B21A NW Spit 2, Context 1.

3.9.6 Slag

494g, primarily unclassified ironworking (125g) and a plano-convex smithing hearth base (343g), plus a small quantity of hammerscale and slag spheres (Appendix 9). The distribution focuses strongly on the squares around the junction of trenches A and B, with limited scatter beyond.

3.9.7 Discussion

Most of these finds come from higher spits Spit 3 and above and they are presumably more recent than the Mesolithic activity in the rockshelter. The slag remains, including a hearth bottom indicate a single short lived episode of blacksmithing, and the presence of two melted copper alloy fragments in the same area suggests that limited bronze working also took place here.

The glass beads generally conform to Guido's Group 7 (iv) (Guido 1978:70); the short cylindrical form of A4B NW Spit 2 is a variant. The type is a common one with a broad date range from the early Iron Age to the post-Roman period, and cannot be more closely dated. Similar globular beads are known locally from Dun Ardtreck (MacKie 2000:383–384&391) and Dun Beag on Skye (Callander 1921:130).

The recovery of the particularly small example (B8B Spit 2) during sieving is a valuable indicator of the tiny beads which are rarely found on excavations; without wet sieving it is unlikely that this minute object would have been detected, emphasising the bias in our knowledge of beads. Its tiny size suggests that it was probably a decorative item on a tassel or part of a beadwork pattern rather than from a necklace.

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… > Images > Artefacts > Metal and glass > Blue_beads,_copyright_Trustees_of_the_NMS_36744.jpg [Illustraion 478]

3.10 Report on human teeth from Sand | Rick Schulting

3.10.1 Introduction

Three human teeth were found during the excavations at Sand, of which two were submitted for further analysis (see Table 134, below). One, a permanent central incisor was found in a high spit (Spit 3) in Context 13, the main midden, but direct dating indicates that it is not associated with the Mesolithic deposits, and dates instead to the Early Bronze Age (2115–1690 cal BC including a correction for the marine reservoir effect, see below and Section 4). The date of the other tooth from Context 13, a deciduous molar, is unknown. As the root is missing, no dating is possible for this specimen, but it was found not far from the adult tooth and may well be contemporary. The third tooth, another deciduous tooth, came from Context 29 slightly above the main midden and not far from the other two.

Table 134

Sand 2000 Square	Context	Tooth	Comments
B1A, Spit 3	13	Permanent central incisor	Dated: AA-50698 2040–1730 cal BC
B25A NE, Spit 4	13	Deciduous tooth	Root missing
A3B SE, Spit 2	29	Deciduous tooth	Not analysed

Table 134: Sand, catalogue of human teeth

3.10.2 Permanent maxillary central incisor

This is a large permanent, maxillary central incisor (see Illustration 479, right). The occlusal surface is moderately worn, with a line of dentine exposed (wear stage 3–4, using Smith 1984). Chipping on one edge appears to have occurred during life, as there is evidence of smoothing. As the incisors are rarely involved in heavy mastication, the chipping may reflect the use of the teeth for non-dietary purposes (for example, use of the mouth as a 'third hand' during manufacturing or other activities). No enamel hypoplasia is indicated.

Illus 479: Sand – permanent, maxillary central incisor, labial view

Examination with a light microscope at low/medium magnification (30–100×) shows a series of striations on the labial surface. These certainly occurred in life rather than post-depositionally (there is almost a complete absence of similar striations on the lingual surface) and could relate either to dietary or non-dietary use of the anterior dentition, or, most probably, to some combination of the two. Incisors are rarely used for dental microwear studies, and so little in the way of comparative data is available. Ungar & Spencer (1999), however, have indicated that consistent patterns in incisor microwear can be used to differentiate Amerindian populations with different diets. Further work will have to be undertaken with a larger sample of British material before interpretation can be attempted. Even so, little can be said about one tooth in isolation.

3.10.3 Deciduous mandibular first molar

Illus 480: Sand – deciduous, mandibular right first molar, occlusal view (max length = 7.9mm)

The second tooth found comprises a deciduous, right mandibular first molar (see Illustration 480, left). Only the crown is present, so that it is not possible to comment on the stage of root development. However, the state of wear on the occlusal surface strongly indicates that the tooth was fully erupted, and it is likely to have been so for some years prior to death. Indeed, it is possible that this represents a shed tooth. The cusps are nearly entirely worn down, with dentine exposure across much of the occlusal surface. The most likely age range represented by the tooth is 8–10 years.

Illus 481: Sand – deciduous, mandibular right first molar, lingual view

Chipping on the lingual edge of the occlusal surface appears slightly worn, and so may have occurred during life, possibly indicating the consumption of quite hard foods from a relatively young age (though keeping in mind that the tooth is likely to be that of an older child). This is supported by the high degree of occlusal wear noted above. Chipping could also be caused by grit incorporated into foods through processing (for example, grit from a grinding slab, incorporated into dried fish or meat, sand in shellfish, and so on). No caries or enamel hypoplasia are present. A slight amount of calculus is present on the lingual surface of the tooth, near the enamel-cementum junction (see Illustration 481, right).

3.10.4 Dating and stable isotope data

The root of the permanent central incisor was sent for an AMS determination, returning a result of 2115–1690 cal BC (3615±65 BP; AA-50698). The associated ð^{13}C value of -8.5‰ suggests some input of marine protein in the diet of this individual, on the order of approximately 20%. This necessitates a slight correction for the marine reservoir effect (Barrett *et al* 2000a). The calibration was made using Calib 4.4 (McCormac *et al* 2002; Stuiver *et al* 1998) and taking this into account, and most likely falls within the range 2040–1730 cal BC. This places it within the Early Bronze Age.

Unlike bone, the dentine that makes up the tooth root is a very stable structure, with a very low turnover rate. Thus, the dietary signal largely refers to the time during which the root was being formed, in this case ages 4–8. Nevertheless, it is likely that this more or less is also representative of the adult diet of this individual and their community, if only for the reason that it is difficult (though by no means impossible) to envisage a situation in which young children would be eating more marine protein than adults in the same community. While a contribution on the order of 20% marine protein is far from insignificant, it is still a relatively minor proportion of the total protein intake.

In terms of broader comparisons, individuals dating to this period in Scotland are relatively rare. Of those that are known, the Sand tooth represents the highest $\delta^{13}C$ value yet found. There is an emerging pattern for most of post-Mesolithic Scottish prehistory, with $\delta^{13}C$ values above about −19‰ being essentially non-existent between 5000 and 2000 BP. After 2000 BP, a number of coastal sites, mainly from Orkney, have individuals with more elevated values, between −19‰ and −16‰ (Schulting & Richards 2002:Fig5). This is especially so in the Viking period, when the use of marine foods in Orkney becomes very significant (Barrett *et al* 2000b). The possibility of regional variation in earlier periods still exists, however, and perhaps the Sand tooth provides some indication of this.

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3.11 The Zooarchaeology of Sand | Rachel Parks & James Barrett

The archive version of the text can be obtained from the project repository on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports`. From here you can download the file '`Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf`'. See also draft version '`sand_bone_report,_Parks.pdf`' in `Specialists reports` and `Appendices 21–29`.

3.11.1 Introduction

This report is based on analysis of the mammal, bird and fish remains from Sand. Approximately one third of the material was analysed by Parks in fulfilment of an MSc in Zooarchaeology at the University of York. The data presented here combines results from that, and more recent analysis, and supersedes earlier unpublished work (Gamble 2002; Parks & Barrett 2004). The full bone catalogue is held as a database in the National Monuments Record for Scotland, and by the author, at the Department of Archaeology, University of York.

A narrow range of local taxa was exploited at Sand, including red deer, wild boar, razorbills and guillemots, and fish from the cod and wrasse families. The mammal remains are highly fragmentary and interpretation is tentative. The bird and fish assemblages, however, are large and it is suggested that two possible seasons of use are represented at the site. The zooarchaeological significance of Sand is not to be underestimated; it is a substantial assemblage from a period in Scottish prehistory with little faunal evidence.

3.11.1.1 The zooarchaeological record of Mesolithic Scotland

Comparative faunal assemblages are important to assess trends of animal use both at Sand and in the period as a whole, but the lack of faunal remains in the Scottish Mesolithic (McCormick & Buckland 1997; Kitchener *et al* 2004) means that few comparative assemblages are available. The unpublished or partly published nature of some sites further reduces this number. The largest comparative assemblage comes from the 5th millennium BC site of the Cnoc Coig shell midden on Oronsay, of which only the mammal bone has been comprehensively published (Grigson & Mellars 1987). The amount of mammal bone recovered here is small and by far the most common species was grey seal (360 specimens) followed by otter (123 specimens), red deer (70 specimens excluding antler) and wild boar (56 specimens). The existing published fish data deals explicitly with the otoliths from the dominant species, saithe (Mellars & Wilkinson 1980).

Much smaller, but published, faunal assemblages are available from the middens at Carding Mill Bay, near Oban, and Morton in Fife (Connock *et al* 1992, Coles 1971). At Carding Mill Bay, red deer, roe deer and wild boar were sparsely represented (two specimens each, Hamilton-Dyer & McCormick 1993:Table 6) and the remaining mammal, bird and fish specimens appear to be a mix of human refuse and natural deposits (McCormick & Buckland 1997:88; Hamilton-Dyer & McCormick 1993:34). From Morton site B, 23 identified mammal specimens are listed in the 1971 report, including deer (12 specimens), aurochs (six specimens), bank vole (two specimens) and single specimens of wild boar, hedgehog and roe deer (Coles 1971:349). The bird bones from the site have been interpreted as representing individual meals and were mostly from seabirds that prefer open water. Out of a total of 34 identified specimens the most abundant species were guillemot, represented by 14 specimens, and gannet, represented by six specimens (Cowles in Coles 1971:350). The fish remains (950 specimens) were overwhelmingly dominated by cod, and Wheeler (in Coles 1971:351) notes that many bones were from large fish, however, the method of recovery during excavation is unclear. Hand collection of material would bias towards large, intact specimens.

In addition to these sites reports on the faunal remains from Ulva cave, on the island of Ulva (Bonsall *et al* 1994:8–21), and An Corran, on Skye (Hardy *et al* forthcoming), await publication. This lack of comparative material, whilst frustrating, serves to highlight the importance of the faunal remains from Sand.

3.11.2 Recovery and methods at Sand

Recovery methods are crucial to understanding the faunal assemblage (Section 3.2; Hardy & Wickham-Jones 2000:48–55). Open area excavation on the terrace of the Sand rockshelter included both the midden deposits and the adjacent midden free area. Outside of the midden no *in situ* features were preserved, probably due to the steep slope, and the midden itself had begun to move down-slope. Approximately 90m² was excavated in two L-shaped trenches.

During excavation all material was wet sieved using a flotation machine: 1.0mm and 0.3mm sieves were used for the floating fraction and the heavy fraction was retained by a 1mm mesh. Some bone was also hand collected during excavation. During initial post-excavation the 1mm heavy fraction was sorted into basic categories: bird; mammal (burnt and unburnt); fish; teeth; and otoliths. The faunal material recovered from the floating fraction and hand collection was minimal and it was combined with the rest of the material prior to analysis.

Due to the rarity of Mesolithic faunal assemblages, no sub-sampling of excavated material was undertaken prior to analysis. However, material from the 1999 test pitting programme at Sand and a small amount of misclassified material extracted during recording was not included. The material was divided into greater than 4mm and greater than 2mm fractions. Fish, small mammal and amphibian bones recovered from both size fractions were analysed. For the bird and mammal bone only the greater than 4mm fraction was recorded.

Recording followed the York protocol (Harland *et al* 2003) which uses a system of quantification codes (QC) to distinguish between diagnostic and non-diagnostic elements. Under the York system, 17 diagnostic (QC1) mammal bone elements are routinely recorded in detail, including species, element zones present and maximum linear dimension. Preservation is assessed by two criteria; surface texture and element completeness. Elements with special interest such as antler are recorded as QC4 elements, all other elements are listed as QC0.

Recording for the bird bone follows that of mammals, with eight QC1 elements recorded in full. Eighteen diagnostic (QC1) fish bone elements are routinely recorded in detail as for bird and mammal, with the addition of an estimation of fish size. Special elements such as otoliths (QC4) are also recorded in detail. Vertebrae (QC2 elements) are identified to family or species level where possible, and all other (QC0) elements are recorded as unidentified. Gadidae vertebrae are further identified to eight groups according to their place along the vertebral column (as defined in Barrett 1997).

For all classes of material QC0 refers to bones that were truly unidentifiable and those not routinely recorded in the York System protocol. All bone fragments were counted and weighed. Measurements taken on mammal and bird specimens followed those defined in von den Driesch 1976, unless otherwise stated. Fish measurements followed those in Barrett 2001 (and references within) where possible; however, it was necessary to use alternative measurements for some Labridae specimens. Metric data for all classes of material are provided in Appendices 22, 23, 24. All alternative fish measurements used for labrids are defined in Appendix 21. The Latin names for taxa mentioned in the text are listed in Appendix 25.

Quantification is by number of identified specimens (NISP) and weight only. The number of identified specimens may be used as both a count of identified specimens and also as a relative measure of species abundance. Another commonly used method of assessing species abundance, the minimum number of individuals (MNI) is not used. MNI provides a conservative estimate of the least number of the individuals required to account for the specimens identified for a certain species by context or site. Both NISP and MNI are heavily affected by how easy it is to identify an element to species, and how fragmented the material is (Reitz & Wing 1999:191–194). In addition, NISP as 'raw data' is best suited for comparison with other sites. At Sand, given the above, the potentially large temporal range of deposition, the lack of distinct contexts within the main shell midden and the high fragmentation of the material, only NISP is used.

3.11.3 Results

In total, 113,998 bone fragments weighing 21,223.49g were examined from Sand (see Tables 135 & 136). This large number of fragments does, however, mask the much smaller subset of 16,589 diagnostic elements (QC1, QC4 and QC2 elements) that were subject to detailed analysis. The majority of bones were recovered from three contexts; the topsoil (Contexts 1, 2, 3), the main shell midden (mainly Contexts 11, 12, 13, 28), and organic rich silt layer (Context 22). The two most archaeologically significant contexts with sufficient remains, the main shell midden and organic rich silt layer are discussed in detail. Bone was also recovered in small quantity from the slumped stony deposit and the sandy soil with heat cracked stone in Area A (Contexts 17, 27, 29). Reference to the context concordance chart (Appendix 3) provides a full description of the way in which the contexts were divided.

To access a printable version of this table, please go to the separate page `table135.html` and set to LANDSCAPE mode.

Table 135

class	recovery	topsoil	main shell midden	palaeo	slopewash	organic rich	shell midden	sandy soil	natural	unprov	total
mammal											
diagnostic	4mm	66	137		2	72	3	9		3	292
	hc	1	2								3
unidentified	4mm	13601	13025	81	1473	6645	2521	5618	24	438	43426
	hc	59	1								60
	subtotal	13727	13165	81	1475	6717	2524	5627	24	441	43781
bird											
diagnostic	4mm	307	810		38	88	17	25	2	3	1290
unidentified	4mm	3608	7953	8	549	2375	206	325	9	18	15051
	subtotal	3915	8763	8	587	2463	223	350	11	21	16341
fish											
diagnostic	2–4mm	2817	6582	2	66	348	169	311	1	80	10376
	4mm	1015	3089		46	191	86	116	1	34	4578
unidentified	2–4mm	7992	21747	3	285	2669	694	1268	2	231	34891
	4mm	844	2609		29	244	44	63		19	3852
	subtotal	12668	34027	5	426	3452	993	1758	4	364	53697

small mammal and amphibian											
diagnostic	2–4mm	13	18				1	1			33
	4mm	5	10				1	1			17
unidentified	2–4mm	16	63		1	8	4	23			115
	4mm		13			1					14
	subtotal	34	104		1	9	6	25			179
	total diagnostic	4224	10648	2	152	699	277	463	4	120	16589
	total number of bones	30344	56059	94	2489	12641	3746	7760	39	826	113998

Table 135: SFS, Number of identified specimens from Sand by method of recovery
Key: hand collected (hc), wet sieved greater than 4mm fraction (4mm), wet sieved greater than 2mm fraction (2–4mm)

To access a printable version of this table, please go to the separate page table136.html and set to LANDSCAPE mode.

Table 136

class	recovery	topsoil	main shell midden	palaeo	slopewash	organic rich	shell midden	sandy soil	natural	unprov	total
mammal											
diagnostic	4mm	541.36	1437.72		72.50	764.56	48.50	52.54		39.50	2956.68
	hc	54.00	156.30								210.30
unidentified	4mm	4721.64	5103.45	10.00	465.04	2056.47	621.74	1413.43	8.50	275.57	14675.84
	hc	93.00	3.50								96.50
	subtotal	5410.00	6700.97	10.00	537.54	2821.03	670.24	1465.97	8.50	315.07	17939.32
bird											
diagnostic	4mm	121.50	360.94		12.97	38.64	6.99	10.71	0.50	3.94	556.19
unidentified	4mm	454.83	820.08	0.35	61.59	286.27	31.22	49.82	0.94	1.76	1706.86
	subtotal	576.33	1181.02	0.35	74.56	324.91	38.21	60.53	1.44	5.70	2263.05
fish											
diagnostic	2–4mm	50.99	114.22	0.03	0.72	5.31	2.98	4.34	0.03	1.56	180.18
	4mm	66.33	202.08		3.31	12.82	5.20	6.38	0.08	2.94	299.14
unidentified	2–4mm	91.88	221.59	0.03	2.71	29.12	8.42	12.34	0.02	2.77	368.88
	4mm	39.12	100.22		1.36	12.67	2.03	2.75		1.05	159.20

subtotal		248.32	638.11	0.06	8.10	59.92	18.63	25.81	0.13	8.32	1007.40
small mammal and amphibian											
diagnostic	2–4mm	0.15	12.25		0.03	0.02					12.45
	4mm		0.17		0.03	0.05					0.25
unidentified	2–4mm	0.02	0.55		0.01	0.07	0.02	0.22			0.89
	4mm		0.06			0.07					0.13
subtotal		0.17	13.03		0.07	0.21	0.02	0.22			13.72
total diagnostic		834.33	2283.68	0.03	89.56	821.40	63.67	73.97	0.61	47.94	4215.19
total number of bones		6234.82	8533.13	10.41	620.27	3206.07	727.10	1552.53	10.07	329.09	21223.49

Table 136: SFS, Weight of bones from Sand by method of recovery
Key: hand collected (hc); wet sieved greater than 4mm fraction (4mm), wet sieved greater than 2mm fraction (2–4mm)

From the main shell midden 139 mammal, 810 bird and 9,671 fish diagnostic elements were recorded. Fewer bones were recovered from the organic rich layer, including 72 mammal, 88 bird and 539 fish diagnostic elements. The majority of the fish remains were recovered from the >2mm fraction, highlighting the importance of fine-sieve recovery (in opposition to Vale & Gargett 2002). The greater number of fish bones is to some extent inflated by the large number of vertebrae (QC2 elements) recorded (see Section 3.11.3.4.3). But, taking into account the differing numbers of diagnostic elements recorded for each class (mammal 17 QC1, 4 QC4, bird 8 QC1 and fish 18 QC1, 4 QC4 and vertebrae), the number of mammal specimens, especially in the main shell midden, is relatively small. By weight, however, mammal bone was the dominant class for both the main shell midden and organic rich contexts. Unidentified mammal bone accounts for fewer than 60% of the total main shell midden bone assemblage. The high number of unidentified specimens suggests that much of the mammal bone was fragmented beyond identification and possible taphonomic and butchery patterns are explored below (Sections 3.11.3.1.4 and 3.11.3.1.6).

3.11.3.1 Mammal bone

3.11.3.1.1 Preservation

A total of 43,781 mammal bones weighing 17,939.31g was recovered from the site (see Tables 137 & 138, below). The small subset of 206 QC1 elements, the majority of which were recovered from the main shell midden and topsoil, makes comparison of preservation between contexts difficult. Based on the surface texture of QC1 elements, preservation of mammal bone in the main shell midden was generally fair to good (see Table 139). By the same criterion, preservation in the organic rich silt layer was fair to poor, although this assessment is based on only 20 specimens. The majority of elements in the main shell midden and organic rich contexts were –20% or 21–40% complete, indicating a high level of fragmentation (see Table 140).

To access a printable version of this table, please go to the separate page `table137.html` and set to LANDSCAPE mode.

Table 137

taxon	topsoil	main shell midden	palaeo	slopewash	organic rich	shell midden	sandy soil	natural	unprov	Total
whale sp.		present								

dog or wolf		2								2
fox		1								1
dog family	1									1
badger					present					
otter		present								
seal sp.	1									1
wild boar	8	29			1		2			40
red deer	30	49		1	22	2	2		2	108
roe deer	1	5								6
deer family	3	2								5
Bos sp.	4	1			1		1			7
sheep	3						1			4
sheep or goat		1								1
large mammal	8	8			3	1	3			23
medium mammal	3	6			2					11
unidentified	13660	13026	81	1473	6645	2521	5618	24	438	43486
QC1 Subtotal	62	104	0	1	29	3	9	0	2	210
QC4 Subtotal	5	35	0	1	43	0	0	0	1	85
Total	13727	13165	81	1475	6717	2524	5627	24	441	43781

Table 137: Sand, Number of identified mammal specimens by context

To access a printable version of this table, please go to the separate page table138.html and set to LANDSCAPE mode.

Table 138

taxon	topsoil	main shell midden	palaeo	slopewash	organic rich	shell midden	sandy soil	natural	unprov	Total
whale sp.		present								
dog or wolf		3.50								3.50
fox		0.50								0.50
dog family	0.50									0.50
badger					present					

otter		present								
seal sp.	2.00									2.00
wild boar	72.70	146.50			2.50		8.04			229.74
red deer	385.80	764.48		38.00	318.66	19.50	11.50		36.00	1573.94
roe deer	2.00	18.50								20.50
deer family	7.00	19.00								26.00
Bos sp.	26.86	11.87			27.00		20.00			85.73
sheep	15.50						1.50			17.00
sheep or goat		4.00								4.00
large mammal	61.50	210.86			21.50	29.00	11.50			334.36
medium mammal 1	10.50	18.00			21.00					49.50
unidentified	4814.64	5106.95	10.00	465.04	2056.47	621.74	1413.43	8.50	275.57	14772.34
QC1 Subtotal	584.36	1197.21	0	38.00	390.66	48.50	52.54	0	36.00	2347.27
QC4 Subtotal	11.01	390.37	0	34.50	373.90	0	0	0	3.50	813.28
Total	5410.01	6694.53	10.00	537.54	2821.03	670.24	1465.97	8.50	315.07	17932.89

Table 138: Sand, Weight of mammal specimens by context

To access a printable version of this table, please go to the separate page table139.html and set to LANDSCAPE mode.

Table 139

texture	topsoil	main shell midden	organic rich	shell midden	sandy soil	unprov	Total
excellent			1				1
good	21	57	3	1	2	1	85
fair	20	36	7	1	3	1	68
poor	4	3	9		1		17
Total	45	96	20	2	6	2	171

Table 139: Sand, Surface texture of mammal QC1 elements. Assessment of surface texture based on the following criteria (Harland *et al* 2003):
Excellent – majority of surface fresh or even slightly glossy; very localised flaky or powdery patches;
Good – lacks fresh appearance but solid; very localised flaky or powdery patches;
Fair – surface solid in places, but flaky or powdery on up to 49% of specimen;
Poor – surface flaky or powdery over >50% of specimen

To access a printable version of this table, please go to the separate page table140.html and set to LANDSCAPE mode.

Table 140

element completeness	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	unprov	Total
0–20%	15	25		10		3		53
21–40%	13	35	1	7	1	2	1	60
41–60%	2	12		1	1		1	17
61–80%	1	4						5
81–100%	12	16		2		1		31
Total	43	92	1	20	2	6	2	166

Table 140: Sand, Completeness of mammal QC1 elements

Just over 30% of the mammal bone was burnt, mainly charred rather than calcined (see Table 141, below). A substantial number of charred fragments were recovered from the sandy soil and heat cracked stone context. Carnivore and rodent gnawing was minimal, and, excluding butchery and working evidence (discussed below), few specimens were otherwise modified. One antler specimen from the main shell midden is of interest as it shows signs of ungulate gnawing, probably by deer (see Illustration 482 lower, right). The same specimen also shows evidence of working, and could suggest the collection of shed antler for use at Sand (see Illustration 482 upper, right).

Illus 482 (right): Worked antler specimen (a, upper), the same specimen shows evidence of ungulate gnawing (b, lower). In both illustrations the bar scale represents 40mm

To access a printable version of this table, please go to the separate page table141.html and set to LANDSCAPE mode.

Table 141

modification	topsoil	main shell midden	palaeo	slopewash	organic rich	shell midden	sandy soil	natural	unp[illegible]	[illegible]
carnivore gnawing	6	9			6	1				22
rodent gnawing		2								2
root etching	4	5			3	1				13
root etching & carnivore gnawing		2								2
ungulate		1								1

gnawing										
calcined	1139	666	9	81	292	205	1086	1	29	3508
charred	3289	2869	10	218	644	522	1132	4	174	8862
burning Total	4428	3535	19	299	936	727	2218	5	203	12370

Table 141: Sand, Modification of mammal bone (all specimens) by context

3.11.3.1.2 Taxonomic abundance

The mammalian assemblage is dominated by wild terrestrial taxa (see Table 137, above), including species indicative of a woodland environment. The most abundant species recorded was red deer, followed by *Sus sp* assumed to be wild boar (based on a qualitative assessment of size and tooth cusp pattern) and referred to as such from hereafter. A wider diversity of species was recorded from the main shell midden, compared to the organic rich silt layer, including roe deer, fox, dog or wolf and otter. Apart from red deer and wild boar, the only other positively identified species from the organic rich silt was badger. Marine mammalian taxa are represented by one seal phalanx, unidentifiable to species, and one unidentified fragment of whale bone. There is no evidence at Sand, therefore, for the intensive exploitation of marine mammalia taxa as for grey seal at Cnoc Coig (Grigson & Mellars 1987).

A few, largely non-diagnostic, elements of probably domestic *Bos* sp. were recorded. These included isolated teeth, a navicular-cuboid and one axis and come from a variety of locations (see Table 142, below). The axis is clearly intrusive due to a cut mark apparently made with a metal blade, but it is not clear if the other elements are intrusive. Few measurable elements were recovered. Measurements were taken from a navicular-cuboid from the main shell midden and a mandibular first molar from the topsoil. Given the lack of measurements it is difficult to assess whether the Bos sp. specimens represent wild aurochs or domestic cattle, but the latter seems probable based on qualitative assessment (O'Connor *pers comm*). Whilst domestic animals are traditionally associated with the Neolithic, the early introduction of a few domesticates in otherwise Mesolithic contexts has recently been argued for Irish assemblages (Woodman & McCarthy 2003). Direct dating of the Sand specimens would be advantageous, but it may still be difficult to demonstrate domestic species on the basis of isolated specimens alone (Rowley-Conwy 1995).

This table can also be printed from the separate page `table142.html` in LANDSCAPE mode.

Table 142

taxon	element	topsoil	main shell midden	organic rich	shell midden	sandy soil	Total
Bos sp.	mandibular premolar	2					2
	mandibular molar	2	1	1		1	5
	axis		1				1
	navicular cuboid		1				1
	incisor	1	5				6
	isolated teeth		1				1
	maxillary molar		1	1			2
sheep	mandibular deciduous	2					2

	premolar						
	metatarsal	1					1
	pelvis					1	1
	maxillary molar		1				1
	isolated teeth					2	2
sheep or goat	calcaneum		1				1
	isolated teeth	5		1	1	1	8
	maxillary molar		1		1		2
	Total	13	13	3	2	5	36

Table 142: Sand, Possible domestic mammalian taxa recorded (all quantification codes)

In addition to *Bos* sp. specimens, one sheep pelvis was recovered from the sandy soil layer and one sheep metatarsal from the main shell midden. The colour and texture of the specimen from the main shell midden suggests that it was probably intrusive. A few other caprine specimens were also identified from various contexts, including a calcaneum, from the main shell midden (see Table 142, above). Whilst heeding the above, without direct dating it is assumed that these are also likely to be intrusive.

Following the York protocol, mammal elements not identifiable to genera were recorded as either 'large mammal', 'medium mammal 1' or 'medium mammal 2'. The first category was used to describe specimens which could have been red deer, cattle or large wild boar, medium mammal 1 was used for specimens the size of small cervids and wild boar, and medium mammal 2 for taxa such as otter, badger and canids.

3.11.3.1.3 Element representation

From the main shell midden, QC1 elements were recorded for red deer, wild boar, roe deer, dog or wolf, fox, *Bos* sp., sheep and either sheep or goat. From the organic rich silt layer, QC1 elements were recorded for red deer, wild boar and *Bos* sp. (see Table 143, below). Red deer was the most abundant species, followed by wild boar for both contexts. Apart from the relatively few diagnostic elements, as compared to the bird and fish assemblages (see below), the most striking observation regarding the mammal remains from Sand is the number of terminal appendicular elements as opposed to meat bearing bones.

To access a printable version of this table, please go to the separate page table143.html and set to LANDSCAPE mode.

Table 143

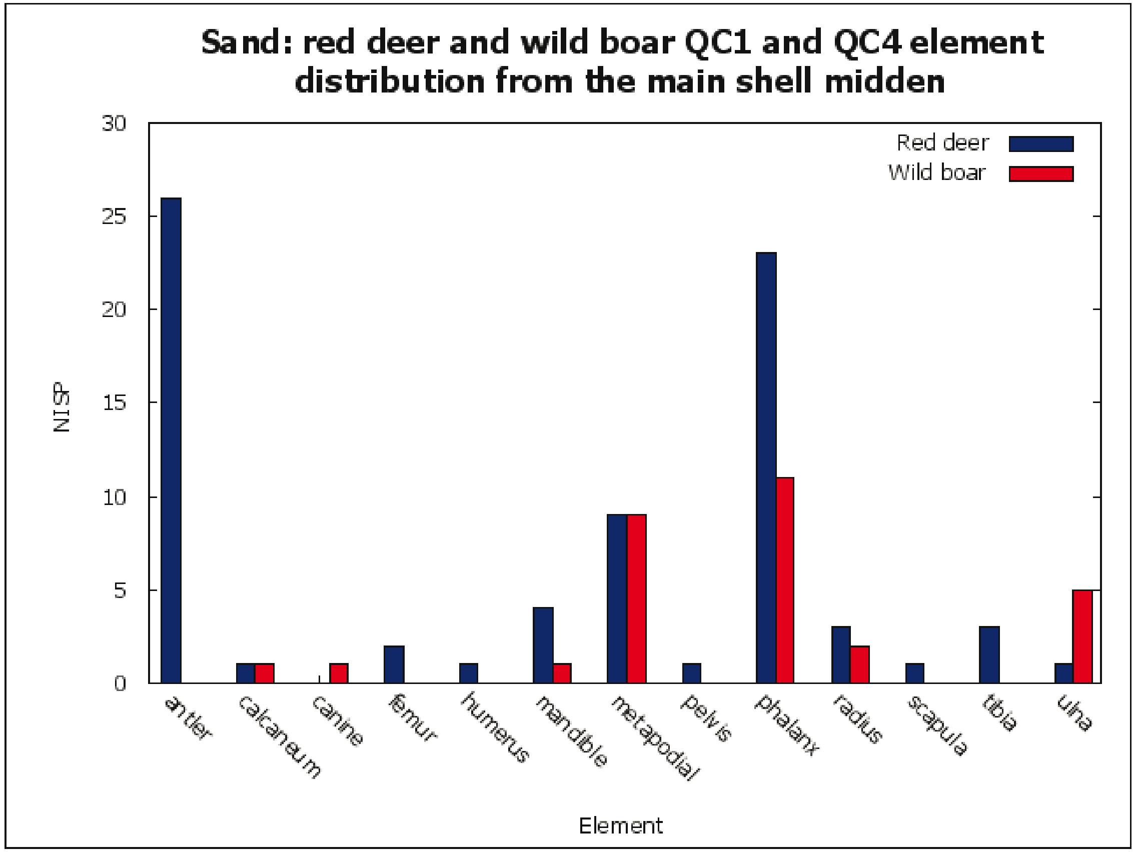
taxon	QC	element	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	unprov	Total
dog or wolf	1	scapula		1						1
		ulna		1						1
fox	1	scapula		1						1
dog family	1	metacarpal	1							1

seal	1	phalanx1	1							1
wild boar	1	astragulus	1							1
		calcaneum	1	1						2
		metacarpal3		1						1
		metacarpal4		1						1
		metapodial	1	5						6
		metatarsal				1				1
		metatarsal3		1						1
		metatarsal4		1						1
		mandible	1	1				1		3
		phalanx1		3						3
		phalanx2	3	6				1		10
		phalanx3	1	2						3
		radius		2						2
		ulna		5						5
	4	canine		1					1	2
red deer	1	astragulus	4			1			1	6
		calcaneum	2	1		1				4
		femur		2						2
		humerus	2	1	1	3				7
		metapodial	2	7		5				14
		metatarsal		2						2
		mandible	6	4		5		1		16
		pelvis		1		1			1	3
		phalanx	2	2						4
		phalanx1	4	9		2	1			16
		phalanx2	2	5		1		1		9
		phalanx3	1	7		1				9
		radius	3	3						6
		radius/ulna	1							1
		scapula		1		1	1			3
		tibia	1	3						4
		ulna		1		1				2
	4	antler	3	26	1	41				71

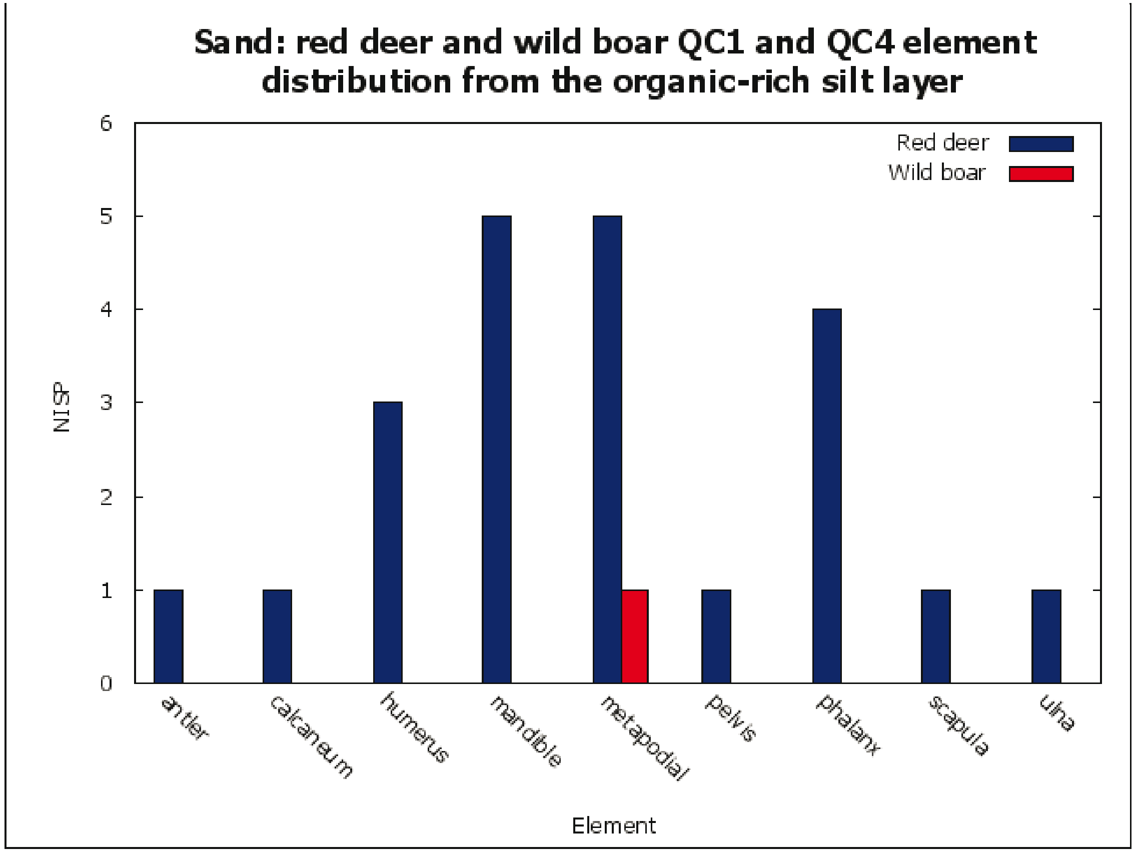
roe deer	1	mandible	1	1						2
		metapodial		2						2
		pelvis		1						1
		scapula		1						1
deer family	1	metacarpal		1						1
		metapodial	1	1						2
		phalanx1	1							1
		radius	1							1
	4	antler	2	8		2				12
Bos sp.	1	mandible	4	1		1		1		7
sheep		mandible	2							2
		metatarsal	1							1
		pelvis						1		1
sheep or goat	1	calcaneum		1						1
large mammal	1	humerus		2						2
		metapodial	5	1		3		1		10
		metatarsal		1						1
		mandible					1			1
		pelvis		1						1
		phalanx	1					2		3
		phalanx3	1							1
		scapula	1	3						4
medium mammal 1	1	astragulus	1							1
		humerus				2				2
		metapodial	2	1						3
		mandible		2						2
		phalanx		3						3
		Total	67	139	2	72	3	9	3	295

Table 143: Sand, Mammal QC1 and QC4 element representation

Illustration 483, (below) shows the QC1 element distribution for red deer and wild boar from the main shell midden context. Both species are best represented by metapodials and phalanges (excluding deer mandibles, where the count is inflated by a number of loose mandibular teeth). This pattern is replicated on a smaller scale in the organic rich silt layer for red deer (see Illustration 484, below). A similar element distribution pattern for red deer and wild boar was observed at the Cnoc Coig shell midden, Oronsay. Here the relative abundance of terminal elements, along with worked bone recovered from the site, was interpreted as possible evidence for hide processing (Grigson & Mellars 1987:252–253). At Sand, given the high degree of fragmentation of the mammal bone, it is unclear if the bias towards terminal elements is the result of this activity (see bone fragmentation below). The robustness and distinctive nature of these elements, even when incomplete, may have inflated their abundance. Skip Charts.



Illus 483: Sand, red deer and wild boar QC1 and QC4 element distribution from the main shell midden



Illus 484: Sand, red deer and wild boar QC1 and QC4 element distribution from the organic-rich silt layer

In addition, 83 antler specimens were recorded from these two contexts – 34 from the main shell midden and 43 from the organic rich silt layer (see Table 144, below). The majority of the antler specimens represent tine ends or small fragments. It is therefore difficult to assess whether the abundance of antler at the site is superficially inflated by fragmentation. Given the otherwise small number of red deer diagnostic elements, three individuals at most could be represented, if the main shell midden is interpreted as one period of deposition. Without antler bases as a means of quantification, it is difficult to speculate, (as Grigson and Mellars were able to argue at Cnoc Coig) whether the antler was removed from a whole carcass (or head) before being brought to the site or removed on site (Grigson & Mellars 1987:252). Shed antler may also have been collected and brought to the site, and in light of the specimen with working and gnawing (see Illustration 482, above), this may account for some of the antler at Sand.

Table 144

Sand context	NISP	unshed	worked?	worked
topsoil	5			
main shell midden	34		2	2
slopewash	1			
organic rich	43	2		1
Total	83	2	2	3

Table 144: Antler recovered from Sand

3.11.3.1.4 Butchery evidence

Fifty-six specimens were recorded as possibly or definitely worked, cut, or deliberately modified in some way (see Table 145, below). Over 60% of these specimens came from the main shell midden. The worked material is covered in the bone tool report (Hardy, Section 3.4). Skip Table.

This table can also be printed from the separate page `table145.html` in LANDSCAPE mode.

Table 145

bone id	taxon	element	modification	notes
mammal				
topsoil				
SFS4-148	unidentified	unidentified	cut	series fine parallel cut marks along length of frag
SFS4-147	unidentified	unidentified	cut & worked	fine irregular cut marks & striations visible at rounded end
SFS4-19	unidentified	unidentified	worked	bevel-ended
SFS4-2065	wild boar	calcaneum	cut?	possible small parallel cuts above distal end
SFS4-15726	unidentified	unidentified	worked?	possible flaking of end of fragment
SFS4-166	unidentified	unidentified	worked?	possible rounded end
SFS4-4	unidentified	unidentified	worked	bevel-ended
SFS4-3614	unidentified	unidentified	cut	three cut marks
SFS4-22	unidentified	unidentified	worked	bevel-ended
SFS4-3268	unidentified	shaft	cut	small medio-lateral cut mark across shaft
SFS4-3257	unidentified	unidentified	cut	
SFS4-203	unidentified	unidentified	worked?	possible striations & slight bevelling at one end of frag
				Total 12
main shell midden				
SFS4-6	unidentified	unidentified	cut & worked	rounded at both ends, shallow cut marks on one side
SFS4-393	large mammal	metapodial	worked	bevelling at one end, working to point at other

SFS4-149	unidentified	unidentified	worked?	slightly abraded at tip
SFS4-6993	Bos sp.	axis	cut	metal cut mark on condyle and chop
SFS4-3193	large mammal	shaft	worked	rounded at end
SFS4-13877	unidentified	shaft	cut	2 parallel cut marks
SFS4-574	unidentified	unidentified	worked?	possible working
SFS4-418	unidentified	unidentified	worked?	bevel-ended but striations ambiguous
SFS4-193	unidentified	unidentified	worked	rounded end
SFS4-16	red deer	antler	worked?	some abrasion but unclear if from human use
SFS4-394	unidentified	shaft	worked	bevel-ended
SFS4-3188	large mammal	shaft	worked	bevel-ended
SFS4-3172	red deer	antler	worked	evidence of use at end of tine – shine & abrasion
SFS4-25	unidentified	unidentified	worked	bevel-ended both ends
SFS4-3189	large mammal	shaft	worked	roughly bevel-ended, looks worked as for lithic
SFS4-3190	large mammal	shaft	worked?	possibly broken to point
SFS4-20	red deer	metatarsal	cut	series fine medio-lateral cut marks at proximal end
SFS4-379	red deer	phalanx 2	cut	small but clear dorsal-ventral cut mark at proximal end
SFS4-1884	red deer	antler	worked	tips of antler worked and also at base
SFS4-3179	unidentified	unidentified	cut	
SFS4-151	unidentified	unidentified	cut	cut across length of frag
SFS4-23	large mammal	scapula	cut	
SFS4-23	large mammal	scapula	cut	fine cut marks over curve of blade edge
SFS4-7	red deer	radius	chop?	chop/split towards proximal epiphysis on posterior side
SFS4-3185	large mammal	shaft	worked	bevel-ended
SFS4-	large mammal	shaft	worked	bevel-ended

3194				
SFS4-3186	large mammal	shaft	worked	bevel-ended
SFS4-400	unidentified	unidentified	worked	bevelled at both ends
SFS4-13879	unidentified	unidentified	cut	6 parallel cut marks
SFS4-15	unidentified	unidentified	worked	bevel-ended, striations visible
SFS4-14	red deer	antler	worked?	abrasion at tine tip possibly from use
SFS4-13	unidentified	unidentified	worked	rounded abraded end
SFS4-12	red deer	metapodial	chop?	
SFS4-3538	red deer	pelvis	cut	3 fine cut marks across ventral surface, zone 5
SFS4-573	unidentified	unidentified	worked	small frag worked to cylindrical shape and point
organic rich				
SFS4-401	red deer	antler	worked	bevel-ended
SFS4-399	unidentified	unidentified	worked	bevel-ended
SFS4-3250	red deer	phalanx 3	cut?	possible dorsal-ventral cut mark/carnivore gnaw on medial side, zone 1
shell midden				
SFS4-3763	unidentified	unidentified	worked	bevel-ended
sandy soil				
SFS4-3764	unidentified	unidentified	worked?	high degree of polish but unclear if worked
SFS4-3191	large mammal	metapodial	worked	roughly bevel-ended, looks worked as for lithic
SFS4-3221	unidentified	shaft	worked	bevel-ended
SFS4-3213	unidentified	shaft	worked	bevel-ended
unprov				
SFS4-6969	unidentified	rib	cut	deep cut mark towards articular end of rib
				Total 56
bird				

topsoil				
SFS4-4120	razorbill or guillemot	humerus	cut	medio-lateral cut mark below proximal head, fine scratches visible over entire shaft
main shell midden				
SFS4-5052	razorbill or guillemot	humerus	cut	medio-lateral cut mark c.2 mm on medial surface of shaft & 2 parallel cut marks on head
SFS4-4282	razorbill or guillemot	ulna	cut	4 very fine, sporadic cut marks, approx medio-laterally, along shaft
slopewash				
SFS4-4328	razorbill or guillemot	humerus	cut?	possible cut mark below crista lateralis of proximal head
				Total 4
fish				
main shell midden				
SFS4-6028	ballan wrasse	caudal vertebra	cut?	
				Total 1

Table 145: Sand, Butchery evidence (all classes of bone); Back to Section 3.11.3.3.3; Back to Section 3.11.3.4.3

Unambiguous cut marks were relatively rare. The identified specimens from the main shell midden produced clear, fine cut marks on a red deer pelvis, scapula, 2nd phalanx, and metatarsal. In the organic rich silt layer, a cut mark was noted on the 3rd phalanx of a red deer. Some of these cut marks are consistent with skinning (for example phalanges), whereas others are more likely to derive from dismembering carcases (for example pelvis, scapula). No cut marks were noted on the potential fur-bearing species (wolf or dog, fox, otter and badger) which are rare in the assemblage overall. There is thus no evidence for large-scale fur exploitation at Sand (Trolle-Lassen 1987).

With regard to the identification of the tools used in working bone, all cut marks, with one exception, show u-shaped profiles consistent with working with stone tools. On one example, an axis of *Bos* sp., the cut mark has a v-shaped profile indicating use of a metal blade.

3.11.3.1.5 Age at death and seasonality

The age at death and seasonality evidence based on the mammal remains is disappointing. Adult specimens were recorded from the main shell midden and organic rich silt layer. A small number of specimens were juvenile or immature specimens, based on juvenile cortex and unfused epiphyses. The majority of these were red deer and wild boar appendicular elements from the main shell midden (see Table 146, below). Unfortunately, the lack of complete mandibles prevents consideration of tooth eruption and wear. The antler specimens also provide little seasonality evidence. No shed antler bases were recovered from either context, and two unshed antler bases from the organic rich layer only exclude a spring death for these animal(s).

This table can also be printed from the separate page table146.html in LANDSCAPE mode.

Table 146

context	taxon	element	juvenile cortex	proximal epiphysis	distal epiphysis
topsoil	dog family	metacarpal			unfused
	wild boar	astragulus			
		calcaneum	yes	unfused	unfused
		metapodial	yes		unfused
	red deer	astragulus	yes		
		humerus		unfused	
			yes		unfused
		radius			unfused
			yes		unfused
	deer family	metapodial			unfused
		radius	yes	unfused	
	sheep	metapodial			unfused
	large mammal	metapodial			unfused
			yes		unfused
		metapodial	yes		unfused
			Total 15		
main shell midden	wild boar	calcaneum	yes	unfused	unfused
		metapodial		unfused	
				unfused	
				unfused	
				unfused	
			yes		unfused
		phalanx 1		fusing	
		phalanx 2	yes	unfused	
					fusing
					unfused
		radius			unfused
			yes	unfused	
		ulna			unfused
					unfused
				unfused	
				unfused	
	red deer	metatarsal			unfused
		phalanx		unfused	
		tibia	yes		unfused

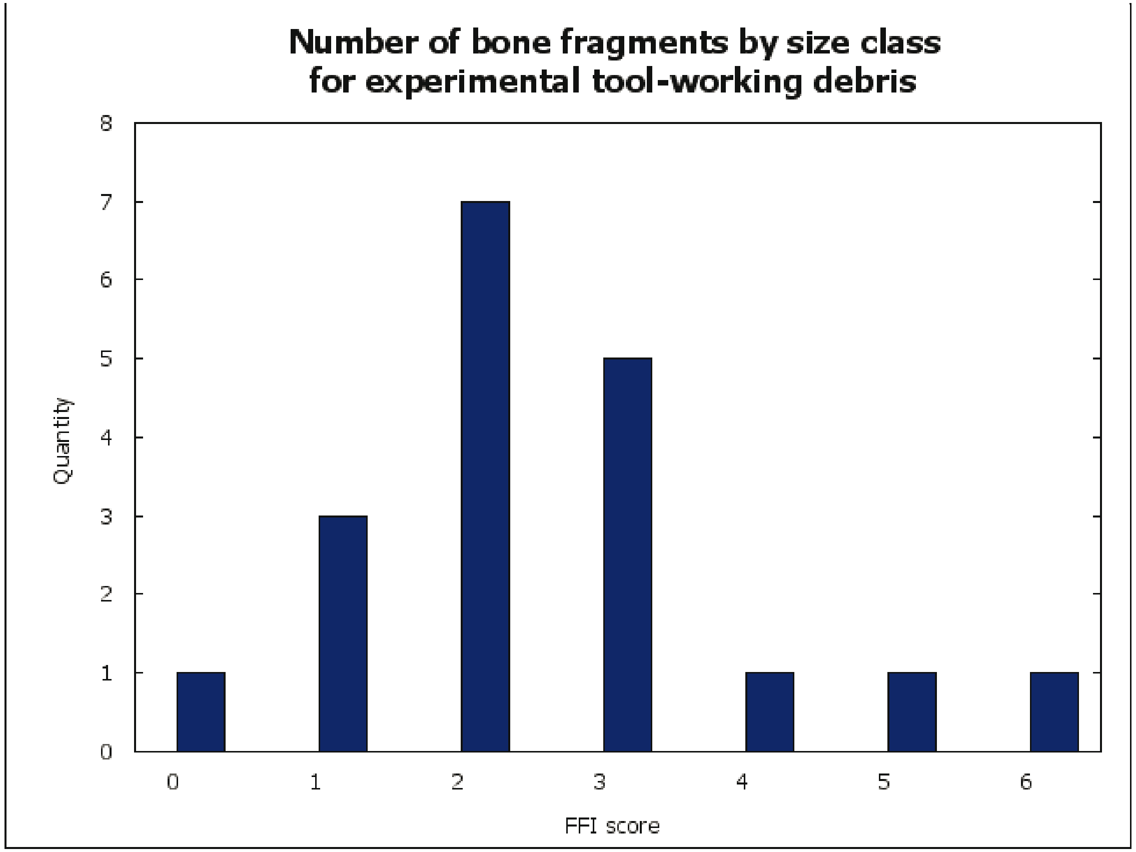
		ulna		unfused	
		femur	yes		
		radius	yes		unfused
	roe deer	metapodial			unfused
	medium mammal 2	phalanx	yes		
		Total 24			

Table 146: Sand, Juvenile mammal specimens

3.11.3.1.6 Bone fragmentation

At Sand it is unclear whether the high fragmentation of the mammal bone is the result of deliberate cultural activity or of post-depositional factors such as trampling. Several bone tools were recovered from the site (Hardy, Section 3.4) and the processing of bone for this purpose is considered below. Another possibility for the high degree of fragmentation is the exploitation of bone marrow and grease. Recently, Outram has advocated a new methodology for the assessment of bone marrow or grease extraction by applying a fracture freshness index (FFI) to shaft fragments and recording the number of cancellous and cortical bone fragments (Outram 2001, 2002, 2003). The FFI score is based on three criteria; fracture angle, fracture outline, and surface texture. When bone is fractured in a fresh state a characteristic helical fracture is produced. A shaft fragment can score between , indicating a smooth helical break on fresh bone, and 6 when the shaft has a rough surface texture and no helical break. If fragmentation for marrow extraction has taken place, a high proportion of shaft fragments with low FFI scores would be expected (Outram 2002).

As noted above, given the bone tools recovered from the site it is possible that some of the fragmentation at Sand is due to tool manufacture. Experimental tool manufacture by Birch (2003 and Section 3.4) found fresh bone was difficult to work with. Two year old bone was initially difficult to break into a uniform shape, but was easier to work when shaping a tool. Outram's FFI was applied to the debris from Birch's experimental tool manufacture on two year old red deer metapodia to assess the type of fracture produced. Illustration 485, (below) shows the FFI scores for the 19 tool manufacture shaft fragments, based on the waste from 12 tools. FFI scores of 2 and 3 were predominant and despite the bone not being fresh, helical fractures were present on many fragments.



Illus 485: Number of bone fragments by size class for experimental tool-working debris

As Outram's method is not standard zooarchaeological practice, it was not applied during initial analysis. However, the greater than 4mm mammal bone from the main shell midden context in B25A and B25B has now been re-assessed using the FFI. Outram's methodology to assess the degree of bone fragmentation relies on the survival of a reasonable number of shaft fragments over 30mm in length. Table 147, (below) not only demonstrates how fragmented the bone from Sand is, but also how few fragments (15%) were over 30mm. Over 70% of fragments were from cortical bone, very few whole or part bones (as defined in Outram 2001) were recorded, and no points of impact were observed. A bias towards cortical bone would be expected, as this is the predominant type of bone in the skeleton. Forty-nine shaft fragments were recorded, 19 of which had helical fractures (see Table 148, below). This paucity of shaft fragments makes meaningful analysis of the FFI scores problematic. Some helical fractures were recorded, and a range of scores was represented, suggesting that bone was broken in both a fresh and dry state.

To access a printable version of this table, please go to the separate page table147.html and set to LANDSCAPE mode.

Table 147

bone type	<20mm	20–29mm	30–39mm	40–49mm	50–59mm	60–69mm	70–79mm	80–89mm	90–99mm	100+mm	total
cortical bone											
shaft		23	12	25	10	2	2	2	3		79

other cortical	4286	427	85	24	12	2	2			1	4839
cortical subtotal											4918
cancellous bone											
appendicular cancellous	11	21	18	5	12	2	1	2	1		73
axial cancellous	2	9	12	5	5	1	1				35
rib	7	24	18	9	7	7	3	1	1		77
other cancellous	1326	99	30	1	1	2					1459
cancellous subtotal											1644
cranial fragments	3	3	7	3	1	3	1	1			22
unidentified & antler	4	10		1						1	16
Total	5639	616	182	73	48	19	10	6	5	2	6600

Table 147: Sand, Fracture freshness index fragments by size class and type

Table 148

FFI score	shaft with helical fracture	Total
0	1	1
1	7	10
2	3	8
3	5	5
4	3	7
5		10
6		7
Total	19	48

Table 148: Sand, Main shell midden fracture freshness index scores. Fracture freshness scores only given to fragments greater than 30mm (Outram 2002)

The cause of fractured bone from archaeological sites has long been debated, particularly with reference to the deliberate breaking by early hominids (as discussed in Lyman 1994:Chapter 8). As noted above, a helical break is typically formed when fresh bone is broken (although such breaks were also made during work on the two year old bone). However, a range of taphonomic processes can create such fractures, including trampling, carnivore gnawing and the dropping of a carcass from a distance (Lyman 1994:324). Due to the small number of shaft fragments from Sand it is difficult to assess whether the fragmentation is due to a specific cultural or post-depositional process based solely on the fracture fragmentation index. Bone marrow extraction remains a possibility, and, given the bone tools from the site, some fragmentation from tool manufacture is also plausible. Indeed, there is no reason why fragmentation for marrow extraction and tool manufacture could not have taken place together. However, in light of the small number of shaft fragments and large number of small fragments of bone it is impossible to favour cultural over taphonomic processes.

3.11.3.2 Small mammal and amphibian bone

A small number (179 diagnostic elements) of small mammal and amphibian remains were recorded, the majority from the topsoil and main shell midden (see Tables 149 & 150, below). These figures have not been included in the above discussion. Shrew, vole and mouse species were represented by mostly mandibles, a nominal amount of frog elements were also present (see Table 151, below). Bank vole, common shrew and wood or yellow-necked mouse were among the identified species. The bank vole is a woodland species (Corbet & Harris 1991) and is unlikely to post-date clearance and peat advancement in the area. Given the unconsolidated matrix of the midden and the burrowing activity or use of burrows by many of these species, it is highly likely that the small mammal and amphibian remains are intrusive, and they are, therefore, not discussed in greater detail. Skip Tables.

This table can also be printed from the separate page table149.html in LANDSCAPE mode.

Table 149

taxon	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	Total
common shrew	2	2					4
pygmy shrew	2						2
shrew sp.	2						2
bank vole	4	3				1	8
field vole	1						1
vole sp.		2				1	3
wood mouse		4					4
wood mouse?		2			1		3
wood or yellow-necked mouse	4	5					9
mouse sp.		1					1
vole or mouse	3	3					6
small mammal	1	4			1		6
common frog		2					2
unidentified	15	76	1	9	4	23	128
QC1 Subtotal	19	28			2	2	51
Grand Total	34	104	1	9	6	25	179

Table 149: Sand, Number of identified small mammal and amphibian specimens

This table can also be printed from the separate page table150.html in LANDSCAPE mode.

taxon	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	Total
common shrew	0.018	0.01					0.019
pygmy shrew	0.011						0.011
shrew sp.	0.012						0.012
bank vole	0.114	0.073				0.047	0.234
field vole	0.063						0.063
vole sp.		0.028				0.015	0.043
wood mouse		0.047					0.047
wood mouse?		0.038			0.026		0.064
wood or yellow-necked mouse	0.075	0.089					0.164
mouse sp.		0.006					0.006
vole or mouse	0.035	0.039					0.074
small mammal	0.015	12.041			0.025		12.081
common frog		0.047					0.047
unidentified	0.009	0.623	0.009	0.142	0.018	0.221	1.022
QC1 Subtotal	0.343	12.409			0.051	0.062	12.865
Grand Total	0.352	13.032	0.009	0.142	0.069	0.283	13.887

Table 150: Sand, Weight of identified small mammal and amphibian specimens

This table can also be printed from the separate page table151.html in LANDSCAPE mode.

Table 151

taxon	element	topsoil	main shell midden	shell midden	sandy soil	Total
common shrew	mandible	2				2
	pelvis		1			1
	tibia		1			1
pygmy shrew	humerus	1				1
	mandible	1				1
shrew sp.	mandible	2				2
bank vole	mandible	3	3		1	7
	ulna	1				1
field vole	mandible	1				1

vole sp.	mandible		2		1	3
wood mouse	femur		2			2
	pelvis		1			1
	ulna		1			1
wood mouse?	femur		2			2
	mandible			1		1
wood or yellow-necked mouse	humerus	1				1
	mandible	1	4			5
	pelvis	1				1
	tibia	1	1			2
mouse sp.	mandible		1			1
vole / mouse	femur		1			1
	humerus	2				2
	pelvis		1			1
	tibia	1	1			2
small mammal	femur		2	1		3
	metapodial		1			1
	mandible	1				1
	tibia		1			1
common frog	radio/ulna		2			2
	Grand Total	19	28	2	2	51

Table 151: Sand, Small mammal and amphibian QC1 element representation

3.11.3.3 Bird bone

3.11.3.3.1 Preservation

A total of 16,341 bird bones weighing 2,263.05g was recovered from the site (see Tables 152 & 153, below). A subset of 1,290 diagnostic (QC1) elements, mainly from the topsoil, main shell midden and organic rich silt layer was analysed in detail. Based on the surface texture of the QC1 elements, the preservation of the bird bone from the main shell midden is predominantly good (see Table 154, below). From the organic rich layer the majority of the elements have a fair surface texture. Table 155, (below) shows that approximately half of the 806 specimens from the main shell midden were 21–40% complete. The remaining elements were mostly between –20% and 41–60% complete. The majority of specimens from the much smaller subset of 88 QC1 elements from the organic rich layer were also 21–40% complete. The bird element completeness is slightly more variable than the mammal bone, discussed above, but overall there seems to be a similar level of fragmentation of QC1 elements. Skip Tables.

To access a printable version of this table, please go to the separate page `table152.html` and set to LANDSCAPE mode.

Table 152

taxon	topsoil	main shell	palaeo	slopewash	organic	shell	sandy	natural	unprov	Total

		midden			rich	midden	soil			
shag or cormorant	1	6								7
razorbill	2	16			1					19
guillemot	18	58		1	2					79
razorbill or guillemot	241	645		35	69	10	19	2	3	1024
little auk		1								1
puffin?	2									2
great auk	4	5			1	1				11
auk family	39	76		2	15	6	6			144
thrush and chat family		3								3
unidentified	3608	7953	8	549	2375	206	325	9	18	15051
auk family Subtotal	306	801	0	38	88	17	25	2	3	1280
QC1 Subtotal	307	810	0	38	88	17	25	2	3	1290
Grand Total	3915	8763	8	587	2463	223	350	11	21	16341

Table 152: Sand, Number of identified bird specimens by context; Back to Section 3.11.3.3.2

To access a printable version of this table, please go to the separate page table153.html and set to LANDSCAPE mode.

Table 153

taxon	topsoil	main shell midden	palaeo	slopewash	organic rich	shell midden	sandy soil	natural	unprov	Total
shag or cormorant	1.44	12.12								13.56
razorbill	2.56	10.35			1.04					13.95
guillemot	15.16	50.44		0.58	0.69					66.87
razorbill or guillemot	84.15	249.29		12.07	28.37	4.56	9.04	0.50	3.94	391.92
little auk		0.34								0.34
puffin?	0.28									0.28

great auk	5.65	10.23			2.30	1.08				19.26
auk family	12.26	27.83		0.32	6.24	1.35	1.67			49.67
thrush and chat family		0.34								0.34
unidentified	454.83	820.08	0.35	61.59	286.27	31.22	49.82	0.94	1.76	1706.86
auk family Subtotal	120.06	348.48	0	12.97	38.64	6.99	10.71	0.50	3.94	542.29
QC1 Subtotal	121.50	360.94	0	12.97	38.64	6.99	10.71	0.50	3.94	556.19
Grand Total	576.33	1181.60	0.35	74.56	324.91	38.21	60.53	1.44	5.70	2263.05

Table 153: Sand, Weight of identified bird specimens

To access a printable version of this table, please go to the separate page table154.html and set to LANDSCAPE mode.

Table 154

texture	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	natural	unprov	Total
excellent	1	8			1				10
good	207	596	4	21	2	4		3	837
fair	97	193	34	65	13	19	2		423
poor	1	7		2	1	2			13
Grand Total	306	804	38	88	17	25	2	3	1283

Table 154: Sand, Surface texture of bird QC1 elements. Assessment of surface texture based on the following criteria (Harland *et al* 2003):
Excellent – majority of surface fresh or even slightly glossy; very localised flaky or powdery patches;
Good – lacks fresh appearance but solid; very localised flaky or powdery patches;
Fair – surface solid in places, but flaky or powdery on up to 49% of specimen;
Poor – surface flaky or powdery over >50% of specimen

To access a printable version of this table, please go to the separate page table155.html and set to LANDSCAPE mode.

Table 155

element completeness	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	natural	unprov	Total
0–20%	64	112	10	10	1	4			201
21–40%	167	414	21	52	9	16	2	2	683

41–60%	56	189	7	21	5	2			280
61–80%	12	53		3		3			71
81–100%	7	38		2	2			1	50
Grand Total	306	806	38	88	17	25	2	3	1285

Table 155: Sand, Element completeness of bird QC1 elements

Fewer than 2% of the bird bones from the site were burnt, the majority of which were charred black rather than calcined white. Very few specimens were modified by gnawing or root etching (see Table 156, below).

This table can also be printed from the separate page `table156.html` in LANDSCAPE mode.

Table 156

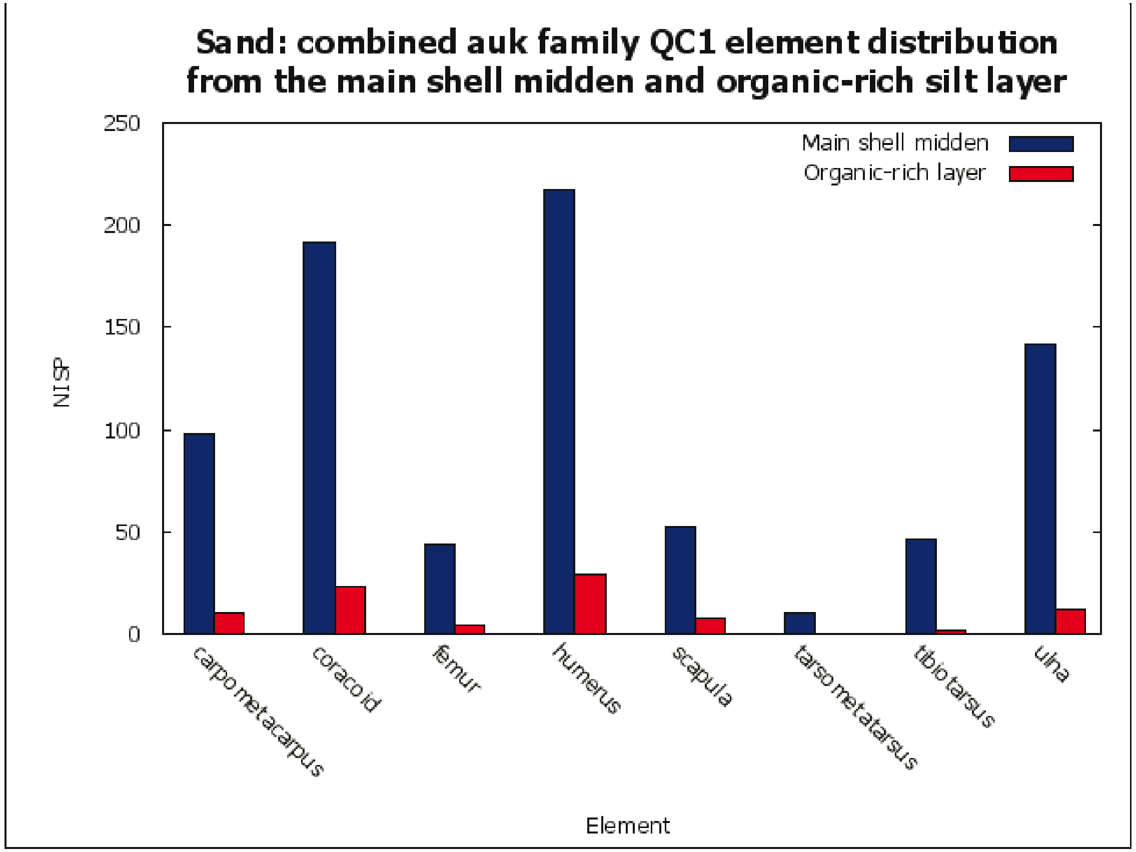
modification	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	Total
carnivore gnawing		1		1			2
rodent gnawing	1						1
root etching		10					10
calcined	1	3		1		1	6
charred	92	85	1	22	4	57	261
Burning Total	93	88	1	23	4	58	267

Table 156: Sand, Modified bird bone (all specimens) by context

3.11.3.3.2 Taxonomic abundance

The bird bone assemblage from all contexts at the site is made up almost exclusively of seabirds (see Table 152, above), in particular species belonging to the auk family (*Alcidae*). Guillemot and razorbill dominated the assemblage which also included rare specimens of other alcids, including the now extinct great auk. Guillemots and razorbills have a very similar skeletal morphology and for this reason distinction beyond the razorbill or guillemot identification was only possible on a limited range of elements. Guillemots are slightly bigger than razorbills but the two species do show some overlap in size, so this criterion alone is not reliable (Cramp 1985:170). Distinction was regularly possible between the two species on well-preserved distal humerii. Shag and cormorant present a similar identification problem. The cormorant is the larger of the two, but they are very similar osteologically. A small number of QC1 elements of either shag or cormorant were recorded from the main shell midden (six specimens) and topsoil (one specimen). Three thrush and chat family QC1 specimens from the main shell midden represent the only terrestrial species from the site.

3.11.3.3.3 Element representation and butchery evidence



Illus 486: Sand, combined auk family QC1 element distribution from the main shell midden and organic-rich silt

Table 157, (below) shows the element distribution of QC1 specimens. The assemblages from the main shell midden and organic rich silt are large enough to discuss in detail. Illustration 486, (above) shows the combined *alcid* (auk family) QC1 element distribution for these contexts. In the main shell midden all QC1 elements are represented, but there is a bias towards the pectoral region and wing elements. In the organic rich silt all QC1 elements apart from the tarsometatarsus are represented. The most abundant elements from this context are the coracoid and humerus, and the bias towards the pectoral and wing regions seems to be repeated. Given the robust and distinctive nature of both wing and leg elements in alcids, this does not seem to be a preservational bias. Skip Table.

To access a printable version of this table, please go to the separate page `table157.html` and set to LANDSCAPE mode.

Table 157

taxon	element	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	natural	unprov	Total
shag or	coracoid	1	3							4

cormorant	femur		2							2
	humerus		1							1
razorbill	coracoid		5							5
	humerus	2	11		1					14
guillemot	carpometacarpus	1	8							9
	coracoid	1	6							7
	femur		1							1
	humerus	15	39	1	2					57
	scapula		1							1
	tarsometatarsus		1							1
	ulna	1	2							3
razorbill or guillemot	carpometacarpus	33	88	5	10	3	4	1		144
	coracoid	71	159	15	17	3	3		1	269
	femur	20	34	1	4					59
	humerus	45	137	8	19	1	3			213
	scapula	16	46		7		5			74
	tarsometatarsus		6							6
	tibiotarsus	13	41		2	1	3		1	61
	ulna	43	134	6	10	2	1	1	1	198
little auk	tarsometatarsus		1							1
puffin?	coracoid	1								1
	humerus	1								1
great auk	carpometacarpus	1								1
	coracoid	2				1				3
	humerus	1	3		1					5
	scapula		1							1
	ulna		1							1
auk family	carpometacarpus	6	2	1			1			10
	coracoid	4	22	1	6	1	3			37
	femur	2	9							11
	humerus	17	27		6		1			51
	scapula	5	4		1	1	1			12
	tarsometatarsus	2	2			1				5
	tibiotarsus	2	5			3				10
	ulna	1	5		2					8
thrush and chat family	coracoid		1							1
	humerus		2							2

Grand Total	307	810	38	88	17	25	2	3	1290

Table 157: Sand, Bird QC1 element representation

Very few cut marks were recorded on the bird bone. There were four in total, two of which were on specimens from the main shell midden (see Table 145, above). All the cut marks are very similar – a series of short parallel cuts below or on the head of the proximal end of the humerus, consistent with wing removal. As highlighted by ethnographic evidence from Greenland and Scotland, auks provide many potential resources, including meat, marrow, skins and feathers (as discussed in Baldwin 1974:95–97; Gotfredson 1997:280; Serjeantson 1997:257).

3.11.3.3.4 Seasonality

A total of 15 juvenile QC1 elements, based on the surface texture consistent with immature bones, was recorded. Ten of these specimens, all alcids, came from the main shell midden context (see Table 158, below).

This table can also be printed from the separate page `table158.html` in LANDSCAPE mode.

Table 158

taxon	element	topsoil	main shell midden	organic rich	Total
razorbill or guillemot	carpometacarpus		1		1
	coracoid		2		2
	humerus		1		1
	ulna	1			1
auk family	coracoid		2		2
	femur		1		1
	humerus	2	3	1	6
	scapula	1			1
	Grand Total	4	10	1	15

Table 158: Sand, Juvenile bird specimens

Auks are diving seabirds and spend much of their time outside the breeding season at sea (Cramp 1985). As Serjeantson (1988:24), has highlighted this means that there is a restricted period of time when they and their young are on land and easily available for capture. Auks generally breed in May and June (Cramp 1985), and razorbills and guillemots brood for 34 days (Serjeantson 1988:24). The two species often form colonies together and prefer steep, rocky, sea-facing cliffs (Cramp 1985:171–178). If the birds were captured during the breeding season this suggests that the site was in use in late spring or early summer. There is, however, another period in the late summer and autumn, when the adult and young birds would be vulnerable to predation (Serjeantson 2001:44). Between late July and November adult auks have a complete moult at sea after breeding. The birds are flightless for 45–50 days from late July to September, until their primary feathers grow back (Cramp 1985:171–198). Rafts of flightless, moulting birds are seen in Loch Snizort and the Inner Sound during August and September (Yoxon & Yoxon 1990:27, Steven Birch *pers comm*). This represents a different type of hunting opportunity than the breeding season. Serjeantson (2001:44), (with specific reference to the great auk) suggests that birds could be taken from the water at that time using boats, possible methods of capture include the use of nets and hooks (Baldwin 1974:68).

If the assumption is made that the behaviour of razorbills and guillemots was similar when Sand was in use, both types and seasons of capture could have been exploited. The small number of juvenile bones recorded from the site may be more consistent with the late summer and autumn moult than with the breeding season in late spring and early summer. However, adult birds were also targeted at breeding sites in recent centuries (Serjeantson 2001).

3.11.3.4 Fish bone

3.11.3.4.1 Preservation

A total of 53,697 fish bones weighing 1,007.37g was recovered from the site (see Tables 159 & 160, below). As with the mammal and bird bones, this figure masks the much smaller number of 14, 954 identified specimens. Based on the surface texture of the QC1 elements, preservation of the fish remains from all contexts was generally good to fair (see Table 161, below). The completeness of these same elements was more variable, with completeness ranging from −20% to 81−100% complete in both contexts Table 162, below). Compared to the mammal and bird bone (see above), a greater proportion of the fish bone QC1 elements from the main shell midden were 81−100% complete. Less than 2% of the fish was burnt, most of which was charred black rather than calcined white (see Table 163, below). Six specimens, four from the topsoil and two from the main shell midden showed evidence of crushing whilst the bone was fresh. An additional specimen from the main shell midden was acid etched, both these modifications are consistent with mastication (Jones 1991). Crushed specimens are also found in otter spraint, but in light of the burnt material and lack of concretions on the bones, typically associated with otter spraint (Nicholson 2000) this can be discounted at Sand. Skip Tables.

To access a printable version of this table, please go to the separate page table159.html and set to LANDSCAPE mode.

Table 159

taxon	topsoil	main shell midden	palaeo	slopewash	organic rich	shell midden	sandy soil	natural	unprov	Total
tope		1								1
dogfish families	1	12								13
ray family	4	1				1				6
elasmobranch	1	3								4
herring	73	87		1	11	9	8		10	199
eel	3	10					1			14
conger eel	1									1
salmon family	1						3			4
rockling sp.	2	1								3
saithe	186	275		6	2	9	23		8	509
pollack	39	101			1	3				144
saithe or pollack	710	1487	1	12	22	44	21		26	2323
cod	26	99		3	1	1	6			136
cod, saithe or pollack	397	1309		13	17	9	35		6	1786
haddock	4	3			1					8

whiting	4	3			1					8
poor cod		3								3
Norway pout, bib or poor cod	5	1		1		1				8
cod family	616	993	1	36	137	37	83		8	1911
gurnard family	2									2
sea scorpion family		3								3
Atlantic horse mackerel	2	15								17
seabream family		1								1
seabream family?							1			1
corkwing wrasse	29	48		1	2	1	1		3	85
goldsinny	1	1								2
corkwing wrasse or goldsinny	29	37				2	10			78
ballan wrasse	110	246		1	15	20	11		2	405
cuckoo wrasse	2	16								18
ballan or cuckoo wrasse	741	808		29	36	50	125	1	8	1798
wrasse family	817	3922		8	286	66	93	1	38	5231
eelpout									1	1
butterfish		17		1						18
sandeel family	1	4								5
Atlantic mackerel	23	159			7	1	5		4	199
perch order	1									1
plaice						1				1
plaice family	1	4					1			6
flatfish order		1								1
unidentified fish	8835	24356	3	314	2913	738	1331	2	250	38742
cod family Subtotal	1989	4275	2	71	182	104	168	48	0	6839
wrasse family Subtotal	1729	5157		39	339	139	240	2	51	7696
identified fish Subtotal	3832	9671	2	112	539	255	427	2	114	14954
Total Fish	12667	34027	5	426	3452	993	1758	4	364	53696

Table 159: Sand, Number of identified fish specimens by context

To access a printable version of this table, please go to the separate page table160.html and set to LANDSCAPE mode.

Table 160

taxon	topsoil	main shell midden	palaeo	slopewash	organic rich	shell midden	sandy soil	natural	unprov	Total
blackmouthed dogfish		0.02								0.02
dogfish families	0.042	0.284								0.326
ray family	0.299	0.02				0.043				0.362
elasmobranch	0.119	0.116								0.235
eel	0.028	0.064					0.016			0.108
conger eel	0.023									0.023
herring	0.694	0.873		0.005	0.052	0.073	0.074		0.07	1.841
salmon family	0.04						0.079			0.119
rockling sp.	0.019	0.003								0.022
saithe	4.744	5.251		0.136	0.027	0.183	0.25		0.19	10.781
pollack	2.192	10.72			0.09	0.422				13.424
saithe or pollack	27.79	48.305	0.023	0.582	0.619	1.267	0.567		1.398	80.551
cod	1.872	4.251		0.37	0.02	0.088	0.187			6.788
cod, saithe or pollack	10.612	31.246		0.66	0.421	0.211	0.457		0.068	43.675
haddock	0.23	0.332			0.09					0.652
whiting	0.115	0.04			0.01					0.165
poor cod		0.349								0.349
Norway pout, bib or poor cod	0.11	0.024		0.016		0.122				0.272
cod family	14.511	32.78	0.01	0.923	5.069	0.638	1.182		0.663	55.776
gurnard family	0.157									0.157
sea scorpion family		0.026								0.026
Atlantic horse mackerel	0.412	1.283								1.695
seabream family		0.18								0.18
seabream family?							0.114			0.114
corkwing wrasse	0.775	1.94		0.024	0.167	0.04	0.011		0.384	3.341
goldsinny	0.03	0.017								0.047

corkwing wrasse or goldsinny	0.313	0.404				0.02	0.074			0.811
ballan wrasse	7.313	17.46		0.032	1.383	0.993	1.081		0.197	28.459
cuckoo wrasse	0.066	0.553								0.619
ballan or cuckoo wrasse	23.67	22.826		1.1	1.185	2.427	4.328	0.08	0.19	55.806
wrasse family	20.071	128.59		0.182	8.667	1.623	2.154	0.025	1.234	162.546
eelpout									0.006	0.006
butterfish		0.065		0.002						0.067
sandeel family	0.012	0.033								0.045
Atlantic mackerel	0.948	8.155			0.33	0.02	0.14		0.101	9.694
perch order	0.082									0.082
plaice						0.01				0.01
plaice family	0.023	0.08					0.01			0.113
flatfish order		0.01								0.01
unidentified fish	130.994	321.803	0.029	4.068	41.786	10.446	15.086	0.022	3.819	528.053
wrasse family Subtotal	52.238	174.28	0	1.338	11.402	5.103	7.648	0.105	2.005	254.119
cod family Subtotal	62.195	133.301	0.033	2.687	6.346	2.931	2.643	2.319	0	212.46
identified fish Subtotal	117.312	316.3	0.033	4.032	18.13	8.18	10.724	0.105	4.501	479.317
Grand Total	248.306	638.103	0.062	8.1	59.916	18.626	25.81	0.127	8.32	1007.37

Table 160: Sand, Weight of fish specimens by context

This table can also be printed from the separate page table161.html in LANDSCAPE mode.

Table 161

texture	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	unprov	Total
excellent	22	20		1	1	5		49
good	141	535	1	20	9	17	2	725
fair	111	352	2	25	16	16	3	525
poor	21	49	2	10	3	1		86
Grand Total	295	956	5	56	29	39	5	1385

Table 161: Sand, Surface texture of fish QC1 elements. Assessment of surface texture based on the following criteria (Harland *et al* 2003):

Excellent – majority of surface fresh or even slightly glossy; very localised flaky or powdery patches
Good – lacks fresh appearance but solid; very localised flaky or powdery patches
Fair – surface solid in places, but flaky or powdery on up to 49% of specimen
Poor – surface flaky or powdery over >50% of specimen

To access a printable version of this table, please go to the separate page table162.html and set to LANDSCAPE mode.

Table 162

element completeness	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	unprov	Total
0–21%	37	132		8	3	5		185
21–40%	94	281	4	24	12	11		426
41–60%	78	184		3	9	8		282
61–80%	40	189		8	2	9	3	251
81–100%	46	164	1	13	3	6	2	235
Grand Total	295	950	5	56	29	39	5	1379

Table 162: Sand, Element completeness of fish QC1 elements

To access a printable version of this table, please go to the separate page table163.html and set to LANDSCAPE mode.

Table 163

modification	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	unprov	Total
acid etched		1						1
crushed	4	2						6
calcined	6	42		6	2	1		57
charred	172	475	1	59	11	16	3	737
Burning Total	178	517	1	65	13	17	3	794

Table 163: Sand, Modified fish bone (all specimens) by context; Back to Section 3.11.3.4.3

3.11.3.4.2 Taxonomic abundance

The fish assemblage from Sand is dominated by two families, the wrasse family (*Labridae*) and the cod family (*Gadidae*). From the wrasse family, the most abundant species was ballan wrasse. Cuckoo wrasse, corkwing wrasse and goldsinny were also identified. Saithe and pollack were the most common gadid species identified; less common gadids included cod, haddock and whiting. In order of abundance, mackerel, herring and horse mackerel were also identified in modest numbers, followed by trace amounts of other taxa (see Table 159, above). There was no great difference in species composition between contexts.

Due to the small size of the specimens and the similar anatomy of saithe and pollack it was often difficult to distinguish between the two. Ambiguous specimens were recorded as Pollachius. Distinction between saithe and pollack otoliths is especially problematic (Harkönen 1986:100), and no identification beyond Pollachius was attempted. Saithe and pollack vertebrae recorded in fulfilment of the MSc thesis were only identified to genus level. However, this should not affect the relative ratio of saithe to pollack based on the QC1 elements and subsequent identification of vertebrae to the species level. Specimens which had the characteristics of saithe, pollack or cod, but which could not be positively distinguished, were recorded as Gadus/Pollachius. Labrid elements were identified to species where possible. Specimens identified to either ballan wrasse or cuckoo wrasse were recorded as lbd1, those identified as either corkwing wrasse or goldsinny were recorded as lbd2. The habitat and behaviour of the most abundant taxa, and their implications for fishing practices, will be considered below.

3.11.3.4.3 Element representation

The main shell midden context produced 9671 of the identified elements from the site (960 QC1, 7910 QC2 and 801 QC4 elements). A sizeable amount of diagnostic material (3832 elements) was also recovered from the topsoil (see Table 164, below). A much smaller assemblage was recorded from the organic rich layer; 57 QC1, 466 QC2 and 416 QC4 elements. Nominal numbers of diagnostic specimens were recorded from other contexts.

To access a printable version of this table, please go to the separate page table164.html and set to LANDSCAPE mode.

Table 164

taxon	QC	element	topsoil	main midden	palaeo	slopewash	organic rich	shell midden	sandy soil	natural	unprov	total
black mouthed dogfish	2	vertebra		1								1
dogfish families	2	mvc	1	12								13
ray family	4	dermal denticle	4	1				1				6
elasmobranch	2	mvc	1	3								4
eel	1	basioccipital		1								1
		quadrate		1								1
		vomer		1								1
	2	abdominal vertebra	3									3
		caudal vertebra		7					1			8
conger eel	2	caudal vertebra	1									1
herring	2	abdominal vertebra	45	44			5	5	6		8	113
		abdominal vertebra 3		1								1

		caudal vertebra	25	29		1	6	4	2		2	69
		caudal vertebra 2		1								1
		first vertebra	2									2
		penultimate vertebra		1								1
		ultimate vertebra	1									1
		vertebra		11								11
salmon family	2	caudal vertebra	1						1			2
		vertebra							2			2
rockling sp.	2	abdominal vertebra	1									1
		abdominal vertebra1	1									1
		caudal vertebra1		1								1
saithe	1	basioccipital	4	4					1			9
		dentary	3	11								14
		hyomandibular	2	1								3
		infraphryngeal	1	1								2
		maxilla	6	7				2	1			16
		palatine	2	1				1				4
		parasphenoid		2								2
		posttemporal	1	1								2
		premaxilla	15	30					1			46
		quadrate	8	9								17
		supracleithrum	2									2
		vomer	5	3								8
	2	abdominal vertebra	2									2
		abdominal vertebra 1	25	45		2	1	3	6			82
		abdominal vertebra 2	21	30		2	1	1	5		1	61
		abdominal vertebra 3	35	50				1	5		1	92
		caudal	4	1								5

		vertebra										
		caudal vertebra 1	24	53		2			2		2	83
		caudal vertebra 2	23	21				1	1		3	49
		first vertebra	3	5					1		1	10
pollack	1	articular		1								1
		basioccipital		3								3
		dentary		6								6
		maxilla		3								3
		premaxilla		13								13
		quadrate		1								1
	2	abdominal vertebra		1								1
		abdominal vertebra 1	7	5								12
		abdominal vertebra 2	2	5				1				8
		abdominal vertebra 3	16	39			1	1				57
		caudal vertebra	2									2
		caudal vertebra 1	7	14				1				22
		caudal vertebra 2	5	10								15
saithe or pollack	1	articular					1					1
		basioccipital		2								2
		cleithrum		1								1
		dentary	3	12								15
		hyomandibular						1				1
		infraphryngeal		5								5
		maxilla	4	6		1		1				12
		palatine	1									1
		parasphenoid		2								2
		posttemporal	3									3
		premaxilla	10	24			1					35
		quadrate		1				1				2
		supracleithrum	2	1								3

		vomer	1	6								7
	2	abdominal vertebra	9	282				4				295
		abdominal vertebra 1	60	56		7	4	5	5		2	139
		abdominal vertebra 2	36	24		1	1	3	1		1	67
		abdominal vertebra 3	46	71		1	2	1	3		3	127
		caudal vertebra	15	298			2					315
		caudal vertebra 1	31	27							2	60
		caudal vertebra 2	39	29		2		2	2			74
		first vertebra	6	24								30
		penultimate vertebra		2								2
		vertebra		1								1
	4	otolith	444	613	1		11	26	10		18	1123
cod	1	basioccipital		1								1
		dentary		6								6
		hyomandibular	1									1
		maxilla		1								1
		parasphenoid				1						1
		posttemporal	1									1
		premaxilla		4					1			5
		quadrate	2	4								6
		vomer	2	1								3
	2	abdominal vertebra	1	13								14
		abdominal vertebra 1	3	5		1	1					10
		abdominal vertebra 2	1	2					1			4
		abdominal vertebra 3	5	3					2			10
		caudal vertebra		41								41
		caudal	1	1		1			1			4

		vertebra 1										
		caudal vertebra 2		5								5
		first vertebra	3	1					1			5
	4	otolith	6	11				1				18
cod, saithe or pollack	1	articular		2								2
		basioccipital		1								1
		dentary	6	8								14
		hyomandibular		1								1
		infraphryngeal	2	1								3
		maxilla	2	7								9
		posttemporal	1									1
		premaxilla	7	14					4			25
		quadrate	2	1								3
		vomer		6								6
	2	abdominal vertebra	22	412		3	7		1		1	446
		abdominal vertebra 1	87	49		1		2	11		1	151
		abdominal vertebra 2	26	33					4			63
		abdominal vertebra 3	51	114		6		1	1		2	175
		caudal vertebra	46	373		1	7	2	3			432
		caudal vertebra 1	89	133				2	8		2	234
		caudal vertebra 2	26	48		2	1	1	3			81
		first vertebra	3	15			2					20
		penultimate vertebra	1	1								2
		ultimate vertebra		1								1
		vertebra	1	67								68
	4	otolith	25	22				1				48
haddock	1	parasphenoid					1					1
		posttemporal		1								1
	2	abdominal vertebra1		1								1

		caudal vertebra	2									2
		caudal vertebra 1	1									1
		caudal vertebra 2	1									1
	4	otolith		1								1
whiting	1	premaxilla		1								1
	2	abdominal vertebra	3	2								5
		caudal vertebra	1				1					2
poor cod	4	otolith		3								3
Norway pout, bib or poor cod	2	abdominal vertebra	1			1						2
		abdominal vertebra1	1									1
		caudal vertebra1	1									1
	4	otolith	2	1				1				4
cod family	1	articular	3	5			1					9
		basioccipital	1	5					1			7
		dentary	6	15			1	1				23
		hyomandibular	1									1
		infraphryngeal		1								1
		maxilla	3	9					1			13
		palatine	2	1								3
		parasphenoid	1	1								2
		posttemporal	2	1			1					4
		premaxilla	20	28		1	7	3	2			61
		quadrate	2	6			1		1			10
		supracleithrum	1	1								2
		vomer	1	4					1			6
	2	abdominal vertebra	48	199	1	2	68	8	9			335
		abdominal vertebra 1	74	87		5	6	7	6			185
		abdominal vertebra 2	9	15		1			1			26
		abdominal	37	43			3		13		1	97

		vertebra 3										
		caudal vertebra	126	232		6	38	11	9		2	424
		caudal vertebra 1	37	59		1	1		8			106
		caudal vertebra 2	21	15		1	2		8		1	48
		first vertebra	18	22		1	2	1			1	45
		penultimate vertebra	1				1					2
		vertebra	64	98		15		1	12		2	192
	4	otolith	138	146		3	5	5	11		1	309
gurnard family	1	premaxilla	1									1
	2	abdominal vertebra	1									1
sea scorpion family	2	abdominal vertebra		1								1
		first vertebra		1								1
		ultimate vertebra		1								1
Atlantic horse mackerel	2	abdominal vertebra	1	6								7
		caudal vertebra	1	6								7
	4	otolith		3								3
sea bream family	2	caudal vertebra		1								1
		vertebra							1			1
corkwing wrasse	1	infraphryngeal	6	23			1	1			3	34
		premaxilla		1								1
		preopercular		4								4
		quadrate		2								3
		vomer	2						1			3
	2	abdominal vertebra	14	8			1					22
		caudal vertebra	7	8		1						16
		vertebra		2								2
goldsinny	1	infraphryngeal	1	1								2
corkwing	2	abdominal	23	15				1	2			41

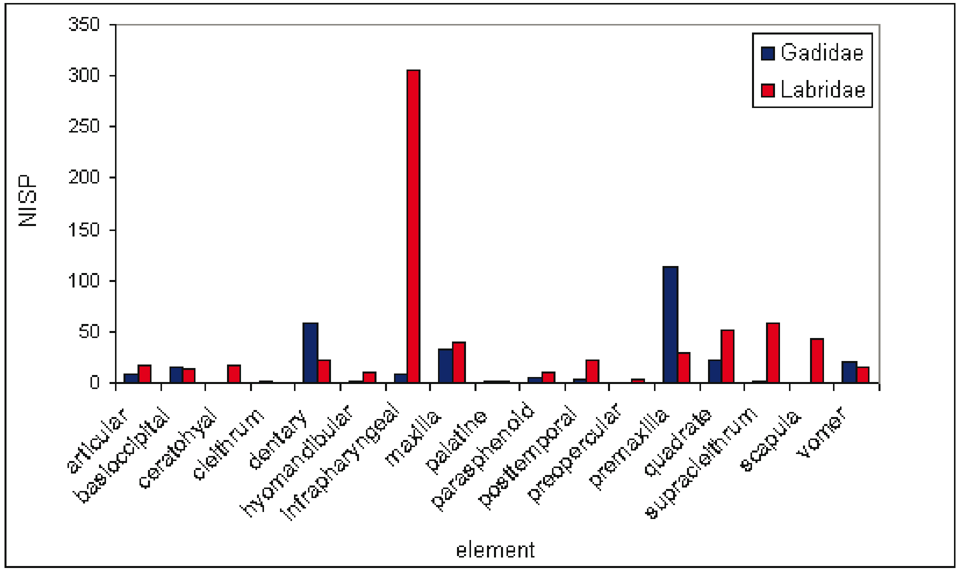
wrasse or goldsinny		vertebra										
		caudal vertebra	6	18				1	8			33
		caudal vertebra 2		4								4
ballan wrasse	1	articular	9	8			3	1			1	22
		basioccipital		2								2
		ceratohyal	1	7			1	1	1			11
		dentary	3	6							1	10
		infraphryngeal	13	46			1		1			61
		maxilla	2	8								10
		palatine	1						1			2
		parasphenoid	1	3								4
		posttemporal	1	6			2	1	1			11
		premaxilla		3				1	1			5
		quadrate	4	12			1	1				18
		supracleithrum	3	8				1	4			16
		scapula		1								1
		vomer		4								4
	2	abdominal vertebra	51	94		1	4	11	1			162
		caudal vertebra	18	26			3	1				48
		first vertebra	3	8				2	1			14
		penultimate vertebra		1								1
		ultimate vertebra		3								3
cuckoo wrasse	1	infraphryngeal		3								3
		posttemporal	1									1
		quadrate		1								1
		supracleithrum		2								2
		vomer		2								2
	2	abdominal vertebra	1	2								3
		caudal vertebra		5								5
		first vertebra		1								1
ballan or	1	basioccipital		1								1

cuckoo wrasse		infraphryngeal	2	8				2				12
		maxilla	1	2				1				4
		opercular	1									1
		palatine	1									1
		parasphenoid		1								1
		posttemporal	1									1
		quadrate		1								1
		supracleithrum	3									3
		scapula		3								3
		vomer		1								1
	2	abdominal vertebra	401	396		22	24	35	85	1	5	969
		abdominal vertebra1		1								1
		caudal vertebra	300	379		6	10	10	29		3	737
		first vertebra	22	13		1	2	2	9			49
		penultimate vertebra	9						2			11
		ultimate vertebra		2								2
wrasse family	1	articular	2	9			1					12
		basioccipital	6	11				2	1			20
		ceratohyal	2	11			3		2			18
		cleithrum	1									1
		dentary	7	16			5					28
		hyomandibular	6	11				1	1			19
		infraphryngeal	30	224		1	9	1				265
		maxilla	9	30			5	2	4			50
		palatine	4	1								5
		parasphenoid	1	7								8
		posttemporal	5	17			1	1				24
		premaxilla	3	25			1	1	2			32
		quadrate	4	35			5	1	3			48
		supracleithrum	7	48		1	2	1				59
		scapula	4	39			1		3			47
		vomer	5	9			1					15
	2	abdominal vertebra	361	1615		5	129	29	47	1	19	2206

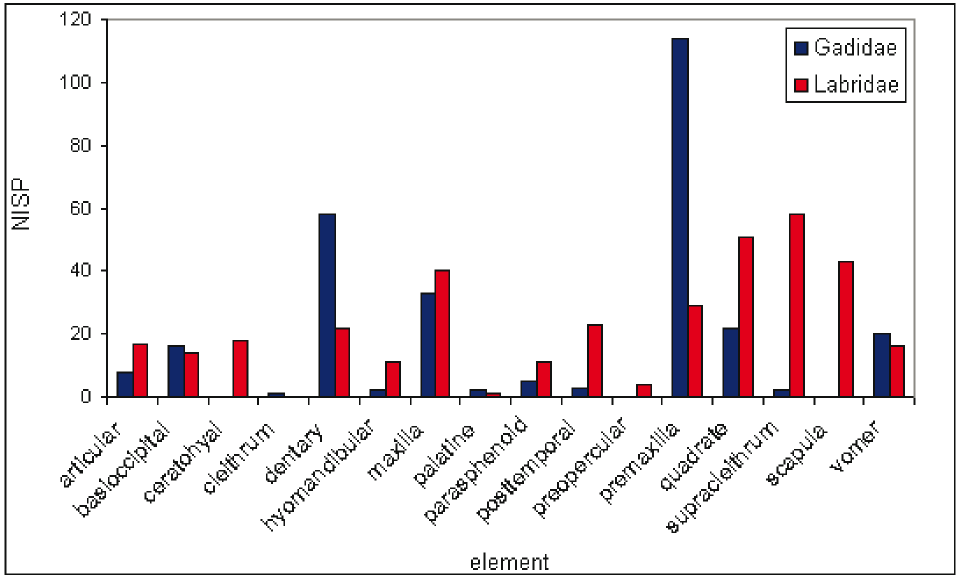
		caudal vertebra	295	1535			96	20	23		16	1985
		caudal vertebra 1									2	2
		first vertebra	41	122		1	22	5	5		1	197
		penultimate vertebra	23	42			4	1	2			72
		ultimate vertebra	1	20			1					22
		vertebra		95				1				96
eelpout	2	abdominal vertebra									1	1
butterfish	2	abdominal vertebra		13								13
		caudal vertebra		4		1						5
sandeel family	2	abdominal vertebra	1	4								5
Atlantic mackerel	2	abdominal vertebra	4	67			1		1		1	74
		abdominal vertebra 3	2									2
		caudal vertebra	16	85			6	1	4		3	115
		vertebra	1	7								8
perch order	1	parasphenoid	1									1
plaice	2	abdominal vertebra						1				1
plaice order	2	abdominal vertebra		2								2
		caudal vertebra	1	2					1			4
flatfish order	2	vertebra		1								1
		total	3832	9671	2	112	539	255	427	2	114	14954

Table 164: Sand, Fish QC1, QC2 and QC4 element representation
• 'Mineralised vertebral centrum' is abbreviated to mvc

Turning first to the main shell midden, Illustration 487 (below) shows the gadid and labrid QC1 element distributions for this context, combining all relevant data at the family level. Almost the full range of QC1 elements is present for both families, but the relative abundance of different elements is widely variable. The most abundant element by far is the wrasse infrapharyngeal. This is a very robust element with a distinctive morphology. Given these properties, it is likely that its abundance has been exaggerated by taphonomic and identification biases. Illustration 488 (below) shows the same QC1 element distribution without the infrapharyngeal. This implies that the element distribution of the gadids has also been influenced by preservation, as more robust elements such as the premaxilla and dentary are most common. A similar pattern of element distribution is seen in the organic rich silt layer. Although based on fewer QC1 elements, the labrid infrapharyngeal and gadid premaxilla are the most common elements.



Illus 487: Sand, combined gadid family and wrasse family QC1 element distribution for the main shell midden



Illus 488: Sand, combined gadid family and wrasse family QC1 element

distribution for the main shell midden without the infrphyrngeal

The paucity of gadid appendicular elements (for example cleithrum, supracleithrum and scapula) could be interpreted as the result of butchery, as these elements are sometimes left in dried fish after removal of the head and thus removed from the catch site (for example Barrett 1997). However, gadid abdominal and caudal vertebrae are both abundant (see Table 163, above) whereas in the case of dried fish some or all of these elements should also be underrepresented. In addition, only one possible cut mark was recorded, on a ballan wrasse caudal vertebrae from the main shell midden (see Table 145, above). Rather than the paucity or absence of certain elements being interpreted as the result of fish processing, it thus seems more plausible that it is due to preservation bias.

3.11.3.4.4 Fish size

Table 165, (below) shows that the majority of fish bones at Sand came from small (150–300mm) to medium (301–500mm) sized fish, based on comparison with reference specimens of known total length (TL). The size distribution for the collective wrasse family specimens and individual cod family species is shown in more detail in Table 166, (below).

To access a printable version of this table, please go to the separate page `table165.html` and set to LANDSCAPE mode.

Table 165

size	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	unprov	Total
very large (801–1000mm)	1							1
large (501–800mm)	7	30	1	4	1			43
medium (301–500mm)	108	239		14	8	14	1	384
small (151–300mm)	167	606	3	33	20	20	4	853
tiny (<150mm)	8	56	1	2		4		71
Grand Total	291	931	5	53	29	38	5	1352

Table 165: Sand, Estimated size of fish from Sand

To access a printable version of this table, please go to the separate page `table166.html` and set to LANDSCAPE mode.

Table 166

taxon	size	topsoil	main shell midden	slopewash	organic rich	shell midden	sandy soil	unprov	Total
all wrasse family	large	1	2		1				4
	medium	50	142		10	3	11	1	217
	small	98	468	2	28	16	11	4	627
	tiny	4	38		2		3		47
saithe	large	1	2			1			4

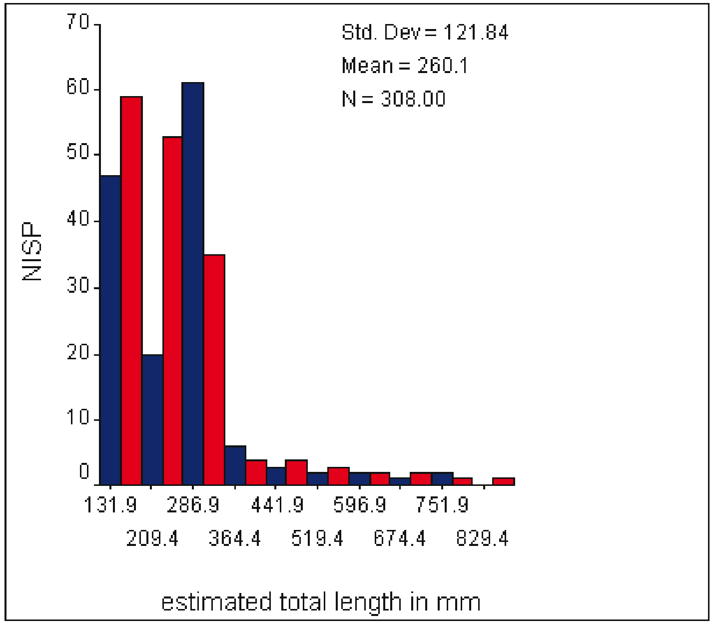
	medium	20	23			1	1		45
	small	27	39			1	2		69
	tiny	1	6						7
pollack	large		4						4
	medium		14						14
	small		8						8
	tiny		1						1
saithe or pollack	extra large	1							1
	large	1	4	1	1				7
	medium	11	20		1	2			34
	small	11	32			1			44
	tiny		1						1
cod	large	1	5						6
	medium	2	5				1		8
	small	3	6	1					10
	tiny		1						1
cod, saithe or pollack	large	1	1						2
	medium	6	15						21
	small	13	21				4		38
	tiny		3						3
haddock	medium		1		1				2
whiting	tiny		1						1
cod family	large	2	10		2				14
	medium	17	19		2	2	1		41
	small	15	32		5	2	3		57
	tiny	3	4	1			1		9

Table 166: Sand, Estimated size of gadid and labridae specimens

Less qualitative estimates of fish total length can be calculated using measurements of QC1 elements (given in Appendix 24) and regression equations relating them to total length (Desse & Desse-Berset 1996:172). Equations exist for selected measurements of the gadid species typically abundant on archaeological sites of all periods in Scotland (for example Jones 1991:161–162). Equations are also available for labrids of the Pacific Ocean, (Leach & Davidson 2001), but unfortunately the osteology of Atlantic labrids is not well researched. Research connected with the use of corkwing wrasse, rock cook and goldsinny as cleaner fish on salmon farms in Scotland (Treasurer 1996:74) does provide limited regression equations for the operculum and otolith (Treasurer 1994a). However, the wrasse otolith is too small for routine recovery and the operculum measurement requires complete preservation. Thus detailed analysis of the wrasse size distributions must await further research.

In the case of gadids, Jones' regression equations were applied to measurements taken on the otoliths of specimens identified as saithe, pollack, and Pollachius from the main shell midden (Appendix 24). A sample of over 300 measurements was obtained from the otoliths. Based on these measurements, a few large specimens are represented, but the majority (over 90%) are under

400mm, and the large specimens probably represent incidental catches. However, the most striking feature of the otolith total length estimates is the bimodal distribution (see Illustration 489, right).



Illus 489: Sand, estimated total length of *Pollachius* otoliths from the main shell midden

The Pollachius size distribution based on the otoliths from the main shell midden at Sand concords well with the bimodal distribution of saithe otolith measurements (as opposed to total length estimation) from the Cnoc Coig shell midden on Oronsay (Mellars & Wilkinson 1980:26). The evidence from Cnoc Coic (and other middens on Oronsay) has been interpreted as evidence for a seasonal fishery, in which age cohorts appear as modes in the measurement data. A similar interpretation of the otolith data from Sand seems reasonable and is discussed in more detail below.

3.11.3.4.5 Method of capture and seasonality

Wrasse are small to medium fish; ranging from the ballan wrasse at an average total length of 300–500mm TL to the goldsinny at around 100–140mm TL; that are found along the west coast today (Sayer & Treasurer 1996:3–7). All wrasse species are associated with rocky shores and they are generally shallow water fish. Treasurer has conducted several studies regarding the capture of wrasse, including the use of fyke nets (a series of joined hooped nets) and prawn creels (Treasurer 1994b, 1996, 2000). Baited and unbaited creels and traps were most successful, although larger species such as ballan and cuckoo wrasse were under-represented (probably due to the small apertures of the fishing gear). Perhaps of most relevance here are the by-catches found associated with these wrasse fishing techniques: saithe, pollack, cod, conger eel, scorpion fish, rockling, flatfish and dogfish species (Treasurer 1996:75). All of these taxa are represented at Sand, with saithe and pollack particularly abundant.

