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ARCHAEOLOGICAL RESEARCH ALONG THE SOUTH-EASTERN CAPE COAST PART I: OPEN-AIR SHELL MIDDENS

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ABSTRACT

This paper reports the findings of the research conducted on Holocene Later Stone Age open-air shell middens along the Cape St Francis coast. To study the shell middens systematically, the research area was divided into eight zones and the coast into five ecological habitats. Two distinct shellfish collecting strategies were noted among the different groups that utilised this resource. Hunter-gatherers and pastoralists collected mainly the larger shellfish species which are only available during certain tidal periods. 'Ceramic' groups on the other hand seemed to be more dependent on shellfish and collected large quantities of small species irrespective of the tidal periods. The distance shellfish that had to be carried between the coast and campsites also played an important role in the species collected.

INTRODUCTION

The background to the research project along the Cape St Francis coast has been published and should be consulted for the descriptions, definitions and terminology used in this paper (see Binneman 2001).

Sampling was conducted at eight locations along the Cape St Francis coast and adjacent dune system, and at one location at the mouth of the Kabeljous River (Figs 1a, b & c). These locations were chosen due to their richness and variety in archaeological features and their specific ecological habitats.

In general, single open-air shell middens carry little information. This is especially true of food waste other than shellfish and of cultural material. Because small volumes of material were taken from the majority of the shell middens, they yielded very little apart from shellfish remains. Thus other food waste and cultural material will not be discussed in detail but only tabulated. Only the important aspects of the research for each zone will be discussed.

The investigation into the different shellfish collecting patterns followed by the different groups is based on the 'economic return ratio' (ERR) for each species. The approach and descriptions regarding the different groups and types of shell middens have been outlined elsewhere (see Binneman 1996, 2001:82-83). As an aid to the discussion of shellfish remains, I report relative frequency percentage without brackets and meat mass in grams frequency percentage within block brackets.

In this paper, references are also made to the Kabeljous Industry but are not discussed here in detail (quartzite stone tool assemblages named after the Kabeljous River Shelters some 4 km upstream from the mouth of a river with the same name). The industry will be discussed at a later stage when information on the shelter is published (for information see Binneman 1996).

RESEARCH AND DESCRIPTIONS WITHIN THE ZONES

KABELJOUS RIVER MOUTH

Four shell middens were sampled along the western side of the Kabeljous River Mouth (Fig.1d). They were all severely damaged in building operations (Binneman 2001, fig. 23). These middens were sampled to compare shell remains, other faunal remains and cultural material to those from the Kabeljous Shelters nearby.

Two middens were of pastoralist/'ceramic' type and yielded pottery and sheep remains, and one was occupied by hunter-collector-fishers and yielded a Kabeljous Industry, including large segments and bored stones. The shell middens were situated a few hundred metres from the estuary opposite a sandy beach with the nearest rocky shore some 1,5 km away. These sites were all built over.

KR/SM1A & B

KR/SM1A was a large windblown area previously levelled by earth moving vehicles. The area was littered with pottery, stone tools, other cultural material, and food

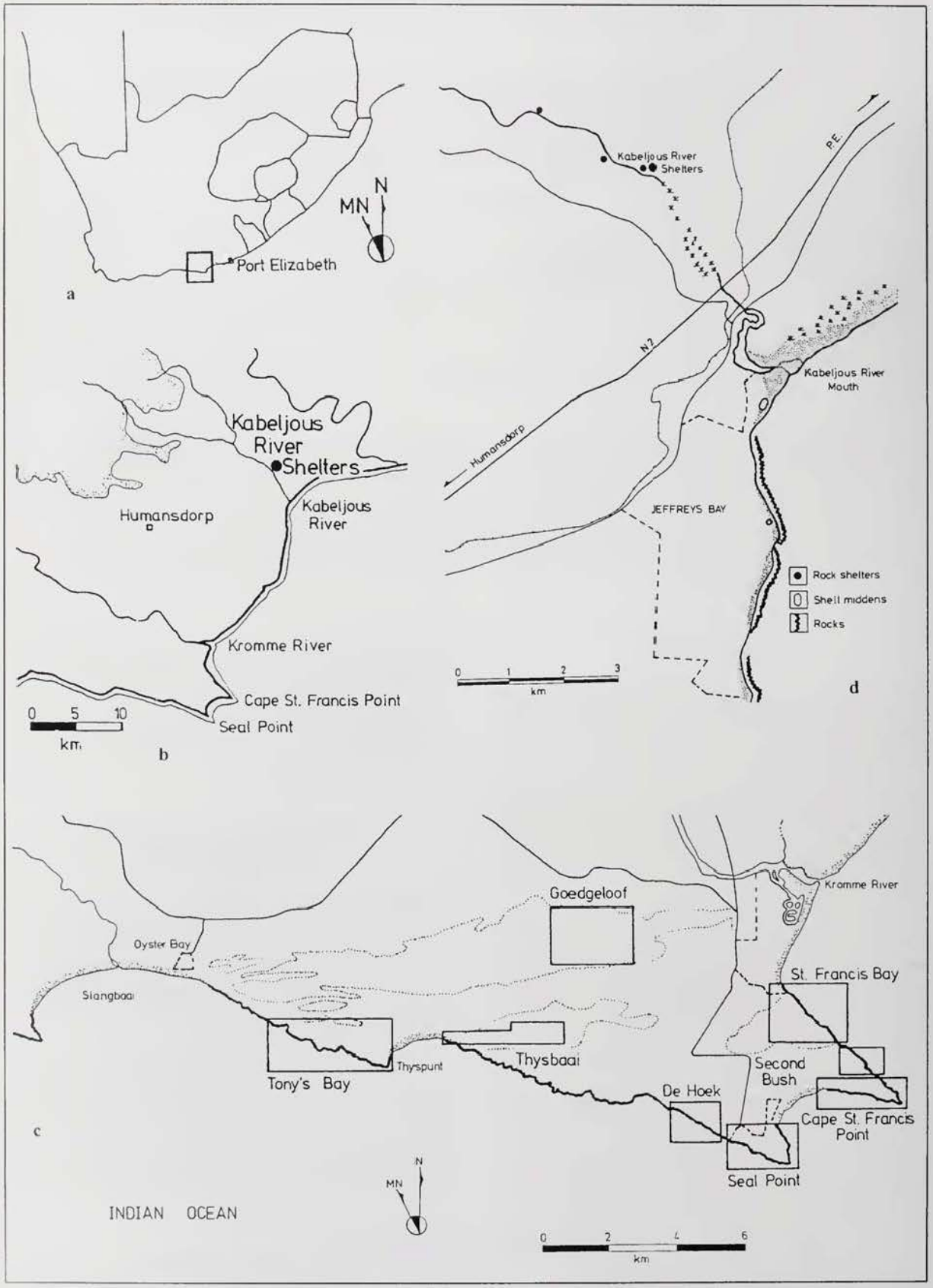

Fig. 1. Map of the different locations sampled along the Cape St Francis coast.

