

*June 2007*

**PROGRESS REPORT ON THE EXCAVATION OF  
SHELL MIDDENS ON PORTION 15 OF FARM  
PAAPEKUILFONTEIN, SUIDERSTRAND, NEAR  
CAPE AGULHAS**

**PERMIT NO 2005-07-004**

**HWC Ref No C13/3/6/2/1/1/1/C13**

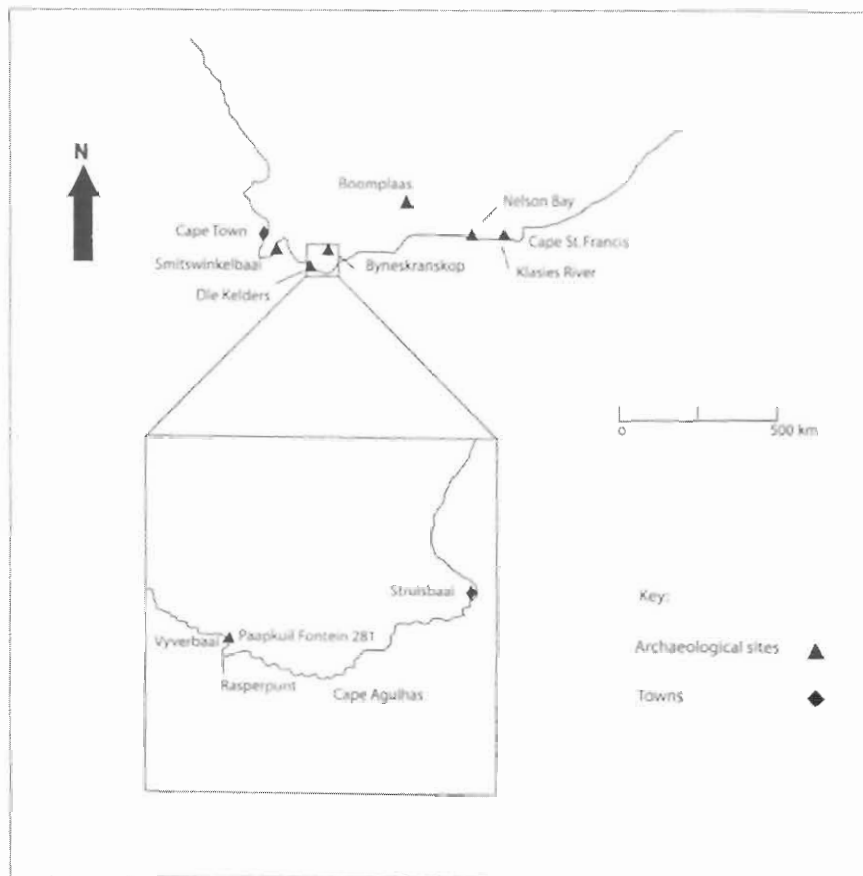
## 1.1 Introduction

Vywerbaai is a small bay located about 5 – 10 km west of the fishing village of Struisbaai (Fig. 1.1). "Vywer" is the local Afrikaans name for "fish trap", so "Vywerbaai" would translate into "fish trap bay". Towards the middle of 2004 the Archaeology Contracts Office (ACO), based at the Department of Archaeology, University of Cape Town, conducted a Phase 1 Archaeological Impact Assessment of Portion 15 of the farm Paapkuil Fontein 281, Cape Agulhas. The area surveyed consisted of 53 hectares of coastal strandveld (Hart 2004). The adjacent shoreline is characterised by gentle sloping boulder beaches and gullies which contain numerous stone walled tidal fish traps (Fig 3.2).

In the course of the ACO survey, twelve Later Stone Age (LSA) shell middens were identified. These are numbered Paapkuil Fontein #1 – #12 (Fig 1.2). Some mitigation of the shell middens was recommended to offset the impact of low density residential development, thus providing the opportunity to investigate possible relationships between the middens and the fish traps. It was hoped that, if the middens preserved quantities of fish bone from species likely to have been caught in traps, that this might provide a means of studying the long-term history of the use of these traps. This chapter reports the findings of the excavation of four shell middens at Paapkuil Fontein 281.

## 1.2 Choice of sites and excavation methods

Four sites were chosen for excavation: Paapkuil Fontein #4, #5, #7 and #11. Figure 1.2 indicates the positions of the shell middens relative to the fish traps. These four middens were chosen because of their relative proximity to the fish traps, and because they appeared to have the greatest depth of deposit, therefore offering the best possibility of preserving *in situ* fish remains. While not a prerequisite, middens containing a range of material were favoured as this would allow investigation



**Fig. 1.1 Map showing the location of Paapkuil Fontein and other important archaeological sites along the southern Cape.**

of the range of activities conducted at the site. Middens not chosen for excavation consisted of thin scatters of surface material or sites disturbed by road building activities or natural erosion processes.

The Paapkuil Fontein sites were excavated in 1m x 1m squares laid across the densest part of the midden. Where possible, sites were excavated according to natural stratigraphy, either according to occupation layers or changes in sediment colour, consistency or texture. In sites where no stratigraphic indicators could be discerned, deposit was removed in arbitrary spits 10 cm deep. Unless otherwise stated, all deposit was passed through a 3 mm mesh sieve. All material recovered from the





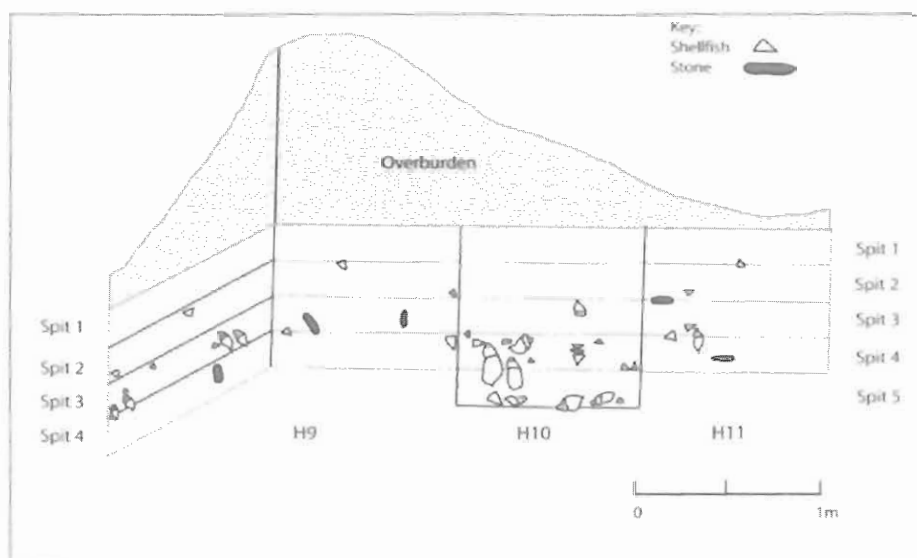
**Fig. 1.3 Part of Paapkuil Fontein 4 before excavation showing midden deposit eroding out of the side of the dune.**

Three and a half 1 m x 1 m squares were excavated. These were numbered H9, H10, H11 and G10, in which only half of the square adjacent to H10 could be excavated, due to the slope of the dune. The deposit in squares H11 and G10 thinned out considerably, probably approaching the edges of the midden.

### ***1.3.1 Stratigraphy and Dating***

No stratigraphic layers could be discerned at Paapkuil Fontein 4. Ten centimetre spits were excavated to retain some stratigraphic control and aid comparison across squares. After the overburden had been removed, four spits were excavated in each square with the exception of H10, where a fifth spit was also excavated. This was the base of the deposit, with sterile sand underneath. Figure 1.4 shows the section drawing for Paapkuil Fontein 4.

A single radiocarbon date was obtained for this site. Marine shell from square H10 spit 4 (the area in which finds were most dense) yielded a date of  $4870 \pm 80$  B.P. (GX-32533). Calibration with the Pretoria calibration curve for marine samples from the southern hemisphere yields a most likely date of 3261 BC. The range of dates at two standard deviations is 3386-2939 BC.



**Fig. 1.4** Section drawing of east wall of H/I section, and H8/H9 section.

### ***1.3.2 Results***

A total area of 3.5 m<sup>2</sup> was excavated constituting 1.5 cubic metres of deposit, excluding the overburden. In total 72.0 kg of archaeological material was retrieved after sieving. Marine shell comprises the bulk of this at 43.7 kg, stone 28.2 kg, ostrich eggshell 102g, bone 12.7g and ochre 8.2g. All of the material recovered has been analysed and is reported below.

### ***1.3.3 Cultural remains***

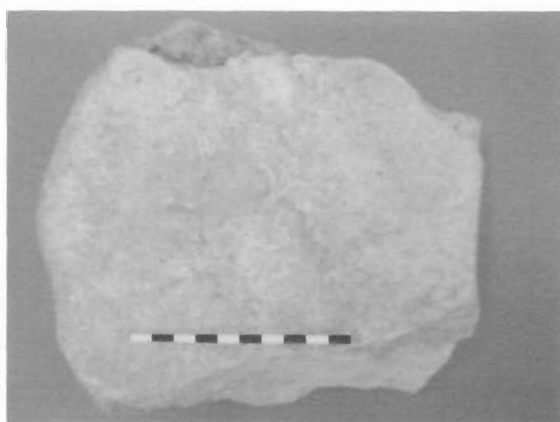
### ***1.3.4 Lithics***

The numbers and percentages of the stone recovered from Paapkuil Fontein 4 are given in Table 1.1. Quartzite was the only raw material present. Only 37 stone pieces were recovered during excavation. There were no retouched artefacts. Twenty-two manuports account for 59 % of the total assemblage. Three hammer-stones were recovered from squares H10 spit 4 and spit 5 and one from G10 spit 2. A single upper grindstone was recovered from square H9 spit 3.