The adult size of saithe and pollack is much larger than that of wrasse and they can reach lengths of over 1m (Wheeler 1969:167–275). Their habitat varies with age (and therefore size), and as with all commercially important gadids, this has important implications regarding method of capture. Both saithe and pollack are found in the waters surrounding the west coast of Scotland and local fishermen attest to the abundance of pollack (lythe) around the coast of the Applecross Peninsula. The behaviour of saithe would make them more likely to be caught in greater abundance, as they form small shoals throughout the year. Only sexually mature, adult pollack shoal during the spawning period. However, the fish are often found in numbers on reefs, with young pollack found closer to the shore than adults, and today are a common catch of anglers (Wheeler 1969:272–273;

Whitehead *et al* 1986:690–691).

The young of both saithe and pollack are found close to the shore in their 1st and 2nd years (Wheeler 1969:272–275). Based on growth estimates for saithe given by Wheeler (1969:167), one year old fish reach *c*150mm TL, two year olds *c*300mm TL, and three year old fish 450mm TL. The otolith distribution from Sand has two modes, one centered around total lengths consistent with first year fish and the second with total lengths of second year fish (see Illustration 489, above right). Similar targeting of distinct size groups of saithe, comparative with those at Sand, was documented by Low in Orkney in the early 1800s (Low 1813:193–194). Here, small numbers of small (6–10 inches, *c*150mm) saithe began to be fished with rods from the shore from August to March with a peak in catch during the winter from large shoals. A second fishery in May, also with rods, targeted fish of *c*15 inches (300mm).

The catch of small sized saithe, pollack, wrasse, and indeed most other taxa from Sand, is broadly comparable with the Danish Mesolithic site of Maglemosegård, where most fish were less than 500mm in total length (Enghoff 1994:75). Although the principal species was cod, at this and other coastal sites, Enghoff found that the same cluster of small specimens was replicated for several coastal taxa (*ibid*:83–84). She thus proposed an indiscriminate ‘catch all’ method of fishing, probably using stationary traps or nets A similar interpretation may be appropriate for Sand especially when the by-catch evidence from the experimental wrasse capture methods (discussed above) is considered.

The lack of large fish at Sand suggests that deep sea fishing methods were not used and, based on the above, an inshore fishery can be proposed. The use of stationary traps or nets to target taxa with small maximum total lengths (the wrasses), and small specimens from species with large maximum lengths (saithe and pollack) seems plausible. If this were the case, the bimodal pattern seen in the main shell midden otolith TL estimates would reflect catches of first and second year fish. A single season of fishing, targeting two sizes of fish may be represented. Alternatively, this could indicate a strongly seasonal fishery, possibly with focused activity in spring and late autumn-winter, taking advantage of shoaling saithe, with pollack and wrasse also caught in abundance. All of the principal species can be taken by line, but the wrasse by-catch evidence suggests the use of stationary traps or nets as the primary fishing method at Sand.

3.11.4 Discussion

The faunal remains from Sand represent one of the largest assemblages from the Scottish Mesolithic, with over 16,000 identifiable specimens. Identifiable mammal remains make up only a small portion of this number, but the bird and fish assemblages are large. Two contexts were analysed in detail; the main shell midden and organic rich silt layer. As far as it is possible to compare the mammal and fish data from Sand with Cnoc Coig, Oronsay, a similar pattern of resource exploitation seems to have been practised. There is no evidence at Sand, however, for the intensive exploitation of marine mammalia taxa as for grey seal at Cnoc Coig. From both sites the mammal assemblages are small, yet similarities can be drawn between the element distribution of the most abundant terrestrial taxa at the site, red deer. At both sites metapodials and phalanges were the most common elements. Interpretation of the abundance of terminal appendicular elements of red deer at Sand remains inconclusive, however, hide processing, as suggested for Cnog Coig, remains one possibility. The bone fragmentation analysis does not permit a conclusive interpretation; marrow extraction and tool manufacture would both result in a high degree of fragmentation and may have occurred simultaneously. The high fragmentation may also be the result of taphonomic processes such as trampling.

With regard to the preservation of material it is worth noting the discrepancy between the quantity of mammal bones that is visibly burnt (30%) as compared with the amount of burnt bird bone (2%).

Turning now to the fish remains; at Sand either saithe or pollack along with species of the wrasse family were the most abundant taxa. Full comparison with Cnoc Coig is not possible due to the partly published nature of the data from Oronsay. However, the size distribution of *Pollachius* otoliths from the main shell midden at Sand compares well with the published saithe otoliths from Cnoc Coig, and may represent two seasons of fishing. From both sites the sizes of the most abundant taxa targeted were small and consistent with a littoral zone habitat. The capture of these fish with traps or nets, perhaps stationary, seems most plausible.

In terms of seasonal use of the site the mammal assemblage is disappointing. Whilst juvenile animals were present at the site, the paucity of evidence concerning age at death makes it difficult to determine seasonal use without tooth wear information. The bird and fish bone assemblages from the main shell midden, and to a lesser extent from the organic rich silt layer, however, give strong indications of seasonal use. Razorbills and guillemots are seabirds, only coming inland to breed. This results in two distinct periods for their possible capture. The first is in late spring or early summer during breeding, the second shortly after this when the birds have a complete moult in late summer and autumn. Given the large rafts of flightless, easily accessible birds that moult in the Inner Sound today, the latter period of capture appears to be the most readily available to the people at Sand. However, the capture of birds from colonies around Raasay and Skye remains a possibility. Similarly, two possible seasons of capture may be suggested by the fish remains. The bimodal distribution of the *Pollachius* otolith total length estimates from the main shell midden suggests that two populations of fish were consistently exploited. Two scenarios can be envisaged. The first is a single season of fishing, targeting two sizes of fish (as suggested by Mellars and Wilkinson 1980 for Cnoc Coig, Oronsay). The second is a seasonal fishery, with first year fishes being taken in late summer through to early spring, and second year fish in late spring, as described by Low (1813) for Orkney in the early 1800s. If the latter scenario is accepted, the combined fish and bird evidence is consistent with two possible periods of use at Sand; late spring and late summer.

The faunal remains from Sand make an important contribution to our understanding of the procurement of seasonal resources and food consumption in the Mesolithic. Much of the recent discourse in the literature concerning diet in the early prehistory of Scotland and beyond has centred around the stable isotope analysis of human bone (for example Schulting & Richards 2002, but see also Bailey & Milner 2002). The assemblage from Sand is not without bias, (it is unclear, for example, what purpose the mammal remains at the site served) but provides important zooarchaeological evidence for a period that is lacking in faunal remains.

3.11.5 Summary

Excavation at Sand has produced one of the largest Mesolithic faunal assemblages in Britain. Substantial quantities of mammal, bird and fish bone have been analysed. This analysis has revealed a focus on a narrow suite of local resources, including wild terrestrial mammals, seabirds and littoral zone fish. The highly fragmentary nature of the mammal assemblage makes interpretation difficult. If the fragmentation is not the result of post-depositional processes, tentative suggestions are the possible skinning of red deer and wild boar, the extraction of bone fat and tool manufacture. The bird remains are dominated almost exclusively by razorbills and guillemots, and their behavioural and breeding patterns place the time of their capture in late spring and early summer, or late summer and autumn. The fish assemblage is dominated by fish from the cod family and wrasse family. The total length estimate distributions for the main gadid taxa, saithe and pollack, point towards one or more seasons of fishing, targeting different sizes of fish. If this does represent two seasons of fishing, late summer and autumn (possibly into winter), and late spring are the most likely. Based on the size and species of fish it is likely that stationary traps and nets were the primary method of fishing at Sand.

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… > Images > Specialists > Zooarchaeology > zooarch_illus_1a.b.pdf [Illustrations 482a & b]

3.12 Mesolithic middens and marine molluscs, procurement and consumption of shellfish at the site of Sand | Nicky Milner

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007` > `Downloads` > `Documents` > `Final Reports`. From here you can download the file '`Milner,_shell_report_Sand.pdf`'. See also the draft version '`shell_report_Sand,_Milner,_2004.pdf`' in `Specialists reports`.

3.12.1 Introduction

Shell middens on the western coast of Scotland were first investigated in the 19th century and since then many have been found both through scientific exploration and by accident. The island of Oronsay is famous for its large mounded shell middens and these have been the subject of several investigations (for example Anderson 1898; Mellars 1987). Similarly, a midden site was found on Risga in the early 1900s and recently has been excavated again (Pollard *et al* 1996). The Oban area is also well known for cave sites with midden deposits, such as MacArthur Cave, the Druimvargie rockshelter, and Carding Mill Bay (Connock *et al* 1992; Pollard 1990). Nearby, on the Isle of Ulva, off the island of Mull, another cave site was found with a Mesolithic shell midden intact (Russell *et al* 1995). The work of the Scotland's First Settlers project has led to the discovery of many more sites including shell middens around the Inner Sound (Hardy & Wickham-Jones 2002).

Despite these many investigations there have been very few published analyses of the shell material from the middens. Ulva is a notable exception and the examination of the shells from this site has resulted in a better understanding of the way in which the people of the Mesolithic procured shellfish, their shellfish exploitation patterns, the processing methods used and the palaeoenvironment (Russell *et al* 1995). Some analysis has also been carried out on the shellfish found in the 1970s excavations in the Oronsay middens, providing information on the procurement methods and palaeo-environment (Andrews *et al* 1985; Mellars 1978). Similar studies have been made on other assemblages from middens in the area but of later date, such as the late Medieval shell midden at Ellary Boulder Cave (Tolan-Smith 2001).

This paper presents the results of shellfish analysis for the site of Sand in Applecross. The shell material was initially sorted by students at the University of Edinburgh and later transported to the University of Newcastle where they were further sorted, counted and measured, following methodologies used at Oronsay (Andrews *et al* 1985; Mellars 1978), Ulva (Russell *et al* 1995) and Ferriter's Cove, Ireland (Woodman *et al* 1999). The counts provide information on the relative abundance of different species. Measurements were made on the three dominant species (limpets, periwinkles and dogwhelks) in order to examine the morphology of the shell, which in turn can reveal something about the environment and the types of shore on which the shells were collected. In addition, these measurements can be used to look for changing size through time, which might indicate changing environmental conditions or pressure, possibly human, on the natural resources. It is important to place the results into the wider context of Mesolithic economy and environment on the western coast of Scotland and therefore these results will be compared with those from other sites, where relevant.

In addition, on a visit to the site of Sand in October 2003, the beach was visited at low tide and a modern comparative collection of live limpet, dogwhelk and periwinkle was gathered and measured (see Illustration 490, right). At low tide on this beach a ridge of rock, covered in shellfish, is exposed. The limpets were gathered from both the upper shore and lower shore to examine the well documented variations in morphology across these zones. It was not possible to gather limpets from the middle shore, as has been done in some other studies, because there were no rocks, and therefore no limpets, in this zone. Dogwhelks were also gathered from both zones. Periwinkles were only found in the lower shore area.

Illus 490: Measuring periwinkles on the beach

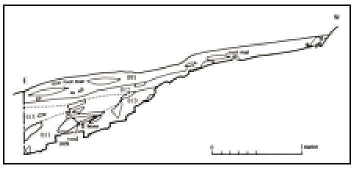
The paper is broken down into sections which firstly deal with the analyses undertaken, followed by a discussion: sampling methods; species found and quantification; measurement results for the three main species; discussion of the results. There are two explicit aims to this paper. The first is to review critically the methods used in order to provide a model for future molluscan studies of similar middens. The second is to use some of the results to reconstruct the ways in which the Mesolithic inhabitants of Sand may have procured and consumed the shellfish.

3.12.2 Sampling

Illus 342: Sand – Trench A,

When carrying out shellfish analysis, it is usually necessary to sample any shell midden unless it is very small, simply because of the vast quantities of shells which are usually present: in the Danish midden of Norsminde it was estimated that there were 83,000 shells within one cubic metre (Bailey & Milner in press). For the site of Sand, square B25B in Trench B was selected as a representative sample for analysis (it was later found that, due to recording problems in this area, material from two separate metre squares, B24B and B25B, had been lumped together and therefore B25B represents two metre squares rather than one). This was the central area where the midden was thicker and several contexts were recognisable within the stratigraphy (but see below). In addition, squares A1B to A6B in Trench A were analysed in order to provide a comparison. These squares are close to the edge of the shell midden and stretched for six metres downhill. There was less shell material here, especially further down the slope (Section 3.2). The squares at the top (A1B and A2B) consisted of what appeared to be slumped material derived from the midden upslope (see Illustration 342, upper right). In all areas, although contexts were identified, the squares were excavated in spits and these were divided into quadrants (NE, SE, SW, NW).

south-facing section showing tail off of midden downslope



Illus 351: Sand – Trench B, north-facing section relating to B25B

Illus 350: Sand – Trench B, Area B1 from the south-west

Below the topsoil (the shell from which was not included in the analysis) in square B25B three contexts were visible (see Illustration 351, above lower right; The midden deposits had little obvious stratigraphical variation, but a layer of crushed shell is visible at top to the east). At the top of the midden there was a layer of crushed shell (12) about 0.05m deep running over the midden deposits. The bulk of the midden was made up of a dense mass of unconsolidated shell (13) which during excavation was noted to be made up mainly of intact limpet shells. Towards the south eastern part of area B1 was a lower layer of shells of a darker grey and ashy consistency (11) which rose up towards the north and comprised the only evidence of stratigraphical variation within this part of the shell midden (see Illustration 350, left). Unfortunately, due to the recording problems mentioned above, it has been necessary to treat all B25B material below Context 12 as undifferentiated midden (which will be referred to as 11/13), though variation was clearly visible in section.

The six grid squares A1B to A6B were fully excavated to bedrock (see Illustration 342, above upper right). A shell-mixed topsoil (1/2) lay across the A trench (although it only appears to be present for squares A1B and A2B in the boxes of excavated material). Below this, in the NW and SW quadrants of A1B and A2B, was a wedge-shaped deposit of shell midden material (28) which appeared to represent slump from the sloping front edge of the midden. This slump overlay organic rich deposits (22) which had comparatively little shell content. Below this lay a sterile palaeosol layer (25) (although a few shells are assigned to this context). Overlying the midden deposits was a slumped stony deposit (27) which separated the midden from sandy soils containing a high percentage of small and fragmented heat affected stones (29 and 17). These layers have been interpreted as slopewash and extended for about 2.5m down slope where the stones had built up against some large boulders.

All of the midden material was initially sorted at Edinburgh University by undergraduate students, and this included sorting out the shell material into different species and shell residue. The shell material from the selected squares was then transported to Newcastle University and the rest of the analysis (measuring and counting) was carried out by students in the Archaeology Wolfson Laboratory. Initially it was intended that the whole of B25B would be analysed; but in the end lack of resources meant that this was not possible and so it was sampled. About three quarters was analysed, see Table 167, below. All of the six squares in Trench A were analysed, because there was far less material from this area.

Table 167

Sand 2000 B25B spit	context	NE	NW	SE	SW
2	12	X – spit not divided into quadrants			
3	13/11	X		X	X
4	13/11	X	X		X
5	13/11		X	X	X
6	11/13			X	X
7	11/13	X	X	X	X
8	11/13	X	X	X	
9	11/13	X		X	

Table 167: Sand, B25B, marine molluscs – quadrants analysed

3.12.3 Species found within each midden area

The shells from both areas were sorted according to species. Then, in order to examine the relative abundance of the different species within the different areas and contexts of the midden, the species have to be quantified. This can be achieved by using either MNI (minimum number of individuals), NISP (number of identifiable specimens) or by weight. MNI is usually the preferred method of quantification in this kind of context; the theoretical problems related to using MNI analysis on archaeozoological assemblages not being applicable to invertebrate remains (Claassen 1998:106). Weighing the shells is a speedier method but the key problems are that there can be differentiated loss of weight due to diagenesis and heavier shelled species are disproportionately represented (Claassen 1998:107). Russell *et al* (1995:Table 4) use both MNI and weight and show some correspondence between the two methods. However, weighing and calculating MNIs were used for the test pits found in the Scotland's First Settlers survey and it was found that there was a discrepancy between weights and MNI particularly with dogwhelks (Section 2.2). The reasons appear to be the heavier weights of the dogwhelks and taphonomic issues. Woodman *et al* (1999:94), in the analysis of molluscan remains from the Mesolithic site of

Ferriter's Cove, Ireland, also found problems with weighing the samples because of the sediment inside the gastropods which could not be removed. The quantification of MNI is thus the method which has been used for Sand (Claassen 1998).

The MNI is calculated by counting the apices for the gastropods, and the umbones of the bivalves are sorted into umbilici (left and right halves) and counted; the largest sum is then used as the MNI, for example where there are 50 left umbilici and 30 right umbilici the count for the left umbilici would be used. The counts were recorded by spit and quadrant and the raw data can be found in Appendices 14 & 15. In order to interpret this data the MNIs have been summed by context and these results will be discussed below.

For some species it is not possible to count the MNI; razor shells were found in some parts of the midden but, due to their fragmentary condition and lack of apex or easily identifiable umbone, their presence was simply noted.

It was found occasionally that some apices were not in the sorted limpet bags, but were still in the residue bags and had been overlooked during initial sorting. In this case, if there appeared to be many in the residue bags, they were spread out again and quickly scanned. Apart from the other possible problems in assessing MNI this suggests that the MNI for the limpets in particular will be fairly crude. However, as the limpets are by far the most predominant species in most contexts and as usually less than 200 apices had been missed, compared with several thousand in total, the relative frequencies of species should not be greatly affected. In the case of Trench A all the residues were re-scanned and the MNIs corrected accordingly.

Before describing the species found and calculating the MNIs, it is important to add a caveat. Shell, like any archaeological deposit, is subject to taphonomic processes (Claassen 1998). Dissolution and chemical conversion are usually the main processes within a midden and the shell will be subject to more complex sequences of taphonomic processes if exposed to either salt or fresh water as opposed to dry deposits. Shells can, for instance, be dissolved in terrestrial settings by the carbonic acid in acid rain or nitric acids from organic decay in the soil. The rate at which the shell is dissolved depends on many factors including the acidity of the ground water, duration of exposure to the acids and skeletal porosity of the shell. Chemical conversion may also occur but this varies depending on the levels of magnesium, aragonite and calcite in the shell.

Other cultural factors will affect the shell, such as heating which can alter the crystallography and internal structure of the shell, hence burnt shells may fracture more easily (and weigh less). Walking across the shell midden or dumping more shells and other material on it will result in breakage which can vary by species. It must also be remembered that the midden probably does not represent the complete assemblage of shellfish (and other animals) gathered during the times of human activity: it is probable that some shellfish were processed and eaten on the shore or taken elsewhere and the midden may represent a sub-sample of shellfish used at this location.

Perhaps one of the most critical points to make when quantifying shell is that differential preservation appears to occur in the middens, that is some species decay more rapidly than others. In the case of Sand, gastropods like the periwinkle and dogwhelk are comparatively robust, and often appear as whole specimens, while the structure of the shell continues to appear tough. Other species, mussel in particular, are often found in a very fragmentary state. Mussel shell is sometimes so degraded that pieces of shell can literally be turned to dust if rubbed between two fingers. This species in particular is thus likely to be substantially under-represented on many sites, including Sand.

To sum up, it is important to note that there are always intrinsic difficulties with sampling and quantification methodologies for shell as well as the inherent taphonomic biases. When considering the results it is necessary to take these problems into account: inevitably there will be a margin of error and the results in terms of percentages of shells should not be regarded as definitive but as a guide to the relative proportions of some species.

3.12.3.1 Description of species

Illus 491: The difference between the smooth and the ribbed limpets

The following descriptions of species identified are taken from Barrett & Yonge (1958), Brehaut (1982) and Gibson *et al* (2001). The most abundant species present was the limpet, *Patella* sp. There are two species which could be present on these shores: *P vulgata* and *P aspera*. It is difficult to distinguish between the two without the animal inside or the colouring inside the shell, which archaeological specimens do not have. When the limpets were being sorted it was noted that there appeared to be two types. One group has pronounced ribs and a jagged aperture, whereas the second group has a smooth exterior and a smoother aperture; but it was not clear whether this variation indicated that they represented different species, (see Illustration 491, right). A comparison of the measurements of the limpets was made but there was no significant difference in size. In order to obtain a second opinion on this matter a sample of these limpets was sent to Janice Light (freelance consultant). She confirmed that they were probably all *Patella vulgata*, with the exception of perhaps one which could be Patella aspera, because it had secondary riblets between the main ones. It is concluded that the majority of specimens in the midden are probably the most common species, *Patella vulgata*, but it may also be possible that there are also some *Patella aspera*.

Limpets are highly subject to morphological convergence and the observable differences of smooth and ribbed are probably features of the shell which characterise their living environments. It is possible that the shells were coming from different levels on the shore, or from different areas of exposure/shelter, or from different sites. For the Sand assemblage it is possible to rule out different locations on the shoreline because there was no difference in the measurements between the two groups. Therefore, it is likely to be related to gathering from different locations. Certainly, on visiting the beach at Sand and examining the modern shells, there was no sign of the smooth version of the shell and only the ribbed limpets were found. In future projects, during excavation, it would be interesting to look out for such variations in shell morphology within the midden deposits because if they are found in localised areas it may be that they are being collected from different zones.

In terms of gathering, limpets cling tightly to rocks on the high, middle and low rocky shores in large numbers and they are fairly easy to exploit after a little experience; they simply need to be knocked off the rocks with a stone (and see Birch, Section 3.4). They can be used either as bait or directly as food. This will be explored in detail in the discussion.

The periwinkle, *Littorina* sp was also fairly common on the site. These tend to be found on rocky shores or stones. There are several different species of periwinkle but the ones found here are *L littorea*, the common or edible periwinkle, and *L littoralis*, the flat periwinkle. Identifying other species from an archaeological sample can be difficult because, as with the limpets, they have lost their colour. Because of this it is possible that there may be a small sample of other species: at Ulva cave L saxatilis and a possible mariae were also identified (Russell *et al* 1995).

The common or edible periwinkle is the larger of the two and lives on rocks and weed on the middle shore and below. The flat periwinkle is much smaller and is flat-topped, usually colourful (yellow, red, green and so on) and is more likely to be collected because of its aesthetic qualities or because it is attached to weed, rather than for consumption purposes (see Illustration 492, right). It lives on the middle and top shore, especially on the Fucus weed. Periwinkles are easy to pick off the rocks and they congregate in large numbers.

Illus 492: Topshells (left) and colourful periwinkles (right) from the beach

The other fairly dominant species is the dogwhelk, *Nucella lapillus*. This species is a carnivore and is a predator of barnacles, limpets, mussels and other molluscs. They are found on rocks in fairly large numbers. Like periwinkles they are very easy to pick off the rocks. On the modern shore at Sand they were found on the middle and high shore and generally not in the same location as the periwinkles. They tend not to be regarded as good to eat and sometimes their presence on an archaeological site has been attributed to collection for dye because they secrete a substance which can be used as purple colouring, (Gibbons & Gibbons 2004) however, very large numbers would be needed for this (see discussion below).

One other gastropod has been found on the site: the topshell, *Gibbula* sp. There are many species of topshell and they are distinctive if worn because they often reveal mother-of-pearl layers. The few shells that have been found here look to be *Gibbula cineraria*, the grey top shell. These are herbivores, they live on rock or weed and are found on the middle and lower shores. They can be consumed but they may also have been collected for their aesthetic qualities (see Illustration 492, above right).

Several bivalves were also found on the site. The mussel, *Mytilus edulis*, is a very common shore animal found in dense beds on rocky, stony and muddy beaches on the middle shore and below, attaching itself to rocks by means of byssus threads. It can easily be gathered by pulling it off the rock and many can be collected because they occur in groups in abundance as noted above. The mussel, however, does not usually survive well on archaeological sites and is often powdery and much degraded. It is likely that on many archaeological sites where mussel is identified it will be significantly under-represented.

The cockle, *Cardium edule*, is harder to exploit because it burrows superficially in sand or mud and therefore needs to be dug or raked out. It tends to be found on the middle and lower shore in great numbers, forming dense cockle beds. Like the mussel, it is widely collected for food today.

The scallop, *Pecten maximus*, is an offshore species. Usually this species only occurs in small numbers on a site. They provide good meat and may have been consumed, but the shells may also have been collected because the large flat valves are good raw material for tools (see Section 3.5). They make good 'plates' and the lower convex valves make good containers. There are several scallop fragments throughout the midden at Sand and one does appear to have been deliberately cut. Scallops that have been collected empty and worked have been found at other sites, for example Oronsay and Ulva (Mellars 1987; Russell *et al* 1995).

The carpet shell, sometimes termed a clam, belongs to the Veneridae family. It is hard to be sure of the species found at Sand because they are represented by a few fragmented pieces. Some fragments of razor shell, *Ensis* sp, have also been found. The razor shell is highly characteristic, up to eight times as long as broad. This mollusc is found on sandy shores but they are not easy to gather because they burrow so deeply and can move so rapidly through the sand, but again the shells can often be found washed up on the shore and the sharp edges may have been used in some way. It is worth noting that in many parts of Britain today they are considered an edible delicacy and collection is a specialised process.

In addition, a number of minute species, no larger than about 5mm were found. These have not been identified to species or quantified. They are unlikely to have been gathered intentionally but were either transported to the site on seaweed, where many of them live, or collected along with some of the other larger species.

One species which appears to be 'missing' from this assemblage is the oyster, *Ostrea edulis*. This is perhaps surprising because most other similar assemblages include some oysters, even if in extremely small numbers (Russell *et al* 1995; Tolan-Smith 2001; Mellars 1987). They may not have been sought after; on the other hand, the majority of species recovered from Sand are rocky shore dwelling species and it may well have been that oysters, which tend to be submerged and attached to a firm substrate, were not available here.

3.12.3.2 Relative proportions of species

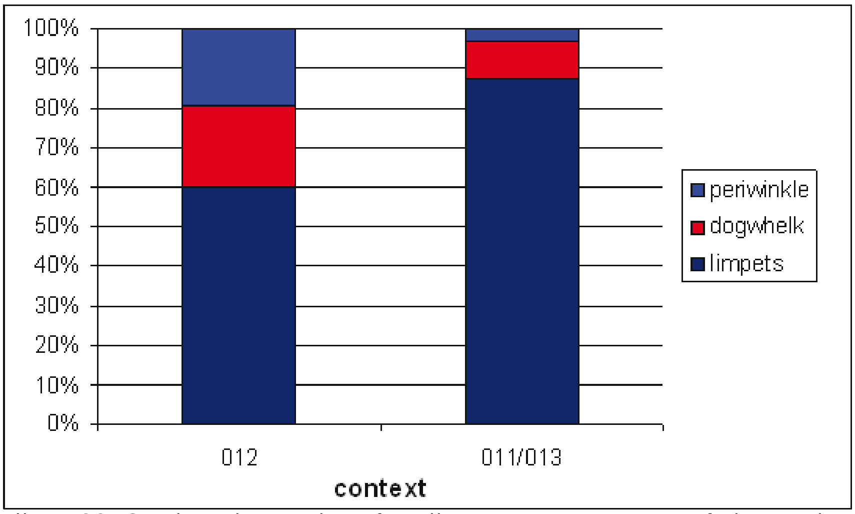
B25B

Eight species have been identified, Table 168 (below). The quantities of the three dominant species (limpet, dogwhelk and edible periwinkle) can be compared in a bar chart (see Illustration 493, below). The dominant species is the limpet, with dogwhelk second and periwinkle third. In Context 12, the top layer, the percentage of limpet to other species is lower (60%), with almost equal proportions of dogwhelk and periwinkle but in the main midden below this limpet constitutes over 85% of the sample. Mussel constitutes about 1% of the assemblage in each context. However, as already mentioned, a taphonomic bias is likely to mean that there were originally a greater number of mussels in all contexts.

Table 168

Sand 2000 B25B context	limpet	dogwhelk	periwinkle	mussel	flat periwinkle	clam/scallop	topshell	cockles	total MNI
12	1028	358	331	17	3	1		2	1740
13/11	32881	3521	1192	367	21	1	6		37989

Table 168: Table to show MNI for each species per context in square B25B



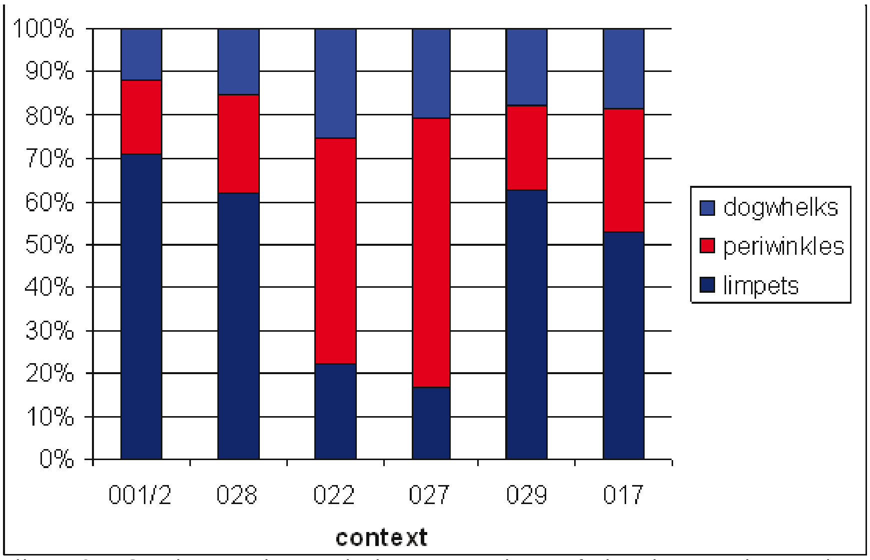
Illus 493: Sand, main species of mollusc as a percentage of the total MNI of those species, per context

Trench A

Table 169

Sand 2000 Trench A Context	limpet	dogwhelk	periwinkle	mussel	flat periwinkle	clam/scallop	cockle	razor	total MNI
1/2	3746	633	916		11		12		5318
28	2471	608	903	3	8		9	x	4002
22	145	167	348	1			1		662
27	17	21	64						102
29	680	192	214	1	1	1		x	1089
17	107	37	58		1		1	x	204
25	2	1							3

Table 169: Sand, MNI and presence of species in Trench A



Illus 494: Sand, Trench A, relative proportions of the three main species as a percentage of the total number of shells per context (25 has been excluded because the total MNI is so small)

Eight species have been identified in Trench A. The MNIs of seven of these species can be seen in Table 169 (above) and the presence of razor shell is denoted by an x. These results are presented as a chart in Illustration 494 (above).

Shells from 1/2 (shell mixed topsoil) were analysed from A1B and A2B. It can be seen from Illustration 494 (above) that the limpet was the dominant component of this context, followed by periwinkles and dogwhelks. Mussels, flat periwinkles and cockles were also present in much smaller quantities. In the slump at the front slope of the midden (28) the composition of shell species is very similar to the shell-mixed topsoil (see Illustration 494, above) that is mainly limpets, followed by periwinkles and dogwhelks and small numbers of mussels, flat periwinkles and cockles. There was also a significant quantity of razor shell from this context.

Context 28 overlay organic rich deposits (22) which had comparatively little shell content. Here, the dominant species is periwinkle. The slumped stony deposit (27) had even less shell material but, like 22, has a predominance of periwinkles. The sandy soils above the midden (17, 29) contain a relatively small number of shells with limpet as the dominant species followed by periwinkles and dogwhelks but very few other species, although razor shell does appear to be present in both contexts. Although these layers contain a lot of stones that had been heat affected there is no visible signs of heating or burning on the shells. Further down slope there was no midden (squares A5B and A6B) and no shells, though three shells were found in 25 (A6B), probably having fallen down slope (consequently this has not been represented graphically).

3.12.3.3 Comparison of trenches A & B

It is estimated that there are about 50,000 shells within the two squares B25B. In A1B there are approximately 8,500, A2B – 2000 and in the rest of the trench less than 700. It is difficult to estimate how many molluscs must have been gathered in total for the whole midden but, if the squares around B25B are similar in size and then tail off as they do in Trench A, then a very rough approximation would be anything between 150,000 and 300,000 shells.

There appears to be some degree of homogeneity throughout the midden: limpets tend to predominate, with the exception of Contexts 22 and 27 in Trench A. Periwinkles and dogwhelks can also be regarded as key species throughout. However, there are some subtle differences and the two areas are fairly different in terms of proportions of species and, in some cases, types of mollusc.

Mussels are more common in B25B than in Trench A. It is possible that this is due to taphonomic processes but there is no obvious reason why there would be a variation in preservation between two midden areas which are so close to each other. Topshell is only a minor species and occurs in very small numbers but it too only occurs in B25B. Conversely, razor shell is present in Trench A but does not appear in B25B.

In terms of relative proportions of species there is a greater amount of limpet in B25B, where limpets constitute almost 90% of the material in the main midden 13/11. In Trench A, however, there is no more than 70% limpet in any context and, if the topsoil (1/2) is not included, then limpet only accounts for 50–60% of the shell material in Contexts 28, 29 and 17. The contexts at the base of the midden, 22 and 27, are interesting in that they contain a majority of periwinkles.

In summary, the differences in shell content between the two areas are very probably significant. Trench A is thought to represent tipping from further upslope, that is in the vicinity of B25B. It is likely that the deposits in Trench A are slightly later stratigraphically and perhaps even came from above the contexts now in B25B. The observed differences may represent subtly different gathering strategies through time. These differences can be investigated further by taking measurements of the shells.

3.12.4 Limpet size and morphology

The measurements of limpets can be compared between contexts in order to determine whether there is any change in size through time. This phenomenon is often used to determine the intensification of human predation or a change in the ambient environment or climate (for example Bailey & Craighead 2003; Mannino & Thomas 2001 & 2002; Milner 2004a). To understand fully which of these factors may have played a part in a change of size it is important to have some age information as well as size measurements (Claassen 1998:45). Without this it is impossible to say whether a sample which appears to be smaller is simply younger, the average age being pushed down through exploitation of older specimens, or whether changing conditions mean a reduction in growth. In the present study it has not been possible to age the molluscs. Nevertheless, a preliminary investigation of size has been conducted in order to make a comparison between contexts.

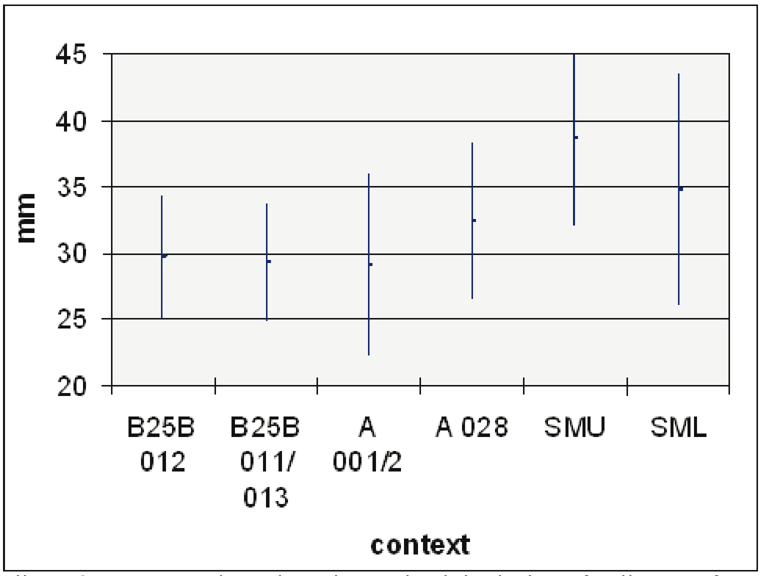
The morphology of the shell may also be assessed. Although they move around whilst feeding, limpets do not move between zones along the shore and the shape of the shell is partly determined by the position on the shore. Limpets living near the high tide mark (upper shore) have taller, more conical shells, whilst those at the low tide mark (lower shore) have much flatter shells. This is related to the force with which the limpet attaches itself to the rock and the amount of time it is out of water. When out of the water the muscles contract keeping the limpet firmly attached to the rock which reduces water loss. This pulls in the mantle which secretes the shell thus affecting shell shape. Therefore by calculating the ratio of length to height of the shell and comparing with modern shell morphology, the gathering strategy of the shell collectors may be assessed (see for example Mellars 1978; Russell *et al* 1995).

In this study, measurements were taken on the complete limpets to 0.1mm using electronic calipers. The length (L1) is taken across the longest length and the height (L2) is measured from the apex to the base of the shell. It must be remembered that many of the limpets in the midden were fragmentary and therefore the number of complete limpets is significantly smaller than the MNI per context. Sampling was not employed and, in most cases, all limpets that could be measured were measured. In Trench A there were very few measurable limpets in some of the contexts and therefore these contexts have been excluded because the sample size is too small. Results from 1/2 and 28 will be used. A good sample size was also obtained from B25B. The measurements of all limpets can be found in Appendix 16.

This section will be divided into two parts. Firstly the lengths of the limpets will be compared between contexts, and secondly the morphology of the limpets will be assessed.

3.12.4.1 Comparison of average length

When the average lengths and standard deviations are compared, the results seem to demonstrate some similarity in size between contexts, although the mean of Context 28 is slightly greater than the other means (see Illustration 495, below). Interestingly the modern limpets are on average larger than the archaeological samples, particularly those from higher up on the shore. These observations can be tested further using analysis of variance to see whether the differences are significant, that is that the differences between groups are due to some systematic influence and are not due to chance. ANOVA multiple comparisons calculated using SPSS actually show a significant difference at the 0.05 level between several of the contexts (Appendix 19). The modern controls are different to all of the archaeological contexts (with the exception of the lower shore limpets and 28), and to each other.



Illus 495: average length and standard deviations for limpets from Sand
SMU= Sand modern upper shore (N=50), SML= Sand modern lower shore (N=51),
12 (N=391), 11/13 (N=11749), 1/2 (N=82), 28 (N=72)

Problems arise, however, when trying to interpret these differences. There can be many reasons for changes in shell growth and Claassen (1998:113) believes that there is no way of differentiating between influences such as impacts of recruitment, predation-mortality, discard behaviour and sampling. This has been debated (for example Mannino & Thomas 2002) but in the case of Sand the changes in sizes observed are unlikely to be meaningful. The larger modern limpets may be larger because they are not currently gathered by humans, but there may also be some environmental explanation; the ambient environment no doubt having changed in many ways since the Mesolithic.

Relatively speaking, the midden at Sand is very small, compared for instance to the Danish kitchen middens where a change in size through the vertical stratigraphy could feasibly be hypothesised to be a result of human predation. In the case of the smaller limpet middens of the west coast of Scotland it is difficult to say how intensive the pressure of gathering would have to be to actually create an observable change in size. The fact that there is no dramatic change here between 12 and 11/13 may suggest that limpet gathering was a sporadic activity carried out on a small scale but there is a lack of stratigraphy which means that it is very difficult to test. Although there could be 150,000 shells within the midden, steady collection of about 300 limpets a day for a period of a month every year would quickly build up a midden the size of Sand within a generation of about 16 years. The collection of 100 modern limpets on the beach appeared to be a very small percentage of the overall population today. Without any data on the Mesolithic natural population, without data on limpet recruitment and without knowing how far afield people were gathering limpets, it is impossible to model how the natural population may have been affected.

3.12.4.2 Morphology

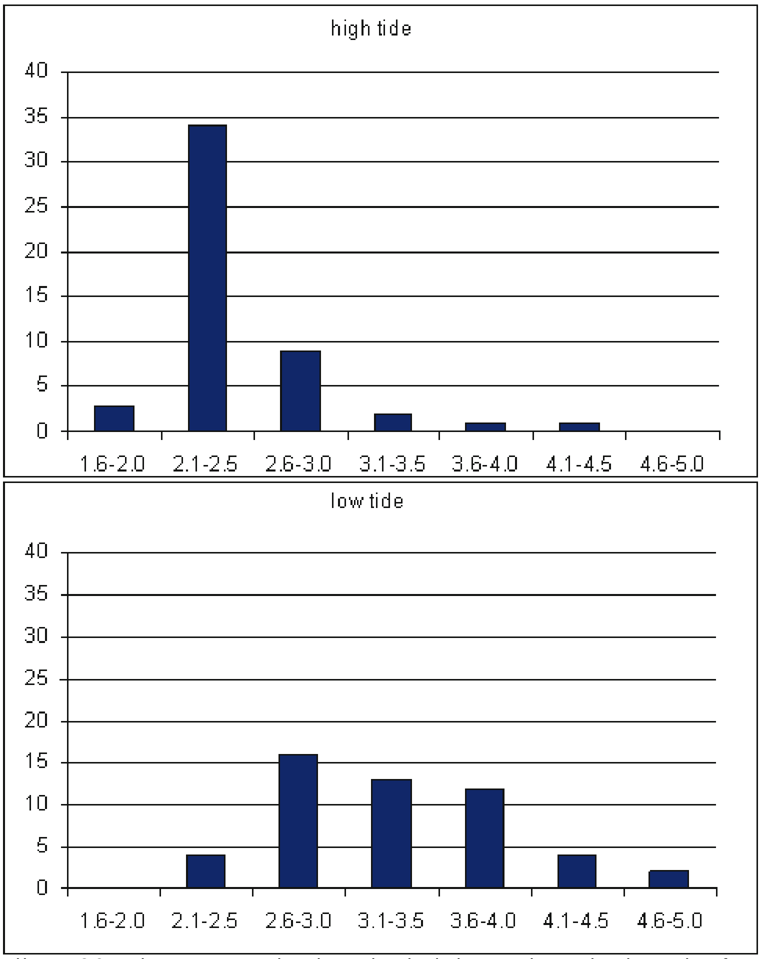
The limpets from B25B and Trench A (the vast majority of measurements are taken from A1B) were measured and the ratio of height to length calculated. In order to make a distinction between the zones of the shore from which limpets may have been gathered it is important to use a modern control so that the variation in shape between upper and lower shore limpets may be properly understood.

Usually histograms are used to present the results of height/length ratios (Mellars 1978:fig 8; Russell *et al* 1995; Tolan-Smith 2001:Illus 61). However, it is possible that this representation can skew the data because the ratios obtained are placed into arbitrary groupings rather than considered as individual points. This is a fundamental problem because it directly affects interpretation. To illustrate this point the data from the modern controls and an archaeological sample will be presented in histogram form and then in scattergrams.

As can be seen in Illustration 496 (below), there is a difference in modern limpet morphology between the upper and lower shores. If the archaeological limpets from A1B Context 1/2 are presented in histogram form and compared to the modern controls, it could perhaps be interpreted that they were being harvested mainly from the lower shore (see Illustration 497, below). However, this interpretation changes if a scattergram is used. In Illustration 498 (below), there is a clear difference in morphology between the lower and upper shore limpets, with very few exceptions. When the archaeological limpets from A1/2 are laid over this distribution (see Illustration 499, below) two important points can be observed:

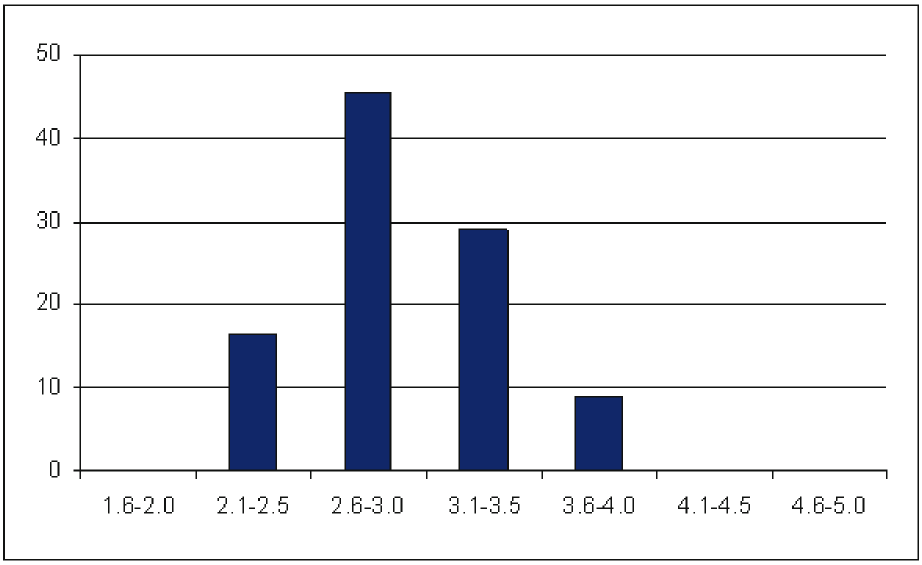
1. the archaeological assemblage is different to the modern controls (as already observed in the ANOVA tests) in that in general the shells are smaller and have a different curve on the graph; the modern controls therefore should not be used as a direct comparison;
2. if an interpretation was to be made from this graph, it is arguable that limpets of various sizes were being collected from both the lower and upper shore. Although the smaller shells look as if they fall into the upper shore zone this is unlikely to be real and more probably due to the differences between the modern and archaeological populations. Skip Charts.

Illustrations 496–499

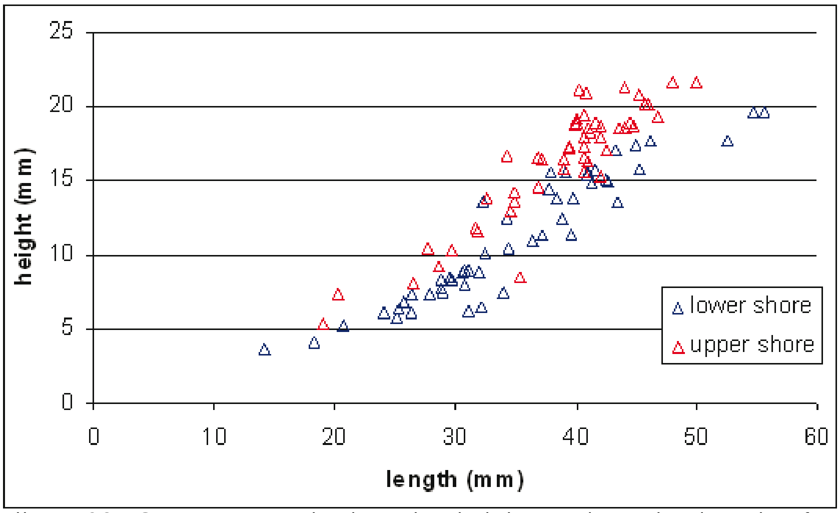


Illus 496: Histograms plotting the height against the length of modern limpets, collected from the lower shore and upper shore

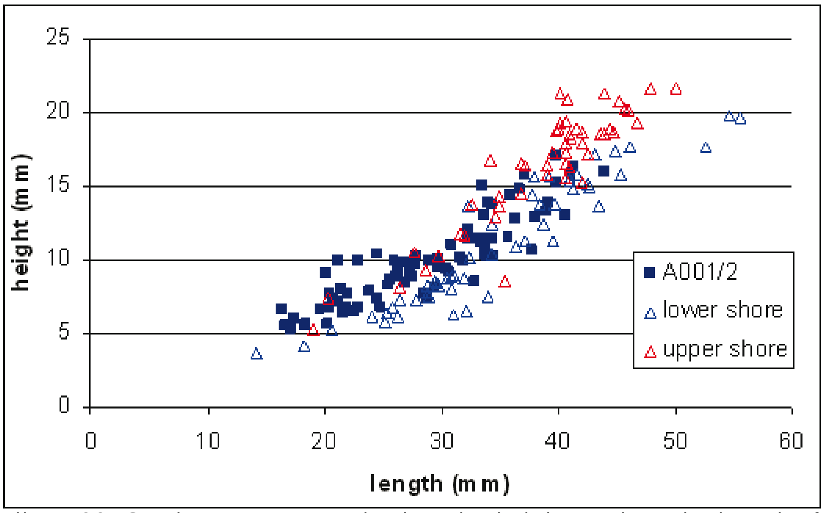
at Sand, October 2003. The groupings are equivalent to those in similar studies (for example Russell *et al* 1995:282)



Illus 497: Sand, histogram plotting the height against the length of limpets from A1B 1/2

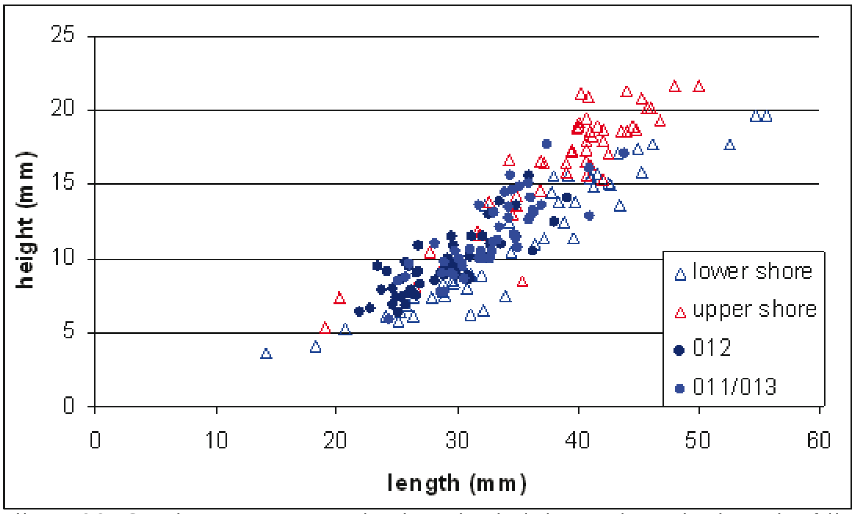


Illus 498: Scattergram plotting the height against the length of modern limpets, collected from the lower shore and upper shore at Sand, October 2003



Illus 499: Sand, scattergram plotting the height against the length of limpets from Trench A, Context 1/2 and this is then overlain by the data from the modern limpets

For each of the contexts in B25B a random sample of 50 limpet measurements has been plotted (see Illustration 500, below). It can be seen that the scatter of modern limpets again falls over the archaeological distribution suggesting that limpets were collected from both shore zones. Again it is difficult to compare the modern limpets with the archaeological ones because the modern ones appear to be much larger.



Illus 500: Sand, scattergram plotting the height against the length of limpets from B25B and measurements from the modern limpets

The results of this analysis show that both tall and squat limpets were being collected, and the likelihood is that collection did not concentrate on one zone of the shore alone. At many of the other archaeological sites which have been examined the results tend to suggest that limpets are gathered from the lower and middle shore, for example at Caisteal nan Gillean, Oronsay (Mellars 1978:387), Ellary Boulder Cave (Tolan-Smith 2001:114) and Ferriter's Cove (Woodman *et al* 1999:99). It is possible, however, that the use of histograms in presenting this type of data can create a false outcome and, in reality, the results may not be so clear cut. It is also important to note that there will be differences in limpet morphology through time and the analysis of modern limpets as an analogue should be used with caution.

3.12.5 Dogwhelk size and morphology

Dogwhelks can be measured like limpets in order to determine whether there is any change in shape or size through the midden. For example, Russell *et al* (1995) found that at Ulva there was an increase in dogwhelk size in the uppermost layer of the midden, but because so few dogwhelks were exploited it was suggested that this change should probably be attributed to ecological factors.

When dogwhelks occur on archaeological sites they also tend to be measured in order to reconstruct the palaeo-environment (for example Andrews *et al* 1985; Russell *et al* 1995). The height of the shell and the height of the aperture are measured and the ratio determined to assess morphology. Elongate shells with narrow apertures tend to be found on sheltered shores and are thought to provide a defence against crabs which are more abundant in these locations. Those dogwhelks found on exposed shores have wider apertures and are squatter. Andrews *et al* (1985) found that the difference in height/aperture ratio between modern and archaeological dogwhelks on Oronsay was perhaps suggestive of increased storminess today. Russell *et al* (1995) also made a comparison of modern dogwhelks with those found in the archaeological midden at Ulva and again found that there was a significant difference; the archaeological shells being more elongate. Again, this may be attributed to increased storminess, though it is also suggested that the changing morphology may be attributed to changing coastal configuration through changing sea-level during the Holocene.

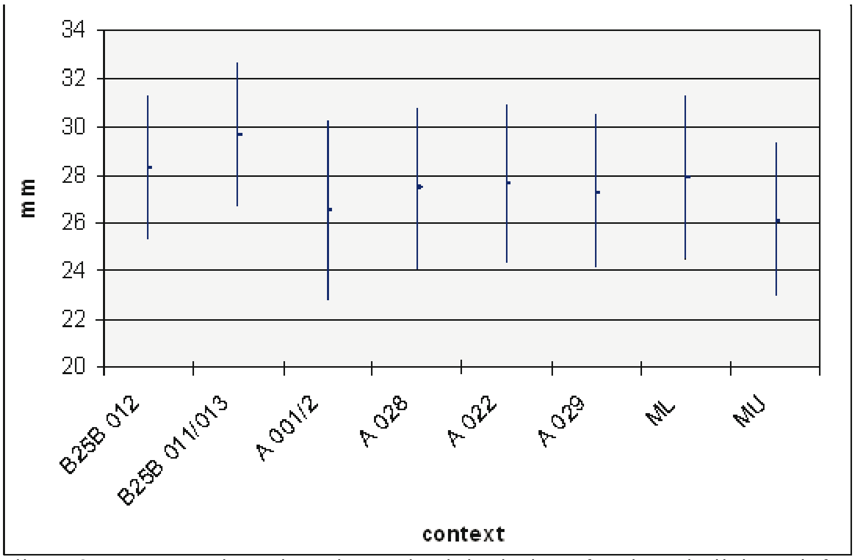
3.12.5.1 Comparison of average length

It can be seen in Illustration 501 (below), that there appears to be a small difference between dogwhelks in B25B and those in Trench A: if the Trench A deposits are later in date this suggests that the dogwhelks are becoming slightly smaller through time. In comparison with Ulva cave, all the dogwhelks from Sand are rather large. The average size for the lower three layers at Ulva was around 25mm, but it increased to almost 29mm in the top layer (Russell *et al* 1995:Table 5).

Again ANOVA tests were made at the 0.05 level and these demonstrated further differences between the contexts within B25B, but no real differences between the Trench A contexts. The modern dogwhelks are shown to be different to the B25B dogwhelks. As with the limpets, it is very difficult to interpret these differences.

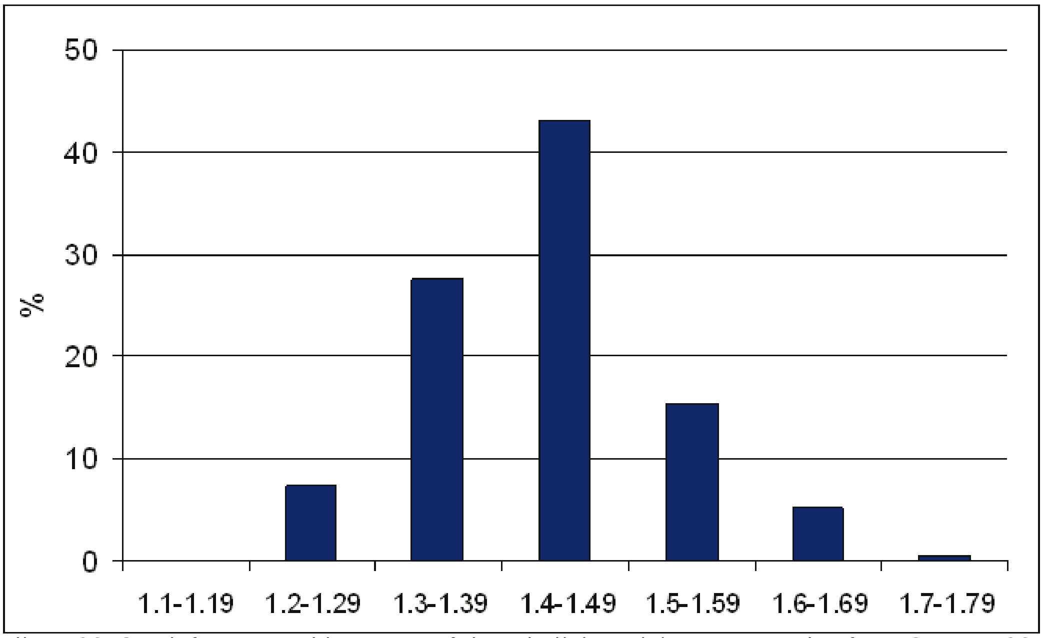
3.12.5.2 Dogwhelk morphology

Despite there appearing to be a difference in size of dogwhelk between the two areas of the midden, there is homogeneity in morphology with the modal class ratio 1.4–1.49 for dogwhelks. Illustration 501 (below) shows the typical distribution of ratios. The dogwhelks from the modern shore are also the same.

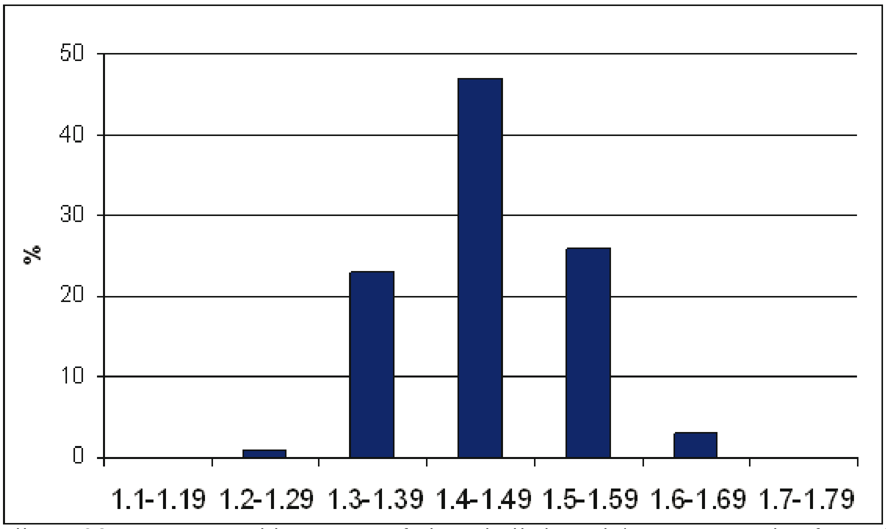


Illus 501: Average length and standard deviations for dogwhelk length from Sand 12 (N=249), 11/13 (N=1333), 1/2 (N=350), 28 (N=326), 22 (N=65), 29 (N=58), ML= modern lower shore (N=50), MU= modern upper shore (N=50).

Compared with the dogwhelks from Oronsay, those from Sand (ancient and modern) are very squat (see Illustrations 502 & 503, below). The mean length/aperture ratio from the sheltered east coast of Oronsay is 1.73 and 1.64 on the exposed west coast (Andrews *et al* 1985). The results from Ellary demonstrated even more elongated shells with a mean of 1.84 (Tolan-Smith 2001:116). The dogwhelks from Sand look to be fairly similar to the archaeological samples from Ulva although those from Ulva may be even slightly squatter (Russell *et al* 1995:Illus 13).



Illus 502: Sand, frequency histogram of dogwhelk length/aperture ratios from Context 28 (N=326).



Illus 503: Frequency histogram of dogwhelk length/aperture ratios from the

collection of modern dogwhelks (N=100) from the beach at Sand.

This data is perhaps surprising considering that the dogwhelk length/aperture ratio is considered to be related to shore exposure: Oronsay is probably more exposed to the elements than Sand or Ulva and yet the dogwhelks there are more elongate suggesting a sheltered shore. However, there are some caveats to the interpretation that the ratio is related to exposed or sheltered shores:

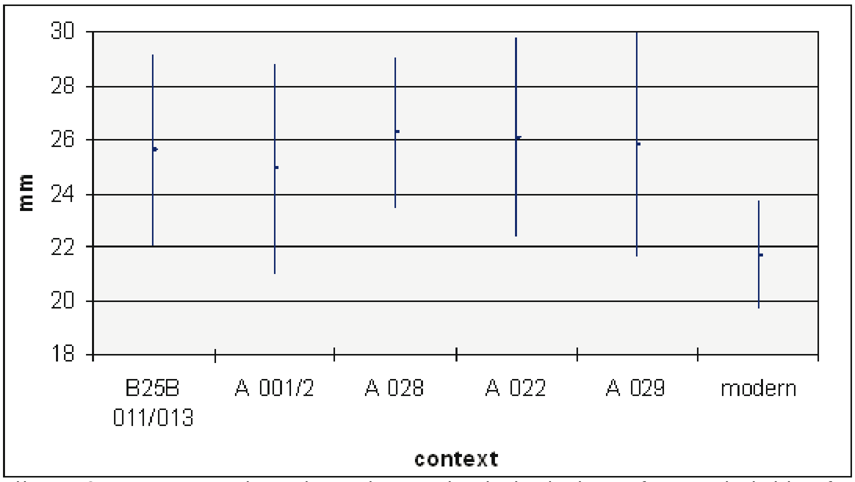
1. the intensity of the predation of crabs will affect the morphology; crab remains have been found at the site but of course the numbers of crabs on the beach in the Mesolithic is unknown (see Milner, Section 3.13) and
2. the genetics which may influence shape are also poorly understood and may apply differently to island populations (Andrews *et al* 1985).

It is thus impossible to offer an interpretation of the morphology of the dogwhelks from Sand.

3.12.6 Periwinkles

The edible periwinkle is fairly robust and survived well in the midden at Sand. Periwinkles were measured simply by taking the height from apex to the bottom of the aperture. Little can be said about the results. As with many other sites there is no variation in size through the midden, (see Illustration 504, below; for example Russell *et al* 1995; Milner 2004a). From the relatively small quantities gathered one would not expect to see any change in size due to exploitation patterns.

There is, however, a significant difference between the archaeological and the modern periwinkles. Unlike the modern limpets that appear to be larger than their archaeological counterparts, the periwinkles are much smaller on the beach today. The reason for this is unknown but it is likely to be due to differences in habitat and environment since the Mesolithic.



Illus 504: Average length and standard deviations for periwinkles from Sand. 11/13 (N=948), 1/2 (N=302), 28 (N=254), 22 (N=105), 29 (N=61), modern (N=50)

3.12.7 Summary and discussion

In summary, the following results can be presented:

- Like other middens in the area, Sand is dominated by limpet, with significant numbers of dogwhelk, periwinkle and mussel.
- There are two contexts in Trench A where periwinkle rather than limpet dominates the assemblage: an organic rich deposit (22) and some stony slumping (27), both of which lie outside of the midden. These may represent a slightly different episode of gathering or consumption, which could be the result of many different things, such as a seasonal change in gathering.
- There are a number of other species present but these occur in much smaller numbers. They may have been consumed (for example possibly the razor shells), or perhaps been gathered for their aesthetic qualities or even accidentally (for example the flat periwinkles) and some may have been used for other purposes, for example scallops as implements. But it is of course possible that consumption and other uses were entwined for some of these species, such as scallops which are both useful and considered good to eat.
- There are some differences between the two areas of the midden, B25B and Trench A: there is more mussel in B25B; limpet constitutes a greater percentage of the assemblage in B25B; topshells are also found here but not in Trench A; and the razor shell is only present in Trench A. Again this suggests some variation in gathering and consumption through time.
- Surprisingly, no oyster has been found in the midden even though it has been found in small numbers in similar (though later) middens elsewhere around the Inner Sound (Section 2.2). The assemblage is a rocky shore assemblage however, and few other bivalves are present either so the lack of oyster may be environmental.
- It is estimated that there are about 50,000 shells within B25B and about 9,000 in Trench A. A very rough estimation would suggest anything between 150,000 and 300,000 shells in the midden overall.
- There are some differences (often very subtle) in the samples of limpets measured but it is impossible to say what has caused them. It is unlikely from a midden of this size that there would be any dramatic decrease in size due to heavy human predation, unless the midden had accumulated very rapidly within a

couple of years and the natural population of limpets had not had time to recover. However, it is more likely that the subtle differences are a result of gathering on different parts of the shore, or due to minor changes in the ambient environment.

- There is no conclusive evidence to suggest that limpets were being exploited from a particular zone of the shore.
- There is a variation in dogwhelk size between contexts but these variations cannot be explained.
- The morphology of the dogwhelks in the archaeological contexts is very similar to those from the modern shoreline. They are fairly squat in shape, (compared to the archaeological dogwhelks from Oronsay) which is thought to be indicative of a fairly exposed shoreline, but the morphology of the shell can be related to a number of factors.
- There is no meaningful difference in the size of periwinkles, except that it can be noted that modern periwinkles are much smaller than their archaeological counterparts. The reason for this is unknown.

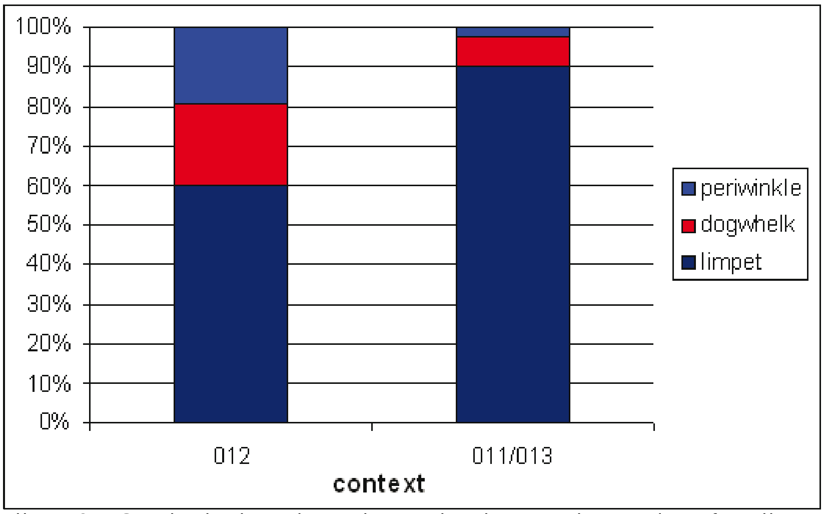
3.12.7.1 A critique of the methodologies employed

Shell midden analysis is expensive and time consuming if dealing with vast quantities of material. For Ferriter's Cove it took over 1,360 hours sorting and identifying shells and fragments (Woodman *et al* 1999:93). For this project, not including the hours spend in the University of Edinburgh sorting the midden material which included identifying and sorting out the shell species, the counting and measuring took in excess of 400 hours. This type of analysis is important but, having finished this project, it is possible to see ways in which economies of both time and money might have been made as well as thinking of ways in which meaningful results can be obtained. Each midden will of course be different and this must always be taken into account, but the following section sets out some of the methodological issues that have been raised.

In terms of sampling, as Claassen (1998:100) has demonstrated, many scholars have discussed how to sample a shell midden but

> "there is no specifiable amount of matrix that can be deemed statistically adequate for world-wide application, nor can there be a fixed size of sample useful world-wide".

In the case of Sand, though only about three quarters of B25B (note: as mentioned in the introduction this encompasses two squares) was sampled for analysis, it is possible that even this quantity was excessive for the purpose of determining an approximation of the relative proportions of species. If instead we take one quarter of the sample and calculate the relative quantities of the predominant species, the resultant bar chart (see Illustration 505, below) is remarkably similar to the original one representing three quarters (see Illustration 493, above). As there are inherent biases in sampling as well as taphonomic issues, perhaps it would be better to examine smaller columns of material (for example 25cm³) right across a midden than expend resources on whole cubic metres. It was certainly beneficial to sample from several areas of the midden which demonstrated that the midden was not homogenous.



Illus 505: Sand, The bar chart shows the three main species of mollusc as a percentage of the total MNI of those species, per context for ¼ of B25B.

In relation to determining relative proportions of species, it is important to consider the ways in which the species are quantified. In this study MNI was used, but in the test pit analysis it was found that weighing was much quicker. The set backs of weighing were highlighted above (Section 3.12.3); however, it is possible that some of these can be dealt with. For instance, the problem of some shells weighing heavier than others can be rectified by taking mean weights of each species and weighting the results accordingly (Section 2.2). This can also be tested using a sample and conducting both MNI counts and weights. If weighing is used it would save a lot more time, however, it would also mean that residues need to be sorted, as much as possible, into species. Woodman *et al* (1999:94) used comparative samples of modern crushed shell to aid in identification of shell fragments. Once the sorters are familiar with residue it need not take long to sort, especially in a midden such as this where limpet predominates and periwinkle and dogwhelks are usually less fragmented and easy to distinguish from limpet.

The measuring results carried out on various species demonstrated in some cases differences between contexts and with modern controls but problems arose with interpreting the results. There are many possible reasons for these changes which are most likely to be connected to changes in the ambient environment, but it is very difficult to identify them. In addition, there also appear to be problems with the morphometric analysis of limpets. It is important to consider whether the modern controls are really comparable and, if they are, what method should be used to identify patterns. The scattergram approach may be more reliable than histograms, though different methods should be tried and tested each time. In their analysis of limpets from La Riera, Spain, Bailey & Craighead (2003) use a more complex method for determining whether limpets were being gathered from low shore, upper shore, sheltered and exposed positions, which includes height, length and width measurements applied to mathematical formulae. It should be noted, however, that this is used for a deep midden sequence spanning the Solutrean to Asturian and this is used in conjunction with other techniques in order to explain size changes noted through the stratigraphy.

Although patterns emerge in many of these studies, it is usually difficult, if not impossible, to interpret the reasons for these. For example Cabral & da Silva (2003) studied limpets from an Iron Age shell midden in Portugal and found that the sizes were very different to modern populations. However, although it was noted that the differences could be due to an increase in wave action and intensity which may be related to an alteration in the morphology of the coast, it was also suggested that it may be related to gathering strategies as well.

There is also little consensus as to why people would be exploiting limpets from either of the different shore zones. Russell *et al* (1995) demonstrate that the limpets were mainly collected from the middle and lower shore and posit that this is perhaps because the lower shore zones were more productive. Mellars (1978:388) discusses work carried out by Fowler (1974) on limpet morphology at Oronsay which indicates that people were gathering limpets from the lower shore. It is suggested that either the limpets are preferable from this location because they are more tender and palatable (see also Russell *et al* 1995; Woodman *et al* 1999) or that this pattern reflects the results of over-exploitation of limpets in the higher and more easily accessible parts of the tidal range and the lower shore is exploited once these are depleted. This however, begs the question, of whether these larger, higher shore limpets are visible in the older layers at the base of the midden. Additionally, Bailey & Craighead (2003:193) hypothesize that in cost-benefit terms they would expect low-shore limpets on sheltered shores to be favoured because this is where the larger limpets grow. The explanation for observed changes at La Riera from the exploitation of lower shore limpets to upper shore limpets in some contexts is that cold and bad weather may have restricted access to the lower shore, as opposed to increased population pressure or over-exploitation.

Perhaps before embarking on measuring limpets we should consider whether the question “Where on the shore are limpets being collected from?” is really an important or interesting question, or even whether any observed changes can be explained. Again this is dependent on the characteristics of the site. In this study the measurement data has provided little insight into the procurement and consumption activities of Mesolithic people or the palaeoenvironment. However, some morphometric analysis on larger middens has proved to be fruitful when built into more complex questions and investigations (for example Bailey & Craighead 2003).

If such studies are to be undertaken, the size of the sample to be measured should also be considered. In this study huge numbers of shells were measured and no sampling strategy was in place. Bailey & Craighead (2003:187–188) provide an interesting example of sampling for measurements. In the original study of the shell material in La Riera cave carried out by Ortea (1986), all of the 15,487 identifiable *P vulgata* were measured. Craighead (1995), however, measured a total of 2,128 spanning 30 layers of midden. What is significant is that, when the results of the two studies are compared, the means of both samples show no significant differences using a Student’s test. There is really only one level where there is a major difference, but here only a very small sample of five limpets was available to be measured by Craighead. It should be feasible in future studies to conduct tests which would determine statistically valid sample sizes so that, for example, perhaps a reduced sample size of 100 shells per context would suffice.

In summary, individual middens vary and it is important to consider what questions to ask before embarking on analysis. On larger or well stratified middens questions relating to changing sizes may be relevant if considering whether intensive human exploitation was taking place or examining changing environmental conditions. On smaller middens such as Sand it is perhaps useful to take other approaches. An estimation of the overall number of shells is useful, partly in deciding what analyses to use but also because it provides an indication of the scale of shell gathering activities. Very little work is usually carried out on accumulation rates which could be related to changes in the deposition of other material remains (fauna, artefacts etc) and theories on the nature and duration of the deposit. Accumulation rates could perhaps be investigated through identifying changes within the middens (for example in shell species, fauna, artefacts, stratigraphy and so on) and a study of shell fragmentation; a rapidly accumulating midden may contain more complete shell than an exposed surface (see also Petersen 2002 in Fischer & Kristiansen 2002). It is also sometimes possible to carry out seasonality assessments and methods on limpets are currently being tested by the author (see also Craighead 1995).

3.12.7.2 Procurement and consumption

The people who were dumping shellfish in this midden appear to be shell gathering on a fairly non-intensive basis. The midden is small compared to some middens in other parts of Europe, but it may also be that many shellfish were processed on the beach and not brought to the midden. The midden is located up from the beach below a rock overhang which would have provided a useful shelter in bad weather, but on better days it is possible that shellfish and other foods were consumed or processed on the beach.

The species of shellfish found on the midden are all fairly easy to procure, mostly living on rocks on the seashore. Although there is sometimes discussion on how limpets are removed from the rocks, because they cling on so tightly, in Charles Darwin’s words when considering the people of Tierra del Feugo:

Illus 506: dogwhelks in a cranny of rocks; these can easily be scooped off

Illus 507: Periwinkles occur in groups on rocks and are easily picked off or scooped up

> "To knock a limpet from the rock does not require even cunning, that lowest power of the mind" (Darwin 1845:206).

Admittedly, Darwin's views were rather biased and he considered these people to be savages, but the general point is true: limpets can easily be removed from rocks with a stone (perhaps a 'limpet hammer') or sometimes even by hand if the limpets have been submerged under water for a long period and they are not dehydrated (Birch, Section 3.4). It is unlikely that it was ever necessary to collect limpets by night (see for example Russell *et al* 1995; Woodman *et al* 1999). Periwinkles and dogwhelks are also easily scooped up. They do not cling so firmly to the rocks and congregate in large numbers (see Illustrations 506, left & 507, right). Although mussels occur less frequently in the midden, there may be some taphonomic bias at work and if this species was readily available on the shore, it too could easily have been collected in large numbers.

Once gathered, the shellfish may have been used for a variety of purposes, for example food, bait, ornaments, tools and it has even been suggested that dogwhelks may have been used as a source of dyestuff (Cerón-Carrasco 2005; Gibbons & Gibbons 2004; Hardy, Section 3.4). The archaeological shell, however, provides little clue towards the purpose or purposes for which different shellfish were used and the discussion is thus speculative.

The limpets which were taken back to the midden and processed could have been consumed in a number of ways. They are easy to remove from their shells, either by using a finger to scoop out the flesh (Birch, Section 3.4), or perhaps using another limpet shell (Fenton 1984:128). They may have been eaten in different ways: raw; lightly boiled or cooked with other foods, for example the survival expert Ray Mears cooks them up with seaweed. Very few, if any, signs of heating were noted on the limpet shells but, even when it does occur, this may not be related to cooking and could for instance be a result of accidental heating.

The other predominant species may also have been eaten: periwinkles are usually regarded as edible. They can be boiled which makes them easier to extract from the shell and then removed with a pin or similar implement as opposed to smashing the mollusc when fragments of shell get into the meat. Many of the periwinkle shells found on the site were whole and not fragmented. Mussels are also considered edible and again could have been boiled or roasted. As with the other species of shell, the mussel may have been cooked along with other ingredients. With regard to dogwhelks it is harder to find accounts of people actually eating this species. They are often thought to be very unpalatable and because they are carnivores their flesh is supposed to have a rather distinctive and unpleasant taste. However, chef Hugh Fearnley-Whittingstall (2001:304) does mention dogwhelks in several of his recipe books and suggests they can be gathered from the shore, boiled and eaten (with mayonnaise) and they are eaten in the Azores (Janice Light *pers comm*). It has also been suggested that periwinkles and dogwhelks may have been collected to add variety to the diet (Mellars 1978; Russell *et al* 1995), perhaps in much the same way as gastropods were collected to add variety to the Anbarra diet (Meehan 1982).

There is also the possibility that shellfish may have been gathered and used as fish bait. Fenton (1978 & 1984) recounts ways in which shellfish have been used as bait in recent times in Scotland and investigations have been carried out on the use of limpet bait in Viking Orkney (Milner 2004a). Mussels make excellent bait and were used so much that, by the nineteenth century, the supply of mussels could not keep up with demand. Limpets can also be used in a variety of ways but tended to be used for inshore fishing. One method in the Northern Isles was craig-fishing or fishing from the rocks. This involved mashing limpets into bait and scattering them on the water or chewing partly boiled limpets and spitting them out. This particularly attracted sillocks (year old coalfish or saithe) which could then be fished with a rod and fixed line or a net. Nets would be lowered into the water and the limpet mash thrown onto the surface of the sea, thus attracting a shoal of fish which can be caught in great numbers when the net is raised (Fenton 1978:538). The fish found in the midden at Sand are dominated by wrasse, young saithe and young pollack, all of which are found close to the shore and could have been caught by these methods (Parks, Section 3.11).

As shells are found on the Mesolithic middens, it could be argued that they are more likely to have been consumed directly than used as bait: why carry shellfish to camp and then back to the beach for fishing when they could be processed on the beach? However, historical accounts show that in some areas limpets were transported home to be shelled (Fenton 1984:128) and they were on occasion then left to rot a little as this made for better crab bait. As suggested in the analysis of the crab remains (Milner, Section 3.13), one method to use limpet bait is to punch holes into the limpet shells in order to string them onto lines. If they were used as bait in some form of trap or basket, they would then be returned to the midden along with the catch. The point here is not to prove that limpets were being used for fish bait but rather to raise the possibilities. In the long run, though it is likely that some limpets were being used for fish bait, it is also feasible that they were being used in direct consumption and perhaps in other ways.

The shells were also useful for other things. They may have been used as ornaments, and they provide a useful raw material suitable for a range of tasks. There is good ethnographic evidence for the use of shell in a number of ways (for example Stewart 1996). In addition to sharp edges (for example razor shell) shell may be cut and shaped and is relatively durable. Worked shell from Sand is discussed elsewhere (Hardy, Section 3.5).

In addition, there has been discussion in the literature as to whether dogwhelks might have been used to make purple dye in the Mesolithic, particularly at Ferriter's cove, Ireland (Gibbons & Gibbons 2004), and Geodha Smoo, Scotland (Cerón-Carrasco 2005). The dogwhelk has a vein of clear liquid near the head and this, when exposed to sunlight, turns green and then purple. The process of extracting the dye is not particularly straightforward however; careful extraction is needed and simple smashing out of the shell does not serve. An account by William Cole (1685) describes how the animal can be cracked open, the shell picked off, the vein dug out and the liquid applied to fine linen or silk. Large quantities of dogwhelks would be needed to create a usable amount of dye, and mordants and additives are also necessary (Janice Light *pers comm*), though perhaps not for some purposes such as temporary body paint. The small quantity and condition (that is whole) of the dogwhelks from Sand make it unlikely that people were using them for dye, furthermore, had this been the case, perhaps we would have expected the shells to be lumped together rather than scattered through the middens.

3.12.8 Conclusion

If we try and picture how people were using shellfish at the site of Sand, it is likely that many of the shellfish were consumed directly as an ingredient of a varied diet. In addition, they are likely to have served a number of other purposes such as bait and tools. Historically, the consumption of shellfish, especially species such as the ones found here, is often connected with poverty and a lack of cultural development. Therefore, discussions on the consumption of shellfish in the Mesolithic have all too often led to bleak images of hunter-gatherers eking out a sparse living on the coast. This perspective can be traced back to early historical accounts such as Darwin's observations of the Fuegians, during his voyage on the Beagle. He described these people as

> "living chiefly upon shellfish" (Darwin 1845:202)

and noted:

> "whenever it is low water, winter or summer, night or day, they must rise to pick shell-fish from the rocks; and the women… sit patiently in their canoes, and with a baited hair-line without any hook, jerk out little fish. If a seal is killed, or the floating carcass of a putrid whale discovered, it is a feast; and such miserable food is assisted by a few tasteless berries and fungi". (Darwin 1845:204).

In this 19th century account the Fuegians were also described (amongst other things) as poor wretches, wild men, cannibals and barbarians which was the type of image some archaeologists in the early 20th century projected onto the shell gathering people of the Mesolithic period (for example Childe 1925 & 1956). Clark (1952:62) also comments that diets in which shellfish are a mainstay are usually associated with a low level of culture, although he may be referring to the views of others such as Childe, rather than his own perception of Mesolithic people which tended to be more positive. In the case of the Fuegians, many of these early preconceptions have since been deconstructed (McEwan *et al* 1997).

Many other ethnographic sources also describe shellfish as a 'poverty' food. As Fenton (1978:542) notes, the Shetland saying "to gang i' da wylk ebb" means "to be reduced to poverty". However, these attitudes are modern and biased and should not be applied back to the Mesolithic period: shellfish have perhaps been considered a food of the poor in recent times because they are free and can be gathered by people who have no money to buy food, but all food was 'free' in the Mesolithic, and resources and food would have been viewed very differently. Indeed, Wickham-Jones (2003) has shown that limpets are considered a delicacy in some areas of the world and can be used in a variety of ways including as charms and for medicinal purposes.

The preconceptions that shellfish represent a time of poverty and hardship contrast strongly with the luxury role of shellfish in today's culture. Rather than using modern perceptions to view the consumption practices of the past, it is perhaps more useful to consider the ways in which people were procuring and consuming foods in the past and to reflect on the variety and richness of resources that would have been available to them. In the case of Sand, we can see that shellfish were an integral part of life: not only as a raw material but also as part of a rich and varied diet which also included other marine species such as crab and fish, terrestrial animals and, no doubt, plants.

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3.13 Consumption of crabs in the Mesolithic: side stepping the evidence? | Nicky Milner

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports. From here you can download the file 'Milner_Crabs.pdf'.

3.13.1 Introduction

A study of crab recovered among the residues from the sieved midden material at the Mesolithic site of Sand has revealed a surprising quantity of remains. An examination of the literature, however, demonstrates that the consumption of crabs is very rarely discussed in Mesolithic studies. Even Grahame Clark, who wrote extensively about the ways in which different types of animal may have been procured, did not consider crab (see for example Clark 1952).

Some studies of crab are undertaken in other parts of the world and for other periods but it is often noted that there is a lack of research into the exploitation of this animal. Serrand (2004) has recently been studying crab exploitation by the pre-Columbian people of the Antilles and work on crab consumption has been carried out in Oman and the Arabian Gulf by Hogarth & Beech (2002). There is also evidence of crab consumption from some Roman and Medieval sites in Britain (Nicholson 1988; Lindsay Allason-Jones and Terry O'Connor *pers comm*), for example fragments of edible crab were found in late second-century AD deposits at York (Alcock 2001:54) but usually the data is only referred to in passing.

So why has the evidence been ignored? For Mesolithic studies the traditional focus of enquiry has concentrated on broad topics such as the overall economy, ranking of resources and calculations of calorific values, meaning that many 'unimportant' or 'minor' resources (such as shellfish, plants, small mammals and so on) gain little or no attention (though see Milner 2002; Wickham-Jones 2003). If these minor resources are considered at all it is often as a peripheral foodstuff, used to plug a gap in the seasonal resource cycle (for example Rowley-Conwy 1984). Consequently, Mesolithic dialogue often retains an androcentric bias with a proliferation of 'boys and arrows' narratives directed on the importance of the deer hunt (Finlay 2000a).

However, the study of resources should not be explored solely within these empirical frameworks. Ethnography demonstrates the wealth of taboos and rituals which can be associated with hunting, fishing expeditions or shell gathering events and the maintenance of social relations is as fundamental to these activities as the goal of finding the next meal. Equally, once a resource is transformed into food it is not merely sustenance; food also creates and constitutes social relationships and it is rich in symbolic meaning and metaphor. These aspects of food studies have been explored by historians, anthropologists and social scientists in the last 20 years but archaeology is only beginning to follow their lead (Milner & Miracle 2002; Parker Pearson 2003).

Each species found within a midden is one of many ingredients in the overall diet of the people who used the site. We have no idea how Mesolithic people perceived different animals in terms of ideology and the supernatural, which tastes were favoured, which foods had symbolic significance, whether some were regarded as high or low status food and whether complex prohibitions were played out. From ethnography these types of meanings and metaphors are usually evident but do not necessarily correlate to optimum foraging theories, calorific values, return rates and so on and attitudes change according to culture. For instance, the crab is often perceived as a fairly anomalous creature in that it can live in both water and on land and it walks sideways; because in some cultures it does not easily fit into set categories it becomes proscribed (for example Douglas 1966) but in others it is valued as a rich and tasty food. In this sense, perhaps a different approach can be taken which considers all foods equally worthy of study. Therefore, rather than dismissing crab as an unimportant resource, the study of crab remains can lead to questions such as: how were they procured; were they eaten or used as bait; were they cooked; where were they deposited? This paper is therefore concerned with the procurement, processing, consumption and deposition of crab, thus providing a more intimate picture of people and their life on the seashore and at the rockshelter of Sand.

3.13.2 The evidence

Illus 508: Sand – the range of crab claws

Illus 509: Sand – some fragments which appear to belong to the carapace of larger crabs

The material from the midden was sorted initially by students at Edinburgh University and any crab remains were separated out. The part of the body that appeared to survive best was the claw (see Illustration 508, left). Claws are fairly robust, especially in the larger crabs, but they are also the more easily identifiable part of a crab and perhaps during sorting were recognised more often than other parts of the animal. It is also possible that some of the specimens may be lobster but currently it is difficult to differentiate between the two. Some parts of the walking legs survive but there are far fewer examples of these. There were also some fragments which appear to belong to the carapace (exoskeleton) of larger specimens (see Illustration 509, right). These can be recognised because the rough texture of this part of the crab is usually very distinct. There was no clear evidence of abdomens or other less robust parts such as the flattened fifth legs which belong to some species, for example the swimming or harbour crab Liocarcinus depurator.

In summary, the more robust parts of the skeleton appear to survive best, which is perhaps not surprising. Many factors could have affected the survival of the crab skeleton. The crabs may have been cooked in a variety of ways (discussed below) and burning, which is evident in some cases, may have made the skeleton more brittle and liable to fragmentation. Some crabs may have been broken up intentionally in order to get to the meat, in which case there is less chance of preservation. The elements will also have been subject to a range of taphonomic factors such as physical, chemical and biological processes, following deposition on or in the midden and consequently some elements may have been destroyed (O'Connor 2000).

There is no easy way to quantify the material: many cultural and natural processes have had varied affects on the remains and quantification can only provide a figure of how many crab claws are found in the excavated part of the midden. It is very difficult to say how many crabs were caught overall during the accumulation of the midden, calculations could vastly under-represent the nature of crab catching and consumption. There are added complications in that each crab has two claws and these, in turn, have two parts (upper and lower) therefore each crab has four pieces of claw to be counted; it is almost impossible to match any of these up, though no doubt some of those recovered were once joined. Although an MNI could be calculated by dividing the total by four, this only provides a figure which can be used to demonstrate that crab was relatively unimportant in the overall economic picture. Instead, a very rough quantification was made: the intention was not to produce a definitive figure, but rather to obtain an approximate representation of the amount of crab found in the midden.

The different sizes of crab, the species of crab and ways in which the crab had been processed were also noted. The crab remains had been sorted by context but no detailed study of variation between context was made because evidence for crab consumption was found across the midden and in this preliminary study there were no obvious differences between areas or contexts. The crab claws were divided by eye into arbitrary categories of small, middle and large sizes and the numbers tallied across the site. No measurements were made because there was no measurable component due to the fact that very few claws were complete. As can be seen from Table 170 (below), there is a total of 545 crab claws in the midden which vary quite significantly in size (see Table 170, below & Illustration 510, right; The modern claws on the left hand side show the variation between 3 different species. The archaeological specimens on the right hand side show some of the variation in size, shape and surface contours in the midden assemblage, which are not matched to the modern specimens).

Illus 510: Sand – Modern and archaeological crab claws, all from Sand

Table 170		
Small claws	Middling sized claws	Large claws
205	245	95

Table 170: Sand – the numbers of crab claws, or significant pieces of claw, found throughout the midden

Although the claws in general were also quite worn it is tentatively possible to identify some to species. Differences in crab claw morphology are distinctive between species but these tend not to be described or drawn in any detail in reference works (Ingle 1980 & 1996). It was therefore important to use modern controls which could be used to help distinguish different species. A number of dead modern crabs were collected from Filey beach, East Yorkshire, after a spring storm had thrown up a large amount of seaweed and marine animals onto the beach. The crabs were macerated in water with a very weak solution of bleach over a period of about a month (with frequent changes of water) this cleaned out the rotting flesh but unfortunately it also eroded away some of the more fragile elements such as the carapace and abdomen. However, (as seen in the midden) the more robust claws and legs remained intact.

In the midden there appear to be at least three species of crab, but there are probably several more. It is thought that the well known edible crab, Cancer pagurus, is fairly abundant in the midden and perhaps most of the large claws actually belong to this species. Some claws had very distinctive striations along the claw and these might match with either Macropipus tuberculatus or Liocarcinus depurator (see Illustration 511, right; Bottom – modern claw of crab with striations compared with archaeological specimen on right (with striations) and archaeological specimen on left (large and without striations which probably belongs to *Cancer pagurus*)). There were also other crab claws which were not similar to either of these kinds of crab and these could belong to a number of so far unidentified species, though it is likely that many of the smaller claws belong to the common shore crab Carcinus maenas. In addition, as already mentioned, some may be lobster claws. The

Illus 511: Comparison of modern and archaeologial claws

different species of crabs are found in different places in the natural environment; for instance, Carcinus maenas is predominantly a shore and shallow water species and can be found on all types of shore. Cancer pagurus on the other hand is usually found on the lower shore, shallow sublittoral and offshore to about 100m, under boulders or in muddy sands.

Illus 512: Sand – an assortment of crab claws which demonstrate burning and breakage (burning is particularly clear on the middle claw which is blue in colour)

It was also noted that some of the crabs had been burnt, particularly on the tips of their claws (see Illustration 512, left), and interestingly this is something that has been found on crabs from the Roman site of South Shields (Lindsay Allason-Jones *pers comm*). The tips had turned blue-white in some cases which is characteristic of a fairly high temperature, though they do not appear to show thermal cracks (Lyman 1994). Bones on a site can be burnt for a number of reasons; they can be thrown on a fire as fuel, accidentally burnt because fires are created on top of a midden, or burnt in cooking. The pattern of burning on the claws does, however, suggest that in at least some cases the latter explanation is probably true. Many of the claws had also been partially broken. Again breakage can occur for post depositional reasons, such as trampling, but it is likely that people were also breaking up the claws for meat.

3.13.3 A picture of procurement, processing, consumption and deposition

There are many ways to catch a crab. A well known method often used to entertain children at the seaside is 'gillying', which is like fishing. Bait is tied to a weighted line and dropped to the bottom and the line is carefully drawn up if movement or tugging is felt. Different baits can be used because crabs eat a wide variety of foods such as prawns, topshells, dogwhelks, mussels, barnacles and so on (Ingle 1996). They use their claws to break open live shelled animals but also will eat dead matter and rotting material. Long lines may also be used with bait placed at regular intervals; these catch several crabs at a time and need to be laid along the seabed.

Some of the smaller crabs, like *Carcinus maenas*, can be found under rocks along the seashore or they can 'tickled' out from rockpools. Here it is necessary to put one's hand under the seaweed in the pool and carefully feel around for a crab lurking beneath. Perhaps surprisingly, if done carefully, this does not lead to being pinched. As well as being caught by hand, Fenton (1978:543) describes how crabs can be drawn from their hiding places with a hook and there is an evocative description in the Irish folk autobiography of Michael Kirby (1990:12) when as a child he goes to the beach with his father and learns how to use a rod to poke a lobster from its hiding place and how to pick it up so as not to incur a pinch. Some crabs bury themselves in the sand and these can usually be found by torchlight at night-time when they surface and scuttle sideways across the beach (Ingle 1996). However, to catch crabs with the bare hand as they run over the beach is difficult, though it is easier with the slower moving hermit crabs (von Brandt 1984:11). Renfrew (1993:17) suggests that in prehistory crabs and lobsters were probably collected in "weighted baskets – the forerunners of modern lobster pots". Again bait can be used in these and they have the advantage that they can be left for periods of time. Fenton (1978:542) talks about using small nets, "baited with any kind of garbage" for catching lobsters in the eighteenth century.

It is fairly easy to conjure up pictures of how people may have gone about catching crabs in the Mesolithic and at the beach at Sand. There was plenty of opportunity at this location with its rocky coastline (see Illustration 513, right; The incoming sea has just covered a stretch of rocks which are exposed at low tide. The coastline to the right and left of the sand is exposed rocky crag). Bait would have been easily available, whether it was the leftovers of a meal, or

Illus 513: The beach at Sand

perhaps some shellfish collected specifically for the purpose. Limpets may have been used as bait in that they could be fixed firmly to a piece of string without a hook: it is speculative, but a hole punched in the shell of the limpet could be threaded or tied onto string and shells with holes in them are common in the midden (Hardy, Section 3.5). It is also important when using bait in this way to use tough meat which cannot be quickly eaten by the crab and limpets may have worked well in this respect. They may also have been left to rot slightly, as many crabs are attracted to the decaying flesh.

Illus 514: Sand – exposed rocky area at low tide, ideal for shell gathering and searching out small crabs in the seaweed fringed rockpools

Illus 515: Sand – small crab found in one of the rock pools

The beach must have been frequently used by the people at Sand, for example when leaving and returning in boats, gathering shellfish and fishing from the rocky crags. It would, thus, have been easy to look for the smaller species of crab which inhabit spaces under rocks and in amongst the seaweed fringed rock pools (see Illustration 514, left & 515, right) as part of the daily routine. The larger *Cancer pagurus* is not usually found in rock pools but in deeper water and so was more likely to have been deliberately caught using baskets and lines, either from the crags to the side of the beach, or from baskets or lines dropped off-shore from boats. If baskets were used for fishing, it is also possible that some crabs were caught incidentally in this way (Parks, Section 3.11).

Once collected the crabs would have been processed by breaking them up and cooking them. Some of the crab claws found are very small, suggesting that little meat could have been extracted from them. These crabs may have been cooked whole, either roasted on hot stones or above a fire, or perhaps boiled in water heated with hot stones. It is also possible that some of the foods such as crab, shellfish, fish or seaweed were cooked together, perhaps to create a seafood broth.

A large crab can provide plenty of meat and will supply enough food for several people to share. They may have been roasted over a fire as there is evidence of burning on the tips of some of the larger claws. Once cooked, they would be broken open and processed. Today, larger crabs are usually processed by breaking off the legs and claws, which is supposed to make the extraction of meat easier. The central under-body can then be pushed away from the shell. The small stomach sac behind the crab's mouth is usually discarded, as are the gills (also known as dead man's fingers) and in female crabs the 'apron' which contains the eggs is also thrown away. The remaining white meat can then be used. There is also a brown flesh which can be scooped out from the shell and this is intensely flavoured. The flesh from the central part can be used and cooked in different ways and perhaps combined with other foods. The meat is removed from claws and legs by breaking them open with a sharp knock and picking out the flesh. This is the most common way to prepare crabs today; in the past other methods may well have been used but the overall amount of meat is likely to have been similar.

An alternative to direct consumption is to use the crab as bait. Fenton (1978:539) describes how a net can be lowered to the bottom of the water and a bait of mashed crabs thrown out. Once the sillocks (young saithe) congregate the net will be hauled up and the fish caught. However, crabs used in this way are likely to be invisible archaeologically.

Illus 516: Empty carapace of *Cancer pagurus* (modern)

After consumption the shell of a crab was presumably deposited in the midden. However, the carapaces of larger crabs may also have been used as containers for other things; their size and shape allows liquids to be held (see Illustration 516, right). Perhaps these in turn were used for holding crabmeat, or for the cooking of other foods. In addition, these parts of the animal may have been taken elsewhere and used in archaeologically undetectable ways.

3.13.4 Conclusion

It would be quite easy to dismiss crabs as a very minor resource in this midden assemblage based only on the quantity present and relative calorific contribution. However, other perspectives are possible which consider individual actions and day to day activities. This approach serves as a reminder that resources were transformed into food through the performance of procurement, preparation and consumption activities and through these actions social relationships were created and maintained.

We can begin to see how crabs contributed to Mesolithic meals and may well have been regarded as one of a number of very tasty foods that could easily be procured just a short walk from the rockshelter. Children have a role to play here, as potential crab-hunters along the shore, after tuition from parents, kin, or friends. Larger crabs may have been caught in baskets further offshore. Many of these catches were, no doubt, taken back to the rockshelter and processed. They could have been cooked in a variety of ways and the food created shared out between people. Although there is no way of knowing exactly which methods were used, all of those described above would have been possible for the Mesolithic people at Sand, as well, no doubt, as others.

It is perhaps time to stop side-stepping ‘minor’ species and integrate all of the faunal and floral evidence into our perceptions of the past. Studies such as Carruthers work on hazelnuts (Carruthers 2000) and Mason & Hather on lesser celandine (Mason & Hather 2000) have opened the way for the contribution of local flora; the Sand crabs are a timely reminder of the other elements. Only through further analysis of crab remains at other sites (species present, processing methods and the study of deposition within contexts) and the study of all other species found within middens will we be able to build up more complex narratives of consumption activities at these sites.

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3.14 Pearls | Karen Hardy

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Four pearls were found, during the sorting of the residues from Sand (see Table 171, below). The pearls are all very small (<2mm diameter) and are likely to have been brought to the site unintentionally, either with seaweed or in shells. Interestingly, they were all found towards the centre of the main midden. There are also individual pearls from two other sites: SFS 68, Allt na Criche and SFS 20, Toscaig 2.

Table 171

Site	Square	Spit	Context
Sand (SFS 4)	B3B	6	13/23
Sand (SFS 4)	B24A	4	13
Sand (SFS 4)	B24A	7	13
Sand (SFS 4)	B25A	5	13
Allt na Criche (SFS 68)	Test Pit 1		6813
Toscaig 2 (SFS 20)	Test Pit 1		2013

Table 14: Pearls found during excavation at Sand and other SFS sites

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3.15 The wood charcoal macro-remains from Mesolithic midden deposits at Sand, Applecross | Phil Austin

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3.15.1 Introduction

The archaeological survival of wood in the form of macroscopic charcoal is intrinsically linked to human activity, typically through the exploitation of wood for fuel. In most instances fuel would have been gathered from relatively local sources; though some form of resource selection/avoidance may have influenced the species acquired and the quantities gathered of particular woods (Shackleton & Prins 1992). The substantial quantity of wood charcoal macro-remains recovered from the excavation of midden deposits at Sand rockshelter thus provides an opportunity to gain an insight into the character and composition of the Mesolithic vegetation at a local scale, to assess the nature of woody plant exploitation, and the impact, if any, of human activity on the local vegetation.

Palaeoenvironmental studies of Mesolithic north-west Scotland are largely confined to palynological investigations. Data generated by such studies enable local to regional scale reconstructions of Mesolithic environments and remain the primary source of knowledge concerning the rate and timings of postglacial plant recolonisation. The data generated from palynology, as for all proxies, is of variable quality and the inferences made are often contentious (see for example Tipping 1994; Edwards 2000b). As a consequence of the nature of the deposits at Sand, the information recovered through speculative palynological studies was less useful than had been hoped (Green & Edwards, Section 3.16). The investigation of a further proxy, macroscopic charcoal, was anticipated to yield superior data. This was especially welcome given the paucity of charcoal studies from early prehistoric sites in Scotland.

In addition to wood charcoal most of the samples provided, including those not subject to detailed analysis, contained fragments of nut shell and, much less frequently, bone and mollusc shell. This investigation is only concerned with the results of the wood charcoal analysis.

3.15.2 Methodology

3.15.2.1 Recovery and sub-sampling

All the charred plant material was recovered through standard flotation procedures. Of the 592 samples submitted for examination, 63 were selected for detailed analysis following sorting and cataloguing. The strategy adopted aimed to provide a comprehensive account of the full range of taxa represented on the site as a whole and in individual contexts given the constraints of time and the stratigraphy (below).

Samples from both Trench A and Trench B were selected or excluded from further investigation according to the quality of the remains, including size, and the quantity of fragments. Following Keepax's (1988) recommendation that to recover the full range of taxa present in a sample or context a minimum of 100 fragments per sample should be examined, where possible preference within each context was given to single samples that contained in excess of this figure. However, many of the samples contained considerably less than 100 fragments. In such cases it was necessary to select contexts for which the combined quantity of fragments from varied samples across the context as a whole was 100 or more. In effect, several samples from the same context were treated as a single sample. Where contexts selected for study contained less than 100 fragments, even when all the samples were combined, all suitable fragments present were examined.

3.15.2.2 Identification

The selected samples were sieved using 4mm, 2mm and 1mm meshes. Material below 2mm is unsuitable for identification and no further work was carried out on material in this size category. Fragments greater than 4mm are more readily and securely identified than fragments in the 2–4mm size category and were thus preferentially selected for examination where available. However, because the woods used may have included twig wood or taxa that produce wood of small dimensions, even as mature plants, a minimum of 25 fragments per sample from the 2–4mm category were also examined where available.

To enable identification, each fragment was pressure-fractured with a razor blade to expose the transverse (TS), tangential (TLS), and radial planes (RLS), supported in a sand bath, and examined using an epi-illuminating microscope at magnifications up to ×400. Identification was determined with reference to descriptions in Schweingruber (1990) and, when necessary, to modern reference material held at the Institute of Archaeology, UCL, London.

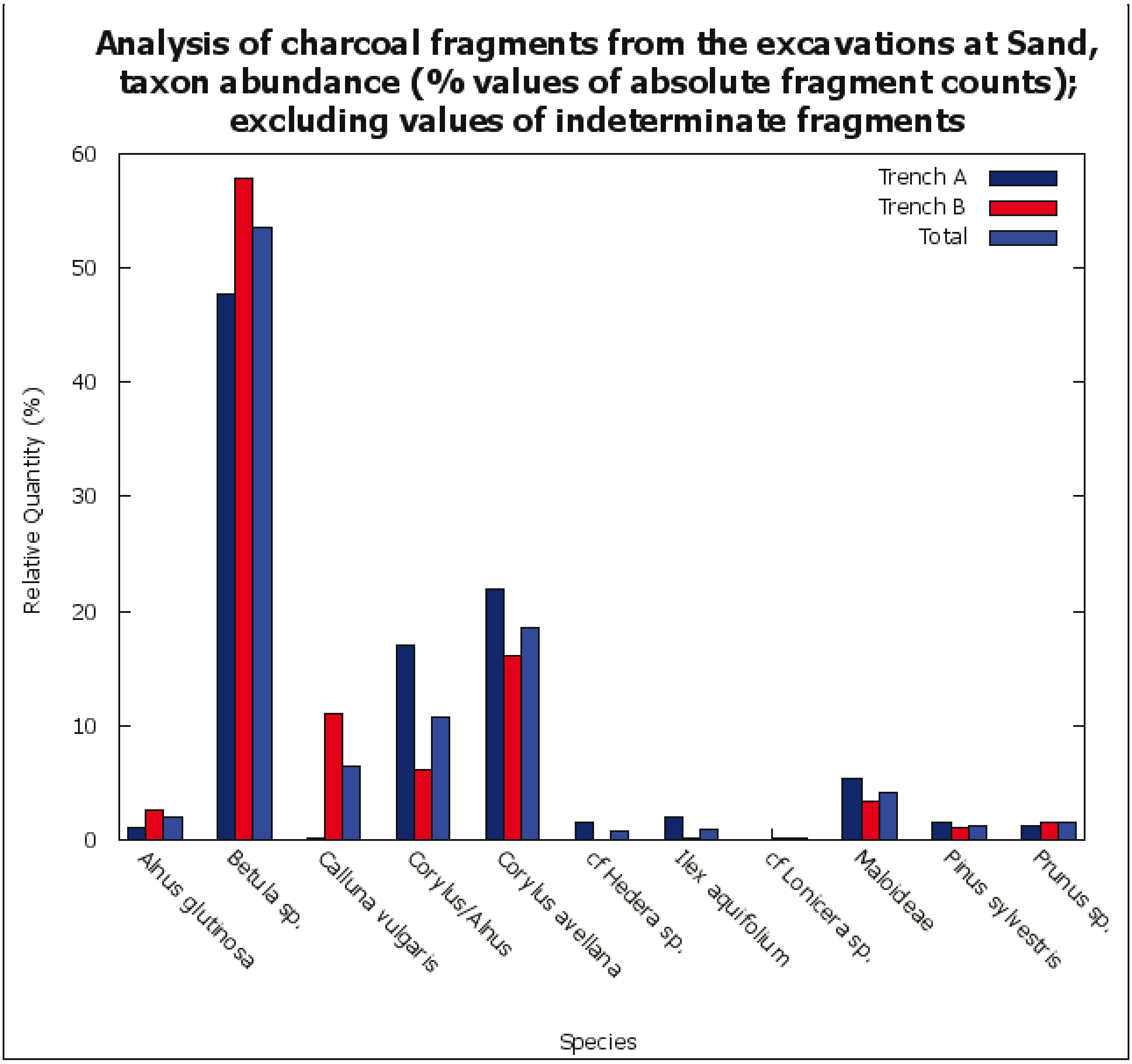
3.15.2.3 Quantification

Problems specific to the quantification of wood charcoal assemblages currently rule out the application of the more sophisticated statistical tools used for quantifying non-woody plant remains. However, a meaningful measure of taxon abundance can be made through presence analysis. Where samples have been recovered from a number of contexts, the presence/absence of a taxon in each context can be taken as a measure of the 'ubiquity' of that taxon (Popper 1989). In effect the actual number of fragments of each taxon present in each sample or context is disregarded. Thus a single fragment of taxon x for example, is attributed with the same significance as 1000 fragments of taxon y. Whilst taxon ubiquity is considered appropriate for this study, to avoid losing information concerning the actual relative frequency of individual taxa within samples/contexts, and the assemblage as a whole, absolute fragment counts were also recorded during analysis and are taken into consideration during the discussion.