Table 1. Preliminary count of faunal species from the Kabeljous River Mouth and St Francis Bay area 1 middens.

	Kabeljous River Mouth			St Francis Bay midden 1/1					
	KR/SM1A*	KR/SM1B*	2C AREA	L1+	L2+	L3+	L4+	4SS+	TOTAL
MAMMALS									
Arctocephalus pusillus	1	1	1		1	1	5	1	8
Equus sp.		1	1						
Hippopotamus amphibius	1								
Alcelaphus buselapus			1						
Silvicapra grammia	1								
Lepus sp.	1								
Hystrix africae-australis		1							
Ovis aries									
juvenile	3	1							
sub-adult	1	1							
adult		1							
old	2								
Bovidae - general									
small medium				1					1
large medium	1	1		1					1
large			1						
TOTAL	**11**	**7**	**4**	**2**	**1**	**1**	**5**	**1**	**10**

* Pottery and sheep present
\+ Only pottery present

Table 2. List of radiocarbon dates for open-air shell middens from the south-eastern Cape coast (Cape St Francis area).

SITE	DATE BP	ASSOCIATION
COASTAL SITES		
Kabeljous River Mouth 2B	2570 ± 60 (Pta-3907)	Kabeljous
Kabeljous River Mouth 1A	1560 ± 40 (Pta-5982)	Pastoralists
St Francis Bay	5180 ± 65 (Pta-1089)	Wilton (De Villiers 1974)
St Francis Bay 2/2	4250 ± 70 (Pta-5042)	Wilton
St Francis Bay 10B	3640 ± 60 (Pta-5055)	Wilton
St Francis Bay 2/1C	1900 ± 50 (Pta-3910)	Wilton
St Francis Bay 2/4	4160 ± 60 (Pta-7550)	Kabeljous
St Francis Bay 1/1	1770 ± 50 (Pta-9311)	Ceramics
Goedgeloof C1/M1	2890 ± 40 (Pta-4066)	Kabeljous
Goedgeloof C3/M4	1270 ± 50 (Pta-4616)	Pastoralists
Goedgeloof C2	245 ± 20 (Pta-8696)	Ceramics/slag (cal. AD 1666)
De Hoek SS6	250 ± 50 (Pta-3908)	Ceramics
Thysbaai W2	3760 ± 60 (Pta-5050)	Wilton
Thysbaai W1	1720 ± 50 (Pta-8653)	Wilton
Oyster Bay HS1/S2	190 ± 50 (Pta-6998)	pastoralists

waste and was one of only a few Khoi pastoralist sites in the research area. A surface sample of faunal remains yielded remains of six sheep (Table 1). Sheep remains identified by J. Brink have been dated to 1560 ± 40 BP (Pta-5982) (Table 2). A surface sample to establish the shellfish content at the site was also collected (Table 3). *Perna perna*, 49,3% [33,7%] was the dominant shellfish species. *Oxystele* spp., 19,2% [4,2%] and *Donax serra*, were also present in fair numbers with *Turbo sarmaticus*, 6,5% [16,6%] the only other significant species. Although *Oxystele* spp. presented a high percentage frequency, its contribution in meat mass was insignificant in comparison with *D. serra* and *T. sarmaticus*. The economic return ratio (ERR) was 33,3% (also see Binneman 2001, table 1). A

Table 3. Shellfish: frequency percentage per species and percentage meat mass contribution from the Kabeljous River Mouth middens.

	KR/SM1A*				KR/SM1B*				KR/SM2A#				KR/SM2B#			
	f	f%	mm/gr	mm%	f	f%	mm/gr	mm%	f	f%	mm/gr	mm%	f	f%	mm/gr	mm%
Perna perna	129	49,3	447,3	33,7	696	16,3	3062,4	20,0	2741	55,0	13430,9	49,5	1082	57,2	4760,0	33,5
Donax serra	48	18,4	643,2	45,5	633	14,8	7026,3	45,9	906	18,2	11778,0	43,4	551	29,1	8650,7	60,9
Patalla barbara					4	0,1			26	0,5			3	0,2		
Patella cochlear									72	1,4			5	0,3		
Patella longicosta	6	2,3			35	0,8			61	1,2			10	0,5		
Patella oculus					3	0,1			10	0,2						
Patella tabularis									7	0,1			5	0,3		
Haliotis midae									3	0,1			3	0,2		
Haliotis spadicea					2	0,1			15	0,3			6	0,3		
Oxystele spp.	50	19,2	60,0	4,2	2498	58,4	2747,8	18,0	799	16,0			126	6,7		
Turbo sarmaticus	17	6,5	234,6	16,6	352	8,2	2464,0	16,1	192	3,9	1920,0	7,1	80	4,2	800,0	5,6
Burnupena spp.	2	0,8			36	0,9			86	1,7			6	0,3		
Solen capensis	4	1,6							3	0,1						
Dinoplax gigas	5	1,9			15	0,4			64	1,3			11	0,6		
TOTAL	261	100,0	1415,1	100,0	4274	100,1	15300,5	100,0	4985	100,0	27128,9	100,0	1888	99,9	14210,7	100,0

Buckets sampled	3=	13	15	8
Buckets analysed	1=	13	15	8
Meat mass/volume	1415,1	1177,0	1808,6	1776,3
Total collecting mass	4245,9	60070,0	71989,7	35923,6
% meat mass of total mass/volume	**33,3**	**25,5**	**37,7**	**39,6**

= Surface samples
* Pottery and sheep
# Kabeljous Industry

Only those shellfish species which contributed relatively high meat mass are considered.

small collection of cultural material was also made (Tables 4 & 5).

A small damaged shell midden, KR/SM1B, located in the same area was also sampled. One square metre was excavated to establish the percentages of shellfish species. The deposit was only 0,1 m thick and contained pottery and the remains of three sheep (Table 1). This midden is not considered to be of pastoralist origin because the shellfish content was similar to that of 'ceramic' middens sampled elsewhere along the Cape St Francis coast (see below). *Oxystele* spp. represented 58,4% [18,0%], while *Perna perna*, 16,3% [20,0%] and *Donax serra*, 14,8% [45,9%] were the only other species of significance (Table 2). Little cultural material was recovered (Tables 4 & 5). As in the case of KR/SM1A, *Oxystele* spp. was well represented but the contribution in meat mass was low. The ERR of 25,5% was notably lower than that of the pastoralist midden.

KR/SM2A & 2B

A second area, some 200 m west of KR/SM1B, was also investigated. Several middens had been badly damaged by building operations or crushed by earth moving vehicles. The area was sampled for important archaeological material. Several large segments and bored stones were recovered (Table 4).