Paapkuil Fontein 4								
Class	Raw material		Spit 1	Spit 2	Spit 3	Spit 4	Spit 5	Total
Chips	Quartzite	n	1			1	1	3
Chunks	Quartzite	n		2		1	1	4
Core	Quartzite	n				2		2
Non - Utilized manuports	Quartzite	n	8	4	3	7	2	24
Utilized								
Hammerstones	Quartzite	n		1		1	1	3
Upper grindstone	Quartzite	n			1			1

**Table 1.1 Stone artefact assemblage from Paapkuil Fontein 4**

A flat stone which was perhaps collected with the intention of using it as a lower grindstone was recovered from square H11 spit 2 (Fig. 1.5)



**Fig 1.5 Flat stone recovered square H11 spit 2. Scale in 10 mm intervals.**

The scarcity of formal stone artefacts in late Holocene southern Cape coastal sites has been well documented (Maggs & Speed 1967, Klein 1974, Avery 1976, Robertshaw 1979, Poggenpoel & Robertshaw 1981, Binneman 1995, Henshilwood 1995). Activities undertaken at this site clearly did not require the use of formal stone artefacts. The date of  $4870 \pm 80$  B.P. (GX - 32533) (with a marine correction of - 500 years for the apparent age of sea water, ca 4370 B.P.) is, however, rather earlier than most of these informal coastal lithic assemblages. Interestingly, it is only Binneman's (1995) work at Klasies River Cave 1, that has yielded a similarly early date of 4 700 B.P. for the macrolithic quartzite industry he calls the Kabeljous. The assemblage from Paapkuil Fontein 4 is small, and it is difficult to know whether a larger sample might have included rare retouched pieces. On the basis of the evidence available,

however, this assemblage appears to be an early late Holocene macrolithic assemblage which lacks formal retouch.

Only three pieces of ochre were recovered from Paapkuil Fontein 4. All three pieces were recovered from spit 3, two from square H10 and one from square H9. The pieces are fairly small and none showed any visible signs of grinding.

### 1.3.5 Non – lithic items

#### ***1.3.6 Ostrich eggshell***

In total, 47 ostrich eggshell fragments were recovered from Paapkuil Fontein 4. None of the pieces was worked and no beads were found. The majority of the fragments came from Square H10, with 37 fragments retrieved from Spit 3 and 6 fragments from Spit 5.

### **1.3.7 Faunal Remains**

#### ***1.3.8 Shellfish***

All of the shellfish remains recovered from Paapkuil Fontein 4 were identified, counted and where possible, measured. Minimum numbers of individuals and percentage values for the different species are given in Table 1.2. A wide range of species were exploited at this site, from both the intertidal and sub – tidal zones. Two species of shellfish, the alikreukel *Turbo sarmaticus* and limpet *Scutellastra longicosta* comprise the bulk of the shellfish assemblage at 34 % and 22.9 % respectively: 56.9 % of the site total. The limpet *Cymbula oculus* was the third highest contributor at 8.7 % of the total assemblage. None of the other eighteen species identified contributed more than 8% of the assemblage. This pattern remains relatively consistent throughout the spits and suggests that shellfish collecting remained relatively constant through time. However, percentage values for *S. longicosta* are lower in spit 1 in comparison with the other spits. The inverse pattern applies to *T. sarmaticus* with higher percentage values in spit 1 in comparison to the other spits. This may indicate a subtle difference in shellfish collection in spit 1.



Paapkuil Fontein 4												
Species	Spit 1		Spit 2		Spit 3		Spit 4		Spit 5		Total	
	no	%	no	%	no	%	no	%	no	%	no	%
Scutellastra cochlear	75	9.4	10	1.6	5	0.4	5	0.4	-	-	95	2.2
Scutellastra longicosta	112	14.1	161	25.7	275	23.5	314	24.5	123	29.0	985	22.9
Scutellastra barbara	25	3.1	18	2.9	44	3.8	49	3.8	13	3.1	149	3.5
Scutellastra barbara/longicosta?	12	1.5	8	1.3	31	2.6	21	1.6	9	2.1	81	1.9
Scutellastra argenvillei	-	-	-	-	3	0.3	2	0.2	-	-	5	0.1
Scutellastra granularis	-	-	-	-	1	-	-	-	1	-	2	-
Cymbula oculus	42	5.3	51	8.1	101	8.6	140	10.9	39	9.2	373	8.7
Cymbula miniata	-	-	-	-	3	0.3	-	-	2	0.5	5	0.1
Dinoplax gigas	2	0.3	2	0.3	1	-	4	0.3	2	0.5	11	0.3
Limpet spp.	88	11.1	13	2.1	56	4.8	27	2.1	14	3.3	198	4.6
Turbo sarmaticus	320	40.3	196	31.3	393	33.6	426	33.3	123	29.0	1458	34.0
Turbo cidaris cidaris	8	1.0	1	0.2	7	0.6	11	0.9	2	0.5	29	0.7
Oxysteles tigrina	8	1.0	50	8.0	73	6.2	87	6.8	25	5.9	243	5.7
Oxysteles sinensis	41	5.2	45	7.2	76	6.5	98	7.7	27	6.4	287	6.7
Oxysteles variegata	-	-	2	0.3	-	-	-	-	-	-	2	-
Oxysteles spp.	16	2.0	36	5.7	53	4.5	12	0.9	19	4.5	136	3.2
Haliois midae	2	0.3	7	1.1	4	0.3	1	-	1	0.2	15	0.3
Haliois spadicea	-	-	-	-	3	0.3	1	-	-	-	4	-
Burnupena spp.	43	5.4	27	4.3	40	3.4	81	6.3	24	5.6	215	5.0
Perna perna	-	-	-	-	1	-	-	-	-	-	1	-
Total	794	100	627	100.1	1170	99.7	1279	99.7	424	99.8	4294	99.9

Table 1.2 MNI's and percentage values for shellfish excavated at Paapkuil Fontein 4

*T. sarmaticus* can be found in the mid-tidal region and sub – tidally down to a depth of 7 metres and *S. longicosta* inhabits the mid – tidal region (Kilburn & Rippey 1982). While other species of shellfish were collected at Paapkuil Fontein 4, each contributed only a small percentage to the total assemblage. Meehan (1982) reported that during her stay with the Anbarra of Arnhem Land Northern Territory (Australia), shell fishing was primarily geared towards one species, whilst other species supplemented and added some variety to the main course. It is possible that shellfish collecting at this site followed along similar lines.

Table 1.3 shows the mean shell lengths for the different species of limpets at Paapkuil Fontein 4, and the maximum diameters of *Turbo sarmaticus* opercula. Mean shell lengths for the different species remain relatively constant throughout the deposit, taking into account the standard deviations.

### **1.3.9 Bone**

Bone was extremely rare at Paapkuil Fontein 4. In total, 56 fragments were recovered, weighing only 12.7 grams. Bone recovered from this site was very fragmented which made identification difficult. Tortoise, marine bird and microfauna were represented in the assemblage. A single fish vertebra was found in square H10 spit 3. It could not be identified to species level. As only one fish bone was found during excavation it is possible that it may have been brought onto the site by a non – human agent.

Paapkuil Fontein 4															
Species	Spit 1					Spit 2					Spit 3				
	n	mean	minimum	maximum	std.dev	n	mean	minimum	maximum	std.dev	n	mean	minimum	maximum	std.dev
Turbo sarmaticus opercula	289	23.1	10.4	43.9	6.9	144	22.7	10.7	49.8	8.1	253	21.8	3.8	46.5	7.4
Turbo cidaris cidaris opercula	8	13.1	11.5	15.9	1.7	1	8.8				7	10.8	9.5	12.7	1.3
Scutellastra cochlear	18	32.4	24.5	51.1	6.2	3	27.5	19.9	38.1	9.1	2	33.6	29.3	38.6	6.6
Scutellastra longicosta	75	56.8	43.4	76.2	6.1	90	57.7	41.2	71.9	6.5	124	58.8	44.9	73.6	6.3
Scutellastra barbara	22	63.1	50.0	74.9	7.0	12	58.5	46.0	73.0	9.7	26	63.1	52.3	73.2	6.0
S. barbara/longicosta ?	8	53.3	45.1	65.1	7.4						11	56.4	45.8	72.8	9.0
Scutellastra argenvillei											3	64.9	58.4	68.9	5.8
Scutellastra granularis											1	43.0			
Cymbula oculus	20	59.5	41.2	75.4	7.6	22	60.9	48.9	75.7	6.5	29	63.2	54.1	75.6	4.9

Species	Spit 4					Spit 5				
	n	mean	minimum	maximum	std.dev	n	mean	minimum	maximum	std.dev
Turbo sarmaticus opercula	295	25.6	2.6	47.7	7.8	106	21.8	9.6	44.1	8.0
Turbo cidaris cidaris opercula	11	10.3	8.2	14.3	1.7	2	11.2	9.5	13.1	2.5
Scutellastra cochlear	1	31.2								
Scutellastra longicosta	161	58.0	5.3	64.1	4.6	48	60.3	48.2	77.4	5.8
Scutellastra barbara	36	63.3	8.2	44.9	8.2	11	66.3	49.7	94.4	11.7
S. barbara/longicosta ?	15	63.3	7.4	46.9	7.4	4	58.2	49.2	66	7.4
Scutellastra argenvillei	1	68.9								
Scutellastra granularis						1	34.0			
Cymbula oculus	62	61.6	5.7	43.8	5.7	15	61.3	51.6	68.6	5.4
Cymbula miniata						2	67.1	56.2	80.2	16.9

Table 1.3

**Table 1.3 Mean sizes and standard deviations for the measured shellfish at Paapkuil Fontein 4. All measurements in mm.**

## 1.4 Paapkuil Fontein 5

Paapkuil Fontein 5 was the largest of the four shell middens excavated at Vyverbaai, situated about 500 metres from the fish traps near the top of a dune. This midden was chosen for excavation because a compact shell lens which appeared to retain good stratigraphy was visible eroding out of a dune. *In situ* deposit with a depth of 40 cm was visible, much of it tightly compacted *Oxystele* spp. The exact size of this midden could not be ascertained as much of it had been covered by dune sand. In addition, some of the material had been exposed and lost by erosion.