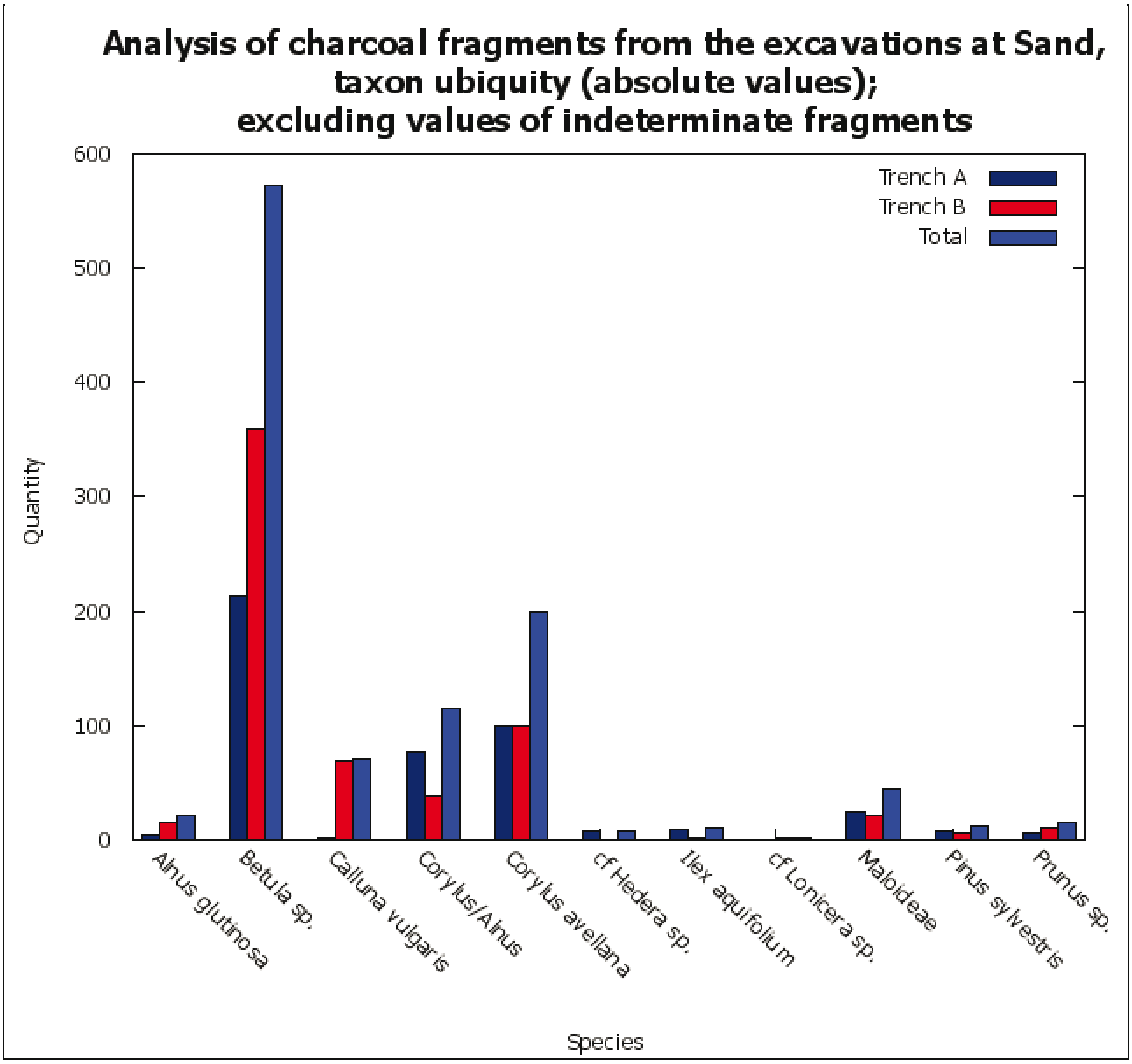
Binomial species names are given where a specimen could be securely identified as being of a particular species, or only one representative of the genus is considered indigenous to the UK, for example *Ilex aquifolium* (holly). Taxon names preceded by *cf* denote that doubts remain about the accuracy of the determination. Nomenclature follows that of Stace (1997).

3.15.3 Results

The results of this investigation are summarised in Table 172 (see pp19–20 of final report). Illustration 517 shows taxon abundance (% values of absolute fragment counts) for Trench A, Trench B, and the site as a whole. Illustration 518 depicts taxon ubiquity for both trenches and the site as a whole. Note that values for indeterminate fragments were not included in calculations and are not included in either chart (see Table 172, below). The full results and catalogue of samples are available in Appendix 11. Skip charts.



Illus 517: Analysis of charcoal fragments from the excavations at Sand, taxon abundance (% values of absolute fragment counts); excluding values of indeterminate fragments



Illus 518: Analysis of charcoal fragments from the excavations at Sand, taxon ubiquity (absolute values); excluding indeterminate fragments

Table 172

This data can be obtained from pp19–20 of the final report and its own page at `table172.html`, as the table is too large to display here.

Table 172: Summary of the results of the analysis of charcoal fragments from the excavations at Sand

NB Samples from B25B are subject to a degree of uncertainty due to a recording error during excavation that affected squares B23A–B26B

A total of 687 fragments was examined from 32 samples from eight Trench A contexts and 836 from 31 samples from nine Trench B contexts. Nine of the 11 taxa identified were common to both trenches. A single fragment of *cf Lonicera* sp. (honeysuckle) was present in Trench B only and seven fragments of *cf Hedera helix* (ivy) were present in Trench A only. Of the combined total of 1,522 fragments examined, 452 were indeterminate.

Where it could be discerned, unidentified fragments were exclusively hardwoods, and included two fragments of root wood, knot wood, and several twigs. Fragments of bark were also present throughout. Twig wood is believed to include *Calluna* (heather), and possibly members of the Maloideae and Betulaceae, but fragments were too degraded or too small to attribute with confidence. Several round-wood fragments initially identified as cf Betulaceae are included among the indeterminate because of the lack of confidence in this attribution. The Betulaceae family includes *Betula* sp (birch), *Corylus avellana* (hazel), and *Alnus* sp (alder), each of which are positively represented in the assemblage; as are *Calluna* and the Maloideae. In some instances it was not possible to differentiate between fragments of *Corylus* and *Alnus* because the anatomical features necessary for positive identification could not be observed. These fragments are recorded independently as '*Corylus/Alnus*'.

It can be particularly difficult to differentiate between members of the Rosaceae family, even as uncharred wood, though identification is usually possible to sub-family. Here, the Rosaceae are represented by the sub-families Prunoideae, genus *Prunus* (blackthorn, cherries), and the Maloideae which includes the genera *Malus* (apple), *Pyrus* (pear), *Sorbus* (whitebeams, rowan, wild service tree), and *Crataegus* (hawthorns). Despite the difficulties of identification, some Maloideae fragments were tentatively identified as '*Sorbus*-type'. Given present day biogeography the most likely of the *Sorbus* spp represented is *Sorbus aucuparia* (rowan), or one or more of its close relations. The presence of either *Pyrus* or *Malus* is doubtful. *Crataegus* is possibly represented in the samples however. Differentiation of the *Prunus spp* was not achieved here. *P spinosa* (blackthorn), *P padus* (bird cherry), and *P avium* (wild cherry) may each be represented. However, the present day distribution of *P padus* suggests that this species may have been more common perhaps than the other *Prunoideae* in Mesolithic Scotland. *Pinus* was the only coniferous species identified, though potentially *Juniperus communis* (juniper) could also have been present.

None of the taxa identified are specifically associated with coastal habitats and there is nothing to suggest the exploitation of driftwood. Though some wood may have derived from the coastal zone, the majority is believed to originate from inland terrestrial environments.

Fragment condition and morphology did not always permit assessment of growth patterns or ring counts in the transverse plane. Those patterns observed indicate that the charcoal was almost exclusively derived from medium to small diameter branches (round-wood) and twigs. No more than ten seasons' growth was noted in any fragment. No evidence of seasonality was apparent from anatomical features.

A summary of the results is given in Table 172, above. Taxon abundance (% values of absolute fragment counts); excluding values of indeterminate fragments is presented in Illustration 517 (above) and taxon ubiquity (absolute values); excluding indeterminate fragments is presented in Illustration 518 (above).

3.15.3.1 Relative frequency of taxa

Betula is by far the most frequently occurring taxon in terms of fragment numbers (n=573), accounting for 53% of the total number of positively identified fragments; followed by *Corylus* (n=199) at 19% (see Illustration 517, above). Both taxa were present in the majority of samples and the only ones represented in all 17 contexts examined (Section 3.15.1). Undifferentiated *Corylus/Alnus* fragments accounted for approximately 11% of the positively identified fragments. The true values for both Corylus and Alnus, are therefore probably greater than listed.

Of the remaining taxa, *Maloideae* (n=45) is the most ubiquitous, being present in 14 contexts, followed by *Prunus* (n=16), present in nine contexts. Despite being represented by a greater number of fragments than either of the above, *Calluna* (n=70) was restricted to eight contexts; all but one from Trench B. It is believed that *Calluna* is probably under-represented in Trench A contexts (only one fragment was positively identified). Several fragments of the indeterminate twig wood recorded in trench A samples were thought to be of this taxon (see above). The values recorded are probably lower, therefore, than the actual number of *Calluna* fragments present. Both *Alnus* (n=21) and *Pinus* (n=13) were present in seven contexts whilst *Ilex* (n=10) was represented in only five contexts. *Hedera* (n=7) and *cf Lonicera* (n=1) were each present in one sample from contexts in Trenches A and B respectively.

3.15.3.2 Fragment properties

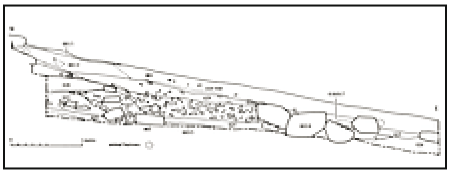
Though some fragments exhibited signs of acute thermal degradation none appeared 'vitrified'. Research carried out by Prior & Alvin (1983) suggests 'vitrification' is a characteristic associated with exposure to extremely high temperatures. The quantity of fragments thus affected, in individual samples and for each context examined, is insignificant and within the range of thermal degradation observable in fragments from small hearth-like open fires (*pers obs*). It may be significant that the most consistently and severely affected fragments were predominantly twig wood.

Fragments exhibiting features suggestive of biological degradation and/or containing fungal hyphae (typically confined to vessels) were present in all contexts from both trenches. It has been suggested that the presence of fungal hyphae is indicative of wood collected as dead-wood, as opposed to living or recently felled ('green') wood (Salisbury & Jane 1940). Biological degradation was inferred in this analysis from abnormal levels of fragment friability or fibrousness and, observed microscopically, damage to the coherence of structural features (for example through the apparent presence of longitudinal cavities characteristic of 'soft rots' (Eaton & Hale 1993). However, it should be noted that, whilst the various characteristics of cellular damage caused by the wood-rotting fungi are well known from studies of uncharred modern wood specimens (for example Eaton & Hale 1993; Rayner & Boddy 1988; Cartwright & Findlay 1958) the diagnostic value of such characteristics for recognising fungal decay in archaeological wood (charred or not) is by no means established and remains uncertain. Hyphae occurred most consistently in fragments of *Betula*, followed by *Corylus* and *Alnus* . As the hyphae are charred it is likely that fungal attack occurred prior to the wood being burnt.

The presence of mineral deposits, visible as orange-brown accretions, was noted in approximately 3% of all fragments examined. The most severely affected were so heavily impregnated that anatomical features were obscured preventing identification. These deposits are believed to accumulate over time through post-depositional leaching of minerals (predominantly iron) through the soil profile.

3.15.4 Discussion

3.15.4.1 Context and taxon representation



Illus 342: SFS 4, Sand – Trench A, south-facing section

Much the same woods are present in approximately the same proportions, with minor variations, in almost all contexts in both Trench A and B. The most conspicuous exception is the earliest of the deposits examined, an otherwise archaeologically-sterile clay-silt (26) uncovered in Trench A (A5B, A6B), which, perhaps not surprisingly, contained very little charcoal (n=27). This context is notable for being the only deposit to contain Hedera (seven of the 14 positively identified fragments). Negligible quantities of *Betula*, *Corylus*, *Corylus/Alnus* were also present. The origin of the charcoal in this context is unclear. Gravity, the topography of the site, and the unconsolidated nature of the deposits, are all important factors in the site formation processes at Sand, collectively responsible for the movement of material downslope over time (see Section 3.2). One possibility therefore is that the charcoal in (26) derived from the overlying silt-clay palaeosol (25) which is upslope (see Illustration 342, right) and had much greater concentrations of charcoal.

The presence of charcoal within the palaeosol (25) suggests that some kind of fire event preceded the main period(s) of activity at Sand. The nature and scale of the fire event(s), where they may have occurred, and the cause (anthropogenic or natural) is/are unclear, but the evidence suggests that anthropogenic fires may be implicated. Sample composition from context (25) – *Alnus*, *Betula*, *Corylus*, Maloideae, and *Pinus*, (*Calluna* may also have been present but was not positively identified) – compares favourably in most respects with the composition of samples from the main body of the organic rich silt deposits (22), and most other archaeological deposits examined here. Charred remnants of vegetation burnt *in situ*, through either natural processes ('wild fire') or human activities (clearance) are likely to include charcoal derived from both deadwood and living plants. It would be expected therefore that the range of plants and plant parts represented would be an indiscriminate mix including not only those woods gathered for fuel but also those not typically gathered for fuel (for example *Vaccinium* spp, and other small shrubs) and plant parts such as root wood (see below). Though bark fragments and higher than average proportions of twig wood were recorded in samples from (25) and (26) during cataloguing, no root wood or 'incidental' taxa were recorded during detailed analysis. The view favoured here is that (25) contains debris from deadwood purposefully gathered and burnt.

The organic rich silt (22), is more clearly an archaeological deposit yet has evidence of human activities distinct from those carried out during the following phase of the site. From the perspective of this study it is notable for being the earliest deposit to contain Calluna. The presence of this taxon in an undisturbed context (Trench B: B3B, spit 9) from early on in the site's history, and its continued presence in later contexts, is a good indication that it was an established component of the local Mesolithic flora.

Context (27), overlying (22), was unremarkable in terms of charcoal composition.

The sandy soils (29) and (17) are particularly interesting in that they contained many 'heat affected' and fire cracked stones, as well as high concentrations of charcoal. Fractured stones were abundant at the site (Clarke, Section 3.6). In both contexts the stones have moved from their original discard locations and there is no indication of the precise spot where they were exposed to fire. The presence of the stones provides some evidence of at least one function relating to the fires in which the charcoal from these deposits was formed. Although no evidence of in situ burning has been identified here, the high concentrations of charcoal in these deposits suggest that the fires occurred locally.

In Area B1 the midden deposit (13), animal-disturbed layers (13/24) and material from contexts (24) and (28), associated with midden (6), seemingly reflect discrete deposits within the midden. The lack of significant variation in the range of charcoal identified in these contexts suggests that more or less the same woods were repeatedly used. The number and frequency of fire events represented by the charcoal is unknown, though several separate episodes are evident. It is also worth noting that small fragments of other materials had percolated into and through the midden (Section 3.2) suggesting that there may have been some local movement of material which would perhaps serve to produce a more uniform range of charcoal fragments in these areas.

Samples from other discrete midden deposits in area B1, contexts (11) and (12), contained abundant charcoal remains. Surprisingly, the ashy layer (11) contained only three taxa (*Betula*, *Calluna*, and *Corylus*), whilst (12), associated with the surface of the midden, contained seven taxa and was thus more in keeping with the general trend. The later contexts (1/1) and (1) also followed general norms. These deposits, described as 'topsoil' and 'shell-mixed topsoil' respectively, were exposed just below the present day surface and it is unclear (without dating) whether the charcoal here is contemporary with the midden deposits below (the range of taxa would suggest that this is the case) or whether it is of more recent origin.

Root wood is uncommon in archaeological charcoal assemblages and so the presence of two small fragments of root-wood from an unidentified hardwood, recovered from Trench B (B6B, spit 6, SW) context (7/8), is of some interest. It is possible that charring resulted from the purposeful employment of root wood as fuel. Root wood is no less effective as fuel than wood from above ground and would have been available through the exposure of root plates following wind-throw, for example. The view favoured here, however, is that charring was incidental to an unknown fire event. Heat generated from surface fires (natural or anthropogenic) permeates below as well as above ground and can thus char surface and narrow sub-surface roots (*pers obs*) A diameter of *c*3mm was recorded for each root fragment and encourages the inference that this is indeed what happened here. It is likely that greater quantities of root wood would have been present, and in more than a single sample and context, if the local vegetation was being affected by fire on a broad scale. This deposit was formed by material that had moved downslope, accumulating around stones (7), obscuring any direct relationship between the charcoal material and the location in which it became charred. Nonetheless the presence of root wood is perhaps compelling evidence that woody plants were present in the immediate vicinity and that most of the charcoal at Sand was generated in hearth-like fires carried out on site.

3.15.4.2 Elements of the contemporary vegetation

Regarding the contemporary vegetation, the high occurrence of light-demanding taxa is striking, notably pioneer postglacial arrivals Betula and Pinus, together with the absence of large deciduous trees capable of forming closed canopy woodland, especially *Quercus* spp (the oaks) and *Ulmus* spp (the elms). The absence of these latter taxa is perhaps surprising given that both appear in the pollen record for Scotland between 6,500 and 6,000BC and, supposedly, pre-date the arrival of *Alnus* (Tipping 1994), which is present. Chambers & Elliott (1989), however, argue convincingly that *Alnus* established populations at an earlier date than the conventional hypothesis. What the factors were that hindered the establishment of oak and elm at Sand, but seemingly enabled alder to establish itself, are unclear. Oak has been identified in charcoal samples from prehistoric deposits at Meall na h'Airde sea cave (see Section 2.2). While it is unknown if these particular deposits are contemporary with those at Sand, it seems that oak was present in the region in early prehistory. Both oak and elm have also been recorded as macroscopic charcoal from Mesolithic deposits to the South, at Bolsay Farm, Islay in the late 7th millennium BC (Kaminski & Seel 2000; Ashmore 2004a & 2004b); albeit as minor components of that assemblage. Out of 1,500+ positively identified fragments from Bolsay Farm, *Quercus* was represented by 11 fragments, *Ulmus* only one. As the authors state, this is in contrast to the significantly higher values recorded for each of these taxa in pollen assemblages from nearby Loch a'Bhogaidh and Coulererach, though factors such as different catchments and/or selective collection of wood should be taken into account.

If these taxa were present in the vicinity of Sand in the past it is almost certain that they would have been represented in the assemblage. Both are excellent fuel woods and have been extensively exploited in the British Isles for artefactual and structural purposes throughout prehistory. This is particularly true of Quercus and is reflected in its status as one of the most ubiquitous taxa recovered as archaeological wood charcoal. Given the quantity of fragments examined and the distinctive anatomical features of both Quercus and Ulmus it is highly unlikely that they have been 'missed' during the sorting and identification processes. Nor are these taxa any more vulnerable to destruction than the other taxa represented. It appears that both taxa were locally absent and this may reflect the dynamic and varied character of earlier postglacial vegetation.

The trees and shrubs that are present indicate that the landscape surrounding Sand would have been characterised by areas of open woodland dominated by *Betula*, and *Corylus* scrub. *Maloideae*, *Ilex*, and *Prunus* sp are likely to have been minor components. Evidence of the open aspect of the vegetation is indicated by the presence of shade-intolerant taxa *Betula*, *Sorbus aucuparia*, *Ilex* and *Pinus*. Whereas *Corylus* is moderately shade-tolerant, it requires open conditions for successful nut production. The abundant presence of charred hazelnut shell at the site clearly indicates that open conditions must have prevailed.

As discussed above (3.15.3.1), the presence of *Calluna* indicates the early establishment of heathland vegetation in the area and it is likely to have been the dominant species where conditions were favourable. It was probably also present in birch/pine woodland associations. In present day western Scotland, Pinus is found in pure stands and as the sub-dominant component in birch/pine woodland (Carlisle & Brown 1968). In the latter *Alnus*, *Prunus padus*, and *Ilex*, may also be present and were probably so in the past.

Alder would have been present in valley bottoms and riverine habitats, given its predilection for damp, even waterlogged, environments. In these locations it would have grown in associations with, among others not represented, birch or pine. In the more favourable locations 'alder carr' may have formed. This is a distinctive type of wet woodland dominated by *Alnus* with *Betula pubescens* (downy birch) as a less prominent but constant member of the community.

Of the taxa identified birch, pine, holly, ivy and rowan, cope particularly well in poor quality or shallow soils and if exposed to harsh weather conditions for prolonged periods, even at elevated altitudes. Stresses induced by such conditions can cause modifications to the growth forms expressed by the plants living in these environments. Wind shaping and stunted growth are likely to have been a distinctive characteristic of trees and shrubs inhabiting the coastal and more exposed inland areas around Sand.

3.15.4.3 Wood acquisition: selection/avoidance, wood and fuel properties

It is difficult to extrapolate from archaeological material the extent to which selection/avoidance criteria may have affected the range of woods exploited and to identify with any certainty what criteria informed the decisions made. This may include quite specific and apparently 'irrational' cultural determinants (Shackleton & Prins 1992). The view favoured here is that wood acquisition at Sand was opportunistic and influenced primarily by environmental constraints (that is low floristic diversity) and practical considerations (for example the availability of deadwood and its accessibility), and this is supported by research on other sites such as that at Nethermills in Aberdeenshire (Boyd & Kenworthy 1992). Indeed, Boyd and Kenworthy conclude that this general pattern of use is reflected across Mesolithic Scotland wherever comparable work has been undertaken. In effect, at Sand, readily available deadwood was gathered as and when needed. Small branches seem to have been favoured over more mature large round wood and stem wood. More than likely this reflects the form of deadwood available rather than a conscious decision. Branches and twigs are the more common component of coarse woody debris and thus more consistently available than stem wood. Stem wood, in the form of fallen logs and standing dead trees ('snags'), only becomes available following the death of a tree (Samuelsson *et al* 1994). Depending on the physical capabilities of those gathering wood, branches and twigs also require less effort to carry than heavier and more cumbersome logs.

Many factors can contribute to the production of deadwood: natural senescence, disease, injury, wind, and environmental change, for example. Some taxa shed plant parts far more readily than others as part of their lifecycle or in response to stresses such as those listed. Scots pine, for instance, naturally sheds its lower branches as it ages (hence the distinctive bole of the mature tree). Birch, on the other hand, is one of the less durable taxa (Eaton & Hale 1993) and seems particularly vulnerable to various forms of fungal attack. This, alongside the comparatively short natural lifespan of birch (*c*100 years), may have resulted in deadwood of this taxon being more readily available than that of less vulnerable and longer lived taxa.

The heating properties of different woods are another aspect that is likely to have influenced the choices made when gathering wood for fire. Individual woods have different properties (Wickham-Jones *et al* 1986), and collection strategies are likely to have exploited this as the occupants of the rockshelter sought to feed their fires. Deadwood burns significantly better than wood fresh from the tree, though extensively decayed deadwood has little value as fuel (Boulton & Jay 1946), but is sought for the smoking of foodstuffs.

Betula, *Corylus*, *Ilex*, *Prunus*, and members of the Maloideae thought to be represented, are all good fuel woods. More significantly, the assemblage includes woods traditionally regarded as poor or unsuitable fuels. "Alder [*Alnus glutinosa*] is one of the worst woods for this purpose" according to one author (Robinson 1917:49). In common with most other coniferous woods *Pinus* is often considered unsuitable because of a tendency to spark dangerously and burn too quickly. The fully mature stems of *Calluna* never attain any great size and, partly as a consequence, have poor heating properties. Whilst it is therefore best employed as kindling, and most likely was used in this capacity at Sand, *Calluna* does possess a relatively more valuable property: it burns with uncommon brightness and is thus a potential source of (good) illumination.

Neither *Hedera* or *Lonicera* appear to feature in the literature concerning fuel woods. This in itself seemingly reflects the fuel value attached to these woods. In both cases it is unlikely that their presence reflects intentional gathering for fuel use unless, perhaps, as tinder or kindling. These taxa may have been incorporated into fire incidentally rather than on purpose; for example, as waste from other activities such as artefact manufacture, or because of their growth habit. Both require some form of support to ascend to canopy level. *Hedera helix* is a climber that affixes itself to the host plant by means of adventitious roots. While Lonicera, a liane, achieves the same result by entwining itself around stems and branches. In both cases they can remain attached following branch loss or the death of the host and by this means end up being charred along with the dead-wood to which they are attached.

The presence of poor fuel woods is intriguing and suggests that supplies of the better fuel woods may have been limited in some way. Whilst low biomass is a possible explanation, scarcity of preferred fuel-woods may reflect a rapid decline in deadwood availability as the result of human activities, specifically fuel wood acquisition. The reality is likely to be a combination of these factors. The evidence does not indicate how much wood was being gathered and consumed, or the rate of consumption. However, fire would have been the focus of many activities, notably the heating of stones and food processing, in addition to providing warmth, light, and a degree of protection. To meet these needs wood gathering may have been necessary on a daily basis. If this was so, total wood consumption could have been considerable over a relatively short time, perhaps as little as one or two seasons, and much of the immediate area may have been denuded of deadwood. This in turn would have required the occupants of the rockshelter to travel greater and greater distances to obtain wood until, presumably, a critical point was reached and the better option was to move to another site where wood supplies were more readily available. However, the impact of wood gathering is unlikely to have had a significant long term impact on the surroundings, at least while living trees and shrubs remained to continue to provide deadwood.

The only direct evidence of plant exploitation at the site consists of the charcoal itself, which indicates the use of a variety of woods for fuel, together with the charred hazelnut shell. The high occurrence of hazel charcoal and hazelnut shell gives some indication of the importance of this plant to the population at Sand as a source of foodstuffs and fuel. The widespread importance of hazelnuts in the Mesolithic economy is well known and need not be reiterated here (see Carruthers 2000 for a detailed discussion of hazelnut exploitation at the Mesolithic site of Staosnaig, Colonsay). No doubt many other taxa represented here were exploited other than as fuel, though there is no evidence to suggest what these modes of exploitation may have been or what parts were being used. It is possible that the bark fragments present in several samples may represent waste from non-fuel use. Birch bark, along with the inner bark of scots pine, has been used in northern Europe as food in times of famine (Niklasson *et al* 1994), for example. Pine resins and pitch extracted from birch bark have also been used as adhesives in artefact manufacture and the papery outer bark of birch, which is excellent tinder, can be used to construct waterproof containers. Other possible uses include fodder (ivy and holly), and medicines. Holly berries for example, are purgative and emetic whilst the leaves have been used in the past to treat fevers. Poles from hazel and other woods may have been used to construct shelters and other structures. Wood from trees and larger shrubs would have been used to make various objects, including weapons and tools. These examples are by no means detailed or exhaustive but serve only to illustrate the myriad of possible uses to which wood and wood products may have been put in the past.

3.15.5 Summary

The charcoal reflects the successive accumulation of debris from small open fires which were located close to midden deposits and used for a range of activities including food processing. The wood used to fuel these fires was most probably collected as deadwood and included poor as well as good fuel woods. The range of woods identified and the proportional representation of each taxon is consistent throughout the site, with only minor variations, irrespective of the nature of each context. This is thought to reflect the short time that the site was in active use, the low diversity of the contemporary woody flora from which the wood originated, and the opportunistic exploitation of deadwood resources. Open woodland dominated by mixed birch/pine and hazel communities probably constituted the principal form of vegetation and this is supported by the work of Shiel on the vegetation of the area today (Shiel, Section 8.2).

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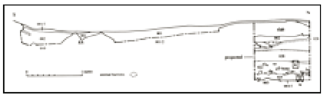
- … > Images > Plans and Sections > SFS_FD16.jpg [Illustration 342]
- … > Data > Artefact and ecofact catalogues > Sand_charcoal_archive.pdf [Appendix 11 final]
- … > Documents > Specialist Reports > charcoal_table.pdf [Appendix 11 draft]

3.16 Palynological studies at Sand, Applecross | Fraser Green and Kevin Edwards

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports`. From here you can download the file '`Green_&_Edwards,_Sand_pollen_report.pdf`'.

3.16.1 Introduction

Material collected by Dr Cressey in two small kubiena tins from Trench A during the excavation of Sand was examined for its organic and palynological content. The first of these, 'Sand 1' was of particular interest as it contained the transition from an inferred midden deposit (Context 28) to a minerogenic soil (Context 22). 'Sand 3' was taken from lower in the profile where the minerogenic soil (Context 25) graded into a friable sandstone unit (Context 3). Both samples originated from the east facing sections of the trench, excavated beneath a loose sandstone slab of obscure provenance (see Illustration 344, right).



Illus 344: East-facing section of Trench A showing location of kubiena tins

3.16.2 Description

Sand 1 consisted of a 10cm thickness of poorly consolidated material. The upper 3cm contained the inferred midden material and had numerous inclusions of shell in a sandy matrix. The lower 7cm, in terms of visibility to the eye and within the sieve retent, seemed to be composed entirely of very sandy soil.

Sand 3 consisted of very sandy soil throughout.

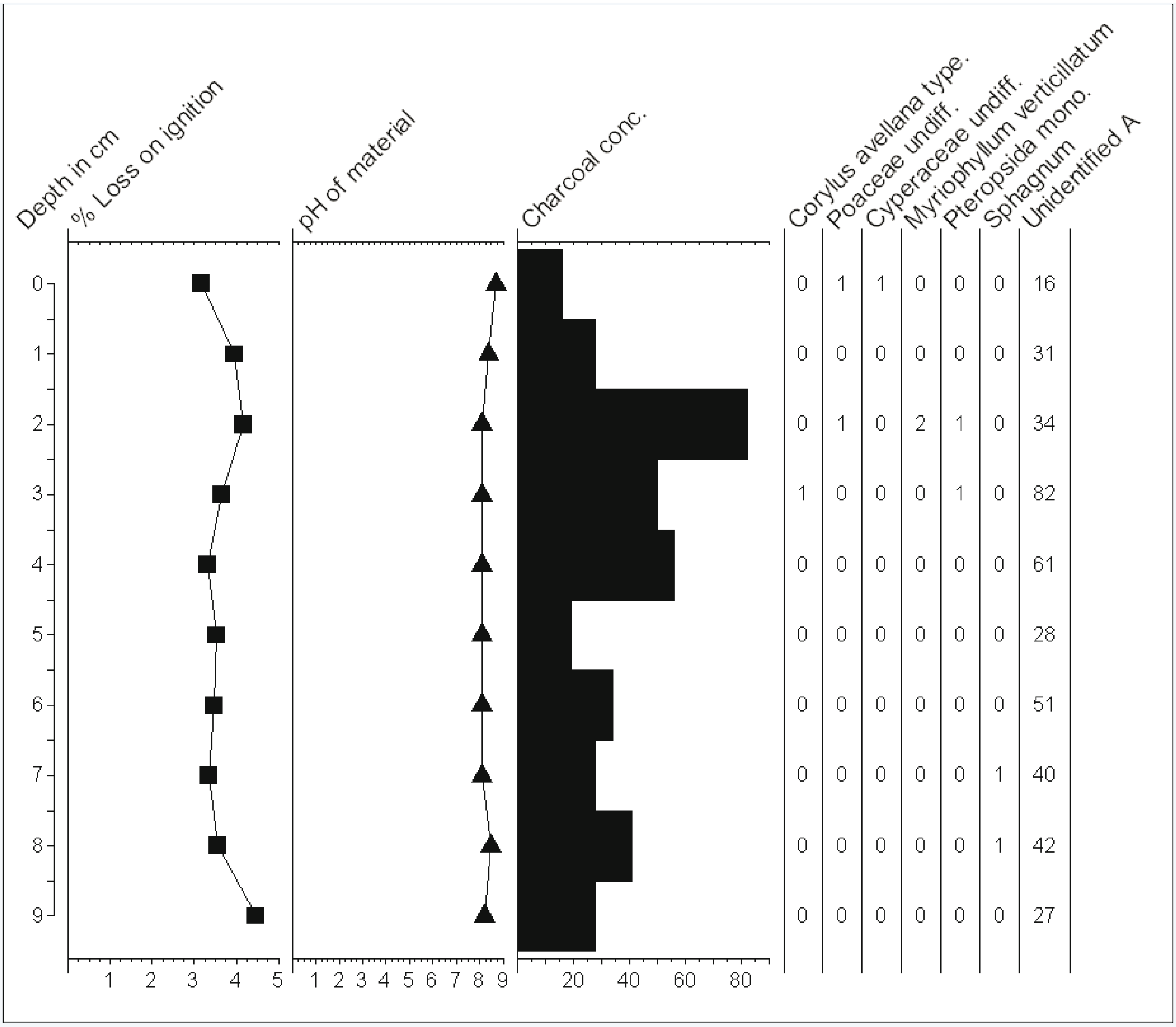
3.16.3 Methods and presentation of results

Both sections were sampled contiguously in 1cm thicknesses and prepared for pollen analysis using standard NaOH, HF and acetolysis techniques (Faegri & Iversen 1989) after sieving through a 180μm mesh. Carbonate tablets containing spores of *Lycopodium clavatum* were added at the start of sample preparation, to enable estimates of palynomorph and charcoal concentrations (Stockmarr 1971). Samples were then mounted on slides using silicone oil. Replicate samples for both sections were analysed for loss on ignition (LOI) for 16 hours at 360°C, and were mixed with deionised water for pH tests. The latter were performed because of indications of effervesence from HCl in the shelly samples (top 3cm of Sand 1).

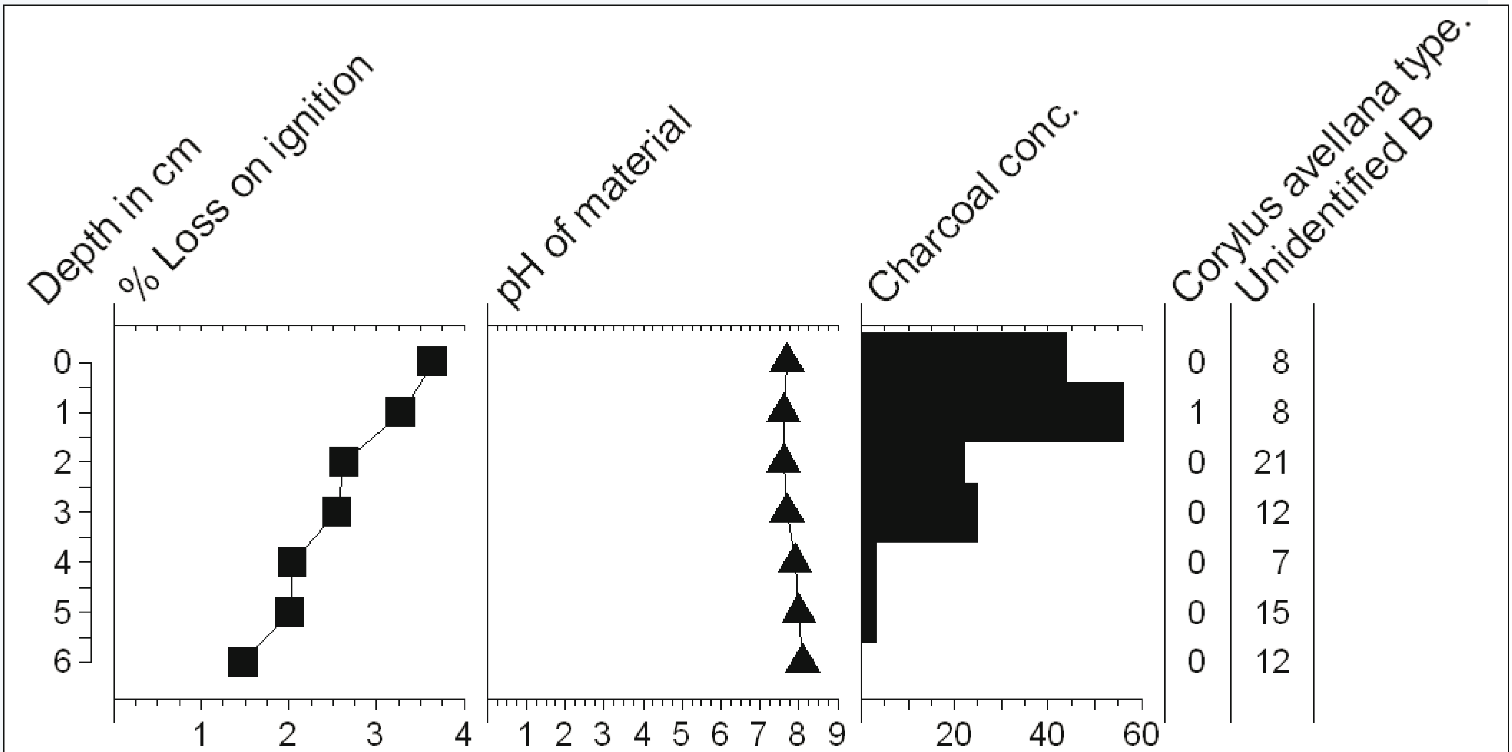
The pollen and spore content for both samples was negligible, while microscopic charcoal was more frequent. A large number of microscope slides was searched for each level. As a result of this sparseness, the palynomorphs were individually noted and identified (pollen type nomenclature follows Stace (1997), amended after Bennett (1994)). Microscopic charcoal was sufficiently abundant for counts of fragments greater than 400μm² size; this involved counting individual fragments in two dimensions using a microscope eyepiece micrometer. The values for charcoal are expressed as concentrations (mm² cm^{-3}). With the exception of some shell fragments in the upper 3cm of Sand 1, the bulk of the sieve retent was minerogenic material. The data displayed in Illustrations 519 and 521 (below) was processed using TILIA and TILIA.GRAPH (Grimm 1991).

Illustrations 519 & 521

This data can be obtained from pp6–7 of the final report.



Illus 519: Palynological, loss on ignition and pH data from Sand 1. Charcoal concentrations are in values of mm² cm^{-3} and palynomorph numbers represent raw counts



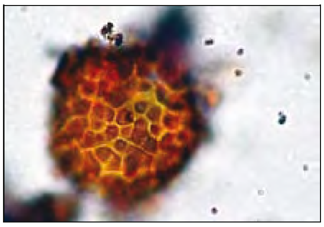
Illus 521: Palynological, loss on ignition and pH data from Sand 3. Charcoal concentrations are in values of mm² cm^{-3} and palynomorph numbers represent raw counts

3.16.4 Discussion

The results for Sand 1 (see Illustration 519, above) illustrate the highly minerogenic nature of the material, the organic content remaining consistently low and generally less than 4% LOI throughout the profile. Even though effervesence in HCl was evident only during the pretreatment of the shelly samples, the pH of all samples was remarkably high throughout, perhaps as a consequence of the leaching of dissolved shell material rich in $CaCO_3$, or from the lime-rich superficial deposits found locally (the country rock is acid Torridonian Sandstone). These very alkaline conditions would explain the lack of palynological evidence, given that pollen is typically only preserved when the pH is less than 5.5 (Dimbleby 1985). In spite of this, it was decided to persist with pollen and spore analysis because the method has produced interpretable results in some calcareous contexts (Dimbleby & Evans 1974). Microscopic charcoal, though of significant concentration, varies greatly throughout the section, although the supposed midden segment has enhanced charcoal values. If this is a result of the inclusion of hearth waste, the lack of macroscopic charcoal is surprising and would argue against the presence of an immediately adjacent domestic fire. Microscope analysis of the larger shell fragments from the top 3cm suggested a mix of cockle and limpet.

The palynological data were extremely limited and only *Corylus avellana*-type (*cf* hazel), *Poaceae* (grasses), *Cyperaceae* (sedges), *Myriophyllum verticillatum* (whorled water-milfoil), *Pteropsida* (monolete) indet (undifferentiated ferns) and *Sphagnum* (bog moss) were present. All these plants save one are part of the flora today. *Myriophyllum verticillatum*, an aquatic plant of basic fresh water, seems to be absent from Scotland now (Perring & Walters 1990) but was perhaps not so in the recent past, as it is still to be found in England (Godwin 1975).

Unidentified spore A (see Illustrations 519, above & 520, right) was relatively abundant. This spore is spherical in all views, well preserved, inaperturate, and 35–45µm in diameter. The exine is very thick (5µm) and is dominated by strong sculptural elements – a network of high relief ridges forming a chaotic web. The lumina between the ridges occupy 40–60% of the grain surface and are of irregular shape. The grain appears to be tectate (in that it possesses a foot layer) but lacks columellae. Its absence from the pollen and spore keys suggests a possible pre-Quaternary origin with derivation from local drift materials. It is interesting to note however, that spore A is not present in the upper levels of Sand 3, despite this deposit reportedly representing the bottom part of the minerogenic material described in Sand 1.



Illus 520: Sand – unidentified spore A

Illustration 521 (above) shows the results for Sand 3. The organic content in the upper part of the profile matches that of the lower section of Sand 1, but quickly reduces as the transition to an even sandier matrix takes place. This is reflected in the charcoal curve which decreases significantly in the basal 4cm. As seen in Sand 1 the pH is consistently high, despite the lack of shell material in these samples, with a corresponding lack of palynomorphs. This would again suggest that the parent material for the soils was highly alkaline.

Sand 3 is of even less palynological interest than Sand 1, producing only one identifiable grain of *Corylus avellana*-type pollen. Unidentified spore B (see Illustration 522, right) is very different from the example in Sand 1. It too is spherical and inaperturate, but is half the size (18–25µm) and relatively featureless. The exine is thin and almost universally psilate, though some palynomorphs show a faint ridging pattern on their surface, producing sunken areas of a polygonal pattern, visible only under 1000× magnification. An estimated 10–16 of these polygons cover the entire grain surface, if present at all. It has been suggested to us that these relatively featureless palynomorphs may be the spores of a liverwort or obscure moss (Dr Andrew McMullen, *pers comm*).

Illus 522: Sand – unidentified spore B

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- … > Documents > Final Reports > Green_&_Edwards,_Sand_pollen_report.pdf
- … > Images > Plans and sections > SFS_FD18.jpg [Illustration 344]
- … > Images > Specialists > Sand Pollen > Sand_pollen_sandsporeA.jpg [Illustration 520]
- … > Images > Specialists > Sand Pollen > Sand_pollen_sandsporeB.jpg [Illustration 522]

3.17 Geophyscial Survey at Sand, Applecross | Nyree Finlay & Louise McAllan

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports`. From here you can download the file '`Finlay,_geophysics.pdf`'.

Introduction

In Spring 2004, geophysical survey was undertaken at Sand, near Applecross (NG6841 4934) around the site excavated in 2000 by Scotland's First Settlers Project (Hardy & Wickham-Jones 2000; Hardy, Section 3.2). The survey was undertaken as part of a pilot project to explore the geophysical signature of Mesolithic sites (Finlay 2004). Geophysics is currently rarely used in Mesolithic research and in the long run the project aimed to demonstrate whether it works as a research methodology for the discovery and investigation of hunter-gatherer sites (Finlay & Sharpe nd). The aim of this survey was to explore the geophysical response of the shell midden deposit and to identify whether the extent of the unexcavated midden could be discerned using gradiometry and resistivity techniques. Unfortunately due to a technical fault, the resistivity survey was abandoned and only the gradiometry results can be presented.

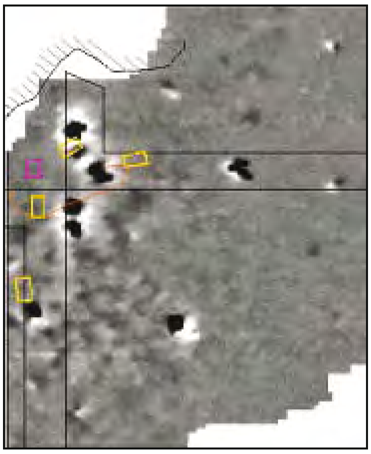
Methodology

Illus 528: Midden deposits visible in exposed sondage pit with abandoned resistivity survey in progress

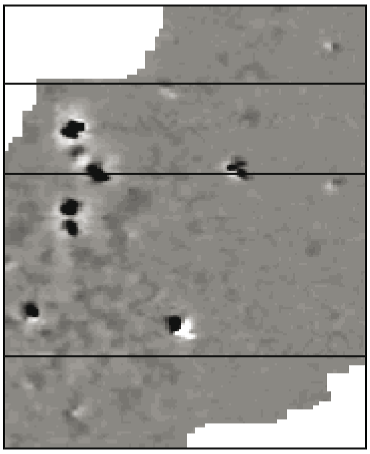
Illus 524: Gradiometry survey in progress at 0.25m intervals along north to south excavation trench

The survey was conducted over two days by a four-person team using Geoscan Research Ltd instruments across the grass covered apron in front of the rockshelter at Sand. This east-facing slope incorporates the excavated trenches (see Illustration 523, below left & Illustration 524, right). The magnetic survey was undertaken over one day, it covered a *c*500m² area and employed an FM36 Fluxgate Gradiometer set to a sensitivity of 1.0nT, allowing for the detection of features up to a depth of 1m below ground surface. A traverse and sampling interval of 0.25m was employed to enhance survey resolution and aid the detection of discrete features. Five survey grids (5m east—west × 20m north—south) were located over the excavation area (see Illustrations 523, below left & 525, below middle left) and dummy readings taken over the exposed rock in the interior of the rockshelter and at break of slope. Results were processed using Geoscan Research Geoplot v3.0 (see Illustrations 526, below middle right & 527, below right).

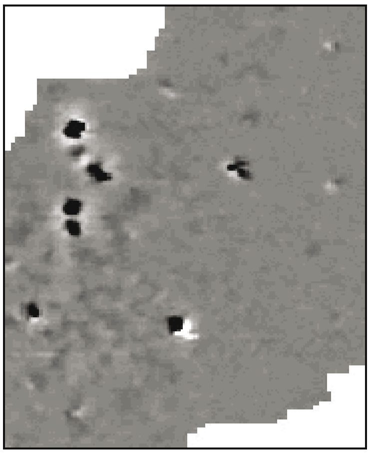
At the time of survey (April 2004), the site was grass covered with some bracken scrub and a carpet of lesser celandine flowers. Weather conditions were fair and ground conditions dry. The trenches excavated in 2000 were clearly visible as differential grass growth and shell midden deposit (containing bone, limpet and periwinkle shells) was exposed in mole disturbance in the unexcavated areas. The day after the gradiometer survey a small square of turf was removed for other purposes and this clearly reveals the nature of the remaining midden deposit in the unexcavated areas and its proximity to the surface (see Illustration 528, above left).



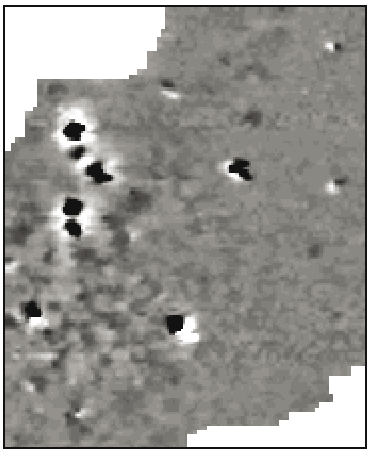
Illus 523: Location of the overall gradiometer survey area and overlay plan of site trench and test-pits



Illus 525: Position of the individual survey grids



Illus 526: Unprocessed gradiometry survey plot

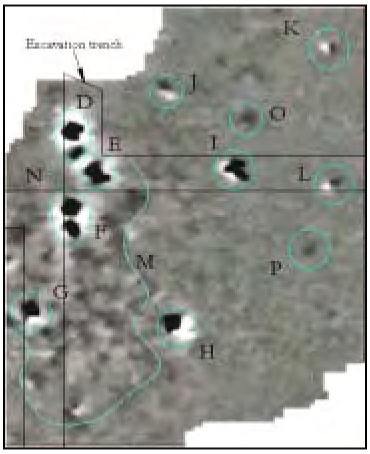


Illus 527: Processed gradiometry results. Data processed by L McAllan

Results

A Linear anomaly. This disturbed response may relate to geological features as it is located at the edge of the rockshelter collapse and top of terrace slope
B, C Linear anomalies reflect edge effects related to the survey grids (see Illustration 525, above middle left)
D, E, F These larger dipolar anomalies correspond with the excavation trenches. Fragments of slag together with the remains of a smithing hearth were recovered from the higher excavation spits in this area (Heald & Hunter, Section 3.9)
G, H, I These dipolar anomalies are isolated responses outwith the main excavated areas. They are similar in character to anomalies D–F. They may indicate further hearths or metal working activity
J, K, L These small dipolar anomalies are likely to reflect individual metal finds
M A large area of magnetic disturbance
N The area directly over the extant midden deposit produced a very subtle negative magnetic response in comparison to the surrounding areas. The edges of this deposit are obscured due to the character of the rockshelter, collapse within the interior and the dipolar anomalies in the excavated area
O, P Discrete small, enhanced magnetic anomalies.

The gradiometer survey results (see Illustration 529, right) appear to be affected by the prior excavation at the site. Of the main features listed above the large dipolar anomalies in the vicinity of the excavated trenches are the most dominant and these are interpreted as probable metal working remains based on the excavation evidence and the nature of the geophysical response. Likewise, the response to the features at G also corresponds to metal finds within one of the earlier test pits. Other similar sized anomalies, H and I, may represent comparable features or further possible hearth remains. There is also a possibility that these anomalies may represent the response from fire cracked stone due to strong thermoremanent magnetisation. The large area of disturbance (M) is likely to be a geophysical response to the quantity of fire cracked stone recovered in this area (Clarke, Section 3.6). This material was not removed from site but was later incorporated into the backfill that also included fire cracked rocks from elsewhere on site, and gravel from the sorted sieve residue, as well as stone from a neighbouring quarry exposure of similar type to the basal geology at the site (Birch *pers comm*).



Illus 529: Processed and annotated gradiometry results in relation to excavated trench

Sand: Interpretation & Discussion

The aim of the survey was to explore the geophysical response of the shell midden deposit at Sand and to see whether the unexcavated limits of the midden could be discerned using geophysical survey. Unfortunately the extent and character of the midden deposit was not easily defined. This is due to a combination of factors, some of which relate to the location and extent of the midden deposit at the site as well as extensive collapse in the rockshelter. There is also the disturbance caused by excavation as that has obscured the subtle negative responses recorded over the unexcavated midden deposit. The interpretation is also clearly influenced by the detection of dipolar responses that are likely to reflect iron objects, slag and potentially fire cracked rock as these all gave an extremely strong response.

Evidence of metal working was recovered from the excavated area and comprised the remains of a smithing hearth together with iron slag at the intersection of the two trenches. Copper alloy fragments, iron nails and other objects were found in this area and elsewhere in the trench (Hardy & Wickham-Jones 2000:67–8; Heald & Hunter, Section 3.9). Metal slag was also recovered from Test Pit 1. Overall the distribution of these metal objects corresponds with the main area of dipolar anomalies identified in the survey. Several other anomalies outwith the excavated area are likely to indicate further metal objects, igneous rocks or possibly further foci of smelting activities. This makes it difficult to ascertain whether some of these responses may relate to the fire cracked rock which, in itself, may relate to Mesolithic activity on site.

Comparable information on the geophysical responses to be anticipated from shell midden deposits is limited by the paucity of focused research. An area of enhanced magnetic readings was apparently recorded over a medieval limpet shell midden overlying Bronze Age structures at Dolphin Town, Tresco, Isles of Scilly (GSB Prospection 1999). At this site metal artefacts and rabbit disturbance also appear to have affected the results and thus potentially masked the character of the midden deposit (Taylor 2004).

In conclusion, while geophysical survey techniques were relatively unproductive at Sand in defining the extent of the midden, there is clear potential to explore further the application of these techniques prior to excavation at other shell midden sites. This research is needed to determine the character of geophysical responses and to assess the suitability of these techniques for discerning the extent of shell midden deposits. In this way, not only is the suite of non-destructive archaeological techniques for Mesolithic research extended, but also possible later events can be highlighted.

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4 Radiocarbon determinations in context | Patrick Ashmore & Caroline Wickham-Jones

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports. From here you can download the file 'Ashmore_and_WJ.pdf'.

4.1 Introduction

Once sites had been identified, the SFS excavations and test pits focussed on exposures of midden material across a large, but well defined, area and in this way various samples of dateable material were collected. While it cannot be claimed that this sample was truly random, so many different factors went into its selection (Section 2.1) that it probably does roughly reflect the true spatial and chronological distribution of midden material in the area. The results of the dating programme are, therefore, valuable, though they are also surprising. The middens are spread over a considerable timescale, and this has given new insights into the reasons for their creation and survival as well as preliminary information on long term aspects of culture and lifestyle in the area.

The SFS project has brought home the truth that some aspects of the way of life were very similar throughout many periods of prehistory and history. Many of the small middens discovered during test pitting are medieval or later in date. Yet there was little to distinguish them from middens 8000 years older. Many even had small quantities of worked lithics, mostly probably contemporary with the middens rather than residual from earlier times. SFS also emphasizes a complementary lesson. The late prehistoric and medieval middens undoubtedly represent only one aspect of human activity in the area during those periods. It seems likely that the earliest sites discovered in SFS similarly represent only one facet of a rich lifestyle.

4.2 Technical matters

All of the radiocarbon ages discussed here have been calibrated to produce dates BC or AD using OxCal 3.9 (Bronk Ramsey 2003) and the 1998 calibration curve (Stuiver *et al* 1998). Readers are advised to consult the list of dates available at the Historic Scotland website (Ashmore *et al* 2000b), the date list (to October 2002) for early foragers in Scotland (Ashmore 2004b) and recent copies of Discovery and Excavation in Scotland for detailed information on individual samples and ages quoted here.

Many ages obtained over the last 30 years from archaeological material in Scotland have very high errors or other problems such as the use of bulk samples on sites with a high degree of residuality. The errors attached to ages obtained before about 1985 often have to be increased from the originally quoted values (Ashmore *et al* 2000a). Opinions as to the reliability of some ages differ, so there is a need for a consistent way in which to express the validity of ages. Recent work on a fairly complete data set for Scottish archaeological ages provides a methodology, though it has not yet been subject to serious peer review (Ashmore 2004b:125). In essence, this work provides a weakness score for ages based on sample quality and other sample related factors. All of the ages obtained for the SFS project have a satisfactorily low weakness, but that is far from true for all of the related dates from other sites. The separate problem of whether a sample really was closely related in time to the context in which it was found can be tackled, sometimes, by obtaining several dates for single bits of short lived organic material from as many contexts as possible.

Sea water has a lower ratio of radiocarbon to normal carbon than the atmosphere. Marine material such as limpet or oyster shells, or the bones of animals which ate marine material, produces radiocarbon ages which are older than those from charcoal of the same true date. Traditionally, shell ages were calibrated on the assumption that the difference between sea water and the atmosphere was constant throughout the last 10,000 years. However, a recent study of matched pairs of samples of shell and charcoal shows that the ratio did vary significantly about 2000 years ago (Ascough *et al* 2004:611&618–619). It now seems highly likely that it varied at other times. This leaves us in the awkward position of not knowing exactly how to calibrate many of the dates obtained from shells over the past few decades, and thus how to compare the radiocarbon ages from shells in middens with the ages from other sites.

4.3 Period nomenclature

There has been some debate over the use of period nomenclature (Ashmore 2003a) and period names like 'Mesolithic' and 'Neolithic' are no longer as useful as they were before the widespread use of absolute dating methods. Indeed they can be positively misleading. For instance, three of the dates from a site with 'Mesolithic' style lithics at the Sands of Forvie near Aberdeen are, at first glance, surprisingly late (Warren 2003:155). Instead of falling before the 4th millennium, one date is about 3400 cal BC, another about 3100 cal BC and the last about 2700 cal BC. The exact stratigraphic relationship between the lithics and the charcoal used for dating might be debated, but one explanation is surely that it is quite credible that the dates could reflect sporadic visits by farmers exploiting marine resources and using a specialised (previously 'Mesolithic') tool kit to do so. Alternatively, as the excavator argues, some groups of people may have maintained earlier practices, rejecting a more settled way of life (Warren forthcoming; and see Saville 2004b:15–16). Elsewhere, some bevel ended tools, once thought to have been used only before about 4000 BC, have been dated to the 3rd and 2nd millennia BC (Ashmore 2004b:89–90). In future it may, perhaps, be more fruitful if we think in terms of the use of particular toolkits for particular activities instead of assuming that all aspects of the way of life changed simultaneously when many people took up farming a few generations after 4000 BC. There may have been much more significant difference between the people of the 9th and those of the 5th millennium BC (the early and the late 'Mesolithic' in Scotland) than between those who lived before and after 4000 BC.

In the following section the term 'forager' is used to denote those who lived by hunting, gathering, and fishing (generally taken to represent the Mesolithic lifestyle, Warren 2005) rather than by farming (generally supposed to have been introduced after the 'Mesolithic' and to have provided the main source of food since).

4.4 SFS dates

In what follows we shall first look at the SFS dates. We shall then consider earlier dates from other parts of Scotland in order to place the project in a broader context and, lastly, the related dates from the Skye and Lochalsh area, mainly in 500 year blocks of time from about 7000 BC onward. We shall also take a glance at some of the sites typifying change in Scotland as a whole.

There are 51 radiocarbon ages from the SFS project as a whole (see Tables 173 & 174, both below), providing an interesting picture of settlement around the Inner Sound from the earliest up to recent times. Skip Tables.

Table 173: Sand, Lochalsh NG 6841 4934

Description	Mat	Code	Calibrated date	Lab Age	Lab Error	d13c
A bevel ended bone artefact BT03 from sample B25A NE Spit 4, from a loose unconsolidated limpet midden (13) overlying a rockfall and covered by crushed shell and	bone, animal	OxA-10384	7050–6500 cal BC	7855	60	-21.07

turf.						
A bevel ended bone artefact BT30 from sample B25B NE Spit 7 from a loose unconsolidated limpet midden (13) overlying a rockfall and covered by crushed shell and turf.	bone, animal	OxA-10175	7050–6450 cal BC	7825	55	-21.06
A single piece of birch charcoal (sample 9/8) from the same Spit 8, Test Pit 9, near the edge of a midden as the bevel ended tool BT07 dated by OxA-9281 to 7715±50 BP and the antler dated by OxA-9280 to 7520±50 BP	charcoal	OxA-9343	6680–6460 cal BC	7765	50	-24.608
Bevel ended tool BT07 made from deer bone from the same Spit 8, Test Pit 9, of the outer edge of a midden as the antler dated by OxA-9280 to 7520±50 BP and charcoal dated by OxA-9343 to 7765±50 BP	bone, animal	OxA-9281	6650–6440 cal BC	7715	55	-21.31
Bevel ended tool BT28 made from deer bone from Spit 7, Test Pit 9, in the midden.	bone, animal	OxA-9282	6470–6240 cal BC	7545	50	-20.834
A single piece of antler (sample 9/8) from the same Spit 8, Test Pit 9, of the outer edge of a midden as the bevel ended tool BT07 dated by OxA-9281 to 7715±50 BP and charcoal dated by OxA-9343 to 7765±50 BP	antler	OxA-9280	6460–6240 cal BC	7520	50	-21.756
A bevel ended bone artefact BT29 from sample A1B NE Spit 9 from a shell free organic midden (22) overlying a sterile palaeosol and covered by the main shell midden	bone, animal	OxA-10176	5630–5470 cal BC	6605	50	-20.86
A bevel ended bone artefact BT09 from sample A2B SW Spit 10 from a shell-free organic midden (22) overlying a sterile palaeosol and covered by the main shell midden	bone, animal	OxA-10177	5540–5320 cal BC	6485	55	-21.76
A human upper left incisor from B1A Spit 3 of a shell midden 13. It underlay a layer of mixed fragmented and intact shell which had tipped or washed down the front face of the midden. The good condition of the tooth means that it may have been deposited as part of a larger portion of the skull or skeleton.	tooth, human	AA-50698	2150–1770 cal BC	3615	65	-18.5
Double bevel ended bone artefact BT11 from sample B25A NE Spit 8, from a loose unconsolidated limpet midden (13) overlying a rockfall	bone, animal	OxA-12096	6650–6470 cal BC	7744	37	

and covered by crushed shell and turf. This date replaces OxA-10152								

Table 173: Radiocarbon determinations from Sand
NB: Dates from squares B24A & B were affected by the recording discrepancy noted in Appendix 3 and the corrected squares B25A & B have been marked here

Table 174

Site	NGR	Description	mat	Code	Calibrated date	Lab Age	Lab Error	d13c
SFS 8 Loch A Sguirr, Raasay	NG 6084 5286	A single piece of birch charcoal (1/3) from spit 3 from midden layers at the rear of a rockshelter. This spit is higher than one dated by OxA-9254 to 2055±39 BP.	charcoal	OxA-9305	6640–6250 cal BC	7620	75	-26.587
SFS 8 Loch A Sguirr, Raasay	NG 6084 5286	Bevel ended tool of deer bone (BT 1) from Spit 2 from midden layers at the rear of a rockshelter. This spit is higher than one dated by OxA-9254 to 2055±39 BP.	bone, animal	OxA-9255	6220–6000 cal BC	7245	55	-21.632
SFS 89 Coire Sgamhadail 1	NG 7906 3826	A piece of hazel charcoal (SFS 89 S 1059B) from a shell midden TP1 C 8914 overlying angular rock fall in a substantial south facing cave at a central point near to its mouth, sheltered to the east and largely dry.	charcoal	AA-50692	2550–1950 cal BC	3815	90	-24.4

SFS 89 Coire Sgamhadail 1	NG 7906 3826	An ungulate bone (SFS 89 Cs 104) securely stratified in a shell midden TP1 C 8914 overlying angular rock fall in a substantial south facing cave, sheltered to the east and largely dry, at a central point near to its mouth.	bone, animal	AA-50693	2290–1880 cal BC	3695	65	-22.4
SFS 77 Camusteel Bay	NG 7050 4217	A piece of hazel charcoal (SFS 77 S 1102A) securely stratified within C 7717, a shell midden at the western side of a small cave lying halfway down a cliff-face the shelter, well within the drip line. The stratigraphy was deep and contained 7 well defined contexts.	charcoal	AA-50690	800–200 cal BC	2365	55	-26.2
SFS 20 Toscaig 2	NG 7010 3758	A charred hazelnut shell (SFS 20, S 1046A) securely stratified within context 7, one of a set of intense laminated occupation deposits TP1 C 2017 inside a deep dry cave with well	charred hazelnut shell	AA-50669	390–110 cal BC	2195	45	-24.2

		preserved stratigraphy.						
SFS 49 Creag Na H Uamha	NG 7174 6092	An ungulate rib (SFS 49) from a shell rich midden TP2 C 2003 located close the eastern wall of the cave underlying roof fall and overlying a layer of sea rounded cobbles in a cave approximately 3m wide and unroofed until 5m into the interior.	bone, animal	AA-50681	370–50 cal BC	2165	45	-21.8
SFS 20 Toscaig 2	NG 7010 3758	A large ungulate bone (SFS 20 S 1033C) from the same context as AA-50668.	bone, animal	AA-50667	350 cal BC – cal AD 10	2095	40	-21.1
SFS 68 Allt na Criche	NG 6828 5037	A charred hazelnut shell (SFS 68 S 1067A) from a layer of periwinkles in a black peaty matrix TP1 C 6814 in a possible platform formed by an arc of grass covered stones outside a north facing rockshelter, lying in an extensive area of sandstone gullies, platforms and rockshelters at a height of	charred hazelnut shell	AA-50687	350 cal BC – cal AD 10	2095	40	-25

		at least 30m OD.						
SFS 68 Allt na Criche	NG 6828 5037	A charred hazelnut shell (SFS 68 S 1066A) from a layer of black silty sand TP2 C 6823 underlying a shell midden in a rock shelter, lying in an extensive area of sandstone gullies, platforms and rockshelters at a height of at least 30m OD. A very different date AA-50686 was obtained from another charred hazelnut shell from this context.	charred hazelnut shell	AA-50685	180 cal BC – cal AD 30	2060	40	-22.1
SFS 8 Loch A Sguirr, Raasay	NG 6084 5286	A single piece of birch charcoal (1/6) from Spit 6 from midden layers at the rear of a rock shelter	charcoal	OxA-9254	170 cal BC – cal AD 50	2055	39	-26.459
SFS 20 Toscaig 2	NG 7010 3758	A deer bone (SFS 20 S 1033B) securely stratified within Context 5, one of a set of intense laminated occupation deposits TP2 C 2025 outside a deep dry cave with well	bone, animal	AA-50668	170 cal BC – cal AD 30	2055	35	-21.2

		preserved stratigraphy. Another date (AA-50667) was obtained from an ungulate bone from this deposit.						
SFS 2 Crowlin 1	NG 691 338	Birch charcoal (1/11) from Spit 11 of the central part of the lower part of a midden	charcoal	OxA-9251	cal AD 120–340	1799	37	-26.586
SFS 2 Crowlin 1	NG 691 338	Birch charcoal (3/4) from Spit 4 of the central part of a midden.	charcoal	OxA-9250	cal AD 650–810	1296	39	-27.691
SFS 41 Toscaig 9	NG 7009 3896	A piece of birch charcoal (SFS 41 S 1024A) from a thick occupation layer of laminated ash with shell TP1 C 4113 in a large airy rockshelter with an extensive midden of limpets and periwinkles. Another piece of charcoal was dated by AA-50678	charcoal	AA-50677	cal AD 630–990	1255	95	-24.2
SFS 77 Camusteel 2	NG 7050 4217	A piece of hazel charcoal (SFS 77 S 1102B) securely stratified within C7717, a shell midden at the western side of a small cave lying halfway down a cliff-face	charcoal	AA-50691	cal AD 680–890	1235	35	-24.6

		the shelter, well within the drip line. The stratigraphy was deep and contained 7 well defined contexts.						
SFS 77 Camusteel 2	NG 7050 4217	A charred hazelnut shell (SFS 77 S 1101A) from the same context as AA-50689.	charred hazelnut shell	AA-50688	cal AD 690–960	1205	40	-26
SFS 77 Camusteel 2	NG 7050 4217	A pig or boar right tibia (SFS 77 S 1101B) securely stratified within a possible floor 7715, at the western side of a small cave lying halfway down a cliff-face, well within the drip line. The stratigraphy was deep and contained 7 well defined contexts. See also AA-50688 from the same context.	bone	AA-50689	cal AD 780–1000	1130	35	-21.6
SFS 41 Toscaig 9	NG 7009 3896	A piece of birch charcoal (SFS 41 S 1024B) from a thick occupation layer of laminated ash with shell TP1 C 4113 in a large airy rock-shelter with an extensive	charcoal	AA-50678	cal AD 1030–1240	885	35	-26

		midden of limpets and periwinkles. Another piece of charcoal was dated by AA-50677						
SFS 6 Ashaig 1, Lochalsh	NG 6866 2420	Hazel charcoal (1/4) from Spit 4 of an open midden	charcoal	OxA-9278	cal AD 1215–1290	771	32	-26.39
SFS 6 Ashaig 1, Lochalsh	NG 6866 2420	Birch charcoal (1/12) from the deepest deposit, Spit 12, of an open midden	charcoal	OxA-9277	cal AD 1210–1295	769	36	-25.639
SFS 6 Ashaig 1, Lochalsh	NG 6866 2420	Birch charcoal (1/6) from Spit 6 of an open midden	charcoal	OxA-9279	cal AD 1220–1390	723	33	-27.138
SFS 49 Creag Na H Uamha	NG 7174 6092	A piece of hazel charcoal (SFS 49 S.A) from Spit 8 in one of two clear contexts TP1 behind an enclosure wall in a shell midden 1002 in a cave approximately 3m wide and unroofed until 5m into the interior. Another similarly dated sample AA-50680 comes from the same context.	charcoal	AA-50679	cal AD 1290–1410	625	35	-28.2
SFS 49 Creag Na H Uamha	NG 7174 6092	A piece of willow charcoal (SFS 49 S.B) from the same context as AA-50679.	charcoal	AA-50680	cal AD 1290–1410	620	35	-26.6
SFS 114 Fergus' Shelter	NG 7571 3714	A red deer, proximal metacarpal	bone, animal	AA-50697	cal AD 1300–1420	580	30	-21.3

		(SFS 114 S 1081B) from a distinct layer of limpet midden TP1 C 11414 lying on natural roof fall which precluded excavation to bedrock in the lowest of a series of conjoined, north-east facing rockshelters with much repaired walls along their perimeters, below the drip lines. This site lies *c*1.5km from the sea but contains a large shell midden. A piece of birch charcoal from the same context was dated as AA-50696.						
SFS 114 Fergus' Shelter	NG 7571 3714	A piece of birch charcoal (SFS 114 S 1081A) from the same context as AA-50697	charcoal	AA-50696	cal AD 1300–1420	575	30	-27.1
SFS 41 Toscaig 9	NG 7009 3896	A cow patella (SFS 41 S 1020C) from a thick occupation layer of laminated ash with shell TP1 C 4112 in a large airy rock-shelter with an extensive	bone, animal	AA-50676	cal AD 1320–1450	525	35	-21.7

		midden of limpets and periwinkles.						
SFS 2 Crowlin 1	NG 691 338	Birch charcoal (1/6) from Spit 6 of a test pit in the central part of a midden	charcoal	OxA-9252	cal AD 1400–1480	477	35	-26.44
SFS 99 Clachan Church	NG 7137 4576	A charred hazelnut shell (SFS 99 SA) from the same context as AA-50695.	charred hazelnut shell	AA-50694	cal AD 1320–1620	475	45	-23.6
SFS 66 Ard Clais Salacher 2	NG 6829 5123	A charred hazelnut shell (SFS 66S 1052A) from a well defined shell midden layer (TP1 C 6614) low down in a brown matrix inside a rockshelter situated in the sheltered base of an old sea cliff. Some recent rock fall from the cliff face is visible though the undulating interior.	charred hazelnut shell	AA-50684	cal AD 1440–1640	375	55	-23.9
SFS 66 Ard Clais Salacher 2	NG 6829 5123	A cut cow metatarsal, (SFS 66 S 1052B) from a well defined shell midden layer (TP1 C 6614) low down in a brown matrix inside a rockshelter situated in the sheltered base of an old sea cliff. Some recent rock fall from	bone, animal	AA-50683	cal AD 1450–1640	355	45	-22.3

		the cliff face is visible though the undulating interior.						
SFS 66 Ard Clais Salacher 2	NG 6829 5123	A cranial fragment from a pig (SFS 66 S 1052C) from a well defined shell midden layer (TP1 C 6614) low down in a brown matrix inside a rockshelter situated in the sheltered base of an old sea cliff. Some recent rock fall from the cliff face is visible though the undulating interior.	bone, animal	AA-50682	cal AD 1450–1640	355	35	-21.1
SFS 41 Toscaig 9	NG 7009 3896	A charred hazelnut shell (SFS 41 S 1020A) from a thick occupation layer of laminated ash with shell TP1 C 4112 overlying shell midden 4113 in a large airy rockshelter with an extensive midden of limpets and periwinkles, shell midden.	charred hazelnut shell	AA-50674	cal AD 1460–1640	350	30	-25.2
SFS 22 Crowlin 3	NG 6902 3415	A pig radius (SFS 22 S.C) from a wet deposit of cream laminations	bone	AA-50671	cal AD 1450–1650	340	40	-21.2

		TP1 C 3005 at the back of the cave below a compacted deposit of charcoal rich soil C3004 in a former sea cave, which has collapsed to form a V-shaped cleft. A hazelnut shell has been dated (AA-50672) from the same context.						
SFS 68 Allt na Criche	NG 6828 5037	A charred hazelnut shell (SFS 68 S 1066B) from the same context as AA-59685 which provided a very different date.	charred hazelnut shell	AA-50686	cal AD 1470–1640	340	30	-24.5
SFS 41 Toscaig 9	NG 7009 3896	A charred hazelnut shell (SFS 41 S 1020B) from a thick occupation layer of laminated ash with shell TP1 C 4112 overlying shell midden 4113 in a large airy rockshelter with an extensive midden of limpets and periwinkles, shell midden.	charred hazelnut shell	AA-50675	cal AD 1480–1650	325	35	-23.3
SFS 2 Crowlin 1	NG 691 338	Pointed tool of deer bone BT23 from Spit 5 of a	bone, animal	OxA-9253	cal AD 1480–1660	316	39	-20.873

		test pit in the central part of the midden						
SFS 26 Crowlin 7	NG 6840 3500	A charred hazelnut shell (SFS 26 S 1091A) from an organic rich lens of shell, bone and charcoal TP1 C 2613 abutting bedrock in a large, open rock shelter. Test Pit 1 was located within the small area of visible midden.	charred hazelnut shell	AA-50673	cal AD 1440–1800	315	60	-25.4
SFS 99 Clachan Church	NG 7137 4576	A charred hazelnut shell (SFS 99 SC) from a sealed old ground surface 9914 containing pottery, low down in the stratigraphy of an open midden site with six clear contexts lying about 12m from the southern graveyard wall. See also AA-50694.	charred hazelnut shell	AA-50695	cal AD 1480–1670	295	35	-25.1
SFS 22 Crowlin 3	NG 6902 3415	A charred hazelnut shell (SFS 22 S.A) from the same context 3005 as AA-50671.	charred hazelnut shell	AA-50672	cal AD 1660–1960	145	55	-23.3
SFS 22 Crowlin 3	NG 6902 3415	An ungulate longbone SFS 22 S.B) from a black humified layer TP1 C 3002 well	bone	AA-50670	cal AD 1680–1960	75	30	-21.3

		below the surface at the back of a former sea cave, which has collapsed to form a V-shaped cleft.						
SFS 22 Crowlin 3	NG 6902 3415	An ungulate longbone SFS 22 S.B) from a black humified layer TP1 C 3002 well below the surface at the back of a former sea cave, which has collapsed to form a V-shaped cleft.	bone	SUERC-1166 Recount of AA-50670	cal AD 1660–1960	140	50	-21.8

Table 174: Radiocarbon determinations from the test pitted sites

Ten radiocarbon ages, including the earliest, relate to the main excavated site at Sand (see Table 173, above). Four of these derive from samples taken from the initial test pits in 1999, five relate to samples taken during excavation in 2000, and one was later submitted to date a human tooth from the upper levels of the midden. An eleventh date, OxA-10152, originally formed part of the suite of determinations from Sand, but was dismissed as unsound following advice from the laboratory in December 2002. This date was replaced by OxA-12096 that was taken from the same bevel ended tool.

These results confirm a mid-late 7th millennium BC date for most of the Mesolithic remains from Sand. There are two mid 6th millennium BC dates, and one late 2nd millennium BC date.

Forty-one dates come from the test pitted sites (see Table 174, above). These include sites around the Inner Sound, mostly targeted for the presence of visible midden. All but two of the sites are rockshelter or cave sites, the exceptions being SFS 6, Ashaig 1 and SFS 99, Clachan Church, both of which are open middens, both potentially associated with early Christian sites. They provide a range of dates from the 7th millennium into recent times. This date list is interesting not only for what is there, but also for the gaps. Both are considered below.

4.5 The wider context of Scotland's First Settlers

Various authors have argued that finds of Scottish tanged points imply an early occupation of Scotland (Morrison & Bonsall 1989). However, the tanged points are all isolated finds and there are, as yet, no radiocarbon ages for contexts that include tanged points. Most of these artefacts can be related to Saville's "ragbag of undiagnostic forms" (Saville 2003:343). Of some half dozen examples, Ballin & Saville only accept the tanged points from Tiree and Shieldaig as genuine (Ballin & Saville 2003:124). On the other hand, tanged points could be taken to support an argument that Scotland was settled early, at the same time as Arctic Norway (for example Morrison & Bonsall 1989:135; Finlayson 1999:881) whence there are dates which demonstrate settlement before 9500 cal BC, and perhaps before 10,000 cal BC (Thommessen 1996). Reindeer, often associated with the hunter-foragers who used tanged points, survived at least until the second half of the 8th millennium near Inchnadamph, not far from Shieldaig (Murray *et al* 1993; Kitchener *et al* 2004:74–5). It is therefore credible that early hunters and foragers were present in Scotland soon after the end of the Younger

Dryas.

The earliest available direct Scottish 14C ages for human activity come from Cramond, Edinburgh and imply settlement somewhere in the period between 8500 and 8300 cal BC (Lawson 2001). A date from a small forager camp at Manor Bridge, Peebles (Warren 2005) and a date from a site with abundant flake debitage, cores and microliths at Daer Reservoir 1 near Biggar also suggest occupation in the second half of the 9th millennium BC (Ward 1995:87; 1997:75; 1998:128). Additionally, the round house site at East Barns, Dunbar, East Lothian (Gooder 2003) has been dated to about 8000 cal BC, and this is similar to or slightly earlier than the date of another round house at Howick, Northumberland (Waddington *et al* 2003). These dates all come from recent work, and they have shown that people were in SE Scotland around the mid 9th millennium, well before most tree species, in a landscape dominated by grass, herbs, birch, willow and hazel scrub, and less than 1500 years after the end of the Loch Lomond mini-glaciation. Current evidence thus suggests that though these early foragers used conventionally 'late' narrow blade microliths (in English terms, Jacobi 1973; 1976; Pitts & Jacobi 1979) they entered Scotland from the south and east rather than up the Irish channel as has been suggested (Wickham-Jones 1990). This would fit with Saville's recent observation that the lithic artefacts do not show connections with Ireland at this early period (Saville 2003). Nevertheless, contacts may not always be reflected in lithic assemblages (Woodman 2004:294–5) and the possibility of contacts up and down the west coast of Scotland and the east coast of Ireland must be admitted, especially later on.

By the mid 8th millennium the settlement base was wider. The earliest ages for human activity from the spread of material at Kinloch, Rùm (Wickham-Jones 1990), and the specialised site at Fife Ness in eastern Scotland (Wickham-Jones & Dalland 1998a & 1998b) suggest that occupation had spread along the current west and east coasts within a century either way of 7500 cal BC. The next earliest site, and the earliest to show strong evidence (albeit as a result of better preservation) for intensive use of coastal resources is a midden in the rock-shelter at Druimvargie near Oban whence a bevelled tool has been dated to the second half of the 8th millennium cal BC (Bonsall *et al* 1995).

The available dating evidence is still patchy, however, and does not address some of the most challenging questions about late forager populations (Ashmore 2004a:92). The number of forager sites peaked around 4400 cal BC, and on current evidence it fell sharply again about 4200 cal BC, well before the widespread adoption of farming perhaps around 3800 cal BC. So far the evidence does not contradict Armit and Finlayson's suggestion that Scotland became, in places, "substantially occupied" shortly before farming was adopted (Armit & Finlayson 1996; Finlayson 1999; Saville 2004b:15–16), but it does not clearly support it either. Meanwhile, some aspects of the forager way of life seem to have been present throughout the next two millennia into the 2nd millennium (Ashmore 2004a:92).

4.6 The sequence of human activity in Skye, Lochalsh and nearby areas

A variety of sites is represented by the 84 dates available for Skye, Lochalsh and nearby areas. The dated SFS sites add to a respectable body of information from the wider area (Ashmore 2004b). The distribution of sites in time largely reflects the types of site (mostly small shell middens) chosen for examination by the SFS project, earlier work at Kinloch (Wickham-Jones 1990), and the numbers of dates obtained from each site. Nevertheless, the distribution of middens, as remarked above, shows that foraging has never really disappeared from coastal lifestyles.

4.6.1 Probably between 8000 and 7000 cal BC

All the dates for this period are from the settlement at Kinloch (Wickham-Jones 1990). All have quite large errors and suggest that settlement here probably started around the middle of the 8th millennium BC. The date (OxA-10152) from Sand relating to this period and included in a recent summary of forager related dates (Ashmore 2004a:figure 6.7; 2004b:102) has been withdrawn, following advice from the laboratory. There are thus no bevel ended tools, from any site in Scotland, dated to this period.

Just to the north of the Inner Sound, there are dates associated with reindeer, suggesting their survival at least until the second half of the 8th millennium BC at Inchnadamph (Murray *et al* 1993). Elsewhere, reindeer are closely associated with early foraging populations (Kitchener *et al* 2004:74) so that their presence in the vicinity makes it quite credible that early foragers may have been present in the area soon after the end of the Younger Dryas.

4.6.2 Probably between 7000 and 6500 cal BC

There are dates from charred hazelnut shell from Kinloch, Rùm (Wickham-Jones 1990) and Camas Daraich in South Skye (Wickham-Jones & Hardy 2004), and from four bevel ended bone tools found at Sand.

The earliest dates at Sand all come from the main body of midden, from Area B1, Context 13, and from Test Pit 9 which was in this area (see Illustration 530, Table below). Despite the recording problems in 2000 (Section 3.2; Appendix 3) these dates are remarkably consistent. Most come from lower spits within Context 13, one (OxA-10384) is from Spit 4. There is a small plateau in the calibration curve which results in the weight of their probability distributions being between about 6700 and 6600 cal BC.

Illustration 530

8000	7000	7
7000	6500	14
6500	6000	10
6000	5500	1
5500	5000	4
5000	4500	0
4500	4000	0
4000	3500	2
3500	3000	1
3000	2500	2
2500	2000	6
2000	1500	0
1500	1000	1
1000	500	1
500	0	8
0	AD 500	1
AD 500	AD 1000	5
AD 1000	AD 1500	10
AD 1500	AD 1750	8
AD 1750	present	3
	Total	84

Illus 530: Numbers of dated sites in Skye and Lochalsh, including non-SFS dates; dates by half millennium except at beginning and end

4.6.3 Probably between 6500 and 6000 cal BC

Dates falling in this period come from midden deposits at SFS 8, Loch a Sguirr rockshelter in Raasay, SFS 1 An Corran (where there is a directly dated residual bevel ended tool above a late 6th millennium context) and Sand. The open-air lithic site at Camas Daraich, Skye also yielded dates from this period (Wickham-Jones & Hardy 2004). Dates from artefacts comprise those from Sand, Loch a Sguirr and An Corran which relate to bevel ended tools (see Tables 173 & 174, above; Table 175, below).

Table 175

Description	Mat	Code	Calibrated date	Lab Age	Lab Error	d13c

Red deer bone bevel ended tool from a shell midden, in deposits containing microliths made of local stone, on a ledge at the base of east facing cliffs.	bone, animal	OxA-4994	6600–6230 cal BC	7590	90	
A ruminant long bone found in the basal layer of red clay. It may have been introduced from elsewhere long after death. The context above it contains a bone tool dated to 7590±90 (OxA-4994) BP. See also AA-27745.	bone, animal	AA-27746	5530–5210 cal BC	6420	75	-22.8
A broken bevel ended bone tool made from a ruminant long bone fragment found in the main shell midden (mostly of limpet shells) at the rear of the rock shelter. See also AA-29315	bone, animal	AA-29316	5310–4990 cal BC	6215	60	-20.6
A bevel ended bone tool made from a red deer metatarsus, found in the main shell midden (mostly of limpet shells) at the rear of the rock shelter.	bone, animal	AA-29315	4220–3800 cal BC	5190	55	-21.3
One of several disarticulated human bones in a black greasy midden. Above this layer lay later prehistoric contexts. There is potential for mixing or intrusion from above.	bone, human	AA-27744	3340–2890 cal BC	4405	65	-20.2
A broken bevel ended bone tool made from a red deer metacarpus found in a black greasy midden, mostly of limpet shells, which probably post-dates the main midden but could include material derived from it.	bone, animal	AA-29311	2890–2580 cal BC	4175	60	-23.3
A broken bevel ended bone tool made from a ruminant long bone fragment, found in a black, greasy midden, mostly of limpet shells, which probably post-dates the main midden, but could include material derived from it.	bone, animal	AA-29314	2620–2300 cal BC	3975	50	-20.6
One of several disarticulated human bones in a deposit almost entirely composed of limpet shells, the lower part of which contains a bone tool dated to 7590±90 (OxA-4994)BP. There was potential for mixing or intrusion from above.	bone, human	AA-27743	2560–2140 cal BC	3885	65	-24
A broken bevel ended bone tool made from a red deer metapodium from a deposit of shell midden just above the natural base of the rockshelter floor and overlain by a black greasy midden deposit with Mesolithic artefacts.	bone, animal	AA-29313	2230–1870 cal BC	3660	65	-23.9
Burnt animal bone (pig) found in the basal layer of red clay. It may have	bone, animal	AA-27745	1520–1210 cal BC	3120	60	-26

been introduced from elsewhere long after death. The context above it contains a bone tool dated to 7590±90 (OxA-4994)BP.						
A complete bone point made from an ovicaprid tibia found in the main shell midden (largely composed of limpet shells) at the rear of the rockshelter. This tool is of a type likely to be later prehistoric.	bone, animal	AA-29312	210 cal BC – cal AD 80	2045	60	-22

Table 175: An Corran, radiocarbon determinations (Saville & Miket 1994; Saville 1998a:126–7)

The site at SFS 1, An Corran in Staffin in Skye, is particularly interesting because of the depth and quality of its midden deposits (Hardy *et al* forthcoming; Saville 1998). An Corran lies on a broad shelf below a rockshelter that has now gone. Only a small proportion of the site was excavated, in advance of disturbance due to roadworks. The deposits comprised midden material roughly a metre deep, which overlay an old ground surface on which there were further non-organic finds. The finds included lithics of Mesolithic aspect; interestingly there were both narrow blade microliths and broader microliths, all of local raw materials. Higher up in the midden there was also pottery. The dates from An Corran indicate that activity here began early, but in contrast to Sand the midden yielded a broad sweep of dates running into the Bronze Age and possibly later prehistory. It seems that activity took place at An Corran over a long period of time, if only intermittently. The presence of well preserved human bones in the midden suggests that this activity included burial of some sort.

The four dates from Sand all come from Test Pit 9 (see Table 173, above), which was dug as part of the initial investigation of the site in 1999. Although Test Pit 9 clearly related to the main shell midden (Section 3.2), the precise stratigraphy of the deposits within the midden sequence is less clear.

4.6.4 Probably between 6000 and 5500 cal BC

The only evidence for this period is that from Kinloch which comes from charcoal in a buried soil by the burn to one side of the site. Although a respectable number of dates has been obtained for this period in Scotland (Ashmore 2004a:87), there is a curious lack of dates from hazel between roughly 6000 BC until about 4500 BC and hazel only reappears about 4000 BC (Ashmore 2004a:89).

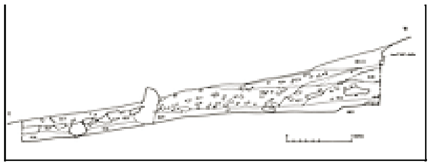
The lack of dates at Sand from the earlier 6th millennium is interesting. While this might, of course, relate to the areas of the site that were sampled for dating, it is also possible that the site was abandoned at this time.

4.6.5 Probably between 5500 and 5000 cal BC

Illus 345: Trench A, north-facing section showing slope in ground

After the early dates there is an apparent gap of c1000 years in the evidence from Sand, and then there are two mid 6th millennium BC dates, both from Context 22 in Area A. These dates both came from just below the main Mesolithic deposits of midden in Area A (Section 3.2). Initially it was clearly contradictory to have later dates from a lower deposit, but close examination of the deposits reveal that the higher, earlier material has slumped from the main body of midden which lies just uphill of Area A. The site at Sand is on a considerable slope (Section 3.1; see Illustration 345, left) and the lower edges of the Mesolithic midden were clearly originally unstable. In this way a small stretch of the stratigraphy at Sand became inverted (see Illustration 531, lower right).

These mid 6th millennium dates are also interesting because both come from a very specific midden-free context (Context 22) in Area A. In this respect the find of a ground stone axe also from this area, in Context 27 which was related to Context 22, is significant. Ground stone axes are not usually associated with the Scottish Mesolithic, but rather with the Neolithic and later (Section 3.3). Although these dates fall before the time when the economic and other bases of life in the area are usually considered to have been changing, they certainly provide added support for later activity at Sand. Together the axe and the different nature of the deposits emphasise the advent of changes to the local lifestyle.



Illus 531: Sand –north-facing section A6–A1 showing the steep slope and inverted stratigraphy

Further evidence from this period around the Inner Sound is scarce, but a broken bevel ended bone tool and a ruminant bone from An Corran indicate activity here (see Table 175, above; Hardy *et al* forthcoming).

4.6.6 Probably between 5000 and 4000 cal BC

No evidence from sites around the Inner Sound except perhaps right at the end.

4.6.7 Probably between 4000 and 3500 cal BC

A date from this or late in the previous period comes from a bevel ended bone tool made from a red deer metatarsus from SFS 1, An Corran. Charcoal from a hollow at Kinloch with no diagnostic material dates from this or the subsequent half millennium.

The massive timber long houses at Balbridie in Aberdeenshire (Fairweather & Ralston 1993) and Claish in Stirling (Barclay *et al* 2002) belong to the second half of this period. Charred barley and pottery and the earliest burials in chambered cairns appear around 3800 cal BC (Ashmore 2004c:127,129&131) all of which suggests that the major changes to the economic and social bases of life were well established in Scotland before the end of this period.

4.6.8 Probably between 3500 and 3000 cal BC

One of several disarticulated human bones from SFS 1, An Corran, belongs to this period. It may reflect final disposal of human bones previously buried elsewhere.

4.6.9 Probably between 3000 and 2500 cal BC

There are dates from SFS 1, An Corran, from a broken bevel ended bone tool, and from Kinloch, from charcoal from a midden-type dump in the peat filling of the burn.

4.6.10.Probably between 2500 and 2000 cal BC

There are dates for this period from two bevel ended tools found at SFS 1, An Corran as well as from one of several disarticulated human bones at the site, and from Kinloch on wood from a deposit of rock and debris in the peat filling of the burn. In addition there are two dates from the large cave at SFS 89, Coire Sgamhadail 1, among a group of caves and rockshelters with visible midden and lithics. It is possible that some of these belong between 2000 and 1500 BC.

More widely in Scotland, this period saw the introduction of metal working including a flat dagger from Dail na Caraidh near Fort William (Barrett & Gourlay 1999; Sheridan 2002; Ashmore 2004c:133; Needham 2004:228&231). It also saw a trend towards burials in cists and graves, though the change was neither as dramatic nor as complete as once thought. There is an increasing number of dates from human bone in cists with multiple burials, and single inhumations where the bones seem to have been conserved elsewhere before they were put in cists (Gibson 2004).

4.6.11 Probably between 2000 and 1500 cal BC

As noted some of the above dates may possibly relate to this period, and there is also a date from one of the human teeth from Sand. It was taken from a human molar found in Area B2, in Context 13 Spit 3 which was near to the 20th century ground surface. Although it was not apparent during excavation, the post excavation work has revealed several different strands of evidence that indicate re-use of the rockshelter at Sand at this time (Section 3.2). There was other more recent artefactual material in this area of the site, including both fragments of coarse pottery (Section 3.8) and unclassified slag from metal working (Section 3.9). It seems likely that the surface of the midden here has always lain near to the ground surface, and been relatively friable, so that the remains of later activity, however small scale, could percolate into the midden material.

At some stage in the later 2nd millennium BC a bronze smith made use of the shelter afforded by the rock formation at Sand, though the slight amount of evidence suggests that this was not for long.

4.6.12 Probably between 1500 and 1000 cal BC

A single burnt pig bone has been dated to this period from SFS 1, An Corran.

4.6.13 Probably between 1000 and 500 cal BC

At SFS 77, Camusteel 2, there is charcoal from a small cave that has been dated to this period. The cave contained visible midden and lithic material (Section 2.2).

4.6.14 Probably between 500 BC and 0

There are dates from hazelnut shell and mammal bone from a deep and dry cave with visible limpet midden, including some lithic finds, at SFS 20, Toscaig 2. Other dates come from an unworked bone from the rockshelter at SFS 49, Creag-na-h-Uamha, charred hazelnut shell from the rockshelters at SFS 68, Allt na Criche, and charcoal from SFS 8, Loch A Sguirr, as well as a complete bone point from SFS 1, An Corran.

The settlement at Tungadale (Miket 2002), the broch at Floddigarry (Martlew 1985) and the dun at Dun Ardtreck (MacKie 2000), all in Skye, probably date to this period. The High Pasture Cave below a cluster of round and U-shaped stone structures, also in Skye, contained butchered bone from pigs, cattle and red deer. Pig bones predominated and a recently obtained radiocarbon age from one of them implies a date between about 400 and 150 cal BC. This may represent feasting and subsequent disposal of bones. The cave also contains bronze working debris, and the occurrence of fish bone and marine shell shows use of coastal resources (Birch 2004:42–3). This demonstrates, as suggested above, that at least the later middens located during SFS are one part of a rich economic system.

4.6.15 Probably between 0 and AD 500

There is a date from this period on charcoal from the midden in the large rockshelter at SFS 2, Crowlin 1. In addition, a handled bowl of alder wood from Talisker in Bracadale (Earwood 1991 & 1993) and bog butter from Kyleakin, Strath (Earwood 1991), both in Skye, probably date to this period.

4.6.16 Probably between AD 500 and 1000

The midden at SFS 2, Crowlin 1 yielded one date, from charcoal, and there are also dates from charcoal from the rockshelter at SFS 41, Toscaig 9, and from both charcoal and pig bone from the small cave SFS 77, Camusteel 2.

4.6.17 Probably between AD 1000 and 1500

There are dates from charcoal and mammal bone from the sites at SFS 41, Toscaig 9; SFS 6, Ashaig 1; SFS 49, Creag-na-h-Uamha; SFS 114, Fergus' Shelter; and SFS 2, Crowlin 1. All but SFS 6, Ashaig 1, are caves or rockshelters.

In addition, Torrin site 1, period 2 probably dates to this period. This comprises the hearth and mound at the heart of a large charcoal mound which was sealed by a turf covering, itself sealed by the earliest phase of the stone shieling structure (Wildgoose 1991). Other probable dates from this period come from the circular cell (C4) at Tungadale (Miket 2002) which has been inserted into homestead (L4), and the pine joists from Caisteal Maol, Kyleakin, Strath (Miket & Roberts 1990).

4.6.18 Probably between AD 1500 and 1750

At SFS 99, Clachan Church there are dates relating to this period on charred hazelnut shell and mammal bone from the midden below the church. Other SFS dated sites at this time are the rockshelters at SFS 66, Ard Clais Salacher 2; SFS 41, Toscaig 9; SFS 68, Allt na Criche; and SFS 2, Crowlin 1, as well as the collapsed sea cave at SFS 22, Crowlin 3. The date from the midden at Crowlin 1 was taken from a pointed tool of deer bone.

4.6.19 Probably between AD 1750 and the present

The most recent dates in the project were all from charred hazelnut shell and come from the sea cave at SFS 22, Crowlin 3, the large rockshelter at SFS 26, Crowlin 7, and the midden at SFS 99, Clachan Church.

4.7 Discussion

These results confirm that the Inner Sound has provided a focus for human activity from the earliest times up to the present day. The Mesolithic dates from Sand add to a growing body of evidence for activity in the area in the late 7th millennium. Current evidence suggests that the initial occupation of the area is likely to have taken place in the mid 8th millennium BC, though only one site has so far produced dates of this period: Kinloch on Rùm (Wickham-Jones 1990). By the 7th millennium BC there are dates from Camas Daraich (Wickham-Jones & Hardy 2004), SFS 1, An Corran (Hardy *et al* forthcoming; see Table 175, above) in Skye, and SFS 8, Loch a Sguirr in Raasay, as well as more dates from Kinloch and Sand. Five sites do not provide much evidence for a millennium of occupation, but all fall within a restricted geographical area: the Inner Sound and adjacent islands. Together the dates and archaeological information are beginning to flesh out knowledge of the early settlement of this part of west coast Scotland (Section 9).

Further afield, after a start around 7500 cal BC there is an apparent peak in the use of Scottish shell middens around 6500 cal BC (Ashmore 2004a:88). The activity around the Oronsay middens probably starts around that time, and peaks, after a gap, around 4400 cal BC. However, there are still relatively few midden sites, and thus relatively few dates relating to them. The distribution of dated examples is heavily biased to Argyll and the Forth Valley. Sea-level changes have probably led to the loss of early coastal middens at least in the east of Scotland. Most of the dates come from marine shell, and recent research suggests that the currently applied correction to shell dates to allow for the marine effect may well be wrong (Ascough *et al* 2004). Therefore it is important that caution be used in the interpretation of these dates for the time being (Ashmore 2004a:88–9&91).

The dating evidence from SFS work, such as it is, contributes substantially to this pattern of mid 7th millennium use of shell middens, but also to the apparent decline in dated sites in the earlier 6th millennium. Not only is there a lack of dates from Sand at this time, there are no other dates from elsewhere. Although it is possible that the site at Sand was abandoned for a time, it might equally relate to the areas of site that were sampled for dating. Elsewhere it is important to ask whether this lack of dates reflects a sampling bias in the research work (are we looking for sites in the wrong places – suggesting a shift in settlement patterns), or was there a decline in population? Broad-based studies such as SFS provide one approach to the problem though as yet the work in the Inner Sound can provide no hard and fast answer. There are, for example, a number of sites which, though producing Mesolithic lithic assemblages did not yield material suitable for dating.

SFS also revealed little activity around the Inner Sound from the 6th into the 3rd millennium BC. Further work is necessary to reveal whether the concentration on caves and rockshelters as well as sites with visible lithics and midden captured all aspects of human activity.

In the years leading to the 1st millennium BC there is a small but steady amount of information, which then increases slowly to the present day. It is important to remember that many sites were not dated, especially those yielding obvious evidence of activity from historic times.

One side effect of the project has been an important cautionary caveat to the conventional assignations of period to a site. Not only does it seem that the application of simple period definitions is no longer useful, in addition it is interesting to note that, though many of the caves and rockshelters had both midden and lithics, these were not necessarily prehistoric. Even the lithics often appear to relate to later ad hoc use of a ubiquitous resource. Flint flakes had an obvious use as strike-a-lights into recent times, but it seems that they might also be used for their sharp edges.

Together the dates provide an interesting sequence of human activity from the most distant human past of the area, into recent times. There is an obvious weakness in the lack of detailed information from many sites, but even the small amount of information available extends our knowledge of the area considerably. More importantly they provide a sound data base which is now available to be picked up by specialists who wish to increase knowledge of any one of several periods.

Files cited in the text

All files start from ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > …

… > Documents > Final Reports > Ashmore_and_WJ.pdf
… > Images > Plans and Sections > SFS_FD17.jpg [Illustration 531]

5 Lithic Raw Material use around the Inner Sound | Caroline Wickham-Jones

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007` > `Downloads` > `Documents` > `Final Reports`. From here you can download the file '`Wickham-Jones,_Lithic_Raw_Materials_Around_the_Inner_Sound.pdf`'.

5.1 Introduction

Illus 365: The main raw materials used at Sand

Scotland's First Settlers has identified several different raw materials that were used for flaked stone tools in prehistory in the area (see Illustration 365, right; Tables 176 & 177, both below). At first it was hoped to enlist the help of specialised geologists to recognise these definitively and provide more information on their occurrence and archaeological development. In the event, this was not possible, partly because of a lack of funding and partly because the archaeological queries are, in geological terms, very specialised so that it was difficult to find points of agreement between the geologists consulted. SFS consulted some half a dozen geologists and found that they offered differing views, for example as to the differentiation of flint or chert from other chalcedonic silicas, or the recognition of baked mudstone as apart from baked volcanic tuffs. (From top left: Rùm bloodstone×2, baked mudstone×2, quartz×3, with chalcedonic silica×2 in the centre). Skip Tables.

Table 176

- Chalcedonic Silica: including flint, chert, agate and jasper
- Baked Mudstone
- Rùm Bloodstone
- Quartz, Quartzite and Rock crystal
- Coarse stone: including a variety of sandstones

Table 176: Different types of raw material identified by the project

Table 177

Site Name	Baked Mudstone	Chalcedonic Silicas	Rùm Bloodstone	Quartz and Quartzite	Coarse stone	Flint	Other	Total	Location*
SFS 185 Achintee		1	2					3	SLS
SFS 95 Achnahannait Bay	1	3						4	W
SFS 68 Allt na Criche		12		47				59	E
SFS 10 Allt na h'Uamha	1	6		1	1			9	SLS
SFS 60 Allt-na-h-Eirigh		1						1	E
SFS 150 Alt Cadh an Eas		2		2				4	SLS
SFS 29 An Corran B	34	41		1				76	W
SFS 30 An Corran C	299	217		12			1v	529	W
SFS 31 An Corran D	10	45	1	2				58	W
SFS 101 An	249	284	5	17				555	W

Corran E									
SFS 193 An Corran F	8	18						26	W
SFS 194 An Corran G		3						3	W
SFS 1 An Corran, Meso site		1						1	W
SFS 116 Applecross Mains Shovel Pits		7		3				10	E
SFS 75 Applecross Manse		28	17	52				97	E
SFS 66 Ard Clais Salacher 2		5		2		5		12	E
SFS 102 Ardheslaig 1			1					1	E
SFS 6 Ashaig 1	2			1				3	S
SFS 92 Ashaig 3		6	1	1				8	S
SFS 93 Ashaig 4		2		1				3	S
SFS 32 Brogaig	52	47		3				102	W
SFS 168 Camas an Leim		1						1	SLS
SFS 188 Camas an Leim		4						4	SLS
SFS 71 Camusteel 1				1				1	E
SFS 77 Camusteel 2		5						5	E
SFS 17 Church Cave		2		2				4	C
SFS 61 Clachan Church				2		1		3	E
SFS 99 Clachan Church Midden		1						1	E
SFS 147 Cnoc na Celpeirein		9		27			1v	37	SLS
SFS 89 Coire Sgamadail 1	1	3		3				7	E
SFS 90 Coire Sgamadail 3–6		8						8	E
SFS 49 Creag na-h-uamha		2						2	E
SFS 2 Crowlin 1	1	25		4		1		31	C
SFS 22 Crowlin 3		53		5		2		60	C
SFS 23 Crowlin 4									C
SFS 26		4						4	C

Crowlin 7									
SFS 188/190 Diabeg				1				1	SLS
SFS 152 Doire na Guaile, Rona	3			76	1			80	C
SFS 117 Dun Hasan 2	1	2						3	W
SFS 104 Fearnmore 1	115	131	40	468				754	E
SFS 80 Fearnmore 2				1				1	E
SFS 114 Fergus' Shelter		68		12	1			81	E
SFS 8 Loch a Sguirr	60	27		62				149	C
SFS 18 Loch a Sguirr 2				5				5	C
SFS 171 Meall na h'Airde 2		23		4				27	SLS
SFS 96 Meallabhan	2	20		1	1			24	E
SFS 183 Nead an Eoin		3	5	3				11	SLS
SFS 50 Pabay 1		9	1	4				14	C
SFS 94 Port Earlish	1	5						6	W
SFS 9 Redpoint	30 (197)	32 (35)	34 (37)	751 (1087)				847 (1356)	SLS
SFS 57 Rubha a Ghair		6	1	6				13	E
SFS 58 Rubha Chuaig		1			1			2	E
SFS 44 Rubha'an Droma Bhain, Scalpay	1	2						3	W
SFS 71 Sand 5		1						1	E
SFS 12 Scalpay 2		16	11	29				56	Scalpay
SFS 33 Scalpay 3		59	10	82			1v	152	Scalpay
SFS 56 Scalpay 4		5	1	20				26	Scalpay
SFS 118 Scalpay 5		36	18	148				202	Scalpay
SFS 198 Scalpay 6a	3	314	16	323	1		2v	659	Scalpay
SFS 195 Scalpay 6b		55	3	1520				1578	Scalpay
SFS 196 Scalpay 7		6	2	22				30	Scalpay
SFS 197 Scalpay 8		1	1					2	Scalpay
SFS 15 Sheildaig	1	14 (663)	1 (68)	29 (5270)				45 (6001)	SLS
SFS 141 R		2						2	C

1/25									
SFS 36 Staffin Island	1	6						7	W
SFS 191 Suarbie Burn		7						7	W
SFS 162 Teanga Fhiadhaich		1	1	11				13	SLS
SFS 186 Torridon Mains		2		1				3	SLS
SFS 20 Toscaig 2		3		1				4	E
SFS 34 Toscaig 3		4		1				5	E
SFS 39 Toscaig 7		2		2				4	E
SFS 41 Toscaig 9	7							7	E
SFS 105 Uags	1	2		7				10	E
SFS 61 Uamh an Traill				1				1	W

Table 177: SFS survey sites: lithic raw materials used, other – (u = unknown, v = volcanic glass); Back to Section 5.8; Key * = location in the Inner Sound: E = eastern coast; W = western coast; C = central islands; S = southern coasts; SLS = Lochs Carron and Torridon

5.2 Method

As a part of the project major sources of raw materials were visited and the surveyors collected and recorded any nodule material that they found (see Appendix 13). In addition, walks were made across some of the beaches in the study area in order to look for nodules of suitable materials, but little was found (see below).