Shell midden KR/SM2 was 0,20 m thick and consisted of two shell lenses separated by a lens of sterile white sand. *P. perna* was the dominant shellfish species in both layers (Table 3). Layer 2A consisted of 55,0% [49,5%] *P. perna*, 18,2% [43,4%] *D. serra* and only 16,0% [3%] *Oxystele* spp., and layer 2B of 57,2% [33,5%] *P. perna*, 29,1% [60,9%] *D. serra* and only 6,7% [1%] *Oxystele* spp. Both layers yielded abundant fish remains. The ERR for KR/SM2A was 37,7% and 39,6% for KR/SM2B.

A large quartzite segment was also found in layer 2B. This layer has been dated to 2570 ± 60 BP (Pta-3907). Five large quartzite segments, two bored stones and *D. serra* scrapers and pendants were also found near the midden (2C area) (Tables 4 & 5).

Discussion

Although both KR/SM1A & 1B yielded sheep remains and pottery, the latter is not regarded as a true pastoralist site, but rather as been occupied by a 'ceramic' group. The high frequency of Oxystele spp. present in the site as well as the notably lower meat mass per volume and ERR, provide the reason for this conclusion. The sheep remains present in the site may have been acquired from pastoralists.

The HCF middens (KR/SM2A & B) and pastoralist midden (KR/SM1A) displayed a similar pattern to those observed from other similar middens elsewhere in the research area (high frequencies of *P. perna* and *D. serra* and low f frequencies of *Oxystele* spp.). The 'ceramic'

Table 4. Cultural material: frequencies of stone artefacts from Kabeljous River Mouth, SFB1, SFB2 areas and the Dune Field area middens.

	Kabeljous River Mouth				SFB1/1						SFB2					Dune Field area				
	1A	1B	2A	2B	L1	L2	L3	L4	L4SS	L5	L1	L2	L3	2/2	2/5	4	6	8	10A	10B
WASTE																				
Chips	9							2						13*					1	1*
Chunks	8													33*						8*
Small cores													3*	16*						5*
Cobble cores	1		1	1							1			1*					3	1
CRP													4	12*						2*
Flakes	92		14	4	14	7	2	6	3	1	14	5	5*	383*	14	10	5	15	10	46*
TOTAL	**111**		**15**	**5**	**14**	**7**	**2**	**8**	**3**	**1**	**15**	**5**	**12**	**458**	**14**	**10**	**5**	**15**	**14**	**63**
UTILISED																				
Hammerstones												2	1						1	
Milled edge														1						
Grindstones																				
Hammer/grind																				
Flakes	3	3					1										2			6*
TOTAL	**3**	**3**					**1**					**2**	**1**	**1**			**2**		**1**	**6**
FORMAL																				
Scrapers													1*	67*						4*
Adzes														1*						1*
Borers														2*						1*
Large segments				1																
Backed flakes														2*						
Bored stones																				
Stone pipes														1*						
Misc retouched														5*						1*
TOTAL				**1**									**1**	**78**						**7**
OTHER																				
ochre	1	1	11	3			1				2	2		14						
Shale			1	1																

All quartzite unless indicated differently.

*Silcrete

midden on the other hand, displayed an interesting difference in the frequencies of shellfish collected. *Oxystele* spp. accounted for the bulk of shellfish with *P. perna* and *D. serra* present in low frequencies. *Oxystele* spp. are usually abundant in the upper balanoid zone and are also easy to collect during all tide cycles, but also provide little in return. It would appear that 'ceramic' shellfish collectors were not selective in their collecting strategy, but collected any species they encountered. The HCF on the other hand were more selective in the shellfish species they collected.

The different shellfish collecting strategies between the groups are clearly illustrated by the ERR's. The ERR for the 'ceramic' midden, KR/SM1B (25,5%), is notably lower than that for the pastoralist midden, KR/SM1A (33,3%) and HCF middens, KR/SM2A (37,7%) and KR/SM2B (39,6%). This pattern is also noticeable in the meat mass per volume; 1170,0 gram for the 'ceramic' midden (KR/SM1B) which is between 8% and 14% lower than that of the pastoralist midden (1415,1 gram) and the HCF middens (1873,0 gram and 1776,3 gram respectively).

ST FRANCIS BAY AND THE SURROUNDING DUNE FIELD AREA

The largest concentration of shell middens and other archaeological features occurred along the coast between St Francis Bay and Oyster Bay and in the shifting dune bypass system between the two coastal resorts (Binneman 2001, fig. 16).

SANTAREME BAY (SFB1/1)

SFB1/1 and five other middens were situated on vacant plots in Santareme Bay, an extension of St Francis Bay (Fig. 3). The midden was located on top of a densely vegetated three metre high dune, opposite a rocky coast. The sandy beach and rocky coast were only a few hundred metres away. *P. perna* is the dominant shellfish species along this part of the Cape St Francis coast.

The midden was 1,10 m thick. Six occupation layers were excavated yielding pottery in five layers (Fig. 4). No sheep remains were recovered from this midden (Table 1). Layer four, a stone feature which must have been a fire place, has been dated to 1770 ± 50 BP (Pta-9311) and

Table 5. Cultural remains: Frequencies of worked shell, bone and pottery from Kabeljous River Mouth, SFB1 and SFB2 middens.

	Kabeljous River Mouth				SFB1/1					SFB2/1			SFB2/2
	1A	1B	2A	2B	L1	L2	L3	L4	4SS	L1	L2	L3	L1
MARINE SHELL													
Nassarius kraussianus													
Shell		1		1					1	1		2	
Donax serra													
Pendants	1	4	11	10								1	14
Scrapers			13	13									
Bullia digitalis													
Beads										4	2		
Thais sp.													
Beads											2	1	
Conus sp.													
Beads	1												
Glycymeris sp.													
Beads										1	1		
Patella cochlear													
Pendant											1		
Burnupena sp.													
Beads												2	
Fusitriton sp.													
Beads												1	
Polynices sp.													
Beads												1	
TOTAL	**2**	**5**	**24**	**24**					**1**	**6**	**6**	**8**	**14**
OSTRICH EGGSHELL													
Beads	10	1			2	6	7		3	1		7	
TOTAL	**10**	**1**			**2**	**6**	**7**		**3**	**1**		**7**	
BONE													
Points										1			
Tubes	1												
Cut marks							1						
Utilised					1								
TOTAL	**1**				**1**		**1**			**1**			
POTTERY													
Fragments	130	15			18	6	1	2	9	288	71		
Rim	3									3			
Rim decorated										1			
Body Decorated	1	1											
Spouts										1			
Lugs										1			
TOTAL	**134**	**16**			**18**	**6**	**1**	**2**	**9**	**294**	**71**		

represents the oldest date for pottery found along the south-eastern Cape coast. Few cultural remains were recovered from the excavation (Tables 4 & 5).