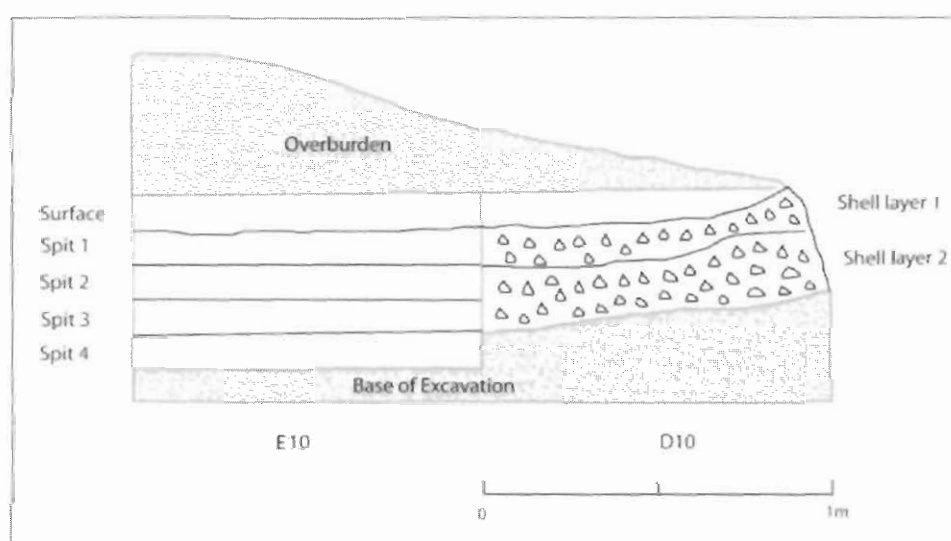
Five 1m x 1m squares were excavated. These were numbered E10, D10, D11, D12 and D13 (Fig 1.6). Due to the bulk of finds (again, mostly shellfish) recovered from this site only the material from square D11 has been analysed. Finds from the other squares are available for possible future analysis.



**Fig. 1.6 Excavated squares at Paapkuil Fontein 5. Square E10 is in the top left hand corner and square D10 adjacent to it. Note the presence of a lower grindstone in the picture in square D12/D13.**

### 1.4.1 Stratigraphy and Dating

Stratigraphy at Paapkuil Fontein 5 was more complicated than at the other middens excavated. Figure 1.7 shows the section drawing for this midden. A sterile dune sand overburden approximately 50 cm in depth was removed with spades until the shell rich levels were reached. Excavation was continued with trowels. The archaeological deposit was characterised by a dark grey sandy loam, sandwiched between over- and underlying sterile white dune sand. This indicated that the deposit was *in situ* and relatively undisturbed.



**Fig. 1.7 Section drawing along 10/9 section line.**

Excavation began in square E10. The "Surface" layer was mainly sterile with infrequent scatter of shell, probably the result of bioturbation of material from the underlying *in situ* material. Four 10 cm spits were removed from E10. It was subsequently possible to recognise, in the adjacent square D10, two shell layers 1 and 2. A thin sandy layer separated shell layer 1 from shell layer 2, but shell layer 1 appeared to wedge out towards square D13. In D13 shell layer 1 was not clearly defined; the surface layer appeared to be directly underlain by shell layer 2.

Two radiocarbon dates on marine shell were obtained for this site. Marine shell from D11 shell layer 1 yielded a date of  $2250 \pm 60$  B.P. (GX-32529). Using the Pretoria calibration programme for marine samples from the southern hemisphere, the most likely date is 110 AD, with a range from 22 BC to 250 AD at two standard deviations. Marine shell from shell layer 2 from the same square yielded a date of  $2320 \pm 70$  B.P.

(GX – 32531) The most likely calibrated date is 36 AD, with a two sigma range from 144 BC to 191 AD. The date ranges overlap at two standard deviations and suggest that these layers are very close in age, if not identical.

#### ***1.4.2 Results***

A total area of 5 m<sup>2</sup> was excavated at Paapkuil Fontein 5 constituting 1.7 cubic metres of deposit. In square D11, 0.4 cubic metres of deposit was removed, which yielded 82.9 kg of archaeological material after sieving. Since this is, by itself, a large quantity of material, only the finds from square D11 have been analysed and are reported here. A breakdown of the finds is as follows, marine shell 80.4 kg, stone 2.4 kg, bone 21.3g, ostrich eggshell 11.3g, ochre 7.8g and charcoal 42.7g. All of the material from D11 has been analysed and is reported below.

#### **1.4.3 Cultural Remains**

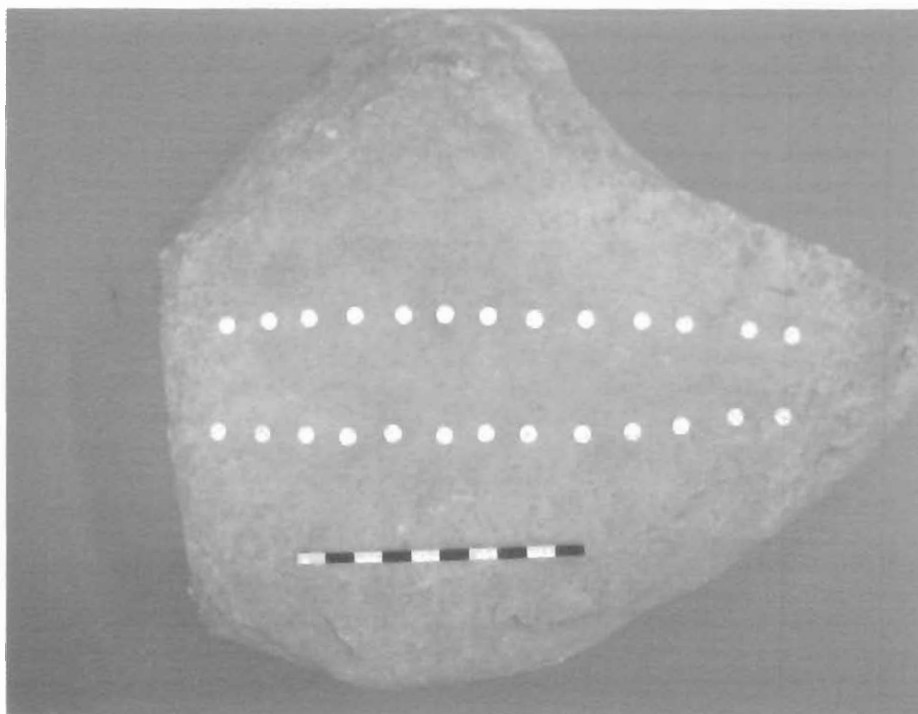
##### ***1.3.4 Lithics***

One hundred and thirty seven stone artefacts were recovered from square D11, and are listed in Table 1.4. Quartzite was the dominant raw material, accounting for 78.1% of the site total, quartz 21.2% and silcrete 0.7%. Much of the quartzite is in the form of manuports, rather than flaked pieces. Within the waste category, quartz accounts for 69% of the site total and quartzite the remaining 31%.

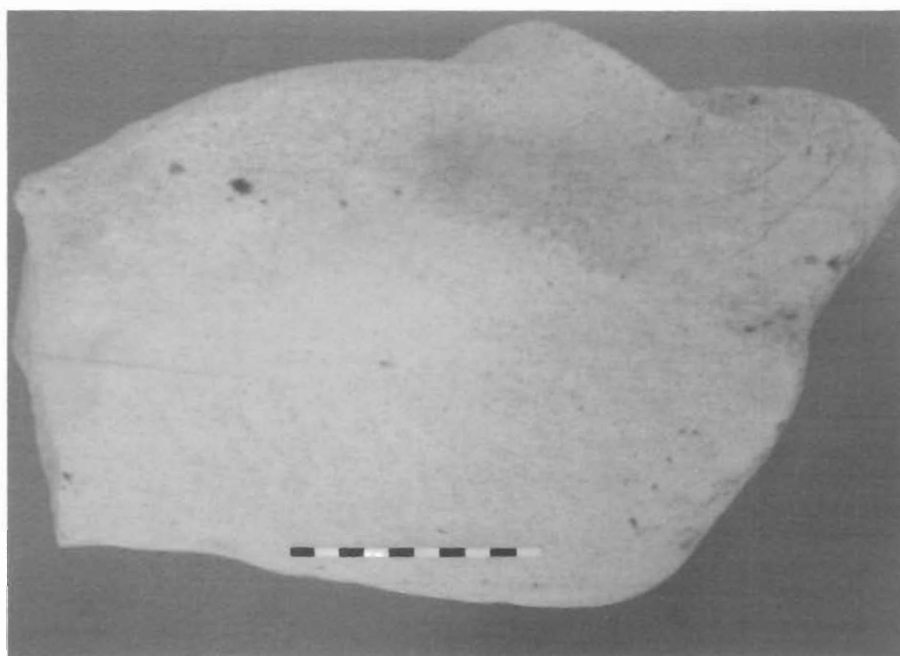
Two miscellaneous retouched pieces were found in shell layer 2, one made from quartz and the other from silcrete. Two lower grindstones were recovered, one from the surface of square C13 and one from shell layer 2 of D12 (These are not listed in Table 1.4 because they did not come from D11.) The grindstone from D12 (Fig. 1.8) has an elongated, linear grinding surface and with time would perhaps have developed a groove, similar to examples excavated at Kasteelberg B on the Vredenburg Peninsula. These grindstones are normally associated with herders and at Kasteelberg B date to the second millennium AD. The lower grindstone recovered from the surface of C13 has a smooth flat grinding surface and seemed to have been broken (Fig. 1.9).