It soon became clear that detailed work on the lithic raw materials would involve the individual classification of every archaeological piece by a specialist and thus be lengthy and expensive, even once an appropriate specialist had been found. In the event, basic differentiation was done by eye by the author, and the discussion is written on this basis. This obviously leaves scope for more precise geological work to be done in the future. The analysis of the use of lithic raw materials around the Inner Sound has much to offer the wider picture of prehistoric activity in the area and it would be good to see it developed.

The problems facing the basic differentiation of the lithic raw materials in use around the Inner Sound are compounded by the ways in which different raw materials react while buried. Work undertaken as part of the Rùm project (Finlayson & Durant 1990) showed that both Rùm bloodstone and local flints were subject to surface alteration while buried so that they often (but not always) ended up a uniform grey colour that made it impossible to distinguish between the two. We do not know whether this alteration extends to other chalcedonic silicas, or the baked mudstones, but it means that accurate identification of the different raw materials is impossible without further analysis of processes such as surface alteration. Furthermore, Finlayson's work for the Rùm project highlighted the considerable changes that come about as a result of burning (whether accidental or deliberate) so that this, too, must be taken into account (Finlayson 1990b).

The following discussion should, thus, be read with the caveat that the picture may change when more detailed work can be done. It does, however, provide a list of the different types of raw material exploited, a rough idea of their varying quantities across the Inner Sound, and an initial interpretation of lithic raw material use in archaeological terms. For that reason it has been included in the overall report.

Throughout this section a distinction is made between primary sources, that is locations where a lithic raw material is found *in situ* in the rock, and secondary sources, or locations where nodules of a particular raw material have eroded out of their parent rock and are to be found as a component of beach or river gravels, loose on the ground surface, or in deposits of glacial till.

5.3 Chalcedonic Silica: including Flint, Chert, Agate and Jasper

Flint is one of the most commonly used materials for stone tools in prehistoric Britain, but as elsewhere in Scotland (Wickham-Jones 1986) it did not dominate the lithic assemblages of the Inner Sound. The main reason for that lies in its relative scarcity. Flint is a non-clastic siliceous sedimentary rock, part of a group known overall as chert (Hallsworth & Knox 1999:22), of which other forms are chert itself, agate and jasper, all of which have been identified among the archaeological assemblages of the Inner Sound. All of these stones occur naturally, in different amounts, around the Inner Sound. They can be difficult to distinguish with the naked eye, and are classified collectively as chalcedonic silica in this report. There is one exception to this, and that concerns the sites with more recent activity where gunflints were found: gunflints tend to be of grey, often imported, flint, and they have been classified as flint.

Flint and chert pebbles occur both in sedimentary rocks, such as the Durness Limestones (Robertson *ed* 1994), and in gravel and till deposits, whether of glacial, marine, or riverine origin. As such they are to be found both in beach and river gravels around the Inner Sound, and in till deposits, for example along the Suarbie Burn in Staffin (see Illustration 270, right). Chalcedonic silicas are particularly abundant around Staffin Bay both on the beach and in till, but they may also be found elsewhere. The abundance of material at Staffin means that Staffin is likely to have acted as an important source of chalcedonic silica for those who lived around the shores of the Inner Sound in prehistory. Initially, it was hoped that it might be possible to differentiate between the silicas from Staffin and those from elsewhere, but that has not been possible so that it is impossible to quantify the importance of Staffin as a source of chalcedonic silica, except to say that it must have formed one of the main sources around the Inner Sound.

Illus 270: Nodules of chalcedonic silica may be found along the Suarbie Burn, Staffin, Skye

In general, chalcedonic silicas have fairly uniform knapping qualities though stone from different sources can have different inclusions which affect the knapper, and some of them are much tougher, and thus require much more force to fracture, than others.

5.4 Baked mudstone

Mudstones are fine grained sedimentary rocks. There are many different types of mudstone (Hallsworth & Knox 1999), some of which occur in Skye (Hesselbo & Coe 2000). In some cases contact with igneous activity means that they have been baked hard to form small rafts of material (identified by some as porcellanite) that is suitable for knapping. Deposits of baked mudstone are small and hard to find and in many cases they are too small to signify in the geological memoirs, but known deposits do occur in Staffin. Baked mudstone from Staffin comprises two types: *in situ* material in small rafts in the cliffs at An Corran (see Illustration 101, right); and eroded nodules such as pebbles on the beaches below. It is likely that other deposits exist in Skye, and there may well be others elsewhere: Good enough notes deposits in the Shiant Isles (1999). The deposits at An Corran were, however, the only baked mudstone source around the Inner Sound to be found and visited by the project. Unfortunately these outcrops were disturbed by rock blasting in the late 1990s so that examination of possible prehistoric extraction is now impossible.

Illus 101: Nodules of baked mudstone occur in the cliffs above An Corran at Staffin

While it is possible that other sources were being exploited in prehistory, the lack of obvious material elsewhere means that the source at An Corran is likely to have formed the major, and possibly exclusive, source of baked mudstone for the Inner Sound in prehistory. The importance of this source is emphasised by the presence in Staffin Bay of a concentration of archaeological activity that is unparalleled, in terms of quantity, elsewhere around the Inner Sound. The site at An Corran itself provides evidence of activity from the seventh millennium BC to the second millennium BC (Hardy *et al* forthcoming a), while SFS survey work has revealed a series of lithic scatter sites around Staffin Bay which, though undated, provide evidence for prolific prehistoric activity. Staffin Bay was obviously important in prehistory and it would have offered many resources. It would seem that one resource here was abundant lithic raw material: both in pebble form on the beach and as outcrops of baked mudstone in the cliffs above An Corran. The presence of chalcedonic silica in the area (above) can only have added to its attractions.

Baked mudstone is fairly easy to knap when fresh, with a fine fracture that does not generally require too much force. It can be brittle, however, with friable edges that are not always well suited to heavier tasks. Some mudstones can be harder to work, and require more force to remove flakes and shape tools. As it degrades mudstone breaks more easily.

It is worth noting that some igneous materials, such as tuff and basalt can appear very similar to the local baked mudstones and may well have been included under the heading 'baked mudstone'. It is likely that all were collected in the same general area.

5.5 Rùm bloodstone

Rùm bloodstone is a crypto-crystalline silica which occurs in association with lavas of Tertiary age. Several sources of bloodstone are known in the west of Scotland (Durant *et al* 1990), but work in the 1980s (Clarke & Griffiths 1990) indicated that the island of Rùm was the only source of knappable raw material in prehistory. Although there are *in situ* outcrops of Rùm bloodstone at the top of Bloodstone Hill (see Illustration 367, right), the evidence suggests that prehistoric knappers exploited nodules from the extensive scree deposits below (Wickham-Jones 1990). Rùm bloodstone was used, though often in small quantity, right around the Inner Sound, suggesting that contact, and transport, took place as much as 40km to the south. The implications of this are discussed below (Sections 5.7 and 5.8).

Work on surface alteration in the 1980s (Finlayson & Durant 1990) indicated that, once buried, artefacts of Rùm bloodstone undergo similar alteration to chalcedonies such as flint and chert. All can end up a uniform grey colour and it is very difficult to distinguish between them. Consequently, the amounts of Rùm bloodstone in individual assemblages may have been underestimated.

Illus 367: Bloodstone Hill, Rùm

Rùm bloodstone is generally quite hard to knap, requiring a lot of force to detach flakes. Only a few nodules are siliceous, or 'glassy' enough to flake easily. Nodules also tend to contain inclusions which affect their fracture.

5.6 Quartz, Quartzite and Rock Crystal

Quartz is a crystalline siliceous mineral that forms a common constituent of many rocks. In its more granular form it is known as quartzite. Some forms of quartz are relatively homogenous and may be knapped for controlled tool production with ease, others are of less good quality and make more irregular tools. Quartzite is similarly variable in quality. Quartz and quartzite are common components of the rocks of the Inner Sound, and they occur both *in situ* (for example vein quartz) and as nodules which may be collected across the area in beach and other gravels as well as in local soils.

Quartz was a common constituent of the lithic assemblages around the Inner Sound and an important lithic resource in prehistory. The quality of quartz used at individual sites varied considerably, suggesting that it was collected locally. Quartzite is a less common component of the lithic assemblages, apparently used only to supplement other materials on occasion.

The variability of quartz has led to problems for lithic analysts in the past. Apart from anything else, the knapping characteristics on struck quartz cannot be read in quite the same way as flint, nor can they necessarily be regarded as analogous from one quartz area to another. Nevertheless, worked quartz has been considered as a component of many assemblages especially in north and west Scotland and it is currently the subject of a specialist study (Saville & Ballin 2000). Quartz flaking formed an important part of the prehistoric lithic repertoire in many other countries, especially in northern Europe where the literature is also of great relevance for those trying to make sense of worked quartz in prehistoric Scotland (for example Broadbent 1979; Knutsson 1988).

Rock crystal is a pure form of quartz which may be found occasionally around the Inner Sound and occurs in a few assemblages. It was not a common raw material.

5.7 Coarse stone

A variety of sandstones were also flaked on several sites, though they were never a major resource. Sandstone is to be found around the Inner Sound, usually as water-worn cobbles in beach and river gravels, and they are likely to have been collected in the vicinity of the individual sites. Cobbles were used to make tools of different kinds (Clarke, Section 3.6) and there is evidence that sandstone was also flaked. It may be that people started to flake it when they saw how it sometimes spalled during use. Generally, the sandstone would be too coarse and friable to make or hold good edges so that it was not an important flaking material, but its presence should not be overlooked.

5.8 Raw material use at the different sites

The most commonly used raw materials in the eighth millennium BC at Sand were baked mudstone and quartz (see Table 178, below). It is likely that the baked mudstone came from Staffin, across the Inner Sound, while the Rùm bloodstone must have come from the island of Rùm to the south. Some of the chalcedonic silica may also have come from Staffin, but the rest, including the other materials is likely to be local. The use of the different raw materials at Sand, including any selection for specific artefacts, is considered in detail under the discussion of the site at Sand as a whole.

Table 178

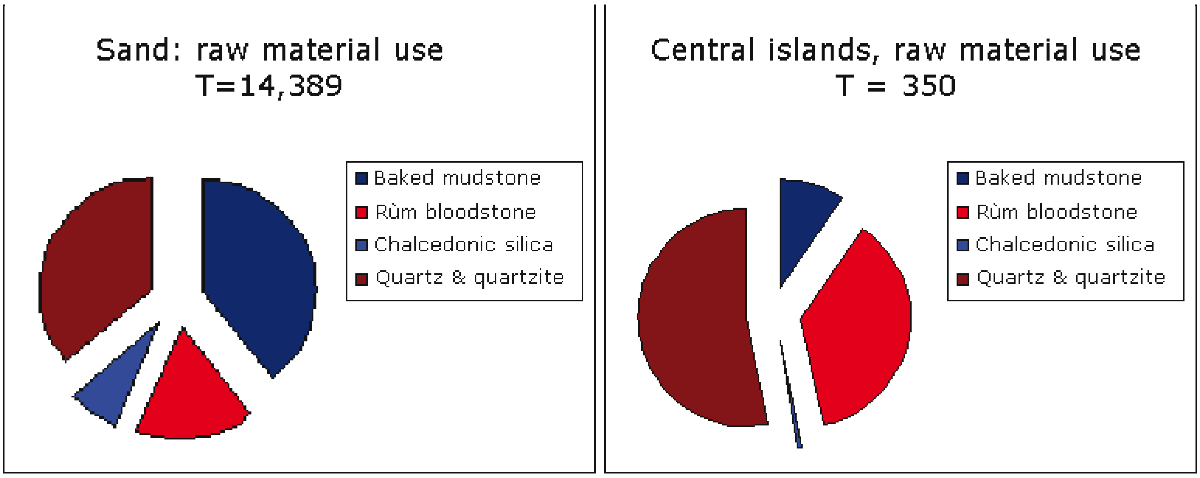
Sand Material	Quantity
Baked Mudstone	5764
Chalcedonic Silicas	2532
Coarse Stone	100
Quartz and Quartzite	5343
Rùm Bloodstone	1059
Unknown	3
Total	14,801

Table 178: Lithic raw material use at Sand

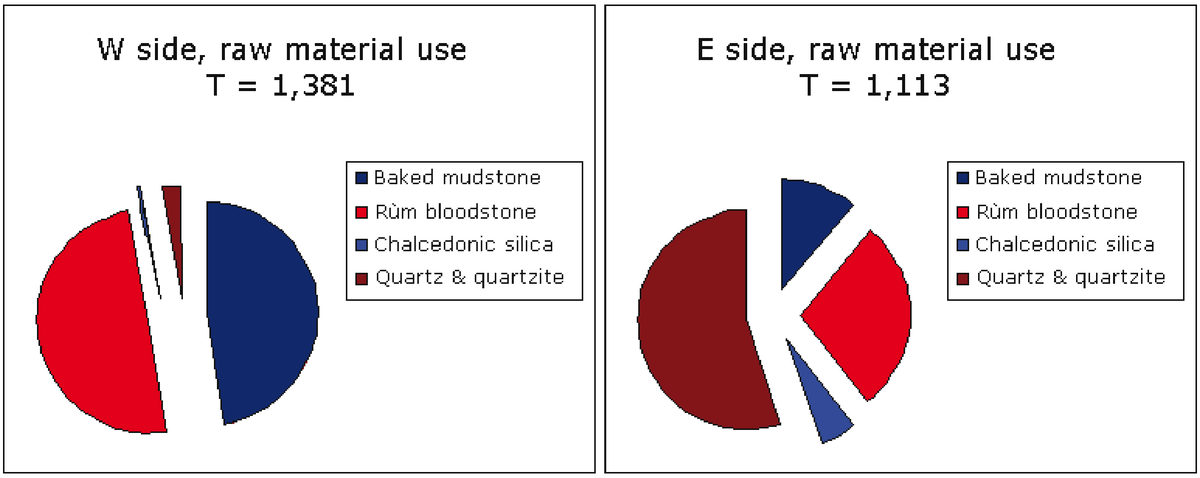
With regard to raw material use across the Inner Sound (see Table 177, above), the assemblage from Sand has been kept separate from the rest to avoid any skewing that might be introduced because of the use of different collection techniques, such as fine excavation and sieving, on site. In addition it has to be remembered that many of the other sites are undated, and those that have dates vary considerably in period (Section 4). As the dating evidence is so variable, the discussion of any possible chronological implications has been left for the final, general, section (below, Section 5.10). As the south coasts of the Inner Sound produced only three sites, each with very small lithic assemblages (a total of 14 pieces), they have not been considered. Scalpay was, however, looked at separately as detailed collection there yielded nearly 3,000 flaked lithics.

The use of the different raw materials around the Inner Sound is not uniform (see Illustration 532, below). The picture for the west side of the Inner Sound is heavily influenced by the assemblages from Staffin (An Corran A–E and Brogaig), which form the principal assemblages on that coast. Baked mudstone and chalcedonic silica were the most heavily used resources, which no doubt reflects the abundance of those materials at Staffin itself. Rùm bloodstone occurred in only very small quantity, and there was a small amount of quartz and quartzite. The east side is quite different. Baked mudstone was of much less importance among the survey sites, though the use of chalcedonic silica was still significant. There was some use of Rùm bloodstone, but by far the most common raw material was quartz and quartzite. These are likely to be local stones, and given the relative lack of imported material such as baked mudstone, and bloodstone, it is likely that the chalcedonic silica was also predominantly local. Skip Charts.

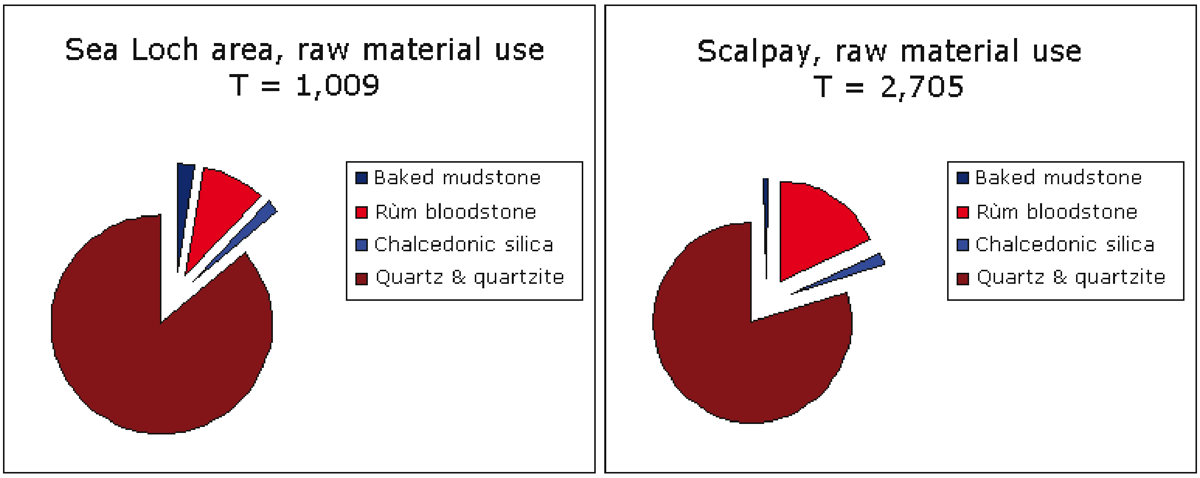
Illustration 532: Lithic raw material use around the Inner Sound



Illus 532 a & b: Raw material use at Sand and at the Central islands



Illus 532 c & d: Raw material use on the West and East sides



Illus 532 e & f: Raw material use in the Sea Loch area and at Scalpay

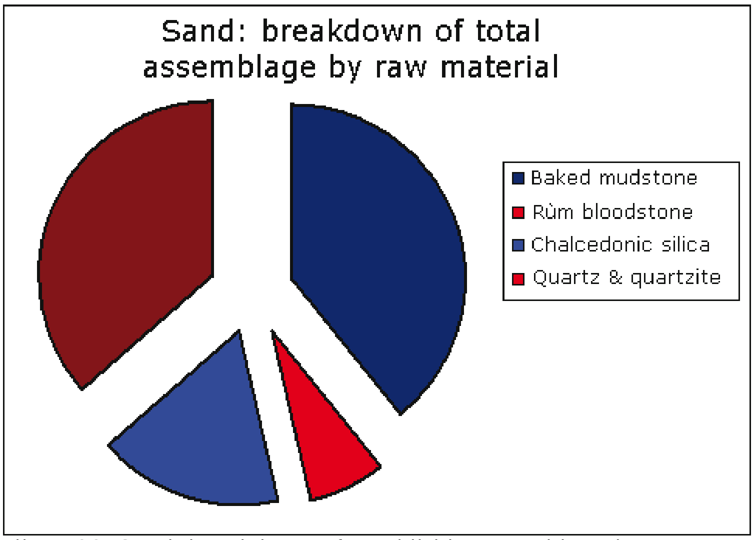
Interestingly, the assemblage from Sand does show notable differences to the other east coast sites. Baked mudstone was more important here, and chalcedonic silica and quartz relatively less so. The proportion of Rùm bloodstone was about the same. It is impossible to say at present whether these differences are the result of the finer excavation techniques in use at Sand as opposed to the survey sites, or whether they reflect a difference that may be due more to other factors such as chronology. Certainly most of the survey sites that have been dated do have more recent dates (Section 4) but more excavation on other sites would be needed to understand fully what is happening here (and see below).

The assemblages from the central islands of the Inner Sound are remarkably like those from the eastern coasts. They are dominated by quartz and quartzites, and baked mudstone is of less importance, perhaps surprisingly so given the apparently proximity of Staffin Bay. Rùm bloodstone was also little used, but chalcedonic silica was important. The lack of baked mudstone suggests that the chalcedonic silica in use came from local sources, or from naturally transported nodules that could be picked up on the beaches. Raw material use in Scalpay is notable because of the almost complete absence of baked mudstone despite the proximity of Scalpay to the source at Staffin. The lithic raw materials used here bear more resemblance to those of the central islands with a dominance of quartz and some use of chalcedonic silica. Rùm bloodstone is present in the Scalpay assemblages, but not in great quantity.

Lochs Torridon and Carron, the Sea Loch survey area, present yet another view. Here quartz and quartzite dominated the lithic assemblages, almost to the exclusion of everything else. There was very little baked mudstone and bloodstone, and only slightly more chalcedonic silica. This is likely to be a reflection of local geology.

5.9 Raw material use for different artefacts

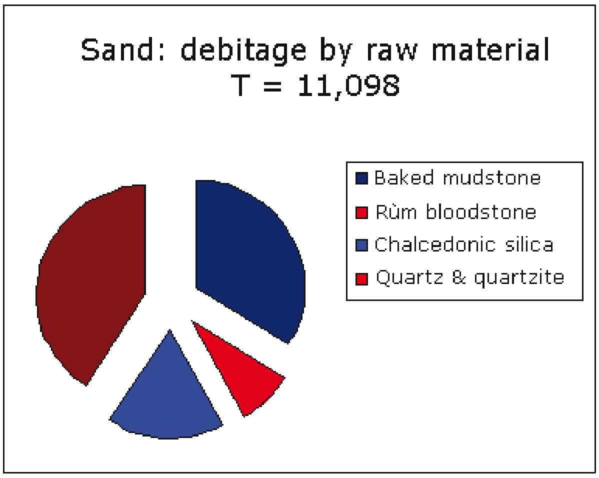
Illustration 533

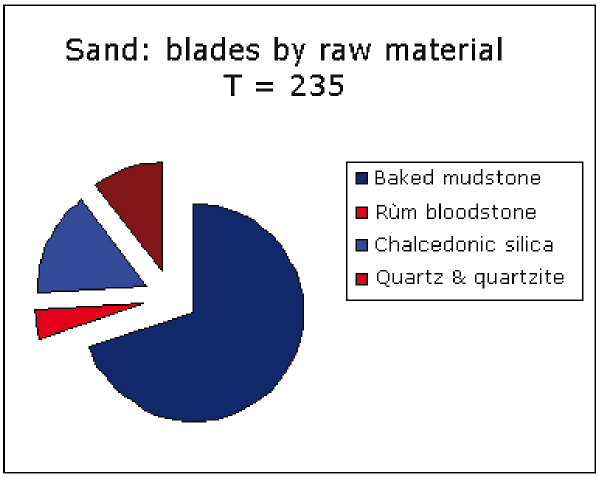


Illus 533: Sand, breakdown of total lithic assemblage by raw material

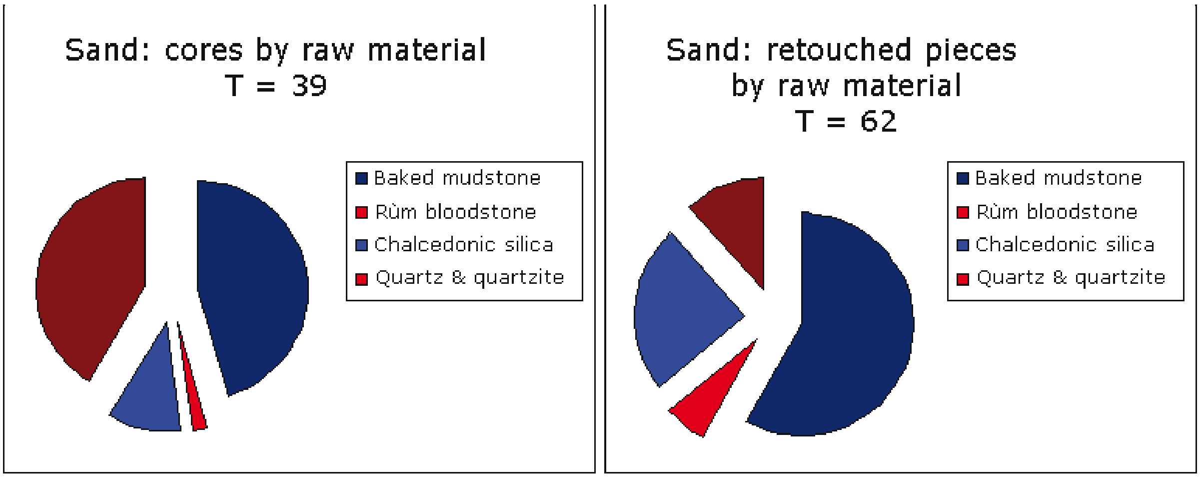
Breakdowns of the different components of the assemblage at Sand largely reflect the characteristics of the various raw materials (see Illustrations 533, above & 534, below), suggesting that there was little conscious selection by material on the part of the knappers. Thus, though there are far more blades of baked mudstone than one might expect, and though both regular flakes and retouched pieces are more common in this material, it is difficult to tell whether this reflects the more regular flaking characteristics of baked mudstone which would lead to more of this sort of piece, or whether it is a conscious selection on the part of the knappers. Perhaps it is a bit of both. Interestingly, however, microliths, which might also be thought to need a more regular material because they are based on blades, make less use of baked mudstone, though it still predominates for their manufacture. Both Rùm bloodstone and chalcedonic silica were apparently quite suitable for the manufacture of microliths. Quartz, while making up about one third of the assemblage, was of less use for blades, regular flakes and retouched pieces and this no doubt reflects the friable nature of much of the local quartz. Skip Charts.

Illustration 534: Sand, different components of the lithic assemblage by raw material

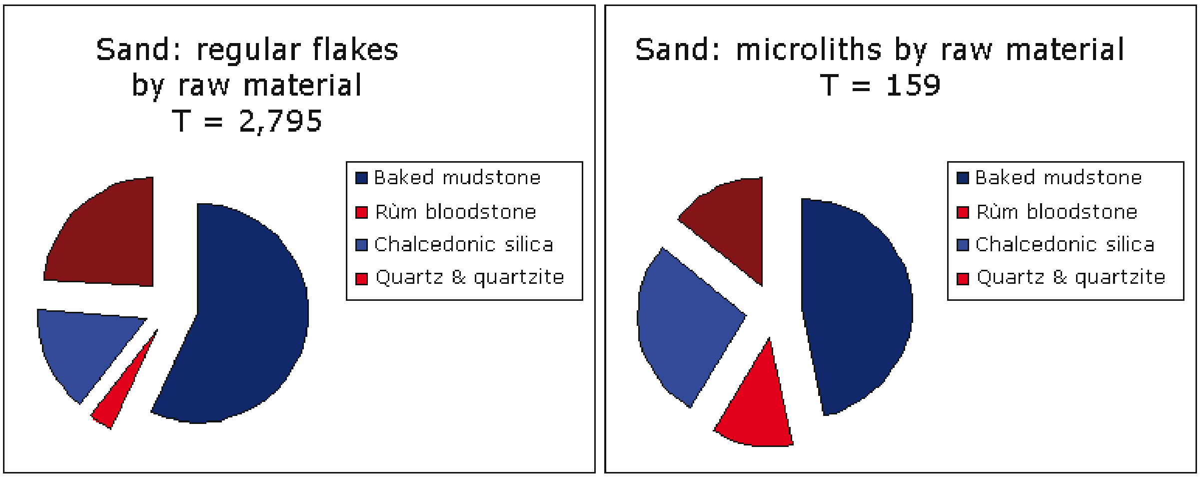




Illus 534 a & b: Sand, debitage and blades by raw material



Illus 534 c & d: Sand, cores and retouched pieces by raw material



Illus 534 e & f: Sand, regular flakes and microliths by raw material

Away from Sand, the small sizes of most of the assemblages and variable collection techniques (which have introduced their own biases) make it difficult to extract meaningful information on the differential use of raw materials. Retouched pieces are almost all of chalcedonic silica, except for one or two baked mudstone pieces – all from the Staffin sites, and one microlith of Rùm bloodstone from Fearnmore 1 at the north end of the Applecross peninsula. The general make-up of individual components of the assemblages very much mimics the breakdown of raw materials used at the different sites, except that on the east coast and Sea Loch sites the proportion of regular flakes of baked mudstone is higher than might be expected. At Redpoint quartz was used successfully to make blades, while at Fearnmore 1 there are few blades anyway and they are of baked mudstone (two) and chalcedonic silica (one).

5.10 General discussion

The four main lithic resources used around the Inner Sound have properties that vary considerably. Not only are they not of equal merit with regard to ease of fracture, they also provided working edges of different durability. Tool manufacture, tool use, and tool maintenance thus vary both between materials and chronologically, as fashions and tasks changed with time.

Quartz was the least reliable, though it provided the most easily available material for the sites in the east and central island belt. Assemblages such as that from Shieldaig show that quartz could be worked very successfully though it resulted in a considerable amount of debitage. Baked mudstone, Rùm bloodstone and chalcedonic silica are all more predictable stones. Baked mudstone tends to be quite brittle and work relatively easily, though it can vary greatly depending on its original location in relation to the heat source, and it tends also to degrade more rapidly. Rùm bloodstone can be a tough stone to work as can chalcedonic silica though some of the chalcedonies were more brittle and thus easier. The knappers around the Inner Sound were quite aware of these individual characteristics and they adapted their knapping techniques in order to make the best use of the stones they had available. In that way the resultant assemblages reflect the characteristics of the different materials so that it is difficult to recognize specific selection for individual types of tool.

The basic diagrams of different raw material use around the Inner Sound are hampered by our incomplete knowledge of the different sites, but they do provide a hint of the detail that could be confirmed, or expanded, by further study. At the outset of the study attention focused on the use of baked mudstone from Staffin Bay, but as time progressed this material was found to be less important than initially thought, with the exception of the sites at Staffin itself, and the assemblage from the excavated Mesolithic site of Sand. Even on the island of Scalpay, not far from Staffin, baked mudstone was almost completely absent. Is it possible that Sand, with the increased detail from excavation, actually holds the key for raw material use on the Mesolithic sites of the area? Until there are more dates relating to the potentially more recent assemblages from the area it is impossible to be certain, but the importance of more homogeneous stones in the Mesolithic would make sense for at this time assemblages comprised many fine regular artefacts and this may well have led to a preference for baked mudstone.

Local resources were clearly important at Sand, but the mobility of the Mesolithic population meant that material could easily be brought in from further afield when this was advantageous. Thus baked mudstone and Rùm bloodstone were particularly valued at Sand for the manufacture of regular flakes, blades and retouched tools including narrow blade microliths. Later on, as the importance of fine lithic tools fell, it is quite possible that imported materials were no longer of such value so that later sites show greater emphasis on the use of local materials. Shieldaig, however, seems to contradict this as the lithic assemblage there, which certainly includes an element of Mesolithic material, is dominated by quartz (Ballin & Saville 2003; Clarke & Griffiths 1990), though the details of the excavation are unclear. Elsewhere, material is derived from surface collection or test pitting so that the precise details of individual sites, including dates, are missing. Only more excavation on a variety of local sites from different periods could test this out.

Many of the survey sites have later dates and these tend to show less use of transported materials. At some sites microliths suggest early activity, but the assemblages are small, pending excavation. Interestingly, with the exception of Sand, it is quartz, followed by chalcedonic silica, that dominates assemblages away from Staffin. It may well be that local availability was the most important factor of raw material selection in later prehistory. Nevertheless, the population of the Inner Sound was mobile, at least by sea, until very recent times (and the rise of road transport). However, it could be argued that the central importance of mobility as the axis around which economy and society swung was greatest during the Mesolithic and it is possible that this is reflected in the movement of baked mudstone and the use of lithic raw materials around the Inner Sound.

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… > Documents > Final Reports > Wickham-Jones,_Lithic_Raw_Materials_Around_the_Inner_Sound.pdf
… > Images > Artefacts > Lithics > lithic_raw_materials_photo.jpg [Illustration 365]

6 Report on pumice-like material from the Applecross Area | Anthony Newton

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports. From here you can download the file 'Newton,_Pumice.pdf'.

6.1 Introduction

Several pieces of pumice-like material were recovered from SFS work. All come from Applecross and the sea loch area. They are discussed in turn below. In addition, many of the beaches in the area contain a pumice-like material of unknown origin. Several samples of this were collected and analysed in more detail in order to try to shed light on the nature of this material. Although none turned out to be pumice this brief report is included here in the possibility that further work on similar samples might be stimulated, and also as a check on the superficial identification of pumice from archaeological sites.

6.2 SFS 147 Cnoc Na Celpeirein

Several pieces of material resembling dark grey pumice were recovered during the SFS Sea Loch Survey in 2002 from SFS 147, Cnoc na Celpeirein, a lithic scatter site of possible Neolithic origin, close to Plockton (Section 2.2). They are angular to sub-angular in appearance and resemble dark grey pumice recovered (by the author) from the dunes at Sand (Applecross) and the shore at Applecross Bay in 2001 and by Stephen Birch from Scalpay (see below).

Superficially, the pieces from Cnoc na Celpeirein resemble the dark grey pumice which occurs on archaeological sites throughout the west coast of Scotland (Newton 1999). Like pumice, they are less dense than water and float. However, analysis showed that this material is not volcanic, though it does appear to be natural (below).

6.3 SFS 20 Toscaig 2

A single sample, apparently of pumice, was collected from Toscaig 2, a cave of later prehistoric date. Although this dark grey material is vesicular, like pumice, it is denser than water and does not float. It is not, therefore, pumice.

6.4 SFS 4 Sand

6.4.1 A2B NW Spit 2, Context 1/2

As with the piece from SFS 20, Toscaig 2, this is dark grey and vesicular but it is denser than water and is not, therefore, pumice.

6.4.2 A2B NE Spit 9, Context 27

This light coloured sample also contains vesicles, but it too is denser than water. It appears similar to a small piece of light coloured material from the rockshelter at Sand. Originally, this piece was also identified as pumice, but geochemical analysis showed that it was largely composed of calcium and phosphorus; it was bone.

6.5 Natural samples

6.5.1 Collection

Pumice-like material forms a regional deposit on local beaches, stretching from Scalpay to Applecross and Sand, and to the Plockton area. Four representative samples from the Applecross-Scalpay area were analysed (see Table 179, below).

Table 179	
Sample	Description
APB 1	Collected from the storm beach at Applecross Bay 2001
Scalpay 1 and 2	Collected by Stephen Birch from a beach on Scalpay
Snd 3	Collected from sand dunes on the north side of Sand bay Applecross

Table 179: SFS samples of pumice-like material collected from local beaches for analysis

In addition, a fifth sample (Clet1) was collected from Clettnadal, on the island of West Burra, off the west coast of Shetland, and this was included in the analysis. Clet1 was recovered from buried coastal silty sand and the nearest radiocarbon date is 9190±75 BP (Edwards, *pers comm*; Whittington *et al* 2003). It seems unlikely that the site has been disturbed.

6.5.2 Initial Analysis

The samples were crushed and analysed on an electron microprobe. The thin sections showed that unlike pumice, the matrix of the material was black, whilst pumice glass is typically clear with a dark brown tint. Quantitative geochemical analysis showed that the material was not pumice, that is, not a silicate glass. Qualitative energy dispersive analyses (EDS) were also undertaken on the same samples and these showed the material did not contain any of the major elements normally associated with natural pumice. The most notable peaks were for sulphur and chlorine.

This technique did not have the resolution or the detection limits to identify accurately the composition or origin of the material. Also the then detector on the EDS was unable to identify light elements, such as carbon.

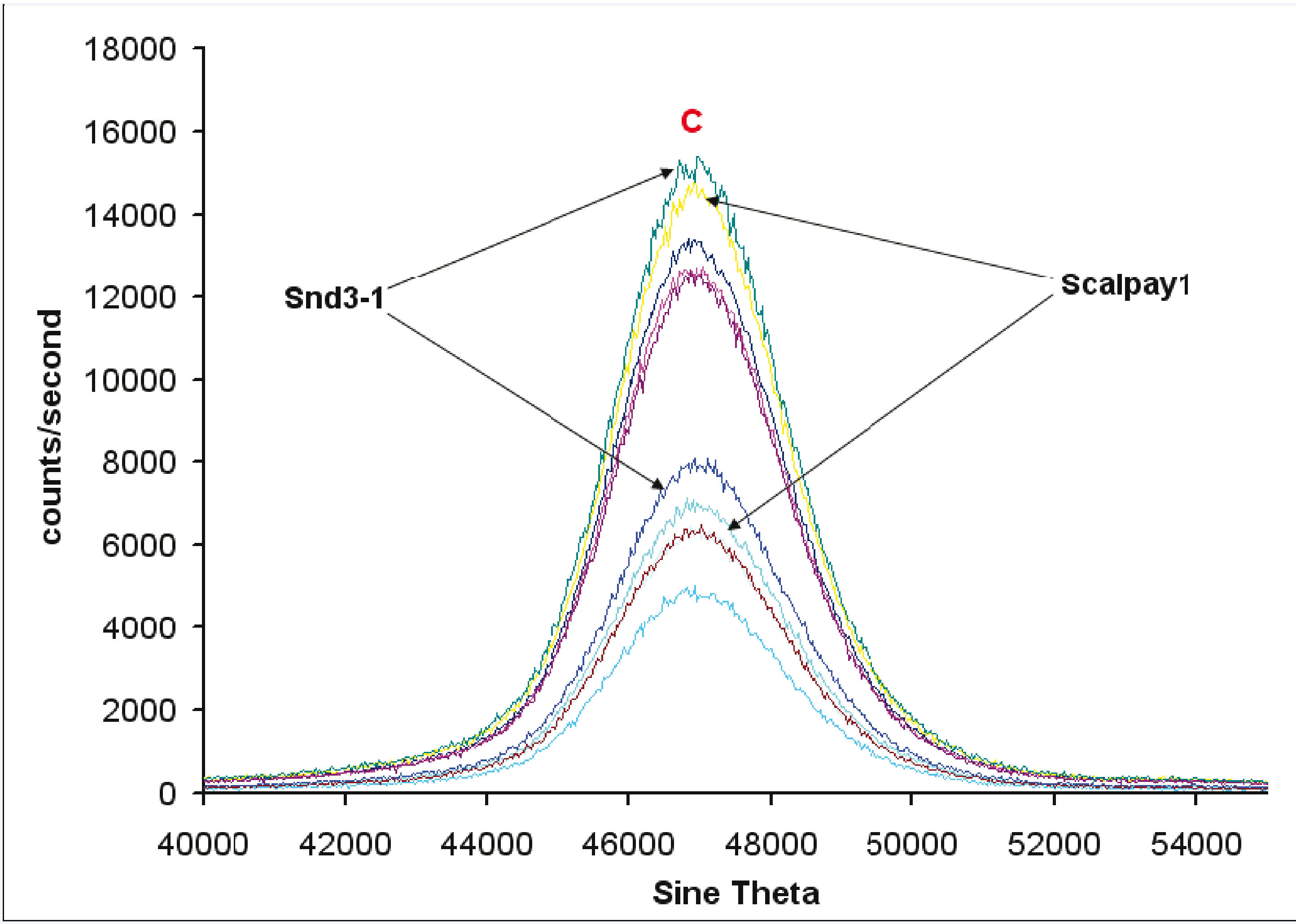
6.5.3 Detailed Analysis

In order to try and shed light on the nature of this material a new set of qualitative analyses was carried out using spectrometer scans of wavelength-dispersive spectrometers (WDS) of a Cameca SX100 electron microscope at the School of GeoSciences, University of Edinburgh. Not only does this produce X-Ray spectra with higher resolutions, but the higher peak to background ratio allows the identification of elements present in small quantities. These WDS analyses were carried out in conjunction with an improved EDS detector on the same instrument. Two sets of analyses were carried out on each piece in order to establish the heterogeneity of the samples.

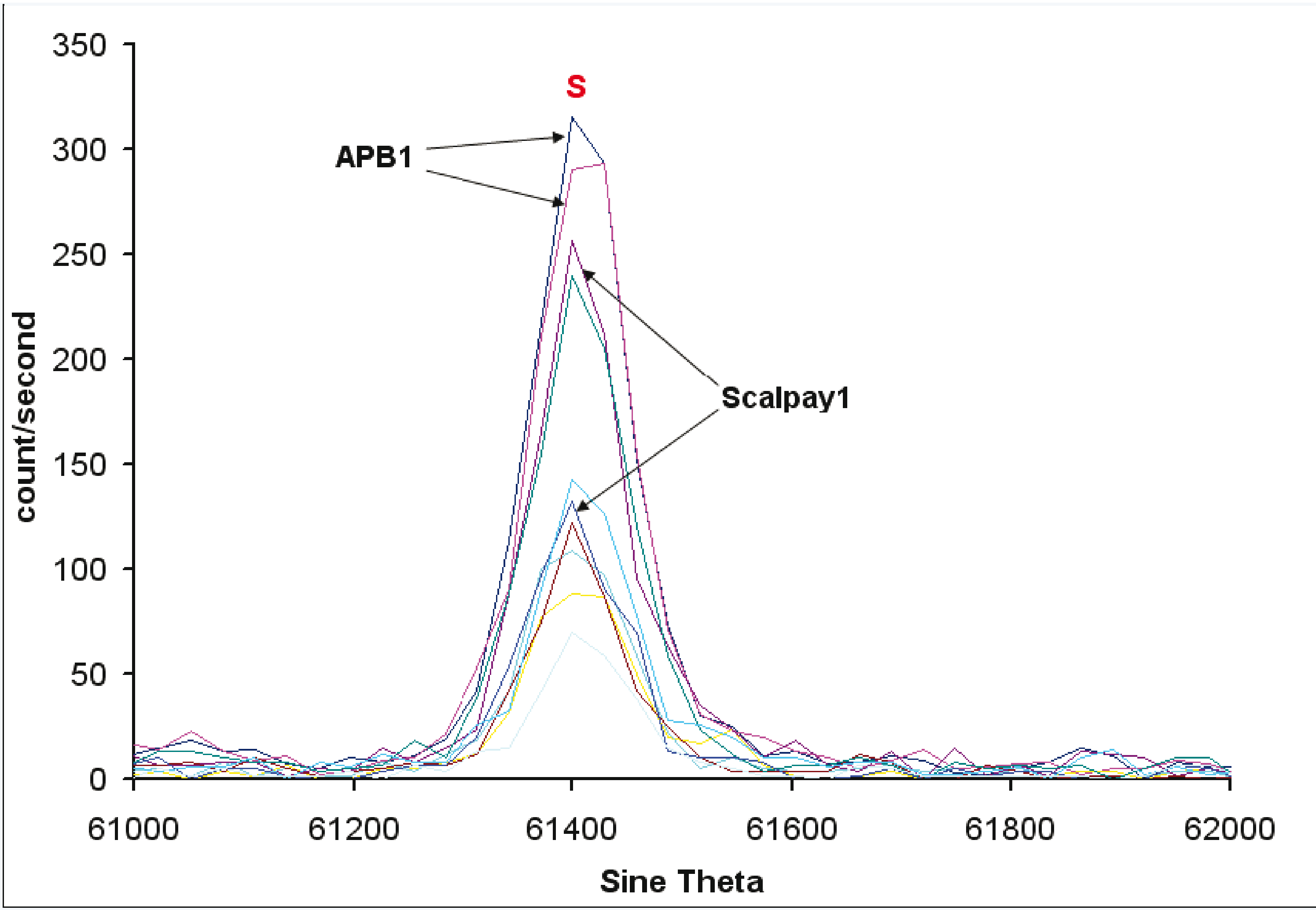
The new EDS and WDS analyses show that the pieces are predominately composed of carbon (see Illustration 535, below). The amount of carbon varies and Illus 535 illustrates that this variation is as much within the pieces as between different ones. This shows that the material is not homogeneous. Other elements which were identified include `Si`, `Al`, `Na`, `Ca`, `S`, `Cl`, `Ti` and `Fe`. Most of these are present in small amounts and like the carbon there are significant variations within a single piece. All of the samples contained some sulphur (see Illustration 536, below), although most samples showed little consistency in abundances. Only the Clettnadal pieces had high concentrations of `Na` and `Ca`. `Fe` was only identified in very small amounts in one of the Clettnadal readings. Scan 2 of Clt1 and scan 1 of Scalpay 2 have particularly high `Si` and `Al`, but the other scans of the same pieces do not show the same pattern. It is difficult to interpret these results. The heterogeneity seen in only two scans of each piece mean that microanalysis is probably not the best technique for analysing this material. It is likely that a completely different technique will be necessary to identify the source of this material.

Illustrations 535 & 536

These illustrations can be found on p3 of the report.



Illus 535: WDS scan which demonstrates that the pieces are mainly composed of carbon, but are heterogeneous with major differences in abundances (counts/second) on successive scans of the sample (two examples are highlighted on the graph, but the same pattern is repeated in the other pieces). The electron beam of the microprobe is about 1 µm in the diameter.



Illus 536: Sulphur was present in all of the pieces analysed. One of the pieces collected from Applecross Bay contained the highest concentrations, although most pieces showed the same heterogeneity seen in the other elements, eg Scalpay 1.

These illustrations can be found on p3 of the report.

6.6 Conclusions

This pumice-like material is not a natural volcanic deposit, though the results show how easy it is to misidentify pumice. Ocean transported pumice, by definition, must be less dense than water. Therefore, samples that sink cannot be ocean transported pumice. This quick test ruled out the material from Toscaig 2 and Sand.

The dark grey material found at SFS 147 Cnoc na Celpeirein and on the present beaches at Applecross, Sand, Scalpay and Plockton does float, but it is still not pumice. Pumice is composed of clear silicate volcanic glass, whilst this material comprises dark material, with sulphur and chlorine being the identifiable constituents. These are unlikely to be the most numerous components of the substance, but yet more detailed work is needed to identify what these are. Only in this way will the origin and age of this interesting deposit be established.

The material is essentially a hard carbon foam, with smaller amounts of other elements, notably `Si`, `Al`, `Ca`, `Cl`, `Na` and `S`, which are present in varying concentrations in the pieces. No P was found in any of the samples, suggesting that this material is not the result of cooking or cremation activity. The pieces also show considerable geochemical heterogeneity. Perhaps the best method with which to identify them is to carry out carbon isotope analyses, as this may yield valuable information on the source of the carbon, which comprises most of the material in all samples.

The similarities between the Applecross/Scalpay material and the 9500 year old piece from Clettnadal also suggest that it is unlikely that they were produced by human activity. It is difficult to imagine what human activity could have produced this material in Shetland at this time.

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… > Images > Specialists > Pumice

7.1 Late-glacial and Holocene Relative Sea-Level Change in Applecross, Raasay and eastern Skye | Alastair Dawson

7.1.1 Introduction

The origins of the rockshelters at Sand and An Corran are intimately related to past changes in relative sea-level that took place at the close of the last (Late Devensian) glaciation in Scotland. The relative sea-level changes that took place across the North West Highlands at this time resulted from the complex interplay of glacio-isostatic rebound consequent upon regional ice melting (deglaciation) and the influence of glacio-eustatic changes in global ocean volume linked to the melting of ice sheets worldwide. This account describes the interaction of these two key processes and describes how the raised shoreline features of Applecross, Raasay and eastern Skye were mostly formed when sea-level was lower (and not higher) than present. In the following pages, in line with the geosciences, ages are expressed in conventional, years BP alone (that is years before present, taken at 1950). Most of the dates refer to the general age ranges of natural periods, but where radiocarbon dates have been used they have not been calibrated because there are various radiocarbon plateaux which affect dates of this age thus making calibration uncertain.

7.1.2 Background

7.1.2.1 Glacial isostasy and eustasy

The last ice sheet in Scotland is generally believed to have reached its maximum extent *c*20,000 years ago when it was sufficiently thick to have covered nearly all of the highest mountains and wide enough to have extended westwards across the (now submerged) continental shelf (Sutherland 1984; Ballantyne *et al* 1998). Widespread glaciation at this time was also associated with the growth of large ice sheets in North America (the Laurentide ice sheet), Scandinavia (the Fennoscandian ice sheet) and across large areas of Russia (the Eurasian ice sheet). Together with ice that accumulated in ice sheets elsewhere, the expansion of existing ice sheets in Greenland and Antarctica, and the growth of mountain glaciers, the accumulation of ice on land was sufficient to lower the average sea-level worldwide by *c*150m. This glacio-eustatic lowering of sea-level in turn, had an effect on the underlying ocean crust. The decreased ocean volume resulted in less mass being exerted on the ocean floor and consequently there was a hydro-isostatic unloading of oceanic crust that resulted in an observed fall in sea-level of *c*120m. In ocean areas located far from the last great ice sheet it is extremely rare to find submerged coral terraces lower than 120m below present sea-level. Thus, one might imagine that in western Scotland, the position of sea-level (as seen from space) was at this approximate level during the last glacial maximum.

At this time nearly all of the present land area of the North West Highlands was covered by ice. Thus, if there was a palaeocoastline, it was located west of the ice sheet somewhere on the (now submerged) continental shelf. The mass of ice resulted in the depression of the underlying crust (lithosphere). This process, known as glacio-isostatic deformation is enormously complex since the lithosphere is able to deform only because the zone of molten rock (magma) beneath the lithosphere has a viscosity capable of deforming as the lithosphere presses down upon it. This zone of low viscosity magma, known as the asthenosphere, is capable of deforming if a load is placed upon it. Thus the last ice sheet that covered the North West Highlands led to the deformation of the underlying lithosphere with both depression, below the ice, and uplift, beyond the former ice sheet margin, across large areas.

7.1.2.2 Relative sea-level changes

The pattern of relative sea-level changes that took place following the melting of the last (Late Devensian) ice sheet in North West Scotland and during the subsequent Holocene is a result of the complex interplay between vertical (glacio-isostatic) land movements and changes in the volume of the world's ocean (see Table 180, below). Together, these two factors resulted in changes in relative sea-level (RSL) that, in the Skye – Applecross area are represented in the landscape by a rich and varied assemblage of raised shoreline features. In some areas, emerged shore platforms and ancient sea stacks testify to the former occurrence of higher (relative) sea-levels. Elsewhere, raised shorelines are indicated by vegetated gravel terraces and shingle ridges.

Table 180			
Stage	Substage	Stadial/Interstadial	Boundary (^{14}Cyr BP)
Flandrian Interglacial			
Pleistocene/Holocene Boundary			10,000
Devensian	Late Devensian	Loch Lomond Stadial (Younger Dryas)	11,000
		Windermere Interstadial	13,000
		(Wester Ross ice advance)	
		Dimlington Stadial	26,000

Table 180: Quaternary stratigraphic nomenclature (after Ballantyne & Harris 1994)

In Skye and Applecross the highest emerged shoreline features visible are raised shore platform fragments and associated backing cliffs that occur up to *c*25–30m OD (Ordnance Datum). The platforms are typically *c*100m in width but locally, as near Lonbain, in western Applecross they may be as wide as *c*500m (Robinson 1977). The emerged coastal rock platforms on Skye were also described by Richards (1969, 1971) as occurring in a wide variety of igneous and metamorphic rock types and often being best developed on west-facing coastlines. In western Applecross, these high rock platform features are especially well developed and are almost continuously developed along the coastline of western Applecross. Some sections of the platform surface are ice-moulded and exhibit glacial striae and thus demonstrate that the features were produced prior to the last general glaciation of the area. Other platform fragments show no evidence of having been overridden by glacier ice and are likely to have been formed during or shortly after the melting of the last (Late Devensian) ice sheet. Thus the rockshelters at An Corran and Sand are in fact the floors of sea caves formed during regional ice sheet melting. The features form part of a raised shoreline that has been affected by differential glacio-isostatic uplift. Thus the sea caves at Sand (27.7m OD) and at An Corran (*c*10m OD) form part of a sequence of early Late-glacial raised shorelines subject to regional glacio-isostatic tilting.

It is argued below that the rockshelter at Sand represents part of a raised shoreline at *c*28m OD that formed during

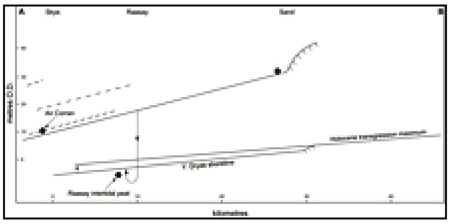
Illus 325: The rockshelter at Sand

the melting of the last (Late Devensian) ice sheet in the NW Highlands (see Illustration 325, right). The simple view that the sea cave must have formed when sea-level was 28m higher than present is mistaken. At the time the sea cave was produced, global ocean volume was considerably less than present due to large volumes of ice having been locked up in the great ice sheets that formed during the last ice age. In fact, sea-level (as viewed from space) was *c*70m below its present level at this time. The reason that the shoreline feature is now raised above sea-level is because 98m of land uplift has taken place since the feature was formed. Thus the 28m shoreline was not produced when sea-level was 28m higher than present, it was formed when sea-level was 70m lower than present!

7.1.3 Relative sea-level changes in Applecross, Raasay and Eastern Skye

7.1.3.1 The initial high level and the subsequent fall

Illus 537: Location map for the raised shoreline of which the Sand rockshelter is part



Illus 538: Generalised shoreline height–distance diagram for Applecross, Raasay and eastern Skye

The Late-glacial marine limit (the highest level reached by the Late-glacial sea) is defined at Sand by the altitude of the rockshelter that represents the lower part of an old sea cave. The overhang above the rockshelter represents the roof of the same sea cave. The altitude of the sea cave is at 27.7m OD and is the highest level reached by the Late-glacial sea as ice melted from the area at the close of the last (Late Devensian) glaciation. The sea cave is part of a raised shoreline that can be traced northwards along the west coast of Applecross at this approximate elevation (Robinson 1977) and declines in altitude to the North West towards north eastern Skye (see Illustrations 537, left & 538, right). With the exception of local areas this raised shoreline has never been mapped in detail nor have regional variations in its elevation been measured in detail. Thus the altitude of this shoreline may differ markedly between Applecross, Raasay and eastern Skye. Sissons & Dawson (1981) measured a similar raised shoreline in Wester Ross and concluded that the feature has a regional slope of *c*0.35m/km. This shoreline, known as the Main Wester Ross Shoreline, is generally considered to have been produced at approximately the same time as the Wester Ross Readvance, a period of renewed ice growth in the North West Highlands that interrupted the decay of the Late Devensian ice sheet (see Illustrations 537, left; 538, right & Table 180, above). If this correlation is broadly correct, one may imagine that the sea cave at Sand (and hence the rockshelter) was produced *c*13–15,000 years BP.

Illus 539: Holocene and Late-Glacial shingle bank, south-

In Raasay, the Late-glacial marine limit is represented at Raasay House by a broad terrace and vegetated bank of shingle. The house is built on the inner (landward) edge of the Late-glacial marine sediments that here occur at *c*27m OD (see Illustration 539, right). Here, as at Sand, the regional melting of the Late Devensian ice sheet resulted in glacio-isostatic rebound of the land surface that outpaced the rate of eustatic sea-level rise and resulted in a RSL fall. Several thousand years later, during the cold climate of the Younger Dryas (*c*10–11,000 years BP, relative sea-level had fallen at Raasay House to near its approximate present level (see Illustrations 537, 538 & Table 180, all above).

The pattern of relative sea-level change in Applecross following the formation of the Sand rockshelter was characterised by a progressive fall in relative sea-level as glacio-isostatic uplift outpaced the rise in eustatic sea-level caused by the melting of ice worldwide. We do not know with much precision the rate at which relative sea-level fell and for how long. We do know, however, that sea-level continued to fall in Applecross, Raasay and Skye until the Younger Dryas period of cold climate when relative sea-level was similar to present. If it is assumed that this period of relative sea-level fall (that is from +27.7m OD to present levels) lasted between 2000 years (minimum) and 4000 years (maximum), the average rate of relative sea-level fall during the Late-glacial was between *c*0.7–1.4 cm per year. Similar estimates for the rate of RSL fall are applicable also to Raasay and eastern Skye.

7.1.3.2 The Younger Dryas – relative sea-level close to present

The climate in the Scotland during the period of relative sea-level fall described above was generally benign. Climate amelioration, after all, was responsible for the melting of the last ice sheet and mild conditions prevailed until the cold climate of the Younger Dryas. Not surprisingly, the onset of the Younger Dryas was associated with a change in conditions at the coast as the formerly mild temperatures were replaced by severe cold. It has been estimated that, during this period of cold climate, mean July air temperature may have been no higher that *c*7°C while January temperatures at sea-level may have descended to *c*–20°C. During this period of cold climate, a small ice cap developed over southern Skye (Ballantyne 1989). In eastern Skye, opposite Raasay, an outlet glacier from this ice cap advanced to the mouth of Loch Sligachan (*ibid*). No other glacier reached the sea at this time in eastern Skye, Applecross or Raasay though large areas of glacier ice occupied the interior areas of Applecross as well as outlet glaciers having reached sea-level in Loch Torridon and Loch Carron (Robinson 1977; Sissons 1977).

During this period, a well developed shore platform and cliff was produced throughout the western Highlands as a result of cold climate shore processes. The platform occurs up to 10–11m in the Oban area, is typically 50–150m wide and is backed by a 10–20m high cliff (Dawson 1988 & 1989; Stone *et al* 1996) (see Illustration 538, above). In Applecross as a result of differential glacio-isostatic uplift, this shoreline occurs slightly above high tide level at Sand where it is represented by a narrow platform and low cliff on the headland immediately south of the dunes. The platform and cliff, known as the Main Late-glacial Shoreline (Main Rock Platform), can also be traced intermittently northwards along the Applecross coast. Within the Sand dune complex it may also form the rock basement seaward of the cliff and beneath the sand accumulations. In many areas, the occurrences of inclined Torridonian sandstone strata render identification of the platform and cliff difficult.

Throughout the western Highlands the platform and cliff of presumed Younger Dryas age is associated with the widespread development of sea caves. The floors of the sea caves occur at different elevations in different places as a result of differential glacio-isostatic uplift. Thus sea caves of this age occur between 4–6m OD along the west coast of Jura, at 10–11m OD in the Oban area, between 2–4m OD along the Sleat peninsula in Skye (see Illustration 538, above). In Applecross, Raasay and eastern Skye the sea cave floors occur within and slightly above the intertidal zone. The cave floors everywhere are mantled by younger Holocene marine gravels. However, there is convincing evidence to indicate that the period of cave formation during the Younger Dryas was separated from the marine gravel deposition during the Holocene by an episode of low RSL and terrestrial sedimentation within the caves (see below).

It has long been recognised that there are striking regional differences in the clarity and development of the Main Late-glacial Shoreline, particularly between the South West and North West Highlands. Bailey *et al* (1924) first observed the comparative obscurity of the feature throughout Ardnamurchan, Moidart and Syke and suggested that the SW Highlands had "…enjoyed a more prolonged period of constant sea-level during the Post Glacial submergence than the country farther northwest". Thus the Main Late-glacial Shoreline (Main Rock Platform), although visible locally, is not a striking feature of the

Applecross, Raasay and eastern Skye coastlines.

The age and origin of the sea caves associated with the Main Late-glacial Shoreline is of fundamental importance to Mesolithic archaeology. For example, the 'Obanian' culture of Lacaille (1954:345) was partly based on the notion that the caves and associated sediment infill represent the product of postglacial (Holocene) marine processes. Since the postglacial relative marine transgression culminated during the mid-Holocene, the cave archaeology had to post-date this marine transgression. The modern interpretation is that whereas the marine sediments within the caves were deposited during the culmination of this relative marine transgression, the caves themselves were not. Given that RSL fell during the Early Holocene after the caves were formed and later rose during the Holocene (post-glacial) transgression, the caves were clearly available for human occupation during the intervening period prior to marine inundation.

7.1.3.3 The post- Younger Dryas low stand in relative sea-level

The melting of the last ice sheet across Scotland was associated with a pattern of glacio-isostatic rebound that decreased exponentially with time. Most of the crustal rebound took place during the Late-glacial period and relatively little during the Holocene. For the Younger Dryas period, the nature of crustal deformation across the North West Highlands is unclear given that there was widespread development of glacier ice in Skye and Applecross. It is not known if the renewed growth and expansion of ice during this period resulted in the re-depression of the lithosphere (crust) or if the growth of ice in Skye, Applecross and elsewhere had no effect on the pattern of decreased crustal rebound. At the start of the Holocene, therefore, crustal rebound was still continuing. The key change influencing patterns of RSL change across the North West Highlands was the (glacio-eustatic) effect of melting ice sheets worldwide that resulted in a progressive increase in global ocean volume. The rate at which ocean volume increased over time in response to melting ice sheets is not known. It is known, however, that in the North West Highlands, the rate of ocean volume increase began to result in a sea-level rise that soon began to outpace the rate of land uplift. It would appear that this change took place between *c*8,000–9,000 14C years BP. Thus the first *c*1000–1500 years of the Holocene interglacial were associated with a low RSL and it is most likely that it was during this time interval that the Raasay intertidal peat deposit began to accumulate (see Section 7.2).

7.1.3.4 The rising Holocene sea-level

During the Early Holocene, climatic amelioration resulted in the widespread melting of ice sheets. The largest of those to disappear entirely were the Laurentide ice sheet in North America and the ice sheets of Scandinavia and Eurasia. The last vestiges of ice in Scandinavia and Eurasia had mostly disappeared by *c*9,000 14C years ago. The Laurentide ice sheet took a little longer to melt – its final disintegration is generally considered to have taken place between 7,500–8,000 years BP. Thus the Early Holocene is characterised by a dramatic rise in sea-level worldwide and it would appear that this rise culminated between *c*7,000–7,500 years BP. It is because of this huge influx of meltwater into the world's oceans that in the North West Highlands, the rate of eustatic sea-level rise during the Early Holocene very quickly outpaced the rate of crustal (glacio-isostatic uplift). Thus the period of intertidal peat accumulation was soon ended by this dramatic rise in sea-level. This RSL rise drowned all the sea caves produced during the Younger Dryas. During this relative marine transgression, all sea caves of Younger Dryas age were subject to wave action and the previously dry floors (possibly containing occupation horizons?) were mantled with marine gravels. In sheltered estuarine environments, this rise in RSL resulted in the deposition of (now raised) mudflats. Along more exposed stretches of coastline, banks and ridges of shingle were deposited. Examples of such vegetated shingle deposits can be seen at Sand immediately adjacent to the unvegetated dunes. Similarly a raised vegetated marine terrace and shingle ridge occur landward of the harbour area at Raasay House. Here, the Holocene raised marine deposits are succeeded upslope by a degraded cliffline that represents the seawards edge of the (higher) Late-glacial marine terrace into which the Holocene shoreline features were cut.

The date of the culmination of the rise in Holocene sea-level is unclear. Some consider that the culmination may have occurred *c*6,500 years BP, but more recent research by Selby (1997) at the Braes, eastern Skye, appears to indicate that the sea may have reached its highest level as late as *c*4,000 years BP. The latter view, if correct, would appear to indicate that most of the Younger Dryas sea caves remained flooded until the Neolithic. The altitude reached by the relative marine transgression is difficult to determine with precision, given a tidal range in the North West Highlands of *c*3.5m. Whereas in northern Applecross, Shennan *et al* (2000) describe the maximum altitude of quiet water sedimentation as no higher than 5.7m OD, the altitudes of gravel terraces and shingle ridges (for example at the head of Loch Torridon) deposited at this time are considerably higher (up to 7.1m OD) (Robinson 1977). From an archaeological perspective, the latter value (*c*7m OD) provides a reasonable estimate for the upper limit of the high water mark of spring tides during the Holocene in Applecross, Raasay and eastern Skye.

Since *c*4,000 years BP, the rise in eustatic sea-level has been so limited that it has been outpaced by residual glacio-isostatic uplift. Indeed, there may have been periods of time during the last *c*4,000 years when eustatic sea-level may have fallen (that is reduced ocean volume) due to the renewed growth of glaciers and ice sheets.

7.1.3.5 Aeolian sedimentation and increased storminess

During recent centuries there has been a marked increase in storminess across the north Atlantic region (Meeker & Mayewski 2002). Whereas the Medieval Warm period was relatively quiescent, the cold climate of the Little Ice Age was extremely stormy. The change from benign to stormy conditions appears to have taken place soon after AD1,400 and it is during this period that wind-blown sand accumulated at the coast. At Sand, this is demonstrated by the presence of considerable thicknesses of blown sand on top of medieval metal workings. However, coastal dune formation may also have taken place during earlier times in the Holocene. For example at Sand, the presence of considerable thicknesses of sand beneath the metal workings points to episodes of dune construction earlier in the Holocene. At Sand, the lower dune deposits locally rest upon Holocene marine gravels, therefore implying that the majority of the dune accumulation in this area took place during the latter part of the Holocene after the drop in RSL.

7.1.4 Summary

The pattern of Late-glacial and Holocene RSL changes that took place in the North West Highlands is complex and represents the interaction of glacio-isostatic rebound following the melting of the Late Devensian ice sheet and the progressive increase in global ocean volume following the melting of ice sheets worldwide. The pattern of differential glacio-isostatic rebound that took place has resulted in individual raised shoreline features of the same age occurring at different altitudes in different places. Thus, even in a restricted area such as Applecross, Raasay and Skye, the details of RSL changes are likely to differ between An Corran, Raasay Harbour and Sand. However, the pattern of Late-glacial and Holocene RSL change within each location is likely to have been very similar.

Files cited in the text

All files start from ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > …

… > Documents > Final Reports > AG_Dawson_report.pdf
… > Images > Specialists > Gen Sea Level > Sea_level_illus_1.gif [Illustration 537]
… > Images > Specialists > Gen Sea Level > Sea_level_illus_2.gif [Illustration 538]

7.2 Relative Sea-level Changes at Clachan Harbour, Raasay, Scottish Hebrides | Sue Dawson

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports. From here you can download the file 'Dawson_Sue_Raasay_report.pdf'. The archive version of all the images on this page can be obtained from the ADS > Downloads > Images > Specialists > Raasay sea level.

7.2.1 Abstract

An intertidal organic deposit enclosed within estuarine clastic sediments, is described for Clachan harbour, Raasay, the Inner Sound. The organic sediments are over and underlain by fine sands and silts containing marine microfossils. Macrofossil analyses (pollen and diatoms) indicate a regression and subsequent transgression at the site during the early Holocene. The altitude at which early Holocene marine regression and transgression is recorded is less than at sites located on the Scottish mainland at Arisaig. This reflects the geographical position of Raasay, located on the periphery of the glacio-isostatic uplift centre, under the influence of differential isostatic uplift across the Inner Hebrides.

7.2.2 Introduction

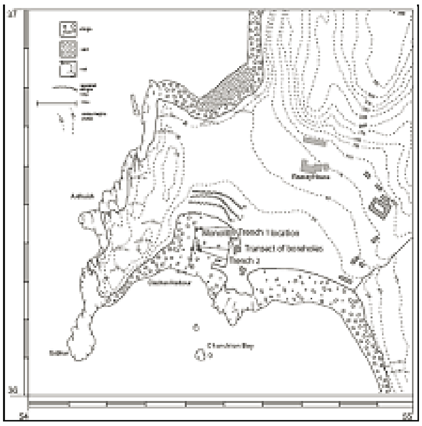
Intertidal organic deposits are rarely described for western Scotland with the exception of the Isle of Coll, where early Holocene intertidal peats are described for Traigh Eileraig (Dawson *et al* 2001). Other intertidal deposits are described for South West Scotland, Orkney, and many from the Outer Hebrides. These latter examples are located at sites which lie around the periphery of the Scottish glacio-isostatic uplift centre. This paper examines a site on the Isle of Raasay, Inner Hebrides where intertidal peats and wood outcrop at the harbour surface in Clachan, South West Raasay. The results of lithostratigraphic and geomophological survey combined with pollen and diatom analyses are used to determine the origins of the deposit together with the raised suite of shingle ridges and terraces in the vicinity of Clachan harbour. These results are compared with recent research on Holocene relative sea-level changes in North West Scotland. In this paper most dates refer to general period nomenclature and are expressed in conventional years before present (BP). Where radiocarbon dates are used they are expressed as uncalibrated, radiocarbon years BP in accordance with standard geo-science practice. Radiocarbon dates in the geo-sciences often refer to years before which accurate calibration is not possible and thus the standard of using non-calibrated dates is preferred.

7.2.3 Isle of Raasay, Clachan Harbour

Illus 542: Clachan Harbour, Raasay

The area of Clachan harbour is sheltered and lies to the south of Raasay House facing the Raasay Sound overlooking the Isle of Skye (see Illustrations 540, below left & 541, below right). An investigation into sediment sequences exposed on the harbour floor led to the discovery of extensive wood and peat deposits covering the western area of the bay. Woody peat and organic rich sands and silts occur in the intertidal zone here (see Illustration 542, right). The intertidal area making up the harbour lies in a sheltered bay within the larger Churchton Bay shielded from high winds and storm waves by stone piers which extend out into the bay and provide some shelter which has probably led to the continuing preservation of the buried wood and peat.

Illus 540: Location map of Skye and Raasay



Illus 541: Geomorphological map of south-west Raasay

7.2.4 Methodology and techniques

Morphological survey was undertaken of all terraces and former shoreline features below an altitude of 50m OD in the vicinity of Clachan harbour. This survey determined the areas for further investigation as well as providing the relative sea-level context of the detailed work undertaken in the harbour. Stratigraphical investigation involved hand coring across the harbour sub-surface to determine the general pattern of estuarine and freshwater sedimentation, which was followed by detailed stratigraphical study of the sediments and the microfossils contained within the sediments. Microfossil analyses were undertaken on two monoliths from the harbour floor sediments which encompassed the greatest extent of the buried peat and underlying clastic sediments. This was to ensure continuity of sedimentation from the clastic to the organic sequences as well as giving an understanding of the possible environment of deposition of the sediment sequences studied.

7.2.5 Morphological mapping

The surfaces immediately upslope of the harbour were mapped at a scale of 1:10,000 using standard geomorphological techniques (Firth 1984). This was followed by measuring the altitudes of all terraces including the present day sand and mudflats along their lengths using a Sokisha total station and Zeiss autoset level. All boreholes and monolith locations were levelled to Ordnance Datum (OD) Newlyn. Tidal data was taken from Portree, Skye and levels related in the discussion to High Water Mark of Ordinary Spring Tides (HWMOST) refer to the position in the tidal cycle that the transition from estuarine to terrestrial sedimentation occurs.

7.2.6 Stratigraphical analyses

Sites were selected for detailed analyses and monolith sampling after initial examination of the harbour area using a hand operated gouge sampler. Boreholes selected for detailed study were undertaken using a 500mm long, 250mm wide monolith tin, which was pushed into the sediment face after widening a pit in the surface sands.

7.2.7 Microfossil analyses

Microfossil analyses followed standard preparation techniques and included preparation for diatoms, pollen, foraminifera and Ostracoda. The study of the microfossil content of sediments allows determination of general changes in the environment of deposition of the clastic and terrestrial sediments as well as determining the presence or absence of hiatus in sedimentation, to enable the changes in relative sea-level to be assessed.

A minimum of 300 microfossils was counted at every level sampled. Eighteen levels were prepared for diatoms using standard techniques (Barber & Haworth 1981). The sediment was subsampled from small tins taken at the site from two trenches (1 and 2, see Illustration 541, above). Approximately 1g wet weight of sediment was placed into a beaker and 20mls of Hydrogen peroxide (H_2O_2) added. The beaker was heated gently on a hotplate for 1–3 hours until all organic matter was oxidized. The material was then transferred to centrifuge tubes and topped up with distilled water. The centrifuge was set at 1200rpm for five minutes. The supernatant was then decanted carefully, topped with distilled water and re-centrifuged. This process was repeated five times to reduce the amount of clays and fine silts.

Diatom slides were made up by allowing the suspension to settle out on a cover slip overnight. The resultant cover slips were mounted in Naphrax and heated for a few minutes in a fume cupboard to evaporate the Toluene within the Naphrax. The slides were then left to cool in the fume cupboard until required for counting.

The diatoms were identified with reference to Hendey (1964) and Van der Werff & Huls (1957–1974). Diatom nomenclature follows Hartley (1986) and salinity and lifeform classification is based on Vos & de Wolf (1993) and Denys (1991/2). Polyhalobian and mesohalobian classes broadly reflect marine and brackish conditions and oligohalobian and Halophilics reflect freshwater environments.

7.2.8 Geomorphology

Following morphological mapping of the area below 25m OD, terraces representing former sea-level changes were identified around Raasay House, immediately north-east of the harbour (see Illustration 539, right). The uppermost level of vegetation in the intertidal area occurs at 3.66m OD which lies approximately 0.70m above the tidal level at MHWST. A suite of vegetated shingle ridges occurs immediately to the north-east of the intertidal area, down slope of Raasay House. The lowest ridge occurs at 7.57m OD, a second (less well defined) occurs at 8.89m OD and the highest ridge occurs at 14.55m OD. Raasay house itself sits on the surface of a well defined terrace at *c*24m OD. It is likely that the highest shingle ridge and the terrace that the house stands on are related to Lateglacial relative sea-level changes (see Section 7.1) when sea-levels were lower and have been subsequently uplifted to their present altitudes.

Illus 539: Holocene and Late-Glacial shingle suite, south-west Raasay

The terrace at *c*7.5m OD is comparable to terraces identified in Skye and Applecross as being a product of the highest level attained by the mid Holocene rise in relative sea-level known as the Main Postglacial Transgression. The higher surface at *c*8.90m OD is probably a Holocene terrace formed from exceptional storm wave activity in which storm waves have overtopped the main level at *c*7.5m OD by 2–3m.

7.2.9 Lithostratigraphy

The harbour floor at Clachan is characterised by a thin (less than 50mm) veneer of coarse shelly sand overlying a highly compacted peat with wood, which in turn overlies a suite of sands and silty and clays which comprise the intertidal sediments. Underlying the surface sand is a highly compacted rich brown peat with large pieces of wood (pine) up to 35cm (long axis) and woody fragments sometimes accounting for up to 80% of the organic deposit. The peat is variable in terms of the presence within the harbour floor area. A greater extent of exposed peat and wood was noted during survey work by Scotland's First Settlers prior to the sampling trip to excavate the monolith for analysis. The peat and wood are easily eroded from the harbour floor by natural processes and they have also been excavated for local fuel use in recent times.

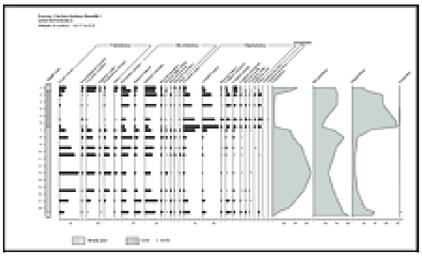
A monolith of excavated sediment encompassing the main stratigraphic units (see Table 181, below) was obtained from the northern part of the harbour towards the back of the present day beach ridge at an altitude of 0.22m OD and the main units are shown in Illustration 543 (right) with the sand veneer clear towards the top of the monolith and the organic deposit below underlain by the silts and clay deposits. The organic deposit exhibits a variable thickness across the area, being up to 0.25m thick in places. In monolith 1 the organic unit is 0.06m thick. The largest stratigraphic unit is composed of sands, silts and clays which make up the intertidal sediments. In the sampled monolith these sediments are *c*0.40m in thickness. The silty clay unit extends to greater depths in excess of several metres and only the sediments around the lithostratigraphic boundaries were collected for further analysis.

Illus 543: Monolith 1 – Clachan Harbour, Raasay, stratigraphy

Table 181		
Depth (cm)	Altitude (m OD)	Stratigraphic description
0–1.0	0.21	coarse grey shelly sand
1.0–7.0	0.15	brown peat with wood fragments
7.0–7.5	0.14.5	fine grey sand
7.5–9.0	0.13	grey–brown organic sand
9.0–10.0	0.12	grey silty sand
10.0–16.0	0.06	clayey silt with sand grains evident
16.0–18.0	0.03	highly organic sand
18.0–50.0	–0.28	grey silty clay

Table 181: Stratigraphy of Monolith 1, Clachan Harbour, Raasay

7.2.10 Biostratigraphical analyses – diatoms and pollen



Illus 544: Monolith 1, Clachan Harbour, Raasay, diatom assemblages

The diatom assemblage for Clachan Harbour is shown in Illustration 544 (right). At the base of the sequence the clastic sediments composed of silts and sands have increasing numbers of *Mesohalobous* (brackish) species. High frequencies of *Diploneis interrupta* and *Navicula peregrina* are indicative of saltings in the supratidal zone. Low numbers of marine and marine-brackish species, including *Diploneis didyma*, *Achnanthes delicatula* and *Navicula digito-radiata* occur in the sands suggesting deposition on mud or sandflats (Vos & de Wolf 1993). As the contact with the overlying organic sediments is approached, the diatom assemblage returns to *Mesohalobous* dominated, with *Diploneis interrupta* and *Diploneis ovalis* prominent. The organic unit is characterised by increasing values of oligohalobian (Freshwater) species, with *Fragilaria* sp and *Navicula pusilla* in greatest numbers. This assemblage is characteristic of a reduction in marine influence. The silty sands providing a thin veneer over the organic sediments across the harbour floor surface are characterised by polyhalobous and mesohalobous species including *Paralia sulcata*, *Cocconeis scutellum*, *Navicula peregrine*, *Nitzschia punctata* and *Diploneis didyma*. The presence of these brackish species together with the aeophile *Diploneis interrupta* indicates deposition within the intertidal area.

The overall assemblage provides evidence for a fall and then a subsequent rise in the marine influence at the site in the early to middle Holocene.

7.2.11 Modern diatom assemblages

An examination of modern diatom assemblages across the vegetated upper intertidal zone and the harbour surface sand flats was undertaken to try and establish the altitudinal relationships between the representative diatom assemblages within the monolith examined and the present day tidal levels. This is undertaken to ensure that the interpretation of the fossil sequences is based on an understanding of the natural succession of coastal sedimentary sequences in the immediate vicinity of the study site. It is therefore imperative to establish contemporary relationships between the diatom assemblages, water levels, sedimentary facies and the coastal vegetation communities to determine the indicative meanings of the relative sea-level changes deduced.

The contemporary samples cover Mean High Water Neap Tides (MHWNT), across the sandflats to the landward edge of the beach and the start of vegetation communities at around Mean High Water Spring Tides (MHWST). The altitudes of these environments are related to tidal levels interpolated from the Admiralty Tide Tables for Portree (the nearest Secondary port) and Ullapool (the nearest Main tidal port). The predicted levels for Clachan harbour are summarised in Table 182 (below).

Table 182								
Place	Chart	LAT	MLWST	MLWNT	MSL	MHWNT	MHWST	HAT

	datum							
Ullapool Main Port		0.0	0.7	2.1	3.0	3.9	5.2	5.8
(Broadford)		(0.0)	(-0.1)	(0.1)	(3.0)	(0.2)	(0.3)	(6.1)
Broadford	-2.85	-2.85	-2.25	0.60	0.15	1.25	2.95	3.25

Contemporary Samples		Characteristic diatom species	Tidal equivalent
1	0.00m OD	*Paralia sulcata, Rhabdonema minutum, Diploneis smithii, Achnanthes brevipes*	MSL±0.15
2	0.22m OD	*Paralia sulcata, Cocconeis scutellum, Rhabdonema minutum*	MSL
3	0.17m OD	*Paralia sulcata, Navicual peregrina, Diploneis didyma*	MSL
4	1.52m OD	*Diploneis interrupta, Paralia sulcata, Cocconeis scutellum*	MHWNT
5	2.32m OD	*Diploneis interrupta, Navicula peregrine, Navicula digito-radiata*	MHWST±0.50

Table 182: Tidal data for Raasay and contemporary diatom sample details

The record of Holocene sea-level changes is reliant upon the identification of distinctive diatom boundaries. These include where the assemblage displays a marked change from polyhalobous (marine) species (indicative of intertidal mud and sandflats) to the dominance of mesohalobous (brackish) species (indicative of a developing saltmarsh) and occur at *c*0.20m above the predictive level of MHWST. The second boundary occurs where a change from mesohalobous species to the dominance of oligohalobous (fresh) taxa is evident. Finally, the third boundary of significance concerns the transition to more freshwater and salt intolerant species around Highest Astronomical Tide (HAT).

Many of the characteristic diatoms observed in the present day sediments are also characteristic of particular diatom zones within the Holocene sequence at Clachan harbour. The diatom assemblages are similar to recent samples determined for the Kentra Moss area, Arisaig (Shennan *et al* 1995).

7.2.12 Pollen assemblages

Pollen analysis was undertaken on the organic sediments from Clachan harbour (see Section 8.1). In brief, pollen grains identified at the base of the organic deposit are characterised by *Betula* with low percentages of *Pinus* and *Salix* and high frequencies of *Cyperaceae* (>50%), some *Artemisia* and minimal counts of *Rumex*. Sedge, willow and birch continue to rise throughout the organic unit with *Atemisia* peaking at 25% before falling to *c*10%. Towards the top of the organic deposit rising *Corylus-Avellana*-type indicate the continued presence of hazel scrub in the vicinity of the site. The continuous curve for *Betula* plus the commencement and development of *Corylus-Avellana*-type at Clachan harbour suggest that birch-hazel woodland was established in the area and confirm an early Holocene, *c*9300 BP, date for the expansion of this throughout the Hebrides (Birks 1989) which is in keeping with research throughout the area.

The Clachan harbour pollen assemblages can be compared with other sites in western Scotland to provide an assessment of the timing of deposition of the intertidal organic sediments. The pollen record from Gruinart, Isle of Islay (Dawson *et al* 1998) exhibits a similar sequence at the base of the organic deposit which are characterised by *Betula*, *Juniperus*, *Salix* and occasional *Pinus*. *Betula* is replaced up core by *Corylus-Avellana*-type. A similar sequence is also observed for Arisaig within uplifted coastal isolation basins. The pollen assemblages described are typical of early Holocene vegetation development with an open tundra landscape being replaced by the development of birch and hazel woodland as a consequence of climatic amelioration (Walker *et al* 1992). The pollen sequences described for an intertidal organic deposit on the Isle of Coll are dated at 8000 radiocarbon years BP (Dawson *et al* 2001). The low percentages of arboreal taxa, typical of the Younger Dryas, suggest an early Holocene age but later than that suggested by the Islay and Arisaig pollen evidence.

7.2.13 Relative sea-level changes

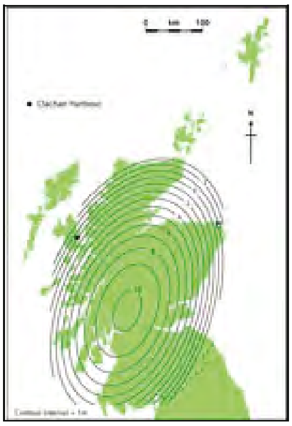
The pattern of relative sea-level changes in Raasay during the early to middle Holocene is characterised by a fall in sea-level, when the rate of glacio-isostatic uplift outpaced the glacio-eustatic increase in the volume of ocean water due to widespread ice melt across the globe. This was followed by a rise, when decreasing glacio-isostatic rebound was overtaken by the rate of rise in sea-level caused by increased melting. The rate of rebound is variable across the Inner Hebrides from the mainland due to the variability of the ice thickness across the area.

7.2.14 Relative sea-level changes: Isle of Skye

Relatively little is known about the chronology of relative sea-level change on the Isle of Skye and Raasay, although many raised marine terraces have been identified no systematic study of the raised shorelines in the area has taken place. Terraces have been identified at *c*30m OD which represent Lateglacial sea-level changes (see Section 7.1). Raised shorelines formed during or following the culmination of the Main Postglacial Transgression are widespread in Skye and reach up to 7m OD in eastern Skye at Sconser, the Braes and Peinchorran (Benn 1991). Raised shingle ridges occur at higher altitudes (up to 10m OD) in more exposed locations. The nearest site to Raasay is a raised tombolo (connecting a former island to the mainland) of vegetated beach gravels at *c*7m OD at the Braes, on the mainland opposite Raasay.

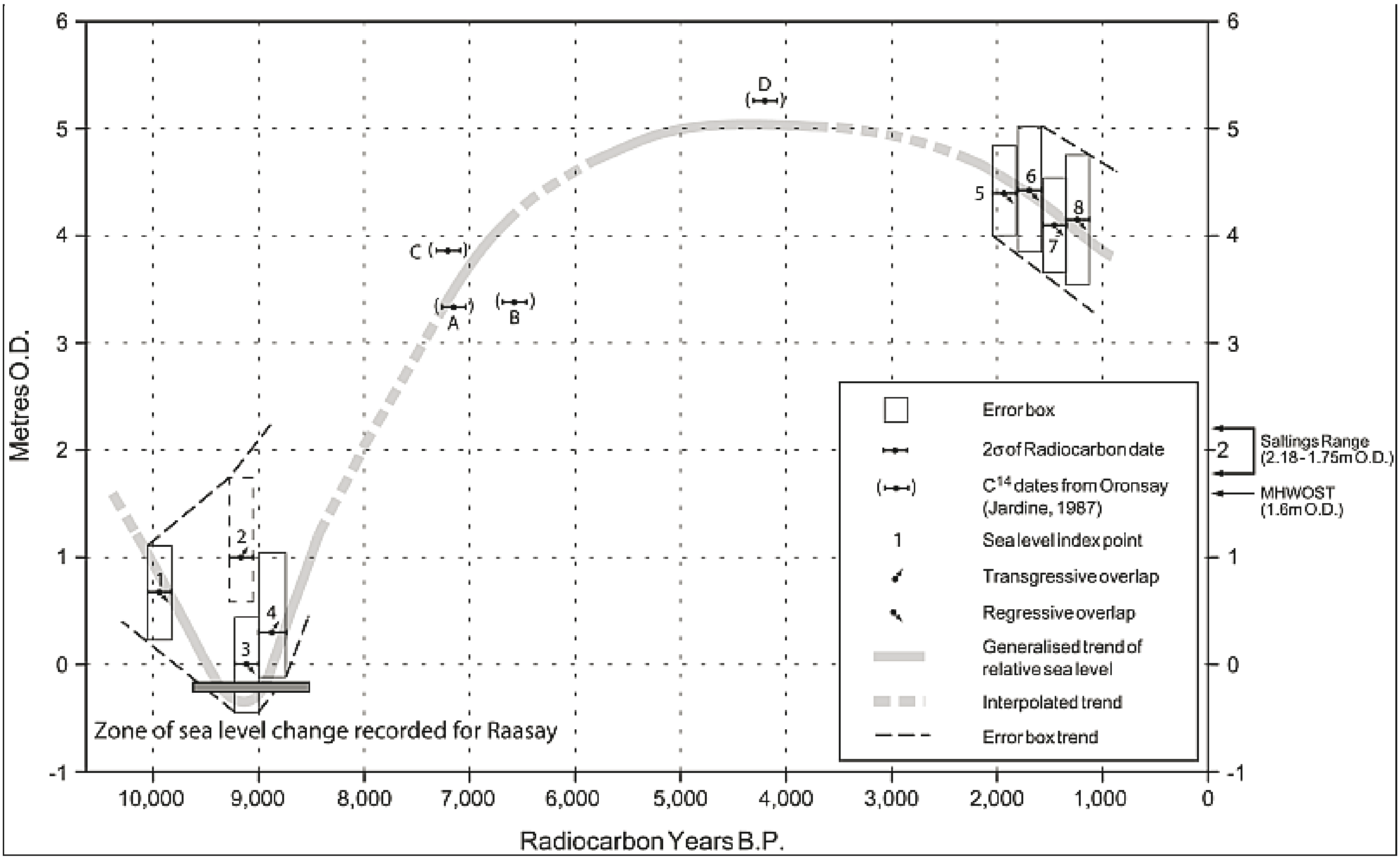
Recent work by Selby *et al* (2000) has examined the late Devensian and Holocene sea-level record from selected isolation basins throughout Skye and shows evidence for marine inundation and sand and silt deposition (in quiet water conditions compared to the high energy raised terraces composed of gravel and shingle around the coastline of Skye), to at least 5m OD.

7.2.15 Relative sea-level changes: Isle of Raasay



Illus 546: Isobase map (adapted from Smith *et al* 2000)

The sediments analysed from the floor of the harbour in south-west Raasay, together with the information from the raised shingle terraces surrounding the harbour area, can be used to determine the pattern of relative sea-level changes for Raasay during the Holocene. A graph of relative sea-level change for the Inner Hebrides is shown in Illustration 545 (below) based upon data from the Isle of Coll and the Isle of Raasay. The earliest part of the Holocene was characterised by low relative sea-levels at *c*0m OD or slightly lower. This is in accord with other areas around the Inner Hebrides. The contact between the silts and clays and the overlying intertidal organic unit at 0.15m OD marks a change from marine sedimentation, typical of an intertidal environment, to terrestrial sedimentation above the influence of marine activity. This boundary marks a relative marine regression at the site in the earliest part of the Holocene. Relative sea-level remained low, sufficiently long enough to allow the growth of woodland at the site, although it was probably at these levels for between 500 and 1000 years. There then ensued a rise in relative sea-level which commenced at *c*8800 radiocarbon years BP on the Isle of Skye (Selby *et al* 2000). Pollen evidence from Clachan harbour suggests that the transgression may be earlier than the Skye and Coll data and be closer to the timing of the transgression on the Isle of Islay around *c*9500 radiocarbon years BP (Dawson *et al* 1998). The raised shorelines around the harbour provide morphological expression of this transgression with shingle ridges located at *c*7.5m OD and *c*9m OD. The stratigraphic evidence for this transgression is present in the thin veneer of sediments overlying the organic unit across the harbour, although much erosion of the sand unit has undoubtedly taken place due to its situation within the present day intertidal zone. The ridges at *c*7m OD are comparable to terraces located around the Isle of Skye and mark the culmination of the Main Postglacial Shoreline. An isobase map for this Shoreline is shown in Illustration 546 (right; Isobase map based upon a quadratic trend surface for the Main Postglacial Shoreline (adapted from Smith *et al* 2000).



Illus 545: Relative sea level graph, Scottish Inner Hebrides (adapted from Dawson *et al* 1998)

7.2.16 Summary

The pattern of relative sea-level change in western Scotland during the Holocene is the product of the combined effects of glacio-isostatic deformation and glacio-eustatic changes. As a consequence, the pattern of Holocene relative sea-level change is regionally variable. Intertidal woody peat in south west Raasay began to accumulate during the early Holocene around *c*9500–8500 14C years BP at which time relative sea-level fell close to 0m OD or slightly lower. Terrestrial organic sedimentation and the development of woodland accumulated at or close to sea-level until *c*8500 14C years BP when they were submerged by a rise in sea-level which reached an altitude of at least *c*7.6m OD, the highest Holocene terrace immediately north-east of the intertidal zone in the grounds of Raasay House.

Storm waves, deposited shingle ridges at even higher altitudes. In the area immediately surrounding Clachan harbour, the occurrence of raised storm ridges with crest altitudes up to *c*10m OD implies that storm waves may have occasionally reached and exceeded this altitude. The age of this relative transgression maximum is dependant upon radiocarbon dating. Analysis by Selby *et al* (2000) for relative sea-level changes in South West Skye suggests that this transgression maximum may have culminated as recently as *c*3000 radiocarbon years BP.

The stratigraphic position and altitude of the intertidal sediments is consistent with the results of relative sea-level investigations undertaken on sediments of a similar age in Islay (Gruinart flats) and north east Coll. Relative sea-level data for this transgression from Kentra Moss (Loch Shiel) and Arisaig, Moidart are at higher altitudes due to the variability in the uplift history between the two areas.

The presence of the organic sediments in the surf zone leads them to be susceptible today to erosion by storm wave activity and removal as well as disturbance by human activity.

Files cited in the text

All files start from ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > …

… > Documents > Final Reports > Dawson_Sue_Raasay_report.pdf
… > Images > Specialists > Raasay sea level > Raasay_illus_1.gif [Illustrations 540]
… > Images > Specialists > Raasay sea level > Raasay_illus_2.gif [Illustrations 541]
… > Images > Specialists > Raasay sea level > Raasay_illus_3.jpg [Illustrations 542]
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… > Images > Specialists > Raasay sea level > Raasay_illus_7.jpg [Illustrations 545]

8.1 Palynological studies in northeast Skye and Raasay | Fraser Green & Kevin Edwards

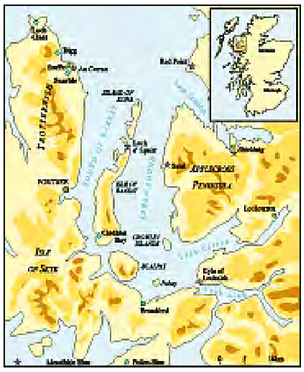
8.1.1 Abstract

Pollen, microscopic charcoal and radiocarbon studies at four sites on Skye and Raasay provide environmental contexts for the archaeological investigations of Scotland's First Settlers around the Inner Sound. One coring site, from a loch in northern Trotternish, Skye, provides a regional summary of environmental change. Other sites closer to the rockshelter at An Corran, Trotternish, furnish more localised pictures of landscape change, some of which may be associated with human intervention of Mesolithic age. Intertidal organic deposits from Raasay assist in reconstructing the early Holocene environment of the area. General date ranges have been presented as uncalibrated, radiocarbon years BP. AMS radiocarbon dates were obtained on bulk sediments and these appear at the sides of the pollen diagrams as calibrated years BP. Calibration was undertaken via the program CALIB v. 5.0.1 (Stuiver & Reimer 2005). Dating estimates are based on straight-line extrapolations with the dates rounded to the nearest ten years and by-passing dates which are out of time sequence (as at Loch Cleat; Edwards & Whittington 2001).

8.1.2 Introduction

This contribution seeks to reconstruct the composition and evolution of the terrestrial natural environment around the Inner Sound during the first half of the Holocene, *c*10000–5000 BP. This time span encompasses the conventional period of the Mesolithic in Scottish archaeology, and the intention is to provide an environmental context to the Mesolithic settlement of this region and to assess the evidence for hunter-gatherer impacts on the landscape. Pollen and microscopic charcoal analyses are the principal tools used to achieve these aims and the work follows a similar design to that pursued elsewhere in the Inner Hebrides (Hirons & Edwards 1990; Edwards & Berridge 1994; Edwards 2000b; Sugden & Edwards 2000).

8.1.3 Core sites



Illus 547: The Inner Sound showing pollen sample sites and Mesolithic sites

Three coring sites in northern Trotternish, Skye, were selected on the basis of their general proximity to the Mesolithic site of An Corran, and their suitability for providing a probable undisturbed pollen record (see Illustration 547, right). The sites were also chosen to reflect differences in pollen source area and taphonomy so that comparisons could be made with regard to the detection of small scale human impacts. An intertidal peat site at Clachan Bay, Raasay, was also studied and summary results are published here. Palynological data from the rockshelter at Sand, Applecross, are presented elsewhere (Green & Edwards, Section 3.16; Green 2005).

8.1.3.1 Digg

Illus 548: The Digg Basin and the surrounding area, showing the core location

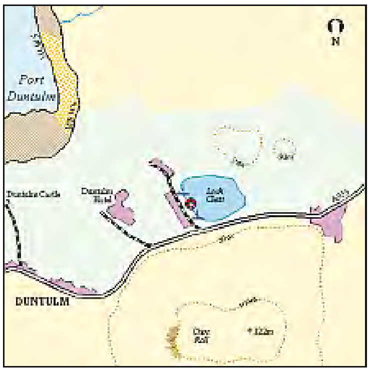
The mire at Digg occupies a broad basin above the western shores of Staffin Bay, a locally significant embayment in the northeast of the Trotternish Peninsula (see Illustration 548, left). The Digg basin is located on a shelf at 40m OD and the eastern edge drops steeply to the sea with the coast less than 100m distant. The coring location (OS Grid reference NG 471286 9609) was selected after a series of trial boring transects were taken in order to ascertain the deepest part of the basin. The basin measures approximately 200m long and 100m wide. The relief of the surrounding area is steep and complex as a result of successive landslipping from the unstable Trotternish Ridge 2km to the west (Ballantyne *et al* 1991). It is possible that the Digg basin itself occupies a depression between rotational landslip blocks. A small stream at its southern end, which falls over the adjacent cliff into Staffin Bay, drains the basin. Although there is no inflow stream, the steep slopes to the north and west are likely to act as drains into the mire. Geologically, the country rock is classified as part of the Upper Jurassic marine facies, mainly clays, shales and sandstones. Overlying this, technically as a drift deposit, are the Tertiary basalt blocks and rubble from the landslips. Soils in the area vary with the topography, and where drainage is suitable the relatively base-rich bedrock produces thin brown earths. In more waterlogged situations, peaty podsols and gleys predominate (Hudson & Henderson 1983).

8.1.3.2 Suarbie

The core at Suarbie was removed from a large area of blanket mire that forms a more or less continuous cover between the Trotternish Ridge in the west, and the lower agricultural lands beside the coast in the east, a distance of *c*5km (see Illustration 549, right). This blanket bog extends northwards as far as the southern slopes of The Quiraing, and southwards to where The Storr abuts the sea cliffs at Rigg – some 12km. Discrete areas of mire are interrupted by the courses of several rivers running from the Ridge to the sea, most notably the Stenscholl/Kilmartin in the north, and the Lealt in the south. The coring site (NG 48224 65822) is within the Stenscholl catchment, *c*400m west of the main stream of the Kilmartin River, 60m west of the Suarbie Burn and *c*500m northeast of the deserted settlement of Suarbie. The bog here occupies a broad depression of gently sloping land between north-easterly flowing burns. The underlying geology of the site is dominated by intrusive dolerite sills of Tertiary age, but the catchment drains softer Jurassic sedimentary rocks to the west, above which the extrusive basalts of the Trotternish Ridge occur. All these lithologies possess a relatively high base-status. Blanket peat is the dominant soil type, with mineral soils being uncommon in the vicinity – these are mostly peaty gleys and peaty podsols occurring where peat generation is restricted by topography or human intervention. Non-calcareous gleys are also fairly regular over the Jurassic sediments, particularly closer to the coast (Hudson & Henderson 1983).

Illus 549: Suarbie and the surrounding area, showing the core location

8.1.3.3 Loch Cleat

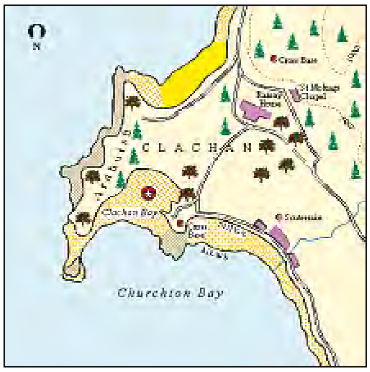


Illus 550: Loch Cleat and the surrounding area, showing the core location

Loch Cleat is a small lake on the west side of the northern tip of the Trotternish Peninsula (see Illustration 550, left). The loch is approximately 0.4km east of the coast at Port Duntulm, and 0.7km from Duntulm Castle. Rubha Hunish, the northernmost extremity of Skye, is *c*3.5km to the north. The coring site is on the western fringes of the loch (NG 41662 74287). The loch occupies a rock basin at 38m above Ordnance Datum and is little more than 100m across at the widest point. The hillslopes around the loch are generally gentle, below 15°, except for the steep 50° slope of the 122m high Cnoc Roll to the immediate south. There is no inflow stream, but a small outflow empties from the northwest into Port Duntulm. Tertiary dolerite sills dominate the underlying geology, with Jurassic sedimentary rocks outcropping closer to the coast in the east and west. The Tertiary flood basalts of the Trotternish Ridge outcrop to the south. Soils are predominantly peaty podsols in poorly drained locations and brown forest soils where drainage is better and the base-rich bedrock is sufficiently weathered (Hudson & Henderson 1983).

8.1.3.4 Clachan Bay

Clachan Bay is a minor embayment on the southern shore of the Ardhuish promontory on the southwest coast of Raasay (see Illustration 551, right). The bay faces south-south-west, is *c*150m in width, and forms part of the larger Churchton Bay. Clachan Bay is shielded from high winds and storm waves by stone piers and the proximity of the Isle of Skye, and this has probably led to the survival of the organic deposit in the intertidal zone. The underlying geology is predominately Tertiary granite, associated with the adjacent Red Hills granites on Skye, but the seaward half of the Ardhuish promontory forms part of a dolerite sill. Jurassic marine sediments and Torridonian sandstones outcrop within 5km of the site.



Illus 551: Clachan Bay and the surrounding area, showing the core location

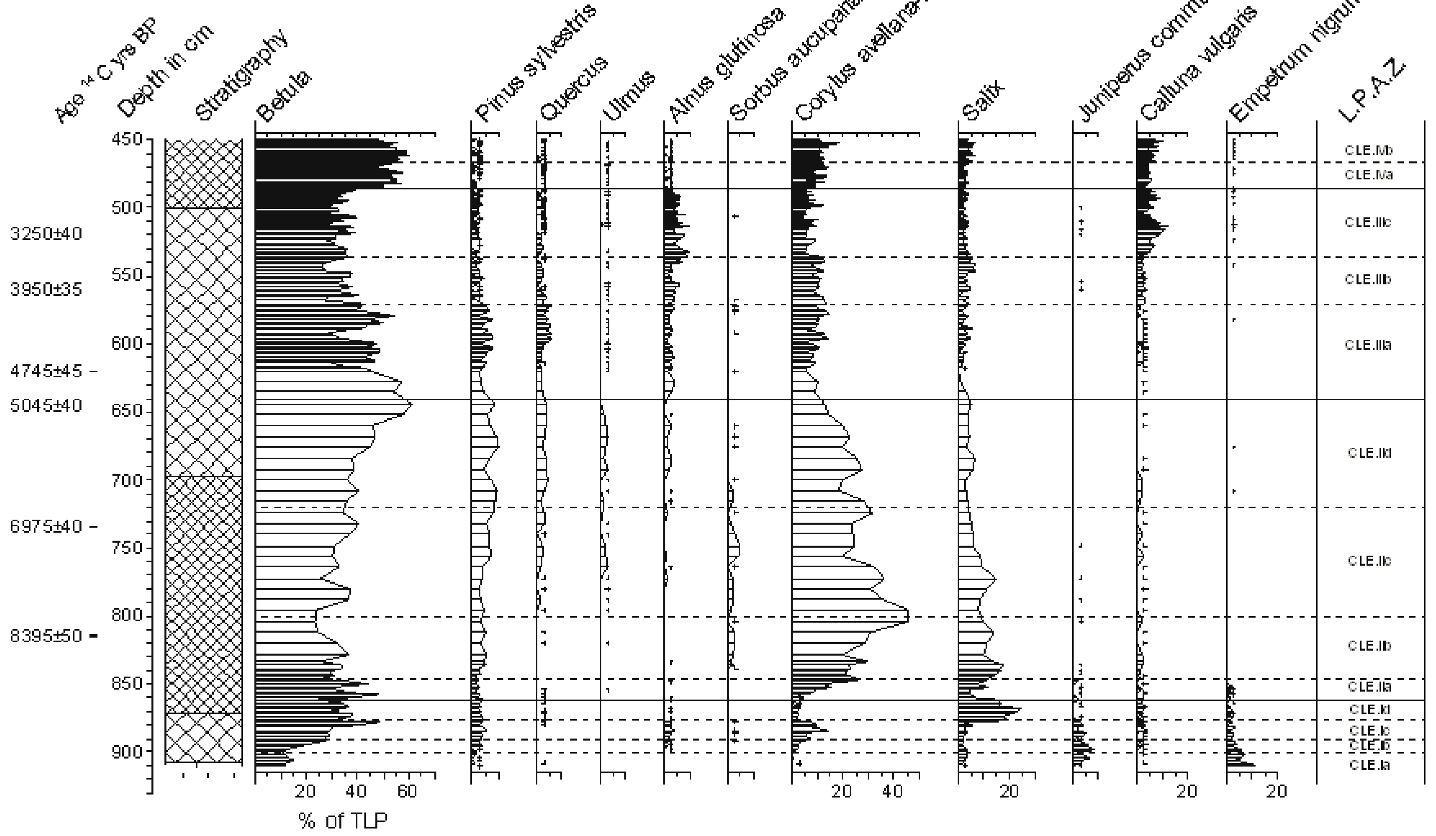
8.1.4 Methods and presentation of results

Samples for the Skye sites were obtained with Russian corers of 5 or 8cm diameter (Jowsey 1966). The intertidal peats at Clachan Bay on Raasay were sampled in monolith tins from open sections.