P. perna was the dominant shellfish species in all the pottery layers and comprised between 75% [84%] and 91% [96%]. *Oxystele* spp., between 6% [2%] and 14% [4%], were the only other species present in notable frequencies. Other species were insignificant (Table 6). The ERR's were: Layer 1, 34,6%; Layer 2, 32,8%; Layer 3, 37,6%; Layer 4, 36,0% and Layer 4SS, 35,8%. Layer five was a thin shell lens 0,20 m below the stone feature. No pottery was present in this lens which probably represents HCF occupation. The shellfish content was markedly different from the overlying pottery layers (Table 5). *P. perna* (50,2% [47,9%]) comprised the largest percentage of the species and *Patella* spp. (25% [14%]) accounted for the bulk of the remainder. Notwithstanding, the total meat mass contribution was much lower than several other species. For example, *T. sarmaticus* (6% [28,3%] and *Haliotis spadicea* (6,3% [23,8%]) made a substantial higher contribution. The ERR was 45,5% which is notably higher than the pottery layers.

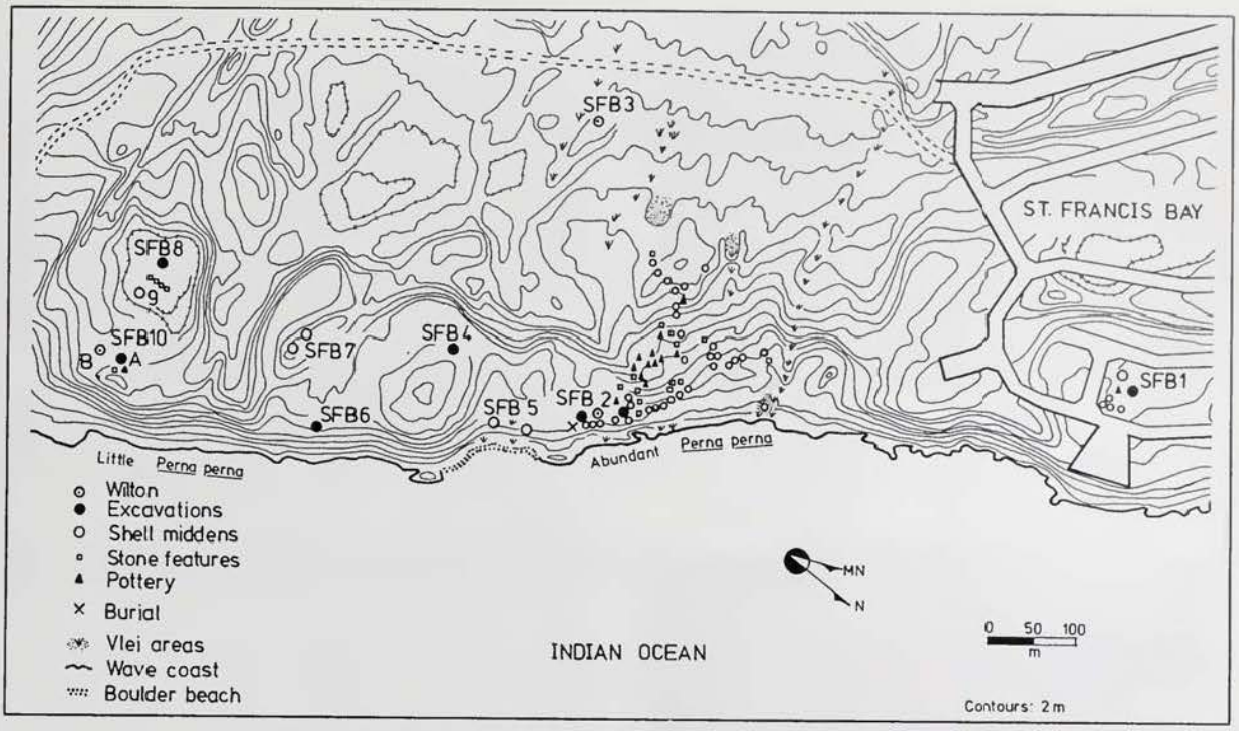

Fig. 2. Map of archaeological sites and features at St Francis Bay and Dune Field Areas as recorded during 1982.

Fig. 3. Location of SFB1/1.

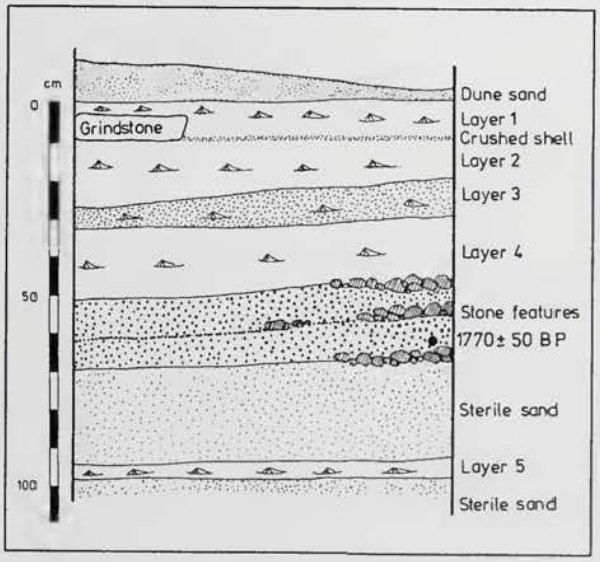

Fig. 4. Section drawing of the excavation at shell midden SFB1/1.

The presence of *H. spadicea* in layer 5 indicates that the lower balaniod zone had been more extensively exploited than the overlying pottery layers. This illustrates the different collecting strategies between HCF and 'ceramic' groups. The latter did not collect from the lower balaniod zone while HCF collected from both the upper and lower balaniod zones. In doing so they obtained species with relatively high meat mass, such as *T. sarmaticus* and *H. spadicea*.

SFB2 AREA

SFB2 was a large windblown dune area to the south of Santareme Bay (Fig. 2). This area comprised one of the largest concentrations of Holocene features in the research area. Several excavations and sampling of middens and other features were conducted opposite a wave coast adjacent to a small boulder coast. Extensive *P. perna* beds are present along this part of the coast.

During 1984, the entire area was covered with branches to stabilise the loose dune sand and it has since been developed into an exclusive holiday resort. The area covered approximately 40 000 square metres and 35 shell

Table 6. Shellfish frequency percentage per species and percentage meat mass contribution from midden SFB1/1.