Paapkuil Fontein 5							
Class	Raw Material		Overburden	Surface	Shell Layer 1	Shell Layer 2	Total
Chips	Quartz	n			5	3	8
		%			45.5	13.6	36.4
	Quartzite	n					
		%					
	Silcrete	n					
		%					
	Quartz	n	1		5	10	16
		%	16.7		45.5	45.5	38.1
Chunks	Quartzite	n	2	2		7	11
		%	33.3	66.7		31.8	26.2
	Silcrete	n					
		%					
Cores	Quartz	n	1		1		2
		%	16.7		9.1		4.8
	Quartzite	n					
		%					
	Silcrete	n					
		%					
	Quartz	n	2			1	3
		%	33.3			4.5	7.1
Flakes	Quartzite	n		1		1	2
		%		33.3		4.5	4.8
	Silcrete	n					
		%					
Total Waste	Quartz	n	4		11	14	29
		%	66.7		100	63.6	69
	Quartzite	n	2	3		8	13
		%	33.3			36.4	31
	Silcrete	n					
		%					
Total utilized	Total	n	6	3	11	22	42
		%	100	100	100	100	100
non - utilized manuports	Quartzite	n		17	34	36	87
Utilized							
Hammerstones	Quartzite	n			2	2	4
Upper grindstones	Quartzite	n		1			1
Chopper	Quartzite	n		1			1
Total utilized		n		2	2	2	6
Retouched							
MRP	Quartz	n				1	1
	Silcrete	n				1	1
Total retouched						2	2

**Table 1.4 Stone artefact assemblage from Paapkuil Fontein 5, Square D11.**



**Fig 1.8 Lower grindstone recovered from square D12 shell layer 2. Dotted lines indicate elongated linear grinding surface. Scale in 10mm intervals.**



**Fig. 1.9 Lower grindstone with a smooth flat grinding surface recovered from the surface of square C13. It has been broken on the left - hand. Scale in 10mm intervals**



### **1.4.5 Non – Lithic items**

#### ***1.4.6 Ostrich eggshell***

Four ostrich eggshell fragments were recovered from shell layer 1 square D11. None show any signs of working.

#### ***1.4.7 Shell artefacts***

A single *Nassarius kraussianus* bead was found in shell layer 2. *N. kraussianus* are common in Holocene assemblages along the south coast, including Scott's Cave (Deacon & Deacon 1963), Wilton Large Rock Shelter (Deacon, 1972), Melkhoutboom (Deacon, 1976), Boomplaas (Deacon *et al.* 1978), Die Kelders (Schweitzer 1979), Byneskranskop (Schweitzer & Wilson 1982), Nelson Bay Cave (Inskeep 1987), The Havens Cave (Binneman 1995), Klasies River Cave 5 (Binneman 1995) and Kabeljous Shelter (Binneman 1995). They have also been reported from the Middle Stone Age at Blombos Cave (d' Errico *et al.* 2005) from levels dating to 75 ka and 78 ka by optically stimulated luminescence.

At Boomplaas the majority of the 30 beads found come from the BLD units which yielded a date  $1955 \pm 65$  BP (UW – 336) (Deacon *et al.* 1978). At BNK 1 (Schweitzer & Wilson 1982) they are present in Layers 14 – 1 with a date of  $9760 \pm 85$  (Pta-587) for their first appearance which is roughly contemporaneous with the situation observed in The Havens Cave sequence (Binneman 1995). This is somewhat earlier than the mid – Holocene date obtained for their appearance in the Nelson Bay Cave sequence (Inskeep 1987). At DK 1 they are the largest component of the perforated shell ornaments, accounting for about 55, 2 % of the assemblage.

### **1.4.8 Faunal Remains**

#### ***1.4.9 Shellfish***

All of the shellfish remains recovered from square D11 at Paapkuil Fontein 5 were identified, counted and when possible, measured. Minimum numbers of individuals and percentage values for the different species are given in Table 1.5. A wide range of

species were exploited both from the intertidal and sub – tidal zones. Two species of shellfish, *Oxystele tigrina* and *Turbo sarmaticus*, comprise the bulk of the assemblage at 47.2 % and 16.3 % respectively: 63.5 % of the assemblage. Three species of *Oxystele* (*O. tigrina*, *O. sinensis* and *O. variegata*) occur at Paapkuil Fontein 5 and together make up 68.6 % of the minimum number of shellfish recovered from the square.

Species	Surface		Shell layer 1		Shell layer 2		Total	
	no	%	no	%	no	%	no	%
Scutellastra cochlear	–	–	7	0.3	8	0.2	15	0.2
Scutellastra longicosta	7	1.4	49	2.1	87	2.1	143	2.1
Scutellastra barbara	2	0.4	–	–	–	–	2	–
Scutellastra barbara/longicosta?	–	–	–	–	7	0.2	7	–
Scutellastra argenvillei	–	–	12	0.5	26	0.6	38	0.5
Scutellastra granularis	2	0.4	5	0.2	9	0.2	16	0.2
Cymbula oculus	6	1.2	126	5.4	246	5.6	378	5.3
Cymbula granatina	–	–	–	–	1	–	1	–
Cymbula compressa	–	–	–	–	2	–	2	–
Dinoplax gigas	7	1.4	47	2.0	82	2.0	136	1.9
Limpets spp.	6	1.2	38	1.6	58	1.4	102	1.4
Turbo sarmaticus	94	18.4	329	14.0	736	17.5	1159	16.3
Turbo cidaris cidaris	–	–	–	–	3	–	3	–
Oxystele tigrina	95	18.6	1137	48.4	2121	50.4	3353	47.2
Oxystele sinensis	148	29.0	245	10.4	360	8.6	753	10.6
Oxystele variegata	–	–	3	0.1	–	–	3	–
Oxystele spp.	101	19.8	307	13.1	356	8.5	764	10.8
Haliotis midae	2	0.4	7	0.3	20	0.5	29	0.4
Haliotis spadicea	1	0.2	–	–	–	–	1	–
Burnupena sp.	40	7.8	71	3.0	72	1.7	183	1.2
Donax serra	–	–	–	–	1	–	1	–
Crepidula porcellana	–	–	1	–	8	0.2	9	0.1
Nassarius kraussianus	–	–	–	–	1	–	1	–
Total	511	100.2	2377	101.1	4196	99.5	7084	98.0

**Table 1.5 MNIs and percentage values of shellfish excavated at Paapkuil Fontein 5 square D11.**

Paapkuil Fontein 5 is primarily an *Oxystele* midden, with *O. tigrina* collected in abundance. This species is generally smaller than *O. sinensis*, which was also collected. *O. tigrina* is found higher up on the shore in the mid – tidal region, whereas *O. sinensis* normally inhabits the lower intertidal, accessible only at spring low tides. This is true also of *T. sarmaticus* (Kilburn & Rippey 1982). *O. tigrina* are relatively small and would have contributed little to the overall diet. One possible explanation for the relatively large quantities of *O. tigrina* in the assemblage is that this species

may have been collected at times when some of the larger shellfish species were unobtainable, perhaps periods other than spring low tides or in rough conditions when the lower reaches of the intertidal may have been too difficult to access.

With the exception of *Haliotis midae*, *T. sarmaticus* was the largest shellfish collected and was the most important food species. While percentage values for the other species remain low, three species namely *S. longicosta*, *C. oculus* and the giant chiton *D. gigas* were also collected in some quantities. Interestingly, Paapkuil Fontein 5 was the only site where *D. gigas* (136 individuals or 1.9%) were found in significant quantities. *Haliotis midae* are also present at the site but contributed less than 1 % to the total assemblage. However, larger individuals provide good returns in terms of food (Avery 1976, Lombard & McLaughlin 1980, Binneman 1995, Proudfoot et al. 2006). Their relatively low visibility at Paapkuil Fontein 5 may therefore be quite misleading. Although none of the shells recovered were sufficiently complete to measure, individuals present may have contributed significantly to the diet.

Measurements for the different species of shellfish excavated at Paapkuil Fontein 5 are given in Table 1.6. Taking into account the standard deviations there appears to be no significant difference in the sizes of the different species throughout the deposit. This is not surprising as the two dates obtained for this site are virtually identical.

Species	Surface					Shell Layer 1					Shell Layer 2				
	n	mean	min	max	std.dev	n	mean	min	max	std.dev	n	mean	min	max	std.dev
<i>T. sarmaticus</i>	82	19.1	5.7	48.8	10.1	279	18.6	6.2	50.6	9.7	636	22.7	8.4	47.9	9.9
opercula															
<i>T. cidaris cidaris</i>											3	10.2	9	12.7	2.0
opercula															
<i>Scutellastra</i>						5	30.7	18.9	47.3	11.6	3	37.5	32.5	40.3	4.4
cochlear															
<i>Scutellastra</i>						18	59.0	36.3	71.4	7.9	29	58.8	48.2	72.8	6.9
longicosta															
<i>Scutellastra</i>						8	73.3	67.8	81.3	4.3	7	77.3	71.8	86.4	4.7
argenvillei															
<i>Scutellastra</i>	1	47.3				5	46.0	44.5	48.4	1.6	5	44	42.4	46.2	1.6
granularis															
<i>Cymbula oculus</i>	1	55.9				25	59.1	48.1	70.6	5.5	54	61.4	45.9	81.0	8.5

**Table 1.6 Mean sizes and standard deviations for the measured shellfish at Paapkuil Fontein 5, D11.**

#### **1.4.10 Bone**

Only 53 fragments of bone weighing 21.3 grams were recovered from square D11. The bone was very fragmented and most fragments were burned. They included the remains of tortoise, marine bird and micro-fauna.