Laboratory sampling for all sites, where appropriate, took place at contiguous 1cm intervals. Samples of $1cm^3$ were processed for analysis of pollen and charcoal content following standard procedures (Moore *et al* 1991).

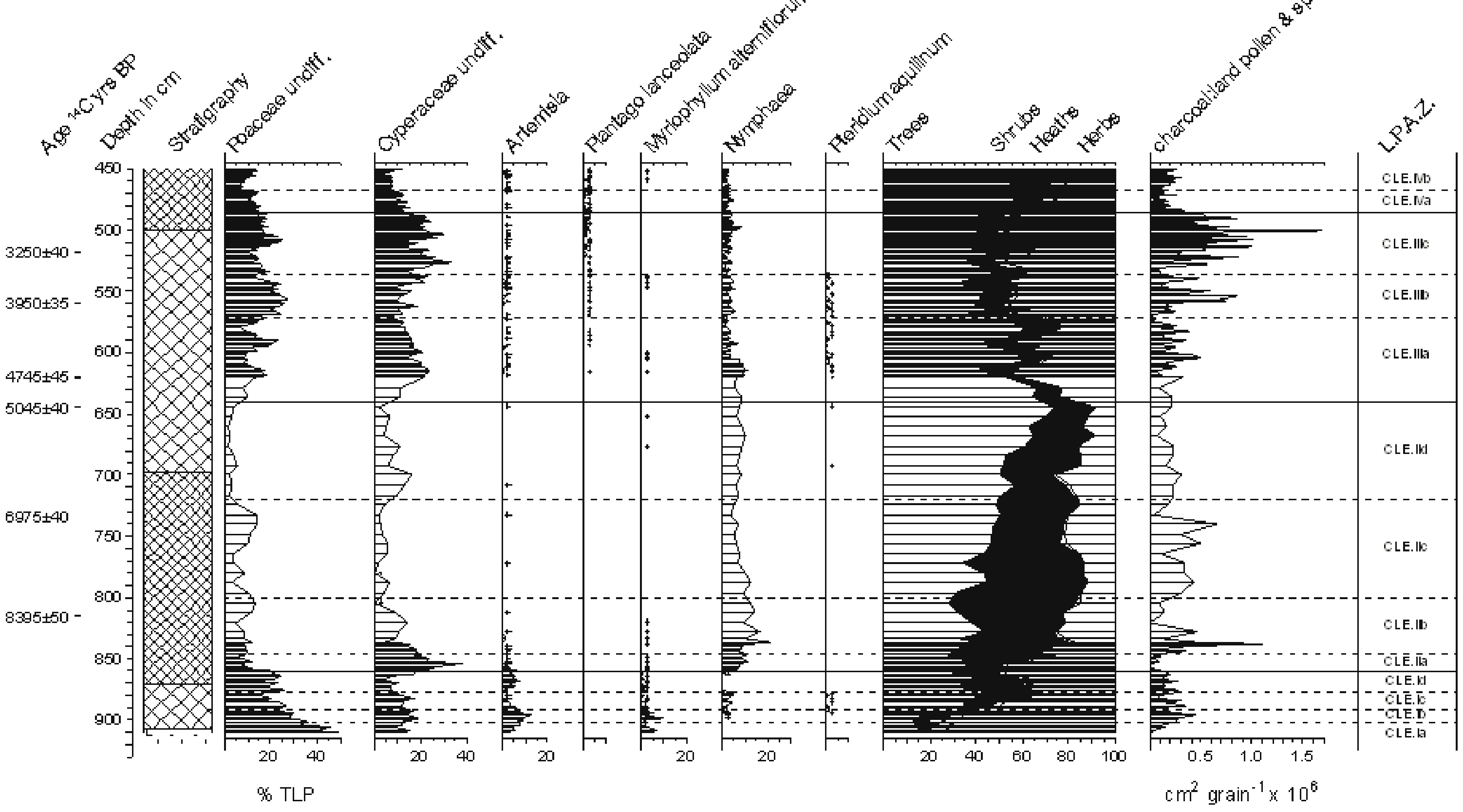
Pollen was initially counted at a minimum of 300 total land pollen (TLP). Higher resolution analysis of selected sections involved minimum counts of 500 TLP. The identification of fossil pollen and spores was based on the keys of Faegri & Iversen (1989) and Moore *et al* (1991) and aided by the type slide collection of the Department of Geography and Environment, University of Aberdeen. Pollen and spore type nomenclature follows Bennett (1994) and Stace (1997). The data were processed and presented using Tilia, TiliaGraph and TGView (Grimm 1991). The pollen diagrams are divided into local pollen assemblage zones (LPAZ) in order to facilitate discussion. Only selected pollen and spore taxa are presented here (see Illustrations 552–556, below), full discussion of the information is presented in Green (2005). Skip Charts.

Illustration 552



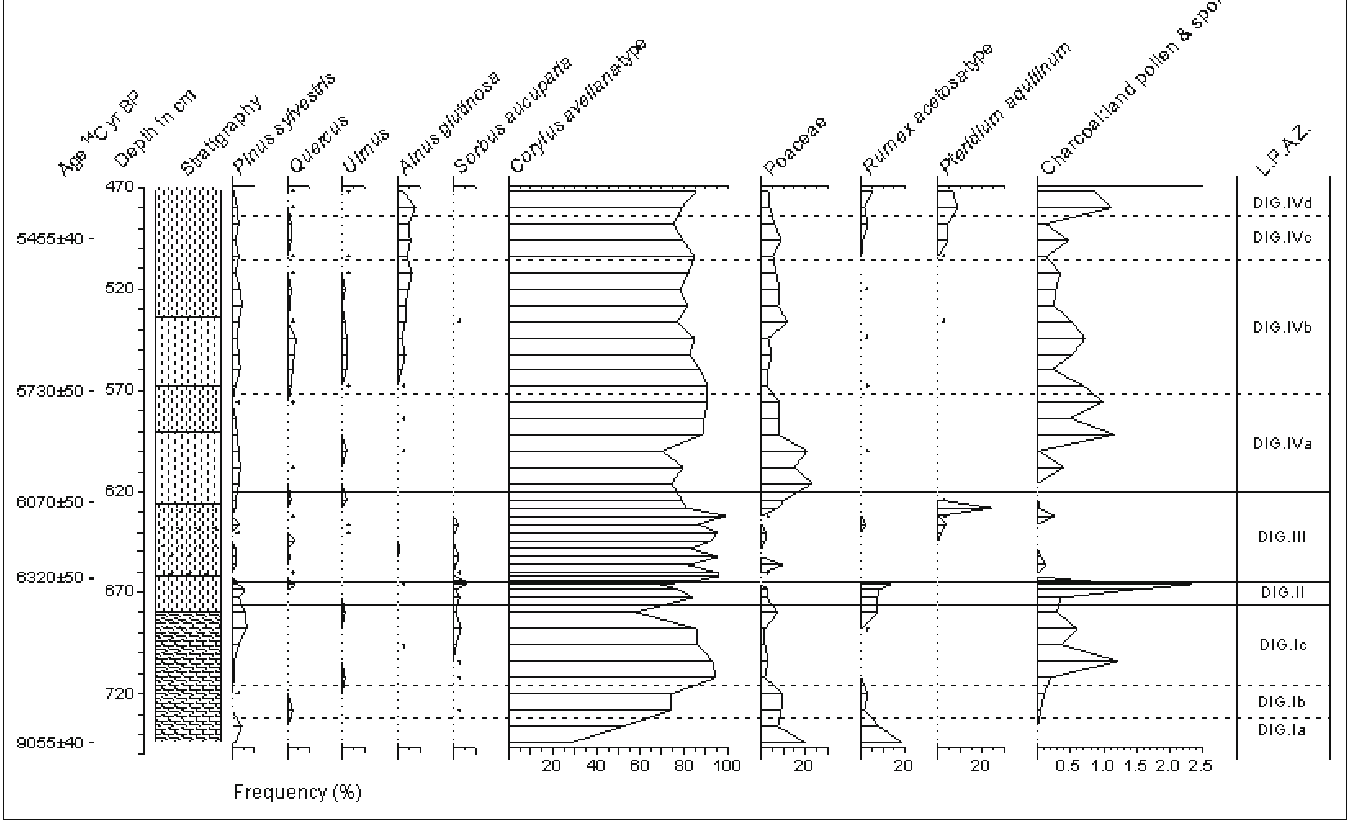
Illus 552: Pollen percentage diagram for Loch Cleat with selected taxa; taxa have been chosen to best represent the general environment. AMS radiocarbon dates were obtained on bulk sediments and these appear at the sides of the pollen diagrams as calibrated years BP Calibration was undertaken via the program CALIB v5.0.1 (Stuiver & Reimer 2005). Back to Section 8.1.5.1

Illustration 553



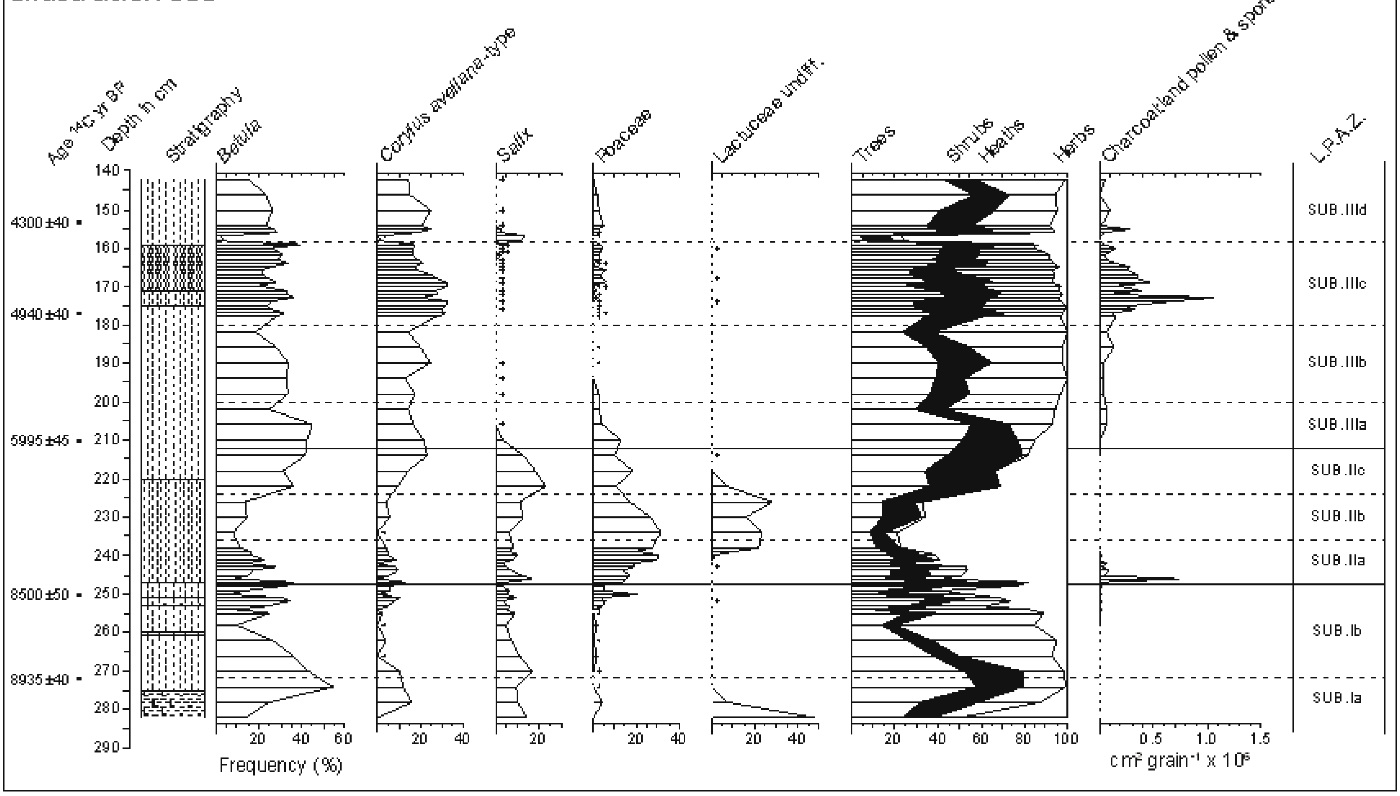
Illus 553: Pollen percentage diagram for Loch Cleat with selected taxa (cont.); taxa have been chosen to best represent the general environment. AMS radiocarbon dates were obtained on bulk sediments and these appear at the sides of the pollen diagrams as calibrated years BP Calibration was undertaken via the program CALIB v5.0.1 (Stuiver & Reimer 2005)

Illustration 554

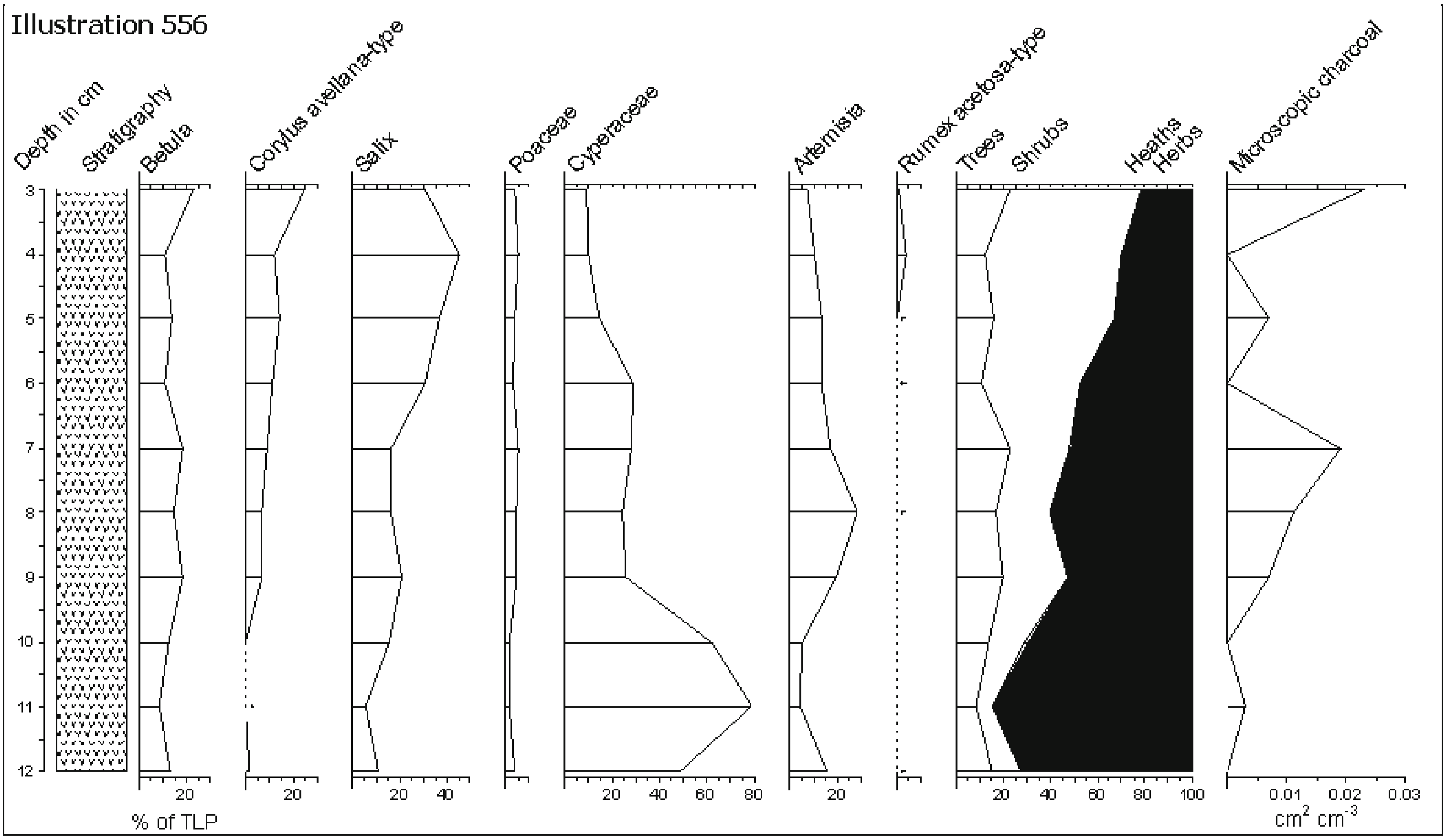


Illus 554: Pollen percentage diagram for Digg with selected taxa; taxa (eg *Betula*, *Calluna vulgaris*) that may have been present on the bog surface have been removed to better represent extra-local taxa. AMS radiocarbon dates were obtained on bulk sediments and these appear at the sides of the pollen diagrams as calibrated years BP Calibration was undertaken via the program CALIB v5.0.1 (Stuiver & Reimer 2005)

Illustration 555



Illus 555: Pollen percentage diagram for Suarbie with selected taxa; taxa have been chosen to best represent the general environment and provide evidence of possible human interference. AMS radiocarbon dates were obtained on bulk sediments and these appear at the sides of the pollen diagrams as calibrated years BP Calibration was undertaken via the program CALIB v5.0.1 (Stuiver & Reimer 2005)



Illus 556: Pollen percentage diagram for Clachan Bay with selected taxa; taxa have been chosen to best represent the general environment

Microscopic charcoal was quantified on every level sampled for pollen and also sampled at contiguous 1cm intervals for 461cm from the Loch Cleat core, from 450cm down. Charcoal was quantified in two-dimensions and then concentrations expressed as total surface area per sample volume (*cf*. Edwards & Whittington 2000) prior to expression as charcoal to pollen ratios (C:P) in an effort to obviate false charcoal peaks resulting from variations in the rate of sediment accumulation (Swain 1973).

AMS radiocarbon dates were obtained on bulk sediments and these appear at the sides of the pollen diagrams as calibrated years BP Calibration was undertaken via the program CALIB v5.0.1 (Stuiver & Reimer 2005). Dating estimates are based on straight-line extrapolations with the dates rounded to the nearest ten years and by-passing dates which are out of time sequence (as at Loch Cleat; Edwards & Whittington 2001). The full data relating to radiocarbon determinations is given in Table 183, below.

Table 183

Lab Code	Depth (cm)	Material dated	Radiocarbon age (^{14}C BP)	δ^{13}C(0/00)	Calibrated dates (cal. BP)
Suarbie					
GU-11320	153–4	*Eriophorum* peat	4300±40	-27.6	4900±80
GU-11319	177–8	*Eriophorum* peat	4940±40	-27.6	5670±80
GU-11318	210–1	*Eriophorum* peat	5995±45	-27.3	6835±115
GU-11317	250–1	*Eriophorum* peat	8500±50	-27.6	9490±60
GU-11316	272–3	*Eriophorum* peat	8935±40	-27.5	10000±90
Digg					
GU-11315	495–6	*Eriophorum* peat	5455±40	-26.7	6245±75
GU-11314	570–1	*Eriophorum* peat	6730±50	-27.3	7580±100

GU-11313	625–6	*Eriophorum* peat	8070±50	-28.3	9000±300
GU-11312	663–4	*Eriophorum* peat	8320±50	-29.2	9630±120
GU-11311	744–5	Bryophyte peat	9055±40	-33.7	10200±50
Loch Cleat					
GU-11307	470–471	Fine detrital gyttja	4155±40	-28.7	4700±130
GU-11307	518–519	Fine detrital gyttja	3250±40	-28.0	3475±105
GU-11308	560–561	Fine detrital gyttja	3950±35	-28.2	4365±85
GU-11307	620–621	Fine detrital gyttja	4745±45	-28.8	5515±75
GU-11306	645–646	Fine detrital gyttja	5045±40	-29.1	5805±105
GU-11305	735–736	Fine detrital gyttja	6975±40	-29.4	7780±90
GU-11304	815–816	Fine detrital gyttja	8395±50	-29.3	9400±130
GU-11303	880–881	Fine detrital gyttja	7215±45	-24.5	8045±115

Table 183: Radiocarbon data for palaeo-environmental samples taken from Suarbie, Digg, and Loch Cleat. Calibration was undertaken via the program CALIB v5.0.1 (Stuiver & Reimer 2005).

Sediment lithology was assessed using the system of Troels-Smith (1955) and this is indicated on the pollen diagrams.

8.1.5 Discussion: general vegetation change *c*10,000–5,000 BP

Selected pollen taxa from the coring sites provide a summary of the principal changes in vegetation around the Inner Sound during the Mesolithic. The following Section describes the general pattern of change throughout this period and details the composition of the vegetation. Subsequent to this the evidence for possible human impact on the vegetation is discussed.

Much of the following is based on data from the three coring sites in northern Trotternish and cannot be ascribed to the opposite shore of the Inner Sound with great confidence. However, using existing palaeoecological studies from Wester Ross and its environs, and from comparisons with present day vegetation, the Holocene environment of the eastern shore can be tentatively reconstructed (see also Shiel, Section 8.2).

8.1.5.1 Trotternish, Raasay and the western shore

Previous palynological investigations from Skye have documented the Lateglacial period (Vasari & Vasari 1968; Birks 1973; Vasari 1977; Birks & Williams 1983; Walker & Lowe 1990), and the starting point for this discussion is the beginning of the Holocene, typically marked by the transition in lake sediments from minerogenic silts and clays associated with the Loch Lomond Stadial, to more organic material. This has been dated to *c*10,050 BP for Loch Cleat in this study and to *c*10,130 BP in Williams (1977), who also investigated Loch Cleat. Dates for this transition are not published in other studies from Skye, but pollen-stratigraphic 'events' associated with the onset of the Holocene are well constrained chronologically, and tend to support the above dates.

A typical pollen succession of *Poaceae* (grasses), *Empetrum nigrum* (crowberry), *Juniperus communis* (juniper), *Betula* (birch) and *Corylus avellana*-type (hazel type) has been identified at most sites. A degree of inter-site variation is reported by most authors (Birks & Williams 1983; Walker & Lowe 1990; Selby 2004), with location relative to exposure and the mountain mass of the Cuillin, or variations in lithology, cited as the main influences on vegetation development.

There exists a considerable discrepancy with regard to the presence of *Alnus glutinosa* (alder) and other thermophilous taxa during LPAZ CLE.Ic (*c*9740–9490 BP; see Illustration 552, above). It is suggested that the pollen and spores of *A glutinosa*, *Sorbus aucuparia* (rowan), *Pteridium aquilinum* (bracken) and *Nymphaea alba* (white water-lily) may be present in these deposits due to contamination during the coring process. This is supported by a radiocarbon date of 7215±45 BP (GU-11303) for a sample in this sub-zone, although only *Sorbus* and *Nymphaea* are at all frequent from samples matching this extrapolated date higher in the core, and *Pteridium* is not recorded at all. It could be that LPAZ CLE.Ic is contaminated by material from various parts of the upper profile, but this does not explain why taxa such as *Ulmus* (elm) and *Quercus* (oak) are missing. It is important to stress that contamination here does not mean total replacement, and this could account for the continued frequency, albeit at steadily decreasing frequencies, of taxa characteristic of the early Holocene such as *Artemisia* (mugwort), *Plantago maritima* (sea plantain) and *Juniperus communis*.

Given this chronological evidence, the lack of a consistent record for alder at this date in Williams' study (Williams 1977), and other investigations from Skye, it would seem prudent to reject the possibility of a local alder expansion in Trotternish. However, the colonisation by alder of Britain and Ireland is complex and poorly understood (Chambers & Elliott 1989; Bennett & Birks 1990). There exists a number of anomalous dates for the first Holocene presence of alder at sites throughout Britain. It is tempting to suggest that with the presence of *Pteridium aqulinum*, a sometimes pyrophytic taxon, some invasion of incipient wetlands created by anthropogenic burning might have occurred (see Smith 1984; Chambers & Price 1985; Hirons & Edwards 1990), but the charcoal evidence is not persuasive and the problem of seed source remains unresolved.

Williams (1977) provides a date of 9,760±150 BP for the beginning of the hazel rise at Loch Cleat, matching the lower boundary of LPAZ CLE.Ic. The implication here is that a climatic threshold has been reached, enabling increased pollen production in hazel, and possibly encouraging the colonisation and/or pollen production of alder and the other incidental taxa.

Subsequent to LPAZ CLE.Ic is an inferred climatic deterioration that characterises LPAZ CLE.Id. This phase is dated to *c*9,490–9,210 BP and is detected by Williams only as an isolated peak in *Salix* (willow) pollen dated to *c*9,200 BP and interpreted as an expansion of arctic-alpine willow scrub on the base-rich substrates surrounding the loch prior to the dominance of *Corylus avellana*. This phase of climatic deterioration comes to a close at *c*9,210 BP, after which herb taxa generally decline and woody taxa are reinstated. This period is the first to be covered by the profiles from Digg and Suarbie, and both these sites begin with an apparent *Corylus* expansion which probably matches the second and decisive expansion of *Corylus avellana* at Loch Cleat. The pollen data from Suarbie and Loch Cleat suggest that hazel populations are likely to have stabilised in northern Trotternish at *c*8,950 BP. The Digg profile provides a slightly later date of *c*8,800 BP for an initial peak in *C. avellana*, though this might be skewed by a strong local pollen signal from *Betula* growing close to the core site.

In the absence of radiocarbon dates for the intertidal peat at Clachan Bay, it is difficult to place inferred vegetation changes within a regional framework. The relative sea-level changes identified by Dawson (see Section 7.2) suggest that the peats were deposited at some point between *c*9,500 and 8,500 BP, and the restricted pollen assemblage, with evidence for a possible *Corylus avellana* rise, supports this. The lithic flake from the site (see Section 2.2; Hardy & Wickham-Jones 2002) is not readily dateable, but is assumed to date no later than the inferred cessation of intertidal peat accumulation around 8,500 BP. The pollen stratigraphy indicates the probable role of *Corylus* and *Betula* in forming a canopy on the drier soils, with willow in wetter habitats. The sedges (Cyperaceae) are assumed to be growing on the peat surface and the continuous frequencies of *Artemisia* pollen probably signify the growth of mugwort on nearby wasteland.

8.1.5.2 The eastern shore

The early Holocene pollen assemblages from Loch Maree (Birks 1972), Loch Clair and Loch Sionascaig (Pennington & Lishman 1971; Pennington *et al* 1972) are characterised by high values for Juniperus pollen. This reveals the affinity of these sites with those from the more continental Eastern Highlands (Birks 1970) where juniper is still a common pinewood associate today. The coastal fringes of Wester Ross probably suffered a greater degree of exposure in the early Holocene than the mountainous hinterland, and for this reason the typical succession of *Poaceae-Empetrum-Juniperus-Betula-Corylus* probably bore more resemblance to parts of Skye.

The acid soils which prevail on the Torridonian sandstone in Applecross and Torridon suggest that the site with the best analogy for these edaphic conditions on Skye is Loch Ashik (Birks & Williams 1983; Walker & Lowe 1990). The south-easterly location of Loch Ashik also provides further support for comparison, but its sheltered aspect should be borne in mind, and possibly favoured the development of woody taxa (Walker & Lowe 1990). Birks and Williams testify to the early development of birch-hazel woodland around Loch Ashik, but this may have much to do with the south-easterly location. Birks (1989) assumes that a corridor of migration must have existed along the Inner Sound to allow early colonisation in eastern Skye and the far north.

8.1.6 Discussion: the holocene woodland phase – *c*8,950–5,000 BP

8.1.6.1 General woodland development in northern Trotternish

The dominant arboreal taxa at all sites are *Betula* and *Corylus avellana*, but the relative abundance of these two taxa, and their changing frequency during this period, differ between sites. Birch reaches its early Holocene peak around Loch Cleat during the expansion of hazel in LPAZ CLE.IIa. (*c*9,210–8,960 BP). Subsequent to this, hazel expands more gradually until reaching a peak frequency of 46% TLP at *c*8,060 BP, consolidating its position as the principal canopy-former in the early Holocene woodland around Loch Cleat.

The situation at Digg and Suarbie is less easily interpreted, mainly because of the difficulty of distinguishing local from extra-local pollen inputs in peat profiles. Assuming that *Corylus avellana* pollen always originates from beyond the peatland under investigation, it seems likely that hazel was not the principal woody taxon around Suarbie at any point in the early Holocene. The surrounding soils must have formed from the same base-rich Tertiary extrusive rocks as further north, so why is hazel less well established? This could be a result of one or a combination of three or more factors:

i. the vegetation at the core site is consistently restricting the input of extra-local pollen
ii. the single peatland mass from which the core was taken was already large enough to exclude hazel from the 'local' pollen catchment
iii. the entire hinterland was dominated by either blanket bog, as today, or numerous discrete peatland mesotopes supporting a predominately acidophilous vegetation

Periods of *Betula* superiority at Digg can more easily be ascribed to incursions of birch onto the bog surface, and hazel is almost certainly the principal arboreal taxon growing in the area throughout the early Holocene.

At Loch Cleat the peak in *Corylus avellana* at *c*8,060 BP is followed by a steady decline to a minimum of 20% TLP by *c*7,350 BP. In contrast, *Betula* gradually increases over this period and continues to increase until becoming the dominant woody taxon in northern Trotternish by *c*5,000 BP. This is not the case at Digg until *c*5,600 BP, perhaps reflecting the abundance of steep, unstable ground in the vicinity, where mineral leaching and peat formation are inhibited and new habitats are created by mass movement, favouring the continued dominance of hazel.

The steady replacement of *Corylus avellana* by *Betula* in the pollen assemblage is perhaps not a reflection of an actual decline in hazel around Loch Cleat, but an artefact of decreasing pollen production in *Corylus* as the birch canopy increases the level of shade, perhaps at a slower rate here due to the exposure and marginal habitats available for woodland (Anderson 1973). Similar patterns are evident at other pollen sites in marginal locations in western Scotland, such as Lochan na Beinne Bige on Lewis (Lomax 1997; Edwards *et al* 2000). It is possible that hazel could be decreasing in actual terms however, perhaps as a result of climatic deterioration linked to the 8200 cal BP event (Alley *et al* 1997; Alley & Ágústsdótir 2005; Rohling & Pälike 2005) and, after *c*7,000 BP to the onset of wetter and perhaps stormier conditions (Ballantyne 2004). This does not account, however, for the apparent contraction of *C. avellana* prior to this date and other factors may be playing a part here. Fluctuations in the pollen of *Myrica gale*, which is included in *Corylus avellana*-type, may be influencing the hazel profile. Human agency may also be responsible for the decline and this will be discussed later.

Irrespective of this gradual shift in the composition of dominant arboreal taxa in the early Holocene woodland around Loch Cleat, the representation of tree and shrub pollen generally increases after *c*7,350 BP, reaching a combined peak of 91% at *c*5,050 BP. This confirms Williams' (1977) findings that birch-hazel woodland dominated much of northern Trotternish during this time as it did many other areas of the Hebrides (Edwards & Whittington 1997).

8.1.6.2 Woodland development on the eastern shore of the Inner Sound

The expansion of woodland on the coastal fringes of Wester Ross was probably broadly similar to that on Skye, except for the suggestion that hazel might have colonised the Wester Ross coast before 9,500 BP. Unsurprisingly, *Ulmus* seems to have spread more quickly on the mainland than the Inner Hebrides, and is judged to have colonised eastern Applecross, eastern Skye and the Morar Peninsula by *c*8,500 BP (Williams 1977; Birks & Williams 1983; Birks 1989). *Quercus* on the other hand is not considered to have ever maintained a significant presence north of approximately Kintail, though fragmented oak stands do exist today at Coille Mhor on the Lochalsh peninsula, and around Edrachillis Bay in the far north-west. Considering this and the marginally less exposed location of the eastern shores, it seems reasonable to suggest that both oak and elm were better established here than on parts of Skye at equivalent latitude.

The colonisation of Wester Ross by *Pinus sylvestris* (Scots pine) is more contentious, particularly given the persistence of semi-natural pinewood at Shieldaig at the present day and the suggestion that pine may have originated from a refugium in this region put forward by Huntley & Birks (1983). In spite of the obvious early colonisation of the hinterland recorded by Birks (1972), Pennington *et al* (1972) and Kerslake (1982) at before *c*8,000 BP, *Pinus* is not detected in significant quantities at Loch Coultrie, just north of the head of Loch Kishorn, until after *c*6,000 BP (Birks 1989). This suggests that the domination by pine of the Shieldaig area might be a mid-Holocene phenomenon, associated with the brief expansion in eastern Skye after *c*4,600 BP.

Alnus glutinosa appears to have colonised much of western Scotland in the centuries prior to *c*6,000 BP, and the eastern shores on the Inner Sound are unlikely to have differed.

8.1.7 Discussion: Mesolithic human impact in the pollen record

8.1.7.1 Human impact during the transition to woodland

The first possible indication of human interference with the vegetation occurs during LPAZ CLE.Ic (*c*9,740–9,490 BP), when an expansion in *Alnus glutinosa* occurs in association with increases in *Pteridium aquilinum* and *Corylus avellana*, but it is of doubtful validity. Climatic and stratigraphic explanations for this phase have been discussed above, and the suggestion that anthropogenic burning may have encouraged alder by increasing run-off and expanding mineral wetlands (see Smith 1984; Chambers & Price 1985; Chambers & Elliott 1989; Hirons & Edwards 1990), and encouraged bracken by disturbing soils and reducing woodland cover was rejected. There is no increase in the C:P curve to suggest a rise in the incidence of burning. The lack of dated evidence for a Mesolithic presence anywhere in Scotland at this time casts further doubt on the likelihood that this episode represents human impact.

The colonisation of hazel in the British Isles, and whether its notable expansion prior to that of other thermophilous arboreal taxa was precipitated by Mesolithic interference or climate change, remained a contentious issue for several decades (Smith 1970), but present thought very much favours a climatic explanation for this phenomenon. High microscopic charcoal values coincident with the *Corylus* rise have been noted in a number of pollen diagrams outside Scotland (Edwards & MacDonald 1991), and Huntley (1993) puts this down to relative aridity of the British climate around this time. More recently, Tallantire (2002) suggested that hazel, already identified by Huntley as possessing greater toleration of climatic extremes than other tree taxa, may have been present before the expansion, but was not able to produce significant quantities of pollen until a thermal threshold had been reached.

Besides a fairly marked but short-lived peak in the C:P curve for Loch Cleat at *c*8850 BP, there is little evidence of increased burning in northern Skye coeval with hazel expansion, and the charcoal record for the phase of decisive hazel increase at Loch Cleat is characterised by the sparsest charcoal representation in the profile.

8.1.7.2 Broad scale human impact during the phase of woodland domination

The microscopic charcoal record for Loch Cleat during this period is relatively stable, remaining at what could be considered 'background' levels (Clark 1988). The exception to this occurs after *c*8,150 BP, when a series of isolated peaks in microscopic charcoal continue until a pronounced dip in charcoal fortunes at *c*6,900 BP. These highs in charcoal are possibly referable to a regional increase in microscopic charcoal in northern Scotland identified by Tipping (1996), who suggests a shift in the climatic regime to increased aridity which would encourage the natural burning of woodland (Bradshaw *et al* 1996; Brown 1997). There is nothing in the pollen record here to suggest management of woodland with fire.

The relatively high, stable charcoal values recorded at Digg after *c*7,950 BP is interpreted here as representing extra-local charcoal input as the bog becomes more open. The C:P curve suggests that more than 'background' levels of microscopic charcoal are entering the basin, and in the absence of evidence for disturbance in the pollen record, it may be that domestic fires from local settlement sites are responsible – the Mesolithic site of An Corran is only 2km distant across the bay and other potentially early sites were located by SFS around Staffin Bay (see Section 2.2).

8.1.7.3 Local human impact during the phase of woodland domination

The first possible instance of human interference in local vegetation occurs at Suarbie in the basal sample, where Lactuceae (dandelion group) pollen dominates at *c*9,150 BP, but again it is of doubtful significance. The assumption would be that the substrate has been disturbed, encouraging the spread of weed taxa (Behre 1981; Brown 1997; Davies & Tipping 2004). No microscopic charcoal was detected, however, and the age and associated taxa suggest that the inferred disturbance is a natural phenomenon. Supporting this is the fact that the basal sediments are more minerogenic, implying instability in the substrate, and encouraging the better representation of robust palynomorphs like Lactuceae.

The next phase of possible human impact occurs at Digg from *c*8,800–8,350 BP. This concerns high charcoal values, rising from negligible levels, which suggest a local increase in burning (Simmons & Innes 1996a & 1996b). The attendant changes in the local vegetation are very difficult to interpret, as changes in the vegetation on the peat surface probably affect the recruitment of both pollen and charcoal. The sustained charcoal maximum on its own however, is a convincing argument for localised non-autogenic burning, particularly given the dearth of charcoal directly prior to the increase (see Edwards 1990). The motives of those responsible for these proposed burning episodes remain obscure.

The disturbance episode coinciding with a peak in microscopic charcoal dated to *c*8,350–6,850 BP at Suarbie is perhaps the most convincing evidence for human interference in the local environment in this study. Several items of circumstantial evidence support the argument for woodland management, including the high charcoal maximum, a drying of the bog surface, a general expansion of herb taxa and the presence of taxa associated with disturbance. The interpretation favoured here is that a brief interlude of fire management took place, possibly to encourage game if not simple woodland removal.

8.1.8 The Mesolithic-Neolithic Transition

Typical indicators of an agricultural presence in pollen assemblages, such as cereal-type and *Plantago lanceolata* pollen, have been used to demonstrate possible precocious pre-elm decline pastoral management further south (Edwards & McIntosh 1988; Edwards 1989). However, there is little to indicate an early beginning to the Neolithic in the literature for the west of Scotland. Sheridan (2000) suggests that the advent of farming may have been an intrusive event that took place at an early date, based on the pottery comparisons from apparently early levels at the chambered tomb at Achnacreebeag, Argyll (Ritchie 1970), but this interpretation has been questioned by others (Thomas 2004), and it has been suggested that the Mesolithic continued until *c*5,000 BP, despite the possible detection of cereal pollen on Islay as early as 5,470 BP (Edwards & Berridge 1994).

The earliest environmental evidence for the beginnings of the Neolithic on Skye is a phase of woodland clearance at Loch Meodal dated to *c*5,200 BP (Williams 1977; Birks & Williams 1983). *Plantago lanceolata* is first detected at Digg and Suarbie at *c*5,230 BP, but not until *c*4,750BP at Loch Cleat, which is unusual given the regional pollen input at the latter site and the evidence for woodland clearance almost three centuries earlier. The elm decline itself is perhaps visible only at Loch Cleat, with *Ulmus* values falling after *c*5,050BP. The incidence of *Plantago lanceolata* at Suarbie and Digg is associated with increases in microscopic charcoal at both sites and an expansion of heath taxa at Digg, but no sites display convincing evidence of actual woodland clearance.

The post elm decline rise in charcoal is quite different from the charcoal decline seen at many sites (Edwards 1988 & 1990; Edwards & McIntosh 1988; Simmons & Innes 1988; Tipping & Milburn 2000). Apart from signifying an expansion in human populations during the Neolithic, it may be denoting a low level of landscape impact around the sites presented here during the late Mesolithic.

8.2 The environment of the Applecross Peninsula coastal fringe, present and past | Robert Shiel with Andrew Stewart & Angi Silver

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports. From here you can download the file 'Shiel,_Environment_and_soils_of_Applecross_Penninsula.pdf'.

8.2.1 Introduction

The Applecross peninsula was visited on a number of occasions during the course of the project in order to record present vegetation and soil conditions in the hope that these might throw light on the environmental history of the area. Settlement along the peninsula appears to have been restricted through time to a narrow elevational band, which the topography has confined to within about a kilometre of the modern shoreline. Exploitation of the inland areas is likely to have been limited to seasonal grazing and hunting. This Section therefore concentrates on the coastal fringe. The climate, geology, soils and vegetation of the present day are all examined and the final discussion looks at the changes within these over the Holocene.

8.2.2 Climate

There is no meteorological station on the westward facing side of the Applecross Peninsula and therefore data has been taken for Kinlochewe at 25 metres above sea-level (masl) (see Table 184, below).

Table 184

Month	Max Temp (°C)	Min Temp (°C)	Days of Air Frost	Hours of Sunshine	mm of Rainfall	Rainfall **days ≥1mm**
Jan	6.7	0.6	12.0	18.0	283.5	21.0
Feb	7.2	0.7	10.5	46.0	212.8	17.4
Mar	8.9	2.0	8.2	64.2	226.8	20.5
Apr	11.3	3.1	5.7	101.1	114.9	16.0
May	14.9	5.5	2.3	147.3	94.0	13.7
Jun	16.6	8.2	0.1	124.5	103.8	14.4
Jul	18.3	10.4	0.0	112.8	98.9	15.6
Aug	18.1	10.1	0.0	108.8	128.5	16.3
Sep	15.4	8.0	0.3	81.6	205.4	18.8
Oct	12.4	5.6	2.2	52.4	234.7	21.1
Nov	8.9	2.7	7.5	23.7	287.5	21.4

Dec	7.4	1.4	10.8	14.0	287.1	21.7
Year	12.2	4.9	59.6	894.3	2277.8	217.9

Table 184: Climate averages for Kinlochewe (25 masl) 1971–2000

Because of the proximity to the sea, winter minimum temperatures at Applecross are probably higher and frost less frequent than those recorded in Table 184 (above), but maximum temperatures will be lower. Tiree has higher minimum and lower maximum temperatures with fewer days of frost and rain, but it is not backed by the large massif of Beinn Bhan (896m). The growing season in Applecross is long, but there are few really hot days and many rain days, even in summer. The soil remains wet for most of the year. The whole of the peninsula is exposed to the prevailing wind. This area is not well suited to ripening seed, but it is suited to the production of green vegetables. For humans the major concerns are to keep warm and dry. The availability of drinking water is unlikely to have been a problem even in the driest years. Outside the Applecross Glen the land grades steeply uphill with a resultant decrease in temperature and increase in rainfall away from the coast. The Applecross Glen, and the narrow areas of raised beach to the north and south of it, are the only substantial areas of land with a less extreme climate and thus are likely to have been attractive for settlement throughout the Holocene. Within the Glen frost may be problem throughout the year.

8.2.3 Geology

The Applecross peninsula consists of a massive exposure of Torridonian Sandstone, which extends to both the north and south towards Gairloch and Skye respectively, but is cut off from them by the sea lochs: Loch Torridon and Loch Carron. These sandstones were laid down about 770 millennia ago as erosion occurred from a large landmass in the position of modern northern Skye and Lewis and Harris (Johnstone & Mykura 1989). The rock is an arkose and was laid down under fluvial conditions. It shows strong current bedding and a great deal of local variation. From Applecross southwards it is known as the Altbea formation, while to the north it is the Applecross formation. Both are described as fine to medium grained pale red sandstones (Phemister 1960). The cementing agents and mineral composition of these particular rocks have not been well studied, though examination of local caves suggests that calcium carbonate may be present in some of the deposits as it was observed on cave walls as flowstone. Phemister (1960) does recognise the presence of calcareous material in the Altbea formation. Around Applecross village and in the Applecross Glen there are small outcrops of Triassic and Jurassic rocks. These include limestones and further reddened sandstones. None of these rocks have been subject to major earthmoving forces and consequently retain their original near-level stratification.

The whole area has been exposed to glacial processes, which have deposited a thin and patchy till; this outcrops mostly to the north of Applecross (Geological Survey 1954). Over much of the rest of the area there is either sandstone exposed at the surface or a covering of moraine. The moraine fields vary greatly in stoniness and have a very uneven surface of small rounded knolls. A considerable area is covered in postglacial peat, but this is thin away from the depressions and at lower elevations it would mostly class as a humose layer. The massif to the east prevented movement of ice from other regions across the peninsula so that most of the till and moraines are of local origin from the Torridonian series. One glacier did come down the Applecross Glen, and this may have spread some of the carbonate-rich sediments across the land between Applecross and Sand. The main glacial flow, however, was from south west to north east (Anderson & Dunham 1966). There is a considerable area of alluvium surrounding the Applecross River and this overlies part of the extensive raised beach. Raised beach formations are also extensive from Cuaig to Sand, but they are patchy elsewhere. Glacial and postglacial deposits cover much of the flatter, low-lying land.

8.2.4 Soils (*with Andrew Stewart*)

The typical soil that would be expected on sandstone is a podsol, though in such a wet climate (see Table 184, above) humic stagnogleys might be expected on slopes with peat in depressions such as Applecross, or by the main road past Sand (Glentworth & Dion 1950). However, it has already been noted that many of the sandstones here appear to be fine textured and there is a thin cover of boulder clay (till) over part of the area, hence a wider suite of soils typical of upland conditions (Askew *et al* 1985) might be expected. On flat areas, blanket peat would form and in depressions, a basin peat. In areas of pan formation, humic stagnopodsols would also be found. The limestone area will have more eutrophic soils, which may range from rendzinas on the slopes through brown earths to, on flatter areas or where there is a thicker cover of till, stagnogleys. The soils of the area have been mapped at 1:250 000 scale (Bibby *et al* 1982) but this only provides a low resolution.

It was not possible to make a comprehensive survey, but the soils were examined at various points along the western edge of the Applecross Peninsula from Cuaig in the north to Uags in the south (below). In addition, land use and modern vegetation were described for each location. As the survey was not comprehensive, no map has been created of the soils (but see Ordnance Survey Landranger map number 24 for the general locations). As the general description of vegetation took place it became clear that the range of species was, in many cases, typical of relict woodland and so a more detailed survey was carried out in various sectors, predominantly in the numerous remaining areas of unplanted deciduous woodland (see below).

8.2.4.1 Cuaig to Sand

Between these two villages the rock is all Applecross formation of the Torridonian sandstone and it has been patchily covered by various glacial and postglacial deposits including raised beach, till, moraine, alluvium, blown sand and peat.

8.2.4.1.1 Cuaig (NGR: NG 705 577)

The settlement lies within the moraine deposit area but the large stream, Abhainn Chuaig, that drains from Croic Bheinn to the south-east has deposited much terrace alluvium and this is described separately. North east of Cuaig in the stream zone, (NGR: NG 706 578), a peat bog is present, thicker than 1m in places with humic sands on the slopes rising away from the flatter stream area. In the area north of Cuaig, west of the chapel ruin, a basin holds humic sands and on the terrace rising immediately to the north-west, a soil (NGR: NG 706 577) shows properties of being buried. This is possibly a buried podsol consisting of a layer of bleached sand underneath 70mm of humus. The soil above the humus is modern cover sand. Much of the vegetation is heather or rough grazing. At NGR: NG 702 576 south-west of Cuaig, still within the moraine landscape, there is some evidence of stone clearance in the form of a low stone wall. This site is almost level, approximately 30m wide with a stream running through the centre. The upper horizon, 200mm deep, was a humic sandy loam overlying a sandy silt loam.

8.2.4.1.2 Abhainn Chuaig (NGR: NG 705 585 to 716 567)

This stream flows north-east into Cuaig Bay (Ob Chuaig), running through a moraine field and undifferentiated drift. Sand accumulation was observed in the form of alluviation and it is possible that this area has experienced both washout and accumulation of sand due to climatic and seasonal changes since the last glaciation; this could have resulted in the buried soil described above. Another buried soil was found on the floodplain area. 200mm of sand lay over 200mm fibrous peat, possibly phragmites, which in turn covered about 400mm of amorphous 'black' peat. This build-up is likely to have occurred in relatively recent times given the depth and freshness of the material. Deep peat areas (greater than 1m deep) were common in hollows and depressions. Deep sands,

Illus 557: Sands deposited by the Abhainn Cuaig

several meters deep, are found on the edge of the steep scarp edge (see Illustration 557, right). This sand lies within the undifferentiated drift geology which forms the basis for the surrounding soils. The only other area where deep sand occurred was in the moraine area to the east of the stream and floodplain. Grassland, rather than moorland, is present on the 'in-by' land including the current alluvial terrace around Cuaig, to the south of the stream. This grassland has been improved through grazing and shallow ploughing. The soil was found to have an Ah horizon on sand. The adjacent areas were covered by blanket peat and peat bogs, depending on the local relief and wetness, and the peat was commonly 0.5 to greater than 1m in depth. The woodland areas near to where the stream enters Ob Chuaig were found to contain shallow sands under peaty topsoil.

8.2.4.1.3 Cuaig to Callakile (NGR: NG 695 566)

West from the main road the landform comprises a steep slope that drops to a walled, moderate to gently sloping area and finally meets a steeper sloped shoreline. This plateau is probably the raised beach shown on the geological map. Inland, the boulder clay is largely covered by peat with some evidence for stone clearance. Much of the walled area is covered by 400mm peat which overlies coarse sand. Shallower peat exists on the gentle slopes, but, in localised depressions, coarser peat was found to a depth of 1m. A small area of grassland with Juncus, approximately 10m wide, was found 30m inland from the sea on a gentle slope.

8.2.4.1.4 Lonbain (NGR: NG 688 531)

Illus 12: General view of Lonbain. Back to Section 8.2.6.4.1

This site is adjacent to a previously crofted area. It consists of sandstone outcrops on the steeper slopes and boulder clay over much of the level areas but with alluvium along the stream that flows parallel to the coast. Along the coast the raised beach, described earlier, continues (see Illustration 12, right). Inland, 150m east on steeply sloping ground (NGR: NG 688 532) 300mm of sandy amorphous peat was recorded, overlying sandy loam to clay loam which in turn overlies weathered sand at 500mm. Areas which are level to slightly sloping range from humose sands to peat down to a depth of 300mm, with an underlying thin layer of sand on sandstone. Peat bog areas can be found in slight depressions. The adjacent old crofted area (NGR: NG 688 531) is of a similar geography with locally variable soils ranging from peat or humose sands over sand or sandy loam. Strip cultivation scars are evident and it is possible that some of the variability in soils is due to effects of past cultivation on drainage patterns.

8.2.4.1.5 Salacher (NGR: NG 687 511)

This area is situated where the parent material changes from a thin cover of boulder clay, to the north and east, to sandstone, running along the coastline to the west and south. Depressions are filled with peat. At NGR: NG 686 511, there is a depression adjacent to the main road holding a peat bog with over 900mm of peat overlying sandy loam. The surrounding area to the west and south was found to be solid sandstone, with boulder clay to the east. Indications of land management exist in the form of a wooden fence that cuts through this site, and joins with the wall that surrounds the woodland at NGR: NG 684 511. This point is on a steep slope of the first ridge to the west which runs parallel to the road and faces east. Small pockets of gleyed soil can be found here, with gleying at approximately 100mm deep. At NGR: NG 663 508, coniferous trees are growing and the soil was found to be a peaty ranker. Since gleying was found adjacent here, it is possible that the trees have influenced the formation of the ranker through processes such as increasing transpiration and improved ground drainage. This suggests that there could be similar soils in other locations where trees have been growing until relatively recent times.

The depression south and west of the trees (NGR: NG 684 507) holds a peat bog greater than 1m deep. The surrounding area running parallel to the coastline consists mainly of blanket peat with small pockets of peat bogs in hollows. The lower lying relief contained the deeper peat, and to the west and south west the peat became deeper, exceeding 1.6m. The ruins of two buildings near to the main road indicate past settlement. Towards the shoreline there is a low walled enclosure of beach pebbles and boulders, within which lies a shallow peat. Beach pebbles underlie this peat, which could indicate a past shoreline. On the 4° slope at NGR: NG 685 507 the soil comprises 300mm of humose bleached sand which overlies a coarse sandy loam, rising to the main road 30m south-east of the trees. This small area has a low wall, and stone clearance piles are present. The vegetation is moss and tussock grass with some Juncus and occasional heather. A few large stones are present on the ground surface. This area also slopes north towards a depression with similar vegetation and soils.

8.2.4.1.6 Sand (NGR: NG 682 506)

Sand comprises a substantial depression sheltered behind a low sandstone ridge to the west that is broken at this point. The depression is partly in-filled with blown beach sand but there are also raised beach deposits, sandstone outcrops and peat in the wetter areas. Thirty metres to the south of the archaeological investigation site, in a slight depression (NGR: NG 682 492), is a peat bog greater than 350mm depth. To the west and south, extending to the military base, blanket bog covers the raised areas while the depressions consist of peat bogs up to 550mm depth. Evidence of past peat cutting was found 50m from the base. Twenty metres south of the road linked to the military base, on the edge of a sandstone-sand ridge (NGR: NG 682 490), humose sand over sand can be found to a depth of 1m or greater. The vegetation here is bracken and grass; Oxalis is also present. South of the ridge, 150m north-west of the settlement remains (NGR: NG 682 489), Juncus and grass persist on 300mm of peaty sand overlying sand. This site slopes gently south-east and is noticeably wetter than could be caused by a spring line. To the east at NGR: NG 683 480, on gently sloping (~2°), south-east facing land, 50mm peat overlies humose sand and has a poor quality grassland vegetation. This area may be affected by increasing salt levels from the sea. There are settlement remains 50m south (NGR: NG 682 488) and here the vegetation is bracken with some grass and sporadic Juncus. This site lies on a slight ridge and the soil is again humose sand. Blown sand underlies a significant area of the archaeological excavation site at Sand. Visually the physical boundaries of this sand can be plotted approximately in line with the change in vegetation from heather to bracken and grassland. Oxalis was noted particularly to the east side of the blown sand area. Blanket peat and peat bogs cover the adjacent areas located on sandstone. Blown sand is now being deposited on the south side of Sand bay, indicating a change in the factors that have influenced the deposition patterns during soil formation at this site. When the site was revisited in 2003 this sand had largely disappeared, demonstrating its dynamic nature.

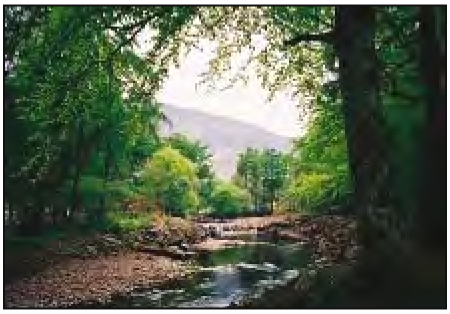
8.2.4.2 Applecross to Uags

This area is more complex geologically than that to the north. Around Applecross itself there are Mesozoic outcrops including limestones. Along the coast to the South of this is the Altbea formation of the Torridonian while further inland the Applecross formation continues. The whole area is variously covered by a range of superficial deposits similar to those to the north. Applecross bay contains a substantial undifferentiated terrace with large areas of alluvium overlying the Liassic limestone. There is boulder clay fringing the valley edge above the terrace and together with the Mesozoic sediments south to Camusteel this forms the largest low-lying area south of Cuaig.

8.2.4.2.1 Applecross (NGR: NG 713 442)

There was no sampling on the Mesozoic red clays, sandstones and conglomerates. The area examined was on the Lias limestone (NGR: NG 713 443). This site has a variable cover of moraine. The location is gently sloping and the soil comprises 500mm sandy loam over sandy clay loam. The vegetation is clover grassland, grazed by sheep and cattle. The surrounding landscape has varying slopes from gentle to steeply sloping to the east and south east. It was noted in conversation with the farmer that there are locations on this land where, during heavy rainfall, water disappears from the surface in to natural drainage voids. The farmer also said that the soils on the limestone did not suffer from traffic-ability problems even with seasonal wetness. At NGR: NG 713 442, adjacent to a dried up streambed, the soil is sandy loam to 300mm or greater, and there is evidence of iron movement with oxidised red iron mottles. This indicates that water movement has occurred down the profile causing iron movement with subsequent oxidation after water dispersal. Large trees run along the field boundaries, maple, silver birch and possibly hazel, with a plantation of coniferous woodland to the north east. This was the only substantial farm seen with good quality, well-managed, cultivated land. In the mature beech woodland at NGR: NG 719 455, near the bottom of the slopes of the limestone, is an acid brown earth of sandy clay loam which sits on top of colluvial coarse material. The woodland is undoubtedly planted and the understorey species – including bluebell and primrose – are typical of an amenity area.

8.2.4.2.2 Applecross Glen



Illus 558: Mixed woodland along the Applecross River. Back to Section 8.2.6.4

The Applecross River enters the Inner Sound at Applecross Bay, north of the settlement of Applecross. The vegetation here ranges from rough grazing to mature mixed deciduous woodland and spruce plantations (see Illustration 558, right). The majority of the higher quality, but still coarse, grazing pasture lies on the flood plain area to the south and south-west of Hartfield. Remnants of cotton grass heads, small areas of Juncus and lady's smock (Cuckoo flower) were observed in this pasture. In the mature mixed woodland between the bay and Applecross house, wood anemone and bluebell were observed in abundance in a deer-fenced exclusion zone. The land surrounding the river comprises a number of soil patterns. Soils covering the immediate floodplain are generally sand to sandy loam. Blanket peat (200–400mm deep), and deep peats (up to and greater than 1m deep), cover much of the land rising away from the floodplain. Evidence of old drainage ditches and the presence of plantations indicate past land management which will have influenced the build up of peat within the river valley. Some of the shallower peats were observed to be sitting on sand or sandy loam soils within 200mm depth. Sands and gravels were observed in natural profiles in a number of places within about 70m of the river, particularly in the mid lower area east of Hartfield and in mid upper areas. The profiles generally have 200mm peat. No buried soils were found. Soil animal activity in the molehills indicates the presence of earthworms, though these were not widespread. Soil wetness is indicated by several molehills in the Beech woodland within 50m of the river, and in the grassland within 20m of the river south of Hartfield, as well as to the east of Hartfield under rough grazing Juncus vegetation. The latter area, a sandy clay loam, may be influenced by the glacial till.

8.2.4.2.3 Camusteel (NGR: NG 705 422) and Camasterach (NGR: NG 710 416)

The settlement of Camusteel lies on Applecross formation sandstone but a large area between the coastal ridge and An Glas-tulach is covered with moraine. At NGR: NG 705 426, on sandstone, blanket bog covers the area along the coastline to the west of the road. To the east of the road, the landscape changes to moraine with coarse sandy peat overlying coarse sandy loam on the slope, about 3°, facing east. On the opposing steeper slope, about 6°, facing west, the soil is sandy loam to the surface, with humose sandy loams on even steeper slopes. The ground was very stony, large to medium stones, but there were also molehills present indicating the presence of earthworms and the lighter soils are not particularly acid. This area is densely populated, much of the land is used for crofting and stone clearance cairns are common.

8.2.4.2.4 Ard-dubh (NGR: NG 706 408)

Ard-dubh lies on Aultbea formation sandstone which gives a rougher landscape. It is adjacent to a stone pebble beach and the surrounding land is covered by blanket peat, 300–700mm deep.

8.2.4.2.5 Culduie (NGR: NG 715 403)

The fields in front of this row of croft houses are gentle to moderately sloping on moraine and undifferentiated glacial deposits. The vegetation is essentially grassland which is heavily grazed by sheep. The soils are deep (700mm), humose sands.

8.2.4.2.6 Ardban (NGR: NG 700 397)

Illus 559: Birchwood at Culduie

An area of blown sand surrounded by Aultbea formation sandstone but with peat in the hollows. The inlet on the east side of the Ardban peninsula (NGR: NG 703 392) forms a depression through the landscape. This is only about 15m wide but it holds a soil with humose sandy loams. The vegetation is moss and Juncus with celandine nearby and pockets of woodland grow along the coastline with silver birch, oak and possibly rowan (see Illustration 559, right). The majority of the soils at NGR: NG 701 396 have formed on blown white sand formed from calcium carbonate-rich shells ($CaCO_3$). This has resulted in the formation of an alkaline soil, as indicated by the pH results (see Table 2, below), with 200mm humic sand over white (machair) sand. The vegetation is grassland and it is heavily grazed by sheep. White sand and shells are present in the small bay to the south of the Ardban settlement from which the soils extend. Away from the coastline, this area of sandy soil is surrounded on all sides by blanket bog and occasional peat bogs. Peat cutting was being carried out during the site visit.

Table 2

Location	Number of caves / rockshelters	Lithic scatters	Find spots	Shovel pitted raised beaches	Open Midden
Loch Torridon	12	3	2	4	
Loch Carron	17	3		3	
North Applecross	13		2		
Mid	17		1	3	3

Applecross					
South Applecross	25			1	1
Islands	53	11			
Trotternish	3	11	1		1
South Skye		2	1		4
Totals	140	30	7	11	9

Table 2: Survey sites by type and area (repeated from Section 2.1)

8.2.4.2.7 Toscaig (NGR: NG 713 385)

Illus 560: Birchwood near Toscaig

Much of this area is located on Aultbea formation sandstone with Toscaig itself located on the edge of a low raised beach. There is also an area of alluvium brought down by the River Toscaig from Coire Dubh. The land rises steeply to the west and east of Toscaig. Most of the area surveyed is covered by blanket peat and heather moorland, with small (~0.5m) silver birch saplings and bog myrtle (*Myrica gale*) found locally. Silver birch is found most commonly near rocks and rocky outcrops where peaty or organic layers were thinner (less than 0.4m), and in rock fissures. Parts of the Toscaig peninsula have been fenced off to reduce deer damage and help regenerate woodland (see Illustration 560, left). Anecdotal evidence from a local resident suggests that, although the regeneration scheme has only been going for five to six years, there is a distinct increase in the number of trees. This would tie in with the significant number of small silver birch saplings found at all elevations.

Illus 561: Reddened mineral soil at Toscaig with Birchwood in background

Localised small (<100m²) peat bogs are commonly found in depressions and where drainage lines are interrupted by gentler relief over the whole area. Depths are often between 0.5–0.9m, but occasionally greater than 1.6m. Larger areas of peat are also found, together with a significant area of raised bog. These deeper peats are commonly covered by sphagnum moss, some cotton grass, bog myrtle and lousewort. They are often surrounded by blanket bog, as at the edge of the short valley (NGR: NG 707 376) and organic soils, generally peaty loams, continue up the steep sides, particularly on the south-east facing slope where silver birch and oak woodland grows. Though most of the soils over the Toscaig area are generally peaty or humified, at least at the surface, mineral topsoils of particular interest are found near NGR: NG 710 383 (see Illustration 561, right). These are sandy loam to sandy clay loam soils set in colluvial material on exposed south to south east facing slopes. However, these soils are not found on or near other ridges and rocky outcrops on the same geology. This suggests that the geology at this location is an anomaly, and likely to be of localised influence. This ridge and its associated soils may be more base and mineral rich than the rest of Toscaig. Indications of these qualities include the presence of earthworms, a leatherjacket, a diversity of woodland plants and a patch of nettles (indicating soil fertility), which was found on the lower south facing slope. Earthworm activity indicates free drainage and a pH that is likely to be less acid. Previous pH analysis of soils from this site (see Table 185, below) confirms this with a pH of no less than five.

Table 185

Location	Depth (cm)	pH

Cuaig	0–20	4.6
Cuaig	20–30	4.6
Lonbain	0–20	5.1
Applecross	0–20	6.0
Applecross	0–20	5.7
Ardban	0–20	7.2
Ardban	20–30	7.4
Toscaig	0–10	5.0
Beach sand	0–20	8.2
Sand roadside	0–15	4.1
Sand roadside	15–25	4.3
Sand roadside	25–35	4.5

Table 185: pH of samples from Applecross peninsula; Back to Section 8.2.6.4.1

Given these seemingly more biologically active soils, in terms of meso-fauna, and potentially more fertile soils, it is likely that the soils and plant life further down slope are influenced by the quality of through-flowing water, thus increasing biological activity lower in the catchment area. Mid and lower moderate to steep slopes to the east and south-east of NGR: NG 710 383 tended to vary in wetness, and consequently ground flora changes occur, with flag iris in the wettest area of the woodland. Stone clearance indicates some form of past land management. At NGR: NG 709 381, 50m north west of the harbour in a north-west to south-east trending valley, the vegetation is moss, tussock grass and deciduous woodland, mainly mature silver birch. A peat bog, 500–700mm deep, is located here overlying 100–200mm of humose sand on sandstone. Lonicera and bilberry were found growing on the rising ground to the north-west, as was Oxalis, grading in to heather and bracken on the steeper ground rising north out of the valley. In a flat L-shaped basin (NGR: NG 709 383) is a peat bog to a depth of greater than 1m with a small lake to the north west. The ground rises to NGR: NG 709 385 where there is a moderately sloping (10°) south to south-west facing gully and the vegetation consists of a number of flowering plants including Oxalis, dog violet, celandine, primroses and grasses. Bracken is also common. The soil is a dark reddish brown sandy loam to sandy clay loam, 200mm thick, overlying coarse sandy loam.

Deciduous woodland is situated on most of the surrounding slopes and even on some of the more exposed sites (see Illustration 21, right). The steeply rising ground to the north and north-west has sandy loam soil approximately 300mm deep. On the hill top overlooking NGR: NG 709 385, the site is very exposed, with blanket peat dominating. However, a number of young silver birch grow here, approximately 0.5m in height. This area has a recently erected deer exclusion zone and it may be that the control of deer is aiding the regeneration of woodland.

Illus 21:General view of Toscaig

In a gully cutting through the Shalach peninsula at NGR: NG 685 377, from south east to north west between Loch Toscaig and the west coast is a raised peat bog greater than 1m deep. There is an inlet from the Loch to the south-east, which is rocky. In the transition zone between the peat bog and the rocky shore line the vegetation includes primrose, bracken, reeds and celandine. Silver birch and oak trees are present on slopes on the north side and on some of the east-facing coastline, with young silver birch growing sporadically over most hills. The majority of this very hilly landscape is covered by blanket bog to a depth of 200mm or more, with small peat bogs in depressions. There is evidence of old peat cuttings on the top of the hills to the south of this gully.

8.2.4.2.8 Uags (NGR: NG 724 350)

The site was visited briefly but, as the season was late, flowering was over and plant recognition difficult (see Illustration 562, right). The location is at the far south tip of the Applecross peninsula and is on the Torridonian Sandstone, which at this point dips more strongly. There is no substantial till or moraine in the area. As elsewhere, the soil consisted of thin podzolic soils over the sandstone whilst in hollows and on level sites thin peaty soils form.

Illus 562: Oakwood at Uags

8.2.4.3 Synthesis of soil examination

The soils are dominantly humose gleys with peat in hollows and on flatter areas. This accords well with Bibby *et al*'s (1982) examination which places the soils dominantly in the peaty gley (humic stagnogley) and peaty podzol with iron pan (humic stagnopodsol) groups. In agreement with these authors the soils on Mesozoic rocks are brown forest soils. Cultivation of the soils has disturbed the peaty top at many locations and this is now seen as a humose rich topsoil. On the areas where moraine is the parent material the soils are stonier, where till is present there is more peat, and the peaty horizons tend to be thicker on the gleys. The only deep peats found were in hollows and it appears that these have been wet centres from which the peat has spread out across land which originally had mineral soils. This process of engulfment of mineral soils is common and can easily lead to the view that the soils were formerly wetter than in fact they were. Without detailed radiocarbon dating within the peaty hollows, it is impossible to date the spread of peat and the associated wettening of the environment. Nevertheless, one can be certain that in the early postglacial the soils here were dominantly mineral to the surface and only after woodland clearance did the spread of peat became more widespread.

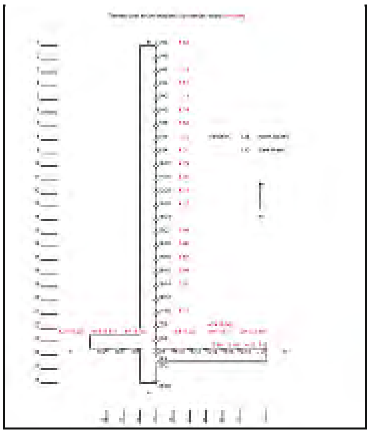
8.2.4.4 Soil pH Measurements

Samples were taken at a range of depths from the soils described above at Cuaig, Lonbain, Applecross, Ardban, Toscaig and Sand. In addition a sample of beach sand was taken from the foreshore at Sand. The soil samples for Sand are from a roadside profile on the uphill side of the Applecross to Cuaig public road 400m north of the road junction at Sand (NGR: NG 685 495). Samples were collected, and analysed, separately along transects A—B and C—D of the dig at Sand.

The samples were dried, the soil within them was mixed thoroughly and a sub-sample of 10g was mixed with 40ml distilled water, allowed to equilibrate for ten minutes and the pH measured with a glass electrode.

The pHs (see Table 185, above) are remarkably high considering the high rainfall (see Table 184, above), nutrient poor parent material of sandstone, and the presence of surface organic matter accumulations. It may be that some of the Torridonian sandstone has carbonate present as a cementing agent, as described above, but this remains to be confirmed. The lowest pH was on the roadside near Sand and though the pH was low throughout the profile here it did increase with depth, as expected. The increase in pH with depth would ensure that plant roots could easily reach soil of a more moderate pH. In addition, the rapid increase in pH with depth indicates that in the past the pH throughout the profile would have been considerably higher and would have supported a more eutrophic vegetation than that of today. Where there is any soil disturbance, as has occurred along the roadside due to the construction of the road, soil with a pH high enough for a wider range of species has been exposed and remnant woodland understorey species such as foxglove are commonly seen in these situations.

The beach sand has the expected high pH. The very obvious movement of this sand, noted in the bay at Sand, and blowing of it and sea water onto the area close to the shore has helped to maintain a higher pH environment than would be expected further inland. It is common to find that the plants along the shoreline are not only tolerant of some degree of salt spray, but also prefer a higher soil pH. There was no good evidence that this sand has affected the pH of soil other than on the foreshore. However alkaline spray drift from the sea is likely to have had an impact over the relatively narrow range from which samples were taken. None of the samples were from the deeper organic soil, in which low pH would be expected.



Illus 563: Sand – transect plan for pH analysis (soil sample locations, pH in red)

The samples taken from the dig site transects (see Appendix 32 & Illustration 563, archive version of the chart on p11 of report) varied in pH from 3.67 to 7.59. Twenty-five of the samples had a pH below 5.5, at which bone would disappear rapidly, and of these 12 had a pH below 4. There were also ten samples with a pH above 6; at this pH bone would be preserved well over a long period. The variation in pH within the dig site is due to the presence of acidic peat associated with some of the samples, the formation of this probably started soon after the site was occupied. In addition, the large amounts of crustacea and shells in parts of the midden have helped to maintain a higher pH. It does not seem that the mobile sand of high pH, seen in 2001 at the south end of Sand bay, has ever moved substantially to the north across the excavated area. In 2003 this sand blow had vanished.

The figure at the bottom of the Illustration shows the pH variation along the transect; all of the higher pHs are found close to the intersection of the two transects, at the point where the shell midden was deepest.

8.2.5 Vegetation (*with Angi Silver*)

Illus 564: Mature birch

The vegetation descriptions above indicate a wide diversity of flora, some of which suggests that there are relict native woodlands (see Illustration 564, right). As a result, a more detailed botanical survey was carried out, predominantly in areas of existing deciduous, apparently natural, woodland and also at Sand, where there was great interest in the possible presence of former woodland.

The woodlands are mainly linear in shape. Originally, it was intended to survey ten metre-wide transects of each woodland, but this was not always practical due to the steepness of the terrain and existence of narrow shelves or ledges of rock. The area was thus traversed wherever the terrain permitted. Most of the plants were identified to species level and the rest to genus. Obviously, a survey of this type is limited to the plants that are in evidence at the time of year (May in this case). As these are deciduous woodlands, however, most of the flora is spring flowering. The frequency of each species of tree is reported as a percentage of the total number of trees and the same for the understorey plants.

8.2.5.1 Locations

Surveys were carried out at the following locations:

8.2.5.1.1 Sgeir Shalach. NGR: NG 704 366

20–30m asl. A narrow inland gully about 800m long running approximately north to south. There was a rock face to the west with the flora on the eastern slope.

8.2.5.1.2 Toscaig 1. NGR: NG 707 370

20–40m asl. A strip of woodland about 800m long, running north to south, parallel to the coast south of Toscaig. Facing east. It was generally quite wet with a central boggy area of grass and sphagnum mosses.

8.2.5.1.3 Toscaig 2. NGR: NG 705 377

20–30m asl. On the north-east hillside of a wide valley about 1600m long running north west-south east inland, perpendicular to the Toscaig coast. This area was dry and very rocky and steep. Most of the flowering plants were on the lower part of the slope where more soil was present. Higher up there were mainly trees, mosses and lichens. There was no sphagnum present.

8.2.5.1.4 Toscaig 3. NGR: NG 707 377

30m asl. Woodland adjoining Toscaig 2, running north to south for about 800m, parallel to, but away from, the Toscaig coast. This was dry at the southern end becoming wetter towards the north. It was on several levels of rock ledges facing east. Species-poor compared to the other sites.

8.2.5.1.5 Toscaig 4. NGR: NG 708 377

20m asl. This wood is parallel to the previous one and adjoins Toscaig 2 at the southern end. It runs parallel to, but does not face the coast. About 800m long on rock ledges facing west.

8.2.5.1.6 Ardban. NGR: NG 704 395

0–20m asl. Running roughly north to south for about 800m. A steep rocky slope with a rock face at the top and the sea at the bottom. Mainly dry with almost no sphagnum.

8.2.5.1.7 Coillegillie. NGR: NG 702 387

20–50m asl. A T-shaped area of woodland. The north to south part, which was about 1600m long, was surveyed and was fairly flat with a stream and open grassy strips. The northern part was fairly dry but it got wetter to the south.

8.2.5.1.8 Toscaig 5. NGR: NG 709 382

10–50m asl. About 1600m long running SSW-NNE parallel to the road from Toscaig to the pier. There were some fairly large oaks here and some big hazels which looked as if they had been coppiced some time ago. There was also an old tumbled down stone wall. The whole place felt very ancient. There was lichen on everything. The southern end of the wood was quite open and flattish with a stream and boggy area with sphagnum, then going down a steep gully towards the north to a more species-rich boggy area at the bottom.

8.2.5.1.9 Sand area.

Plants were identified but no percentages were estimated.

Sand 1 By the road to the south of the car park NGR: NG 683 491 0–10m asl
Sand 2 Boggy coastal meadow NGR: NG 683 490 0–10m asl
Sand 3 Bank near car park, below rockshelter NGR: NG 683 492 0–20m asl
Sand 4 Outside rockshelter NGR: NG 683 492 10–20m asl
Sand 5 Near ruined house NGR: NG 682 489 0–10m asl

8.2.5.1.10 Cuaig NGR: NG 703 585

0–20m asl. A brief survey of a small strip of woodland north of Cuaig, opposite Reaulay. A steep slope parallel to and going down to the sea.

8.2.5.2 Species found

The number of species found and most common species is shown in Table 186, below. Birch is by far the most common arboreal species (see Table 187, below). Only at Uags (surveyed separately in October) and in the planted woodlands around Applecross are other tree species common or dominant. Birch is clearly able to regenerate freely when grazing is suppressed.

Table 186

Toscaig 1	17 species; birch, bracken, bilberry
Toscaig 2	22 species; birch, bracken, bilberry, wood sorrel
Toscaig 3	14 species; birch, bracken, northern bilberry
Toscaig 4	16 species; birch, bracken, northern bilberry
Toscaig 5	29 species; birch, bracken, tormentil, bluebell
Sgeir Shalach	12 species; birch, bracken, wood sorrel, sweet vernal grass
Ardban	23 species; birch, bracken, wood sorrel
Coillegillie	16 species; birch, bracken, wood sorrel, bilberry

Table 186: Applecross peninsula vegetation survey, number of species found and most common species

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Table 187

Tree species	%
Alnus glutinosa	1
Betula pubescens	92
Corylus avellana	1
Quercus petraea	2
Sorbus aucuparia	4

Table 187: Proportion of tree species averaged across all woodlands

A wide range of herbaceous species was recorded, of which bracken was the most common overall, but with considerable amounts of *Vaccinium* and *Oxalis* (see Table 188, below). Excluding grasses and mosses a total of 66 species was identified.

Table 188

Species	%
Hyacinthoides non-scripta	3
Oxalis acetosella	10
Potentilla erecta	6
Primula vulgaris	2
Pteridium aquilinum	21
Vaccinium myrtillus	10
Vaccinium uliginosum	2

Viola riviniana	3

Table 188: Most common herb species averaged over all woodlands

8.2.5.3 Comparison with previous documentation on Scottish woodlands

According to McVean and Ratcliffe (1962), most highland birchwoods fall into one of two categories: *Betuletum* Oxaleto-Vaccinetum (bilberry-rich birchwood) or *Betula*-herb nodum (Herb-rich birchwood). Bilberry and wood sorrel are two of the main indicators of the Betuletum Oxaleto-Vaccinetum type of woodland along with rowan, bracken, hard fern, tormentil and so on, all of which were found by the survey. McVean and Ratcliffe also include *Galium hercynicum*, (now called *Galium saxatile*) or heath bedstraw as a constant, and this was not found, perhaps because it does not usually appear until later in the season. The Betula-herb nodum differs in the virtual absence of *Vaccinium* species and the appearance of *Anemone nemorosa* (wood anemone) and *Conopodium majus* (pignut) which were not recorded by the survey. Wood anemone is a spring flowering plant, and should have been visible had it been present. It is thus possible to conclude that the woodlands surveyed were of the Betuletum Oxaleto-Vaccinetum variety.

A noticeable feature of the woodlands recorded was the lack of age structure. There were many mature trees, including some quite large and old specimens, as well as a lot of small seedlings in some areas, but almost no saplings or young trees. This could be due to past grazing by deer, in some places now prevented by fencing as described earlier. There were also many trees with multiple trunks, probably created by previous coppicing (see Illustration 565, right). There was no sign of recent management of any of the areas surveyed.

Illus 565: Pollarded birch

Illus 566: Woodland plants, including bluebells, at Sand

At Sand, which is without trees, several species were recorded which are normally associated with woodlands, such as bluebells, wood sorrel, dog violet, lesser celandine and primrose (see Illustration 566, left). This could mean that woodland was once present. It is possible that there has been woodland all along the coast from Cuaig to Toscaig at some time in the past.

The oak-rich woodland near Uags, was subsequently examined in the autumn (see Illustration 567, below right). It appears much larger on the 1899 Ordnance Survey map used as the base for the geological map (Geological Survey 1954) than on the modern map. Today, oak woodland (estimated 10–13m tall) grows from the coastal edge, up the stream gullies, adjacent to and rooted into sandstone rock. Very occasional silver birch and rowan are also found. The ground vegetation is generally moss, bracken and sedges rising to heather on the crags. Occasional wild mint, bramble, fern, common blueberry and primrose were also recorded. This site was formerly inhabited so that care must be taken in drawing conclusions as to the origins of the woodland. Nevertheless, it is clear that oak can flourish in the area, in this case below about 50m OD. Oak was noted in the other woodlands examined but it was uncommon (see Table 187, above). As Uags is exposed to uncontrolled sheep grazing it is not possible to assess the potential of the oak trees to regenerate from seed.

An examination was also made of the woodlands on the limestone near Applecross. An area of sycamore and oaks included tormentil, wood sorrel, wood anemone, celandine, bluebell, primrose and nettles. Buttercups, foxglove, bracken, bramble, moss, grass, violet and Juncus were found in an area of mature beech trees. Adjacent to this was an area dominated by silver birch and rowan on

Illus 567: Oak-rich woodland at Uags

moister more humose top soils, with Juncus, moss and grass vegetation. Heading down slope towards Applecross House, younger woodland occurred with beech, silver birch and chestnut, and ground flora including bluebell, primrose, and dandelion. On a lower managed area near the house one *Araucaria* (monkey puzzle), horse chestnut, holly, sycamore, beech, bluebell, fern spp, oxalis, and rhododendron occurred. In woodland to the south of Applecross house on gently sloping land (~2°), silver birch, rowan, larch, beech, rhododendron, foxglove, bramble, bluebell and holly occurred.

8.2.6 Discussion

The whole area is striking for a general lack of peat and the presence both of rock and soil close to or at the surface. In addition, there is a flora which is typical of soils that are drier and less acid than might otherwise be expected. This is not to say that peat does not occur, most of the hollows and flat areas are filled with peat to one metre or more depth, but in many places mineral material is found usually within about 500mm. This indicates that, in the past, the environment was able to support a wide flora and fauna, and would have been relatively productive, given the long growing season at low elevations. In the following discussion, the acidity, wetness, soil development, flora and the environment are considered both with relation to human occupation through time and to the preservation of archaeological artefacts. Although described separately, it is obvious that these factors are strongly interlinked and that they have a considerable cumulative effect.

8.2.6.1 Soil Acidity

As it is near to the coast the area already receives two main inputs of base-rich material: sea spray and shell fragments. Strong and frequent winds mean that there is a considerable carry of sodium, potassium, magnesium and calcium inland. These conditions would commonly maintain the flora associated with a eutrophic environment, as elsewhere on the coast, but here the extent of this aeolian effect may be more pronounced. There is also considerable exposure of shell sand in the bays. The sand is less mobile than the spray but it has certainly had an impact on low-lying areas around the inlets perhaps over as much as 50m. In addition to these sources, parts of the sandstone contain an unusually large amount of bases, so that these three factors combined may be responsible for maintaining the pHs noted in Table 185 (above) and Illustration 12, (above). An active vegetation which transpires large amounts of water and takes up base nutrients from depth has also helped to develop this environment. The vegetation discussed below certainly suggests that until relatively recently a rather better suite of soils than now visible has been preserved; even today the soils are relatively good for the location.

8.2.6.2 Wetness

The immediate post-glacial rainfall is usually considered to have been somewhat lower than that today, though from the beginning of the Atlantic period, about 5,300 BC, rainfall increased to at least as much as present. The lower rainfall coupled with the suggested deciduous woodland vegetation discussed below would have provided a much drier environment; even today the planting of coniferous vegetation leads to substantial drying of the soil. For as long as the deciduous woodland persisted, the soils and environment would therefore have been drier, and there would also have been collateral benefits from better shelter and fuelwood supply. Before peat development, the mineral soils would have tended to shed water rapidly, also leading to a drier environment which warmed up quickly in the spring. As peat spread the water held in the organic matter would make the whole area cooler and damper.

8.2.6.3 Soil development

The lack of widespread podsolisation of soils developed from sandstone under high rainfall was initially surprising, but in view of the higher pH and presence of deciduous trees even today on areas where grazing animals are restricted, it seems that for much of the postglacial period past soils have comprised acid brown earth on slopes. In flat areas and hollows, gleys and peats began to develop from an early date, though much of the gleying could post-date woodland clearance. As acid brown earths, probably with some gleying, there would have been a thick humus mat under woodland conditions, once the woodland was cleared this would rapidly transform into the incipient humose horizon or thin peat as seen today. The localised peat deposits with thin organic tops on other soils, represent the end point of soil evolution and the organic matter would have been less extensive in the past. Care in generalising this argument is, however, essential as, from the clearance of the woodland, peat cutting must have limited the extent of the peat deposits today. The anthropogenic effects need careful interpretation, but the properties of most soils today are a function of human interference.

8.2.6.4 Vegetation (*with Angi Silver*)

It is debatable whether oak woodland was ever extensive in the area, though a wide range of tree species can clearly tolerate the present conditions on the more eutrophic soils – and these were more widespread in the past (see Illustration 558, above). Even today some of the species can propagate freely when grazing livestock are excluded. The widespread presence of understorey species away from human habitation and modern woodland indicates that woodland was formerly much more extensive at low altitudes. It must be concluded, therefore, that all of the area under consideration had deciduous woodland cover at some time during the Holocene. This is supported by other specialist studies (see Sections 3.15 & 8.1) and it has major implications for the archaeological interpretation of the environmental conditions and resources in the area.

Files cited in the text

All files start from ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > …

… > Documents > Final Reports > Shiel,_Environment_and_soils_of_Applecross_Penninsula.pdf

9 Retrospective Discussion | Karen Hardy & Caroline Wickham-Jones

The archive version of the text can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Final Reports. From here you can download the file 'W-J,_SFS_Final_discussion.pdf'.

9.1 Introduction

Illus 568: SFS survey work in progress. Much of the work had to be carried out by boat

Scotland's First Settlers (SFS) was set up to look for evidence of the earliest foragers, or Mesolithic, settlement around the Inner Sound, western Scotland. Particular foci of interest included the existence and nature of midden sites, the use of rockshelters and caves, and the different types of lithic raw material (including especially baked mudstone) in use. In order to implement the project a programme of survey and test pitting, together with limited excavation was set up (see Illustration 568, right). Along the way information on other sites, both Prehistoric and later was collected, and this has also been covered in this report. In addition, a considerable amount of information on the changing nature of the landscape and environment has been presented. Fieldwork has finished, data has been analysed. There will always be scope for further work (and this will be discussed later), but the first stages of the project have definitely come to a close. How well has it achieved its aims?

9.2 The major achievements of the project

9.2.1 Fieldwork

SFS fieldwork was conducted over a period of five years between 1999 and 2004. During this time the entire coastline of the Inner Sound together with its islands was walked. Survey comprised a range of techniques including walkover and surface recording, test pitting and shovel pitting both of caves and open air locations. The topography and the seascape vary considerably and survey and testing methods were adapted to accommodate this.

One hundred and twenty nine new archaeological sites were recorded, 36 of which were shovel pitted and 44 test pitted. Although SFS began as a Mesolithic project, sites from other periods were also identified and knowledge of human occupation across the survey area, but most notably in the Applecross peninsula and the Crowlin islands, can now be viewed from a genuinely multi-period perspective from the earliest times up to the present day. Survey work has also served to highlight the broad nature of the sites which included many caves and rockshelters.

9.2.2 Post excavation

Specialist analysis included detailed environmental work (Austin, Cressey, Green & Edwards, Shiel), early Holocene sea-level fluctuation and geomorphology (A Dawson, S Dawson), a review of the radiocarbon dates (Ashmore & Wickham-Jones), artefacts (Ashby, Clarke, Hardy, Heald & Hunter, Isbister, MacSween, Wickham-Jones) and ecofacts (Milner, Mulville, Parks & Barrett, Schulting), pumice (Newton), and geophysical work (Finlay & McAllan), all of which set the human record into both local and broader contexts.

9.3 The Mesolithic

Evidence relating to Mesolithic settlement has been found in two different ways. Excavation at the midden site of Sand has yielded important assemblages of artefacts and ecofacts dated to early in the Mesolithic of Scotland, while finds and dates from other survey sites suggest Mesolithic activity elsewhere around the Inner Sound.

Aside from the radiocarbon dating evidence (which came after fieldwork), sites were determined as being Mesolithic from the complex of lithic material present. Microliths provide a well attested Mesolithic type-fossil and there is no evidence for their continued use into later Prehistory. Microliths were thus used as an indicator of the Mesolithic, and they could usually be identified in the field. Miscellaneous microlithic retouch on the other hand was not regarded reliable enough to indicate Mesolithic activity when it occurred by itself (for example at Scalpay 3, SFS 33). Blades and the use of specific blade technology (for example blade cores) were also regarded as indicators of Mesolithic activity, in line with work by Wickham-Jones elsewhere (Wickham-Jones & Firth 2000), but in the event there were few SFS sites with many blades (see Table 189, below). As blades may be accidentally produced, the occurrence of one or two blades on a site was not taken as conclusive evidence for Mesolithic activity unless there were other indicators. For blades to be regarded as indicative of Mesolithic activity a criteria of abundance thus operates: that is more than one or two have to be present. Given the varying size and nature of the assemblages concerned, it is not possible to specify precisely how many blades need to be present, but it needs to be enough to suggest that the knappers were deliberately aiming to make blades rather than accidentally producing the odd blade-like piece.

Table 189

Site	Work undertaken	Microliths	Blades	Platform (blade) cores	Total Lithics
*An Corran A (SFS 1)	Excavation	Present	Present	Present	5229
An Corran B (SFS 29)	Surface collection		1	1	76
An Corran C (SFS 30)	Surface collection	3	19	2	529
An Corran D (SFS 31)	Surface collection		2		58
An Corran E (SFS 101)	Surface collection	3	36		555
An Corran F (SFS 193)	Surface collection	1			26

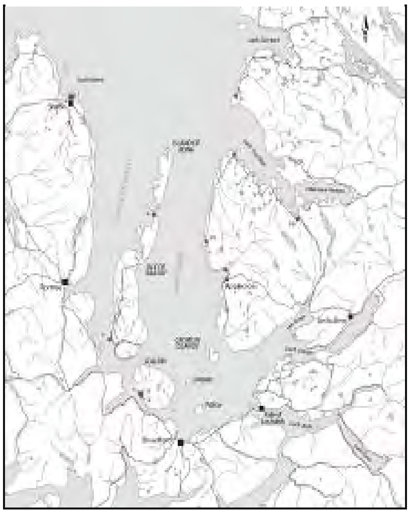
Applecross Manse (SFS 75)	Shovel pits	1	2		97
Brogaig (SFS 32)	Surface collection		2	2	102
Fearnmore 1 (SFS 104)	Test pits	3	3		754
*Loch a Sguirr (SFS 8)	Test pits		5		79
Port Earlish (SFS 94)	Surface collection		1		6
Redpoint (SFS 9)	Previous excavation, surface collection and test pits	4	29	Present	>847 from field collection, 1356 from previous work
*Sand (SFS 4)	Excavation	167	253	20	14,840 from excavation
Scalpay 3 (SFS 33)	Test pits	1 possible	2		152
Scalpay 5 (SFS 118)	Surface collection		3		202
Scalpay 6a (SFS 198)	Test pits	5	27	1	660
Scalpay 7 (SFS 196)	Surface collection	1			30
Scalpay 8 (SFS 197)	Surface collection	1		1	2
Sheildaig (SFS 15)	Excavation	Present	Present	Present	>6000 from excavation
Torridon Mains (SFS 186)	Shovel pits		1		3
Uags (SFS 105)	Test pits		1		10

Table 189: SFS Sites with Mesolithic-type artefacts. SFS 29, 31, 32, 33, 94, 105, & 186 are included for completeness though they do not meet the criteria of abundance (see text, Section 9.3) and are thus not certainly Mesolithic
* = Sites with radiocarbon dates indicative of Mesolithic activity; definite Mesolithic sites in red

Sites that contained lithic evidence suggestive of early activity, but where there were no microliths or blades were put into either the early Prehistory (Mesolithic and Neolithic) or Prehistory (Mesolithic, Neolithic, Bronze Age, Iron Age) categories, unless there was radiocarbon confirmation for the Mesolithic.

In addition to the three known Mesolithic sites of An Corran, Shieldaig and Redpoint, another 18 sites located by SFS survey can be defined as potentially Mesolithic (see Illustration

569, right). One, (Loch a Sguirr, SFS 8) yielded a combination of radiocarbon dates and blades but no microliths; the remainder produced microliths and/or blades (see Table 189, above). Microliths thus occurred on 12 sites, though generally in small quantity. Blades occurred on 17 sites, but usually in small quantity (ten sites had three blades or fewer). Interestingly, there were eight sites with both blades and microliths, and this included all of the four sites which had blades in larger amounts (An Corran C, An Corran E, Redpoint, and Scalpay 6a).



Illus 569: Location of SFS Mesolithic sites mentioned in text

Loch a Sguirr is worth noting for the presence of radiocarbon dates indicating activity in the Mesolithic while there are no microliths. Given the small area investigated it is possible that microliths may still be recovered here by further work, but it shows that the absence of microliths should not be taken as an indication that a site is not Mesolithic. This is discussed below (Section 9.5) in relation to the problems of identifying later Mesolithic sites; all in all it is clear that there is still no certain way to identify a Mesolithic site from the artefacts alone.

Sites with two blades or less, and no microliths, (8 in total) were not regarded as certainly Mesolithic, though they are definitely worthy of further archaeological examination as projects such as the Southern Hebrides Mesolithic Project (SHMP) have demonstrated the value of repeated visits to a site (Mithen 2000). An additional six sites contained artefactual material considered to be early Prehistoric (Mesolithic/Neolithic) and a further 25 sites were considered to be Prehistoric but without artefacts diagnostic of a specific period (see Tables 13, below & 189, above; Section 2.1; Appendix 1). Although one has to be careful of creating a circular argument, it is interesting to note that those sites identified as Mesolithic include most of the sites that yielded sizeable lithic assemblages, given that the existence of a sizeable lithic assemblage was included in the SHMP list of criteria of Mesolithic traits (Mithen 2000). The only exceptions to this would be some of the other An Corran sites and Scalpay sites where larger lithic assemblages were also recovered, though these assemblages are likely to have been biased in comparison to those from other sites by repeated collection on a number of occasions.

Table 13

Location	Number of microlithic sites	Number of early prehistoric sites	Number of indeterminate prehistoric sites	Total number of prehistoric sites
Trotternish	4	1	5	10
South Skye			3	3
Loch Carron			5	5
South Applecross			2	2
Mid Applecross	2		4	6
North Applecross				
Loch Torridon	4		2	6
Islands	4	5	4	13
Totals	14	6	25	45

Table 13: Prehistoric sites by sub-area (repeated from Section 2.1.13)

The SFS work provided only a brief glimpse of most of the sites. Very few sites were revisited, though where this took place further lithics and other material was usually found. A good example is SFS 10 Allt na Uamha where lithics were not visible at the time of the first visit and none were recovered from the test pits made at that point, though a second visit yielded eight pieces. In general, sites were visited once only, perhaps for a couple of days to include test pitting, and most of the lithic assemblages are small. This should be borne in mind when comparing SFS results with those of other projects. Not only may the criteria for period recognition differ (see above for a discussion of the criteria used by SFS), but they may also be applied using more or less rigorous standards (SFS sites with isolated blades were not regarded as definitely Mesolithic, nor were sites with a single piece that showed miscellaneous microlithic retouch), and the assemblages may result from different methods of field work. If the problems inherent in comparing assemblages made of different raw materials are taken into consideration (quartz assemblages are unlikely to yield many blades for example) it is obvious that there are many drawbacks to constructing global pictures from the work of different projects, especially those undertaken at different seasons and by different people. This is not to suggest that an overall picture of, say, west coast Scotland, cannot be drawn from the work of the various different projects that have taken place there, but rather that simple one-to-one comparisons of data are not appropriate.

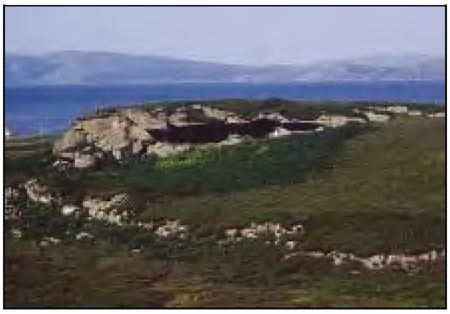
It is very interesting to note that the Mesolithic and early Prehistoric sites are not, by and large, rockshelter sites. Ten of the 13 Mesolithic sites are open-air scatters as are five of the six early Prehistoric sites and 19 of the 27 undiagnostic Prehistoric sites, a total of 74% of all Prehistoric sites. This has implications both for our understanding of the Mesolithic and for the ways in which we set about locating other sites. It is also interesting to note the presence of two major groupings of sites in the list: those at An Corran and those in Scalpay. These undoubtedly owe their existence both to the visibility (and density) of Mesolithic material in these areas and to the local presence of enthusiastic and dedicated field workers who were able to return on many occasions and monitor the erosion of lithics. It is worthwhile noting that, in Scalpay at least, these sites do indeed appear to represent discrete scatters, though the mechanisms by which they were created will remain vague without detailed excavation.

Before looking in general at the pattern of Mesolithic activity around the Inner Sound it is worth looking in detail at the site of Sand, in order to understand the specifics of Mesolithic activity at a single location.

9.4 SFS 4 Sand

9.4.1 The site

Although Sand is highly visible in the landscape as a rockshelter (see Illustration 23, right), there was no archaeological evidence within the rockshelter itself. There is a lack of deposits of any sort there, natural or otherwise; bedrock is simply too close to the ground surface so that any material that might have been present has long since eroded away or fallen downslope to join the deposits on the terrace below. The rockshelter is clearly visited from time to time today, but there was no build up of modern material either. It is likely, therefore, that the rockshelter was used to provide shelter during the Mesolithic, though the surviving Mesolithic deposits indicate that activity also took place in front of the shelter.



Illus 23: Sand – general view of the rockshelter

9.4.2 The midden

The main archaeological information at Sand has come from the

Illus 348: Sand – excavation of the midden deposits

midden which survives up to one metre thick in a discrete deposit immediately in front of the shelter (see Illustration 348, left). Accumulation of midden seems to have started in a natural hollow outside of the shelter and preservation was assisted both by the high calcium content of the Applecross Sandstones, and by the conditions created by the deposits themselves as they built up. The midden covers a relatively small area, roughly eight metres by eight metres, and the existence at its top of a worn layer which perhaps indicates a pathway, and was particularly notable at the western edge of the midden nearest the rockshelter, suggests that it never extended much above the current ground surface. Downslope of the shelter the midden becomes much thinner. The total volume of midden can therefore be estimated at not more than 50m³, of which approximately 16% was excavated.

Artefacts were an important part of the midden make up, though the bulk of the material comprised ecofacts. There were four types of Mesolithic artefact: flaked lithics; coarse stone tools; worked bone; and worked shell. All of these seemed to have accumulated in the midden as a result of casual discard; there was no evidence of specific deposits or dumps.

9.4.3 Away from the midden

In addition to the midden deposits excavation was carried out across other areas of the site (see Illustration 357, right). Although there was no surviving evidence of built or cut features there was ample indication in the form of artefacts that activity had taken place across the terrace in front of the rockshelter. The majority of the lithic assemblage came from the deposits away from the midden. In general there was nothing to distinguish the stone tools away from the midden from those within the midden, but retouched pieces tended to be found away from the midden. Slopewash affected the deposits here, but there were hints in the grouping of material that discrete deposits, or activity areas, had once existed. Area A, running downslope away from the midden, also contained great quantities of burnt and heat-fractured stone.

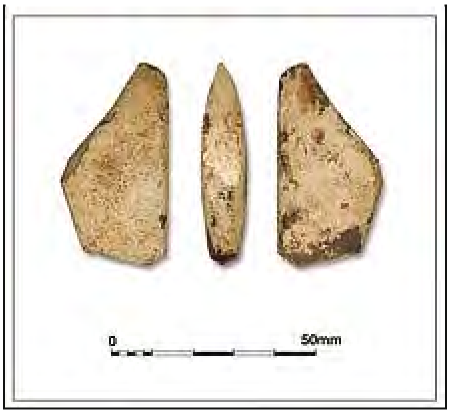
Illus 357: Sand – excavation in Area B3 looking towards the midden

9.4.4 Flaked lithic tools

Illus 365: Sand – a selection of the raw materials from which the flaked stone tools were made

The lithic tools from Sand are classically Mesolithic in type (see Section 3.3; Illustration 365, left), though the range of tools is limited in comparison with some sites. There are characteristic narrow blade microliths of varying types, though crescents and fine points dominate, and other types such as backed bladelets and scalene triangles are relatively scarce, though common elsewhere. Larger retouched pieces also occur, including scrapers and edge retouched pieces. Interestingly, the scrapers are different from some other west coast Mesolithic sites in that there are none of the angled scrapers that were so common, for example, at Kinloch (Wickham-Jones 1990). There were no specific dumps of knapping debris, but the assemblage does contain evidence for on-site manufacture as well as for the use and repair of tools. The knappers were using a mix of materials including local chalcedonies and quartzes as well as baked mudstone and Rùm bloodstone from further afield across the Inner Sound.

There was little indication among the flaked lithics of any material that might be more recent in date. A single piece, the barbed and tanged point (1999/1), is characteristic of more recent periods (Bronze Age) and this was found prior to excavation in up-cast from a mole hill so that there is no secure link to the Mesolithic site below. There was, however, one piece at the base of the midden that is conventionally out of place in a Mesolithic setting. This is the small ground stone axe (27/1; see Illustration 346, right) which would be more at home in the Neolithic. The radiocarbon determinations have clarified the situation by confirming that immediately downslope of the midden there is a deposit of material with slightly later dates. Although this is early for the Neolithic, it does include the axe. There were no other specifically Neolithic artefacts here, however, and it has been overlain by material from the midden which slumped across it, thus inverting the stratigraphy (see below). This would seem to be an indication of activity on site in the Early Neolithic.



Illus 346: Sand – the ground stone axe

9.4.5 Cobble tools

In addition there was an assemblage of 28 cobble tools from Sand, both in the midden and away from it. This is a small assemblage of limited tool types, mostly facially pecked pebbles, and it is perhaps most notable for what is lacking rather than for the tools that are present. There were no stone bevelled pebbles of the type so common on some other west coast Mesolithic sites such as Kinloch (Clarke 1990). In general the cobble tools suggest that a limited range of activities was taking place.

9.4.6 Bone tools

Illus 570: Sand – worked bone, bevel-ended tools and the harpoon fragment

The worked bone assemblage comprises 53 tools (see Illustration 570, left). In addition there was a small amount of possible flaked bone and several pieces of antler with scratch marks that may indicate the manufacture and maintenance of tools. As with the lithic assemblage, the bone tool assemblage also comprised a limited range of types. Eighty three percent (44) of the tools are bevel ended tools and there are only nine other tools, of which seven are points. This assemblage is less diverse than that from many other Mesolithic midden sites such as the Oronsay middens and Risga, and may be suggestive of a limited number of activities (possibly adding weight to the suggestion by other specialists that Sand may have been a specialised site). The quantity of bevel ended bone tools in comparison to the lack of stone bevelled pebbles adds support to the argument that the two are not directly related and are unlikely to have served similar purposes despite their similar appearance (Clarke *pers comm*).

Ethnographic evidence, the results of experimental work and functional analyses, both macro and microscopic, have all combined to suggest that the bevel ended bone tools are closely linked to hide working. As discussed in Section 3.4 it has been possible to make a tentative correlation between a specific aspect of hide working (tanning and colouring) and the use of these tools.

9.4.7 Worked shell

In addition to the worked bone there was a small assemblage of worked shell preserved within the midden at Sand. Some pieces such as the

Illus 571: Sand – perforated cowrie

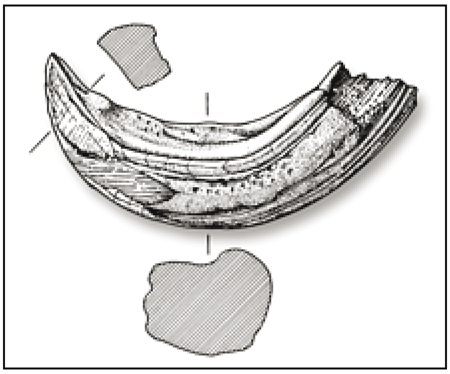

Illus 459: Sand – cut scallop

perforated limpets may be natural, but they still remain enigmatic in terms of human activities as they suggest, at the least, the collection of empty perforated shells. A small number of cowrie shells was recovered, some of which are also perforated (see Illustration 571, left), mirroring cowries from other Mesolithic sites such as Cnoc Coig in Oronsay. Ethnographic studies suggest a wide range of uses to which either of these might have been put, from ornaments to fertility objects, or currency. Scallop shell was also worked at Sand (see Illustration 459, right), and the artefacts of worked scallop are more substantial, though perhaps no less enigmatic in that they are equally difficult to interpret today. There were four pieces of scallop: one has had a piece cut out of it, and two are artefacts of which one is a pointed fragment with marked use-wear. Shell has been an important raw material for tools such as knives in many societies around the world and it is not surprising to find that the inhabitants of Mesolithic Scotland made use of it.