	Layer 1*				Layer 2*				Layer 3*				Layer 4*			
	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %
Perna perna	4048	86,6	24288,0	97,0	3845	75,5	21532,1	88,7	4295	81,8	24911,2	95,1	8352	91,2	42595,2	96,1
Donax serra	3	0,1							9	0,2			13	0,1		
Patella argenvillei	19	0,4			6	0,1			6	0,1			5	0,1		
Patalla barbara									3	0,1						
Patella cochlear	12	0,3			44	0,9			48	0,9			44	0,5		
Patella longicosta	7	0,2			34	0,7			20	0,4			10	0,1		
Patella miniata					4	0,1										
Patella oculus	14	0,3			52	1,0			31	0,6			25	0,3		
Patella tabularis	8	0,2			26	0,5	520,3	2,1	5	0,1			5	0,1		
Haliotis spadicea	3	0,1			23	0,5			16	0,2			13	0,2		
Oxystele spp.	384	8,2	422,4	1,7	723	14,2	939,9	3,9	619	11,8	804,7	3,1	519	5,7	674,7	1,5
Turbo sarmaticus	102	2,2	326,0	1,3	161	3,2	1288,2	5,3	80	1,5	480,0	1,8	73	0,8	1058,5	2,4
Burnupena spp.	44	0,9			148	2,9			81	1,5			74	0,8		
Solen capensis	22	0,5							28	0,5			12	0,1		
Dinoplax gigas	8	0,2			30	0,6			11	0,2			12	0,1		
TOTAL	4674	100,2	25036,4	100,0	5096	100,2	24280,5	100,0	5252	100,0	26195,9	100,0	9157	100,1	44328,4	100,0
Buckets sampled			17				11				9				14	
Buckets analysed			17				11				9				14	
Meat mass/volume			1472,7				2207,3				2910,7				3116,3	
Total collecting mass			72377,6				73938,0				9586,0				123238,2	
% meat mass of total mass/volume			**34,7**				**32,8**				**37,6**				**36,0**	

	Layer 4SS*								Layer 5#			
	f	f %	mm/gr	mm %	TOTAL f	f %	mm/gr	mm %	f	f %	mm/gr	mm %
Perna perna	726	86,2	4573,8	93,6	21266	85,0	117900,3	94,5	166	50,2	962,8	47,9
Donax serra					25	0,10						
Patella argenvillei					36	0,20			10	3,0		
Patalla barbara					6	0,02			3	1,0		
Patella cochlear	7	0,8			197	0,80			42	12,7		
Patella longicosta					90	0,40			19	5,7		
Patella miniata					7	0,03			3	1,0		
Patella oculus					130	0,50			8	2,4		
Patella tabularis	2	0,2			47	0,20	520,3	0,4	1	0,3		
Haliotis spadicea	1	0,1			56	0,20			21	6,3	478,8	23,8
Oxystele spp.	56	6,6	72,8	1,5	2334	9,30	2914,5	2,3	33	10,0		
Turbo sarmaticus	23	2,7	241,5	5,0	459	1,80	3394,2	2,7	20	6,0	570,0	28,3
Burnupena spp.	25	3,0			376	1,50			4	1,4		
Solen capensis	2	0,2			64	0,30						
Dinoplax gigas	1	0,1			63	0,25			1	0,3		
TOTAL	843	99,9	4888,1	100,1	25012	100,70	124729,3	99,9	331	100,1	2011,6	100,0
Buckets sampled			6								4	
Buckets analysed			6								4	
Meat mass/volume			814,7								502,8	
Total collecting mass			13644,2								4425,1	
% meat mass of total mass/volume			**35,8**								**45,5**	

* Pottery

Kabeljous Industry

Only those shellfish species which contributed relatively high meat mass are considered.

middens and more than 20 stone features were recorded (Figs 5a & b). Only a few were still *in situ*. Most of these stone features were circular and consisted of heat fractured quartzite cobbles and pebbles. Large quantities of charcoal but little shell were associated with these features. Occasionally cores and flakes were also present. Three of these stone features in the SFB2 area were mapped (Binneman 2001, fig. 20). Two were fire places, probably hotplates for cooking shellfish and one was probably remains of a windbreak (see also Cairns 1974).

SFB2/1

This was the largest shell midden in the a rea and covered approximately 50 square metres. Two small excavations of 1 square metre each were conducted at different localities (SFB2/1A & 1C). A small midden (SFB2/1B) at the bottom of the dune was also sampled. Excavation 1A yielded two layers of 0,15 m each divided by a sterile layer of black organic sand. Excavation 1C on the western side yielded three layers some 0,40 m thick. The two top layers were similar to those exposed on the northern side and contained pottery. Pottery was absent from layer three. A fully flexed infant burial was found on the eastern slope of the dune. The burial was facing in a north-easterly direction lying on its left side.

P. perna (between 48% [73%] and 63% [83%]) and *Oxystele* spp. (29% [11%] and 35% [14%]) were the dominant species in the two top layers at excavations 1A and 1C (Table 7). Other species were insignificant. The ERR for Layer 1 was 24,6% and for Layer 2, 28,1%. The remains of a number of large animals were found, including *Bos taurus*, *Syncerus caffer* and *Hippopotamus amphibius* (Table 8). Few cultural remains were recovered from both excavations (Tables 4 & 5). Many potsherds were found in excavation 1A, but probably all belong to a single spouted vessel (Table 5). Only a few quartzite flakes and shell beads were found.

Layer 3 in excavation 1C did not produce any pottery and dates to 1900 ± 50 BP (Pta-3910) (Fig. 6). D. *serra*, which was absent from the overlying two layers, was present in layer 3 (Table 7). Although only representing 3.4% [6,1%] of the total species, its contribution in meat mass is substantially higher than that of *Oxystele* spp. which comprised 14,5% of the percentage frequency. The presence of *D. serra* indicates that HCF also exploited the sandy beaches. The 'ceramic' groups did not collect this species. This pattern was visible at most of the 'ceramic' middens. *D. serra* is not present in any large numbers along this part of the coast today and similar conditions may have prevailed during prehistorical times. *T. sarmaticus* provided the second highest meat mass although it only represented 7,5% [14,4] of the shellfish collected. The ERR for Layer 3 was 35,5% which is notably higher than that of the 'ceramic' layers. Layer 3 yielded two stone features and a few silcrete stone tools (Table 4).

SFB2/1B

This midden covered approximately 4square metres and

Fig. 5a (top). Windblown SFB2 Area with midden SFB2/1 in the background and SFB2/2 in the foreground, 1981. 5b (bottom). Area covered by branches, 1985.

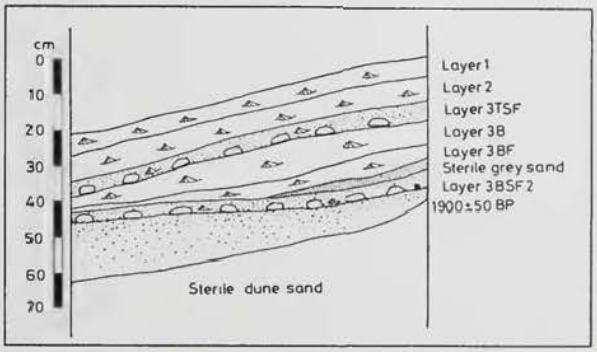

Fig. 6. Section drawing of the excavation at shell midden SFB2/1C.

was dominated by *P. perna* (86,0% [95,8%]) (Table 6). No pottery was recovered. The size of the midden and the presence of species from the lower balanoid zone (*P cochlear* and *P. argenvillei*) suggest that the site was occupied for a short time, probably for only a few days during spring low. It would appear that HCF preferred shellfish species with a higher meat mass per species from the lower balanoid zone to the more accessible, easy to collect *Oxystele* spp. (1%) from the upper balanoid zone. The ERR was 35,4%.