### **1.5 Paapkuil Fontein 11**

This was a fairly small midden, situated about 100 meters from the fish traps. Unlike Paapkuil Fontein 4 and Paapkuil Fontein 5, this midden was not elevated near the top of a dune, but was situated in a low-lying flat area close to the bay, and was exposed on the surface prior to excavation (Fig. 1.10). The site was therefore subject to erosion, and some of the original contents of the site may have been lost. Six 1m x 1m squares were excavated. These were numbered J9, J10, J11, K9, K10 and K11. The excavation extended right to the edges of the remaining midden, so that the entire site was excavated.



**Fig 1.10 Exposed midden deposit of Paapkuil Fontein 11 before excavation. Scale bar measures 20 cm.**

### ***1.5.1 Stratigraphy and Dating***

Paapkuil Fontein 11 was dug stratigraphically down to a maximum depth of 20 cm. Three stratigraphic layers were identified, a surface layer, shell layer and a sand layer. The surface layer consisted of exposed loose material on the surface of the site. This was removed with brushes until more dense shell was encountered, in squares K9 and K10, in a layer approximately 5 cm deep. This was removed separately as the shell layer. Underneath the shell layer, shell was much more loosely scattered in the sand layer, which continued down to a depth of 20 cm. This was the base of the deposit. In squares other than K9 and K10, only the surface layer was present, with sterile dune sand underneath.

Marine shell from the sand layer in square K9 yielded a radiocarbon date of  $1319 \pm 60$  B.P. (GX – 32532). Using the Pretoria calibration programme, the most likely calibrated date is 1073 AD, with a two-sigma range from 991-1232 AD.

### ***1.5.2 Results***

A total area of 6 m<sup>2</sup> was excavated constituting 0.53 cubic metres of deposit. In total 51.3 kg of archaeological material was retrieved after sieving. Marine shell comprises the bulk of this at 45.6 kg, stone 5.6 kg, ostrich eggshell 1.3g, bone 14.4g, ochre 0.53g and pottery 12.8g. All of the material recovered has been analysed and is reported below.

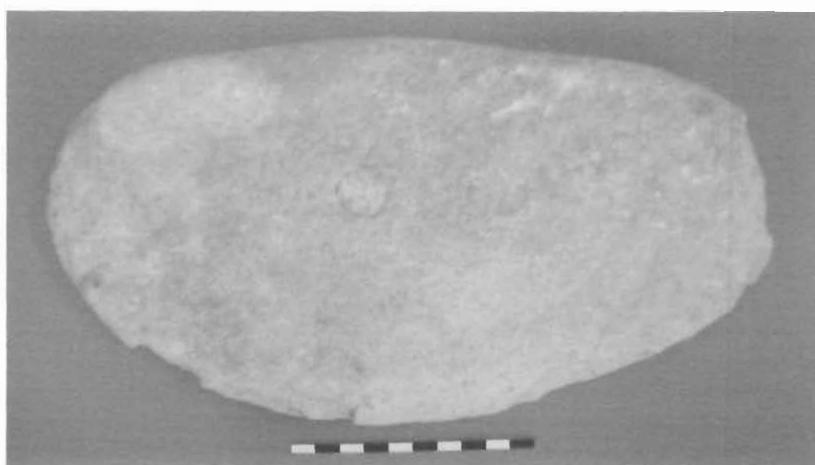
### **1.5.3 Cultural Remains**

#### ***1.5.4 Lithics***

The numbers and percentages of the stone recovered from Paapkuil Fontein 11 are given in Table 1.7. A total of 290 pieces of stone were recovered during excavation. Quartzite was the dominant raw material accounting for 72.8 % of the site total. Quartz accounts for 25.2 % and silcrete the remaining 2 %. Silcrete was extremely

rare in this site, as at other excavated sites at Paapkuil Fontein. Three silcrete flakes were recovered, with only one piece being utilized. Eighty-two percent of the stone recovered falls within the waste class. Within this class 85.8 % of the artefacts recovered are chips and chunks; 73.6 % of which are chunks.

Two miscellaneous retouched pieces were found. Both were made from quartz, and come from square K9 sand layer and the surface of J9. Utilized artefacts, too, were rare at this site. Three utilised flakes were recovered during excavation. These come from the surface of J10, the sand layer in K9 and the shell layer in K10. A flat stone, perhaps imported with the intention of using it as a lower grindstone, was recovered from the surface of J9 (Fig. 1.11).



**Fig. 1.11 Flat stone recovered from the surface of square J9. May have been brought onto the site with the intention of using it as a lower grindstone. Scale in 10mm intervals.**

Paapkuil Fontein 11						
Class	Raw material		Surface	Shell layer	Sand layer	Total
Chips	Quartz	n	8	3	7	18
		%	8.1	5.6	8.1	7.5
	Quartzite	n	1	4	6	11
		%	1.0	7.4	7.0	4.6
	Silcrete	n				
		%				
Chunks	Quartz	n	17	8	18	43
		%	17.2	14.8	20.9	18.0
	Quartzite	n	55	30	48	133
		%	55.6	55.6	55.8	55.6
	Silcrete	n				
		%				
Cores	Quartz	n	3			3
		%	3.0			1.3
	Quartzite	n		1		1
		%		1.9		0.4
	Silcrete	n				
		%				
Flakes	Quartz	n	2	3	1	6
		%	2.0	5.6	1.2	2.5
	Quartzite	n	11	4	5	20
		%	11.1	7.4	5.8	8.4
	Silcrete	n	2	1	1	4
		%	2.0	1.9	1.2	1.7
Total waste	Quartz	n	30	14	26	70
		%	30.0	25.9	30.2	29.3
	Quartzite	n	67	39	59	165
		%	67.7	72.2	68.6	69.0
	Silcrete	n	2	1	1	4
		%	2.0	1.9	1.2	1.7
	Total	n	99	54	86	239
		%	100	100	100	100
Non - utilized manuports	Quartzite	n	36	1	9	46
Utilized						
Flakes	Quartz	n	1			1
	Quartzite	n			1	1
	Silcrete	n		1		1
Total utilized		n	1	1	1	3
Retouched						
MRP	Quartz	n	1		1	2
Total retouched		n	1		1	2

**Table 1.7 Stone artefact assemblage from Paapkuil Fontein 11.**

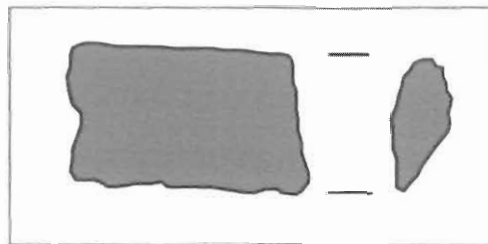
### **1.5.5 Non – Lithic items**

#### ***1.5.6 Ostrich eggshell***

A single piece of unworked ostrich eggshell was recovered from Paapkuil Fontein 11, from the surface of K9.

### 1.5.7 Pottery

Five small pot sherds were found at Paapkuil Fontein 11. One rim sherd was recovered from square K9 sand layer. It is a thickened rim with a thickness of 9.2 mm (Fig 1.12). This is comparatively thick, compared with sherds recovered from other sites along the southern Cape (Schweitzer 1979, Schweitzer & Wilson 1982, Henshilwood 1995). Unfortunately, the sherd is too small to allow reliable estimation of the diameter of the mouth of the vessel. The very slight curvature, in combination with the thickness, probably means that it came from a large pot. The remaining four sherds were undecorated body sherds. Two of these could be measured. The sherd from K9 sand layer has a thickness of 6.6 mm and the sherd from the surface of J9 has a thickness of 6.6 mm.



**Fig. 1.12 Rim sherd from square K9 showing exterior and section views. Scale: actual size.**

### 1.5.8 Faunal Remains

#### 1.5.9 Shellfish

All of the shellfish remains recovered from Paapkuil Fontein 11 were identified, counted and, when possible, measured. Minimum number of individuals and percentage values for the different species are given in Table 1.8. The range of species present in this site is similar to those found in the other Paapkuil Fontein sites. Sixteen species of shellfish were collected, of which two (*T. sarmaticus* and *O. tigrina*) comprise the bulk of the assemblage at 31.7 % and 32.7 % respectively, making up 64.4 % of the site total. While *O. tigrina* is relatively small, it is clear that some



preference was given to it, probably reflecting the ease with which it could be collected. However it is clear that subsistence was primarily geared towards the exploitation of *T. sarmaticus*, the most important species in terms of meat weight. The frequencies of the other excavated species are low and it is likely that they did not play an important part in the overall diet.

Table 1.9 shows the mean sizes of the different shellfish species at Paapkuil Fontein 11. Shells other than the opercula of *T. sarmaticus* were more fragmented in the shell layer and sand layer. This accounts for the very small numbers of measurements in these layers. The only species for which there are meaningful samples from more than one layer are *T. sarmaticus* and *T. cidaris cidaris*. There was no variation in the size of either species from one layer to another. It is likely that all three layers contain material deriving from a single occupation, but somewhat bioturbated, so that variation in the sizes of the shellfish would not be expected.