9.4.8 Pigment

The extent of pigment use in the Scottish Mesolithic is unclear but pigments were in use well before the Mesolithic in many areas of the world (Bednarik 1994, Wadley *et al* 2004). At Sand evidence for the use of pigments has come from three potential sources. Two nodules, one of haematite and one of ochre had working marks on their surfaces that may well relate to the extraction of pigment (see Section 3.7). In addition, several bevel ended bone tools contained residual traces of iron or manganese oxide (see Section 3.4) both of which are an integral part of hide processing in many societies. Not only do they serve to preserve and soften the hide, they can also be used to add colour. Finally, there have been suggestions from elsewhere that dogwhelk were used for the extraction of dye, even as far back as the Mesolithic (Gibbons & Gibbons 2004; Cerón-Carrasco 2005) and this species was among those recovered from the midden at Sand, though not in large quantity. The study of pigments in the Mesolithic is as yet in its infancy, but it is hardly surprising to find that the Mesolithic inhabitants of Scotland used colour, and gratifying to start to recognise physical evidence of this.

9.4.9 Zooarchaeology


Illus 572: Sand – boar's tusk

Complementing the artefacts there is a large assemblage of ecofacts. The bone assemblage is an important one for Mesolithic Scotland and though it includes animals, the bird and fish assemblages are larger. Red deer dominate the animal bone assemblage, together with some wild boar (see Illustration 572, right) and small numbers of other species such as badger. All of these are indicative of woodland and they add interesting weight to the vegetational history of the area (see below). The most common elements of the deer and boar were metapodials and phalanges suggesting that the removal of hides was an important part of the activities at Sand, though cut marks indicate that butchery was also carried out. The bird remains are dominated by razorbills and guillemots, suggesting both late spring and early summer activity on site, or late summer and autumn, and cut marks on several of these suggest wing removal. Interestingly, while only 2% of the bird bone was visibly burnt, 30% of the mammal bone had evidence of burning, though whether this relates to different practices in the treatment of meat, or to the differential treatment of mammal bone refuse remains to be ascertained. These two possible seasons of activity are supported by the fish remains which are dominated by the cod and wrasse families. The small size of the fish, together with the species present suggests coastal fishing; there is no evidence for deep sea fishing from boats, and stationary traps and nets are likely to have been the main methods of capture employed.

9.4.10 Shellfish

The shell assemblage is physically both large and diverse, though it is not likely to have resulted from intensive shell fish gathering. Limpets predominate but significant numbers of periwinkle, mussel, and dogwhelk are also present. Shellfish were obviously an important resource to the inhabitants of Sand and it is likely that they were not just eaten. Some shell (especially scallop) was used as a raw material for tools. Ethnographically documented uses of shellfish range from their use as bait for both fish and crustacea, to jewellery and even to the use of dogwhelk for dyestuff; any or all of these may have taken place at Sand. Shellfish would have been available on a year round basis, but it is interesting to note that the shell midden at Sand is not large in a Scottish context. Any exploitation of shellfish results in the rapid accumulation of large amounts of debris. The midden at Sand could have built up in the space of a few visits to the site.

9.4.11 Marine exploitation

Fish and shellfish were not the only marine species exploited at Sand. There is a small but significant assemblage of crustacea suggesting that two main species of crab (*Cancer pagurus* and *Carcinus maenas*) were harvested, presumably for eating but also possibly for use as bait. Given the apparent interest in seabirds, fish, crustacea, and shellfish at Sand, one element of the marine ecosystem is under-represented; there was only one seal bone and one whale bone in the midden at Sand. This is in sharp contrast with the evidence from sites such as Cnoc Coig on Oronsay where seal appears to have been intensively exploited.

The marine exploitation that has left its trace is interesting because it provides an alternative view of the Mesolithic, a time for which tasks assumed to be male, notably hunting, have predominated in the literature. This is a common archaeological problem, and indeed it extends to the study of many hunter-gatherer societies where women and children tend to carry out the more archaeologically invisible tasks. It is important to try and provide a rounded view of society, however, and even if women and children were archaeologically invisible in the Mesolithic (itself a moot point), we can be sure that they were around. Elements like the crustacea and the shellfish help to provide an added dimension to our view of Mesolithic life. Although we can never be sure who did what, there is ample ethnographic evidence to suggest that women and children were largely responsible for the secure and constant food supply, such as the collection of shellfish. For the Scottish Mesolithic we cannot be sure who did what, but it is only if we have as wide as possible a view of appropriate tasks that we can approach a balanced interpretation. In this respect, it is important to remember other resources such as seaweed, birds’ eggs and plants, which, while potentially useful and with plenty of ethnographic parallels, would leave little archaeological trace.

9.4.12 Vegetational history

Other ecofactual information includes hazelnut shells, a small assemblage of charcoal, the contribution of related pollen studies in the area, and a soil and vegetation survey. Fortuitously, all combine to suggest that at the time of the occupation at Sand woodland

Illus 573: Native birch woodland in Applecross

Illus 574: Remains of *Pinus sylvestris* in a local bog

was more common across the Applecross peninsula (see Illustration 573, left). This comprised open woodland dominated by mixed birch/pine and hazel communities (see Illustration 574, right) and it must have served as an important resource in itself, not only for food resources such as nuts, berries and tubers, but also for elements such as firewood which were vital to the needs of every day life, not to mention the wide role of wood-related materials such as bark in the material culture (Clark 1952; Wickham-Jones *et al* 1986; Bridges 1949). Once again we are prompted to remember the more archaeologically invisible work of women and children.

The charcoal remains suggest that the range of species may have been limited, and the inclusion of poor fuel woods suggests that material for fires may have been short. Fuel gathering trips would be a daily necessity for the occupants at Sand and they may well have had to venture further and further afield as the immediate environs of the site quickly became denuded. Interestingly, the majority of the charcoal remains derive from inland species. A lack of firewood may well have been an important factor determining the life-span of individual stays at the site and this is something that has been seen ethnographically (Wickham-Jones *et al* 1986). Nevertheless, human predation had little long-term effect on the woodland at this stage and the impact of the early woodland still reverberates in the area today – stands of bluebells are a common feature of Applecross in the spring, in the open moorland as well as in the recent woods.

There was little on-site pollen, and, though the midden did have enhanced levels of microscopic charcoal, there was little macroscopic charcoal present, suggesting that domestic fires did not take place in, or on, the midden itself. The charcoal present would be consistent with the disposal of ash and other hearth waste into the midden area. In this respect the presence of large quantities of fire cracked stone on the terrace downslope of the midden adds weight to the possibility of activities involving fire taking place away from the midden.

9.4.13 Specialisation at Sand?

The preceding summary shows that many of the strands of evidence relating to the site at Sand can be drawn neatly together and suggest some form of specialisation, though precise interpretation in terms of function, duration, and social aspects of activity are still lacking. The composition of artefacts suggests that a limited range of activities took place at the site, and the size of the shell midden suggests that occupation (or occupations) was short.

Although the artefacts from Sand comprise standard Mesolithic types, in many cases the suite of tools is limited in comparison to other Mesolithic sites such as those on Rùm and Oronsay. Common lithic elements, such as some microlith types (backed bladelets and scalene triangles) are rare, while some specific scraper types found elsewhere (for example Kinloch, Rùm) are missing. In contrast to some Mesolithic sites there were very few artefacts of coarse stone and no stone bevel ended pieces. The coarse stone assemblage is small and dominated by facially pecked cobbles. The bone tools are also limited in range, being almost exclusively dominated by two types (points and bevel ended tools) of which bevel ended tools form over 80% of the assemblage.

Specialisation is a complex state to recognise archaeologically and the interpretation of Sand still lacks refinement. Limited activities, and the small size of the site, might suggest short term occupation/s (perhaps themselves a form of specialisation), or they might suggest longer but closely targeted activity. With regard to the activities carried out at Sand, shell fish processing and some fishing are clear. In addition, a possible relation between bone bevel ended tools and hide processing is beginning to emerge, supported by both experimental work and archaeological evidence (see above & Section 3.4) and this is fascinating in light of the suggestion that parts of the animal bone assemblage have resulted from an emphasis on hide processing (see Section 3.11). Detailed function work on the lithic assemblage is lacking, though a limited range of activities is indicated here too.

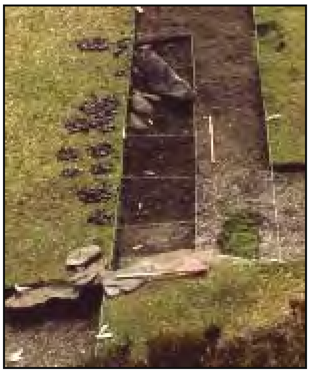
9.4.14 Seasonality at Sand

Seasonality is crucial to many elements of the interpretation of life in Mesolithic Scotland. It has been assumed to tie in closely with aspects such as mobility, though mobility itself is now under discussion, as are the ways in which it has been interpreted in the past (Wickham-Jones forthcoming). Not only is there a wealth of archaeological work on mobility, ethnographic work shows that it is not at all a simple concept and existing assumptions of a simple direct relationship between mobility and seasonality can be challenged. Although there is a body of ethnographic work suggesting that movement was carried out on a seasonal basis (Grøn & Kuznetsov 2003; Manker 1975) it is now clear that the environment formed only one of many interacting elements of life. Recent ethnographic work in Tierra del Fuego, for example, shows a society (the Yamana) where movement was due to a complex interaction of factors including social, environmental, resource based and seasonal aspects (Estévez & Vila *pers comm*). Conditions here vary from those of the northern hemisphere, because the southern Oceanic conditions are not subject to the same seasonal fluctuations, but Tierra del Fuego does broaden the accepted wisdom of the north of Europe.

The fish and bird bones recovered from Sand suggest that there may have been two main periods of activity: one from late summer into autumn and the other encompassing the late spring. Neither would be out of place with hide working, for which there is evidence on site. The autumn is a traditional time for the kill, and hide working also took place at this time in many cultures (Manker 1975); the beasts are in prime condition to provide meat for the winter along with good quality hides. Elsewhere, hides are worked in the spring (Beyries 1999) and it is at this time that some cultures kill mature bull deer for meat as they can be tainted during the rut. Autumn is the time to consider the needs of winter in other ways – clothing is prepared, shelters repaired and many other tasks undertaken as the nights start to draw in. Spring, however, is also a time for repair and preparation for the activities of summer, and spring kills can provide an important celebration for those who have survived the rigours of winter. At both times shellfish would provide a vital resource to supplement the diet of those who were involved in hide processing and other work, and also to use as bait for other types of fishing. At Fife Ness in eastern Scotland the predominance of crescents among the microliths has been tentatively linked to the exploitation of marine resources in the autumn (Wickham-Jones & Dalland 1998a & b), suggesting that the high quantity of crescents at Sand may be noteworthy in this respect. Activity in the autumn is also supported by the recovery of burnt hazelnut shells which would themselves have formed an important food resource (suitable for storage and providing fats vital to the lean hunter-gatherer diet). No doubt other woodland products such as roots and berries also supplemented the diet at this time.

9.4.15 The wider site at Sand

It is important to remember that this information comes by and large from the rubbish deposits at Sand and it may, thus, be biased. Information away from the midden confirms that activity took place across the small open apron in front of the rockshelter, but it only hints at its nature. Large quantities of heat-fractured rock attest to the importance of fire (see Illustration 362, right) – useful both for cooking and processing, as well as to provide light and heat.

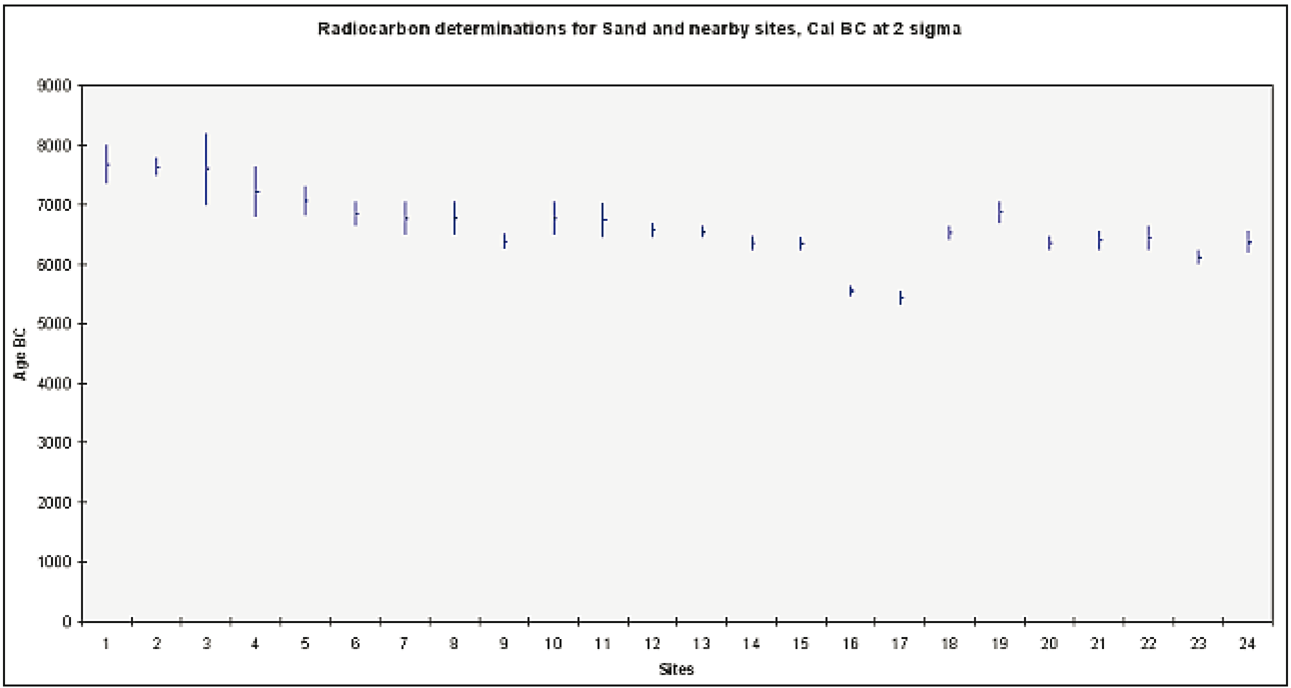


Illus 362: Sand – Area A during excavation of heat-fractured rock

The nature of the site away from the midden is important when the rarity of midden sites is considered. Although new midden deposits are still being discovered, the majority of Scottish Mesolithic sites do not have preserved midden and their lack of organic preservation provides a restricted view of material culture. Sites like Sand are a timely reminder of the detail that may be missing in non-midden settings. Sand also provides strong support for the abandonment of the argument that midden sites might represent a quite different cultural development to non-midden sites. Although there are minor specific differences, the lithic assemblage from Sand is broadly similar to the stone tools from open-air sites like Kinloch in Rùm (Wickham-Jones 1990). It is likely that the differences that do exist reflect other, 'less-cultural', factors such as task or gender orientation, seasonal bias, or some form of specialisation – or a combination of factors.

9.4.16 Date

Another dimension to the evidence from Sand lies in the radiocarbon determinations. The site at Kinloch shows that Mesolithic settlement was established in the area by the end of the 8th millennium, and Camas Daraich and An Corran provide supporting evidence of increasing activity into the 7th millennium, but the Sand dates are still surprisingly early (see Illustrations 575, below & 569, above). It is, to date, one of the earliest dated midden sites in Scotland. Sand extends midden deposits back, but perhaps that is not surprising if one is to argue that midden material is partly an accident of preservation. Seven of the ten radiocarbon determinations from Sand suggest a relatively contained period of Mesolithic activity in the early–mid 7th millennium BC, perhaps divided into two: between 7050–6440 BC; and 6470–6240 BC. Three relate to later activity and are discussed below. It is interesting that the separate counts provided such similar dates and perhaps this supports the argument for short term activity.



Illus 575: Radiocarbon determinations relating to the Mesolithic from Sand and nearby sites
Sites: 1–9 = Kinloch, Rùm (Wickham-Jones 1990);
10–17 = Sand, Applecross;
18–21 = Camas Daraich, Skye (Wickham-Jones & Hardy forthcoming);
22–23 = Loch a Sguirr, Raasay;
24 = An Corran, Staffin, Skye (Hardy *et al* forthcoming a)

9.5 Midden sites in a Mesolithic context

The argument for relatively short term, specialised activity at Sand is an interesting one in view of the discussion over the role of the midden in the Mesolithic. Cultural differences apart, middens have been interpreted under various guises including famine sites, specialised sites for the exploitation of coastal resources, and feasting sites. They have been regarded as home to part of a community, a whole community, and more than one community (Bailey & Milner 2002; Bonsall 1996; Russell *et al* 1995; Mellars 2004). Perhaps we can only be certain that there are different types of midden and no fixed interpretations.

Sand sheds unusual light on this because though there is evidence to suggest that it may have been a specialised site, that specialisation is not wholly coastal, and it may well not be entirely economic. It is indeed unlikely that the economic, social, and ritual elements of life (to name but a few) were clearly separated, though they certainly form convenient pigeon holes for the archaeologists of the 21st century. The ecofact and artefact evidence combines to suggest that the main tasks at Sand included both hide processing and marine exploitation, but specialisation is a complex process that involves more than simple functional explanation. Exploitation at Sand concerned both coastal and terrestrial resources and may have been short term. The coastal location of the site may well have provided the key to facilitate this – access to marine and littoral resources would provide an easily accessible and reliable source of food while people were preoccupied with other tasks.

At the same time, the proximity of the sea means that in the autumn fish, shellfish, and seabirds were on hand to process and build up for winter supplies, while the coastal woodlands provided a good source of nuts and other vital fats and carbohydrates, these could be easily stored. It is all too easy to fall into the trap of considering a site only in terms of a single use, when simple human nature suggests that this is unlikely. In the same way the population may well have fluctuated throughout one occupation, and from year to year.

The midden site at Sand would thus seem to represent not the specific result of some ancient famine or feast, but rather a normal part of life that could be revisited from time to time. In this respect it is interesting that Mesolithic middens like Sand are still relatively rare in the area, and also that activity at Sand as indicated by the presence of shell middens did not apparently continue beyond the later 7th millennium.

Illus 576: Location of non-SFS Mesolithic sites mentioned in text

Only two other midden sites with Mesolithic dates have been recorded in the area of the Inner Sound, An Corran (SFS 1), and Loch a Sguirr (SFS 8). Further afield on the west coast knowledge is limited by a lack of research on the scale of SFS, but midden sites become even sparser (see Illustration 576, right). To the north there are no known sites (though they presumably wait to be found). To the south Risga, on Loch Sunart, is well documented if as yet not properly interpreted (Pollard *et al* 1996). Ulva cave, on the small island of Ulva, off the coast of Mull, contains a midden site dated to between 7100 BC and 4100 BC (Russell *et al* 1995). There is a cluster of midden sites in the caves around Oban, of which Carding Mill Bay in a rockshelter (Connock *et al* 1992) and Lón Mór, an open-air site (Bonsall *et al* 1993) have most recently been examined. In Oronsay the five open midden sites stand out by virtue of their great size though again publication remains incomplete (Mellars 1987). If midden sites were merely a part of the annual cycle surely one might expect more of them over the four thousand years or more that constituted the Scottish Mesolithic? Several mitigating factors might come into play: a low population; unfavourable preservation conditions, including sea-level change; archaeological invisibility; and a lack of modern survey work. Midden sites have often been seen as a defining characteristic of the Scottish Mesolithic (Lacaille 1954; Saville 2004), but there are two problems with this. Firstly, it is increasingly clear that there are many different types of midden: they do not represent a uniform phenomenon. Secondly, it seems that, in Scotland, middens may well be rare – fortuitous survivors that have served to flesh out the bare bones provided by most sites.

Any comparison of Sand with other sites is clearly hampered by the state of knowledge of some of them, but a trawl of the literature provides some interesting information. In Oronsay the bone specialist concluded that some of the differential bone representation might be the result of the working of deer hides (Grigson & Mellars 1987:254). Carding Mill Bay produced only a very small bone assemblage and though fish, birds and mammals were present the specialists felt unable to be certain that they related to human activities (Hamilton-Dyer & McCormick in Connock *et al* 1992:34). The bone assemblages from Risga and An Corran have yet to be published, though analysis of the material from An Corran indicates that while the fish and mammal remains are very similar to Sand the bird assemblage is dominated by puffin, which are not present at Sand (Bartosiewicz forthcoming). Loch a Sguirr, SFS 8, yielded very few bones, and they do not seem to relate to the Mesolithic deposits. Although there are some similarities, it seems that each midden site is quite different to the others. Furthermore, there is great chronological variation between them (see Table 190, below). Across the span of the Mesolithic the rarity of midden sites is reinforced.

Table 190

Site	7500 – 7000 BC	7000 – 6500 BC	6500 – 6000 BC	6000 – 5500 BC	5500 – 5000 BC	5000 – 4500 BC	4500 – 4000 BC	4000 – 3500 BC
Sand		x	x		x			
Loch a Sguirr			x					
An Corran		x	x		x			x
Risga					x	x		
Druimvargie	x	x	x					
MacArthur				x				
Lon Mor			x		x		x	
Raschoille		x	x	x	x			x
Carding Mill Bay							x	x
Ulva		x	x			x		x
Cnoc Sligeach						x	x	x
Cnoc Coig						x	x	x
Caisteal nan Gillean					x	x	x	
Caisteal nan Gillean 2							x	x
Priory Midden						x	x	

Table 190: Date spans for midden sites in the west of Scotland (information from Ashmore 2004b)
NB: dates are based on a variety of raw materials, and some were taken several years ago

The Mesolithic in Scotland spans a period of at least four thousand years. Recent research has shown that not only did it cover an extensive time span, but also that there was considerable complexity within the Mesolithic – both between different geographical areas, and between different chronological episodes within the period. So far, the majority of dated sites, of any type, fall into the first half of that period and in the study area there is currently a complete lack of dated sites for the thousand year period between 5000–4000 BC. Superficially there is little as yet to distinguish earlier Mesolithic sites from later Mesolithic sites in Scotland so that it is impossible to predict whether a site will fall into the earlier or later period, except that most new information turns out to add to our knowledge of the earlier Mesolithic while the later part of the period remains a bit of a desert. There are, of course, exceptions. To the south of the study area, sites like Risga and the Oronsay middens provide important information regarding settlement between 5000–4000 BC (Ashmore 2004a & b), but the fact remains that it seems to be hard to identify the later sites. One possibility is that a change in artefact styles took place, thus affecting our rate of recognition. One of the most telling indications of

Mesolithic activity is still the presence of blades and microliths on a site. If they were absent in the later period sites might well go unrecognised. This cannot be quite the whole picture, however, because there are sites where the microliths are associated with later dates, as the example of the Sands of Forvie shows (Section 4; Warren forthcoming). Knowledge of the Mesolithic in Scotland is increasing, but it is clear that our understanding is limited. There are still many problems to be resolved. We need yet more sites... and more ways of studying them.

Although the majority of dates suggest a fairly contained lifespan for the midden at Sand in the early/mid 7th millennium, there is a small amount of evidence suggesting some activity at the rockshelter in the earlier 6th millennium. There was little excavation in this area, but the matrix of the deposits is quite different to that of the shell midden, it comprises an organic deposit without shells (see Illustration 343, right). The finds here comprised lithics and, with the exception of the small ground stone axe, there is nothing to distinguish them from the rest of the site. Axes such as this would generally be associated with the Neolithic, albeit from the earliest Neolithic onwards, but the date for these deposits precedes recognised Neolithic activity in Scotland (see Sections 3.1 & 4). This may well be another example of the limitations of the conventional 'three age system' by which artefacts, life-style and culture all apparently changed simultaneously at specific points in time (see Section 4). Small axes such as this are rare but not unknown. Whatever its role, it seems that some 500 years after the cessation of activity related to the midden, people were once again making use of the shelter afforded by the rockshelter at Sand. It is likely that the midden was still visible and these later occupants may well have been responsible for treading the path that lay across its surface. They seem to have brought with them a similar suite of tools to those used by the previous inhabitants, but they were concentrating on different tasks and less dependent on shellfish. Someone lost, or deposited, an axe. Not long after they left, the old midden collapsed downhill, burying and mixing with their remains.

Illus 343: Sand – Area A at the end of excavation, the dark shell free organic deposits can clearly be seen below the slumped midden

Finally, though there was no obvious sign during excavation, there are a few finds that indicate even later activity at Sand. This took place below the rockshelter, apparently making use of the stabilised surface of the midden which served to level the ground. The finds comprise small fragments of pottery, metal finds including slag and a hearth bottom, copper alloy droplets, four glass beads and, handily, a couple of human teeth. One of the latter has been dated to 2150–1770 BC. Interestingly there was no disturbance of the midden surface visible to the eye. The artefacts had all percolated down into the midden, not surprisingly given its loose matrix, though most remained in the upper spits of the midden material (see Table 98, below). The small amounts of material found suggest that several short lived episodes were involved, some of which were based around the working of bronze and/or iron. Luckily, none resulted in substantial disturbance to the midden.

Table 98

Find	Area/square	Spit/Context	Associated Date if present	Period
pathway	B1	Surface Context 12		Post Midden
Polished stone axe	A/A2B	Spit 8 Context 27	5630 to 5470 BC	Early Neolithic?
human upper left incisor	B2/B1A	Spit 3 Context 13	2150–1770 cal BC	Bronze Age

Barbed and tanged arrowhead		Surface		Bronze Age
Casting waste	A/A2B A/A1B	Spit 6 Context 17 Spit 2 Context 1/2		Bronze/Iron Age
Glass beads	A/A4B B3/B5B B3/B8B	Spit 2 Context 17 Spit 4 Context 1/2 Spit 2 Context 1		Iron Age – post Roman
Slag	A/A2B B2/B2A B3/B5B B3/B21A	Spit 3 Context 29 Spit 4 Context 13 Spit 3 Context 1 Spit 2 Context 1		Iron Age?
Coarse pottery	A B1 B2 B3	Spits 2–6 Contexts 1/17/28/29 Spits 2–4 Contexts 11/12/13 Spits 1–4 Contexts 1/13/24 Spits 1–7 Contexts 1/7/8		?post-Medieval
Glass sherds	A/A5B A/A6B A/A6B	Spit 1 Context 1 Spit 2 Context 17 Spit 1 Context 1		post-medieval
Glass bead	B1/B25A	Spit 3, Context 13		15th–18th century AD
Fragments of metal	B1/B24B B3/B5B & B21B	Spit 6 Context 13 Spits 3 & 1 Context 1		?
Nails	A/A2B & A6B B2/B1B B3/B4B	Spits 3 & 2 Contexts 17/29 Spit 4 Context 24 Spit 1 Context 1		?
Knife tip	A/A6B	Spit 1 Context 1		?

Table 98: Summary of later material from the shell midden at Sand (repeated from Section 3.2.4)

9.6 First foragers: the Mesolithic around the inner sound

9.6.1 Dates

The nature of the remains at Sand meant that in some ways it came to dominate the project in 2000. But the excavations here were only a part of SFS, and, ironically, though it is important for its early dates, the Mesolithic forms only a small part of the rest of the survey. Before considering the later sites, however, it is useful to look at the Inner Sound in the Mesolithic.

SFS confirmed a human presence in the Inner Sound from the earliest period of activity in the region. Not surprisingly, the dates for the very earliest human settlement in Scotland are slightly earlier and come from further south and east (see Section 4). Within 500 years, however, people were apparently settled across Scotland and there is good evidence that they were active in and around the Inner Sound. There are dates from this period from Kinloch (Wickham-Jones 1990), SFS 1 An Corran A (Hardy *et al* forthcoming), SFS 8 Loch a Sguirr (see Illustration 209, right), and SFS 4 Sand. Dated sites are only part of the picture, however. SFS survey work revealed other sites with Mesolithic artefacts: SFS 30, 101, 193, An Corran C, E, & F; SFS 75 Applecross Manse; SFS 104 Fearnmore 1, SFS 196–8 Scalpay 6–8; SFS 15 Shieldaig and SFS 9 Redpoint.

Illus 209: SFS 8, Loch a Sguirr, Raasay – rockshelter high in the cliff

9.6.2 Types of site

The rest of the SFS sites with Mesolithic material are open lithic scatters with no midden. Although the lack of midden is likely to relate partly to local preservation conditions it also suggests that a suite of different activities took place around the Inner Sound, though this could only be confirmed by excavation. It is supported, however, by the emerging evidence that in later times midden and rockshelter sites were but one facet of a complex pattern of human activity across the area. Even with the small amount of evidence that we have, it is clear that this is reflected in the Mesolithic. So far the Mesolithic evidence indicates exploitation of a range of locations from caves and rockshelters, to sheltered coves (SFS 104, Fearnmore 1, Illustration 43, below left), wide rocky bays (SFS 9, Redpoint, Illustration 577, below centre), sheltered bays (An Corran), inland sea lochs (SFS 15, Shieldaig), old terraces (SFS 75, Applecross Manse, Illustration 25, below right), and open coastal ridges (Scalpay).

Illus 43: SFS 104, Fearnmore 1 – general view, site lies just above the small cove in the centre of the photo

Illus 577: SFS 9, Redpoint – testpitting team in the dunes

Illus 25: SFS 75, Applecross Manse – shovelpitting on the terrace

The Mesolithic lasted for several millennia, however, and it must be admitted that the evidence is spread pretty thinly across time. We have either to postulate periods of abandonment, or accept that most Mesolithic sites have either not survived or are yet to be found. It is unlikely that the population of west coast Scotland was ever large, but given the fertility of the area (both on land and sea), long periods of human exodus seem unlikely. Given the transitory nature of many sites, Mesolithic remains are known to be fragile and it seems likely that some sites may simply have disappeared. The project recorded active erosion in numerous places. Equally, the problems of locating sites with no obvious remains such as midden were also highlighted, and many sites could well be awaiting discovery. Both this and other survey work have shown how the visibility of sites today is variable and dependent largely on weather conditions (Mithen 2000).

9.6.3 Mobility in the Mesolithic of the Inner Sound

One of the avowed interests of the project lay in an examination of mobility in the Mesolithic. Can we shed further light on this? In some ways the lack of Mesolithic sites is frustrating as it limits our ability to consider the possible relationship of one site to another. There are other ways of approaching the problem, however (Wickham-Jones 2005). One increasingly mentioned approach to mobility is to look at the material culture for elements that must have been brought to site from further afield. The resource of choice is often lithics because not only do they tend to survive, but also it is often possible to identify specific source locations.

Around the Inner Sound the lithic raw materials do indeed offer an interesting picture of procurement (see Section 5). Some, like quartz and the many pebble chalcedonies, are ubiquitous; they occur around the Inner Sound and were used on most sites, though they were probably locally obtained and thus offer little information regarding mobility. Others such as the baked mudstone and Rùm bloodstone have sources that are specific and limited. Wherever they are found, therefore, they have to have been transported. The most likely method of transportation involves people – the Mesolithic inhabitants of the Inner Sound, and interestingly the two stones do not provide quite the same picture. Both are good quality raw materials but whereas Rùm bloodstone is found in small quantities on most sites, baked mudstone is found in larger quantity on a few sites while it is almost absent from others. It may be relevant that the source of Rùm bloodstone lies outside the Inner Sound, though not far away, on the island of Rùm some 70km to the south. Baked mudstone, however, is to be found at Staffin on the north-west shores of the Inner Sound. Wherever Rùm bloodstone was used it all had to be bought in to the area and we know that it was a favoured resource that assisted the production of both microliths and blades. Baked mudstone was also a quality knapping material but though it is an important part of the blade assemblage at some sites such as SFS 104 Fearnmore 1, it is almost completely lacking elsewhere, for example in the Scalpay sites. This is even more unusual when one considers the proximity of Scalpay to the baked mudstone source at Staffin.

Another approach is to look at the physical conditions of an area and consider how it might have facilitated or hindered the mobility of the human population. The importance of water, particularly sea, transport in the Mesolithic, is widely recognised (Warren 1997 & 2000, Fischer 1995) and this is reinforced by ethnographic work from around the world. The Inner Sound offers a confined, sheltered, area where transport would usually be facilitated (see Illustration 8, right) even though managing small craft here does require skilled seamanship. There are strong currents in parts of the Inner Sound and weather conditions and visibility can both deteriorate quickly, though it is important not to underestimate the skills in weather prediction and marine knowledge of those who live in close contact with the sea (Steel 1988; Towsey 2002). At the same time there are numerous sheltered bays and this combined with the variety of resources available around the shores of the Sound must have created favourable conditions for a mobile hunter-gatherer population. Easy access into a highland hinterland should not be forgotten. Applecross and Skye, as well as Torridon, all provide a variety of routes to access different resources elsewhere.

Illus 8: View to the west across the Inner Sound

At present it is impossible to explain the distribution of lithic raw materials in detail, but it clearly shows that people were moving around the Inner Sound in the Mesolithic, and weight is added by the favourable conditions of the Sound itself. There are not enough sites, and too little is known about most of them, to suggest whether they fulfilled different roles in the annual cycle, or whether there are other explanations for the differences observed between sites. As seen above, each offers very different settings and types of remains; though the picture has still to be rounded out by excavation and the addition of information from inland sites.

The available suite of archaeological and ethnographic evidence would suggest that the Mesolithic population of the Inner Sound was mobile. The community may well have been small; we cannot yet say whether the sites result from the movement of a single extended group or from several groups. Given the size of the area, however, and what we know of the resource base, the former is perhaps more likely. Even had various groups existed, ethnographic work shows that the interpretation of territories is unlikely to be simple. Both clearly defined territories and a fluid system of overlap have been recorded in different high latitude coastal areas (see Ackerman 2003; Piana *et al* 1992; Orquera & Piana 1999 for ethnographical and archaeological work in similar marine terrain; and Smith 1992 has looked at carrying capacity in Scotland). It is also interesting to note that evidence for contacts and mobility furth of the Inner Sound is limited. The wider distribution of Rùm bloodstone has been well discussed, but this is, at present, the only hint. There are few positive identifications of baked mudstone further afield, and no other exotic materials in the Inner Sound. It is thus possible that, from the point of view of the sea at least, the Inner Sound offered a self contained niche within which the Mesolithic hunter-gatherer-fisher community could thrive. Added value would of course be provided by the upland hinterland which should clearly be a focus for further research.

Interestingly, the picture of a limited movement of raw materials provided by Rùm bloodstone and by the baked mudstone from Staffin is mirrored by the distribution of pitchstone from Arran in the Mesolithic (Wickham-Jones 1986). A general picture seems to be emerging of small areas, up to some 70km in diameter, within which the Mesolithic groups of western Scotland were mobile. This is contrasted by work elsewhere where larger areas are suggested such as in southern England, or parts of Ireland, or indeed on continental Europe (Wickham-Jones 2005).

9.7 Later periods around the Inner Sound

Illus 578: Location of SFS sites mentioned in text – sites dating to later than the Mesolithic

Some of the survey sites around the Inner Sound clearly relate to activity in the earliest times (see Section 2.2). Some are more recent (see Illustration 578, left). Other sites were used on and off up to the modern period (see Illustration 579, right). Indeed the indications are that at some sites activity is on-going.

Illus 579: SFS surveyors make use of a well maintained shelter at SFS 40, Toscaig 8

9.7.1 Early Farmers

The emerging Neolithic in the area is attested by dates from both bevel ended bone tools and human bones in the midden at SFS 1 An Corran A. In addition there are the early dates associated with the small ground stone axe from SFS 4 Sand, and the later human tooth from the top of the Sand midden. It is likely that some of the other lithic scatter sites at An Corran belong to this period, as may some of the lithic scatter material from Scalpay. The lithic material from the scatter site at SFS 147 Cnoc na Celpeirein looks Neolithic, and there was also evidence of activity at this

Illus 144: SFS 89, Coire Sgamhadail

time from two radiocarbon determinations on material from the midden in the large cave at SFS 89, Coire Sgamhadail 1 (see Section 4 & Illustration 144, right).

9.7.2 The First Bronze Workers

Illus 119: SFS 77, Camusteel 2

By the start of the 2nd millennium BC metal working had become established across Scotland. The evidence of a brief episode of metal working from the top of the midden at Sand provides a reminder of this early smithing activity. The number of dated sites from this period in the area is small, however, until the last centuries BC when the rockshelters at SFS 77 Camusteel 2 (see Illustration 119, left), SFS 20 Toscaig 2, SFS 49 Creag-na-h-Uamha, SFS 68, Allt na Criche, SFS 8 Loch A Sguirr, and SFS 1, An Corran all provide dates. Open-air sites at this time are lacking, but archaeologically they would be almost invisible due to the fall off in lithic use and the friability of other evidence.

9.7.3 Iron Working

The 1st millennium AD is similarly dependent on radiocarbon dates from middens in rockshelters and caves: SFS 2 Crowlin 1; SFS 41, Toscaig 9; and SFS 77, Camusteel 2 all have dates from this period. The general paucity of evidence for activity at this time is interesting but once again the material culture is not conducive to archaeological investigation.

9.7.4 The Historic Period

After AD 1000 the information level picks up. Radiocarbon determinations relating to this later period come from eight cave and rockshelter sites, seven of which are shell middens inside rockshelters (SFS 26 is a rockshelter with a partly bare rocky floor with some soil covering): SFS 41, Toscaig 9; SFS 49, Creag-na-h-Uamha (see Illustration 47, below left); SFS 114, Fergus’ Shelter; SFS 2, Crowlin 1; SFS 66, Ard Clais Salacher 2; SFS 68, Allt na Criche; SFS 22, Crowlin 3; and SFS 26, Crowlin 7. In addition there are two dates from open-air middens: SFS 6, Ashaig 1; and SFS 99, Clachan Church (see Illustration 51, below centre). The material culture has survived better from these more recent times and consequently there are other sites with evidence that suggests later activity: cave and rockshelter sites with later material include SFS 76 Camusteel 1; SFS 77, Camusteel 2; SFS 17, Church Cave; SFS 89 Coire Sgamhadail 1; SFS 90, Coire Sgamhadail 3–6; SFS 23, Crowlin 4; SFS 58, Rubha Chuaig (see Illustration 46, below right); SFS 19, Toscaig 1; SFS 20, Toscaig 2; SFS 35, Toscaig 4; SFS 38, Toscaig 6; and SFS 63, a cave in north Applecross, of which nine sites are also shell middens (SFS 76, SFS 23 and SFS 63 are all rockshelters with no visible midden).

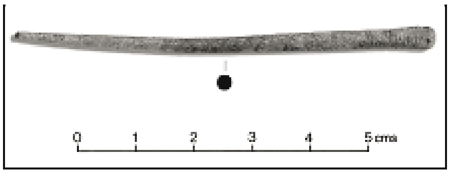
Illus 47: SFS 49, Creag-na-h-Uamha

Illus 51: SFS 99, Clachan Church – Test Pit 2 lies in the central foreground

Illus 46: SFS 58, Rubha Chuaig – general view, the site lies in the centre of the picture

Illus 48: SFS 96, Meallabhan – site lies halfway down this dune

There are also two open-air sites with evidence from this period: SFS 11, Sand 3; and SFS 96, Meallabhan (see Illustration 48, left). The latter is particularly interesting as it has considerable evidence of metal working (see Illustration 233, right). Metal and metal working remains came from several sites and provided a general picture of short term activities in many of the sites. In general the evidence suggests that this comprised expedient craftwork; that is repair rather than manufacture. It is particularly indicated by unused rivets and small scale smithing. There were only four sites that produced clear evidence of iron working and, where it could be characterised, this was blacksmithing. At SFS 6 Ashaig 1, SFS 22 Crowlin 3 and SFS 96 Meallabhan this was minimal, indicating iron working somewhere in the vicinity. SFS 89 Coire Sgamhadail 1 might also be associated with iron working but only SFS 4 Sand produced significant slag remains, including a hearth bottom. Even so, the small quantities and tight distribution at Sand suggest a single short lived episode, and this would be supported by the lack of other physical evidence from this time. There was no sign of disturbance to the earlier deposits. The melted copper alloy droplets in the same area of the midden suggest that limited bronze working may have been involved as well. Elsewhere, isolated metal objects on some sites are likely to have accumulated from accidental discard and breakage.



Illus 233: SFS 96, Meallabhan – metal pin

9.7.5 Biases in the Historical record

For the more recent part of this period the relative scarcity of level fertile land around the Inner Sound means that many sites may lie under modern settlement. In this respect the bias of recent archaeological evidence towards the eastern shores of the Inner Sound is noteworthy. The abundance of cave and rockshelter sites here is likely to have influenced perceptions of past activity (see Illustration 6, right). The lack of information relating to the western, Skye, shores of the Inner Sound, and indeed to many of the islands is likely to relate to the methods of survey, which did not for example record upstanding remains of recent buildings, rather than to an actual lack of past activity.

Illus 6: SFS 2, Crowlin 1 – site is prominent in the seascape

9.8 Targetting areas and themes for further study

During the course of work there were, of course, a number of times when it would have been nice to go on and find out more. Additionally, other possibilities for further work arose as specialist work unfolded. The Inner Sound is a large area, but several locations stood out as worthy of further exploration.

Staffin Bay, with its numerous lithic scatter sites is one obvious area worthy of further study. The SFS fieldwork suggested that there was a large amount of archaeology preserved here, but active erosion means that this resource is under serious threat (see Illustration 57, right). Despite the quantity of lithics recovered, it was not possible to be certain about the nature of these sites, nor of their precise date, though activity in both the Mesolithic and Neolithic is suggested and this would obviously be supported by the radiocarbon determinations that came from the nearby midden at SFS 1 An Corran. It is possible that the sites in Staffin Bay might shed light on the mysterious lack of later Mesolithic sites in the area. If later Mesolithic sites do not

Illus 57: SFS 29, An Corran B – active erosion at the edge of the cliff in 1999

usually comprise the microlithic assemblages that we have come to expect, then 'nondescript' lithic assemblages such as those from Staffin may well fill the gap. Blanket shovel pitting would provide a good starter to approach the problem of characterising and understanding the sites at Staffin.

Illus 100: General view of An Corran from the north, the site lies below the rocky cliff in the centre of the picture

To the south end of Staffin Bay lies the site of An Corran A (see Illustration 100, left). Here excavation in the 1990s yielded a long-lasting midden site with activity that stretched from the Mesolithic into the Neolithic (Hardy *et al* forthcoming, Saville & Miket 1994a & b). An Corran A is a complex site with a lot to offer regarding different periods of Mesolithic activity, as well as Neolithic activity and burial. Although it is not easily accessible today, some of the midden at An Corran A has been preserved and would clearly repay more considered excavation, particularly in the context of the increased information that is now available regarding the Inner Sound in general.

Another concentration of lithic scatter sites was revealed in Scalpay. Here reduced rates of erosion mean that the sites are under less threat, though in the long term attrition is still ongoing. The Scalpay sites highlight their own questions about past activities around the Inner Sound. Once again they seem to relate to both Mesolithic and Neolithic activity, though the SFS brush was very broad. Perhaps most unexpected was the almost complete lack of baked mudstone at these sites, though they do not lie far from the source of mudstone at Staffin. Only further work, including excavation, could put this in its wider context.

The three lithic scatter sites of SFS 9 Redpoint, SFS 15 Shieldaig and SFS 104 Fearnmore 1 occupy key locations around Loch Torridon. Each offers considerable potential for further work. In the case of Shieldaig the site has been destroyed but it was excavated and the finds, though prolific, have never been properly studied (Clarke & Griffiths 1990). This is now on-going as part of an investigation into the use of quartz in prehistory around the west coast of Scotland (Saville & Ballin 2000) and the results are keenly awaited. Redpoint is a large sand dune site that is subject to active erosion. New flaked lithic material is revealed every year, suggesting that the site is both large and under considerable threat. This includes Mesolithic and more recent material. Redpoint would not be an easy site to approach for detailed excavation, but serious monitoring and the detailed study of the lithics that can be collected would add greatly to our understanding of the area. Sand dune sites like this may not be easy to study but work at the Sands of Forvie (Warren forthcoming) has highlighted the fact that it is possible to recover valuable archaeological information through the use of painstaking excavation and analysis. SFS 104, Fearnmore 1, in contrast, lies under consolidated turf and is not seriously threatened apart from a small amount of erosion due to the existence of a foot path that crosses the site. Nevertheless, Fearnmore 1 did yield an interesting lithic assemblage including Mesolithic material and it occupies a strategic location at the head of a sheltered inlet of the sea. Excavation at Fearnmore 1 has much to offer our understanding of the Inner Sound in the Mesolithic.

Illus 142: SFS 144, Clachan Old Harbour, Raasay – general view from the north-

The one inter-tidal site, SFS 144 Clachan Old Harbour (see Illustrations 142, left & 66, right) suggests that the possibility of further archaeological deposits in the inter-tidal zone of the Inner Sound should be explored. As sea-level change is very dependent on various local conditions (see Section 7.1) it is not possible to extrapolate precisely the height of sea-

Illus 66: SFS 144, Clachan Old Harbour, Raasay – preserved timbers in the mud

east level at different dates, even from one area of the Inner Sound to the next. But the remains at Clachan Old Harbour show that there is potential for inter-tidal sites and a combination of a likely early date with good preservation conditions (see Section 7.2) means that they would be particularly important if found. The history and rarity of the site at Clachan Old Harbour, itself, means that though the survival of much archaeological material here is doubtful, there is still a place for further work to check this.

Down the centre of the Inner Sound lies a chain of rocky islands whose commanding position must have made them crucial to both the Mesolithic and later populations. Several sites have been discovered here, including some that have been dated to the Mesolithic, such as SFS 8, Loch a Sguirr. Many of the middens are large and would repay further work. Many of these sites are undergoing active erosion, adding urgency to the interest of archaeological examination.

The study of the individual artefacts and ecofacts from Sand also suggests several directions for further examination. There was, for example no detailed use-wear study of the lithic assemblage, though the techniques for this work and the benefits that it brings are both well established (Finlayson 2004; Hardy forthcoming b). Further work on the technology of both bone and shell tools is another direction, as is more detailed comparison of aspects of the ecofacts.

Turning to themes rather than sites or artefacts *per se*, one theme that had to be abandoned by the project concerns the procurement and use of the various individual lithic raw materials around the Inner Sound (see Illustration 365, right). This requires detailed co-operation between geologists and archaeology, and it is clearly a theme of some importance to our understanding of the prehistoric population of the area. Not only would it be useful to pinpoint the precise source areas and the spread of individual rocks, but it would be useful to look at any possible preference for the use of different materials for different types of tool. Other aspects include a study of extraction techniques, as well as any change in the exploitation of the different stones through time. SFS has built up a considerable database of raw material information as a basis for work of this kind.

Illus 365: Mixed lithic raw materials

Another theme must concern examination of the missing pieces of the Mesolithic picture. SFS targeted the coastlands, what about the inland sites? Detailed fieldwork, including perhaps shovel pitting on a large scale, is necessary to fill out the exploitation of other resources.

The search for later Mesolithic sites in the area is obviously another theme that has been touched on above. We need to characterise the later Mesolithic remains and build up a picture of sites that relate to this period. Did the population decline in the years leading to the adoption of farming? The brief glimpse of an axe and later activity at Sand suggests that the transition to farming and other changes of lifestyle into the Neolithic is also a theme worthy of examination.

The role of midden sites is another theme that we have only just begun to tackle. The information from Sand is obviously a step in the right direction. The midden at An Corran is one potential source of information, but one of the important lessons of SFS has been the fact that middens do not just comprise a Mesolithic resource. The SFS survey work has resulted in a considerable database of midden sites that comes right up to recent times. Many were test pitted, but further work on the changing role of midden sites through time would provide its own rewards. In particular it would be interesting to set the middens from more recent periods into their wider context by including in the study the historical built remains that were ignored by SFS.

Elsewhere midden material was buried by rockfall and was thus inaccessible for SFS test pitting. As much of the rockfall in the area occurred in the early Holocene these sites are worthy of further examination. Our picture of the very early settlement of Scotland is still hazy, but we can be fairly certain that most known sites relate to the time by which people had become established in this new land. Any sites that might relate to those tentative earlier periods of colonisation should be prioritised for study.

One aspect of life in the Inner Sound that is conspicuously absent from the SFS record is death and burial. Apart from a couple of teeth at Sand, actual people and their burial monuments do not figure in our records. One clear explanation for this lies in the sites targeted for study – we did not record later burial monuments. The lack of any evidence from the caves and rockshelters is interesting, however, as this type of location does figure in the burial record elsewhere in periods such as the Neolithic and Bronze Age (for example around Oban; Pollard 1990 & 1996). There is only one site in the SFS area where burial in a rockshelter seems to be attested in the Neolithic: SFS 1 An Corran (Hardy *et al* forthcoming a). Prior to that, information relating to burial in the Mesolithic is almost entirely absent from Scotland as a whole (the scant remains from Oronsay being the obvious exception; Conneller 2006; Mellars 1987). It is important to remember that the disposal of the dead may not necessarily have led to permanent remains, nor have followed a single pattern. The changing face of disposal of the dead is one theme that would well repay further study.

The quality of archaeological preservation around the Inner Sound is generally high. In this respect it offers great potential for a study of the changing emphasis on local resources with the introduction of farming and other historical developments. The use of shellfish in historical times (see Table 191, below) is a matter of interest and is now the subject of on-going research in the Southern Hebrides. Although it has been little researched in a Scottish context, recent work in Islay (Hardy 2004) suggests that numerous limpet middens were formed here in early historic times, adding weight to the value of the record from the Applecross peninsula. It is not clear why limpets suddenly became popular at this time though it is possible that some widespread cause, for example climatic deterioration or social pressure, may have forced a change in the subsistence routine. Although historical references suggest very much that shellfish were a famine food, today they are promoted very much as quality goods (though not limpets) that serve to attract tourists and thus add outside capital to the local economy.

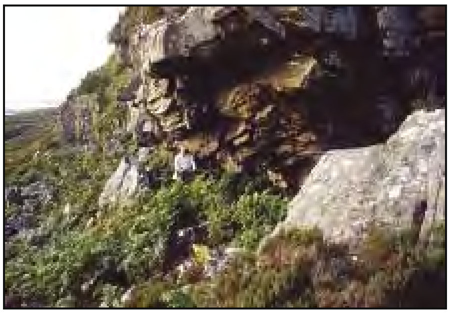
Table 191

Mesolithic	Unidentified prehistoric	Iron Age	Historic	No/few Artefacts
4	5	2	20	15

Table 191: Shell middens around the Inner Sound by rough chronological type
(NB: some have evidence for more than one period of activity)

Another of the surprises that came out of the project was the number of sites that yielded information relating to metal working, in particular local craft-repair work. Self sufficiency has obviously been a matter of great importance through the ages. The development and change of metal working, and the use of metal goods through time, is an unexamined field where archaeology has much to offer.

As primarily Mesolithic specialists it is difficult for us to identify themes that relate to the later, historic periods, though we have tried to be faithful in our treatment of the later evidence. There are groupings of later sites that would repay further study. What, for example, was the role of the caves and rockshelters in Crowlin? What was the attraction of the Toscaig caves? (See Illustration 580, right).



There are management issues that result from the project as well. It is interesting to note, for example, that the most productive site, that at Sand, was not visible prior to excavation. The presence of lithics within a molehill indicated the existence of a site, but it was not possible to quantify the extent or preservation of the site in advance of intrusive investigation. Geophysics may offer a way through here as Finlay's work suggests (Section 3.17), but it is salutary to recognise that other, equally rewarding sites are likely still to lie hidden. The project also highlighted the value of intensive and repeated fieldwork. The potential of the An Corran sites around Staffin Bay was only revealed by repeated visits to the area, while the many sites on Scalpay owe their discovery to the fact that one of the team lived locally, literally 'on the doorstep'. The Scalpay sites, in fact, appeared to appear and disappear with local conditions such as rainfall – there is no doubt that they were only discovered and recorded in detail because it was possible to make repeated walks across the area. Factors such as these combine with the effects of erosion and local developments to influence our understanding of the Prehistory of an area. They suggest that, it is important to maintain a local presence if we are to fully reveal archaeological potential especially of those early sites that may only be represented by scatters of worked stone.

Illus 580: SFS 42, Toscaig 10 – one of the many sites at Toscaig

Another factor to influence archaeological survival is of course the way in which the local environment has developed through time. Around the Inner Sound, Holocene sea-level rise, though it has taken place (Dawson, Section 7.1) seems not to have topped five or six metres, though Selby's work at Braes in eastern Skye (1997) shows how local variation is still important. This will, of course, have had an impact on the survival of earlier archaeological material, and it is a good example of how we have to understand the natural environment in order to be able to interpret the archaeological record properly. Another example lies in the presence of midden material below rockfall on some sites.

Management decisions are partly influenced by the dates assigned to remains, and here again there are important lessons to be learned from the project. The problem of recognising Mesolithic sites has been discussed. This has management implications as it can mean that Mesolithic material will tend to be underrepresented in the archaeological record in areas where test pitting and radiocarbon dating has not been possible. Furthermore, though the survey work recorded a large number of sites, radiocarbon dating has been necessary to refine our understanding of the human use of the area, and it is worth noting that the radiocarbon determinations did not always agree with the diagnostic material from a site (for example SFS 66, Ard Clais Salacher 2).

Scotland's First Settlers has revealed a wealth of information pertaining to the past settlement of the Inner Sound. This is very rewarding for those of us who took part. However, it is only the tip of the iceberg regarding our understanding of the human population of this particular niche of Scotland through time.

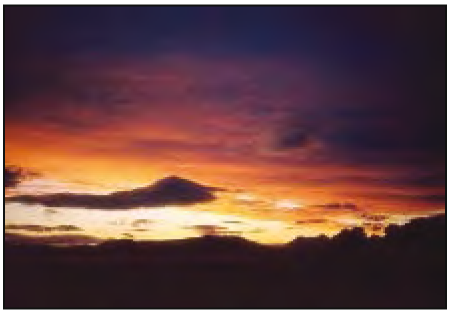
9.9 Conclusion

Scotland's First Settlers has been very successful not only at providing information relating to its primary aim, that of looking at the Mesolithic settlement of the Inner Sound, but also at filling out the picture of human activity in the Inner Sound up to the present day. The midden site at the rockshelter of Sand has proved to be one of the earliest midden sites in Scotland, yielding a wealth of information on the material culture, activities and environment of its inhabitants. Other Mesolithic sites broadened the picture. Yet more sites yielded information right up to the present day and they provide a formidable database which we hope will play an important role in future studies of human settlement in the area.

Scotland's First Settlers was perhaps ambitious in the global survey methods applied. To walk the entire coastlines of the Inner Sound, both modern and ancient, took dedication on the part of our survey team (see Illustration 581, below left), together with considerable logistical back-up both to ensure field safety and the validity of information, and to process that information afterwards (see Illustration 582, below centre). This publication is the result of intensive post-fieldwork study over several years on the part of many specialists and their helpers. We think that it has been well worthwhile. There are many other stretches of Scottish coastlands that would benefit from this level of study and we hope that similar projects may take place elsewhere to add to the emerging picture of complexity in the remains of the past (see Illustration 583, below right).

Illus 581: Considerable dedication was called for from all who took part

Illus 582: The logistics of sorting and processing all the material were great



Illus 583: Final view across the Inner Sound

Files cited in the text

All files start from ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > …

… > Documents > Final Reports > W-J,_SFS_Final_discussion.pdf
… > Images > Scanned Slides > 1999 > 1999-354.jpg [Illustration 568]
… > Images > Maps > Map_of_local_meso_sites.pdf [Illustration 569]
… > Images > Artefacts > Lithics > lithic_raw_materials_photo.jpg [Illustration 365]
… > Images > Artefacts > Coarse and ground stone tools > Axe_photo.jpg [Illustration 346]
… > Images > Artefacts > Worked bone > bone_tools_from_Sand_1999_-_photo.jpg [Illustration 570]
… > Images > Artefacts > Worked shell > Sand_cowrie_shell_bead.jpg [Illustration 571]
… > Images > Artefacts > Worked shell > cut_scallop_shell_photo.jpg [Illustration 459]
… > Images > Artefacts > Worked bone > boars_tusk_drawing.jpg [Illustration 572]
… > Images > Maps > map_of_various_sites.pdf [Illustration 576]
… > Images > Maps > later_sites_mentioned_in_final_discussion.pdf [Illustration 578]
… > Images > Artefacts > Metal and glass > pin_from_Meallabhan.jpg [Illustration 233]
… > Images > Scanned Slides > 1999 > 1999-325.jpg [Illustration 583]

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Appendix 1 – Catalogue of all sites (survey database) | Karen Hardy & Caroline Wickham-Jones

The data set for this table is large and goes across two files. The raw data can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007` > `Downloads` > `Documents` > `Field reports and info on SFS sites`. From here you can download the two SFS Catalogue of Survey Sites CSV files:

- `SFS_Catalogue_of_Survey_Sites._8.6.04_sheet1.csv`
- `SFS_Catalogue_of_Survey_Sites._8.6.04_sheet2.csv`

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

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Appendix 2 – Sand, Comprehensive List of Contexts | Karen Hardy & Caroline Wickham-Jones

The data from this table can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Post Excavation Information`. From here you can download the file '`Context_List_Sand.pdf`'.

Number	Trench	Description
1	A&B	Topsoil
1/1	A&B	Thin band of turf and dense root matter, shell and stone free.
1/2	A&B	Shell mixed topsoil situated above and around midden area. Contained fractured and fragmented shell.
1/3	A&B	Animal disturbed topsoil, surface molehill deposits.
2	A&B	Substantial bracken root mat.
3	A&B	Bedrock.
3/1	A&B	Very degraded powdery bedrock.
3/2	A&B	Large fragments of eroded bedrock occurring in immediately overlying deposits.
3/3	B	Yellow rippled sandstone bedrock.
3/4	A	Large rounded boulders sitting on bedrock.
4	A&B	Pale pink-yellow, fine, sandy subsoil immediately overlying some areas of bedrock.
5	B	Palaeochannel.
5/1	B	Natural water channel following edge of bedrock filled with dark brown-black organic peaty silt. Sterile.
5/2	B	Mineralisation occurring at interface of palaeochannel and bedrock. Compacted black manganese stained soil with iron panning.
6	A&B	Shell midden, general context for entire deposit of shell midden. Truncated mound sitting on sloping scree surface.
7	B	Washed deposit of mixed small stones within matrix 8. Contains beach pebbles and angular stones.
8	B	Mid-brown sandy silt deposit around stones 7. Probably deposited as a wash from original features upslope. No shell content, many degraded bones.
9	A&B	Eroded stone slabs from roof of rockshelter. These form a loose layer within Area B1.
10	B	Matrix occurring around and beneath 9 within Area B1. Consists of fine pink compacted sand derived from eroding rock above.

11	B	Dark grey ashy layer of whole and fragmented shell.
12	A&B	Band of crushed degraded shell at top of midden.
13	B	Dense mass of unconsolidated shell forming main body of midden.
14	B	Compacted pale fine sand washed from degrading bedrock.
15	B	Small circular area of darkened organic soil, probably natural.
16	-	VOID
17	A	A mixed deposit of dark-brown sandy silt containing 30-40% stones, many of them fire cracked.
18	A	A small deposit of dark coloured silt situated between large boulders in trench A. Essentially the same deposit as 17 but within the stone content, due to the larger stones acting as a barrier to downslope movement of small stones.
19	A	A large fallen stone sitting within Trench A, partially visible above the current ground surface.
20	B	A pale orange-pink sand overlying bedrock in Area B1.
21	B	A thin band of natural pale brown silt between the fallen stones 9 and 20.
22	A&B	A substantial shell free midden deposit of dark silt underlying shell midden 6. Contains large quantities of bone and antler.
23	A&B	Mole disturbance, mostly within the upper layer of the shell midden 6. Contains nesting material, disturbed soils, and much voiding.
24	B	A layer of shell which has tipped down the surface of the midden proper 6.
25	A	A dark silt clay natural palaeosol underlying all archaeological deposits in Trench A.
26	A	A sterile clay silt deposit underlying 25.
27	A	A slumped stony deposit overlying midden 22. Shell free.
28	A	Tipped layers of shell derived from shell midden 6.
28/1	A	Deposit representing a substantial episode of slip from the shell midden. Consists of compacted, mainly crushed, shell and dark silt.
28/2	A	A thin lens of less degraded shell overlying 28/1. Slightly higher percentage of shell than 28/1.
28/3	A	A thin lens of less degraded shell underlying 28/1. Slightly higher percentage of shell than 28/1.
28/4	A	A thin lens of concentrated crushed shell overlying 28/4.
28/5	A	Deposit representing a second major episode of slip from the shell midden. Probably associated with the fall of a large stone immediately overlying. Less compacted and containing larger shell fragments than 28/1.
29	A	A similar deposit to 17 containing many heat affected stones. Consists of a compacted dark silty sand.

NB: Excavation took place in spits, but contexts were visible in the sections and thus recorded and related to material as it was extracted.

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Appendix 3 – Sand 2000, Concordance list | Caroline Wickham-Jones & Karen Hardy

The data from this table can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007` > `Downloads` > `Documents > Post Excavation Information`. From here you can download the PDF file '`Sand_Concordance_list_final.pdf`'.

Squares

Spit	A1B	A2B	A3B	A4B	A5B	A6B	B1A	B1B	B2A	B2B	B3B	B4B	B5B	B6B
1	1/2	1/2	1/2	1	1	1	1/2	1/2	1/2	1/2	1	1/3	1	1
2	1/2	1/2	29	17	17	17	1/2	1/2	1/2	1/2	1	1	1	1
3	1/2	29	29	17	25	17	13	1/2	13	1/2	1	1	1	1
4	28	E -29 W -28	17	17	25	17	13	24	13	13/24 disturbed	1/2	1/2	1/2	1
5	28	E -29 W -28	17	17	25	25					13 disturbed	1/2 disturbed	1	1
6	28	E -17 W -27	17	17	25	26					13/23 disturbed	7/8	7/8	7/8
7	22	E - 17/27 W -22	17	17	26	26					13/23 disturbed	7/8	7/8	5
8	22	E -27 W -22	17	25	26	26					13/23/24 disturbed	21	14/21	5
9	22	E -27 W -22	25	25							22			
10	22	22?									22			
11	25	25												

Scotland's First Settlers: Sand 20, Concordance list (cont)

Corrected square numbers				B25A	B25B	B25A	B25B	B26A	B26B
Spit	B7B	B8A	B8B	B24A	B24B	B24A	B24B	B25A	B25B
1	1	1	1	1/12	1	1/12	1	1	1
2	1	1	1	13	12	13	12	1	1
3	1	1	1	13	13	13	11	1	1
4	1	5	14	13	13	13	11	1	1
5	1	14	14	13	13	13	11	1	1
6	7/8		14	13	11	13	13	12	12
7	5		14	13	11	13	13		
8	5		14	13	11	13	13		
9				13	11	13	13		

NB: it seems that during excavation not only were square numbers after B24 incorrectly recorded (hence the correction above), but also that material from the four uncorrected grid squares that should have been B23A/B and B24A/B was lumped together as B24A/B. This means that material from the 4 metre square block of midden at the heart of the site is relatively uncontexted despite attempts to introduce a more accurate system of recording (see Section 3.2).

New square numbers; Old Square numbers

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Appendix 4 – Catalogue of the flaked lithic assemblage, all sites | Caroline Wickham-Jones

The data from this catalogue can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Lithic Catalogue`. From here you can download the multiple CSV files created from the database, as well as the accompanying PDF file '`ADS_database_doc_template.pdf`'. However, the look-up lists are also given below, in alphabetical order.

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

Available Look-Up Lists

Classification

From '`Classification.csv`' and C Classification table in original *MS Access* database.

- Amorphous
- Anvil
- Awl
- B and T point
- Backed bladelet
- Backed triangle
- Bevel ended tool
- Bifacial indet
- Bifacial leaf point
- Bipolar
- Borer
- Broken microlith
- Broken scraper
- Broken
- Burin
- Concave scraper
- Core rejuvenation
- Core trimming
- Crescent
- Crested
- Debitage
- Denticulate

- Disc scraper
- Disc
- Double end scraper
- Edge retouched
- End and side scraper
- End scraper
- Faceted hammerstone
- Fine point
- Ground edge tool
- Gunflint
- Hammerstone Flake
- Invasive flaking
- Lamelle a cran
- Limpetscoop
- Long Hammerstone
- Manuport
- Microburin
- Microlithic retouch
- Miscellaneous
- Natural
- Notched
- Obliquely blunted
- Plain
- Plano convex knife
- Platform
- Polished axe
- Polished axe flake
- Pot Boiler
- Regular
- Resharpening flake, unknown type
- Retouching flake
- Rod
- Rounded hammerstone
- Rubbing stone
- Saw
- Scalene triangle
- Scraper resharpening flake
- Scraper, core tablet
- Scraper, general
- Serrated
- Side scraper
- Smoothed Stone
- Spherical
- Tanged scarper
- Transverse arrowhead
- Trapeze
- Truncated scraper
- Undamaged
- Unknown

Condition

top

From `Condition.csv'.

- Mint
- Burnt
- Abraded

- Corticated
- Abraded and cortic.
- Rusty
- Patinated
- Mixed

Material

top

From `Material.csv` and C Material table in original *MS Access* database.

- Agate
- Baked Mudstone
- Bloodstone
- Carnelian
- Chalcedonic silica
- Chert
- Coarse Stone
- Flint
- Jasper
- Lava
- Micaceous Sandstone
- Micaceous Shist
- Obsidian (Volcanic glass)
- Pitchstone
- Pumice
- Quartz
- Quartzite
- Rock crystal
- Sandstone
- Siliceous indet
- Silicified Limestone
- Siltstone
- Volcanic glass (Obsidian)
- Unknown

Type

top

From `Type.csv` and C Type table in original *MS Access* database.

- Blade
- Chip
- Chunk
- Coarse Stone Tool
- Core
- Flake
- Microlith
- Pebble
- Retouched Blade
- Retouched Chunk
- Retouched Core
- Retouched Flake
- Unworked
- Worked

Sub-type

top

From ‘`Sub-Type.csv`’ and C Sub-Type table in original *MS Access* database.

- Broad Blade
- Cobble
- Flaked
- Fragment
- Inner
- Mixed
- Narrow Blade
- Primary
- Secondary
- Stone Flake
- Sub-type
- Whole
- With Cortex
- Without Cortex