Table 7. Shellfish frequency percentage per species and percentage meat mass contribution from middens of the SFB2 area.

	SFB2/1 L1"				SFB2/1 L2*				SFB2/1 L3'			
	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %
Perna perna	1242	47,9	5599,3	73,2	1825	62,7	8577,5	82,9	2857	67,5	20570,4	72,5
Donax serra									142	3.4	1732,4	6,1
Patella argenvillei	11	0,4			7	0,2			11	0,3		
Patalla barbara	5	0,2							6	0,1		
Patella cochlear	28	1,1			16	0,6			45	1,1		
Patella longicosta	38	1,5			4	0,1			23	0,5		
Patella miniata					2	0,1			3	0,1		
Patella oculus	41	1,6			18	0,6			17	0,4		
Patella tabularis	10	0,4			2	0,1			19	0,5		
Haliotis spadicea	2	0,1			7	0,2			49	1,2	1063,3	3,7
Oxystele spp.	901	34,7	1072,4	14,0	844	29,0	1181,6	11,4	615	14,5	922,5	3,3
Turbo sarmaticus	219	8,4	979,2	12,8	118	4,1	590,0	5,7	315	7,5	4095,0	4,4
Burnupena spp.	79	3,0			20	1,8			104	2,5		
Solen capensis	3	0,1			42	0,4			17	0,4		
Dinoplax gigas	12	0,5			4	0,1			9	0,1		
TOTAL	2591	99,9	7650,9	100,0	2909	100,0	10349,1	100,0	4232	100,1	28383,6	100,0
Buckets sampled				14				17				28
Buckets analysed				14				17				28
Meat mass/volume				546,5				608,8				1013,7
Total collecting mass				31159,2				36785,9				79930,0
% meat mass of total mass/volume				**24,6**				**28,1**				**35,5**

	SFB2/1B#				SFB2/2'				SFB2/5#			
	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %
Perna perna	1694	86,0	13382,6	95,8	778	60,2	5973,0	59,4	3995	70,3	37867,5	84,0
Donax serra					195	15,1	2214,0	22,0	8	0,1		
Patella argenvillei	22	1,1			23	1,8			32	0,6		
Patalla barbara	4	0,2			1	0,1						
Patella cochlear	69	3,6			16	1,2			71	1,3		
Patella longicosta	7	0,4			14	1,1			9	0,2		
Patella miniata	6	0,3			15	1,2						
Patella oculus	9	0,5			28	2,2			17	0,3		
Patella tabularis	2	0,1			2	0,2			8	0,1		
Haliotis spadicea	11	0,6	291,5	2,1	9	0,7			139	2,4	4059,1	9,0
Oxystele spp.	68	3,5			59	4,6			940	16,5	1659,0	3,7
Turbo sarmaticus	19	1,0	300,2	2,1	98	7,6	1860,1	18,5	79	1,4	1485,0	3,3
Burnupena spp.	14	0,7			17	1,3			370	6,5		
Solen capensis					5	0,4			12	0,2		
Dinoplax gigas	36	1,9			31	2,4			3	0,1		
TOTAL	1961	99,9	13974,3	100,0	1291	100,1	10047,1	99,9	5683	100,0	45070,6	100,0
Buckets sampled				14				14				25
Buckets analysed				14				14				25
Meat mass/volume				998,2				717,7				1802,8
Total collecting mass				39511,1				32329,8				125943,8
% meat mass of total mass/volume				**35,4**				**31,1**				**35,8**

Pottery and *Bos taurus* * Pottery present ' Silcrete microlithic stone tools present # Kabeljous Industry

Only those shellfish species which contributed relatively high meat mass are considered.

Table 8. Faunal remains from SFB2 and Dune Field areas.

	SFB2/1			SFB2	Dune Field area		
	L1	L2	L3	SFB2/2	SFB2/5	SFB4	SFB8
MAMMALS							
Homo sapiens	1						
Arctocephalus pusillus	2	1	1				1
Equus sp.	1						
cf. Canis mesomelas	1						
Hippopotamus amphibius	1						
Raphicerus melanotis	1						
Raphicerus sp.	1			1	1		1
Syncerus caffer	1						
Lepus sp.	1						
Hystrix africae-australis	1						
Bos Taurus	1						
Bovidae - general							
small medium				1			
large medium				1	1		
large						1	
TOTAL	12	1	1	3	2	1	2
REPTILES (tortoise)						*	

SFB2/2

This midden was badly eroded by wind action. It was situated on a high dune and only 5 square metres of the deposit remained. A large number of silcrete microlithic stone tools were collected from both the surface and a small excavation (Table 4). All the elements from the inland Wilton Industry were present except for segments. Several *D. serra* pendants were also recovered (Table 5). A shell sample from this site has been radiocarbon dated to 4250 ± 70 BP (Pta-5042) (true date). *P. perna* (60,2% [59,4%]) and *D. serra* (15,1% [22,0%]) were the most abundant species (Table 7). It is evident that HCF also exploited the nearby sandy beach and ignored *Oxystele* spp. (4,6% [1%]). The ERR was 31,1%.

SFB2/5

This small midden covered approximately fifteen square metres and was 0,20 m thick. Rough, large surface quartzite (coarse grained silcrete) stone tools which were probably from hunter-gatherer origin were recovered (Table 4). *P. perna* (70,3% [84,0%]) and *Oxystele* spp. (16,5% [3,7%]) were the dominant species (Table 7). *H. spadicea* accounted for only 2,4% of the percentage frequency, but provided the second highest meat mass [9,0%]. The ERR was 35,8%.

SFB3

A large number of silcrete stone tools were collected from the surface of this eroded midden. All the microlithic elements of the Wilton Industry were present except for segments (Table 3).

DUNE FIELD AREA

The middens in the Dune Field area were located opposite a wave coast flanked by two small boulder beaches (Fig. 2). *P. perna* is not abundant along this part of the coast and only increases in number near Cape St Francis Point. It is assumed that collecting of this species took place in the SFB2 Area some 0,5 km away. This area has also been subject to large scale development since 1984.

SFB4 & 6

Both these middens were damaged by illegal digging and off road vehicles. They were sampled to establish the shellfish content. *P. perna* was the dominating species with 44,5% [65,8%] and 49,5% [64,7%] respec-tively (Table 9). *Oxystele* spp., 16,3% [4,1%] and 20,4% [4%] accounted for the second highest frequency, but indicated that HCF also exploited the sandy beaches. *D. serra* may have been collected opportunistically when the beach was searched for wash-ups such as fish, marine birds, seals and whales.

The same may be true for *Solen capensis* found in the deposits, which are only to be found at the Kromme River estuary some 5 km away. Pottery was absent from these middens. Only quartzite stone tools were found at both middens (Table 3). The ERR's for SFB4 was 30,7% and for SFB6 34,2%. SFB4 was dated to 4160 ± 60 (Pta-7550) and represent the oldest date for open-air middens associated with the Kabeljous Industry in the research area (Table 2).