Paapkuil Fontein 11								
Species	Surface		Shell Layer		Sand Layer		Total	
	no	%	no	%	no	%	no	%
Scutellastra cochlear	2	0.2	2	0.7	1	0.1	5	0.2
Scutellastra longicosta	2	0.2	1	0.4	3	0.4	6	0.3
Scutellastra argenvillei	7	0.6	—	—	7	0.9	14	0.6
Scutellastra granularis	3	0.3	3	1.1	2	0.3	8	0.3
Cymbula oculus	26	2.2	2	0.7	7	0.9	35	1.5
Cymbula granatina	—	—	—	—	2	0.3	2	—
Dinoplax gigas	12	1.0	2	0.7	5	0.6	19	0.8
Limpets spp.	21	1.8	6	2.2	14	1.7	41	1.8
Turbo sarmaticus	419	35.6	95	34.2	213	26.3	727	31.7
Turbo cidaris cidaris	20	1.7	1	0.4	16	2.0	37	1.6
Oxystele tigrina	347	29.5	74	26.6	302	37.2	750	32.7
Oxystele sinensis	70	6.0	18	6.5	70	8.6	158	6.9
Oxystele variegata	6	0.5	1	0.4	1	0.1	8	0.3
Oxystele spp.	101	8.6	38	13.7	72	8.9	211	9.2
Haliotis midae	6	0.5	3	1.1	6	0.7	15	0.7
Burnupena spp.	107	9.1	27	9.7	76	9.4	210	9.2
Crepidula porcellana	9	0.8	1	0.4	9	1.1	19	0.8
Fissurella aperta	17	1.4	4	1.4	4	0.5	25	1.1
Total	1175	100	278	100.2	810	100	2290	99.7

**Table 1.8 MNIs and percentage values for the shellfish assemblage at Paapkuil Fontein 11.**

Paapkuil Fontein 11															
Species	Surface					Shell Layer					Sand Layer				
	n	mean	minimum	maximum	std.dev	n	mean	minimum	maximum	std.dev	n	mean	minimum	maximum	std.dev
Turbo sarmaticus opercula	180	19.2	6.5	52.0	10.7	67	20.6	7.8	45.9	9.7	150	20.1	1.3	48.2	9.2
Turbo cidaris cidaris opercula	17	10.8	7.4	17.0	2.6	1	10.3				11	11.6	7.4	15.0	2.5
Scutellastra cochlear	2	31.2	30.8	31.7	0.6										
Scutellastra longicosta	1	57.2													
Scutellastra argenvillei	3	77.3	67.4	84.6	9.1	1	87.7				1	81.3			
Scutellastra granularis	1	38.4													
Cymbula oculus	5	59.0	50.2	68.7	7.0										

**Table 1.9 Mean sizes and standard deviations of the measured shellfish at Paapkuil Fontein 11.**

### **1.5.10 Bone**

Only 36 fragments of bone were recovered from this site. They weighed 12.8 grams. Like the rest of the Paapkuil Fontein sites, bone recovered from this site was very fragmented, making identification difficult. The range of species includes marine bird, tortoise and microfauna.

## **1.6 Paapkuil Fontein 7**

The criteria for selecting Paapkuil Fontein 7 for excavation were somewhat different from the other sites. All three previously excavated sites at Paapkuil Fontein contained large amounts of shellfish, relatively little cultural material, and almost no bone, including fish bone. Two of the sites (Paapkuil Fontein 4 and 5) were located near the tops of dunes, eroding out of their sides, and the third (Paapkuil Fontein 11) was a surface site in a low-lying flat area close to the bay.

We set out to find a site which was less exposed and therefore less subject to erosion. In August 2005, Paapkuil Fontein 7 (about 100 metres east of Paapkuil Fontein 11) was barely visible on the surface, although Hart (2004) reported a thin scatter of shell in this area, with many quartzite manuports. We noted only a few isolated shells which alerted us to the possibility that there might be a midden buried below the ground surface. A test hole was dug to see whether there was any *in situ* sub-surface deposit worth excavating. A dense shell midden was encountered immediately beneath the surface.

Secateurs were used to clear low standing bushes. The sandy overburden was removed with the aid of spades but was not screened as this was wind – deposited dune sand. Four 1m x 1m squares were excavated stratigraphically until sterile dune sand was encountered. These were numbered A4, A5, Z4 and Z5.

### 1.6.1 Stratigraphy and Dating

Three stratigraphic layers were identified, surface, shell layer 1 and shell layer 2. The surface was mainly bioturbated material from the *in situ* shell layer brought up by root action and surface cleaning to expose the main shell rich bearing layers. Shell layer 1 was approximately 12 cm thick. It consisted of a tightly compacted dump of shell refuse with relatively clearly defined margins. Shell layer 2 was present only in square A5, where animal burrowing could be observed. It is possible that this was in fact bioturbated material derived from the overlying shell layer 1. For the purpose of this analysis, however, they have been kept separate. The four squares excavated extended over the bulk of this midden. Only small amounts of deposit are likely to remain in adjacent squares.



**Fig. 1.13 Squares A4 (foreground) and A5 after the surface and shell layer 1 had been removed.**

Marine shell from square A5 Shell layer 1 yielded a date of  $1450 \pm 60$  B.P. (GX – 32530) (982 AD), similar in age to the date obtained for Paapkuil Fontein 11. Using the Pretoria calibration programme, the most likely calibrated age is 982 AD, with a two sigma range from 835-1063 AD.

### **1.6.2 Results**

A total of 4 m<sup>2</sup> was excavated constituting 0.8 cubic metres of deposit, excluding the overburden. In total 72.1 kg of archaeological material was retrieved after sieving. Marine shell comprises the bulk of this at 71.2 kg, stone 905.2g, ostrich eggshell 3.5g and bone 7.9g.

### **1.6.3 Cultural Remains**

#### **1.6.4 Lithics**

Only 16 pieces of stone were recovered from Paapkuil Fontein 7 (Table 1.10) of which 13 are manuports and three hammerstones. Quartzite was the only raw material type present. It is likely that this site was used as a shellfish processing location and the hammerstones were probably used for the processing of shellfish.

<b>Paapkuil Fontein 7</b>						
Class	Raw material		Surface	Shell layer 1	Shell layer 2	Total
Non - utilized manuports	Quartzite	N	5	7	1	13
Utilized Hammerstones	Quartzite	N		2	1	3

**Table 1.10 Stone artefact assemblage from Paapkuil Fontein 7.**

### **1.6.5 Non – Lithic items**

#### **1.6.6 Ostrich eggshell**

Two ostrich eggshell fragments were present in the site. These come from the surface of square Z4 and shell layer 1 of square Z5.

## 1.6.7 Faunal Remains

### 1.6.8 Shellfish

All the shellfish remains recovered from Paapkuil Fontein 7 were identified, counted and, when possible, measured. Minimum numbers of individuals and percentage values for the different species are given in Table 1.11. *T. sarmaticus* was the main species targeted, contributing 43.5 % of the total assemblage. *O. tigrina* was the second common most species, contributing 22.8 % of the assemblage. Minimum numbers of individuals for the different limpet species were relatively small; *C. oculus* was the most common and contributed only 3.2 % of the total MNI.

Interestingly, 49 *Haliotis midae* were present at the site, a species that is rare at the other three excavated sites. Although it contributed only about 1.6 % of the number of shellfish present, it is one of the most economical species to exploit in terms of flesh mass and food return.

Table 1.12 shows the mean shell lengths for the different shellfish species present at Paapkuil Fontein 7. Once again, only the two species of Turbo are present in all three layers in sufficiently large numbers to allow meaningful comparison. The sizes are very similar in each layer.

Paapkuil Fontein 7								
Species	Surface		Shell Layer 1		Shell Layer 2		Total	
	no	%	no	%	no	%	no	%
Scutellastra cochlear	1	0.1	5	0.3	—	—	6	0.2
Scutellastra longicosta	11	1.1	10	0.6	1	0.3	22	0.7
Scutellastra barbara	5	0.5	4	0.2	—	—	9	0.3
Scutellastra argenvillei	6	0.6	10	0.6	4	1.3	20	0.7
Scutellastra granularis	—	—	1	—	—	—	1	—
Cymbula oculus	39	3.9	44	2.5	14	4.5	97	3.2
Cymbula miniata	—	—	2	0.1	—	—	2	—
Cymbula granatina	1	0.1	—	—	1	0.3	2	—
Dinoplax gigas	5	0.5	6	0.3	1	0.3	12	0.4
Limpet spp.	12	1.2	37	2.1	12	3.9	61	2.0
Turbo sarmaticus	404	40.8	804	45.4	125	40.6	1333	43.5
Turbo cidaris cidaris	13	1.3	16	0.9	2	0.6	31	1.0
Oxystele tigrina	274	27.7	357	20.2	68	22.1	699	22.8
Oxystele sinensis	101	10.2	151	8.5	25	8.1	277	9.0
Oxystele variegata	1	0.1	1	—	—	—	2	—
Oxystele spp.	47	4.8	129	7.3	29	9.4	205	6.7
Haliotis midae	6	0.6	40	2.3	3	1.0	49	1.6
Burnupena spp.	59	6.0	139	7.9	18	5.8	216	7.0
Crepidula porcellana	4	0.4	14	0.8	5	1.6	23	0.7
Total	989	99.9	1770	100	308	99.8	3067	99.8

**Table 1.11 MNIs and percentage values for the shellfish assemblage from Paapkuil Fontein 7.**

Paapkuil Fontein 7															
Species	Surface					Shell layer 1					Shell layer 2				
	n	mean	minimum	maximum	std.dev	n	mean	minimum	maximum	std.dev	n	mean	minimum	maximum	std.dev
Turbo sarmaticus opercula	291	19.4	1.8	49.3	8.2	312	20.5	7.6	49.4	8.9	58	18.4	9.8	46.3	8.9
Turbo cidaris cidaris opercula	11	12	9.8	15.2	1.7	16	11.8	9.1	16.1	1.9	2	11.9	11.8	12.0	0.1
Scutellastra cochlear	1	26.9				1	25.8								
Scutellastra longicosta	1	54.7				2	56.9	51.6	62.9	8.0					
Scutellastra barbara	2	69.9	68.7	71.2	1.7										
Scutellastra argenvillei	1	76.3				7	76.3	69.8	82.9	5.0	2	82.7	75.1	91.2	11.4
Cymbula oculus	4	55.6	51.1	65.9	6.6	4	61.2	54.2	69.8	7.2	3	61.7	55.1	65.5	5.8

**Table 1.12 Mean sizes and standard deviations for the measured shellfish at Paapkuil Fontein 7.**

### 1.6.9 Bone

Paapkuil Fontein 7 yielded very little bone, 22 fragments in total, weighing 7.9 grams. Bone recovered from this site is not very significant. Most remains are of microfauna with fragments of marine bird and tortoise also present.