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```
… > Classification.csv
… > Condition.csv
… > Material.csv
… > Type.csv
… > Sub_type.csv
… > [various site-specific CSV files]
… > ADS_database_doc_template.pdf
```

Appendix 5 – Sand Excavations & Inner Sound and Skye Test Pits | Ann Clarke

The data on this page can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues`. From here you can download the relevant CSV files:

- `Coarse_Stone_catalogue_sheet1.csv`
- `Coarse_Stone_catalogue_sheet2.csv`
- `Coarse_Stone_catalogue_sheet3.csv`

See also:

- `Documents > Final reports > Coarse_Stone_Report,_Clarke.pdf`
- `Documents > Specialists reports > Coarse_Stone_Report,_Clarke.pdf`

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

NB: Grid squares B24/25. This catalogue preserves the original grid references as recorded on site. A recording error during excavation means that the location of material from these grid squares is uncertain.

Catalogue of Non-Artefactual Fractured Stone from Sand

Download the data from '`Coarse_Stone_catalogue_sheet1.csv`'.

Site	Trench	Spit		Context	Quantity	Description
Sand	TP4	4			1	Heat cracked cobbles
Sand	TP4	3			3	Heat cracked cobbles
Sand	A1B		C23	surface	1	Heat cracked cobbles
Sand	A1B	10		22	5	Heat cracked – no cortex
Sand	A1B	10		22	11	Heat cracked – no cortex
Sand	A1B	7		22	1	Heat cracked cobbles
Sand	A1B	7		22	4	Heat cracked cobbles
Sand	A1B	7		22	14	Heat cracked – no cortex
Sand	A1B	8		22	4	Heat cracked – no cortex
Sand	A1B	9		22	3	Heat cracked cobbles
Sand	A1B	9		22	3	Heat cracked cobbles
Sand	A1B	11		25	1	Heat cracked cobbles
Sand	A1B	11		25	10	Heat cracked – no cortex
Sand	A1B	11		25	4	Heat cracked – no cortex

Sand	A1B	4		28	3	Heat cracked cobbles
Sand	A1B	4		28	9	Heat cracked – no cortex
Sand	A1B	4		28	7	Heat cracked cobbles
Sand	A1B	4		28	11	Heat cracked cobbles
Sand	A1B	4		28	7	Heat cracked – no cortex
Sand	A1B	6		28	10	Heat cracked cobbles
Sand	A1B	6		28	3	Heat cracked cobbles
Sand	A1B	5		28	1	Heat cracked cobbles
Sand	A1B	5		28	10	Heat cracked cobbles
Sand	A1B	2		1/2	3	Heat cracked – no cortex
Sand	A1B	2		1/2	8	Heat cracked cobbles
Sand	A1B	2		1/2	3	Heat cracked cobbles
Sand	A1B	2		1/2	12	Heat cracked cobbles
Sand	A1B	2		1/2	7	Heat cracked cobbles
Sand	A1B	3		1/2	2	Heat cracked cobbles
Sand	A1B	3		1/2	1	Heat cracked – no cortex
Sand	A1B	3		1/2	1	Heat cracked cobbles
Sand	A1B			surface	1	Heat cracked cobbles
Sand	A2			surface	1	Heat cracked cobbles
Sand	A2A	1	46	1/2	7	Heat cracked cobbles
Sand	A2A	1	65	1/2	9	Heat cracked cobbles
Sand	A2B	6		17	3	Heat cracked cobbles
Sand	A2B	6		17	6	Heat cracked cobbles
Sand	A2B	9		22	13	Heat cracked – no cortex
Sand	A2B	10	111	22	1	Heat cracked cobbles
Sand	A2B	10	111	22	11	Heat cracked – no cortex
Sand	A2B	10	111	22	4	Heat cracked – no cortex
Sand	A2B	10	111	22	1	Heat cracked cobbles
Sand	A2B	10	111	22	10	Heat cracked – no cortex
Sand	A2B	10	111	22	1	Heat cracked cobbles
Sand	A2B	10		22	2	Heat cracked cobbles
Sand	A2B	7		22	1	Heat cracked – no cortex
Sand	A2B	7		22	2	Heat cracked cobbles
Sand	A2B	7	55	22	1	Heat cracked cobbles
Sand	A2B	9		22	1	Heat cracked – no cortex
Sand	A2B	9		27	5	Heat cracked cobbles
Sand	A2B	9		27	3	Heat cracked – no cortex
Sand	A2B	6		27	7	Heat cracked – no cortex
Sand	A2B	6		27	7	Heat cracked cobbles
Sand	A2B	6		27	2	Heat cracked cobbles

Sand	A2B	6		27	5	Heat cracked – no cortex
Sand	A2B	8	106	27	3	Heat cracked – no cortex
Sand	A2B	8	106	27	2	Heat cracked cobbles
Sand	A2B	5	68	28	4	Heat cracked cobbles
Sand	A2B	5	68	28	46	Heat cracked – no cortex
Sand	A2B	4		28	19	Heat cracked cobbles
Sand	A2B	4		28	22	Heat cracked – no cortex
Sand	A2B	4	66	28	5	Heat cracked – no cortex
Sand	A2B	4	66	28	2	Heat cracked cobbles
Sand	A2B	5	74	29	13	Heat cracked cobbles
Sand	A2B	5	74	29	14	Heat cracked – no cortex
Sand	A2B	5	64	29	18	Heat cracked cobbles
Sand	A2B	5	64	29	45	Heat cracked – no cortex
Sand	A2B	3	78	29	23	Heat cracked cobbles
Sand	A2B	3	78	29	5	Heat cracked – no cortex
Sand	A2B	3		29	8	Heat cracked cobbles
Sand	A2B	3		29	4	Heat cracked – no cortex
Sand	A2B	3		29	29	Heat cracked cobbles
Sand	A2B	4	64	29	33	Heat cracked cobbles
Sand	A2B	4	64	29	38	Heat cracked – no cortex
Sand	A2B	4		29	18	Heat cracked cobbles
Sand	A2B	4		29	1	Heat cracked no cortex
Sand	A2B	2		1/2	19	Heat cracked cobbles
Sand	A2B	2		1/2	14	Heat cracked cobbles
Sand	A2B	2		1/2	38	Heat cracked cobbles
Sand	A2B	2		1/2	12	Heat cracked – no cortex
Sand	A2B	2		1/2	67	Heat cracked cobbles
Sand	A2B	7		17/27	4	Heat cracked cobbles
Sand	A2B	7		17/27	2	Heat cracked – no cortex
Sand	A2B	7		17/27	4	Heat cracked cobbles
Sand	A2B	7		17/27	3	Heat cracked – no cortex
Sand	A2B	11		n/a	1	Heat cracked – no cortex
Sand	A2B	11		n/a	1	Heat cracked – no cortex
Sand	A2B	11		n/a	1	Heat cracked cobbles
Sand	A2B	7	55	22	1	Heat cracked – no cortex
Sand	A2B	5		28	5	Heat cracked cobbles
Sand	A2B	5		28	5	Heat cracked – no cortex
Sand	A3			surface	2	Heat cracked cobbles
Sand	A3A	1	47	1/2 or 1	3	Heat cracked cobbles
Sand	A3B	4		17	32	Heat cracked cobbles
Sand	A3B	4		17	30	Heat cracked – no cortex

Sand	A3B	4		17	24	Heat cracked cobbles
Sand	A3B	4		17	19	Heat cracked – no cortex
Sand	A3B	4		17	50	Heat cracked cobbles
Sand	A3B	4		17	16	Heat cracked cobbles
Sand	A3B	4		17	11	Heat cracked – no cortex
Sand	A3B	7		17	3	Heat cracked – no cortex
Sand	A3B	7		17	5	Heat cracked cobbles
Sand	A3B	7		17	4	Heat cracked cobbles
Sand	A3B	7		17	2	Heat cracked – no cortex
Sand	A3B	7		17	6	Heat cracked cobbles
Sand	A3B	7		17	4	Heat cracked cobbles
Sand	A3B	5		17	16	Heat cracked cobbles
Sand	A3B	5		17	34	Heat cracked – no cortex
Sand	A3B	5		17	7	Heat cracked cobbles
Sand	A3B	5		17	6	Heat cracked – no cortex
Sand	A3B	5		17	6	Heat cracked – no cortex
Sand	A3B	5		17	12	Heat cracked cobbles
Sand	A3B	5		17	5	Heat cracked cobbles
Sand	A3B	6		17	9	Heat cracked cobbles
Sand	A3B	6		17	5	Heat cracked cobbles
Sand	A3B	6		17	4	Heat cracked cobbles
Sand	A3B	6		17	2	Heat cracked – no cortex
Sand	A3B	6		17	3	Heat cracked cobbles
Sand	A3B	6		17	3	Heat cracked – no cortex
Sand	A3B	9		25	1	Heat cracked – no cortex
Sand	A3B	3		29	19	Heat cracked cobbles
Sand	A3B	3		29	16	Heat cracked cobbles
Sand	A3B	3		29	16	Heat cracked cobbles
Sand	A3B	3		29	7	Heat cracked cobbles
Sand	A3B	2		29	37	Heat cracked cobbles
Sand	A3B	2		29	10	Heat cracked cobbles
Sand	A3B	2		29	4	Heat cracked – no cortex
Sand	A3B	2		29	8	Heat cracked cobbles
Sand	A3B	2		29	5	Heat cracked cobbles
Sand	A3B	2		29	4	Heat cracked cobbles
Sand	A3B	1			1	Heat cracked cobbles
Sand	A4B	1	53	1	3	Heat cracked cobbles
Sand	A4B	1	63	1	6	Heat cracked cobbles
Sand	A4B	4	67	17	10	Heat cracked cobbles
Sand	A4B	4	67	17	74	Heat cracked – no cortex

Sand	A4b	3	78	17	23	Heat cracked cobbles
Sand	A4B	3	78	17	16	Heat cracked – no cortex
Sand	A4B	3		17	18	Heat cracked cobbles
Sand	A4B	3		17	14	Heat cracked – no cortex
Sand	A4B	3		17	12	Heat cracked cobbles
Sand	A4B	3		17	3	
Sand	A4B	3		17	4	Heat cracked cobbles
Sand	A4B	5		17	6	Heat cracked stone
Sand	A4B	5		17	20	Heat cracked cobbles
Sand	A4B	5	84	17	8	Heat cracked cobbles
Sand	A4B	5	84	17	39	Heat cracked – no cortex
Sand	A4B	6		17	4	Heat cracked stone
Sand	A4B	6		17	10	Heat cracked cobbles
Sand	A4B	2	48	17	1	Heat cracked cobbles
Sand	A4B	2		17	5	Heat cracked cobbles
Sand	A4B	2		17	18	Heat cracked cobbles
Sand	A4B	2		17	5	Heat cracked cobbles
Sand	A4B	6		17	7	Heat cracked cobbles
Sand	A4B	6		17	4	Heat cracked cobbles
Sand	A4B	6		17	11	Heat cracked – no cortex
Sand	A4B	7		17	2	Heat cracked cobbles
Sand	A4B	7		17	2	Heat cracked – no cortex
Sand	A4B	7		17	3	Heat cracked cobbles
Sand	A4B	7		17	1	Heat cracked – no cortex
Sand	A5B	1	44	1	1	Heat cracked cobbles
Sand	A5B	1	52	1	1	Heat cracked cobbles
Sand	A5B	1	49	1	5	Heat cracked cobbles
Sand	A5B	2		17	7	Heat cracked cobbles
Sand	A5B	2		17	10	Heat cracked cobbles
Sand	A5B	5		25	4	Heat cracked cobbles
Sand	A5B	5		25	6	Heat cracked – no cortex
Sand	A5B	5		25	3	Heat cracked cobbles
Sand	A5B	5		25	1	Heat cracked cobbles
Sand	A5B	5		25	1	Heat cracked – no cortex
Sand	A5B	3		25	8	Heat cracked – no cortex
Sand	A5B	3		25	4	Heat cracked cobbles
Sand	A5B	3		25	2	Heat cracked cobbles
Sand	A5B	3		25	4	Heat cracked – no cortex
Sand	A5B	6		25	1	Heat cracked – no cortex
Sand	A5B	4	74	25	2	Heat cracked cobbles
Sand	A5B	7		26	1	Heat cracked cobbles

Sand	A6B	1	51	1	4	Heat cracked cobbles
Sand	A6B	1	54	1	3	Heat cracked cobbles
Sand	A6B	1		1	4	Heat cracked cobbles
Sand	A6B	3	89	17	5	Heat cracked cobbles
Sand	A6B	3	89	17	4	Heat cracked – no cortex
Sand	A6B	3	89	17	4	Heat cracked cobbles
Sand	A6B	3		17	1	Heat cracked cobbles
Sand	A6B	4	68	17	12	Heat cracked cobbles
Sand	A6B	4	68	17	17	Heat cracked – no cortex
Sand	A6B	4		17	2	Heat cracked cobbles
Sand	A6B	4		17	4	Heat cracked cobbles
Sand	A6B	2		17	2	Heat cracked cobbles
Sand	A6B	2		17	1	Heat cracked cobbles
Sand	A6B	2		17	5	Heat cracked cobbles
Sand	A6B	25		25	8	Heat cracked – no cortex
Sand	A6B	6	93	26	6	Heat cracked – no cortex
Sand	A10A	1		n/a	1	Heat cracked cobbles
Sand	A12B	1	45	n/a	1	Heat cracked cobbles
Sand	A13A	1	63	n/a	2	Heat cracked cobbles
Sand	A14B	1	91	n/a	1	Heat cracked cobbles
Sand	A16B	1	56	n/a	3	Heat cracked cobbles
Sand	A16B	2	75	n/a	2	Heat cracked cobbles
Sand	A17B	1	39	n/a	1	Heat cracked cobbles
Sand	B1A	3		13	3	Heat cracked cobbles
Sand	B1A	3		13	18	Heat cracked – no cortex
Sand	B1A	4		13	2	Heat cracked – no cortex
Sand	B1A	2		1/2	6	Heat cracked cobbles
Sand	B1A	2		1/2	20	Heat cracked – no cortex
Sand	B1B	4		24	18	Heat cracked cobbles
Sand	B1B	4		24	10	Heat cracked – no cortex
Sand	B1B	4		24	1	Heat cracked cobbles
Sand	B1B	2		1/2	4	Heat cracked cobbles
Sand	B1B	3		1/2	5	Heat cracked – no cortex
Sand	B1B	3		1/2	10	Heat cracked cobbles
Sand	B1B	3		1/2	4	Heat cracked cobbles
Sand	B1B	3		1/2	5	Heat cracked – no cortex
Sand	B2A	3		13	35	Heat cracked stone
Sand	B2A	2		1/2	13	Heat cracked – no cortex
Sand	B2B	2		1/2	3	Heat cracked – no cortex
Sand	B2B	4	62	13/24	32	Heat cracked – no cortex

Sand	B2B	4	62	13/24	2	Heat cracked cobbles
Sand	B2B	4	61	13/24	2	Heat cracked cobbles
Sand	B2B	4	61	13/24	6	Heat cracked – no cortex
Sand	B2B	4		13/24	3	Heat cracked stone
Sand	B3A	1	36	1	1	Heat cracked stone
Sand	B3B	3		1	1	Heat cracked cobbles
Sand	B3B	3		1	4	Heat cracked cobbles
Sand	B3B	2	31	1	5	Heat cracked – no cortex
Sand	B3B	2		1	1	Heat cracked cobbles
Sand	B3B	2	22	1	2	Heat cracked cobbles
Sand	B3B	2	22	1	5	Heat cracked – no cortex
Sand	B3B	2		1	2	Heat cracked – no cortex
Sand	B3B	1		1	6	Heat cracked cobbles
Sand	B3B	1		1	6	Heat cracked – no cortex
Sand	B3B	5	103	13	1	Heat cracked cobbles
Sand	B3B	5		13	3	Heat cracked cobbles
Sand	B3B	5		13	5	Heat cracked cobbles
Sand	B3B	5		13	5	Heat cracked cobbles
Sand	B3B	5		13	10	Heat cracked – no cortex
Sand	B3B	5		13	2	Heat cracked – no cortex
Sand	B3B	5		13	5	Heat cracked cobbles
Sand	B3B	9		22	5	Heat cracked – no cortex
Sand	B3B	9		22	1	Heat cracked – no cortex
Sand	B3B	4	48	1/2	1	Heat cracked cobbles
Sand	B3B	4		1/2	5	Heat cracked cobbles
Sand	B3B	4	42	1/2	6	Heat cracked cobbles
Sand	B3B	6		13/23	1	Heat cracked cobbles
Sand	B3B	6		13/23	2	Heat cracked cobbles
Sand	B3B	6		13/23	1	Heat cracked – no cortex
Sand	B3B	6		13/23	1	Heat cracked cobbles
Sand	B3B	7		13/23	1	Heat cracked cobbles
Sand	B3B	7		13/23	5	Heat cracked – no cortex
Sand	B3B	7		13/23	1	Heat cracked – no cortex
Sand	B3B	7		13/23	4	Heat cracked cobbles
Sand	B3B	7		13/23	22	Heat cracked – no cortex
Sand	B3B	8		13/23/24	5	Heat cracked cobbles
Sand	B3B	8		13/23/24	1	Heat cracked cobbles
Sand	B3B	8		13/23/24	2	Heat cracked – no cortex
Sand	B3B	8		13/23/24	3	Heat cracked – no cortex
Sand	B3B	8		13/23/24	6	Heat cracked cobbles
Sand	B3B	8		13/23/24	1	Heat cracked cobbles

Sand	B4A	1	40	1/3 or 1	1	Heat cracked stone
Sand	B4A	1	41	1/3 or 1	2	Heat cracked cobbles
Sand	B4B	2		1	2	Heat cracked cobbles
Sand	B4B	2		1	4	Heat cracked – no cortex
Sand	B4B	2		1	3	Heat cracked cobbles
Sand	B4B	3		1	1	Heat cracked cobbles
Sand	B4B	3		1	5	Heat cracked cobbles
Sand	B4B	8		21	7	Heat cracked – no cortex
Sand	B4B	4		1/2	3	Heat cracked cobbles
Sand	B4B	4		1/2	5	Heat cracked – no cortex
Sand	B4B	4		1/2	6	Heat cracked cobbles
Sand	B4B	4		1/2	2	Heat cracked cobbles
Sand	B4B	4		1/2	2	Heat cracked – no cortex
Sand	B4B	4		1/2	1	Heat cracked cobbles
Sand	B4B	5		1/2	3	Heat cracked cobbles
Sand	B4B	5		1/2	2	Heat cracked cobbles
Sand	B4B	5		1/2	5	Heat cracked cobbles
Sand	B4B	1		1/3	3	Heat cracked cobbles
Sand	B4B	6		7/8	3	Heat cracked cobbles
Sand	B4B	6		7/8	5	Heat cracked – no cortex
Sand	B4B	6		7/8	1	Heat cracked cobbles
Sand	B4B	6		7/8	3	Heat cracked cobbles
Sand	B4B	7		7/8	19	Heat cracked – no cortex
Sand	B5B	3		1	3	Heat cracked cobbles
Sand	B5B	3		1	5	Heat cracked cobbles
Sand	B5B	3		1	2	Heat cracked cobbles
Sand	B5B	3		1	7	Heat cracked cobbles
Sand	B5B	2		1	4	Heat cracked cobbles
Sand	B5B	2		1	5	Heat cracked – no cortex
Sand	B5B	2		1	8	Heat cracked cobbles
Sand	B5B	2		1	7	Heat cracked – no cortex
Sand	B5B	2		1	36	Heat cracked – no cortex
Sand	B5B	2		1	5	Heat cracked cobbles
Sand	B5B	5		1	1	Heat cracked cobbles
Sand	B5B	4		1/2	7	Heat cracked cobbles
Sand	B5B	4		1/2	8	Heat cracked cobbles
Sand	B5B	4		1/2	4	Heat cracked cobbles
Sand	B5B	4		1/2	5	Heat cracked cobbles
Sand	B5B	4		1/2	16	Heat cracked – no cortex
Sand	B5B	7		7/8	12	Heat cracked – no cortex

Sand	B5B	7		7/8	1	Heat cracked – no cortex
Sand	B5B	7		7/8	6	Heat cracked – no cortex
Sand	B5B	6		7/8	4	Heat cracked cobbles
Sand	B5B	6		7/8	2	Heat cracked – no cortex
Sand	B5B	6		7/8	2	Heat cracked cobbles
Sand	B5B			n/a	5	Heat cracked cobbles
Sand	B6B	4		1	3	Heat cracked cobbles
Sand	B6B	4		1	6	Heat cracked cobbles
Sand	B6B	4		1	4	Heat cracked – no cortex
Sand	B6B	4		1	1	Heat cracked cobbles
Sand	B6B	4		1	2	Heat cracked – no cortex
Sand	B6B	4		1	11	Heat cracked cobbles
Sand	B6B	5		1	4	Heat cracked cobbles
Sand	B6B	3		1	3	Heat cracked cobbles
Sand	B6B	3		1	2	Heat cracked – no cortex
Sand	B6B	3		1	1	Heat cracked cobbles
Sand	B6B	1		1	1	Heat cracked cobbles
Sand	B6B	2		1	2	Heat cracked cobbles
Sand	B6B	2		1	4	Heat cracked cobbles
Sand	B6B	2		1	1	Heat cracked – no cortex
Sand	B6B	2		1	3	Heat cracked cobbles
Sand	B6B	2		1	12	Heat cracked – no cortex
Sand	B6B	2		1	3	Heat cracked cobbles
Sand	B6B	2		1	2	Heat cracked – no cortex
Sand	B6B	6		7/8	4	Heat cracked cobbles
Sand	B6B	6		7/8	11	Heat cracked – no cortex
Sand	B6B	6		7/8	7	Heat cracked – no cortex
Sand	B7B	1		1	2	Heat cracked cobbles
Sand	B7B	1		1	1	Heat cracked cobbles
Sand	B7B	4		1	8	Heat cracked – no cortex
Sand	B7B	4		1	1	Heat cracked cobbles
Sand	B7B	4		1	4	Heat cracked cobbles
Sand	B7B	4		1	1	Heat cracked cobbles
Sand	B7B	3		1	1	Heat cracked cobbles
Sand	B7B	2		1	5	Heat cracked cobbles
Sand	B7B	2		1	1	Heat cracked cobbles
Sand	B7B	2		1	1	Heat cracked – no cortex
Sand	B7B	2		1	8	Heat cracked cobbles
Sand	B7B	2		1	7	Heat cracked – no cortex
Sand	B7B	7		5	2	Heat cracked cobbles
Sand	B8B	4		14	23	Heat cracked – no cortex

Sand	B14B	1		n/a	1	Heat cracked cobbles
Sand	B14B	5		n/a	3	Heat cracked – no cortex
Sand	B22A	1		n/a	1	Heat cracked cobbles
Sand	B24A	5		13	2	Heat cracked – no cortex
Sand	B24A	5		13	1	Heat cracked cobbles
Sand	B24A	6		13	5	Heat cracked – no cortex
Sand	B24A	2		13	2	Heat cracked – no cortex
Sand	B24A	3		13	6	Heat cracked – no cortex
Sand	B24A	8		13	2	Heat cracked – no cortex
Sand	B24A	8		13	12	Heat cracked – no cortex
Sand	B24A	7		13	5	Heat cracked – no cortex
Sand	B24A	7		13	1	Heat cracked cobbles
Sand	B24A	7		13	3	Heat cracked – no cortex
Sand	B24A	4		13	1	Heat cracked cobbles
Sand	B24A	4		13	1	Heat cracked cobbles
Sand	B24A	4		13	1	Heat cracked – no cortex
Sand	B24A	9		n/a	10	Heat cracked – no cortex
Sand	B24B	3		11	26	Heat cracked – no cortex
Sand	B24B	3		11	2	Heat cracked cobbles
Sand	B24B	3		11	1	Heat cracked – no cortex
Sand	B24B	4		11	1	Heat cracked cobbles
Sand	B24B	2		12	5	Heat cracked cobbles
Sand	B24B	2		12	18	Heat cracked – no cortex
Sand	B24B	2		12	3	Heat cracked cobbles
Sand	B24B	2		12	8	Heat cracked – no cortex
Sand	B25A	2		1	1	Heat cracked cobbles
Sand	B25A	2		1	17	Heat cracked – no cortex
Sand	B25A	3		1	4	Heat cracked cobbles
Sand	B25A	3		1	7	Heat cracked – no cortex
Sand	B25A	6		n/a	1	Heat cracked cobbles
Sand	B25A	6		n/a	39	Heat cracked – no cortex
Sand	B25A	6		n/a	6	Heat cracked – no cortex
Sand	B25A	6		n/a	5	Heat cracked cobbles
Sand	B25A	4		n/a	4	Heat cracked – no cortex
Sand	B25A	4		n/a	1	Heat cracked cobbles
Sand	B25A	5		n/a	1	Heat cracked – no cortex
Sand	B25A	4		n/a	1	Unused cobble Flat and round and cracked – possible plate?
Sand	B25B	3		1	23	Heat cracked – no cortex
Sand	B25B	3		1	1	Heat cracked cobbles
Sand	B25B	4		1	1	Heat cracked – no cortex

Sand	B25B	5		n/a	1	Heat cracked – no cortex

Catalogue of Non-Artefactual Fractured Stone from Other Sites

Download the data from ‘`Coarse_Stone_catalogue_sheet2.csv`’.

Site	SFS	Trench	Context	Sample/Find number	Quantity	Description
Crowlin 1	SFS 2			C17	1	Heat cracked – no cortex
Loch a Sguirr	SFS 8	TP7	TP7		1	Heat cracked cobbles
Loch a Sguirr	SFS 8	TP9	5		2	Heat cracked cobbles
Loch a Sguirr	SFS 8	TP9	8		2	Heat cracked cobbles
Toscaig 2	SFS 20		1	S1025	4	Heat cracked cobbles
Toscaig 2	SFS 20			S1026	4	Heat cracked – no cortex
Toscaig 2	SFS 20		2	S1027	1	Heat cracked cobbles
Toscaig 2	SFS 20		2	S1029	8	Heat cracked cobbles
Toscaig 2	SFS 20		4	S1030	12	Heat cracked cobbles
Toscaig 2	SFS 20		9	S1034	3	Heat cracked cobbles
Toscaig 2	SFS 20		11	S1037	1	Heat cracked cobbles
Toscaig 2	SFS 20	TP2	11	S1037/C58	4	Heat cracked cobbles
Toscaig 2	SFS 20		5	S1039	11	Heat

						cracked cobbles
Toscaig 2	SFS 20		7	S1041	16	Heat cracked cobbles
Toscaig 2	SFS 20			S1043	1	Heat cracked cobbles
Toscaig 2	SFS 20	TP1	1	S1045/C93	1	Heat cracked cobbles
Toscaig 2	SFS 20		11	S1045	17	Heat cracked cobbles
Toscaig 2	SFS 20		12	S1046	7	Heat cracked cobbles
Toscaig 2	SFS 20		2006	S2	2	Heat cracked cobbles
Toscaig 2	SFS 20		1		1	Heat cracked – no cortex
Toscaig 2	SFS 20	TP2	2	C60	1	Heat cracked cobbles
Toscaig 2	SFS 20	TP2	5	C59	1	Heat cracked cobbles
Toscaig 2	SFS 20		10	S1044	7	Heat cracked cobbles
Toscaig 2	SFS 20		4	S1038	2	Heat cracked – no cortex
Toscaig 2	SFS 20	TP1		S1040/C84	2	Heat cracked cobbles
Crowlin 3	SFS 22	1	8		1	Heat cracked cobbles
Crowlin 3	SFS 22		3002		7	Heat cracked – no cortex
Crowlin 3	SFS 22		3003		1	Heat

						cracked cobbles
Crowlin 4	SFS 23	TP1	1	S1105	2	Heat cracked cobbles
Crowlin 7	SFS 26	TP2	1	S1089	2	Heat cracked cobbles
Toscaig 9	SFS 41	TP2	2	C24	1	Heat cracked cobbles
Toscaig 9	SFS 41			S1016	1	Heat cracked cobbles
Toscaig 9	SFS 41			S1019	2	Heat cracked cobbles
Toscaig 9	SFS 41			S1020	1	Heat cracked cobbles
Toscaig 9	SFS 41			S1023	1	Heat cracked cobbles
Druim an Aonaich, Raasay	SFS 47			R1/17/1	1	Heat cracked cobbles
Pabay 1	SFS 50				1	Heat cracked cobbles
Rubha a Ghair	SFS 57			S1047	2	Heat cracked cobbles
Rubha Chuaig	SFS 58			S4	1	Heat cracked cobbles
Rubha Chuaig	SFS 58		2		1	Heat cracked cobbles
Rubha Chuaig	SFS 58				1	Heat cracked – no cortex
Rubha Chuaig	SFS 58				1	Heat cracked cobbles
Ard Clais Salacher	SFS 66	TP1	1	C87	1	Heat

2						cracked cobbles
Ard Clais Salacher 2	SFS 66	TP1	1	C88	1	Heat cracked cobbles
Allt na Criche	SFS 68	TP1	2	C95	2	Heat cracked cobbles
Allt na Criche	SFS 68	TP3	2	C98	1	Heat cracked cobbles
Allt na Criche	SFS 68	TP2	2	S1064	3	Heat cracked cobbles
Allt na Criche	SFS 68	TP2	3	S1066	3	Heat cracked cobbles
Allt na Criche	SFS 68	TP1	4	S1067	4	Heat cracked cobbles
Allt na Criche	SFS 68	TP1	5	S1068	1	Heat cracked cobbles
Allt na Criche	SFS 68	TP1	6	S1069	7	Heat cracked cobbles
Allt na Criche	SFS 68	TP2	4	S1086	1	Heat cracked – no cortex
Allt na Criche	SFS 68	TP3	2	S1087	3	Heat cracked cobbles
Allt na Criche	SFS 68	TP2	1		1	Heat cracked cobbles
Sand 5	SFS 71	TP1	3	S1092	1	Heat cracked cobbles
Sand 5	SFS 71	TP1	3	S1094	2	Heat cracked cobbles
Camusteel 2	SFS 77	TP1	2	S 1099	6	Heat cracked cobbles
Camusteel 2	SFS 77	TP1	7	S1102	1	Heat

						cracked cobbles
Camusteel 2	SFS 77	TP1	6	S1103	1	Heat cracked – no cortex
Camusteel 2	SFS 77				2	Heat cracked cobbles
Camusteel 3	SFS 78	TP1	2	S1097	2	Heat cracked cobbles
Coire Sgamhadail 1-2	SFS 89	TP2	1	S1053	10	Heat cracked cobbles
Coire Sgamhadail 1-2	SFS 89	TP2	1	S1053	3	Heat cracked – no cortex
Coire Sgamhadail 1-2	SFS 89	TP1	3	CSC103	55	Heat cracked cobbles
Coire Sgamhadail 1-2	SFS 89	TP1	3	CSC103	12	Heat cracked – no cortex
Coire Sgamhadail 1-2	SFS 89	TP1	3	CSC103	1	Lump of vesicular slag
Coire Sgamhadail 1-2	SFS 89	TP1	3	CSC103	2	Unworked cobbles, burnt
Coire Sgamhadail 1-2	SFS 89	TP1	1	CSC101	1	Heat cracked – no cortex
Coire Sgamhadail 1-2	SFS 89	TP2	1	S1057	7	Heat cracked cobbles
Coire Sgamhadail 1-2	SFS 89	TP1	4	S1058	8	Heat cracked cobbles
Coire Sgamhadail 1-2	SFS 89	TP1	4	S1058	12	Heat cracked – no cortex
Coire Sgamhadail 3-6	SFS 90	TP1	1	S1054	4	Heat cracked cobbles
Coire Sgamhadail	SFS 90	CS21		S1073	6	Heat

						cracked cobbles
Coire Sgamhadail 3	SFS 90	CS22		S1074	2	Heat cracked cobbles
Fraser's Croft	SFS 100	TP1	2	S1079	4	Heat cracked cobbles
Fearnmore 1	SFS 104	TP5	1	S1111	11	Heat cracked cobbles
Fearnmore 1	SFS 104	TP5	1		1	Heat cracked cobbles
Fearnmore 1	SFS 104	TP4	1		8	Heat cracked cobbles
Uags 1	SFS 105	TP1	1	S1107	1	Heat cracked – no cortex
Uags 1	SFS 105	TP1	2	S1108	1	Heat cracked cobbles
Creag Ban	SFS 125			R1/8/1	1	Heat cracked cobbles
R1/20	SFS 136			R1/20/1	2	Heat cracked cobbles
	Toscaig	9		S1043	1	Heat cracked cobbles
	Toscaig	3			1	Heat cracked cobbles
	Toscaig	3			2	Heat cracked cobbles
	TP4a				2	Heat cracked cobbles
	Trench 9	4			1	Heat cracked cobbles

Catalogue of Unused Cobbles

Download the data from '`Coarse_Stone_catalogue_sheet3.csv`'.

NB: Grid squares B24/25. This catalogue preserves the original grid references as recorded on site. A recording error during excavation means that the location of material from these grid squares is uncertain.

Trench		Spit		Context	Dimensions	Notes
TP4		4			117×70×28	
TP4		4			95×60×52	
A01B		8		22	78×60×36	
A01B				22/25	100×60×44	
A01B				22/25	53×49×40	
A02B		9		27		
A02B		9		27	95×65×48	
A02B		9		27	62×56×40	
A02B		9		27	67×57×43	
A02B		9		27	107×54×47	
A02B		10		22	62×52×36	
A02B		8		22	80×68×25	burnt
A02B		9		22	73×51×28	
A02B		10		22	43×35×23	
A02B		9		27	75×52×41	
A03B		7		17	115×63×32	
A03B		7		17	86×52×48	
A03B		6		17	95×83×48	burnt
A03B		8		17	83×70×47	
A03B		8		17	100×68×31	
A03B		8		17	63×53×27	
A03B		8		17	75×53×38	
A03B		8		17	102×73×23	
A03B		2		29	94×94×58	burnt
A04B		7		17	73×59×39	
A04B		1		1	33×32×21	
A08B		1		n/a	57×57×52	burnt
A11A		1		n/a	93×86×59	
A16B		1	55	n/a	95×67×30	
B01A		3		13	112×60×42	
B01B		1		1/2	164× 46×40	
B02					103×47×33	
B03B		8		13/23/24	95×54×26	
B03B		10		22	75×53×35	

B03B		9		22	63×56×28	
B03B		7		13/23	94×68×45	
B03B		6		13/23	57×50×28	
B03B		9		22	120×78×57	
B04B		8		21	138×87×40	
B04B		8		21	81×53×38	
B04B		2		1	94×62×45	
B04B		7		7/8	91×54×41	
B04B		8		21	93×67×38	
B04B		8		21	74×64×21	
B04B		8		21	120×73×38	
B04B		8		21	64×60×38	
B04B		5		1/2	62×40×22	
B05A		1		1	40×32×22	
B05B		7		7/8	98×60×55	
B05B		7		7/8	70 52×45	
B05B		4		1/2	70×60×48	
B05B		6		7/8	58×52×41	
B05B		6		7/8	60×45×34	
B05B		6		7/8	52×42×14	
B05B		6		7/8	52×36×13	
B05B		6		7/8	93×65×40	
B05B		6		7/8	90×82×42	
B06A		1		1	83×68×41	
B07A		1		1	98×60×47	
B07A		1		1	77×75×46	
B07B		2		1	64×48×30	
B07B		3		1	55×42×25	
B13A		1		n/a	118×48×47	
B20B		1		n/a	72×56×34	
B24B		7			132×43×37	burnt
B25A		3		1	111×65×20	burnt
B25A		3		1	92×56×42	burnt

Trench	Site	Spit	TP/Ref	Context	Dimensions	Notes
SFS 2	Crowlin 1	2	TP1	C7	158×63×51	
SFS 2	Crowlin 1		C302	C6	92×65×45	burnt
SFS 2	Crowlin 1				138×55×24	burnt
SFS 6	Ashaig 1			C1	111×111×75	
SFS 8	Loch a Sguirr	3	TP6		62×42×29	

SFS 8	Loch a Sguirr	2	TP2		93×68×42	
SFS 19	Toscaig 1	surface		C73	88×86×76	burnt
SFS 19	Toscaig 1	surface		C16	53×55×30	
SFS 20	Toscaig 2				253×92×80	
SFS 20	Toscaig 2			S1040/C84	102×38×22	burnt
SFS 20	Toscaig 2	11		S1045	95×64×22	
SFS 20	Toscaig 2	11		S1045	104×58×22	
SFS 20	Toscaig 2	10		S1035/C66	67×51×14	burnt
SFS 20	Toscaig 2	10		S1035/C66		
SFS 20	Toscaig 2	3			111×56×27	
SFS 20	Toscaig 2		TP1	C61	58×39×26	
SFS 20	Toscaig 2	11		S1037/C57	77×54×30	
SFS 20	Toscaig 2	5			120×100×20	burnt
SFS 20	Toscaig 2	5			73×67×20	burnt
SFS 20	Toscaig 2	5			73×38×20	burnt
SFS 20	Toscaig 2	5			120×27×40	burnt
SFS 20	Toscaig 2	5			65×32×17	burnt
SFS 20	Toscaig 2	5			55×25×15	burnt
SFS 20	Toscaig 2	5			90×40×30	burnt
SFS 20	Toscaig 2	6	TP2	C50	99×44×24	
SFS 20	Toscaig 2	4		S1038	79×73×19	
SFS 41	Toscaig 9	2		C25	115×52×25	burnt
SFS 49	Creag na-h-Uamha	1			120×55×38	burnt
SFS 49	Creag na-h-Uamha	1			102×65×51	burnt
SFS 66	Ard Clais Salacher		C6611	C86	175×108×63	burnt
SFS 66	Ard Clais Salacher		C6611	C86	92×68×68	burnt
SFS 66	Ard Clais Salacher		C6611	C86	73×73×41	
SFS 66	Ard Clais Salacher		C6612	C79,80	106×82×40	
SFS 66	Ard Clais Salacher		C6612	C79,80	76×59×35	
SFS 66	Ard Clais Salacher		C6614	C81	106×68×36	burnt
SFS 68	Allt na Criche		C6832	C99	135×98×43	
SFS 68	Allt na Criche		C6832	C99	120×63×35	
SFS 78	Camusteel 1		C7811	S1096		
SFS 99	Clachan Church Midden		C9911	S1083	99×60×28	
SFS 105	Uags 1		C10512	S1108	105×52×20	
Survey		R1/12/1			95×65×35	burnt

Catalogue of Coarse Stone

NB: Grid squares B24/25. This catalogue preserves the original grid references as recorded on site. A recording error during excavation means that the location of material from these grid squares is uncertain.

Catalogue of Coarse Stone from Sand

Cat no	Site	Trench	Spit	Context	Description	Dimensions
ST11	Sand	A1B	8	22	Facially pecked/dished cobble. Oval cobble of coarse grained sandstone. Pecking in centre of one face has formed a dished face with a smooth finish 18mm in diameter.	ML 75mm; MW 51mm; MTh 38mm
ST9	Sand	A2B	10	22	Facially pecked cobble. Oval cobble of medium grained sandstone. Single patches of pecking on both faces are linear in character.	ML 80mm; MW 50mm; MTh 39mm
ST12	Sand	A2B	10	22	Facially pecked/dished cobble. Irregular shaped cobble of fine-grained sandstone. A circular patch of pecking in centre of one face is slightly dished with a rough finish 24mm in diameter.	ML 118mm; MW 63mm; MTh 71mm
ST29	Sand	A2B	8	27	Facially pecked cobble. Oval cobble of fine grained sandstone. Patch of light pecking in centre of flatter face.	ML 66mm; MW 52mm; MTh 36mm
ST33	Sand	A2B	9	27	Facially pecked cobble. Sub-oval cobble of coarse grained sandstone. Patch of heavy pecking to the side of one face.	ML 109mm; MW 88mm; MTh 52mm
ST38	Sand	A2B	9	27	Plain hammerstone. Oval cobble of medium grained sandstone. Small patches of rough pecking around perimeter.	ML 80mm; MW 60mm; MTh 47mm
ST6	Sand	A3B	7	17	Facially pecked/dished cobble. Oval cobble of medium grained sandstone. Pecking in centre of both faces has formed a dished face with smooth surface 19–21mm in diameter and 2–3mm deep.	ML 70mm; MW 58mm; MTh 40mm
ST16	Sand	A3B	6	17	Plain hammerstone. Oval cobble of sandstone. Patch of light pecking on either end.	ML 78mm; MW 61mm; MTh 50mm
ST28	Sand	A3B	8	17	Facially pecked cobble. Flat oval pebble of coarse grained	ML 64mm; MW 43mm;

					sandstone. Abraded. Patch of linear pecking in centre of one face.	MTh 21mm
ST31	Sand	A3B	7	17	Facially pecked/dished cobble. Oval cobble of fine grained sandstone. Patch of light pecking in centre of flatter face with very shallow smooth dished area 15mm in diameter.	ML 69mm; MW 57mm; MTh 34mm
ST19	Sand	A4B	6	17	Facially pecked cobble. Irregular shaped cobble of quartzite. Circular patch of light pecking in centre of broadest face.	ML 80mm; MW 67mm; MTh 46mm
ST27	Sand	B24A	2	13	Facially pecked cobble. Oval cobble of medium grained sandstone. Small patch of heavy pecking towards one end on one face. Some light pecking on opposite end.	ML 101mm; MW 63mm; MTh 45mm
ST20	Sand	B3A	1	1	Plain hammerstone. Flat oval cobble of coarse grained sandstone. Heavy pecking has caused flaking from both ends and one side.	ML 120mm; MW 83mm; MTh 43mm
ST2	Sand	B3B	9	22	Facially pecked cobble. Oval cobble of sandstone. Small patch of pecking placed just off-centre on one face. Pecking 15mm diameter and quite light. Very light smooth facet ground on one end.	ML 96mm; MW 65mm; MTh 42mm
ST7	Sand	B3B	8	13/23/24	Facially pecked/dished cobble. Oval cobble of coarse grained sandstone. Pecking in centre of both faces has formed a dished face slightly rough in finish 20mm in diameter. One face has another indentation.	ML 90mm; MW 82mm; MTh 40mm
ST32	Sand	B3B	6	13/23	Facially pecked/dished cobble. Oval cobble of fine grained sandstone. Patch of light pecking in centre of flatter face with very slight smooth dish 14mm in diameter.	ML 47mm; MW 44mm; MTh 29mm
ST37	Sand	B3B	8	13/23/24	Facially pecked cobble. Oval cobble of medium grained sandstone. Circular patch of pecking on one	ML 71mm; MW 53mm; MTh 53mm

					face. Spread of pecking down one side.	
ST3	Sand	B4B	6	7/8	Facially pecked/dished cobble. Oval cobble of coarse grained sandstone Pecking in the centre of one face has caused a slightly dished surface with a smooth surface 19mm in diameter. Smaller patch of pecking on opposite face. Some moderate pecking down one side too.	ML 78mm; MW 67mm; MTh 42mm
ST10	Sand	B5B	3	1	Facially pecked cobble. Oval cobble of medium-grained sandstone. Circular patch of heavy pecking on one face. Extensive spread of heavy pecking down length of opposite face. Rough pecking on both sides too.	ML 94mm; MW 52mm; MTh 45mm
ST25	Sand	B5B	n/a		Plain hammerstone. Narrow, elongate cobble of medium-grained sandstone. Broken across width. Spread of pecking around surviving end.	Broken L 76mm; MW 45mm; MTh 37mm
ST5	Sand	B6A	1	1	Facially pecked/dished cobble. Oval cobble of coarse-grained sandstone. Pecking in centre of one face has formed a dished face with a smooth finish 29mm in diameter and 2–3mm deep. A circular patch of pecking on opposite face.	ML 78mm; MW 68mm; MTh 45mm
ST13	Sand	B6B	4	1	Ground cobble. Small cobble of fine grained sandstone. The cobble has been shaped to a sub-circular outline by pecking and then grinding forming a broad facet around most of the perimeter. Single patches of pecking in centre of both faces.	ML 46mm; MW 44mm; MTh 34mm
ST22	Sand	B6B	6	7/8	Facially pecked cobble. Oval cobble of medium grained sandstone. Spread of light pecking over one face.	ML 70mm; MW 61mm; MTh 46mm
ST39	Sand	B6B	4	7	Facially pecked cobble. Oval cobble of medium grained sandstone. Very light pecking in centre of one	ML 81mm; MW 66mm; MTh 43mm

					face.	
ST1	Sand	B7B	3	1	Facially pecked cobble. Flat oval sandstone cobble. Broken across width. Circular patch of pecking forming slight rough-bottomed hollow is placed towards one end of the cobble. 17mm diameter.	Broken L 65mm; MW 69mm; MTh 24mm
ST36	Sand	B7B	3	1	Facially pecked cobble. Large cobble of quartzite. Broken. Small patches of pecking on parts of surviving surface.	Broken L 120mm; MW 102mm; MTh 63mm
ST4	Sand	B8B	3	14	Facially pecked/dished cobble. Oval cobble of coarse grained sandstone. Pecking in centre of both faces has caused dished surfaces with a smooth finish 15–20mm in diameter and 2-3mm deep.	ML 65mm; MW 55mm; MTh 33mm
ST8	Sand	B8B	4	14	Facially pecked cobble. Oval cobble of medium grained sandstone. Single patches of pecking on both faces, ends and one side.	ML 73mm; MW 64mm; MTh 47mm

Catalogue of Coarse Stone from other sites

Cat No	Site	SFS No	Test Pit	Sample/ Finds ref	Context	Description	Dimensions
ST21	Crowlin 1	SFS 2	TP3	C4	C302	Bevelled pebble. Sub-rectangular shaped cobble of fine grained sandstone. Broken across width. A bevel has been formed on unbroken end by a pecked facet and a naturally angled face.	Broken L 130mm; MW 36mm; MTh 27mm
ST23	Crowlin 1	SFS 2	TP1	C9	5	Plain hammerstone. Flat oval cobble of fine grained sandstone. Light pecking on ends and sides.	ML 124mm; MW 70mm; MTh 31mm

ST40	Crowlin 1	SFS 2	TP1	C8	1	Ground edge stone. Tabular piece of sandstone with one end pecked/lightly ground on both faces to form an acute edge angle with a curved outline	ML 83mm; MW 32mm; MTh 16mm
ST30	Toscaig 2	SFS 20	TP2	S1032	7	Whetstone/rubber? Narrow elongated cobble of fine grained sandstone. On three flat faces there are dark, shiny patches perhaps from use as a whetstone or rubber. Later prehistoric.	ML 111mm; MW 37mm; MTh 29mm
ST17	Toscaig 2	SFS 20	TP1	C74	1	Bevelled pebble. Flat oval cobble of fine grained sandstone. Two facets on either face of narrow end form a bevel. One of the facets is very heavily pecked.	ML 103mm; MW 57mm; MTh 18mm
ST	An Corran C	SFS 30	Location 6			Facially pecked cobble. Elongated oval cobble of coarse grained sandstone. Cracked from heat damage. Abraded. Localised patch of pecking towards one end of one face. Possible pecking around one end but difficult to tell because of weathering.	ML 106mm; MW 59mm; MTh 38mm

ST24	Toscaig 10	SFS 42	Surface	Surface	C62	Plain hammerstone. Oval cobble of coarse grained sandstone. Possible spreads of pecking over parts of the surface.	ML 123mm; MW 83mm; MTh 48mm
ST15	Rubha a Ghair	SFS 57	TP1	S1047		Bevelled pebble. Flat, sub-rectangular cobble of fine grained sandstone. Heat cracked. On one end two broad pecked facets form a bevel. Opposite end is broken but there are traces of faceting on either face which may indicate another bevelled end since broken, perhaps through use.	ML 120mm; MW 63mm; MTh 30mm
ST26	Allt na Criche	SFS 68	TP3	C97	C6832	Faceted cobble. Flat oval cobble of medium grained sandstone. Single broad, rounded facets pecked on either end. Some flaking from these facets. ?Later prehistoric	ML 126mm; MW 86mm; MTh 35mm
ST34	Coire Sgamhadail 1	SFS 89		S1073	CS21	Faceted cobble. Oval cobble of medium grained sandstone. Single broad, rounded facets pecked on either end. Large amount of flaking from these facets. ?Later prehistoric	ML 100mm; MW 84mm; MTh 58mm
ST18	Coire Sgamhadail	SFS 89	TP2	C8921	CSC121	Bevelled pebble. Flat, narrow	ML 141mm; MW 48mm;

	1					cobble of quartzite. Rough bevel on one end formed by two narrow pecked facets.	MTh 27mm
ST35	Fearnmore 1	SFS 104		S1111	C10451	Facially pecked cobble. Oval cobble of coarse grained sandstone. Spread of light pecking on one face.	ML 52mm; MW 50mm; MTh 37mm

NB: Grid squares B24/25. This catalogue preserves the original grid references as recorded on site. A recording error during excavation means that the location of material from these grid squares is uncertain.

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Appendix 6 – Catalogue of Worked Bone | Karen Hardy

There are 73 worked bone finds catalogued, with 26 tabulated fields. The data can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues`. From here you can download the file '`SFS__worked_bone_catalogue.csv`'.

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

NB: Square numbers have been left as recorded in excavation, they have *not* been corrected.

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Appendix 7 – Report on the Coarse Pottery | Ann MacSween

The data on this page can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents >. From here you can download the appropriate files:

- > Final reports > MacSween,_SFS_Pottery.pdf
- > Final reports > MacSween,_Sand_Pottery.pdf
- > Specialists reports > SFS_Pottery,_MacSween.pdf
- > Specialists reports > SFS_Pottery_Additional_material,_MacSween.pdf

This report presents the pottery finds from the Scotland's First Settlers project as a whole. Because of the diversity in site type, geographical location and chronology, it is presented as a catalogue. The more substantial sherds are recorded in full and small fragments and crumbs are listed. In the majority of cases the sherds were small or abraded and had no diagnostic attributes, and there are only a few instances where comment is made on the possible date of a sherd. As has been commented on in various papers (for example Lane 1990; Campbell 2002; MacSween 2002) fabric has yet to be proved a reliable indicator of date. Individual references to pottery finds are also included in the accounts of individual sites (see Sections 3.8 & 2.2 on Sand)

NB: 'P' numbers relate the catalogue entries back to the individual bags. For crumbs weighing less than 2g, no weight is recorded.

SFS 10 Allt Na Uamha

TP1 Context 1

P80 Eleven body sherds, slightly abraded. The fabric is fine sandy clay with occasional rock fragments which has fired hard and is grey with a brown exterior margin. Interior surface sooted.
Th 4mm; Wt 8g

TP1 Context 2

P81 One body sherd, fresh. The exterior surface is smoothed. The fabric is sandy clay which has fired hard and is grey with a red interior surface. The exterior surface is sooted.
Th 6mm; Wt 5g

P82 One body sherd, abraded. The exterior surface is smoothed. The fabric is sandy clay with occasional mixed rounded and angular rock fragments which has fired hard and is grey. The interior surface is sooted.
Th 7mm; Wt 4g

P83 One body sherd, fairly fresh. The exterior surface is smoothed. The fabric is fine

sandy clay which has fired hard and is red.
Th 7mm; Wt 2g

Comment: Probably Iron Age or later

SFS 30 An Corran C

Surface

P6 Rim which has been pinched up, leaving a slight bevel on the exterior. The fabric is fine clay with small voids (organics) which has fired hard and is grey with red surfaces.
Th 5mm; Dia 120mm; Wt 4g

SFS 101 An Corran E

Surface

P7 V1 One body sherd, slightly abraded, decorated with deep oblique incisions, 3mm wide and 1mm deep. The fabric is fine sandy clay with occasional rock fragments and round/triangular voids (possibly shell) which has fired soft and is brown. Light sooting on both surfaces.
Th 8mm; Wt 8g

Comment: From the angle of the sherd and the nature of the decoration, this sherd is probably from an Unstan Ware vessel, dating to the earlier part of the Neolithic. (refer to for example, pottery from Bharpa Carinish, North Uist [MacSween 1993:373,Fig 8,V54]).

P8 V2 One body sherd, slightly abraded. The fabric is fine clay with occasional rock fragments which has fired soft and is grey with a red exterior surface.
Th 7mm; Wt 6g

SFS 66 Ard Clais Salacher 2

P14 V1 Sherd, probably from the rounded part of a base, fresh. The fabric is coarse sandy clay with occasional rock fragments which has fired hard and is buff. There are finger impressions on the interior surface, probably from shaping.
Th 9mm; Wt 18g

P15 V2 Body sherd, fresh. The fabric is sandy clay which has fired hard and is black. Both surfaces are sooted.
Th 6mm; Wt 11g

P17 V1A Two sherds, probably from the same vessel. The fabric is sandy clay with occasional coarse quartz which has fired hard. Exterior surface sooted.
Th 7mm; Wt 12g

P18 V2A One sherd. The fabric is sandy clay which has fired hard and is black. Sooting on both surfaces.
Th 6mm; Wt 7g

P19 V3A Sherd from the neck of a vessel, decorated with a horizontal line around the neck of the vessel, with vertical lines *c*12mm long and 3mm apart below it. The fabric is sandy clay with occasional rock fragments which has fired hard and has a red exterior and a grey interior.
Th 10mm; Wt 31g

Comment: the nature of the decoration – a band of incised decoration around the neck of the vessel – is indicative of an Iron Age date (*cf* decoration on a vessel dating to the earlier Iron Age from Kebister, Orkney [Dalland & MacSween 1999:181,Illus 159.1]).

TP1 Context 4 S1032

P20 One body sherd from a coil-constructed vessel, slightly abraded. The fabric is fine clay with *c*20% of angular rock fragments up to 6mm long which has fired hard and is grey with a red exterior surface. There is light sooting on both surfaces.
Th 8mm; Wt 14g

P16 Sherd of modern glazed pottery.

SFS 99 Clachan Church

TP1 Context 4

P23 One sherd, broken in two. The fabric is sandy clay which has fired hard and is black. There is sooting/residue on both surfaces.
Th 4mm; Wt 5g

One fragment. The fabric is sandy clay.
Th 5mm

SFS 17 Chuch Cave, Rona

TP2, Context 1

P84 One body sherd, slightly abraded. The fabric is coarse sandy clay which has fired hard and is grey with a red interior margin.
Th 7mm; Wt 4g

TP2, Context 2

P85 One body sherd, slightly abraded. The exterior surface is smoothed and possibly burnished. The fabric is sandy clay which has fired hard and is grey with a brown interior surface.
Th 4mm; Wt 2g

P86 One body sherd, slightly abraded. The fabric is sandy clay which has fired hard and is grey with red surfaces.
Th 6mm; Wt 1g

P87 One body sherd, abraded. The exterior surface is smoothed and decorated with incised lines probably forming a chevron pattern. The fabric is fairly coarse sandy clay which has fired hard and is grey.
Th 6mm; Wt 3g

Comment: Probably Iron Age or later. The motif on the one decorated sherd is indicative of an Iron Age date, and the fabrics and fineness of the undecorated sherds indicate an Iron Age or later date.

SFS 117 Dun Hasan

Surface

P25 One body sherd, slightly abraded. The exterior surface is smoothed. The fabric is fine sandy clay with occasional rock fragments and voids which has fired hard and is grey with brown surfaces.
Th 10mm; Wt 25g

SFS 8 Loch A Sguirr

TP1 Spit 1

P4 One body sherd, slightly abraded. There are finger smoothing marks on the interior and exterior surfaces. The fabric is fine clay with small voids (possibly organics) which

has fired hard and is grey with a red exterior margin. The exterior surface is sooted with small patches of residue.
Th 6mm; Wt 8g

TP9 Spit 7

P5 Two abraded fragments from the same vessel. The fabric is fine sandy clay which has fired hard and is grey with red surfaces.
Th 11mm

TP9 Spit 8

P1 V1 Body sherd, slightly abraded. The fabric is fine sandy clay with occasional voids (organics) which has fired hard and is grey. The exterior surface is sooted.
Th 7mm; Wt 3g

P2 V2 Two body sherds, fresh. The fabric is fine sandy clay which has fired hard and is grey with red margins. The exterior surface is sooted and there is lighter sooting in the interior.
Th 5mm; Wt 4g

P3 Two crumbs. Sandy clay. Grey with a red exterior margin. *c*4mm.

SFS 106 Loch Toscaig 3

Surface

P24 Small abraded fragment. The fabric is fine sandy clay which has fired hard and is grey with red margins.
Th 7mm

SFS 171 Meall Na H'airdie 2

TP1 Context 2

P79 One body sherd, slightly abraded. The fabric is sandy clay which has fired hard and is grey with a red exterior margin. The exterior is sooted and the interior is sooted with a residue.
Th 6mm; Wt 14g

Comment: Probably Iron Age or later.

SFS 96 Meallabhan

Surface

P28 V1 One body sherd (fresh) and one fragment (slightly abraded). The fabric is sandy clay which has fired hard and is grey with brown surfaces. Sooting/residue on the exterior and interior surfaces.
Th 6mm; Wt 14g

P29 V2 One body sherd from below the neck of the vessel. The fabric is fine clay with organics (incompletely burnt out) which has fired soft and is light grey with a buff exterior surface. The exterior surface is smoothed.
Th 6mm; Wt 6g

P30 V3 One body sherd, slightly abraded. The fabric is fine sandy clay with occasional rock fragments which has fired hard and is red. The exterior surface is sooted.
Th 6mm; Wt 6g

P31 V4 One body sherd, slightly abraded. The fabric is fine sandy clay which has fired soft and is grey with a red interior margin. The exterior surface is sooted and there is light sooting in the interior.
Wt 7g; Th 7mm

P32 V5 One body sherd and two rim sherds (flat rim), abraded. One sherd is from the neck of the vessel (33mm from the lip of the vessel to the point of inflection). The fabric is coarse sandy clay which has fired hard and is grey with buff margins. The exterior surface is sooted.
Th 7mm; Wt 16g

P33 V6 Three body sherds (abraded). The fabric is coarse sandy clay which has fired hard and is grey with a brown interior margin. The exterior surface is sooted.
Th 5mm; Wt 12g

P34 V7 Plain rim from a necked vessel (22mm from the lip of the vessel to the point of inflection). The fabric is coarse sandy clay which has fired hard and is grey with red margins.
Th 9mm; Wt 16g

P35 V8 Body sherd, slightly abraded. The fabric is fine sandy clay with occasional voids and occasional rock fragments which has fired soft and is grey with a red exterior margin.
Th 6mm; Wt 6g

P36 V9 Forty body sherds and fragments plus two rim sherds from a necked vessel with a flattened lip. Slightly abraded/abraded. 23mm below the lip of the vessel, above the point of inflection, is a pinched up cordon. The fabric is sandy clay with some voids (organics) which has fired hard and is grey with a buff exterior margin. Some of the body sherds have been combed on the exterior surface. Both surfaces are sooted.
Dia at neck 100mm; Th 7mm; Wt 176g

P37 V10 Two rim sherds and two body sherds from a necked vessel with a slightly everted lip, abraded. 18mm below the lip of the vessel is a pinched up cordon. The fabric is sandy clay which has fired hard and is grey with a buff exterior margin. There is light sooting on the exterior surface.
Wt 12g

P38 V11 32 body sherds and a rim sherd, probably all from the same (flat-rimmed) vessel. One sherd has a pinched up cordon, abraded. The fabric is sandy clay with c10% of inclusions which has fired hard and is grey with a buff/red exterior margin. There are patches of residue in the interior.
Th 7mm; Wt 102g

TP1 Context 1 S1095

P22 Three crumbs, probably pottery, from different vessels. The fabric is fine sandy clay.

Comment: Some of the pottery from this site, in particular V9 and V10 may be medieval in date (Julie Frankilin, *pers com*), for example, the form of a vessel of the Scottish White Gritty ware, 13–14th century, from Kirkwall (MacAskill 1982b, reproduced in McCarthy & Brooks 1988:210,Fig 114,no525).

SFS 58 Rubha Chuaig

Surface

P9 Body sherd, slightly abraded. The fabric is fine sandy clay which has fired hard and is grey with red margins. The exterior surface is sooted.
Th 5mm; Wt 5g

Test Pit 1

P12 Three body sherds from the same vessel. The fabric is sandy clay which has fired hard and is grey with red/brown margins. There is sooting on the exterior and interior surfaces.
Th 10mm; Wt 29g

TP1 Context 1

P13 Another sherd from the same vessel
Th 10mm; Wt 13g

TP1 Context 4

P11 Abraded body sherd from the same vessel. The fabric is sandy clay which has fired hard and is grey with red/brown margins. There is sooting on the exterior and interior surfaces.
Th 10mm; Wt 11g

TP2 Context 2

P10 Body sherd, slightly abraded. The fabric is coarse clay which has fired hard and is grey with red margins. Raised surface (?unsmoothed coil junctions). Sooted.
Th 5mm; Wt 5g

SFS 4 Sand 1 (Main Excavation Site)

Surface – Molehill

P27 Three fragments from different vessels. Fine sandy clay with c10% of rock fragments which has fired hard and is grey with a brown exterior.
Th 8mm

TP7 Spit 3

P26 Abraded sherd. The fabric is sandy clay with c10% of rock fragments up to 5mm long which has fired soft and is grey with a brown interior margin.
Th 6mm; Wt 4g

B4B SE Spit 6 Context 7/8

P21 Small abraded sherd. The fabric is fine sandy clay with occasional rock fragments which has fired hard and is grey with buff margins.
Th 6mm; Wt 2g

Sand: coarse pottery from sorting (all very abraded). No weight = total weight less that 1g top

Cat No.	Context	Spit	Description	Material	Max Width	Weight
P39	A1B NE	Spit 2	1 sherd	fine sandy		5g
P40	A2B SE	Spit 3	1 frag	sandy	5mm	
P41	A2B SW	Spit 4	3 crumbs	fine sandy		
P75	A2B NW	Spit	2 crumbs	fine sandy		

		5				
P119	A2B SE	Spit 5	1 crumb	fine sandy		
P120	A2B SW	Spit 6	2 crumbs	fine sandy, occ rock		2g (possible rim frag)
P42	A3B NE	Spit 4	1 frag	sandy		
	A3B SW	Spit 5		white material (not pottery)		
P43	A3B NW	Spit 2	1 frag	sandy, voids		
P118	A3B NW	Spit 6	2 crumbs	fine sandy, organics		
P44	A6B	Spit 1	1 frag	fine sandy	6mm	
P45	B1A	Spit 2	3 crumbs	fine sandy clay		
P46	B1A	Spit 2	2 crumbs	sandy		3g
P115	B1A	Spit 2	1 crumb	sandy, occ rock		
P77	B1A	Spit 2	1 sherd	sandy	5mm	3g
P47	B1A	Spit 3	2 frags	fine sandy/sandy		
P48	B1B NE	Spit 4	2 crumbs	fine sandy		
P49	B1B SE	Spit 1	1 sherd	fine sandy	6mm	4g
P50	B1B	Spit 2	2 frags	sandy	7mm	3g
P51	B1B NW	Spit 3	1 frag	fine sandy, voids		
P52	B2	Spit 2	1 crumb	fine sandy clay		
P53	B2B	Spit 2	1 body	sandy	7mm	2g
P54	B2B	Spit 3	2 sherds	sandy	7mm	3g
P55	B2B	Spit 3	1 frag	fine sandy	7mm	
P56	B2B NW	Spit 4	1 frag	sandy		
P78	B3B	Spit 2	2 frags	sandy	6mm	3g
P57	B3B SW	Spit 3	1 crumb	fine sandy		
P113	B3B SE	Spit 3	1 crumb	sandy		

P114	B4B NW	Spit 2	1 crumb	sandy		
P58	B4B NE	Spit 7	1 frag	fine sandy, occ rock, organics		
P59	B4B SE	Spit 7	1 frag	fine clay	8mm	
P60	B4B SW	Spit 2	1 frag	sandy		
P61	B4B SW	Spit 5	1 crumb	fine sandy		
P76	B4B SE	Spit 3	1 crumb	fine sandy		
P62	B5B NW		1 crumb	sandy		
P63	B5B NE	Spit 2	1 frag	sandy, occasional large quartz		
P64	B5B SE	Spit 4	1 crumb	sandy clay		
P65	B5B SE	Spit 6	2 sherds	fine sandy, voids	6g	
			2 frags	fine sandy, voids		
			2 crumbs	fine sandy, voids		
P66	B6B SW	Spit 4	1 crumb	fine sandy, occ rock, voids		
P67	B6B SE	Spit 5	1 crumb	fine		
P68	B6B SE	Spit 6	1 frag	sandy, voids		
P69	B20B	Spit 1	1 frag	fine, sandy	7mm	
			1 crumb	fine, sandy		
P70	B24B	Spit 2	1 crumb	fine sandy clay		
P117	B24B	Spit 2	2 crumbs	sandy, occ rock		2g
P112	B25	Spit 2	1 crumb	sandy		
P71	B25A	Spit 2	1 frag	fine sandy clay	6mm	
P72	B25A	Spit 3	1 crumb	fine sandy clay		
P73	B25B SE	Spit 4	1 frag	fine sandy		
P74	B24B SW	Spit 3	1 tiny crumb	sandy		
P116	B25B	Spit 2	1 crumb	sandy		

NB: finds from squares Area B1 – B24/25 were affected by a recording error on site that makes their location uncertain.

Glazed Pottery and Glass

top

Cat No	Context Information	Description
P95	SFS 76, Camusteel 1, TP1 Context 1, s1105	19 sherds/fragments
P96	SFS 77, Camusteel 2, TP1 Context 1	6 sherds
P88	SFS 23, Crowlin 4, TP1 Context 1, s1105	glazed pottery (4 small pieces)
P90	SFS 22, Crowlin 3, TP1; Context 3	3 pieces glazed pottery; 4 pieces glass
P106	SFS 22, Crowlin 3, TP1 Context 3	2 sherds
P107	SFS 22, Crowlin 3, TP1 Context 3	1 fragment
P91	SFS 4, Sand 1, Spit 1	1 piece glazed pottery
P92	SFS 4, Sand 1, TP11 Spit 2	1 piece glazed pottery
P93	SFS 4, Sand 1, B17A, Turf	1 sherd
P104	SFS 104, Fearnmore 1, surface	2 sherds
P101	SFS 104, Fearnmore 1, surface	1 fragment
P98	SFS 104, Fearnmore 1, TP1 Context 1	3 fragments
P103	SFS 104, Fearnmore 1, TP2 Context 1	1 sherd
P99	SFS 104, Fearnmore 1, TP3 Context 1	2 fragments
P100	SFS 104, Fearnmore 1, TP4 Context 1	3 sherds
P102	SFS 104, Fearnmore 1, TP6 Context 1	5 sherds; 3 fragments; 1 pipe stem
P89	SFS 100, Fraser's Croft, TP1 Context 2, s1082	glazed pottery (1 piece)
P97	SFS 100, Fraser's Croft, TP1 Context 2,	1 handle
P105	SFS 19, Toscaig 1, TP1 Context 1	4 sherds

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Appendix 8 – Archive catalogue of pottery finds | Ann MacSween

The data in this table can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the file 'Pottery_Archive.csv'.

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

Cat No	Site	Context	Description	Source
P1	SFS 8 Loch a Sguirr	Trench 9, Spit 8	Body sherd slightly abraded	(V1) Coarse Pottery Report p1
P2	SFS 8 Loch a Sguirr	Trench 9, Spit 8	Two body sherds,fresh	(V2) Coarse Pottery Report p1
P3	SFS 8 Loch a Sguirr	Trench 9, Spit 8	two crumbs, sandy clay	Coarse Pottery Report p1
P4	SFS 8 Loch a Sguirr	Trench 1, Spit 1	Body sherd slightly abraded	Coarse Pottery Report p1
P5	SFS 8 Loch a Sguirr	Trench 9, Spit 7	Two abraded fragments from same vessel	Coarse Pottery Report p1
P6	SFS 30 An Corran C	N13 Surface	Rim, pinched up, slight bevel on exterior	Coarse Pottery Report p2
P7	SFS 101 An Corran E	N30 Site 'E'	Body sherd decorated with deep oblique incisions	Coarse Pottery Report p2
P8	SFS 101 An Corran E	N30 Site 'E'	Body sherd slightly abraded	Coarse Pottery Report p2
P9	SFS 58 Rubha Chuaig	SF N58	Body sherd slightly abraded	Coarse Pottery Report p2
P10	SFS 58 Rubha Chuaig	S1 Trench 2, Spit 2	Body sherd slightly abraded	Coarse Pottery Report p2

P11	SFS 58 Rubha Chuaig	S2 Trench 1, Spit 4	Abraded body sherd	Coarse Pottery Report p2
P12	SFS 58 Rubha Chuaig	Test Pit 1	Another three sherds from same vessel	Coarse Pottery Report p2
P13	SFS 58 Rubha Chuaig	Context 1001	Another sherd from same vessel	Coarse Pottery Report p2
P14	SFS 66 Ard Clais Salacher 2		Sherd, probably from rounded part of a base	(V1) Coarse Pottery Report p3
P15	SFS 66 Ard Clais Salacher 2		Body, sherd fresh	(V2) Coarse Pottery Report p3
P16	SFS 66 Ard Clais Salacher 2		Sherd of modern glazed pottery	Coarse Pottery Report p3
P17	SFS 66 Ard Clais Salacher 2		Two sherds probably from the same vessel	(V1A) Coarse Pottery Report p3
P18	SFS 66 Ard Clais Salacher 2		One sherd	(V2A) Coarse Pottery Report p3
P19	SFS 66 Ard Clais Salacher 2		Sherd from the neck of a vessel	(V3A) Coarse Pottery Report p3
P20	SFS 66 Ard Clais Salacher 2	Context 6614 S1032	One body sherd from a coil constructed vessel	Coarse Pottery Report p3
P21	SFS 4 Sand	B4B SE, Spit 6	Small abraded sherd	Coarse Pottery Report p3
P22	SFS 96 Meallabhan	Context 9611 S 1095	three crumbs, probably pottery from different vessels	Coarse Pottery Report p4
P23	SFS 99 Clachan Church	Context 9914	One sherd broken in two	Coarse Pottery Report p4
P24	SFS 106 Loch Toscaig 3		Small abraded fragment	Coarse Pottery Report p4
P25	SFS 117 Dun	(2) N29	One body sherd slightly	Coarse Pottery

	Hasan		abraded	Report p4
P26	SFS 4 Sand	Trench 7, Spit 3	Abraded sherd	Coarse Pottery Report p4
P27	SFS 4 Sand	SFS 4 N7 NG 6835 4938 molehill	Three fragments from different vessels	Coarse Pottery Report p4
P28	SFS 96 Meallabhan	NG 6848 4878	One body sherd and one fragment	(V1) Coarse Pottery Report p5
P29	SFS 96 Meallabhan	NG 6848 4878	One body sherd from the neck of the vessel	(V2) Coarse Pottery Report p5
P30	SFS 96 Meallabhan	NG 6848 4878	One body sherd slightly abraded	(V3)Coarse Pottery Report p5
P31	SFS 96 Meallabhan	NG 6848 4878	One body sherd slightly abraded	(V4) Coarse Pottery Report p5
P32	SFS 96 Meallabhan	NG 6848 4878	One body sherd and two rim sherds	(V5) Coarse Pottery Report p5
P33	SFS 96 Meallabhan	NG 6848 4878	Three body sherds abraded	(V6) Coarse Pottery Report p5
P34	SFS 96 Meallabhan	NG 6848 4878	Plain rim from a necked vessel	(V7) Coarse Pottery Report p5
P35	SFS 96 Meallabhan	NG 6848 4878	Body sherd slightly abraded	(V8) Coarse Pottery Report p5
P36	SFS 96 Meallabhan	NG 6848 4878	Forty body sherds plus two rim sherds from necked vessel	(V9) Coarse Pottery Report p5
P37	SFS 96 Meallabhan	NG 6848 4878	Two rim sherds and two body sherds from necked vessel	(V10) Coarse Pottery Report p5
P38	SFS 96 Meallabhan	NG 6848 4878	Body sherd and rim sherds probably from same vessel	(V11) Coarse Pottery Report p6
P39	SFS 4 Sand	A1B NE, Spit 2	One sherd	Coarse Pottery Report p6
P40	SFS 4 Sand	A2B SE, Spit 3	One fragment	Coarse Pottery

				Report p6
P41	SFS 4 Sand	A2B SW, Spit 4	Three crumbs	Coarse Pottery Report p6
P42	SFS 4 Sand	A3B NE 4	One fragment	Coarse Pottery Report p6
P43	SFS 4 Sand	A3B NW, Spit 2	One fragment	Coarse Pottery Report p6
P44	SFS 4 Sand	A6B, Spit 1	One fragment	Coarse Pottery Report p6
P45	SFS 4 Sand	B1A, Spit 2 N72	Three crumbs	Coarse Pottery Report p6
P46	SFS 4 Sand	B1A, Spit 2	Two crumbs	Coarse Pottery Report p6
P47	SFS 4 Sand	B1A, Spit 3	Two fragments	Coarse Pottery Report p6
P48	SFS 4 Sand	B1B NE, Spit 4	Two crumbs	Coarse Pottery Report p6
P49	SFS 4 Sand	B1B SE, Spit 1	One sherd	Coarse Pottery Report p6
P50	SFS 4 Sand	B1B, Spit 2	Two fragments	Coarse Pottery Report p6
P51	SFS 4 Sand	B1B NW, Spit 3	One fragment	Coarse Pottery Report p6
P52	SFS 4 Sand	B2, Spit 2	One crumb	Coarse Pottery Report p6
P53	SFS 4 Sand	B2, Spit 2	One crumb	Coarse Pottery Report p6
P54	SFS 4 Sand	B2B, Spit 3	Two sherds	Coarse Pottery Report p6
P55	SFS 4 Sand	B2B, Spit 3	One fragment	Coarse Pottery Report p6
P56	SFS 4 Sand	B2B NW, Spit 4	One fragment	Coarse Pottery Report p6
P57	SFS 4 Sand	B3B SW, Spit 3	One crumb	Coarse Pottery Report p6
P58	SFS 4 Sand	B4B NE, Spit 7	One fragment	Coarse Pottery Report p6
P59	SFS 4 Sand	B4B SE, Spit 7	One fragment	Coarse Pottery Report p6
P60	SFS 4 Sand	B4B SW, Spit 2	One fragment	Coarse Pottery Report p6

P61	SFS 4 Sand	B4B SW, Spit 5	One crumb	Coarse Pottery Report p6
P62	SFS 4 Sand	B5B NW	One crumb	Coarse Pottery Report p6
P63	SFS 4 Sand	B5B NE, Spit 2	One fragment	Coarse Pottery Report p6
P64	SFS 4 Sand	B5B SE, Spit 4	One crumb	Coarse Pottery Report p6
P65	SFS 4 Sand	B5B SE, Spit 6	Two sherds, two fragments, two crumbs	Coarse Pottery Report p6
P66	SFS 4 Sand	B6B SW, Spit 4	One crumb	Coarse Pottery Report p6
P67	SFS 4 Sand	B6B SE, Spit 5	One crumb	Coarse Pottery Report p6
P68	SFS 4 Sand	B6B SE, Spit 6	One fragment	Coarse Pottery Report p6
P69	SFS 4 Sand	B20B, Spit 1	One fragment , one crumb	Coarse Pottery Report p6
P70	SFS 4 Sand	B24B, Spit 2 N49	One crumb	Coarse Pottery Report p6
P71	SFS 4 Sand	B25A, Spit 2	One fragment	Coarse Pottery Report p6
P72	SFS 4 Sand	B25A, Spit 3	One crumb	Coarse Pottery Report p6
P73	SFS 4 Sand	B25B SE, Spit 4	One fragment	Coarse Pottery Report p6
P74	SFS 4 Sand	B24B SW, Spit 3	One tiny crumb	Coarse Pottery Report p6
P75	SFS 4 Sand	A2B NW, Spit 5	Two crumbs	Coarse Pottery Report p6
P76	SFS 4 Sand	B4B SE, Spit 3	One crumb	Coarse Pottery Report p6
P77	SFS 4 Sand	B1A, Spit 2	One sherd	Coarse Pottery Report p6
P78	SFS 4 Sand	B3B, Spit 2	Two fragments	Coarse Pottery Report p6
P79	SFS 171 Meall na h'Airdie 2	Test Pit 1 Context 2	One body sherd slightly abraded	Coarse Pottery Report p6
P80	SFS 10 Allt na Uamha	Test pit 1 Context 1	Eleven body sherds slightly abraded	Coarse Pottery Report p6

P81	SFS 10 Allt na Uamha	Test pit 1 Context 2	One body sherd fresh	Coarse Pottery Report p6
P82	SFS 10 Allt na Uamha	Test pit 1 Context 2	One body sherd abraded	Coarse Pottery Report p6
P83	SFS 10 Allt na Uamha	Test pit 1 Context 2	One body sherd fairly fresh	Coarse Pottery Report p7
P84	SFS 17 Church Cave	Test Pit 2 Context 1	One body sherd slightly abraded	Coarse Pottery Report p7
P85	SFS 17 Church Cave	Test pit 2 Context 2	One body sherd slightly abraded	Coarse Pottery Report p7
P86	SFS 17 Church Cave	Test pit 2 Context 2	One body sherd slightly abraded	Coarse Pottery Report p7
P87	SFS 17 Church Cave	Test pit 2 Context 2	One body sherd abraded	Coarse Pottery Report p7
P88	SFS 23 Crowlin 4	Context 2311 S 1105	Glazed pottery (four small pieces)	Coarse Pottery Report p7
P89	SFS 100 Fraser's Croft	Context 10012 S1082	Glazed pottery one piece	Coarse Pottery Report p7
P90	SFS 22 Crowlin 3	Trench 1 context 3003	Three pieces glazed pottery, four pieces glass	Coarse Pottery Report p7
P91	SFS 4 Sand	u/s, Spit 1	One piece glazed pottery	Coarse Pottery Report p7
P92	SFS 4 Sand	Trench 11, Spit 2	One piece glazed pottery	Coarse Pottery Report p7
P93	SFS 4 Sand	B17A Turf N31	One sherd	Coarse Pottery Report p7
P94	SFS 4 Sand	A3B SW, Spit 5	White material (not pottery)	Coarse Pottery Report p7
P95	SFS 76 Camusteel 1	Trench 1 Context 7611 s1105	Nineteen sherds/fragments	Coarse Pottery Report p7
P96	SFS 77 Camusteel 2	Trench 1 context 7711	Six sherds	Coarse Pottery Report p7
P97	SFS 100 Fraser's Croft	Context 10012	one handle	Coarse Pottery Report p8
P98	SFS 104 Fearnmore 1	Trench 1 Context 10411	Three fragments	Coarse Pottery Report p8
P99	SFS 104 Fearnmore 1	Trench 3 Context 10431	Two fragments	Coarse Pottery Report p9
P100	SFS 104 Fearnmore 1	Trench 4 Context 10441	Three sherds	Coarse Pottery Report p9

P101	SFS 104 Fearnmore 1	Surface	One fragment	Coarse Pottery Report p9
P102	SFS 104 Fearnmore 1	Trench 4 Context 10461	Five sherds, three fragments, one pipe stem	Coarse Pottery Report p9
P103	SFS 104 Fearnmore 1	Trench 2 Context 10421	One sherd	Coarse Pottery Report p9
P104	SFS 104 Fearnmore 1	Surface	Two sherds	Coarse Pottery Report p9
P105	SFS 19 Toscaig 1	Trench 1, Spit 1	Four sherds	Coarse Pottery Report p9
P106	SFS 22 Crowlin 3	Trench 1 context 3003	Two sherds	Coarse Pottery Report p9
P107	SFS 22 Crowlin 3	Trench 1 context 3003	One fragment	Coarse Pottery Report p9

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… > Data > Artefact and ecofact catalogues > Pottery_Archive.csv

Appendix 9 - Catalogue of metal, slag and glass | Andrew Heald & Fraser Hunter (*with contributions by David Caldwell & Stuart Campbell*)

The data on this page can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents >`. From here you can download the files:

- `Final reports > Heald_&_Hunter,_Metal_report.pdf`
- `Specialists reports > metal_report,_Heald_and_Hunter.pdf`

In this catalogue the following abbreviations are used: L = length, W = width, T = thickness, D = diameter, H = height, M = mass.

In some cases pieces were catalogued on site and the original N numbers have also been recorded. For non-ferrous metals, the alloy type was determined by non-destructive energy-dispersive X-ray fluorescence (XRF) analysis. The results are from surface analysis only, and thus are affected by corrosion. Stuart Campbell and David Caldwell kindly commented on some of the medieval and later non-ferrous material. Iron work identifications and measurements were supplemented from X-rays. A full catalogue of nails and slag is in Appendix 10; only basic details are noted here. Square-sectioned rod fragments with no other distinguishing features were assumed to be nail fragments.

SFS 4 Sand

Copper alloy

Casting waste – irregular droplet, 5×3×3mm, m 0.1g. Leaded bronze. A2B NE. Spit 6, Context 17

Casting waste – irregular droplet, 9×7×5 mm, m 0.7g. Leaded bronze. A1B SE. Spit 2, Context 1/2.

Iron

Knife tip? Straight edge, shallow curving back. L26mm, H10mm, T4mm. A6B NE. Spit 1, Context 1.

Nails four fragments A2B. Spit 3, Context 29; A6B.SW. Spit 2, Context 17; B1B SW. Spit 4, Context 24; B4B. Spit 1.

Flake 7.5×6×2mm. B24B SW. Spit 6, Context 13.

Lump undiagnostic. 19×11×7mm. B5B NE. Spit 3, Context 1.

Fragment undiagnostic. 11×7×4mm. B21B NE. Spit 1, Context 1.

Glass Beads (with *Dawn McLaren*)

Turquoise glass bead globular, slightly flattened at one end. The surface shows that the bead was formed by winding a glass rod around a core. Its iridescent surface suggests a potash glass and a late medieval – early post-medieval date (?15th–18th century). D4.5mm, H4mm, hole D2mm. B25A SE. Spit 3, Context 13.

Deep blue translucent glass bead cylindrical, short. Slightly uneven with a D-shaped section. D4.2mm, H2.6mm, central perforation D2.2mm. A4B NW Spit 2, Context 17.

Deep blue translucent glass bead globular, D-shaped section. The surface of the bead is very eroded. D2.8mm, H1.5mm, central perforation Dc0.8mm. B5B NE Spit 4, Context 1/2.

Deep blue translucent glass bead globular, slightly uneven D-shaped section. D1.3mm, H0.8mm, central perforation Dc0.3mm. B8B Spit 2, Context 1.

These beads generally conform to Guido's group 7 (iv) (Guido 1978:70); the short cylindrical form of A4B NW Spit 2 is a variant. The type is a common one with a broad date range from the early Iron Age to the post-Roman period, and cannot be more closely dated. Similar globular beads are known locally from Dun Ardtreck (MacKie 2000:383,384&391) and Dun Beag on Skye (Callander 1921:130).

The recovery of the particularly small example (B8B Spit 2) during sieving is a valuable indicator of the tiny beads which are rarely found on excavations; without wet sieving it is unlikely that this minute object would have been detected, emphasising the bias in our knowledge of beads. Its tiny size suggests that it was probably a decorative item on a tassel or part of a beadwork pattern rather than from a necklace.

Other Glass

Post-medieval vessel glass olive green: 2 sherds from A5B. Spit 1, Context 1; 1 from A6B. Spit 1, Context 1; 3 from A6B.SE. Spit 2, Context 17; 1 (N22) from Test Pit 1 (1999 excavations), Spit 5.

Modern clear glass 2 sherds (N 30) from B1 turf, Context 1; 1 (N36) from B26B. Spit 1, Context 1.

Vitrified material

Amorphous slag fragment L14mm, W12mm, T10mm. 1.2g. A2B NW Spit 3, Context 29.

Small amorphous slag fragment L3mm, T2.5mm. B2A SW Spit 4, Context 13.

Slag sphere L3.2mm, T2.8mm. B5B NW Spit 3, Context 1.

Fuel ash slag fragments 9.9g. B21A NW Spit 2, Context 1.

Slag 494g, primarily unclassified ironworking (125g) and a plano-convex smithing hearth base (343g), plus a small quantity of hammerscale and slag spheres (catalogue, Appendix 10). The distribution focuses strongly on the squares around the junction of trenches A and B, with limited scatter beyond. Most of this material comes from higher spits, Spit 3 and above and it is presumably more recent than the Mesolithic activity in the rockshelter. It indicates a limited episode of blacksmithing, and the presence of two melted copper alloy fragments in the same area suggests that bronze working also took place here.

SFS 2 Crowlin 1

Non-ferrous

Irregular sub-square lead sheet one edge broken. The slightly undulating surface suggests it may have been a patch shaped to fit an underlying object. L33mm, W33mm, T3mm. Trench 1 Spit 6, N10. The object is undiagnostic, although lead is uncommon before the medieval period.

Iron

Nails a single shank fragment (N12) from Test Pit 1, Spit 3.

SFS 6 Ashaig 1

Slag 15.9g unclassified ironworking,

SFS 17 Church Cave

Copper alloy

Lace end strip of sheet rolled into a tight cylinder, probably for use as a rivet. L30mm, D3mm. Alloy: gunmetal. Test Pit 2, Context 3.

These are common finds from the 15th–17th century contexts elsewhere in Scotland.

SFS 19 Toscaig 1

Iron

Nails two fragments from Test Pit 1, Context 1004 (midden), S1001.

SFS 20 Toscaig 2

Glass

Post-medieval neck of an olive-green bottle from Test Pit 2, Spit 2.

SFS 22 Crowlin 3

Non-ferrous

Lead shotgun pellet Small broken sphere, D5mm. Test Pit 1, Context 3002.

Lead pistol ball consistent with a smooth-bored and muzzle loading weapon of the post-medieval period. The surface damage is a mixture of impact deformation and post-depositional damage and corrosion. D13.5-14mm, 13g. Test Pit 1, Context 3003. (Stuart Campbell)

Iron

Circular button flat, with separate loop. Details obscured by corrosion. Post-medieval. D18mm, T5mm. Test Pit 1, Context 3003.

Nails three nails with roves, and a separate rove possibly used in boat construction(L 17mm, W17mm, T4mm). The nails are 38, 41 and 46mm L, with flat sub-square heads (11–13mm) and square shanks (4.5–6mm); lozenge shaped roves and two parallelogram shaped ones (17×17mm, 26×22mm, 26×15mm, 42×30mm). Test Pit 1, Context 3003.

Tacks three small tacks (11–19mm L) with sub-square or rectangular heads, from contexts Test Pit 1, Contexts 3002 and 3003, and Test Pit 2, Spit 2.

Nails 44 fragments (Test Pit 1, Context 3002×20, Context 3003×24), all fragmentary but with a few larger examples (based on head and shank dimensions).

Fragment undiagnostic. 11×5.5×5mm. Test Pit 1, Context 3002.

Fragment undiagnostic. 19×19×6.5mm. Test Pit 1, Context 3003.

Flakes ×7 Test Pit 1, Context 3003.

Slag

Unclassified ironworking slag 9g Test Pit 1, Context 3002.

Slag spheres 0.1g Test Pit 1, Context 3003.

Glass

Post-medieval 2 sherds, 1 green, 1 iridescent, ?18th century, Test Pit 1, Context 3002; 5 sherds, 1 green, 2 iridescent, 2 iridescent & ?melted?, Test Pit 1, Context 3003.

SFS 23 Crowlin 4

Copper alloy

Belt mount Copper alloy with figure-of-eight piercing for engaging a stud fastening. The mount was secured to a strap or bolt by being bent over the top of it. The mount still has some mineralised leather adhering to its back. 19th–20th century?

SFS 41 Toscaig 9

Iron

Plain annular ring Circular cross section. Welded? (no evidence of butt join). Surface sheet of tin, soldered to iron (XRF detects trace lead). No wear to indicate function, but tinning of iron is a rarity before the Medieval period. N32. Test Pit 1, Spit 1. D31mm, T6mm.

Mount 34 small fragments from a flat, ?rectangular? sheet mount (one corner survives) with stamped decoration, the edges turned over and flattened to form a raised border 5mm wide. Surviving corner has a rivet hole 2mm Dpunched from the front (border) side. Rivets survive in two sheet fragments, both with sub-square heads *c*4×4mm and short flat shanks; one joined two sheets together. Few fragments join, but the overall length of surviving border is 120mm, typical T1–1.5mm. Found in both Spits 1 and 2 (S1011 and S1013) in Test Pit 2. 19th–20th century date

Sheet Three fragments of an unidentified flat sheet object with part of one straight edge. Max. 10×7.5×2mm. Test Pit 1, Spit 1.

Tack with square head (12×12mm) and short shank (L 5mm). L21mm. Test Pit 1, Spit 2, S1012.

Nails five fragments, all from Test Pit 1 (Spit 1, S1010,×4, Spit 3, S1015,×1)

Fragment unidentified, no original edges. 15×12.5×3mm. Test Pit 1 Spit 2, S1012.

Glass

Post-medieval one sherd clear iridescent glass; Test Pit 1, Spit 1, S1010.

SFS 49 Creag Na-H-Uamha

Iron

Nail one fragment N83 Spit 1

SFS 57 Rubha a Ghair

Iron

Knife tip fragment with remains of organic scabbard (?leather). Convex curving back with concave upturned tip. Blade concave from resharpening. Early Historic or Medieval. Test Pit 1, Context 572, S1047. L49mm, H18mm, T5mm.

SFS 58 Rubha Chuaig

Iron

Nails two shank fragments (L 23 & 29mm), one slightly bent from removal. Undiagnostic fragment, 19×16×5mm. Test Pit 7, Spit 3.

SFS 66 Ard Clais Salacher 2

Glass

Post-medieval two sherds of olive-green glass from Test Pit 1, Context 6611

SFS 68 Allt Na Criche

Copper alloy

Buckle or brooch pin(?), broken at both ends and bent, rectangular in section and tapering along its length, with four V-shaped notches on one edge at the articulating end; this has solder on the reverse from fastening the return of the pin round a bar. Burnishing and filemarks on both faces. Post-medieval, although it cannot be assigned to a more specific typological class. L23mm, B 3.5mm, T1mm. Alloy: leaded gunmetal (trace silver). Test Pit 2, Context 6821 (turf). (Stuart Campbell)

Circular link Circular-sectioned fine rod bent into a circle, the ends slightly overlapping. Alloy: brass. D: 7mm; T: 1mm. It appears to have been tinned or silvered (this could not be confirmed analytically given the small areas involved), which points to a post-Iron Age date, but it is otherwise undiagnostic and can only be dated as Early Historic - post-medieval. Test Pit 2, context 6823, S1066.

Iron

Knife fragment (two pieces) with remains of wooden handle. Small knife with stepped tang (tang H8.5mm, W4.5mm); the blade tip and tang end are lost. Surviving blade L20mm, with a straight back; its height varies from 11.5 to 6mm. The edge shape is unclear but the rapid taper suggests it is heavily resharpened. L44mm. Test Pit 1 Context 6812.

SFS 69 Sand 3

Strap buckle made by winding and hammering together a strip of sheet metal. The two ends have been joined at the pivot bar by ‘key holing’ one end into an aperture in the other and it is at this point that the buckle has broken. The pivot bar has iron staining from the pin. Similar decoration of three pairs of twin V-shaped indentations at 90° intervals is known in Scotland on both brooches and buckles; this example dates from the late medieval period. D21–22mm, T2–4mm. Alloy: brass (Stuart Campbell). Surface Find.

SFS 76 Camusteel 1

Iron

Rim and body fragment of a cast iron vessel probably a three legged cooking pot with everted rim, originally *c*210mm in diameter. Broken just above the shoulder. Test Pit 1, Context 7611, S1105. L65mm, H: 34mm, T4mm. Post-medieval.

Glass

Modern nine clear glass sherds, some decorated. Late 19th–20th century. Test Pit 1, Context 7611, S1105.

SFS 77 Camusteel 2

Copper alloy

Eyelets two small lentoid-sectioned discs flanking organic remains; probably eyelets around a perforation in cloth or leather.

Post-medieval or modern. D6.5mm, H2.5mm, washer T0.5mm, perf D2mm. Alloy: brass. Test Pit 1, Context 7711, S1098.

Iron

Staple? Thin bar, the ends bent back to touch its underside. 17×6×3.5mm. Test Pit 1, Context 7711, S1098.

Nails two small fragments from Test Pit 1, Context 7711, S1098 & S1099.

Glass

Modern 15 clear glass sherds (including base), some decorated. Late 19th-20th century. Test Pit 1, Context 7711.

SFS 90 Coire Sgamhadail 3–6

Copper alloy

Pin tip? Flat bar fragment, broken at one end, tapering to a point. Probably the tip of a Medieval or post-medieval buckle or brooch pin. Alloy: leaded gunmetal. L15mm, W4.5mm, T1.5 mm. Test Pit 2, S1073.

Stud hollow dome fastened by rolled sheet rivet. The gap between the stud and the flattened end of the rivet is very small (*c*1mm), implying it ornamented a thin organic medium such as leather. The type is not chronologically diagnostic, although the zinc levels indicate a post-Iron Age date. D7mm, stud H3.5mm, rivet L4.5mm. Stud alloy: high-zinc gunmetal (trace lead). Test Pit 2, S1073

Lace end rolled sheet rod, lacking part of its length. L15mm, D2mm. Alloy: copper (minor zinc and lead). Test Pit 2, S1073. Medieval or post-medieval.

Iron

Collar – thin bar rolled into a small circle, the ends slightly overlapped. D9mm, H6.5mm. Test Pit 2, S1073.

Knife? Heavily concreted and highly fragmented iron object. Firm identification impossible without conservation, but where the section is exposed it appears to be fragments of a small knife (blade H*c*10mm). Test Pit 2, Context ??, S1073.

Other

Fired clay sub-rectangular object with uneven surfaces, presumably an accidentally fired piece of clay. 11.5×11.5×5mm. Test Pit 2, S1073.

Slag 130.9g vitrified hearth/furnace lining with slag. S1057.

SFS 96 Meallabhan

Copper alloy

Stick pin circular cross-section, lacking only the point of the tip. The sides of the head bear four zones of decoration, each with a ring-and-dot motif at the top and six or seven transverse incised lines below. The lowest lines are joined to form a circumferential border defining the decorated head (which is 7.5mm long). The depth of the dots suggests they were once inlaid, but no trace of this now survives. The top of the head is rounded and plain. The pin tapers evenly to the point, and is slightly bent at its midpoint. L72mm, D4mm. Alloy: leaded gunmetal. Surface find.

This is a Hiberno-Norse stick pin of 'undifferentiated' type (O'Rahilly 1998, Class 7, 27–8), where the head is a continuous part of the shaft; the decoration is of her type A. There are close parallels from Garry Iochdrach, North Uist (Beveridge & Callander 1932:41; NMS GT 489) and from Norse levels at Jarlshof, Shetland, the latter being near identical (Curle 1936:263–4, fig 11.6; NMS HSA 853). Examples from Dublin date from *c*1100–1225 (*ibid*:28,33).

Vessel fragment with iron handle rivet Two fragmentary sheets of copper alloy held by a broken rivet. One sheet has two stab marks, perhaps from an earlier patch (held by paper clip rivets) removed when this second sheet was added. The rivet is domed and sub-square (head D19mm×H9mm) with a rectangular shank (7.5×6mm), overall L24mm. As it is not clenched against the sheet it must originally have held the handle attachment, now lost. The edges of the sheet are curled and ragged, suggesting the fragment ripped out of the vessel in use. Sheet 39×25.5×0.2–0.3mm. Alloy: gunmetal (primarily Cu with low levels Zn, Sn, Pb). Surface Find.

This comes from a copper alloy vessel, probably a small bowl or dish with iron suspension handles. The alloy composition (with its zinc content) indicates a Roman or later date, and such vessels are known from the Early Historic and Medieval periods (for example Hunter 1994:57–62).

Iron

Thin strip or bar one original straight edge surviving; punched hole, diameter 4mm. L65mm; H28mm; T1mm. Condition implies post-medieval date.

Bar/knife fragment heavy corrosion obscuring details. 14.5×11mm.

Button circular with separate loop. Details obscured by corrosion. Post-medieval. D18mm, H14mm.

Nails four, of which one is intact (L64mm) and two are among the largest from the SFS project, based on head size (21mm).

Fragment Disintegrated object, perhaps a nail. Max L27mm.

Flake undiagnostic. 25×16.5×8mm.

Slag 32g unclassified ironworking slag

SFS 99 Clachan Church

Glass

Post-medieval two sherds olive-green glass (one a rim) and a clear modern sherd. Test Pit 1, Context 9911.

SFS 104 Fearnmore 1

Glass

Post-medieval olive-green sherd from Test Pit 3, Context 10431.

Modern clear sherds (2) from Test Pit 4, Context 10461.

SFS 114 Fergus's shelter

Iron

Rove rectangular with tip of clenched nail surviving. L26mm, W23mm, T5mm. Test Pit 1, Context 11411, (surface layer), S1077.

Bar, tapering, rectangular-sectioned; perhaps a tang. 24.5×5×3mm. Test Pit 1, Context 11411, (surface layer), S1077.

Nails five modern nails and a possible horseshoe nail from Test Pit 1, Context 11411, (S1077).

Glass

Post-medieval olive-green sherd from Test Pit 1, Context 11412, S1078.

Table

Site	Ornament	Knife	Nail	Tack	Boat nail	Fitting &c	Fe frags	Lace ends	Vessel	Glass	Metal-working	Other	No.	Datable objects
SFS 96	2		4			2	2		1		32g		11	Hib-Norse; PM
Sand	1	1	5				3			9	495g; +Cu		19	PM
SFS 2			1			1							2	M+
SFS 4										1			1	PM
SFS 6											16g			
SFS 17								1					1	PM
SFS 19			2										2	
SFS 20										1			1	PM
SFS 22	1		44	3	4		3			7	9.1g	2 Pb shot	64	PM
SFS 23						1							1	PM
SFS 41			5	1		3	1			1			11	PM

SFS 49			1											
SFS 57		1											1	EH-M
SFS 58			2				1						3	
SFS 66										2				PM
SFS 68	2	1											3	EH-M; M-PM
SFS 69	1												1	Late M
SFS 76									1				1	PM
SFS 77			2			2				15			19	Mod
SFS 90	2	1				1		1			131g		5	
SFS 96	1	1	1			1	3		1		32g		8	EH–M-PM
SFS 99										3			3	PM
SFS 104										3			3	PM-Mod
SFS 114			6		1	1				1			9	PM-Mod
Total	10	5	73	4	5	12	13	2	2	43		2	173	

The Table can be found on pp9–10 of PDF report, and its own page for printing in Landscape format;
Abbreviations: EH = Early Historic; M = Medieval, PM = post-medieval, Mod = modern.

Metal, glass and slag from SFS sites. Note that the ornament category includes different materials; slag fragments are not included in site totals. Information about each find is included by site in Section 2.2 the Active Sites Report.

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… > Documents > Final reports > Heald_&_Hunter,_Metal_report.pdf [final]

Appendix 10 – Catalogue of the nails and slag from all sites | Fraser Hunter

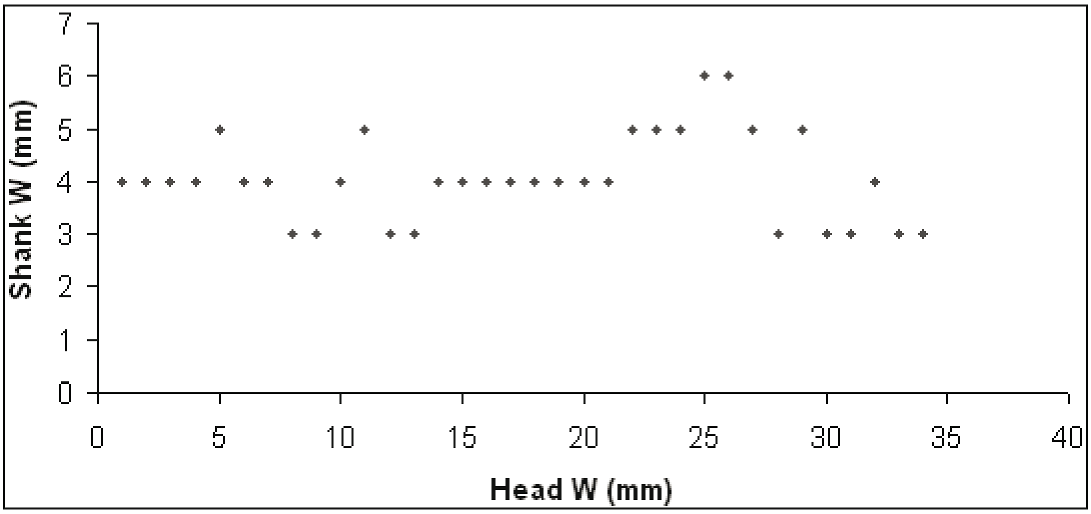
The data in these tables can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues`. From here you can download the relevant CSV files and chart:

- `SFS_Nail_and_slag_catalogue_nails.csv`
- `SFS_Nail_and_slag_catalogue_nails_chart.gif`
- `SFS_Nail_and_slag_catalogue_slag.csv`
- `SFS_Nail_and_slag_catalogue_sheet3.csv`

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

Nails

From the file '`SFS_Nail_and_slag_catalogue_nails.csv`'.



Scatter diagram showing the dimensions of nails:
head width (x-axis) vs shank width (y-axis) in mm.

The file is also available from the ADS as a colour GIF image.

Slag

From the file '`SFS_Nail_and_slag_catalogue_slag.csv`'.

Non-slag material

From the file '`SFS_Nail_and_slag_catalogue_sheet3.csv`'.

Find No	Year	Site	Context	Trench	Test Pit, Spit	Description	Weight (g)
149	2000	Coire Sgamadail	513	1	S1072	Iron pan fragments	6.4
150	2000	Sand			A3B NW SP3	Iron pan fragments (6 pieces)	6.9
151	2000	Coire Sgamadail		1	1070	Iron pan fragments	23.6
152	2000	Sand			B6B NW 2	Stone	2.2
153	2000:89	Cave 2	201	1	1054	Stone – one small fragment	0.2
154	2000	Sand			A2B SE SPIT 9	Unclassified material – stone? – two small fragments – not magnetic	0.2

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… > Data > Artefact and ecofact catalogues > SFS_Nail_and_slag_catalogue_nails.csv
… > Data > Artefact and ecofact catalogues > SFS_Nail_and_slag_catalogue_nails_chart.gif
… > Data > Artefact and ecofact catalogues > SFS_Nail_and_slag_catalogue_slag.csv
… > Data > Artefact and ecofact catalogues > SFS_Nail_and_slag_catalogue_sheet3.csv

Appendix 11 – SFS 2000, Sand, wood charcoal analysis | Phil Austin

The data in these tables can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the file 'Sand_charcoal_archive.pdf'.

The written report can be found in Section 3.15 or the archive version at the ADS > Downloads > Documents > Final Reports > Austin,_Sand_charcoal.pdf

Trench A – absolute fragment counts

Full Table on p1 of named report.

Trench B – absolute fragment counts

Full Table on p2 of named report.

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Appendix 12 – Sand, pigment resources catalogue | Arlene Isbister

The data in this table can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the file 'Sand_Pigment_Resources_Catalogue.pdf'.

The written report can be found in Section 3.7 or the archive version at the ADS > Downloads > Documents > Final Reports > Isbister,_SFS__Pigment_Resources.pdf

Find / context	Artefact type	Identification / Description / Modification	Streak	Hardness Mohs scale	Approximate Dimensions
B5B Spit 6 Context 7/8	Pigment Resource	Purplish grey nodule of haematite, compact or massive in structure. One face is botryoidal or warty in appearance. Distinctive wear is evident on two faces. A smooth curved surface, with faint pitting and minimal scoring, has been worked by rubbing down the nodule's largest face. Another face is deeply gouged and sharply scored where pigment powder has been unevenly scraped off from an area 250mm×150mm. This face also has a very narrow, edge ground facet.	Orangey-red	5	ML 300mm MW 150mm MT 150mm
A2B NE Spit 6 Context 17	Pigment Resource	Limonite cortex on ocherous mudstone. The front heavy cortex is an earthy-orange limonite and worn scratchings, rubbing and pit marks	Earthy-orange	4	ML 380mm MW 270mm MT 100mm

		are evident on its surface. It has been scored with a sharp point over a 250mm×100mm area. Also, rubbing appears to have produced a worked facet with a broken area of pigment. The mottled pink-grey back side shows no signs of modification but does produce an earthy-orange streak identical to the front cortex.			

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… > Data > Artefact and ecofact catalogues > Sand_Pigment_Resources_Catalogue.pdf
… > Documents > Final Reports > Isbister,_SFS__Pigment_Resources.pdf

Appendix 13 – Catalogue of Lithic Raw Material Samples Collected from Around the Inner Sound | Caroline Wickham-Jones

The data in this table can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the file 'List_of_lithic_raw_materials_collected.pdf'.

The written report can be found in Section 5 or the archive version at the ADS > Downloads > Documents > Final Reports > Wickham-Jones,_Lithic_Raw_Materials_Around_the_Inner_Sound.pdf

Site	Description
An Corran, Staffin, Skye NG 492 685	Various pebbles and nodules of baked mudstone collected from screes above the excavated site.
An Corran, Staffin, Skye NG 491 686	Various pebbles and nodules of baked mudstone collected from the shore below the excavated site.
An Corran B, Staffin, Skye NG 4885 6851	Flint-like nodules collected from exposures in till. For example: 45×31×30mm.
Bloodstone Hill, Rùm NG 315 007	Samples of Rùm bloodstone previously collected.
Brochel Forest, Raasay NG 5814 4547	Flint-like pebbles collected. For example: 55×45×28mm.
Eilean Mhuire, Shiant Isles NG 431 987	Nodule of baked mudstone donated by Adam Nicholson. 86×60×46mm.
Flodigarry, Skye NG 465 715	Large nodule of flint collected from erosion section in till. Identified in BGS. 129×98×77mm.
Loch Cleap, Skye NG 4687 6638	Two shattered bits of flint-like material collected from shoreline. 47×42×27mm & 38×27×18mm.
Lón a'Mhuilinn, Staffin, Skye NG 4840 6715 – NG 4732 6556	Shattered flint-like pebbles of varying size collected along burn.
Lón Glas, Staffin, Skye NG 4792 6672 – NG 4738 6618	Shattered flint-like pebbles of varying size collected along burn.
Marishader, Skye NG 2875 6438	Shattered flint-like pebbles and a nodule of silicified stone collected from the Kilmartin River.
Staffin Bay, Skye NG 483 683	Flint-like nodule collected from shingle beach at high water mark. 60×56×54mm.

Ob Gavscavaig, Sleat, Skye	Two flint-like nodules collected from beach. 41×37×30mm & 40×36×25mm.
Staffin Bay, Skye NG 4728 6888 – NG 4825 6834	Flint like pebbles and larger nodules collected along beach at high water mark. For example: 30×22×22mm & 67×65×64mm.
Stenscholl River, Staffin, Skye NG 4845 6835	Chunk of flint-like material 97×43×29mm, and a chunk of baked mudstone 43×41×34mm collected from the outflow of the Stenscholl River.
Stenscholl River, Staffin, Skye NG 4845 6835	Four flint-like pebbles collected from the outflow of the Stenscholl River. For example: 39×20×17mm
Stenscholl River, Staffin, Skye NG 4845 6835	Flint-like nodule collected from the outflow of the Stenscholl River. 78×70×45mm
Stenscholl River, Staffin, Skye NG 4845 6835	Two flint-like nodules collected from the outflow of the Stenscholl River. 57×41×21mm & 51×43×37mm
Stenscholl River, Staffin, Skye NG 4845 6835	Flint-like pebbles collected from the outflow of the Stenscholl River. For example: 50×49×36mm
Stenscholl River, Staffin, Skye NG 4845 6835	Two fine grained volcanic nodules collected from the outflow of the Stenscholl River. 111×82×50mm & 88×51×36mm
Suarbie Burn, Staffin, Skye NG 4842 6584 – NG 4800 6538	Shattered flint-like pebbles of varying size collected along burn.
Suarbie Burn, Staffin, Skye NG 465 683	Flint-like pebbles collected from till exposures in side of burn along course of burn. For example: 76×43×32mm.

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… > Documents > Final Reports > Wickham-Jones,_Lithic_Raw_Materials_Around_the_Inner_Sound.pdf

Appendix 14 - Sand, B24B shell | Nicky Milner

The data in these tables can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Shells` catalogues. From here you can download the CSV files.

- Sand_shell_data_B24B_context_11.csv
- Sand_shell_data_B24B_context_12.csv
- Sand_shell_data_B24B_context_13.csv

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

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Appendix 15 – Sand, Trench A shell | Nicky Milner

The data in these tables can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Shells. From here you can download the relevant CSV files.

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

Total MNI of main shell types, by context

From the file 'Sand_shell_data_trench_A_Counts_by_context1.csv'.

Context	Square	limpets	periwinkle	dogwhelk	Total
1/2	A1B	3136	686	477	4299
	A2B	610	230	156	996
	Total	3746	916	633	5295
28	A1B	2183	808	545	3536
	A2B	288	95	63	446
	Total	2471	903	608	3982
22	A1B	144	342	165	651
	A2B	1	6	2	9
	Total	145	348	167	660
27	A2B	17	64	21	102
29	A2B	417	92	96	605
	A3B	263	122	96	481
	Total	680	214	192	1086
17	A2B	3	7	3	13
	A3B	6	2	4	12
	A4B	98	49	30	177
	Total	107	58	37	202
	Grand Total	7166	2503	1658	11327

Totals only of MNI of shell types, by context

From the file 'Sand_shell_data_trench_A_Counts_by_context2.csv'.

Context	limpet	periwinkle	dogwhelk	Total
1/2	3746	916	633	5295
28	2471	903	608	3982
22	145	348	167	660
27	17	64	21	102
29	680	214	192	1086
17	107	58	37	202
Grand Total	7166	2503	1658	11327

Total MNI of all shell types, by context

top

From the file 'Sand_shell_data_trench_A_Counts_by_context3.csv'.

Context	Quad	limpets	periwinkle	dogwhelk	cockle	flat periwinkle	mussel	clam / scallop	Total
1/2	A1B	3136	686	477	9	11	5		4324
	A2B	610	230	156	3		3		1002
	Total	3746	916	633	12	11	8	0	5318
28	A1B	2183	808	545	5	7	2		3550
	A2B	288	95	63	4	1	1		452
	Total	2471	903	608	9	8	3	0	4002
22	A1B	144	342	165	1		1		653
	A2B	1	6	2					9
	Total	145	348	167	1	0	1	0	662
27	A2B	17	64	21	0	0	0	0	102
29	A2B	417	92	96					605
	A3B	263	122	96		1	1	1	484
	Total	680	214	192	0	1	1	1	1089
17	A2B	3	7	3					13
	A3B	6	2	4					12
	A4B	98	49	30	1	1			179
	Total	107	58	37	1	1	0	0	204
25	A6B	2	0	1	0	0	0	0	3
Grand Total		7168	2503	1659	23	21	5	1	11380

Shells from square A1B, by Spit

top

From the file ‘`Sand_shell_data_trench_A_SquareA1B.csv`’.

Box	Code	Spit	Context	limpets	mussel	periwinkle	flat periwinkle	dogwhelk	cockle	Total	other
74	A1B NE	2	1/2	707		189	4	136	4	1040	1 Hydrobiid
74	A1B NW	2	1/2	467	2	87	1	67	1	625	
74	A1B SE	2	1/2	771	1	311	5	201	1	1290	1 cowrie, 2 pos. snails
74	A1B SW	2	1/2	472						472	
			Total	2417	3	587	10	404	6	3427	
?	A1B NE	3	1/2	259	1	36	1		1	298	Hydrobia
?	A1B NW	3	1/2	265	1	20		24	1	311	Hydrobid, Helicidae 2
?	A1B SE	3	1/2	195		43		49	1	288	
			Total	719	2	99	1	73	3	897	
?	A1B NE	4	28	736	1	102	2	122		963	
?	A1B NW	4	28	443	1	44		48	1	537	Clausiliidae sp, Hydrobid
74	A1B SE	4	28	385		53	1	62	1	502	
			Total	1564	2	199	3	232	2	2002	
111	A1B NE	5	28	235		87		43	2	367	
111	A1B NW	5	28	135		36		35		206	

111	A1B SE	5	28	69		113		57		239	
			Total	439	0	236	0	135	2	812	
?	A1B NE	6	28	96		175	4	76		351	
?	A1B SE	6	28	84		198		102	1	385	Endodonitidae sp
			Total	180	0	373	4	178	1	736	
111	A1B NE	7	22	84		205		100		389	
111	A1B NE	7	22	6					1	7	
111	A1B SW	7	22	46	1	131		64		242	
			Total	136	1	336	0	164	1	638	
111	A1B NE	8	22	3		3		1		7	
111	A1B SE	8	22	3		3				6	
			Total	6	0	6	0	1	0	13	
111	A1B NE	9	22	2	0	0	0	0	0	2	
			Grand Total	5463	8	1836	18	1187	15	8527	

Totals only of Shells from square A1B, by Spit

From the file ‘Sand_shell_data_trench_A_SquareA1B_nos_by_context.csv’.

Context	Spit	limpets	periwinkle	dogwhelk	flat periwinkle	cockle	mussel	Total
1/2	2	2417	587	404	10	6	3	3427
	3	719	99	73	1	3	2	897
	Total	3136	686	477	11	9	5	4324
28	4	1564	199	232	3	2	2	2002
	5	439	236	135		2		812
	6	180	373	178	4	1		736
	Total	2183	808	545	7	5	2	3550
22	7	136	336	164		1	1	638
	8	6	6	1				13
	9	2						2
	Total	144	342	165		1	1	653
	Grand Total	5463	1836	1187	18	15	8	8527

Shells from square A2B, by Spit

top

From the file ‘Sand_shell_data_trench_A_SquareA2B.csv’.

Box	Code	Spit	Context	limpets	mussel	periwinkle	flat periwinkle	dogwhelk	cockle	Total	Other
104	A2B NE	2	1/2	70	1	41		29	2	143	
104	A2B NW	2	1/2	133	1	46		9	1	190	
104	A2B SE	2	1/2	100		35		32		167	Clausiliidae
104	A2B SW	2	1/2	307	1	108		86		502	
			Total	610	3	230	0	156	3	1002	

104	A2B NE	3	29	8		3		2		13	
104	A2B NW	3	29	395		85		91	1	572	Clausiliidae sp
104	A2B SE	3	29	4						4	
			Total	407	0	88	0	93	1	589	
104	A2B NE	4	29	1		2		1		4	
104	A2B NW	4	28	112		25	1	22	1	161	
104	A2B SE	4	29	4		1				5	
104	A2B SW	4	28	156	1	20		30		207	
			Total	273	1	48	1	53	1	377	
104	A2B NE	5	29	4		1		2		7	
104	A2B NW	5	28	6		30		6	2	44	
104	A2B SE	5	29	1						1	
104	A2B SW	5	28	14		20		5	1	40	
			Total	25	0	51	0	13	3	92	
104	A2B NW	6	27	5		38		13		56	
104	A2B SE	6	17	3		7		3		13	
104	A2B SW	6	27	9		21		8		38	
			Total	17	0	66	0	24	0	107	
104	A2B NE	7	17/27			3				3	
104	A2B NW	7	22			3		1		4	
104	A2B SE	7	17/27	1						1	
			Total	1	0	6	0	1	0	8	
104	A2B NE	8	27	1		1				2	
104	A2B SE	8	22	1		1		1		3	
104	A2B SW	8	27	1		1				2	
			Total	3	0	3	0	1	0	7	
104	A2B NW	9	22	0	0	1	0	0	0	1	
104	A2B SE	10	22?	0	0	1	0	0	0	1	
104	A2B NW	11	25	1	0	0	0	0	0	1	
			Grand Total	1064	3	446		288	7	1808	

Totals only of Shells from square A2B, by Spit

From the file '`Sand_shell_data_trench_A_SquareA2B_nos_by_context.csv`'.

Context	Spit	limpets	periwinkle	dogwhelk	flat periwinkle	cockle	mussel	Total

1/2	2	610	230	156		3	3	1002
29	3	407	88	93		1		589
28/29	4	273	48	53	1	1	1	377
	5	25	51	13		3		92
	Total	298	99	66	1	4	1	469
17/27	6	17	66	24				107
17/27/22	7	1	6	1				8
22/27	8	3	3	1				7
22	9		1					1
22?	10		1					1
25	11	1						1
	Grand Total	1337	494	341	1	8	4	2185

Shells from square A3B, by Spit

top

From the file '`Sand_shell_data_trench_A_SquareA3B.csv`'.

Box	Square	Spit	Context	limpets	mussel	periwinkle	flat periwinkle	dogwhelk	clam/scallop	Total
?	A3B NE	2	29	43		17		18		78
104	A3B NW	2	29	1		18		11		30
?	A3B SE	2	29	133	1	53		42		229
?	A3B SW*	2	29	69		29		24		122
			Total	246	1	117	0	95	0	459
104	A3B NE	3	29	2		1		1		4
104	A3B NW	3	29	11		4	1		1	17
104	A3B SE	3	29	1						1
104	A3B SW	3	29	3						3
			Total	17		5	1	1	1	25
104	A3B NW	4	17	1		1				2
104	A3B SE	4	17	2		1				3
			Total	3	0	2	0	0	0	5
104	A3B SW	5	17	1	0	0	0	2	0	3
104	A3B NW	6	17	1						1
104	A3B SE	6	17			1		1		2
			Total	1	0	1	0	1	0	3
104	A3B NW	7	17		0	0	0	1	0	1
104	A3B SW	8	17	1	0	0	0	0	0	1
			Grand Total	269	1	125	1	99	1	496

* *Helicidae* sp was also found in this portion of the square. No cockles were found in any A3B squares.

Totals only of Shells from square A3B, by Spit

From the file '`Sand_shell_data_trench_A_SquareA3B_nos_by_spit.csv`'.

Context	Spit	limpets	periwinkle	dogwhelk	flat periwinkle	mussel	clam/scallop	Total
29	2	246	117	95		1		459
	3	17	5	1	1		1	25
	Total	263	122	96	1	1	1	484
17	4	3	2					5

	5	1		2				3
	6			2				2
	7	1						1
	8	1						1
	Total	6	2	4	0	0	0	12
Grand Total		269	124	100	1	1	1	496

Totals only of Shells from square A3B, by Context

From the file '`Sand_shell_data_trench_A_SquareA3B_nos_by_context.csv`'.

Context	limpets	periwinkle	dogwhelk	Total
29	263	122	96	481
17	6	2	4	12
Grand Total	269	124	100	493

Shells from square A4B, by Spit

top

From the file '`Sand_shell_data_trench_A_SquareA4B.csv`'.

Box	Square	Spit	Context	limpets	periwinkle	flat periwinkle	dogwhelk	cockle	Total
104	A4B NE	2	17	3	2				5
104	A4B NW	2	17	46	14		10	1	71
104	A4B SE	2	17		2		1		3
104	A4B SW	2	17	44	29		19		92
			Total	93	47	0	30	1	171
104	A4B NW	5	17	1	1				2
104	A4B SE	5	17	2	1	1			4
104	A4B SW	5	17	1					1
			Total	4	2	1	0	0	7
104	A4B SW	6	17	1	0	0	0	0	1
			Grand Total	98	49	1	30	1	179

There were no mussels or clam/scallops found in this square.

Shells from square A5B

top

From the file '`Sand_shell_data_trench_A_SquareA5B.csv`'.

There were no shells found in this square.

Shells from square A6B

From the file '`Sand_shell_data_trench_A_SquareA6B.csv`'.

Box	Code	Spit	Context	limpets	periwinkle	Total
104	A6B NE	5	25	1	1	2
104	A6B SE	5	25	1		1
			Grand Total	2	1	3

There were no mussel, flat periwinkle, dogwhelk, clam/scallop or cockle shells found in this square.

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… > Sand_shell_data_trench_A_Counts_by_context3.csv
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… > Sand_shell_data_trench_A_SquareA1B_nos_by_context.csv
… > Sand_shell_data_trench_A_SquareA2B.csv
… > Sand_shell_data_trench_A_SquareA2B_nos_by_context.csv
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… > Sand_shell_data_trench_A_SquareA3B_nos_by_spit.csv
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… > Sand_shell_data_trench_A_SquareA4B.csv
… > Sand_shell_data_trench_A_SquareA5B.csv
… > Sand_shell_data_trench_A_SquareA6B.csv

Appendix 16 - Limpet Measurements | Nicky Milner

The raw data on which these table are based can be obtained from the SFS project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Shells. From here you can download the appropriate CSV file(s) for limpet shells.

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

Square B24B, Context 11

Spits 6, 7, 8 and 9

SD	M ratio	SD
2.4	3	0.4

This box contained *c*4,400 examples.

From the ADS file 'Sand_limpet_measurements_Grid_sq_B24b_context_011.csv'.

Square B24B, Context 12

Box 174, Spit 2

SD	M ratio	SD
2.2	2.9	0.4

This context contained almost 400 examples.

From the ADS file 'Sand_limpet_measurements_Grid_sq_B24b_context_012.csv'.

Square B24B, Context 13

Spits 3, 4 and 5

M L2	SD	M ratio	SD
9.7	2.1	3	0.4

This box contained over 7,000 examples.

From the ADS file 'Sand_limpet_measurements_Grid_sq_B24b_context_013.csv'.

Trench A

top

Context 1/2, Spits 2 and 3

From the ADS file 'Sand_limpet_measurements_Trench_A_context_001-2.csv'.

Trench	Box	Spit	Quad	N	L1	L2	Trench	Box	Spit	Quad	N	L1	L2

A1B	74	2	NE	1	33.9	10.88
				2	23.87	7.83
				3	26.35	9.16
				4	30.65	9.07
				5	31.63	10.12
				6	41.12	15.81
				7	33.81	11.35
				8	33.81	11.35
				9	39.91	15.28
				10	36.38	12.78
				11	43.88	16.06
				12	34.34	11.4
				13	32.02	9.84
			NW	14	18.49	5.62
				15	27.6	8.92
				16	20.2	9.05
				17	29.81	9.54
				18	25.98	9.93
				19	21.23	9.92
				20	21.99	7.57
				21	20.43	6.69
				22	22.94	6.72
				23	22.96	9.92
				24	24.53	7.34
				25	32.85	8.49
				26	26.09	8.91
				27	28.97	9.88
				28	27.85	10.20
				29	27.67	9.62
				30	28.47	7.64
				31	33.55	11.27
				32	37.86	10.59
				33	30.47	9.35
				34	34.52	10.29
				35	35.95	14.34
				36	39.80	17.00
				37	37.17	15.78
				38	36.63	14.71
				39	39.01	13.26
				40	39.14	13.88
				41	40.65	13.01
				42	38.13	12.84
A1B	74	2	SE	43	16.7	5.53
				44	17.54	6
				45	17.11	5.21
				46	16.31	6.68
				47	20.41	7.64
				48	21.32	7.11
				49	19.76	6.62
				50	21.61	6.37
				51	21.90	6.70
				52	25.68	8.64
				53	24.57	10.36
				54	26.94	8.40
				55	27.40	8.98
				56	21.39	7.96
				57	27.42	9.67
				58	26.88	9.72
				59	29.83	10.00
				60	32.32	11.39
				61	32.35	12.06
				62	33.78	10.28
				63	33.56	15.04
				64	34.04	13.93
				65	41.32	16.30
			SW	66	30.92	10.96
		3	NE	67	34.34	13.76
			SE	68	33.66	12.95
				69	35.74	11.44
				70	33.32	11.16
				71	33.03	11.34
				72	29.39	8.09
				73	28.79	7.43
				74	25.59	8.26
				75	24.86	6.76
				76	20.25	5.59
				77	18.40	5.48
				78	20.82	7.32
				79	22.48	6.49
A2	104	2	SW	80	32.41	12.32
				81	29.18	8.82
				82	26.90	7.24

Context 17, Spits 2, 4, 5, 6, 7 and 8

There were no measurements from this context.

From the ADS file ‘Sand_limpet_measurements_Trench_A_context_017.csv’.

Context 22, Spits 7, 8 and 9

top

From the ADS file ‘Sand_limpet_measurements_Trench_A_context_022.csv’.

M L1	SD	M L2	SD	M ratio	SD
31.7		10.1		3.2	

There was only one measurement from this context and therefore not enough data with which to perform a statistical analysis.

Trench	Box	Spit	Quad	N	L1	L2
A1B	111	7	NE	1	31.74	10.07

Context 25

There were no measurements from this context.

From the ADS file '`Sand_limpet_measurements_Trench_A_context_025.csv`'.

Context 27, Spits 6, 7, and 8

From the ADS file '`Sand_limpet_measurements_Trench_A_context_027.csv`'.

M L1	SD	M L2	SD	M ratio	SD
29		14.2		2	

There was only one measurement from this context and therefore not enough data with which to perform a statistical analysis.

Trench	Box	Spit	Quad	N	L1	L2
A2B	104	6	SW	1	28.96	14.17

Context 28, Spits 4, 5 and 6

top

From the ADS file '`Sand_limpet_measurements_Trench_A_context_028.csv`'.

SD	M L2	SD	M ratio	SD
5.9	10.9	3.0	3.1	0.5

Trench	Box	Spit	Quad	N	L1	L2
A1B	74/?/111	4	NE	1	46.42	19.34
				2	42.6	13.22
				3	42.02	13.96
				4	37.74	13.09
				5	36.38	12.69
				6	37.25	12.64
				7	36.78	12.37
				8	35.22	12.34
				9	36.71	11.76
				10	31.55	9.64
				11	32.93	9.43
				12	39.69	12.51
				13	36.57	11.12
				14	37.99	10.32
				15	34.22	11.05
				16	29.31	9.74
				17	32.88	9.67
				18	34.55	11.79
				19	35.91	12.85
				20	35.26	11.23
				21	37.72	12.89
				22	33.36	10.92
A1B	74/?/111	4	NW	54	36.09	9.21
				55	35.96	11.59
			SE	56	33.93	15.86
				57	38.94	16.04
				58	29.69	10.48
				59	34.75	13.70
				60	41.17	14.73
				61	40.9	13.59
				62	30.77	9.48
				63	32.02	9.90
		5	NE	64	35.61	18.59
				65	34.91	17.17
				66	38.28	13.42
			NW	67	36.82	13.79
				68	40.56	16.32
		6	NE	69	33.47	10.94
				70	37.41	10.27
A2B	104	4	NW	71	38.43	16.84
			SW	72	27.59	8.95

				23	33.28	10.85
				24	32.45	8.53
				25	31.4	9.64
				26	29.57	10.09
				27	32.28	11.43
				28	29.25	8.31
				29	30.5	11.16
				30	32.76	10.11
				31	26.85	11.37
				32	34.03	11.24
				33	34.45	10.19
				34	28.83	9.72
				35	25.45	6.65
				36	27.64	8.54
				37	29.71	8.92
				38	31.34	10.17
				39	26.31	9.27
				40	26.71	9.3
				41	27.05	9.8
				42	25.94	7.64
				43	26.65	8.5
				44	24.48	7.51
				45	21.47	7.58
				46	22.65	6.44
				47	31.94	5.75
				48	19.97	5.17
				49	21.12	7.73
				50	24.85	6.57
				51	25.22	6.9
				52	19.72	5.45
				53	20.29	6.19

Context 29, Spits 3, 4 and 5

top

From the ADS file 'Sand_limpet_measurements_Trench_A_context_029.csv'.

M L1	SD	M L2	SD	M ratio	SD
32.7	5.1	10.9	4.2	3.1	0.6

There were only five measurements from this context and therefore not enough data with which to perform a full statistical analysis.

Trench	Box	Spit	Quad	N	L1	L2
A2B	104	3	NW	1	36.08	10.75
				2	33.03	10.66
				3	28.13	7.28
		4	–	4	38.43	16.84
			SW	5	27.59	8.95

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… > Sand_limpet_measurements_Grid_sq_B24b_context_011.csv
… > Sand_limpet_measurements_Grid_sq_B24b_context_012.csv
… > Sand_limpet_measurements_Grid_sq_B24b_context_013.csv
… > Sand_limpet_measurements_Trench_A_context_001-2.csv
… > Sand_limpet_measurements_Trench_A_context_017.csv
… > Sand_limpet_measurements_Trench_A_context_022.csv
… > Sand_limpet_measurements_Trench_A_context_025.csv
… > Sand_limpet_measurements_Trench_A_context_027.csv
… > Sand_limpet_measurements_Trench_A_context_028.csv
… > Sand_limpet_measurements_Trench_A_context_029.csv

Appendix 17 – Dogwhelk Measurements | Nicky Milner

The raw data on which these table are based can be obtained from the SFS project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Shells`. From here you can download the appropriate CSV file(s) for dogwhelk shells.

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

Square B24B, Context 11

Box 174, Spits 6, 7, 8 and 9

This box contained *c*300 examples.

From the ADS file '`Sand_dogwhelk_measurements_SquareB24b_context011.csv`'.

Square B24B, Context 12

Box 174, Spit 2, no quads

This context contained *c*250 examples.

From the ADS file '`Sand_dogwhelk_measurements_SquareB24b_context012.csv`'.

Square B24B, Context 13

Box 174, Spits 3, 4 and 5

This box contained over 1,000 examples.

From the ADS file '`Sand_dogwhelk_measurements_SquareB24b_context013.csv`'.

Trench A

top

Context 1/2, Box 174, Spits 2 and 3

This context contained 350 examples.

From the ADS file '`Sand_dogwhelk_measurements_TrenchA_context011-2.csv`'.

Context 22, Box 111, Spits 7, 8 and 9

This context contained 65 examples.

From the ADS file ‘`Sand_dogwhelk_measurements_TrenchA_context022.csv`’.

Spit	Quad	N	L1	L2
7	NE	1	30.37	20.44
		2	30.05	22.4
		3	30.55	19.35
		4	33.55	22.01
		5	27.61	18.39
		6	27.65	18.34
		7	31.16	21.07
		8	25.20	17.16
		9	29.92	20.75
		10	25.03	17.73
		11	25.54	17.89
		12	28.72	18.81
		13	28.32	19.12
		14	24.99	17.64
		15	30.52	21.05
		16	26.48	17.41
		17	28.93	20.37
		18	25.58	17.94
		19	30.56	23.37
		20	29.34	18.84
		21	25.08	16.65
		22	29.27	19.74
		23	21.48	17.27
		24	27.19	18.64
		25	23.97	18.62
		26	22.76	16.01
		27	27.43	16.55
		28	24.80	15.66
		29	26.16	16.88
		30	30.85	18.78
		31	26.58	18.54
		32	30.13	21.59
		33	33.83	21.69
		34	28.39	19.77
		35	27.29	20.05
		36	31.66	20.66
		37	29.45	19.81
		38	25.84	17.53
		39	29.99	19.61
		40	30.77	20.20
		41	30.50	21.00
		42	25.58	18.26
7	SW	46	22.33	17.41
		47	23.85	16.68
		48	24.89	18.24
		49	24.96	19.75
		50	28.59	20.89
		51	33.48	20.65
		52	28.05	19.94
		53	25.16	19.62
		54	30.51	20.64
		55	27.89	19.29
		56	23.65	18.21
		57	29.28	20.68
		58	27.62	19.00
		59	24.40	17.40
		60	26.12	17.14
		61	24.26	17.30
		62	31.57	18.95
		63	34.38	23.35
		64	27.50	19.58
8	NE	65	32.13	21.67

		43	23.44	17.06
		44	22.86	16.30
		45	18.31	12.68

Context 28, Box 74/?, Spits 4, 5 and 6

top

This context contained over 300 examples.

From the ADS file 'Sand_dogwhelk_measurements_TrenchA_context028.csv'.

Context 29, Spits 3, 4 and 5

This context contained 58 examples.

From the ADS file 'Sand_dogwhelk_measurements_TrenchA_context029.csv'.

Northern Quads					Southern Quads				
Spit	Quad	N	L1	L2	Spit	Quad	N	L1	L2
3	NE	1	27.62	19.79	3	SE	3	24.86	16.57
		2	28.75	18.78			23	29.81	20.18
							24	27.66	18.65
	NE2	4	29.09	19.16			25	27.25	18.43
		5	29.88	17.56			26	26.64	15.34
		6	30.27	20.54			27	25.8	15.51
		7	25.3	17.59			28	26.5	18.76
		8	22.86	17.22			29	31.07	19.04
		9	27.46	19.1			30	27.09	18.45
		10	25.18	16.79			31	25.19	17.48
		11	30.08	20.24			32	34.93	21.49
		12	26.22	18.57			33	23.9	15.03
		13	28.75	18.51			34	25.1	16.24
		14	26.05	16.64			35	24.51	18.13
		15	31.25	20.55			36	26.11	17.68
		16	29.59	19.9			37	24.47	16.01
							38	26.42	18.17
	NW	17	33.94	23.22			39	25.04	17.39
		18	31.28	20.73			40	25.17	18.03
		19	26.85	19.11			41	32.63	22.46
		20	33.7	23.42			42	28.39	18.47
		21	25.73	16.08			43	23.89	17.33
		22	20.08	14.19			44	26.56	17.67
							45	27.06	18.89
						SW	46	30.62	19.25
							47	25.95	17.41
							48	26.97	17.82
							49	28.69	19.01

50	26.72	18.29
51	29.72	18.93
52	24.66	15.82
53	32.41	21.75
54	22.39	16.94
55	29.76	18.76
56	22.17	15.72
57	24.41	15.95
58	20.93	15.54

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- … > Sand_dogwhelk_measurements_SquareB24b_context011.csv
- … > Sand_dogwhelk_measurements_SquareB24b_context012.csv
- … > Sand_dogwhelk_measurements_SquareB24b_context013.csv
- … > Sand_dogwhelk_measurements_TrenchA_context011-2.csv
- … > Sand_dogwhelk_measurements_TrenchA_context022.csv
- … > Sand_dogwhelk_measurements_TrenchA_context028.csv
- … > Sand_dogwhelk_measurements_TrenchA_context029.csv

Appendix 18 – Periwinkle Measurements | Nicky Milner

The raw data on which these table are based can be obtained from the SFS project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Shells. From here you can download the appropriate CSV file(s) for periwinkle shells.

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

Trench A

Context 1/2

This context contained over 300 examples.

From the ADS file 'Sand_periwinkle_measurements_context_001-2.csv'.

Context 11

This context contained over 170 examples.

From the ADS file 'Sand_periwinkle_measurements_context_011.csv'.

Context 13

This context contained almost 800 examples.

From the ADS file 'Sand_periwinkle_measurements_context_013.csv'.

Context 17

This context contained 17 examples.

From the ADS file 'Sand_periwinkle_measurements_context_017.csv'.

Spit	Quad	M
A2B	SE6	24.97
A4B	NW2	21.99
		24.76
		22.75
		22.76
	SW2	26.31

		29.01
		33.43
		30.74
		23.65
		22.47
		26.25
		22.78
		23.42
		20.03
		23.92
		25.96

Context 22

This context contained over 100 examples.

From the ADS file ‘`Sand_periwinkle_measurements_context022.csv`’.

Context 27

This context contained 10 examples.

From the ADS file ‘`Sand_periwinkle_measurements_context027.csv`’.

Spit	Quad	M
A2B	SW7	21.76
		29.02
		32.28
		37.63
	NW6	26.51
		24.70
		28.02
		28.97
		22.43
		26.01

Context 28

This context contained over 250 examples.

From the ADS file ‘`Sand_periwinkle_measurements_context028.csv`’.

Context 29

This context contained 61 examples.

From the ADS file ‘`Sand_periwinkle_measurements_context029.csv`’.

Spit	Quad	M	Spit	Quad	M
A2B	NW3	28.26	A3B	NE2	24.11

		30.09			28.70
		28.45			33.19
		24.63			27.55
		25.81			
		29.90		SE2	25.76
		27.25			25.27
		29.91			22.85
		26.66			24.81
		25.70			32.65
		25.88			23.33
		22.92			28.44
		24.76			29.26
		22.47			27.16
		26.93			31.64
		22.14			24.29
		28.32			27.15
		25.47			26.07
		28.37			25.26
		21.90			24.22
		21.23			21.81
A3B	NW2	29.66		SW2	29.15
		21.81			27.60
		21.92			25.89
		28.28			24.63
		22.67			3.016
		28.25			28.64
		24.21			23.68
		27.01			21.05
		31.63			21.88
		27.97			23.96

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… > Sand_periwinkle_measurements_context_011.csv