SFB8 & 9

The surface samples taken from both these middens (see Binneman 2001, fig. 4a) were dominated by *P. perna*

Table 9. Shellfish frequency percentage per species and percentage meat mass contribution from the Dune Field area middens.

	SFB4#				SFB6#			
	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %
Perna perna	929	44,5	9197,1	65,8	768	49,5	5683,2	64,7
Donax serra	24	1,2			3	0,2		
Patella argenvillei	41	2,0			2	0,1		
Patalla barbara	6	0,3			5	0,3		
Patella cochlear	114	7,4	569,8	4,1	53	3,4		
Patella longicosta	48	2,3			63	4,1		
Patella miniata					3	0,2		
Patella oculus	47	2,3			40	2,6		
Patella tabularis	22	1,1			41	2,6	471,5	5,4
Haliotis midae	8	0,4			4	0,3		
Haliotis spadicea	20	1,0			33	0,9	564,7	6,4
Oxystele spp.	341	16,3	579,7	4,1	317	2,1		
Turbo sarmaticus	158	7,6	3634,0	26,0	94	20,4	2068,0	23,5
Burnupena spp.	227	10,9			120	6,1		
Solen capensis	2	0,1				7,7		
Dinoplax gigas	62	3,0			6	0,4		
TOTAL	2089	100,2	13980,6	100,0	1552	100,0	8787,4	100,0
Buckets sampled			9				9	
Buckets analysed			19				9	
Meat mass/volume			1553,4				976,4	
Total collecting mass			45505,5				25690,3	
% meat mass of total mass/volume			**30,7**				**34,2**	

	SFB8/9#				SFB10A*				SFB10B*			
	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %
Perna perna	211	37,0	1814,6	50,9	1688	52,2	5401,6	60,6	123	26,2	799,5	13,8
Donax serra	5	0,9							11	2,2		
Patella argenvillei	17	3,0			23	0,7			8	1,7		
Patalla barbara	17	3,0			6	0,2			1	0,1		
Patella cochlear	185	32,4	647,5	18,2	480	14,8	960,0	10,8	62	12,2		
Patella longicosta	7	1,2			37	1,1			6	1,3		
Patella miniata					8	0,3						
Patella oculus	30	5,3			39	1,2			29	6,4		
Patella tabularis	25	4,4	595,0	16,7	2	0,1			66	13,6	1716,0	29,7
Haliotis midae	1	0,2							29	5,7	2813,1	48,7
Haliotis spadicea	5	0,9			7	0,2			11	2,0		
Oxystele spp.	6	1,1			599	18,5	838,6	9,4	51	12,0		
Turbo sarmaticus	23	4,0	506,1	14,2	251	7,8	1706,8	19,2	36	7,8	450,2	7,8
Burnupena spp.	18	3,7			85	2,6			26	4,5		
Solen capensis												
Dinoplax gigas	17	3,0			7	0,2			20	4,2		
TOTAL	571	100,1	3563,2	100,0	3234	100,0	8907,0	100,0	477	100,0	5778,8	100,0
Buckets sampled			3				7				10	
Buckets analysed			3				7				4	
Meat mass/volume			1187,7				1272,4				1444,7	
Total collecting mass			11382,5				35940,1				16558,2	
% meat mass of total mass/volume			**31,3**				**24,8**				**34,9**	

* Pottery present
# Kabeljous Industry
' Silcrete microlithic stone tools present

Only those shellfish species which contributed relatively high meat mass are considered.

Table 10. Frequencies of worked shell and bone and pottery from the Dune Fields area, Seal Point, De Hoek, Tony's Bay and Goedgeloof middens.

	Dune Fields			Seal Point		De Hoek	TB			Goedgeloof			
	6	8	10A	SP1	SP2	DH8	FTS	C3/1	C3/2	C3/4	C3/5	C3/6	A8
MARINE SHELL													
Donax serra													
Pendants		1		1	3								
Scrapers													
Pend/scrapers													
Glycymeris sp.													
Beads										1			
Thias squasmosa													
Beads										1			
TOTAL		1		1	3					2			
OSTRICH EGGSHELL													
Fragments				1									
Beads			1	1	1					5			3
TOTAL			1	2	1					5			3
BONE													
Points	1												
Tubes								1					
Pendants								1		1			
TOTAL	1							2		1			
POTTERY													
Fragments			47			4	35	20	1	82	11	4	85
Rim								5	1	11	18	3	3
Rim decorated								5		12	2	2	1
Body decorated								14		33	6	6	14
Spouts							1	2	2	1			
Lugs								1				3	2
Bases													1
TOTAL			47			4	36	47	4	139	37	18	106

(37,0% [50,9%]) and *P. cochlear* (32,4% [18,2%]) (Table 9). *P. tabularis* (4% [14,2%]) also made a useful contribution to the meat mass. *Oxystele* spp. only contributed 1% of the total frequency. The shellfish species collected at these two middens illustrates that HCF ignored the small species such as *Oxystele* spp. in favour of species with a higher meat mass. The ERR was 31,3%.

The stone tools recovered from the surface of these two middens consisted of a typical quartzite Kabeljous industry, including flakes, cores, grindstones, rubbers and hammer stones (Table 4).

SFB10A & B

This was a large shellfish accumulation of some 40 metres in length on top of a high dune ridge and consisted of two middens (see Binneman 2001, fig. 4a). SFB10A yielded pottery (Table 10). *P. perna* (52,2% [60,6%]), *Oxystele* spp. (18,5% [9,4%]) and *P. cochlear* (14,8% [10,8%]) were the most important species (Table 9). Although *T. sarmaticus* only accounted for 7,8% of the total frequency, it contributed the second highest meat mass [19,2%]. This was the only 'ceramic' midden which displayed such a high percentage of *Patella* spp. No other 'ceramic' midden had more than 6%. The ERR of 24,8% is similar to other 'ceramic' middens in the area and lower than that of the HG and HCF middens.

SFB10B yielded silcrete microlithic stone tools, again lacking segments (Table 4). A burial dating to 5180 ± 65 (Pta-1089) BP was found in the vicinity of this midden (De Villiers 1974; Thackeray & Feast 1974). A shell sample from SFB10B has been radiocarbon dated to 3640 ± 60 BP (Pta-5055) (true date).

The dominant species collected was *Patella* spp., 35%, of which only *P. tabularis*, 13,6% [29,7%] made a significant meat mass contribution. *P. cochlear*, 12,2%, accounted for only 3% of the meat mass. *P. perna*, 26,2%

[13,8%] accounted for the single highest frequency. *Oxystele* spp., 12,0%, was also well represented, but its meat mass contribution [1%] was negligible. *Haliotis midae* which only accounted for 7,8% of the frequency collected, contributed the highest meat mass [48,7%] (Table 8). The ERR was 34,9%.