## 1.7 Discussion

### 1.7.1 Introduction

Radiocarbon dates obtained for the four sites excavated at Paapkuil Fontein indicate a sequence of occupation spanning the last 5 000 years before present. Table 1.13 gives a summary of the radiocarbon dates and important characteristics of each site.

Site	Dates	Lithics	Shellfish % MNI
P4	4870 $\pm$ 80 BP 3261 BC	Quartzite only n = 35	T. sarmaticus 34 % S. longicosta 22.9 % Oxysteles (all spp) 15.6 % C. oculus 8.7 %
P5	2250 $\pm$ 60 BP 110 AD 2320 $\pm$ 70 BP 36 AD	Quartzite dominated n = 145	Oxysteles (all spp) 68.6 % O. tigrina 47.2 % T. sarmaticus 16.3 % C. oculus 5.3 % D. gigas 1.9 %
P11	1319 $\pm$ 60 BP 1073 AD	Quartzite dominated n = 290	Oxysteles (all spp) 49.1 % O. tigrina 32.7 % T. sarmaticus 31.7 % C. oculus 1.5 %
P7	1450 $\pm$ 60 BP 982 AD	Quartzite only n = 16	T. sarmaticus 43.5 % Oxysteles (all spp) 38.6 % O. tigrina 22.8 % C. oculus 3.2 %

**Table 1.13 Summary table showing the main characteristics for each site excavated.**

### 1.7.2 Cultural remains



### 1.7.3 Lithics

Stone artefacts and manuports comprise the majority of the cultural remains recovered from the Paapkuil Fontein sites. Retouched artefacts were present only in Paapkuil Fontein 5 and 11, where they were rare. They account for less than one percent of the artefacts recovered from all four sites. Miscellaneous retouched pieces are the only type present in this class, with three out of the four found made from quartz and one from silcrete.

Quartzite is the dominant raw material in all sites, accounting for 72.5 % of all stone artefacts recovered. It is the only raw material present in Paapkuil Fontein 4 and 7, the number and range of artefacts recovered from these two sites being extremely limited. Quartz is the second common most raw material, accounting for about 24.6 % of all stone recovered. Small quantities of silcrete make up the rest of the assemblage.

Stone artefacts are generally more abundant in Paapkuil Fontein 11 and 5 although formal tools remain rare. Utilized artefacts are present at all four excavated sites but in small numbers. Hammerstones are the most visible artefact in this class and are present in all the sites. They are also the only artefact type present at Paapkuil Fontein 7. The lack of other stone artefacts from the site suggests knapping activities were rare. It is therefore likely that the hammerstones may have been used for processing shellfish, although shellfish and in particular *T. sarmaticus* were no more fragmented at the other excavated sites. The hammerstones recovered from Paapkuil Fontein 7 are rounded quartzite pebbles with bruising on one side, consistent with having being used as hammers.

Grindstones (upper and lower) are present only at Paapkuil Fontein 5, with possible lower grindstones recovered from Paapkuil Fontein 4 and 11, although these were regarded as manuports. The lower grindstones recovered from Paapkuil Fontein 5 have already been discussed in detail and do not warrant any further discussion.

In a general observation, the stone assemblages of Paapkuil Fontein 5 and 11 are similar. The relatively larger proportion of quartz, especially in the chip class, indicates activities other than the processing of shellfish. Generally, though, the

number of stone artefacts was small in both sites and the range of activities conducted may have been limited.

Although the dates obtained for the excavated sites indicate occupation of the area spanning the last 5 000 years before present, no real temporal patterns could be observed within the stone artefact assemblage. Stone was present in small quantities at all the sites; formal artefacts were extremely rare or absent. This pattern suggests that the primary activity at Paapkuil Fontein was the collection and processing of shellfish with limited stone knapping activity at Paapkuil Fontein 5 and 11.

One of the striking features of the lithic assemblage at Paapkuil Fontein is the almost complete absence of retouched artefacts. Although the number of stones recovered from the Paapkuil Fontein sites was low in comparison to other coastal sites in the southern Cape, the assemblage is similar to late Holocene coastal assemblages in the south and south-western Cape. Numbers of diagnostic artefacts are generally low, for example at Bonteberg Shelter (Maggs & Speed 1967), Die Kelders (Schweitzer 1979), Byneskranskop (Schweitzer & Wilson 1982), Smitwinkelbaai (Poggenpoel & Robertshaw 1981), Nelson Bay Cave (Inskeep 1987). Similar observations were also made at Klasies River Cave 1 and 5 (Singer and Wymer 1969) and the re-excavation of caves 5A and 5B and 1 (Binneman 1996), Storms River Mouth middens (H.J. Deacon 1979), the Garcia State Forest sites (Henshilwood 1996), Cape St. Francis middens and the late Holocene deposits at the Havens Cave and the Kabeljous River Shelter (Binneman 1996). Along the west coast, in the Elands Bay area, some late Holocene assemblages include more formal artefacts (Orton 2006).

The reason for the relatively low numbers of formal artefacts in late southern Cape coastal assemblages is not entirely clear. Goodwin (1952:137) and Clark (1959:2007) postulated that the exploitation of marine resources did not require the use of elaborate technology. Klein (1973) suggested this pattern could be interpreted as the result of sampling error or that formal tools were not required. H.J. Deacon (1976) suggested that the absence of formal tools and in particular small convex scrapers at coastal sites may have been the result of the replacement of plant food gathering with shellfish collecting.

Although there is greater variation in stone artefact assemblages during the last 2000 years before present than during the mid – Holocene (J. Deacon 1984), this may be explained, in part, as a result of differing nature of activities or intensity with which those activities were carried out. In certain cases formal artefacts may be entirely absent, for example at Scott's Cave (Deacon & Deacon 1963), the Pearly Beach shell middens (Avery 1976), Smitwinkel Bay Cave (Poggenpoel & Robertshaw 1981) or present in very low numbers, as at Gordon's Bay midden (van Noten 1966). It is interesting to note that the absence of formal stone artefacts may relate to an increase in the abundance of bone implements and shell artefacts at coastal sites. However, this is not always the case as only two bone implements and no shell artefacts were found at Bonteberg shelter, while a range of bone and shell implements were found at Witsands (Goodwin & Van Riet Low 1929:261) and Smitwinkel Bay; bone and shell implements were present at Nelson Bay Cave (Inskeep 1987) and Matjies River Rock Shelter (Ludwig 2005) as well. While no bone implements were found at the Paapkuil Fontein sites, bone artefacts are generally more numerous at coastal sites.

The virtual absence of formal stone artefacts from the lower spits at Paapkuil Fontein 4 is interesting. These units yielded a date of  $4870 \pm 80$  B.P. which, when corrected for the apparent age of seawater, is approximately 4370 B.P. Small convex scrapers are normally the dominant formal tool type during the Wilton. These type of scrapers accounted for 52% and 72.4% of the formal tools at BNK 1 (Schweitzer & Wilson 1982) and Wilton large rock shelter (J. Deacon 1972). At The Havens Cave (Binneman 1996:52), scrapers are the most important formal tool type accounting for 91.6% of the formal class. There is a slight variation in this pattern in that backed scrapers are the most important form during the Wilton at Garcia State Forest, making up 31% of the formal class. Scrapers here account for only 16.5 % of the formal assemblage. At BNK 1 they account for 12.2 % of the retouched artefact category and are numerous only in layers post-dating 4 000 years before present. Interestingly, there is a decrease in the frequency of scrapers and an increase in adzes at BNK 1 and by layer 3 adzes accounted for 56% and scrapers 34% of the retouched artefact category. No date was obtained for layer 3 but the underlying layer 5 was dated to  $3900 \pm 60$  (Pta – 1571) and the overlying layer 2 yielded a date of  $3400 \pm 55$  (Pta – 1569).

Ochre was present in very small amounts at Paapkuil Fontein 4, 5 and 11. All of the pieces were very small and none showed any signs of modification. However, possible traces of ochre were present on the grinding surface of a lower grindstone found at Paapkuil Fontein 5 square C13 (see fig. 1.9 pp. 15).

## **1.7.4 Faunal remains**

### ***1.7.5 Shellfish***

An examination of the shellfish assemblage at Paapkuil Fontein indicates that *T. sarmaticus* was the most important species exploited at all sites. Although eighteen different species of shellfish are present, not all occur at each of the sites. The proportions of shellfish other than *T. sarmaticus* vary between sites and the numbers of certain species are so low that they played a minimal dietary role in the overall assemblage. With the exception of Paapkuil Fontein 5 where *Oxysteles* spp. and in particular *O. tigrina* becomes the most numerous species, *T. sarmaticus* undoubtedly contributed the bulk of the food component in terms of flesh.