```
… > Sand_periwinkle_measurements_context_013.csv
… > Sand_periwinkle_measurements_context_017.csv
… > Sand_periwinkle_measurements_context022.csv
… > Sand_periwinkle_measurements_context027.csv
… > Sand_periwinkle_measurements_context028.csv
… > Sand_periwinkle_measurements_context029.csv
```

Appendix 19 – Sand, statistical data for the shells | Nicky Milner

The data in these tables can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the file 'Sand_shells_statistical_data.pdf'.

The written report can be found in Section 3.12 or as an archive version at the ADS > Downloads > Documents > Final Reports. From here you can download the PDF files 'Milner,_shell_report_Sand.pdf'. See also 'shell_report_Sand,_Milner,_2004.pdf' in Documents > Specialist Reports.

Limpet Lengths

Descriptives – Dependent Variable: Length

					95% Confidence Interval for Mean			
Context	N	Mean	Std Deviation	Std Error	Lower Bound	Upper Bound	Minimum	Maximum
12	390	29.694	4.7354	0.2398	29.223	30.166	20.5	48.8
13	7350	28.933	4.3028	0.0502	28.834	29.031	6.9	55.4
11	4398	29.715	4.4509	0.0671	29.583	29.846	8.2	51.4
1/2	82	29.059	6.8228	0.7535	27.560	30.558	16.3	43.9
28	72	32.424	5.8592	0.6905	31.047	33.801	19.7	46.4
LS	51	34.828	8.7129	1 .2201	32.378	37.279	14.2	55.6
US	50	38.594	6.4950	0.9185	36.748	40.440	19.1	50.0
Total	12393	29.318	4.5127	0.0405	29.239	29.398	6.9	55.6

Table on p1 of report

ANOVA – Dependent Variable: Length

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8388.785	6	1398.131	70.983	0.000
Within Groups	243965.0	12386	19.697		
Total	252353.8	12392			

Table on p1 of report

Multiple Comparisons – Dependent Variable: Length, Bonferroni

					95% Confidence Interval	

(I) Context	(J) Context	Mean Difference (I-J)	Std Error	Sig.	Lower Bound	Upper Bound
12	13	0.762*	0.2306	0.020	0.061	1.462
	11	-0.020	0.2345	1.000	-0.733	0.692
	1/2	0.635	0.5392	1.000	-1.003	2.274
	28	-2.730*	0.5693	0.000	-4.459	-1.000
	LS	-5.134*	0.6608	0.000	-7.142	-3.126
	US	-8.900*	0.6667	0.000	-10.925	-6.874
13	12	-0.762*	0.2306	0.020	-1.462	-0.061
	11	-0.782*	0.0846	0.000	-1.039	-0.525
	1/2	-0.126	0.4928	1.000	-1.624	1.371
	28	-3.491 *	0.5256	0.000	-5.088	-1.894
	LS	-5.896*	0.6236	0.000	-7.791	-4.001
	US	-9.661 *	0.6298	0.000	-11.575	-7.748
11	12	0.020	0.2345	1.000	-0.692	0.733
	13	0.782*	0.0846	0.000	0.525	1.039
	1/2	0.656	0.4947	1.000	-0.848	2.159
	28	-2.709*	0.5273	0.000	-4.312	-1.107
	LS	-5.114*	0.6251	0.000	-7.013	-3.214
	US	-8.879*	0.6312	0.000	-10.798	-6.961
1/2	12	-0.635	0.5392	1.000	-2.274	1.003
	13	0.126	0.4928	1.000	-1.371	1.624
	11	-0.656	0.4947	1.000	-2.159	0.848
	28	-3.365*	0.7168	0.000	-5.543	-1.187
	LS	-5.769*	0.7915	0.000	-8.174	-3.364
	US	-9.535*	0.7963	0.000	-11.955	-7.115
28	12	2.730*	0.5693	0.000	1.000	4.459
	13	3.491 *	0.5256	0.000	1.894	5.088
	11	2.709*	0.5273	0.000	1.107	4.312
	1/2	3.365*	0.7168	0.000	1.187	5.543
	LS	-2.404	0.8123	0.065	-4.873	0.064
	US	-6.170*	0.8170	0.000	-8.653	-3.687
LS	12	5.134*	0.6608	0.000	3.126	7.142
	13	5.896*	0.6236	0.000	4.001	7.791
	11	5.114*	0.6251	0.000	3.214	7.013
	1/2	5.769*	0.7915	0.000	3.364	8.174
	28	2.404	0.8123	0.065	-0.064	4.873
	US	-3.766*	0.8833	0.000	-6.450	-1.082
US	12	8.900*	0.6667	0.000	6.874	10.925
	13	9.661*	0.6298	0.000	7.748	11.575
	11	8.879*	0.6312	0.000	6.961	10.798
	1/2	9.535*	0.7963	0.000	7.115	11.955
	28	6.170*	0.8170	0.000	3.687	8.653
	LS	3.766*	0.8833	0.000	1.082	6.450

* The mean difference is significant at the 0.05 level; Table on p2 of report

Dogwhelk Lengths

Descriptives – Dependent Variable: Length

Context	N	Mean	Std Deviation	Std Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
12	249	28.3333	2.99822	0.19000	27.9591	28.7075	19.60	35.50
13	918	29.4248	2.91536	0.09622	29.2360	29.6137	16.15	38.80
11	305	29.9856	3.05125	0.17471	29.6418	30.3294	22.42	37.85
1/2	350	26.5233	3.73460	0.19962	26.1307	26.9159	4.46	40.19
28	326	27.4652	3.34490	0.18526	27.1008	27.8297	17.36	37.18
22	65	27.6046	3.27707	0.40647	26.7926	28.4166	18.31	34.38
29	58	27.2652	3.17944	0.41748	26.4292	28.1012	20.08	34.93
LS	50	27.8526	3.35626	0.47465	26.8988	28.8064	19.83	33.72
US	50	26.0508	3.20459	0.45320	25.1401	26.9615	15.28	31.59
Total	2371	28.4775	3.39509	0.06972	28.3408	28.6143	4.46	40.19

Table on p3 of report

ANOVA – Dependent Variable: Length

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3642.095	8	455.262	45.419	0.000
Within Groups	23675.999	2362	10.024		
Total	27318.094	2370			

Table on p3 of report

Multiple Comparisons – Dependent Variable: Length, Bonferroni

(I) Context	(J) Context	Mean Difference (I-J)	Std Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
12	13	-1.0915*	0.22622	0.000	-1.8156	-0.3675
	11	-1.6523*	0.27041	0.000	-2.5178	-0.7868
	1/2	1.8100*	0.26248	0.000	0.9699	2.6501
	28	0.8681*	0.28648	0.041	0.0152	1.7210
	22	0.7287	0.44098	1.000	-0.6828	2.1402
	29	1.0681	0.46160	0.747	-0.4094	2.5456
	LS	0.4807	0.49064	1.000	-1.0897	2.0511
	US	2.2825*	0.49064	0.000	0.7121	3.8529
13	012	1.0915*	0.22622	0.000	0.3675	1.8156
	11	-0.5608	0.20925	0.267	-1.2305	0.1090
	1/2	2.9015*	0.19889	0.000	2.2649	3.5361
	28	1.9596*	0.20412	0.000	1.3063	2.6130
	22	1.8202*	0.40636	0.000	0.5195	3.1209
	29	2.1597*	0.42865	0.000	0.7876	3.5317
	LS	1.5722*	0.45978	0.023	0.1006	3.0439
	US	3.3740*	0.45978	0.000	1.9024	4.8457
11	12	1.6523*	0.27041	0.000	0.7868	2.5178
	13	0.5608	0.20925	0.267	-0.1090	1.2305
	1/2	3.4823*	0.24800	0.000	2.8685	4.2561

	28	2.5204*	0.25221	0.000	1.7131	3.3277
	22	2.3610*	0.43252	0.000	0.9986	3.7654
	29	2.7204*	0.45353	0.000	1.2686	4.1721
	LS	2.1330*	0.48305	0.000	0.5869	3.6791
	US	3.9348*	0.48305	0.000	2.3687	5.4809
1 / 2	12	-1.8100*	0.26248	0.000	-2.6501	-0.9699
	13	-2.9015*	0.19889	0.000	-3.5381	-2.2649
	11	-3.4823*	0.24800	0.000	-4.2561	-2.8685
	28	-0.9419*	0.24369	0.004	-1.7219	-0.1619
	22	-1.0813	0.42761	0.414	-2.4500	0.2874
	29	-0.7419	0.44864	1.000	-2.1785	0.6948
	LS	-1.3293	0.47886	0.199	-2.8614	0.2028
	US	0.4725	0.47886	1.000	-1.0596	2.0046
28	12	-0.8681*	0.28648	0.041	-1.7210	-0.0152
	13	-1.9596*	0.20412	0.000	-2.6130	-1.3063
	11	-2.5204*	0.25221	0.000	-3.3277	-1.7131
	1/2	0.9419*	0.24369	0.004	0.1619	1.7219
	22	-0.1394	0.43007	1.000	-1.5159	1.2371
	29	0.2000	0.45119	1.000	-1.2441	1.6442
	LS	-0.3674	0.48086	1.000	-1.9265	1.1517
	US	1.4144	0.48086	0.119	-0.1247	2.9535
22	12	-0.7287	0.44098	1.000	-2.1402	0.6828
	13	-1.8202*	0.40636	0.000	-3.1209	-0.5195
	11	-2.3610*	0.43252	0.000	-3.7654	-0.9986
	1/2	1.0813	0.42761	0.414	-0.2874	2.4500
	28	0.1394	0.43007	1.000	-1.2371	1.5159
	29	0.3394	0.57187	1.000	-1.4910	2.1699
	LS	-0.2480	0.59555	1.000	-2.1542	1.6582
	US	1.5536	0.59555	0.329	-0.3524	3.4600
29	012	-1.0681	0.46160	0.747	-2.5456	0.4094
	13	-2.1597*	0.42865	0.000	-3.5317	-0.7876
	11	-2.7204*	0.45353	0.000	-4.1721	-1.2686
	1/2	0.7419	0.44864	1.000	-0.6948	2.1785
	28	-0.2000	0.45119	1.000	-1.6442	1.2441
	22	-0.3394	0.57187	1.000	-2.1699	1.4910
	LS	-0.5874	0.61098	1.000	-2.5430	1.3682
	US	1.2144	0.61098	1.000	-0.7412	3.1700
LS	12	-0.4807	0.49064	1.000	-2.0511	1.0897
	13	-1.5722*	0.45978	0.023	-3.0439	-0.1006
	11	-2.1330*	0.48305	0.000	-3.6791	-0.5869
	1/2	1.3293	0.47886	0.199	-0.2028	2.8614
	28	0.3674	0.48086	1.000	-1.1517	1.9265
	22	0.2480	0.59555	1.000	-1.6582	2.1542
	29	0.5874	0.61098	1.000	-1.3682	2.5430
	US	1.8018	0.63320	0.161	-0.2249	3.8285
US	12	-2.2825*	0.49064	0.000	-3.8529	-0.7121
	13	-3.3740*	0.45978	0.000	-4.6457	-1.9024
	11	-3.9348*	0.48305	0.000	-5.4809	-2.3687
	1/2	-0.4725	0.47886	1.000	-2.0048	1.0596
	28	-1.4144	0.48086	0.119	-2.9535	0.1247

	22	-1.5536	0.59555	0.329	-3.4800	0.3524
	29	-1.2144	0.61098	1.000	-3.1700	0.7412
	LS	-1.8018	0.63320	0.161	-3.8285	0.2249

* The mean difference is significant at the 0.05 level; Table on p4 of report

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… > Data > Artefact and ecofact catalogues > Sand_shells_statistical_data.pdf
… > Documents > Final reports > Milner,_shell_report_Sand.pdf [final]
… > Documents > Specialists reports > shell_report_Sand,_Milner,_2004.pdf [draft]

Appendix 20 – Limpets with holes and other potentially worked or modified shell | Nicky Milner

The data in these tables can be obtained from this site at: `> Data > …`

- appendix_20_sheet1_rawdata.csv
- appendix_20_sheet2_sand.csv
- appendix_20_sheet3_testpits.csv

Please right-click as 'Save Target As...' or 'Save Link As...' to download to your computer.

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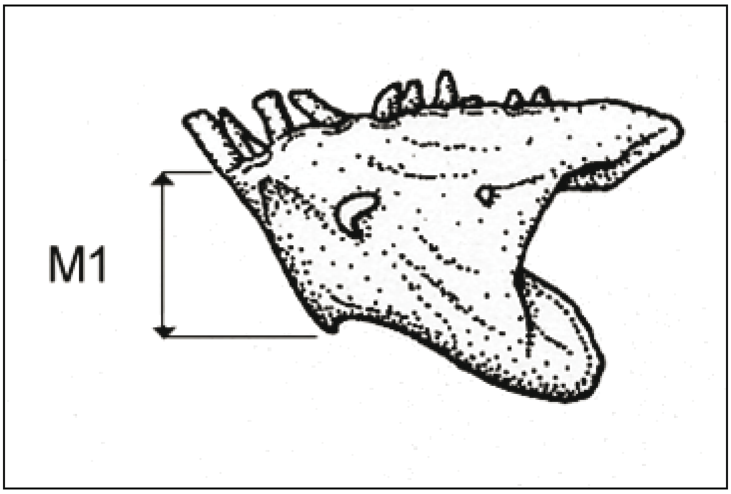
Appendix 21 – Labrid dentary, premaxilla and scapula measurements | Rachel Parks & James Barrett

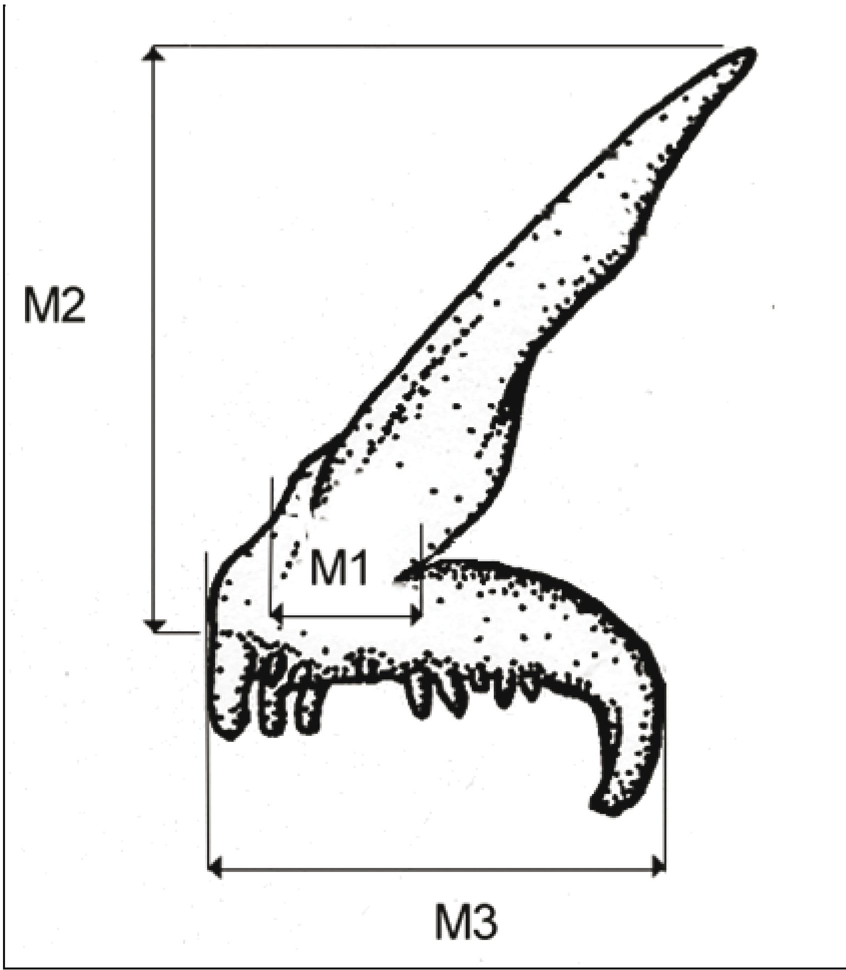
The data on this page can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues`. From here you can download the file '`Zooarchaeology_fish_measurement_appendices_13.9.4.pdf`' (page 1). See also the draft version '`sand_bone_report_appendix_Parks.pdf`' (p2) in `Specialists reports`.

The written report can be found in Section 3.11 or as an archive version at the ADS > `Downloads > Documents > Final Reports`. From here you can download the file '`Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf`'. See also the draft version of the report '`sand_bone_report,_Parks.pdf`' in `Documents > Specialist reports`.

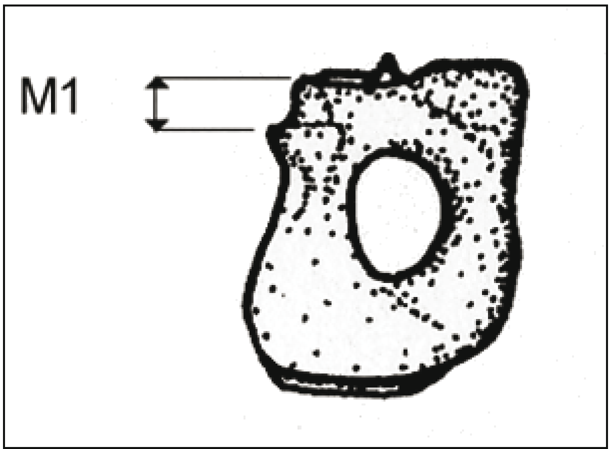
The left lateral view is shown. Drawings by Sven Schroeder based on *Labrus bergylta*. All other measurements used for labrids follow those defined in the York protocol. Large sizes shown.



Dentary measurement



Premaxilla measurement



Scapula measurement

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… > Documents > Specialists reports > sand_bone_report_appendix_Parks.pdf [draft]

… > Documents > Final reports > Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf’ [report final]

… > Documents > Specialists reports > sand_bone_report,_Parks.pdf [report draft]

Appendix 22 – Sand, Mammal QC1 element measurements | Rachel Parks

The data on this page can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the file 'Zooarchaeology_fish_measurement_appendices_13.9.4.pdf' (pages 2 and 3). See also the draft version 'sand_bone_report_appendix_Parks.pdf' (p3) in Specialists reports.

The written report can be found in Section 3.11 or as an archive version at the ADS > Downloads > Documents > Final Reports. From here you can download the file 'Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf' (page 4). See also the draft version of the report 'sand_bone_report,_Parks.pdf' in Documents > Specialist reports.

element	taxon	context	bone id	Measurements in mm			
astragulus				Bd	Dl	GLl	GLm
	red deer	topsoil	SFS4-2000	35.44	25.91	54.05	50.65
calcaneum				C+D		GL	
	red deer	topsoil	SFS4-3120	37.82		109.9	
humerus				BT			
	red deer	organic rich	SFS4-1800	48.3			
metapodials				Bd			
	red deer	main shell midden	SFS4-12	36.39			
			SFS4-1928	45.85			
			SFS4-1965	46.88			
		organic rich	SFS4-329	40.84			
			SFS4-5967	39.85			
mandibular				LM		BM	

molar1	*Bos* sp.	organic rich	SFS4-2251	28.78	11.94
mandibular molar3*				P6	P7
	wild boar	main shell midden	SFS4-2521	16.5	16.26
phalanx 1				GL	Ll
	red deer	main shell midden	SFS4-1820	24	25.23
			SFS4-5854	26.9	
			SFS4-5855	27.2	
radius				Bp	Bd
	red deer	topsoil	SFS4-1998		53.92
		main shell midden	SFS4-7	55.76	
	wild boar		SFS4-1835		39.42
scapula				GLP	
	large mammal	main shell midden	SFS4-5852	63.12	
tibia				Bd	
	red deer	main shell midden	SFS4-1917	36.32	
navicular-cuboid				GB	
	Bos sp.	sandy soil	SFS4-2537	49.35	

Mammal QC1 element measurements
* Measurements P6 and P7 taken on the wild boar mandibular molar 3 follow Dobney *et al* 1999

Bibliography

• Dobney, K, Jaques, D, & Johnstone, C 1999 *A Protocol for Recording Vertebrate Remains from Archaeological Sites*. York: Reports from the Environmental Archaeology Unit, 99/15.

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… > Documents > Specialists reports > sand_bone_report_appendix_Parks.pdf [draft]

… > Documents > Final reports > Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf' [report final]

… > Documents > Specialists reports > sand_bone_report,_Parks.pdf [report draft]

Appendix 23 – Sand, Bird QC1 element measurements | Rachel Parks

The data in this table can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the file 'Zooarchaeology_fish_measurement_appendices_13.9.4.pdf' (pages 4–12). See also the draft version 'sand_bone_report_appendix_Parks.pdf' (pp4–10) in Specialists reports.

The written report can be found in Section 3.11 or as an archive version at the ADS > Downloads > Documents > Final Reports. From here you can download the file 'Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf' (page 8). See also the draft version of the report 'sand_bone_report,_Parks.pdf' in Documents > Specialist reports.

element	taxon	context	bone id	Measurements in mm			
carpometacarpus				GL	Bp	Did	L
	guillemot	main shell midden	SFS4-3911			6.75	
			SFS4-3912			6.97	
			SFS4-4174			6.46	
			SFS4-4988	40.56	10.68		
			SFS4-3909		9.95		
			SFS4-3910		11.85		
			SFS4-3935		10.23		
			SFS4-4175		9.39		
		topsoil	SFS4-4638		10.35		
	razorbill or guillemot	main shell midden	SFS4-4002			5.65	
			SFS4-4068		8.79		

			SFS4-4069			6.53	
			SFS4-4070			6.08	
			SFS4-4098		9.75		
			SFS4-4141		9.32		
			SFS4-4204	40.52	10.64	6.2	40.06
			SFS4-4205		9.51		
			SFS4-4206			6.6	
			SFS4-4207		10.15		
			SFS4-4209			6.72	
			SFS4-4416			6.23	
			SFS4-4543		9.7		
			SFS4-4545			6.1	
			SFS4-4556		9.61		
			SFS4-4629			6.47	
			SFS4-4742		9.99	6.49	
			SFS4-4761			6.91	
			SFS4-4788		10.97		
			SFS4-4811			7.04	
			SFS4-4880		10.91		
			SFS4-4915			6.23	
			SFS4-4918			7.07	
			SFS4-5068		10.73		
			SFS4-5069		9.46		
			SFS4-5071		10.2		
			SFS4-			6.68	

			5132				
			SFS4-5744		9.41		
			SFS4-5747		10.09		
		shell midden	SFS4-5310		10.29		
		topsoil	SFS4-3959		9.31		
			SFS4-4640			7.13	
			SFS4-4642			6.52	
			SFS4-4675		9.94		
			SFS4-4698			7.25	
			SFS4-4897			6.69	
			SFS4-4899			7.16	
			SFS4-4900		10.69		
			SFS4-4901			6.74	
			SFS4-5238		10.31		
			SFS4-5249			6.25	
		organic rich	SFS4-4521		10.82		
			SFS4-4522			6.80	
			SFS4-5141			6.66	
		sandy soil	SFS4-5547		10.29		
	great auk	topsoil	SFS4-5291		13.66		
	auk family		SFS4-3955		8.56		
		main shell midden	SFS4-4603			7.39	
			SFS4-5101			7.27	
coracoid				GL	BF	Bb	Lm
	razorbill	main shell midden	SFS4-3853	36.69	12.8		35.95

	razorbill or guillemot		SFS4-4003	38.26			
			SFS4-4823	35.56			35.29
humerus				GL	SC	Bp	Bd
	guillemot	main shell midden	SFS4-4085	10.43			
			SFS4-4190	83.19	7.25	18.26	
			SFS4-4193	11.24			
			SFS4-4408	11.14			
			SFS4-4409	9.78			
			SFS4-4483	11.49			
			SFS4-4554	81.66	6.91	16.85	8.17
			SFS4-4612	8.88			
			SFS4-4614	9.26			
			SFS4-4658	11.25			
			SFS4-4752	10.04			
			SFS4-4753	10.27			
			SFS4-4786	9.02			
			SFS4-4821	10.2			
			SFS4-4835	9.21			
			SFS4-4906	10.38			
			SFS4-5054	77.54	7	16.99	10.76
			SFS4-5157	82.12	16.87	8.7	
			SFS4-5214	9.25			
			SFS4-5223	81.63	17.68	9.13	
			SFS4-5305	17.5	10.14		
			SFS4-5754	10.52			

			SFS4-5763	10.4			
			SFS4-3981	16.61			
			SFS4-3985	11.47			
			SFS4-3985	11.48			
			SFS4-4192	17.8			
		organic rich	SFS4-5276	9.77			
		topsoil	SFS4-3951	11.75			
			SFS4-3952	11.41			
			SFS4-3969	11.38			
			SFS4-4634	11.4			
			SFS4-4635	11.36			
			SFS4-5185	10.21			
			SFS4-5186	10.09			
			SFS4-5231	9.76			
			SFS4-5760	10.08			
	razorbill	main shell midden	SFS4-4042	67.85	6.44	16.34	
			SFS4-4609	8.21			
			SFS4-4657	9.63			
			SFS4-4751	9.51			
			SFS4-4907	9.07			
			SFS4-5061	9.56			
			SFS4-5062	9.16			
			SFS4-5755	8.78			
		topsoil	SFS4-4699	70.28	6.65	16.7	9.04
	razorbill or	main shell	SFS4-	17.01			

	guillemot	midden	3888					
			SFS4-3889	16.38				
			SFS4-3891	10.26				
			SFS4-3980	17.87				
			SFS4-3982	11.22				
			SFS4-4140	17.22				
			SFS4-4191	16.99				
			SFS4-4555	17.34				
			SFS4-4608	17.99				
			SFS4-4613	15.19				
			SFS4-4656	17.65				
			SFS4-4719	17.16				
			SFS4-4721	17.44				
			SFS4-4724	7.93				
			SFS4-4837	16.39				
			SFS4-4881	8.75				
			SFS4-4941	17.85				
			SFS4-4942	8.45				
			SFS4-4987	17.68				
			SFS4-4996	9.41				
			SFS4-5053	10.04				
			SFS4-5055	16.83				
			SFS4-5056	16.81				
			SFS4-5057	16.67				
			SFS4-5110	18.57				

			SFS4-5195	58.57	8.13		
			SFS4-5212	15			
			SFS4-5601	9.89			
		organic rich	SFS4-4377	9.66			
			SFS4-5615	16.73			
		topsoil	SFS4-3882	15.63			
			SFS4-4257	16.57			
			SFS4-4261	11.37			
			SFS4-4633	17.05			
			SFS4-4984	10.48			
	great auk	main shell midden	SFS4-4138	9.21			
			SFS4-4620	11.49			
			SFS4-5334	11.96			
	auk family		SFS4-3983	12.15			
			SFS4-4043	6.53			
		organic rich	SFS4-4510	8.17			
		topsoil	SFS4-4637	10.48			
	thrush and chat family	main shell midden	SFS4-5655	6.86			
scapula				GLP	SLC	Dic	GL
	guillemot	main shell midden	SFS4-3997		11.52		
	razorbill or guillemot		SFS4-3860		11.04		
			SFS4-3860				
			SFS4-3914		10.42		
			SFS4-3915		10.62		
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			SFS4-4401		9.93		
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			SFS4-4706		10.6		
			SFS4-4874		10.82		
			SFS4-5142		10.42		
		sandy soil	SFS4-5374		10.1		
			SFS4-5489		11.04		
			SFS4-5561		10.33		
		topsoil	SFS4-4236		9.92		
			SFS4-4237		10.91		
			SFS4-4262		10.94		
			SFS4-4991		11.46		
			SFS4-5118		9.55		
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			SFS4-5808		10.71		
	great auk	main shell midden	SFS4-4667		16.73		
	auk family	topsoil	SFS4-5252		11.06		
		shell midden	SFS4-5542		10.17		
tarsometatarsus				GL	SC	Bp	Bd
	guillemot	main shell midden	SFS4-4197	36.28	3.51	8	7.5
	razorbill or guillemot		SFS4-4345			8.11	
tibiotarsus				GL	Bd	Dip	Dd
	razorbill or guillemot	main shell midden	SFS4-4024		6.93		
			SFS4-4101			7.06	
			SFS4-4202		7.17		
			SFS4-4203		7.25		
			SFS4-4347		7.25		
			SFS4-4430		7.44		
			SFS4-4432		7.07		
			SFS4-4449		7.71		
			SFS4-4494		6.71		6.84
			SFS4-4564				7.48
			SFS4-4736		7.40		
			SFS4-4807		6.82		
			SFS4-4950		7.15		

			SFS4-4951		6.79		
			SFS4-5437		6.94		
			SFS4-5571		6.99		
			SFS4-5741				7.31
			SFS4-5818				7.56
		shell midden	SFS4-5469		5.99		
		sandy soil	SFS4-5375		6.96		
			SFS4-5521		7.78		
		topsoil	SFS4-3884				5.49
			SFS4-4264		6.35		
			SFS4-4287		6.08		
			SFS4-4848		6.82		
			SFS4-5027		6.88		
			SFS4-5257		7.04		
			SFS4-5362		7.22		
			SFS4-5804				7.15
	auk family		SFS4-3956		6.75		
		shell midden	SFS4-5312		6.24		
		main shell midden	SFS4-5739				6.06

Bird QC1 element measurements

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… > Documents > Specialists reports > sand_bone_report_appendix_Parks.pdf [draft]

… > Documents > Final reports > Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf' [report final]

… > Documents > Specialists reports > sand_bone_report,_Parks.pdf [report draft]

Appendix 24 – Sand, Fish QC1 and QC4 element measurements in mm | Rachel Parks

The data in this table can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the file 'Zooarchaeology_fish_measurement_appendices_13.9.4.pdf' (pages 13–30). See also the draft version 'sand_bone_report_appendix_Parks.pdf' (pp10–15) in Specialists reports.

The written report can be found in Section 3.11 or as an archive version at the ADS > Downloads > Documents > Final Reports. From here you can download the file 'Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf' (page 10). See also the draft version of the report 'sand_bone_report,_Parks.pdf' in Documents > Specialist reports.

element	taxon	context	bone id	M1	M2	M3
articular	ballan wrasse	topsoil	SFS4-6800	3.16		
		main shell midden	SFS4-7100	2.41		
basioccipital	saithe		SFS4-1049	3.05	3.31	
			SFS4-737	3.03	3.51	
			SFS4-7313	2.82	3.46	
			SFS4-791	2.57	4.01	
		sandy soil	SFS4-7633	3.02	4.23	
		topsoil	SFS4-6846	3.62	4.07	
			SFS4-7189	2.99	3.76	
			SFS4-7540	2.84	3.80	
	pollack	main shell midden	SFS4-880	3.04	3.19	
			SFS4-1781		6.32	
	cod		SFS4-7113		10.63	
	cod, saithe or		SFS4-	11.75		

	pollack		7127			
	cod family		SFS4-1656	2.64	3.48	
			SFS4-12371	2.79	3.28	
			SFS4-6886	3.68	4.82	
		sandy soil	SFS4-12014	1.55	2.01	
	ballan wrasse	main shell midden	SFS4-7740	4.73	5.57	
	wrasse family		SFS4-2669	3.09	3.78	
			SFS4-2581	4.76	5.26	
			SFS4-2822	5.04	5.21	
			SFS4-1748	2.76	3.04	
			SFS4-1719	3.08	3.14	
			SFS4-2995	2.47	2.72	
			SFS4-2568	3.18	3.21	
			SFS4-6881	5.18	5.23	
			SFS4-7125	4.92	5.37	
			SFS4-7126	4.78	4.77	
		shell midden	SFS4-7673	3.84	3.88	
			SFS4-7609	3.82	4.49	
		sandy soil	SFS4-7634	3.68	3.83	
		topsoil	SFS4-6745	3.15	3.80	
			SFS4-6746	3.57	3.77	
			SFS4-6824	3.24	3.04	
			SFS4-6685	3.03	3.44	
			SFS4-13106	2.96	3.45	
dentary	saithe		SFS4-6157	3.61	3.48	

			SFS4-13012		2.46	
		main shell midden	SFS4-1043	1.82	2.49	
			SFS4-1044	1.64	2.32	
			SFS4-12176		2.55	
			SFS4-7316	2.86	2.48	
			SFS4-7418	2.88		
			SFS4-7023	4.52	4.69	
			SFS4-7112	4.09		
	pollack		SFS4-6093	4.84	4.92	
			SFS4-12253	5.46		
			SFS4-2844	6.51		
			SFS4-6179		5.84	
	saithe or pollack		SFS4-1045		2.21	
			SFS4-604	1.72	2.36	
			SFS4-1597	2.35		
		topsoil	SFS4-15707	5.83		
	cod	main shell midden	SFS4-709		1.71	
			SFS4-819	1.49	2.03	
			SFS4-2915	1.86		
	cod, saithe or pollack		SFS4-708	1.92	2.5	
		topsoil	SFS4-2792	3.98		
	cod family		SFS4-6848	2.86		
		main shell midden	SFS4-2684		2.3	
			SFS4-7024	2.60		
	ballan wrasse		SFS4-1246	5.26		
	wrasse family		SFS4-2888	6.88		
			SFS4-	2.77	4.13	

			SFS4-1076			
		topsoil	SFS4-2790	5.86		
			SFS4-2755	3.86		
otolith	saithe or pollack	main shell midden	SFS4-15377	5.84	2.29	
			SFS4-15377	5.84	2.29	
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			SFS4-14128	10.71	3.91	
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			SFS4-15249	6.95	2.67	

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			SFS4-13986		3.11	
			SFS4-13987	5.43	2.06	
			SFS4-13988		2.17	
			SFS4-13992		2.75	
			SFS4-13993		3.39	
			SFS4-15376	6.05	2.21	
			SFS4-15214		2.54	
			SFS4-15365	10.13	3.84	
			SFS4-15367	5.64	2.21	
			SFS4-15352		6.93	
			SFS4-15353		5.28	
			SFS4-15358		2.67	
			SFS4-15312		3.37	
			SFS4-15314	6.43	2.56	
			SFS4-15317		3.65	
			SFS4-15319		2.29	
			SFS4-15324		6.51	
			SFS4-15325		3.98	
			SFS4-15328		4.13	
			SFS4-15331		2.69	

			SFS4-15335		3.81	
			SFS4-15339		3.66	
			SFS4-15346	5.84	2.26	
			SFS4-15347		2.51	
			SFS4-14946		2.81	
			SFS4-14952		3.63	
			SFS4-14954		2.28	
			SFS4-14931	16.22	6.15	
			SFS4-14934		2.40	
			SFS4-15210	9.88	3.76	
			SFS4-14989		3.76	
			SFS4-14990		3.78	
			SFS4-14991		3.65	
			SFS4-14992		3.57	
			SFS4-14993		3.59	
			SFS4-14994	11.46	4.71	
			SFS4-14996		3.72	
			SFS4-14998	8.74	3.34	
			SFS4-14999		2.00	
			SFS4-15003	11.05	4.07	
			SFS4-15004		3.24	
			SFS4-15006		3.54	
			SFS4-15009	5.69	2.34	
			SFS4-15298		2.28	
			SFS4-		2.28	

			15025			
			SFS4-15028		3.63	
			SFS4-15050		7.61	
			SFS4-15051		5.73	
			SFS4-15052		5.85	
			SFS4-15054		3.47	
			SFS4-15055		3.51	
			SFS4-15056		4.47	
			SFS4-15058		3.48	
			SFS4-15059		3.76	
			SFS4-15060		3.60	
			SFS4-15061		2.53	
			SFS4-15063		3.77	
			SFS4-15066		2.38	
			SFS4-15067		2.50	
			SFS4-15068		3.20	
			SFS4-15071		2.40	
			SFS4-15072	5.88	2.21	
			SFS4-15373	5.82	2.27	
		organic rich layer	SFS4-14674		3.05	
			SFS4-14667		2.66	
			SFS4-14668		2.23	
		sandy soil	SFS4-12120		3.39	
			SFS4-12114		3.54	
		shell midden	SFS4-14612		2.43	

			SFS4-14615		3.52	
			SFS4-14623		3.60	
			SFS4-14708		4.92	
			SFS4-14698		3.38	
			SFS4-14703		3.00	
			SFS4-15093	7.12	2.85	
		topsoil	SFS4-6793		3.70	
			SFS4-15034	9.83	3.81	
			SFS4-15036		3.81	
			SFS4-15037		2.49	
			SFS4-15038		2.27	
			SFS4-15042		3.57	
			SFS4-15043		2.44	
			SFS4-15048		3.52	
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			SFS4-14632		2.61	
			SFS4-14658		3.78	
			SFS4-14661		3.61	
			SFS4-14646		4.02	
			SFS4-14648		2.73	
			SFS4-14639		3.53	
			SFS4-15096		3.89	
			SFS4-15097		3.02	
			SFS4-		2.39	

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			SFS4-15110		2.4	
			SFS4-15114		3.26	
			SFS4-14838		3.52	
			SFS4-14840		2.71	
			SFS4-14841		3.58	
			SFS4-14842		2.34	
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			SFS4-14846		2.68	
			SFS4-14847	6.29	2.37	
			SFS4-14848		2.65	
			SFS4-14849		2.7	
			SFS4-14851		3.5	
			SFS4-14853		3.98	
			SFS4-14857		2.46	
			SFS4-14858		3.52	
			SFS4-14862		2.62	
			SFS4-14864		2.26	
			SFS4-16046		3.82	
			SFS4-16047		2.41	
			SFS4-14499	10.56	4.1	
			SFS4-14504		3.82	
			SFS4-14505		2.53	

			SFS4-14508		3.39	
			SFS4-14509		2.66	
			SFS4-14512		2.41	
			SFS4-15146		3.59	
			SFS4-15150	6.5	2.65	
			SFS4-15152		3.41	
			SFS4-15386		3.75	
			SFS4-13925		3.8	
			SFS4-13926		3.86	
			SFS4-13929	9.23	3.34	
			SFS4-13933		3.18	
			SFS4-13934	9.28	3.71	
			SFS4-13935		3.56	
			SFS4-13936		4.02	
			SFS4-13937		3.48	
			SFS4-13938	5.95	2.44	
			SFS4-13939		2.47	
			SFS4-14020		4.94	
			SFS4-14021		3.62	
			SFS4-14022		3.87	
			SFS4-14023		4.07	
			SFS4-14025		3.84	
			SFS4-14028		3.4	
			SFS4-14029		3.92	
			SFS4-		3.42	

			14031			
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			SFS4-14036		2.63	
			SFS4-14037		3.33	
			SFS4-14038		3.53	
			SFS4-14041		3.66	
			SFS4-14042		2.57	
			SFS4-14044		3.64	
			SFS4-14045		3.35	
			SFS4-14046		3.59	
			SFS4-14048		2.49	
			SFS4-14049		2.31	
			SFS4-15158		2.9	
			SFS4-15166		3.52	
			SFS4-15170		3.61	
			SFS4-15171		2.43	
			SFS4-15186	6.25	2.38	
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			SFS4-15190		3.53	
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			SFS4-15469		3.59	
			SFS4-15471		3.98	
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			SFS4-15476		2.4	
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			SFS4-15449		3.22	
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			SFS4-15451		3.38	
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			SFS4-15461		2.46	
			SFS4-13921		3.83	
			SFS4-14681	6.12	2.33	
			SFS4-14683		3.44	
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			SFS4-14603		3.83	
			SFS4-14593		2.29	
			SFS4-14594		3.19	
			SFS4-14595		3.7	
			SFS4-14596		2.99	
			SFS4-14598		2.21	
			SFS4-14577		4.09	
			SFS4-14578		2.79	
			SFS4-14581		2.16	
			SFS4-14587		3.4	
			SFS4-14589		3.32	
			SFS4-		2.44	

			15390			
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			SFS4-15395		2.3	
			SFS4-15300		5.16	
			SFS4-15301		3.3	
			SFS4-15473	6.26	2.44	
			SFS4-15304		3.44	
			SFS4-13948	16.6	6.54	
			SFS4-13950		5.12	
			SFS4-13951	10.28	3.68	
			SFS4-13952		4.24	
			SFS4-13955	10.72	4.4	
			SFS4-13956	10.67	3.77	
			SFS4-13957	7.57	2.96	
			SFS4-13958		3.67	
			SFS4-13963		3.06	
			SFS4-13964		2.36	
			SFS4-13965		2.78	
			SFS4-13966		2.3	
			SFS4-13968		3.62	
			SFS4-14981		2.46	
			SFS4-14982	5.82	2.25	
			SFS4-14983		3.4	
			SFS4-14960		3.62	
			SFS4-14961		2.91	

			SFS4-14962	5.87	2.48	
			SFS4-14971		3.45	
			SFS4-14972		3.76	
			SFS4-14975		2.4	
			SFS4-14957	9.27	3.43	
			SFS4-15639		4.8	
			SFS4-15643		3.46	
			SFS4-15646		2.25	
			SFS4-15593		2.77	
			SFS4-15594		3.57	
			SFS4-15596	5.77	2.12	
			SFS4-15597		2.37	
			SFS4-15599		2.34	
			SFS4-15659		3.62	
			SFS4-15661		3.56	
			SFS4-15662		2.69	
			SFS4-15649		4.59	
			SFS4-15650		3.53	
			SFS4-14065		3.19	
			SFS4-15396		5.65	
			SFS4-15403		2.97	
			SFS4-15406	9.33	3.41	
			SFS4-15407		3.47	
			SFS4-15409		3.65	
			SFS4-	5.84	2.17	

			15410			
			SFS4-15413		2.44	
			SFS4-14875		2.82	
			SFS4-14917		4.72	
			SFS4-14919		3.33	
			SFS4-14920		2.63	
			SFS4-14921		2.5	
			SFS4-14883		3.93	
			SFS4-14885		4.17	
			SFS4-14886		2.95	
			SFS4-14887		2.48	
			SFS4-14888		2.41	
			SFS4-14889		3.44	
			SFS4-14890	6.29	2.61	
			SFS4-14891	5.72	2.27	
			SFS4-14892		2.61	
			SFS4-14894		2.79	
			SFS4-14897		3.92	
			SFS4-14901		3.14	
			SFS4-14903		2.86	
			SFS4-14905		2.36	
			SFS4-15677		3.37	
			SFS4-15678		2.6	
			SFS4-15679		3.59	
			SFS4-15682		2.72	

			SFS4-15637		2.57	
			SFS4-15638		2.41	
			SFS4-15667		3.36	
			SFS4-15668		2.48	
			SFS4-15670		2.66	
			SFS4-15671		2.27	
			SFS4-15674		3.3	
			SFS4-15675		2.49	
			SFS4-15631		2.47	
			SFS4-15420		3.52	
			SFS4-15421	9.54	3.81	
			SFS4-15425	6.20	2.35	
			SFS4-15427		3.86	
			SFS4-15428		2.64	
			SFS4-15430		3.3	
			SFS4-15431		2.77	
			SFS4-15432		3.5	
			SFS4-15435		2.37	
			SFS4-15436		1.98	
		unprov	SFS4-15127		3.76	
			SFS4-15129		2.62	
			SFS4-15130		2.00	
			SFS4-15131		3.51	
			SFS4-15138		2.65	
			SFS4-		3.41	

		15140			
		SFS4-15141		3.51	
		SFS4-15143		2.28	
cod	main shell midden	SFS4-15263		5.17	
		SFS4-15529		4.80	
		SFS4-15533	10.82	5.12	
		SFS4-15381		4.17	
		SFS4-15378	9.89	4.30	
		SFS4-15323		5.16	
	shell midden	SFS4-14611		4.76	
	topsoil	SFS4-13924	10.20	4.53	
		SFS4-14024	11.96	5.19	
cod, saithe or pollack	main shell midden	SFS4-15282		3.59	
		SFS4-15360	11.28	4.82	
		SFS4-14015		2.47	
		SFS4-15374		3.60	
		SFS4-15332		4.30	
	topsoil	SFS4-15116		2.35	
		SFS4-14033	5.86	2.30	
		SFS4-15168		4.00	
		SFS4-14679		4.69	
		SFS4-15388		3.52	
		SFS4-15401		3.39	
		SFS4-15402		3.98	
		SFS4-15408		3.48	

			SFS4-14914		2.34	
			SFS4-15433	7.62	3.18	
	haddock	main shell midden	SFS4-14158		3.69	
	poor cod		SFS4-14809	8.34	4.38	
			SFS4-14810	8.24	4.15	
			SFS4-11584		4.37	
	cod family		SFS4-13902		3.06	
			SFS4-15284		3.56	
			SFS4-15285	9.68	3.56	
			SFS4-15286		3.38	
			SFS4-15287		3.42	
			SFS4-15288	6.16	2.34	
			SFS4-15289		2.12	
			SFS4-15290		2.24	
			SFS4-14163		2.57	
			SFS4-15350		2.43	
		organic rich layer	SFS4-14673		2.08	
premaxilla	saithe	main shell midden	SFS4-1030	3.53		3.76
			SFS4-1031	2.41		3.02
			SFS4-1032	4.05		
			SFS4-1035	4.39		
			SFS4-1036	3.5		4.43
			SFS4-1037	3.19		4.05
			SFS4-1039	3.79		4.41
			SFS4-	7.43		

			7203			
			SFS4-16189	2.93		
			SFS4-593	2.39		
			SFS4-891	2.72		4.13
			SFS4-12184	4.05		
			SFS4-7306	2.6		
			SFS4-6143	3.41		
			SFS4-13373	2.62		
			SFS4-1673	3.43		
			SFS4-7416			4.43
			SFS4-7417	2.02		2.87
			SFS4-6885	3.77		
			SFS4-6910	3.42		
			SFS4-6911	3.08		
			SFS4-7052	3.16		
		sandy soil	SFS4-7631	2.41		3.83
		topsoil	SFS4-6738	2.45		
			SFS4-6739	2.42		
			SFS4-6740	2.58		
			SFS4-6132	5.25		
			SFS4-7155	2.91		
			SFS4-7482	2.78		
			SFS4-6156	4.13		
			SFS4-13295	2.98		
			SFS4-13220	3.24		4.37
			SFS4-13130	3.05		

	pollack	main shell midden	SFS4-1038	2.78		
			SFS4-1040	3.79		
			SFS4-15750	5.13		
			SFS4-888	3.5		
			SFS4-889	3.4		4.02
			SFS4-890	2.45		1.58
			SFS4-2631	2.55		
			SFS4-2924	3.66		4.47
	saithe or pollack		SFS4-592	3.3		4.40
			SFS4-595	1.82		4.35
			SFS4-598	2.04		
			SFS4-12234	2.92		
			SFS4-12350	2.81		
			SFS4-2690	2.36		3.60
			SFS4-1220	3.24		3.60
			SFS4-12961	3.30		
		organic rich layer	SFS4-2393	3.35		4.34
		topsoil	SFS4-16093	3.7		
			SFS4-16073	3.05		
			SFS4-7709	3.09		
			SFS4-13242	2.90		
			SFS4-12911	3.27		
	cod	main shell midden	SFS4-1029	3.01		2.34
			SFS4-887	3.71		3.15
			SFS4-766	4.55		
			SFS4-2912	4.2		4.91
		sandy soil	SFS4-7783	4.41		
	cod, saithe or pollack	main shell midden	SFS4-596	1.78		
			SFS4-886	4.42		

			SFS4-7305	3.68		
			SFS4-1607	3.05		3.48
			SFS4-2847	2.90		
			SFS4-15704	3.70		
		sandy soil	SFS4-7782	2.75		
			SFS4-7632	2.93		
	whiting	main shell midden	SFS4-1761	2.42		3.7
	cod family		SFS4-600	0.93		
			SFS4-706	3.51		
			SFS4-770	4.18		
			SFS4-2880	4.23		
	corkwing		SFS4-591	2.65		
	ballan wrasse		SFS4-15833	3.88		
			SFS4-901	7.23		
			SFS4-1619	3.58		
		sandy soil	SFS4-6310	6.09	28.46	
	wrasse family	main shell midden	SFS4-1272	2.20	8.42	6.07
			SFS4-986	3.07		
			SFS4-1581	3.22		
			SFS4-1582	3.53	17.38	11.37
			SFS4-6045	2.42	9.62	
			SFS4-1741	4.15		
			SFS4-1118	3.72		
			SFS4-1082	5.07		
			SFS4-1542	3.09		
			SFS4-1301	12.47		
		topsoil	SFS4-16212	2.34		
	saithe	main shell	SFS4-	4.09		

quadrate		midden	7206			
			SFS4-12177	3.29		
			SFS4-7312	3.96		
			SFS4-6148	3.25		
			SFS4-15783	4.26		
			SFS4-7368	3.84		
			SFS4-6909	2.29		
			SFS4-7069	2.09		
		topsoil	SFS4-6697	3.57		
			SFS4-7193	6.13		
			SFS4-7134	3.75		
			SFS4-6129	3.07		
			SFS4-6130	3.61		
			SFS4-6155	4.09		
			SFS4-6167	2.92		
			SFS4-6578	2.51		
	pollack	main shell midden	SFS4-2767	3.20		
	cod		SFS4-7201	10.05		
			SFS4-12415	3.67		
			SFS4-7311	2.76		
		topsoil	SFS4-16034	5.28		
			SFS4-13716	3.23		
	cod, saithe or pollack	topsoil	SFS4-7763	2.90		
		main shell midden	SFS4-16344	2.69		
	cod family		SFS4-6141	2.6		

			SFS4-6149	3.99		
		topsoil	SFS4-6826	2.22		
	corkwing	main shell midden	SFS4-1369	2.04		
			SFS4-1720	2.42		
	ballan wrasse		SFS4-12230	4.62		
			SFS4-12231	4.96		
			SFS4-6200	6.77		
			SFS4-16200	4.87		
			SFS4-2804	6.20		
			SFS4-12734	3.96		
			SFS4-12319	5.99		
			SFS4-6673	3.32		
			SFS4-1063	4.83		
			SFS4-12967	3.70		
			SFS4-7097	5.81		
		shell midden	SFS4-6236	4.42		
		organic rich layer	SFS4-2219	4.70		
		topsoil	SFS4-6719	3.85		
			SFS4-6720	3.67		
	ballan or cuckoo wrasse	main shell midden	SFS4-12315	2.11		
	wrasse family		SFS4-1278	4.65		
			SFS4-605	3.71		
			SFS4-11989	2.30		
			SFS4-2854	4.22		
			SFS4-12203	2.59		

			SFS4-6201	2.26		
			SFS4-7252	2.20		
			SFS4-7666	2.31		
			SFS4-11880	3.31		
			SFS4-11899	2.65		
			SFS4-1606	2.05		
			SFS4-1287	4.18		
			SFS4-1245	4.11		
			SFS4-1117	3.59		
			SFS4-1143	3.08		
			SFS4-1505	2.88		
			SFS4-12312	3.03		
			SFS4-12314	2.52		
			SFS4-1348	3.15		
			SFS4-2873	3.66		
		shell midden	SFS4-7594	3.5		
		organic rich layer	SFS4-2244	3.53		
			SFS4-2158	2.88		
		sandy soil	SFS4-6249	3.08		
			SFS4-6291	1.63		
		topsoil	SFS4-6700	4.75		
			SFS4-12960	2.37		
			SFS4-6230	2.47		
			SFS4-6205	3.06		
scapula	ballan wrasse	main shell	SFS4-	2.61		

		midden	SFS4-12322			
	ballan or cuckoo wrasse		SFS4-12245	2.17		
			SFS4-12196	2.04		
			SFS4-12342	2.36		
	wrasse family		SFS4-13378	1.58		
			SFS4-12356	2.06		
			SFS4-7396	1.53		
			SFS4-6182	1.74		
		sandy soil	SFS4-7819	2.05		
			SFS4-6277	1.92		
		topsoil	SFS4-7712	1.54		

Fish QC1 and QC4 element measurements

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Appendix 25 – Latin names for taxa mentioned in the text | Rachel Parks

The data in this table can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the file 'Zooarchaeology_fish_measurement_appendices_13.9.4.pdf' (pages 31&32). See also the draft version 'sand_bone_report_appendix_Parks.pdf' (pp15–17) in Specialists reports.

The written report can be found in Section 3.11 or as an archive version at the ADS > Downloads > Documents > Final Reports. From here you can download the file 'Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf'. See also the draft version of the report 'sand_bone_report,_Parks.pdf' in Documents > Specialist reports.

Common name	Latin name
Mammal	
unidentified whale	whale sp
dog or wolf	*Canis* sp
fox	*Vulpes vulpes*
dog family	Canidae
badger	*Meles meles*
otter	*Lutra lutra*
unidentified seal	seal sp
wild boar	*Sus scrofa*
red deer	*Cervus elaphus*
roe deer	*Capreolus capreolus*
deer family	Cervidae
cow family	*Bos* sp
sheep	*Ovis aries*
sheep or goat	Caprine
large mammal	
medium mammal 1	
medium mammal 2	
unidentified mammal	
Small mammal and amphibian	

common shrew	*Sorex araneus*
pygymy shrew	*Sorex minutes*
shrew sp	*Sorex* sp
bank vole	*Clethrionomys glareolus*
field vole	*Microtus agrestis*
unidentified vole	vole sp
wood mouse	*Apodemus sylvaticus*
yellow-necked mouse	*Apodemus flavicollis*
mouse sp	*Murinae* sp
vole or mouse	unidentified vole or mouse
small mammal	
common frog	*Rana temporaria*
Bird	
cormorant or shag	*Phalacrocorax carbo / aristotelis*
razorbill	*Alca torda*
guillemot	*Uria aalge*
razorbill or guillemot	*Alca torda / Uria aalge*
little auk	*Alle alle*
puffin?	*Fratercula arctica*?
great auk	*Pinguinus impennis*
auk family	Alcidae
thrush and chat family	Turdidae
unidentified bird	
Fish	
tope shark	*Galeorhinus galeus*
dogfish families	Scyliorhinidae/Squalidae
ray family	Rajidae
elasmobranch	elasmobranch
herring	*Clupea harengus*
eel	*Anguilla anguilla*
conger eel	*Conger conger*
salmon family	Salmonidae
rockling sp.	*Ciliata* sp / *Gaidropsarus* sp
saithe	*Pollchius virens*
pollack	*Pollachius pollachius*
saithe or pollack	*Pollachius* sp
cod	*Gadus morhua*
cod, saithe or pollack	*Gadus* sp / *Pollachius* sp
haddock	*Melanogrammus aeglefinus*
whiting	*Merlangius merlangus*
poor cod	*Trisopterus minutus*
Norway pout, bib or poor cod	*Trisopterus* sp

cod family	Gadidae
gurnard family	Triglidae
sea scorpion family	Cottidae
Atlantic horse mackerel	*Trachurus trachurus*
sea bream family	Sparidae
sea bream family?	Sparidae?
corkwing wrasse	*Symphodus* (*Crenilabrus*) *melops*
goldsinny	*Ctenolabrus rupestris*
corkwing wrasse or goldsinny	*Symphodus* (*Crenilabrus*) *melops* / *Ctenolabrus rupestris*
ballan wrasse	*Labrus bergylta*
cuckoo wrasse	*Labrus bimaculatus*
ballan wrasse or cuckoo wrasse	*Labrus bergylta* / *Labrus bimaculatus*
wrasse family	Labridae
eelpout family	Zoarcidae
butterfish	*Pholis gunnellus*
Sand-eel family	Ammodytidae
Atlantic mackerel	*Scomber scrombus*
perch order	Perciformes
plaice	*Pleuronectes platessa*
plaice family	Pleuronectidae
flatfish order	Heterosomata (Pleuronectiformes)
unidentified fish	

Latin names for taxa mentioned in the text

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Appendix 26 – Sand, Estimated total length in mm of saithe, pollack and *Pollachius* based on otolith measurement 2 from the main shell midden | Rachel Parks

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The written report can be found in Section 3.11 or as an archive version at the ADS > Downloads > Documents > Final Reports. From here you can download the file 'Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf'. See also the draft version of the report 'sand_bone_report,_Parks.pdf' in Documents > Specialist reports.

otolith M2	logged measurement	total length estimate
6.31	2.82	663.81
3.77	2.48	300.31
3.58	2.44	277.32
3.89	2.50	315.15
3.61	2.45	280.91
3.80	2.48	304.00
3.45	2.42	261.96
4.19	2.55	353.35
3.46	2.42	263.13
3.05	2.34	216.68
3.20	2.37	233.31
4.70	2.63	421.73
2.34	2.16	144.08
2.35	2.16	145.03
3.16	2.36	228.83
3.35	2.40	250.36
2.53	2.21	162.48
2.43	2.18	152.70
2.32	2.15	142.18
4.97	2.66	459.61
2.69	2.25	178.57
2.38	2.17	147.89

3.11	2.35	223.28
2.06	2.07	118.40
2.17	2.11	128.28
2.75	2.27	184.74
3.39	2.41	254.98
2.67	2.25	176.53
3.36	2.40	251.51
3.66	2.46	286.92
3.47	2.42	264.31
3.93	2.51	320.16
3.44	2.42	260.80
2.39	2.17	148.84
3.30	2.39	244.63
6.03	2.79	619.00
3.46	2.42	263.13
3.52	2.43	270.19
3.47	2.42	264.31
3.82	2.49	306.46
3.71	2.47	292.98
3.47	2.42	264.31
2.60	2.23	169.46
2.29	2.14	139.36
3.92	2.50	318.90
3.57	2.44	276.13
2.47	2.19	156.59
2.27	2.14	137.49
6.75	2.87	736.42
4.28	2.56	365.11
3.80	2.48	304.00
2.44	2.19	153.67
2.88	2.30	198.36
3.89	2.50	315.15
3.57	2.44	276.13
3.60	2.45	279.71
2.29	2.14	139.36
5.30	2.71	507.44
2.34	2.16	144.08
2.25	2.13	135.63
3.91	2.50	317.65
3.72	2.47	294.20
3.45	2.42	261.96
3.74	2.47	296.63
3.27	2.38	241.21
3.44	2.42	260.80
3.51	2.43	269.01

3.76	2.48	299.08
3.34	2.40	249.21
3.16	2.36	228.83
2.37	2.17	146.93
3.76	2.48	299.08
3.86	2.49	311.42
3.62	2.45	282.11
3.71	2.47	292.98
4.63	2.61	412.09
2.16	2.11	127.37
2.48	2.20	157.56
2.70	2.25	179.60
2.39	2.17	148.84
4.70	2.63	421.73
2.47	2.19	156.59
2.41	2.18	150.77
2.63	2.24	172.48
3.99	2.52	327.72
2.77	2.27	186.82
2.04	2.07	116.64
3.66	2.46	286.92
2.96	2.32	206.91
2.36	2.16	145.98
2.51	2.21	160.51
2.98	2.32	209.07
3.12	2.35	224.39
7.14	2.90	802.96
6.54	2.85	701.44
3.85	2.49	310.18
4.32	2.57	370.38
3.64	2.45	284.51
3.35	2.40	250.36
3.34	2.40	249.21
2.32	2.15	142.18
3.53	2.43	271.38
4.37	2.58	377.00
3.51	2.43	269.01
4.09	2.53	340.45
4.09	2.53	340.45
4.11	2.54	343.02
3.99	2.52	327.72
3.88	2.50	313.91
3.20	2.37	233.31
2.55	2.22	164.46
2.63	2.24	172.48

3.92	2.50	318.90
3.75	2.47	297.86
3.25	2.38	238.95
2.91	2.30	201.56
3.23	2.37	236.69
2.17	2.11	128.28
3.81	2.48	305.23
3.33	2.39	248.06
2.62	2.23	171.47
2.53	2.21	162.48
2.37	2.17	146.93
3.28	2.38	242.35
2.87	2.30	197.31
2.60	2.23	169.46
2.66	2.24	175.52
2.58	2.22	167.45
2.27	2.14	137.49
3.82	2.49	306.46
2.48	2.20	157.56
2.65	2.24	174.50
2.30	2.15	140.30
2.82	2.28	192.04
2.67	2.25	176.53
2.48	2.20	157.56
2.95	2.31	205.84
2.97	2.32	207.99
2.66	2.24	175.52
3.34	2.40	249.21
2.46	2.19	155.61
2.41	2.18	150.77
6.15	2.80	638.07
2.40	2.18	149.80
2.81	2.28	190.99
3.63	2.45	283.31
2.28	2.14	138.43
3.76	2.48	299.08
3.78	2.48	301.53
3.65	2.46	285.71
3.57	2.44	276.13
3.59	2.44	278.51
4.71	2.63	423.11
3.72	2.47	294.20
3.34	2.40	249.21
2.00	2.05	113.13
4.07	2.53	337.89

3.24	2.38	237.82
3.54	2.44	272.56
2.34	2.16	144.08
2.28	2.14	138.43
3.63	2.45	283.31
7.61	2.95	885.79
5.73	2.76	572.21
5.85	2.77	590.77
3.47	2.42	264.31
3.51	2.43	269.01
4.47	2.59	390.37
3.48	2.42	265.48
3.76	2.48	299.08
3.60	2.45	279.71
2.53	2.21	162.48
3.77	2.48	300.31
2.38	2.17	147.89
2.50	2.20	159.52
3.20	2.37	233.31
2.40	2.18	149.80
2.21	2.12	131.94
3.57	2.44	276.13
5.70	2.75	567.61
3.74	2.47	296.63
2.45	2.19	154.64
3.36	2.40	251.51
3.68	2.46	289.34
3.76	2.48	299.08
2.54	2.21	163.47
2.44	2.19	153.67
3.58	2.44	277.32
3.62	2.45	282.11
3.24	2.38	237.82
3.39	2.41	254.98
2.78	2.27	187.86
3.31	2.39	245.77
2.94	2.31	204.76
2.28	2.14	138.43
3.46	2.42	263.13
3.41	2.41	257.30
3.94	2.51	321.41
3.39	2.41	254.98
2.56	2.22	165.46
3.36	2.40	251.51
2.56	2.22	165.46

2.67	2.25	176.53
2.78	2.27	187.86
3.56	2.44	274.94
3.56	2.44	274.94
2.49	2.20	158.54
3.64	2.45	284.51
3.33	2.39	248.06
3.57	2.44	276.13
2.55	2.22	164.46
2.35	2.16	145.03
3.91	2.50	317.65
2.38	2.17	147.89
2.28	2.14	138.43
2.28	2.14	138.43
3.37	2.40	252.67
2.56	2.22	165.46
3.65	2.46	285.71
2.29	2.14	139.36
6.51	2.84	696.49
3.98	2.51	326.45
4.13	2.54	345.59
2.69	2.25	178.57
3.81	2.48	305.23
3.66	2.46	286.92
2.26	2.14	136.56
2.51	2.21	160.51
6.93	2.88	766.88
5.28	2.70	504.49
2.67	2.25	176.53
3.51	2.43	269.01
3.84	2.49	308.94
2.21	2.12	131.94
2.14	2.10	125.56
2.27	2.14	137.49
2.21	2.12	131.94
2.29	2.14	139.36
5.94	2.78	604.83
5.68	2.75	564.54
3.74	2.47	296.63
2.70	2.25	179.60
5.02	2.67	466.75
4.19	2.55	353.35
4.92	2.66	452.51
4.07	2.53	337.89
4.12	2.54	344.30

5.12	2.68	481.14
2.91	2.30	201.56
3.44	2.42	260.80
2.60	2.23	169.46
3.70	2.47	291.76
3.27	2.38	241.21
2.88	2.30	198.36
2.79	2.28	188.90
3.34	2.40	249.21
2.11	2.09	122.86
3.10	2.35	222.18
3.68	2.46	289.34
2.97	2.32	207.99
3.74	2.47	296.63
2.44	2.19	153.67
2.48	2.20	157.56
3.82	2.49	306.46
5.18	2.69	489.86
3.99	2.52	327.72
3.36	2.40	251.51
3.58	2.44	277.32
2.53	2.21	162.48
3.56	2.44	274.94
2.87	2.30	197.31
2.19	2.11	130.10
3.95	2.51	322.67
2.54	2.21	163.47
2.76	2.27	185.78
2.82	2.28	192.04
2.54	2.21	163.47
2.53	2.21	162.48
2.66	2.24	175.52
3.94	2.51	321.41
3.98	2.51	326.45
2.74	2.26	183.71
2.30	2.15	140.30
2.49	2.20	158.54
2.44	2.19	153.67
3.90	2.50	316.40
5.20	2.69	492.77
3.84	2.49	308.94
3.81	2.48	305.23
4.08	2.53	339.17
3.44	2.42	260.80
3.70	2.47	291.76

4.12	2.54	344.30
3.49	2.43	266.66
4.02	2.52	331.52
3.45	2.42	261.96
3.99	2.52	327.72
3.22	2.37	235.56
3.37	2.40	252.67
3.29	2.39	243.49
3.61	2.45	280.91
3.39	2.41	254.98
3.99	2.52	327.72
3.64	2.45	284.51
3.28	2.38	242.35
2.46	2.19	155.61

Estimated total length of saithe, pollack and *Pollachius* based on otolith measurement 2 from the main shell midden

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- … > Documents > Specialists reports > sand_bone_report,_Parks.pdf [report draft]

Appendix 27 – Fish QC1 and QC4 measurements taken, in mm | Rachel Parks

(SFS 2, SFS 8, SFS 20, SFS 22, SFS 41, SFS 66, SFS 89a)

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CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

The written report can be found in Section 3.11 or as an archive version at the ADS > Downloads > Documents > Final Reports. From here you can download the file 'Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf'. See also the draft version of the report 'sand_bone_report,_Parks.pdf' in Documents > Specialist reports.

taxon	element	site	provenance	bone id	M1	M2	M3
conger eel							
	basioccipital	SFS22	3002	SFS22-8749	9.93	12.77	
		SFS22	3002	SFS22-9005	9.08	11.98	
	quadrate	SFS22	3002	SFS22-10963	10.58		
		SFS22	3002	SFS22-10964	9.68		
		SFS22	3002	SFS22-8690	8.37		
		SFS22	3003	SFS22-8817	7.81		
three-bearded rockling							
	premaxilla	SFS20	2012/13	SFS20-10124	1.34		3.20
saithe							
	basioccipital	SFS2	106	SFS02-9813	2.31	2.91	

	SFS22	3002	SFS22-8743	3.3	3.75	
	SFS22	3002	SFS22-8791	2.65	3.45	
	SFS22	3003	SFS22-8984	1.88	2.21	
	SFS22	3003	SFS22-8985	2.4	3.16	
	SFS66	6614	SFS66-9427	1.75	2.01	
dentary	SFS2	106	SFS02-11655		2.42	
	SFS2	106	SFS02-9795		2.48	
	SFS2	106	SFS02-9796		2.5	
	SFS20	TP2	SFS20-10873		3.12	
	SFS22	3002	SFS22-8753	2.71		2.86
	SFS22	3002	SFS22-8755	3.76	3.41	
	SFS22	3002	SFS22-9024	2.83	2.98	
	SFS22	3002	SFS22-9057		2.5	
	SFS22	3002	SFS22-9098		1.71	
	SFS22	3002	SFS22-9099		1.92	
	SFS22	3002	SFS22-9194	1.99	1.69	
	SFS22	3002	SFS22-9195	1.2	1.23	
	SFS22	3002	SFS22-9196	1.94	1.49	
	SFS41	TP1	SFS41-10257	2.4	2.8	
	SFS41	TP1	SFS41-10425		2.28	
	SFS66	6614	SFS66-9347	3.2	3.28	
	SFS66	6614	SFS66-9433		2.5	
	SFS66	6614	SFS66-9434	2.55	2.34	
premaxilla	SFS2	303	SFS02-9683	3.95		5.54
	SFS2	106	SFS02-	2.31		3.3

				9809			
		SFS20	2021/22	SFS20-11038	4.23		6.32
		SFS22	3003	SFS22-8994	2.71		3.56
		SFS22	3002	SFS22-9092	3.31		4.19
		SFS22	3002	SFS22-9093	3.24		4.17
		SFS22	3002	SFS22-9094	2.56		
		SFS41	2015	SFS41-10423	3.81		5.61
		SFS66	6614	SFS66-9430	3.29		4.83
		SFS8	trench1/spit4	SFS8-14284	2.29		
		SFS8	trench3/spit3	SFS8-14422	2.89		
	quadrate	SFS2	303	SFS02-9682	4.94		
		SFS2	106	SFS02-9801	3.39		
		SFS2	106	SFS02-9803	3.89		
		SFS20	2021/22	SFS20-10868	4.61		
		SFS20	2021/22	SFS20-10885	4.01		
		SFS22	3002	SFS22-8710	4.47		
		SFS22	3002	SFS22-8711	4.73		
		SFS22	3002	SFS22-8712	3.92		
		SFS22	3002	SFS22-8758	3.29		
		SFS22	3002	SFS22-8793	2.76		
		SFS22	3003	SFS22-8816	4.11		
		SFS22	3003	SFS22-8819	3.83		
		SFS22	3003	SFS22-8989	2.52		
		SFS22	3002	SFS22-9058	3.42		
		SFS22	3002	SFS22-9090	3.23		

		SFS41	4112	SFS41-10260	2.81		
		SFS66	6614	SFS66-9339	3.74		
		SFS66	6614	SFS66-9340	2.85		
		SFS66	6614	SFS66-9396	3.65		
		SFS66	6614	SFS66-9397	2.25		
		SFS66	6614	SFS66-9398	1.99		
		SFS66	6614	SFS66-9399	2.37		
		SFS8	trench1/spit4	SFS8-14226	4.27		
		SFS8	trench1/spit4	SFS8-14372	3.72		
pollack							
	basioccipital	SFS22	3002	SFS22-9136	3.76	5.18	
		SFS41	4112	SFS41-10265	3.19	4.41	
		SFS41	4112	SFS41-10388	2.03	2.43	
		SFS66	6614	SFS66-9348	3.96	5.91	
	dentary	SFS22	3002	SFS22-9023	3.69		
		SFS66	6614	SFS66-9332		5.35	
	premaxilla	SFS2	106	SFS02-9808	2.95		3.08
		SFS22	3003	SFS22-10747	4.91		5.65
		SFS22	3002	SFS22-8698	5.24		6.38
		SFS89a	8921	SFS89a-11376	11.8		13.07
		SFS2	106	SFS02-9802	2.28		
		SFS22	3003	SFS22-8818	5.53		
		SFS22	3003	SFS22-8988	3.99		
saithe or pollack							
	basioccipital	SFS20	2021/22	SFS20-11048	4.33	5.77	

		SFS22	3002	SFS22-8744	4.43	5.11	
		SFS22	3002	SFS22-8745	3.1	3.64	
		SFS22	3002	SFS22-8746	3.62	4.24	
		SFS22	3002	SFS22-8747	4.18	5.24	
		SFS22	3002	SFS22-9059	3.38		
		SFS41	4112	SFS41-10380	3.45	4.37	
		SFS41	4112	SFS41-10426	2.83	3.55	
		SFS41	4112	SFS41-10430	2.65	3.1	
		SFS8	trench1/spit4	SFS8-14227	3.39	4.94	
	dentary	SFS2	106	SFS02-9797		3.22	
		SFS22	3002	SFS22-8764		3.66	
		SFS22	3002	SFS22-9096		1.56	
		SFS22	3002	SFS22-9097		1.91	
		SFS22	3002	SFS22-9108		1.71	
		SFS66	6612	SFS66-10934	2.23		
		SFS66	6614	SFS66-9435		3.7	
		SFS66	6612	SFS66-9507	2.35	2.28	
		SFS66	6612	SFS66-9518	2.86	3.52	
		SFS8	trench1/spit5	SFS8-14368		2.78	
	otolith	SFS2	106	SFS02-9778	8.46	3.23	
		SFS20	2021/22	SFS20-11443		3.55	
		SFS20	2002	SFS20-11445		3.93	
		SFS20	2022-24	SFS20-11447		3.85	
		SFS20	2021/22	SFS20-11452		3.39	
		SFS20	2021/22	SFS20-	7.32	2.66	

				11455			
		SFS20	2024	SFS20-11462	6.8	2.73	
		SFS22	3003	SFS22-11472	10.75	3.98	
		SFS22	3003	SFS22-11475	13.79	5.55	
		SFS22	3002	SFS22-11476	12.99	4.49	
		SFS22	3002	SFS22-11477	10.07	4.26	
		SFS22	3002	SFS22-11479		3.08	
		SFS22	3003	SFS22-11480	8	3.43	
		SFS22	3003	SFS22-11481	8.83	3.52	
		SFS22	3002	SFS22-11485		3.5	
		SFS22	3002	SFS22-11486	7.89	3.11	
		SFS22	3002	SFS22-11487	7.32	2.96	
		SFS22	3002	SFS22-11488	7.75	2.89	
		SFS22	3002	SFS22-11489		3.08	
		SFS22	3002	SFS22-11491		4.17	
		SFS66	6614	SFS66-11464		4.42	
		SFS66	6614	SFS66-11466		3.12	
		SFS89a	8914	SFS89a-11501		4.53	
		SFS89a	8914	SFS89a-11534		2.63	
		SFS89a	8914	SFS89a-11535		2.97	
		SFS89a	8914	SFS89a-11537		3.35	
		SFS89a	8914	SFS89a-11543		2.42	
		SFS89a	8914	SFS89a-11571		3.92	
		SFS89a	8914	SFS89a-11572	2.77		
		SFS89a	8914	SFS89a-11573	2.94		

		SFS89a	8914	SFS89a-11574		2.53	
	premaxilla	SFS41	4112	SFS41-10222	4.86		6.21
		SFS41	4112	SFS41-10512	4.28		
	quadrate	SFS2	106	SFS02-9804	3.44		
		SFS20	2021/22	SFS20-11083	3.43		
		SFS22	3002	SFS22-9091	3.26		
		SFS8	trench3/spit3	SFS8-14451	2.93		
cod							
	dentary	SFS2	106	SFS02-9745	2.38	2.61	
	otolith	SFS20	2012/13	SFS20-11453	14.51	7.02	
		SFS20	2012/13	SFS20-11454		6.49	
		SFS22	3002	SFS22-11473	18.15	10.06	
		SFS22	3002	SFS22-11482	19.41	10.32	
		SFS22	3002	SFS22-11483		10.22	
		SFS41	4111	SFS41-9884	17.93	10.05	
		SFS41	4111	SFS41-9885	18.76	9.44	
		SFS66	6612	SFS66-11467	11.76	6.13	
	quadrate	SFS22	3002	SFS22-8709	5.29		
		SFS66	6614	SFS66-9337	4.5		
		SFS66	6614	SFS66-9338	4.48		
cod, saithe or pollack							
	basioccipital	SFS66	6614	SFS66-9428	3.12	3.78	
	dentary	SFS22	3003	SFS22-8845		1.63	
		SFS22	3003	SFS22-8846		1.38	
	otolith	SFS89a	8914	SFS89a-11536		2.54	

		SFS89a	8914	SFS89a-11576		2.6	
	quadrate	SFS2	106	SFS02-9806	4.06		
ling							
	basioccipital	SFS22	3002	SFS22-9119	10.06	13.4	
		SFS22	3002	SFS22-9120	11.41	13.75	
		SFS22	3002	SFS22-9121	13.96	19.8	
	dentary	SFS22	3003	SFS22-10743	6.87	5.99	
	quadrate	SFS22	3002	SFS22-8708	7.32		
haddock							
	basioccipital	SFS66	6614	SFS66-9429	3.05	3.3	
Norway pout							
	otolith	SFS89a	8914	SFS89a-11503	5.24	2.43	
bib							
	quadrate	SFS89a	8914	SFS89a-9612	1.72		
poor cod							
	otolith	SFS20	2015	SFS20-11442	6.16	2.96	
		SFS20	2012/13	SFS20-11456	5.64	2.95	
		SFS20	2014	SFS20-11457	7.71	3.77	
		SFS20	2014	SFS20-11458	7.07	3.40	
		SFS20	2014	SFS20-11459	7.1	3.66	
		SFS8	trench3/spit3	SFS8-14482		3.85	
		SFS89a	8914	SFS89a-11505	6.6	3.12	
		SFS89a	8914	SFS89a-11509	7.29	3.45	
		SFS89a	8914	SFS89a-11510	6.91	3.46	
		SFS89a	8914	SFS89a-11511	7.12	3.43	

		SFS89a	8914	SFS89a-11513	7.84	3.89	
		SFS89a	8914	SFS89a-11517	5.98	2.76	
		SFS89a	8914	SFS89a-11520	6.05	2.90	
		SFS89a	8914	SFS89a-11525	7.24	3.58	
		SFS89a	8914	SFS89a-11526	6.83	3.21	
		SFS89a	8914	SFS89a-11527	8.64	3.99	
		SFS89a	8914	SFS89a-11528	7.85	3.89	
		SFS89a	8914	SFS89a-11529	7.66	3.75	
		SFS89a	8914	SFS89a-11545	7.52	3.58	
		SFS89a	8914	SFS89a-11546		3.56	
		SFS89a	8914	SFS89a-11547		3.43	
		SFS89a	8914	SFS89a-11548		3.68	
		SFS89a	8914	SFS89a-11549	6.28	3.09	
		SFS89a	8914	SFS89a-11550	6.37	3.14	
		SFS89a	8914	SFS89a-11563	5.48	2.67	
Norway Pout, bib or poor cod							
	otolith	SFS20	2015/16	SFS20-11450	7.82	4.19	
		SFS89a	8914	SFS89a-11502		4.67	
		SFS89a	8914	SFS89a-11504	6.47	2.92	
		SFS89a	8914	SFS89a-11508	7.42	3.36	
		SFS89a	8914	SFS89a-11512	6.93	3.25	
		SFS89a	8914	SFS89a-11514	7.78	3.38	
		SFS89a	8914	SFS89a-11515	6.39	3.22	
		SFS89a	8914	SFS89a-11516		3.36	
		SFS89a	8914	SFS89a-11518	5.71	2.82	

		SFS89a	8914	SFS89a-11519	6.22	2.72	
		SFS89a	8914	SFS89a-11521	6.00	2.94	
		SFS89a	8914	SFS89a-11522	5.89	2.91	
		SFS89a	8914	SFS89a-11523	6.27	3.13	
		SFS89a	8914	SFS89a-11524		3.13	
		SFS89a	8914	SFS89a-11530		3.09	
		SFS89a	8914	SFS89a-11532	7.03	3.17	
		SFS89a	8914	SFS89a-11533	5.07	2.32	
		SFS89a	8914	SFS89a-11551		3.12	
		SFS89a	8914	SFS89a-11552	7.72	3.70	
		SFS89a	8914	SFS89a-11553	6.71	3.22	
		SFS89a	8914	SFS89a-11554	7.14	3.45	
		SFS89a	8914	SFS89a-11555	6.94	3.26	
		SFS89a	8914	SFS89a-11556		3.27	
		SFS89a	8914	SFS89a-11557	7.22	3.27	
		SFS89a	8914	SFS89a-11558	6.13	2.93	
		SFS89a	8914	SFS89a-11559	6.44	3.05	
		SFS89a	8914	SFS89a-11560	6.55	2.98	
		SFS89a	8914	SFS89a-11561	6.19	3.24	
		SFS89a	8914	SFS89a-11562	5.72	2.73	
		SFS89a	8914	SFS89a-11564	6.08	3.15	
		SFS89a	8914	SFS89a-11567		2.59	
		SFS89a	8914	SFS89a-11568	5.05	2.42	
cod family							
	basioccipital	SFS2	106	SFS02-	1.36	1.78	

				9815			
		SFS20	2013	SFS20-10137	4.6	6.13	
		SFS22	3002	SFS22-8748	5.00	7.26	
		SFS89a	8914	SFS89a-9610	1.82	2.31	
	dentary	SFS20	2013/14	SFS20-11768		1.61	
		SFS22	3002	SFS22-8756		3.29	
		SFS89a	8914	SFS89a-9595		3.79	
		SFS89a	8914	SFS89a-9613		1.56	
	otolith	SFS89a	8914	SFS89a-11531		3.51	
	premaxilla	SFS2	106	SFS02-9811	1.47		2.23
		SFS66	6614	SFS66-9432	3.21		
	quadrate	SFS20	2014	SFS20-10192	4.36		
		SFS89a	8914	SFS89a-9615	3.10		
hake							
	premaxilla	SFS89a	8914	SFS89a-11386	12.58		10.07
Atlantic horse mackerel							
	otolith	SFS22	3002	SFS22-11484	8.92	4.31	
goldsinny							
	premaxilla	SFS20	2022-24	SFS20-11097	2.41	8.22	5.95
ballan wrasse							
	articular	SFS41	4112	SFS41-10494	3.21		
	basioccipital	SFS8	trench1/spit5	SFS8-14340	4.85	5.10	
	dentary	SFS20	2014/15	SFS20-10989	2.91		
	premaxilla	SFS20	2015	SFS20-10980	2.69	9.21	
		SFS8	trench1/spit4	SFS8-14183	6.16		
		SFS8	trench1/spit5	SFS8-	7.25		

				14336			
	quadrate	SFS20	2012/13	SFS20-10101	7.36		
		SFS41	4113	SFS41-10474	5.15		
		SFS8	trench1/spit4	SFS8-14197	3.97		
		SFS8	trench1/spit4	SFS8-14250	3.50		
		SFS8	trench1/spit4	SFS8-14287	2.82		
		SFS8	trench1/spit5	SFS8-14371	4.02		
		SFS8	trench3/spit2	SFS8-14457	4.22		
	scapula	SFS8	trench3/spit3	SFS8-14418	2.07		
cuckoo wrasse							
	opercular	SFS20	2013/14	SFS20-10152			
	quadrate	SFS41	4111/12	SFS41-10204	3.36		
ballan or cuckoo wrasse							
	quadrate	SFS8	trench1/spit4	SFS8-14289	2.68		
		SFS8	trench1/spit4	SFS8-14290	3.52		
		SFS8	trench1/spit4	SFS8-14291	2.48		
	scapula	SFS8	trench1/spit4	SFS8-14234	1.91		
		SFS8	trench1/spit4	SFS8-14235	1.91		
		SFS8	trench1/spit4	SFS8-14236	1.64		
		SFS8	trench1/spit4	SFS8-14237	1.92		
		SFS8	trench1/spit4	SFS8-14239	1.52		
		SFS8	trench1/spit4	SFS8-14240	1.33		
		SFS8	trench3/spit3	SFS8-14420	1.62		
wrasse family							
	basioccipital	SFS8	trench1/spit 4	SFS8-14200	2.93	3.26	
		SFS8	trench1/spit4	SFS8-	3.26	3.62	

				14247			
	premaxilla	SFS20	2006	SFS20-11143	1.65		5.06
		SFS89a	8913	SFS89a-9573	1.51		
	quadrate	SFS20	2013/14	SFS20-10148	4.41		
		SFS20	2006	SFS20-11142	2.17		
		SFS8	trench3/spit3	SFS8-14402	5.31		
	scapula	SFS20	2025	SFS20-11126	1.60		
		SFS22	3002	SFS22-8788	2.12		
		SFS8	trench1/spit4	SFS8-14202	1.50		

Fish QC1 and QC4 measurements taken, in mm from sites SFS 2, SFS 8, SFS 20, SFS 22, SFS 41, SFS 66, SFS 89a

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… > Data > Artefact and ecofact catalogues > Parks_testpitdata_appendix2.csv
… > Documents > Final reports > Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf' [report final]
… > Documents > Specialists reports > sand_bone_report,_Parks.pdf [report draft]

Appendix 28 – Test pit sites, Latin names for fish taxa mentioned in the text | Rachel Parks

The data on this page can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the relevant CSV file 'Parks_testpitdata_appendix3.csv'.

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

The written report can be found in Section 3.11 or as an archive version at the ADS > Downloads > Documents > Final Reports. From here you can download the file 'Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf'. See also the draft version of the report 'sand_bone_report,_Parks.pdf' in Documents > Specialist reports.

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common name	latin name
black mouthed dogfish	*Galeus melastomus*
dogfish families	Scyliorhinidae/Squalidae
spurdog	*Squalus acanthias*
ray family	Rajidae
elasmobranch	elasmobranch
eel	*Anguilla anguilla*
conger eel	*Conger conger*
herring	*Clupea harengus*
salmon family	Salmonidae
three-bearded rockling	*Gaidropsarus vulgaris*
rockling sp.	*Ciliata / Gaidropsarus*
saithe	*Pollachius virens*
pollack	*Pollachius pollachius*
saithe or pollack	Pollachius
cod	*Gadus morhua*
cod, saithe or pollack	Gadus/Pollachius
haddock	*Melanogrammus aeglefinus*
haddock?	*Melanogrammus aeglefinus*?
whiting	*Merlangius merlangus*
ling	*Molva molva*

Norway pout	*Trisopterus esmarki*
bib	*Trisopterus luscus*
poor cod	*Trisopterus minutus*
Norway pout/bib/poor cod	Trisopterus
cod family	Gadidae
hake	*Merluccius merluccius*
angler	*Lophius piscatorius*
grey gurnard	*Eutrigla gurnardus*
gurnard family	Triglidae
bull rout	*Myoxocephalus scorpius*
sea scorpion family	Scorpaenidae
Atlantic horse mackerel	*Trachurus trachurus*
sea bream family	Sparidae
corkwing wrasse	*Symphodus* (*Crenilabrus*) *melops*
goldsinny	*Ctenolabrus rupestris*
corkwing wrasse or goldsinny	*Symphodus* (*Crenilabrus*) *melops* / *Ctenolabrus rupestris*
ballan wrasse	*Labrus bergylta*
cuckoo wrasse	*Labrus bimaculatus*
ballan or cuckoo wrasse	*Labrus bergylta* / *Labrus bimaculatus*
wrasse family	Labridae
eelpout	*Zoarces viviparus*
butterfish	*Pholis gunnellus*
wolf-fish	*Anarhichas lupus*
sandeel family	Ammodytidae
dragonet	*Callionymus lyra*
dragonet family	Callionymidae
goby family	Gobiidae
Atlantic mackerel	*Scomber scombrus*
turbot family	Bothidae
plaice	*Pleuronectes platessa*
plaice family	Pleuronectidae
sole family	Soleidae
flatfish order	Pleuronectiformes

Test pit sites, Latin names for fish taxa mentioned in the text

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… > Documents > Final reports > Parks_&_Barrett,_zoo-archaeology_of_Sand_22.9.04.pdf’
[report final]
… > Documents > Specialists reports > sand_bone_report,_Parks.pdf [report draft]
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Appendix 29 – Catalogue of fish bone from the test-pitted sites | Rachel Parks

The data on this page can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the relevant CSV files 'Parks_testpitdata_table1.csv' to 'Parks_testpitdata_table14.csv'.

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

Draft versions of the fish tables from the test-pitted sites, drawn up by Rachel Parks for inclusion in the report, are to be found in 'finaltestpit_amended May06.pdf' at Documents > Specialists reports.

Table 1: Number of identified fish specimens by site

Data from the ADS archive CSV file 'Parks_testpitdata_table1.csv'.

Table 2: Weight of fish specimens by site

Data from the ADS archive CSV file 'Parks_testpitdata_table2.csv'.

Table 3: Estimated size of common gadids by site

Data from the ADS archive CSV file 'Parks_testpitdata_table3.csv'.

Table 4: Loch a Sguirr (SFS8) element representation

Data from the ADS archive CSV file 'Parks_testpitdata_table4.csv'.

Table 5: Surface texture of QC1 and QC4 elements by site

Data from the ADS archive CSV file 'Parks_testpitdata_table5.csv'.

site	provenance	QC	excellent	good	fair	poor	Total
SFS8	trench 1	1	24	46	26	7	103
	trench 3	1	14	16	6	2	38
		Total	38	62	32	9	141
SFS89a	8914	1	2	28	4		34
	8914	4	61	13	1		75
		Total	63	41	5	0	109

SFS20	test pit 1	1	27	37	6		70
	test pit 2	1	5	28	2		35
		Total	32	65	8	0	105
SFS2	106	1	11	35	15		61
	110	1	1	1			2
	303	1	1	5	3		9
		Total	13	41	18	0	72
SFS41	4112	1	10	35	10	0	55
SFS66	6614	1	23	58	23	0	104
SFS22	3002	1	5	83	87	3	178
	3003	1	3	48	20	2	73
		Total	8	131	107	5	251
		Grand Total	187	433	203	14	837

Assessment of surface texture based on the following criteria (Harland *et al* 2003):
Excellent – majority of surface fresh or even slightly glossy; very localised flaky or powdery patches.
Good – lacks fresh appearance but solid; very localized flaky or powdery patches.
Fair – surface solid in places, but flaky or powdery on up to 49% of specimen.
Poor – surface flaky or powdery over >50% of specimen.

Table 6: Completeness of QC1 and QC4 elements by site

Data from the ADS archive CSV file '`Parks_testpitdata_table6.csv`'.

site	provenance	QC	0–20%	21–40%	41–60%	61–80%	81–100%	Total
SFS8	trench	1	9	32	15	23	24	103
	trench 3	1	5	9	7	11	6	38
		Total	14	41	22	34	30	141
SFS89a	8914	1	2	10	9	8	11	40
	8914	4		2	8	3	62	75
		Total	2	12	17	11	73	115
SFS20	test pit 2	1	18	28	14	23	22	105
	test pit 1	1				no shells found		
SFS2	106	1	7	28	5	9	12	61
	110	1					1	1
	330	1		4	2	2	1	9
		Total	7	32	7	11	14	71
SFS41	4112	1	2	20	10	6	7	45
SFS66	6614		16	29	27	25	14	11
SFS22	3002	1	9	38	67	37	27	178
	3003	1	3	18	19	19	14	73
		Total	12	56	86	56	41	251
		Grand Total	71	218	183	166	201	839

Table 7: Modified bone (all specimens) by site

Data from the ADS archive CSV file '`Parks_testpitdata_table7.csv`'.

site	provenance	crushed	calcined	charred	total burnt	Total
SFS8	trench	1	61	245	305	367
	trench 3		1	15	16	17
	Total	1	62	260	321	384
SFS89a	8914	0	0	21	21	21
SFS20	test pit 1	6	1	53	54	61
	test pit 2	4	1	30	31	36
	Total	10	2	83	85	97
SFS2	106	8	0	32	32	40
	110	none found				
	330	none found				
SFS41	4112	1	48	112	160	209
SFS66	6614	5	1	40	41	47
SFS22	3002	1	21	172	193	215
	3003	6	88	289	377	471
	Total	7	109	461	570	686
Grand Total		32	222	1009	1230	1484

Table 8

Data from the ADS archive CSV file '`Parks_testpitdata_table8.csv`'.

Table 9

Data from the ADS archive CSV file '`Parks_testpitdata_table9.csv`'.

Table 10

Data from the ADS archive CSV file '`Parks_testpitdata_table10.csv`'.

Table 11

Data from the ADS archive CSV file '`Parks_testpitdata_table11.csv`'.

Table 12

Data from the ADS archive CSV file '`Parks_testpitdata_table12.csv`'.

Table 13

Data from the ADS archive CSV file '`Parks_testpitdata_table13.csv`'.

Table 14: Estimated size of selected taxa at Crowlin 3

Data from the ADS archive CSV file '`Parks_testpitdata_table14.csv`'.

size	taxon	3002	3003	Total
extra large >1m	conger eel	21	3	24

	cod	1		1
	ling	8	1	9
	cod family	2		2
	Total	32	4	36
very large 801–1000mm	conger eel		1	1
	saithe	1		1
	saithe or pollack	2		2
	cod	4		4
	ling	7	1	8
	cod family	1		1
	Total	15	2	17
large 501–800mm	conger eel	1		1
	saithe		2	2
	pollack	2	1	3
	cod	2	1	3
	cod, saithe or pollack		1	1
	ling	7	1	8
	cod family	3	1	4
	Total	15	7	22
medium 301–500mm	saithe	32	13	45
	pollack	10	8	18
	saithe or pollack	15	2	17
	cod	2		2
	cod, saithe or pollack	2	2	4
	ling	1		1
	cod family	8	2	10
	ballan wrasse		1	1
	Total	70	28	98
small 151–300mm	saithe	21	11	32
	pollack	2	4	6
	saithe or pollack	8	8	16
	cod	3		3
	cod, saithe or pollack		3	3
	ling		1	1
	cod family	1	2	3
	wrasse family	1		1
	Total	36	29	65
tiny <150 mm	saithe	2		2
	saithe or pollack	3		3
	cod family		2	2
	wrasse family		1	1
	Total	5	3	8
	Grand Total	173	73	246

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• Harland, JF, Barrett, JH, Carrott, J, Dobney, K & Jaques, D 2003 'The York System: an integrated zooarchaeological database for research and teaching', *Internet Archaeol* 13 (visited June 2005).

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All files start from `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > …`

`… > Documents > Specialists reports > finaltestpit_amended May06.pdf [draft tables]`

The following are all located in `… > Data > Artefact and ecofact catalogues > …`

```
… > Parks_testpitdata_table1.csv
… > Parks_testpitdata_table2.csv
… > Parks_testpitdata_table3.csv
… > Parks_testpitdata_table4.csv
… > Parks_testpitdata_table5.csv
… > Parks_testpitdata_table6.csv
… > Parks_testpitdata_table7.csv
… > Parks_testpitdata_table8.csv
… > Parks_testpitdata_table9.csv
… > Parks_testpitdata_table10.csv
… > Parks_testpitdata_table11.csv
… > Parks_testpitdata_table12.csv
… > Parks_testpitdata_table13.csv
… > Parks_testpitdata_table14.csv
```

Appendix 30 - Catalogue of animal bone from the Test Pitted sites | Jacqui Mulville

The data on this page can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the relevant CSV file 'SFS_Test_pitted_sites_bone_data_sheets_table1.csv'. See also draft version 'Mulville_sfs_tables.csv' in Documents > Specialists reports.

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*.

Bone from the Test Pitted sites, NISP for each context by site

The data set has too may field to be displayed here. Please download the data from the archive detailed above.

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… > Data > Artefact and ecofact catalogues > SFS_Test_pitted_sites_bone_data_sheets_table1.csv
… > Documents > Specialists reports > Mulville_sfs_tables.csv [draft]

Appendix 31 – Lithic material from the Survey | Caroline Wickham-Jones

The data on this page can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Lithics. From here you can download the relevant CSV file 'Survey_Sites_Lithics.csv'.

CSV format is platform and software independent. It can be opened in a text editor or spreadsheet program such as *MS Excel*. This particular file contains the raw data from which the table has been collated.

SFS Number	Site Name	Quantity
SFS 185	Achintee	3
SFS 95	Achnahannait Bay	4
SFS 68	Allt na Criche	59
SFS 10	Allt na'Uamha	9
SFS 60	Allt-na-h-Eirigh	1
SFS 150	Alt Cadh an Eas	4
SFS 29	An Corran B	76
SFS 30	An Corran C	529
SFS 31	An Corran D	58
SFS 101	An Corran E	555
SFS 193	An Corran F	26
SFS 194	An Corran G	3
SFS 1	An Corran, Mesolithic excavations	1
SFS 116	Applecross Mains	10
SFS 75	Applecross Manse	97
SFS 66	Ard Clais Salacher	12
SFS 102	Ardheslaig 1	1
SFS 6	Ashaig 1	3
SFS 92	Ashaig 3	8
SFS 93	Ashaig 4	3
SFS 32	Brogaig	102
SFS 168	Camas an Leim 1	1
SFS 188	Camas an Leim 2	4
SFS 76	Camusteel 1	1
SFS 77	Camusteel 2	5

SFS 17	Church Cave	4
SFS 61	Clachan Church	3
SFS 99	Clachan Church Midden	1
SFS 147	Cnoc na Celpeirein	41
SFS 89	Coire Sgamadail 1	7
SFS 90	Coire Sgamadail 3–6	8
SFS 49	Creag na-h-Uamha	2
SFS 2	Crowlin 1	31
SFS 22	Crowlin 3	60
SFS 23	Crowlin 4	1
SFS 26	Crowlin 7	4
SFS 190	Diabeg	1
SFS 152	Doire na Guaile	80
SFS 117	Dun Hasan 2	3
SFS 104	Fearnmore 1	754
SFS 80	Fearnmore 2	1
SFS 114	Fergus' Shelter	81
SFS 8	Loch a Sguirr	149
SFS 18	Loch a Sguirr	5
SFS 171	Meall na h'Airde 2	27
SFS 96	Meallabhan	24
SFS 183	Nead an Eoin	11
SFS 50	Pabay 1	14
SFS 94	Port Earlish	6
SFS 9	Redpoint (catalogue not complete)	847
SFS 57	Rubha a Ghair	13
SFS 58	Rubha Chuaig	2
SFS 44	Rubha'an Droma Bhain	3
SFS 71	Sand 5	1
SFS 12	Scalpay 2	56
SFS 33	Scalpay 3	152
SFS 56	Scalpay 4	26
SFS 118	Scalpay 5	202
SFS 198	Scalpay 6a	660
SFS 195	Scalpay 6b	1578
SFS 196	Scalpay 7	30
SFS 197	Scalpay 8	2
SFS 15	Shieldaig	45
SFS 141	R 1/25	2
SFS 36	Staffin Island	7
SFS 191	Suarbie Burn	7
SFS 162	Teanga Fhiadhaich	13
SFS 186	Torridon Mains	3
SFS 20	Toscaig 2	4
SFS 34	Toscaig 3	5

SFS 39	Toscaig 7	4
SFS 41	Toscaig 9	7
SFS 105	Uags	10
SFS 61	Uamh an Triall	1

Lithic material from the Survey

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… > Data > Lithics > Survey_Sites_Lithics.csv

Appendix 32 – Sand, transect soil sample descriptions | Robert Shiel with Andrew Stewart

The data in this table can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Data > Artefact and ecofact catalogues. From here you can download the file 'Soil_transect_descriptions.pdf'.

Soil descriptions follow standard procedures (Hodgson 1978) and the following abbreviations have been used to aid soil description. The ends of the transects were plotted by EDM to record their relative positions.

DV = Dominant vegetation
MD = Maximum depth
Mun = Munsel colour code
Txt = Texture
Con = Consistency
Rts = Root content
St = Stone content

Sand, transect A—B soil sample descriptions

Sample No. 1/50m DV/*Calluna vulgaris*, MD/0.16m, Mun/10YR 3/1 v.d. grey, Txt/Gritty, Con/Plastic. Rts/Frequent. St/Rare.

Sample No. 2/48m DV/ *Calluna vulgaris*, MD/0.24m, Mun/10YR 3/1 v.d.grey, Txt/Gritty, Con/ Plastic, St/Rare Surface wet with *Sphagnum rubricum*.

Sample No. 3/46m DV/*Calluna vulgaris*, MD/0.30m Mun/10YR 3/1 v.d. grey Txt/Gritty, Con/Plastic, St/Rare, Rts Frequent. Surface spongy.

Sample No. 4/44m DV/*Calluna vulgaris*, MD/0.60m, Mun/10YR 3/1 v.d.grey (top) 7.5YR 4/2 brown (basal), Txt/Gritty, Con/Plastic, Dt/Rare. Peat giving way to peaty loam.

Sample No. 5/42m DV/*Calluna vulgaris*, MD/0.44m, Mun/10YR 3/1 v.d. grey, (top) 7.5YR 4/2 brown (basal), Txt/gritty, Con/Plastic, St/Rare. Sand content increases with depth becoming granular towards the base.

Sample No. 6/40m DV/ *Calluna vulgaris*, MD/0.35m, Mun 10YR 3/1 black (top) 7.5YR 4/2 brown (basal) Txt/Gritty, Con/Plastic becoming firm with depth.

Sample No. 7/38m DV/ *Calluna vulgaris*, MD/0.30m, Mun/10YR 3/1 black 7.5 YR 4/2 brown (basal) Txt/Gritty, Const/Plastic becoming firm with depth, St/Rare. Rt/Frequent.

Sample No. 8/36m DV/ *Calluna vulgaris*, MD/0.26m, Mun/10YR 4/3 Brown, Txt/Gritty, Const/Friable, Rt/Frequent. Very sandy in contrast to previous-shallow profile close to weathered base.

Sample No. 9/34m DV/ *Calluna vulgaris*, MD/0.30m, Mun/10YR 3/1 v. d. grey (top) 10YR 6/8 Yellowish brown (basal) Text/Grittty, Const/Loose, Rt/ Frequent. Weathered sandstone at base.

Sample No 10/32m DV/ *Calluna vulgaris*, MD/0.15m, Mun/10YR 3/1 Black, Txt/Gritty/Const/Firm, Rt/Rare. Weathered sandstone at the base.

Sample No 11/30m DV/ *Calluna vulgaris*, MD/0.18m, Mun/10YR 3/1 Black, Text/Sandy, Const/Friable, Rt/Abundant fine, St/Rare. Brown weathered sandstone at base.

Sample No 12/28m DV/*Calluna vulgaris*, MD/0.20m, Mun/10YR 3/1 Black, Text/Sandy, Const/Friable, St/Rare, Rt/Abundant fine.

Sample No 13/26m DV/*Calluna vulgaris*, MD/0.23, Mun/10YR Black, Text/Sandy/silt, Const/Firm, Rts Abundant large.

Sample No 14/24m DV/formerly *Pteridium aquilinum*, MD/0.20m, Mun/10YR 3/1 Black with white quarts grains, Text/Gritty, Const/Firm, Rts/Abundant, mixed from top to base.

Sample No 15/22m DV/ formerly *Pteridium aquilinum*, MD/0.20m, Mun/10YR 3/1 black, Text/Sandy, Const/Firm.

Sample No 16/20m DV/ formerly *Pteridium aquilinum*, MD/0.20m, Mun/10YR black, Text/Gritty, Const/Firm, Rts/Abundant, fine with thicker *Pteridium* root present.

Sample No 17/18m DV/ formerly *Pteridium aquilinum*, MD/0.32, Mun/10YR 3/1 black, Text/Gritty, Const/Friable, Rts/Occasional fine, St/Rare. Centre of cultivation strip.

Sample No 18/16m DV/ formerly *Pteridium aquilinum*, MD/0.44m, Mun/10YR 3/1 black, Text/Gritty sand, Const/Friable, St/Rare Rts/Abundant fine below turf.

Sample No 19/14m DV/ formerly *Pteridium aquilinum*, MD/0.45m, Mun/10YR 3/1 black, Text/Gritty, Const/Firm, St/Rare Rts/Abundant fine with thicker *Pteridium* root present.

Sample No 20/12m DV/ formerly *Pteridium aquilinum*, MD/0.46m, Mun/10YR black, (lower 10YR 6/4 yellowish brown), Text/Gritty, Const/Firm, Rts/Abundant large at 0.12m becoming fine with depth. Weathered sandstone at 0.38m.

Sample No 21/10m DV/ formerly *Pteridium aquilinum*, MD/0.50m, Mun/7.5 YR 3/1 very dark grey, Text/Gritty, Const/Firm, St/ Abundant angular, Rts/Abundant fine with thicker *Pteridium* root present.

Sample No 22/8m DV/ formerly *Pteridium aquilinum*, MD/0.50mm, Mun/7.5YR 3/1 very dark grey(lower 7.5YR 5/4 brown, Text/Gritty, Const/Firm at top, friable with depth, Rts/Rare, St/ Large angular stones at base intermixed with weathered sandstone.

Sample No 23/6m DV/ formerly *Pteridium aquilinum*, MD/0.67m, Mun/7.5YR very dark grey, Text/Silty sand, Const/Plastic, Rts/Rare, St/Present and impeding. Shell present encroaching on midden material.

Sample No 24/4m Not recorded due to the presence of large rock

Sample No 25/2m DV/ formerly *Pteridium aquilinum*, MD/0.42m, Mun/7.5YR 3/1 very dark grey, Text/Gritty, Const/Firm, Rts/Abundant fine with thicker *Pteridium* root present, St/Large angular blocks with medium smaller stones. Midden material present.

Sample No 26/0m Recorded from within east facing section due to the presence of boulders near the surface. DV/ formerly *Pteridium aquilinum*, MD/Not etablished,Text/Gritty, Const/Friable due to exposure thicker *Pteridium* root present.

Sand, transect C—D soil sample descriptions

Sample 21/1 DV/ formerly *Pteridium aquilinum*, MD/0.30m, Mun/10YR 4/1 very dark grey, Text/Grittty, Const/Loose and friable, Rt/ Frequent small, St/Rare. Homogenous due to ploughing.

Sample 18/2 DV/ formerly *Pteridium aquilinum*, MD/0.30m, Mun/10YR 4/1 very dark grey, Text/Sandy, Const/Friable, Rt/ Frequent, St/Occasional. Homogenous due to ploughing.

Sample 16/3 DV/ formerly *Pteridium aquilinum*, MD/0.25m, Mun/10YR 4/1 very dark grey, Text/Grittty, Const/Loose and friable, Rt/Frequent *Pteridium* down through the profile. Homogenous due to ploughing at surface. Base consists of archaeological layer.

Sample 14/4 DV/ formerly *Pteridium aquilinum*, MD/0.40m, Mun/10YR 4/1 very dark grey, Text/Grittty, Const/Loose and friable, Rt/ Frequent small, ST/Occasional angular fragments Homogenous due to ploughing. Weathered sandstone at the base, root impact at base.

Sample 12/5 DV/ formerly *Pteridium aquilinum*, MD/0.45m, Mun/10YR 2/2 very dark brown, Text/Sandy, Const/Loose and friable down to 0.33m, Rt/ Abundant *Pteridium* roots in upper section, St/Absent.

Sample 10/6 DV/ formerly *Pteridium aquilinum*, MD/0.30m, Mun/10YR 4/1 very dark grey, Text/Grittty, Const/Loose and friable, Rt/ Frequent small. Homogenous due to ploughing.

Sample 8/7 DV/ formerly *Pteridium aquilinum*, MD/0.30m, Mun/10YR 4/1 very dark grey, Text/Grittty, Const/Loose and friable, Rt/ Frequent small. Homogenous due to ploughing.

Sample 6/8 DV/ formerly *Pteridium aquilinum*, MD/0.30m, Mun/10YR 4/1 very dark grey, Text/Grittty, Const/Loose and friable, Rt/ Frequent small. Homogenous due to ploughing.

Sample 4/9 DV/ formerly *Pteridium aquilinum*, MD/0.30m, Mun/10YR 4/1 very dark grey, Text/Grittty, Const/Loose and friable, Rt/ Frequent small. Homogenous due to ploughing.

Sample 2/10 DV/ formerly *Pteridium aquilinum*, MD/0.30m, Mun/10YR 4/1 very dark grey, Text/Grittty, Const/Loose and friable, Rt/ Frequent small. Homogenous due to ploughing.

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Appendix 33 – Publications relating to Scotland's First Settlers | Karen Hardy & Caroline Wickham-Jones

The data in these tables can be obtained from the project archive on the Archaeology Data Service (ADS) website, after agreeing to their terms and conditions: `ads.ahds.ac.uk/catalogue/resources.html?sfs_ba_2007 > Downloads > Documents > Publications`. From here you can download many of the articles as PDFs.

Finlayson B, Hardy K, & Birch S, Wickham-Jones CR & Wildgoose M 1999, Crowlin Islands, Eilean Mor, *Discovery and Excavation in Scotland 1998*, Edinburgh. 46; `'D&E_1998.pdf'`

Finlayson B, Hardy K, & Wickham-Jones CR 1999, Scotland's First Settlers: *Data Structure Report*. Edinburgh; `'Data_Structure_Report_1999.pdf'`

Finlayson B, Hardy K, & Wickham-Jones CR 2000, Inner Sound, Survey and trial excavation, *Discovery and Excavation in Scotland* 1999, Edinburgh. 49–50; `'D&E_1999.pdf'`

Finlayson B, Hardy K, & Wickham-Jones CR forthcoming, Scotland's First Settlers: Work on the early settlement of the Inner Sound of Skye, Scotland, *Mesolithic Miscellany*, forthcoming; `'Mesolithic_miscellany_unpublished_paper.pdf'`

Hardy K, & Wickham-Jones CR 2000, *Scotland's First Settlers: Data Structure Report*. Edinburgh; `'Data_Structure_Report_2000.pdf'`

Hardy K & Wickham-Jones CR 2001a, Inner Sound: Survey and Excavation. *Discovery and Excavation in Scotland* 2000, New Series, Volume 1. Edinburgh. 44–5; `'D&E_2000.pdf'`

Hardy K, & Wickham-Jones CR 2001b, *Scotland's First Settlers: Data Structure Report*. University of Edinburgh; `'Data_Structure_Report_2001.pdf'`

Hardy K, & Wickham-Jones CR 2001c, Scotland's First Settlers, a project to investigate the earliest settlement of west coast Scotland, *History Scotland*, 1, 22–7; `'History_Scotland_paper.pdf'`

Hardy K, & Wickham-Jones CR 2002a, Inner Sound: Survey and Excavation. *Discovery and Excavation in Scotland 2001*. New Series volume 2. The Journal of the Council for Scottish Archaeology, Edinburgh. 61–2; `'D&E_2001.pdf'`

Hardy K, & Wickham-Jones CR 2002b, Scotland's First Settlers: the Mesolithic Seascape of the Inner Sound, Skye and its contribution to the early prehistory of Scotland. *Antiquity* 2002, 825–33.

Hardy K, & Wickham-Jones CR 2002c. Inner Sound: Rona, Loch Torridon & Loch Carron: survey and test pitting. *Discovery and Excavation in Scotland 2002*. New Series volume 3. The Journal of the Council for Scottish Archaeology, Edinburgh. 60–1; `'D&E_2002.pdf'`

Hardy K, & Wickham-Jones CR 2002d, *Scotland's First Settlers: Data Structure Report 2002*, University of Edinburgh; 'Data_Structure_Report_2002.pdf'

Hardy K, & Wickham-Jones CR 2003. Scotland's First Settlers: An Investigation into Settlement, territoriality and mobility during the Mesolithic in the Inner Sound, Scotland, in Larsson L, Kindgren H, Åkerlund A, Kuntsson K & Loeffler D. *Mesolithic on the Move: Proceedings of the Meso 2000 conference*, Oxford: 369–84; 'Meso_2000_paper.pdf'

Hardy K, & Wickham-Jones CR 2004. Scotland's First Settlers. The study of an archaeological seascape. in Carver E & Lelong O (eds) *Modern Views, Ancient Lands*. Oxford: BAR Brit Ser 377; 51–64.

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- … > D&E_1998.pdf
- … > Data_Structure_Report_1999.pdf
- … > D&E_1999.pdf
- … > Mesolithic_miscellany_unpublished_paper.pdf
- … > Data_Structure_Report_2000.pdf
- … > D&E_2000.pdf
- … > Data_Structure_Report_2001.pdf
- … > History_Scotland_paper.pdf
- … > D&E_2001.pdf
- … > D&E_2002.pdf
- … > Data_Structure_Report_2002.pdf
- … > Meso_2000_paper.pdf