One of the striking features about the shellfish assemblage is the relatively low numbers of *Haliotis midae* at Paapkuil Fontein 4 (0.3%), 5 (0.4%) and 11 (0.7%). *H. midae* was more numerous at Paapkuil Fontein 7 with 49 individuals recovered, contributing 1.6% to the total assemblage. This is a large species and one of the most rewarding shellfish to exploit in terms of edible flesh. The relatively low numbers of this species at sites 4, 5 and 11 is surprising, especially in light of the predominance of *T. sarmaticus* at these sites which inhabit the same littoral zone as *H. midae*. It is possible that *H. midae* may not have been favoured or that larger individuals may have been inaccessible during the time of occupation.

One of the objectives of the shellfish analysis was to compare the Paapkuil Fontein sites to other south coast sites. This was somewhat hindered by the fact that few detailed studies exist on open air sites along the south coast. However a few notable examples do exist, including the work done by Avery (1975) at Pearly Beach and Hawston, Binneman (1995) at Cape St. Francis and Henshilwood (1995) at Garcia

State Forest, Blombos. One of the difficulties in making detailed comparisons with these studies is the different research objectives of each. Avery (1976), for example, distinguished middens on the basis of meat mass contributed by different shellfish species. Binneman (1995), on the other hand, distinguished sites according to a model of Economic Return Rates (ERR). In other words, shellfish were grouped on the basis of the ratio of meat weight to shell weight. At Garcia State Forest, near Blombos, the objective was to investigate temporal patterns in the exploitation of the littoral zone (Henshilwood 1995). The idea was to see whether specific areas of the littoral zone were being targeted at different times and whether these differences could be explained in terms of environmental, social and/or cultural factors.

While there exists a large body of evidence for the exploitation of molluscs in coastal cave sites, the data may not be directly comparable to open air locations. Meehan (1982), for example, made the distinction between processing and dinnertime sites. She observed that at processing sites some shellfish are processed and eaten near to their procurement localities. Some species may therefore be taken purely as a snack whilst other species may find their way back to more formal dinnertime or camp sites. Furthermore, possible differences in the nature of the littoral zone immediately adjacent to coastal cave sites may affect the shellfish assemblage. This situation makes comparisons of the shellfish component between different coastal settings difficult. Keeping these considerations in mind, only broad comparisons could be made between the Paapkuil Fontein sites and other localities, focussing on temporal patterning in shellfish assemblages along the south and south eastern Cape coast.

The earliest assemblage analysed here, from Paapkuil Fontein 4, is characterised by relatively high proportions of *Turbo sarmaticus* (34%), the limpets *Scutellastra longicosta* (22.9%) and *Cymbula oculus* (8.7%). An interesting feature of this site is the relatively low proportions of *Oxysteles* spp present, contributing 16.3 % (all species) to the assemblage. The proportions of the different species of shellfish remain relatively constant throughout the deposit. While it is apparent that a quite a range of species was taken by the occupants of this site, intensive harvesting was focussed mainly on *T. sarmaticus* and the above mentioned limpet species. The overall pattern for this site suggests that shellfish targeted were the most economical in terms of return of food.

The shellfish assemblages of Paapkuil Fontein 5, 7 and 11 are very similar. *Oxysteles* spp. are the most numerous shellfish, in particular *O. tigrina*. *T. sarmaticus* are the second most common shellfish and was the major food contributor (see Table 3.13). While the shellfish assemblages at all three sites are relatively uniform, differences do occur. Notably, at Paapkuil Fontein 5, the giant chiton *D. gigas* is much more numerous than at the other Paapkuil Fontein sites, while at Paapkuil Fontein 7 and 11 *Burnupena* spp seem to have been of greater importance.

It is noteworthy that mussels of all types are extremely rare in the Paapkuil Fontein shellfish assemblages. A single *Perna perna* was identified at Paapkuil Fontein 4, and one *Donax serra* at Paapkuil Fontein 5. This is in marked contrast to many other South Coast sites, where *P. perna* were a favoured food item.

It is clear from the shellfish assemblage that there is a pattern of increased abundance of smaller shellfish species such as *Oxysteles*, particularly *O. tigrina*, in the more recent sites. This increase in *Oxysteles* spp corresponds to a decline in the number of limpets. It is unclear at the present moment whether the scarcity of limpets in the later sites was the result of environmental factors causing the depletion of the limpet beds. Alternatively, past human predation factors may have played a role, or there may have been a conscious effort on the part of the collectors to target species other than limpets. The abundance of *Oxysteles* spp and in particular *O. tigrina* may therefore be the result of reduced availability of other shellfish species. However, although there is an increase in the number of smaller shellfish, including *Burnupena* spp collected, the bulk of the dietary needs were fulfilled by *T. sarmaticus*.

At the Garcia State Forest sites described by Henshilwood (1995), *T.sarmaticus* was the most common shellfish species in all the sites, although the species features less strongly in the post-2 000 B.P. sites, when it was supplanted by *Oxysteles* spp. An interesting distinction between the post-2 000 and pre-2 000 sites is the differing strategies employed in exploiting the littoral zone. Subsistence strategies after 2 000 B.P. focussed more intensively on shellfish in the shallower inter-tidal, as at Paapkuil Fontein. In the pre-2 000 sites the clear focus was on shellfish from the lower reaches of the littoral zone, such as *Turbo* spp., *S. argenvillei*, *S. tabularis* and *Haliotis* spp.

Along the Cape St. Francis coast, Binneman (1995) identified several categories of middens based on their contents. These include Hunter-Gatherer, Hunter-Collector-Fisher, Pastoralist and Ceramic type middens. Ceramic middens were distinguished from pastoralist sites on the basis of the absence of domestic fauna in their assemblages. Although there exists some degree of overlap between these categories, the main aim of Binneman's investigation was to examine different shellfish collection strategies. Binneman found that HG, HCF and pastoralist middens displayed similar collection strategies. In general they focussed on species with the highest meat mass available, often collecting from the lower balanoid zone where larger species occur. Binneman suggested that collection took place mainly during new moon and full moon phases. Ceramic middens, on the other hand, reflected a different collection strategy. Groups that occupied these sites collected mainly small, easy to collect species with a low meat mass from the upper balanoid zone.

While it is tempting to interpret increased collection of small shellfish species as "intensification", or perhaps suggest that it is a pattern uniquely observable in post – 2 000 B.P. assemblages, more evidence is needed to see whether this is a real pattern or the result of random variation. In some instances, increased emphasis on the collection of smaller species such as *Oxystele spp* occurs in assemblages dated to the mid to late mid-Holocene such as at Klasies River Mouth Cave 5A (Binneman 1995). This may reflect broadening of collection strategy by collecting more regularly, irrespective of tidal cycle. Another explanation could be that increased collection of small, low yield species could have been the result of the lack of availability of larger species. It is clear that better dated sequences are needed to tease apart these temporal variations in resource exploitation.

*T. sarmaticus* opercula at Paapkuil Fontein are smaller than those from the Garcia State Forest sites, where the means of most samples clustered between 25-30 mm (Henshilwood 1995: Figure 6.7: 126). At GSF, there was a decrease in mean length through time. The largest opercula were found in the sites which predate ca. 5 000 years before present. The smallest occurred in GSF 7/2 and 7/1 which date to around ca. 2 700 years before present and were similar in size to GSF 9 which yielded a date of ca. 480 years before present. Henshilwood ascribed this decrease to three possible



factors, namely human predation, tidal condition at the time of collection, perhaps related to the length of time a site was occupied, or environmental change. He did not see correlations between operculum size and site location or site type.

Using the equation  $op\ \varnothing\ (mm) = 0.504\ \text{shell breadth (mm)} + 1.791$  (McLaughlin & Lombard 1981) shell breadth was calculated from the mean operculum length for each site at Paapkuil Fontein. This data is given in Table 1.14. The results indicate that the mean sizes of *T. sarmaticus* collected fall within the sub-adult class, i.e. individuals with shell breadth <50 mm. The current minimum legal size limit is 63.5 mm.

Juvenile and sub-adult *T. sarmaticus* inhabit a wider range of the infralittoral, whilst larger individuals are found only in the deeper sub-tidal zone. It is possible that larger individuals may not always have been accessible. It should be noted, however, that some of the largest individuals found at Paapkuil Fontein sites are well above the legal size limit and are significantly larger than individuals found in areas where the species are currently being over-exploited (Proudfoot *et al.* 2006).

Paapkuil Fontein 4		
unit	mean operculum length (mm)	shell breadth (mm)
Spit 1	23.1	49.4
Spit 2	22.7	41.5
Spit 3	21.8	39.7
Spit 4	25.6	47.2
Spit 5	21.8	39.7
Paapkuil Fontein 5		
Unit	mean operculum length (mm)	Shell breadth (mm)
Surface	19.1	34.3
Shell layer 1	18.6	33.4
Shell layer 2	22.7	41.5
Paapkuil Fontein 7		
Unit	mean operculum length (mm)	Shell breadth (mm)
Surface	19.4	34.9
Shell layer 1	20.5	37.1
Shell layer 2	18.4	33.0
Paapkuil Fontein 11		
unit	mean operculum length (mm)	Shell breadth (mm)
Surface	19.2	34.5
Shell layer	20.6	37.3
Sand layer	20.1	36.3

**Table 1.14** *Turbo sarmaticus* shell breadth calculated from mean operculum length for each excavated site.