Discussion

Several interesting aspects emerge from this area. There are marked differences visible in the collecting strategies of the 'ceramic' groups, hunter-gatherer (Wilton groups) and hunter-collector-fishers (Kabeljous groups). However, these differences are not always consistent for the different groups. For example, SFB1/1 layer 5 (HCF occupation) (Table 6) yielded a high frequency of *Patella* spp., but none of the other HCF or HG middens in the SFB2 Area show a similar pattern (Table 7). On the other hand, none of the 'ceramic' middens show this pattern either, but the SFB2 area middens yielded high frequencies of *Oxystele* spp., while the SFB1/1 midden showed an opposite pattern. In general HG and HCF middens yielded low frequencies of *Oxystele* spp., with the HG middens the only sites which yielded relatively high numbers of *D. serra*. The species from the different types of middens in the Dune Field area show similar patterns to those in the adjacent SFB2 Area (Table 9). The 'ceramic' midden (SFB10A) yielded similar *Patella* spp. frequencies to the HCF (SFB8) and HG (SFB10B) middens, while the latter two middens show a similar pattern in the *Oxystele* spp. collected in the 'ceramic' midden. It is interesting to note that *D. serra* was present at all the Dune Field non-pottery middens (SFB4, 6, 8 and 9) but, absent from the pottery midden (SFB10A).

Percentage frequencies and meat mass frequencies can be misleading and do not always expose the important differences between shellfish collecting strategies. Economic return ratio's (ERR's) on the other hand provide more reliable information because they can be used as a tool to compare collecting strategies between different middens in the same habitat. The ERR's from the 'ceramic' layers at SFB1/1 (Table 6) are the highest recorded for these middens in the research area and range between 32,8% and 37,6%. The reason is that 'ceramic groups' collected mainly *P. perna* and *Oxystele* spp. The Kabeljous layer at SFB1/1 on the other hand, has an ERR of 45,5% which is notably higher than the 'ceramic' layers. This indicates clearly that the collecting strategy of the Kabeljous group was far more economical than that of the 'ceramic' groups for the same habitat. A similar pattern is visible in the SFB2 area. The ERR's for the 'ceramic' midden (SFB2/1 L1 & 2) (24,6% & 28,1%) are lower than that of the Kabeljous (SFB2/1B & SFB2/5) (35,4% & 35,8%) and Wilton middens (SFB2/1 L3 & SFB2/2) (35,5% & 31,1%) (Table 7). The same pattern is also visible at the Dune Field area. The 'ceramic' midden (SFB10A) has a ERR of 24,8% which is notably lower than that of the Kabeljous and Wilton middens which have ERR's higher than 30%.

The oldest date for the presence of pottery (1770 ± 50 BP) along the south-eastern Cape coast comes from SFB1/1 Layer 4. No domestic fauna were associated with this midden. The remains of one *Bos taurus* was recovered from SFB2/1, but this is not regarded to be a true pastoralist site. The date of 1900 ± 50 BP from SFB2/1C is important because it is the most recent date for a Wilton site along the this part of the study area. The charcoal sample submitted for radiocarbon dating was collected 0,25 m below the 'ceramic' layers from a fire place, and therefore rules out contamination. The microlithic silcrete industry which dates between 1900 BP and 4250 BP, indicates that hunter-gatherer groups, most probably from the Langkloof some 80 km due north of Cape St Francis, visited the coast occasionally (Binneman 1985). There are no known silcrete outcrops along the coast and therefore it is assumed that the silcrete was brought to the coast from the mountains where there are abundant known silcrete resources (W. Illenberger pers. comm.; pers. obser.). This indicates that two different groups, the inland Wilton and coastal Kabeljous, shared the same area and resources.

GOEDGELOOF AREA

Approximately five kilometres from the St Francis Bay coast a large number of sites occur dating from the Late Pleistocene to recent pastoralist/'ceramic' occupation. The archaeological features were located in three clusters separated by huge dunes which move slowly eastward (Fig. 1). The archaeological features were situated on old hard windswept deflation surfaces (see Binneman 2001, figs11 & 13).

COMPLEX 1

This was a large windswept area with numerous archaeological features of different ages. Large areas with Middle Stone Age tools are regularly uncovered. Among these were several round caches of flaked stone. Other features included shell middens and round stone structures, probably of pastoralist/'ceramic'origin.

C1/M1

This midden as well as others in the vicinity was all hard and consolidated. Wind erosion had caused this midden to break-up in large blocks. A skeleton found in such a block has been radiocarbon dated to 2890 ± 60 BP (Pta-4066). The midden yielded a Kabeljous quartzite Industry with large segments and bored stones. A shell sample taken from this midden was dominated by *Solen capensis* (42,8% [62,7%]), followed by *P. perna* (20,7%, [17,5%]) and *D. serra* (13,6% [15,0%]) (Table 11). The ERR of 51,3% was the highest recorded for any Kabeljous midden in the research area.

The nearest source of *S. capensis* is at the Kromme River Mouth. *S. capensis* prefers clean sands of estuaries or lagoons where it burrows down to one metre deep near the low spring tide zone. The populations in the Kromme estuary are one of the largest in the eastern Cape (Heydorn & Morant 1988:61).

Table 11. Shellfish frequency percentage per species and percentage meat mass contribution from the Goedgeloof middens.

	C1/M1#				C2/M4#				C3/M4*			
	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %
Perna perna	211	20,7	1582,5	17,5	192	21,3	1440,0	20,6	286	16,7	2145,0	12,0
Donax serra	139	13,6	1362,0	15,0	1	0,1			1	0,1		
Patella argenvillei	13	1,3			35	3,9			14	0,8		
Patalla barbara	3	0,3			3	0,3						
Patella cochlear	54	5,3	167,4	1,8	198	22,0	613,8	8,8	15	0,9		
Patella longicosta	5	0,5			12	1,3			16	0,9		
Patella miniata					2	0,2						
Patella oculus	10	1,0			13	1,4			2	0,1		
Patella tabularis					1	0,1						
Haliotis spadicea	3	0,3	133,1	1,5	4	0,5						
Oxystele spp.	121	11,8			37	4,1			100	5,9		
Turbo sarmaticus	12	1,2	134,4	1,5	109	12,1	1253,5	17,9	30	1,8		
Burnupena spp.	14	1,3			3	0,3			1	0,1		
Solen capensis	437	42,8	5681,0	62,7	290	32,2	3683,0	52,7	1242	72,7	15773,4	88,0
Dinoplax gigas					1	0,1						
TOTAL	1022	100,1	9060,4	100,0	900	99,9	6990,3	100,0	1707	100,0	17918,4	100,0

Buckets sampled	4	2	6
Buckets analysed	4	2	6
Meat mass/volume	2266,5	3595,2	2986,4
Total collecting mass	4412,0	8852,9	4791,4
% meat mass of total mass/volume	**51,3**	**39,5**	**62,5**

Kabeljous Industry
* Pottery and sheep

Only those shellfish species which contributed relatively high meat mass are considered.

COMPLEX 2

Several large middens similar to those at complex 1 were present in this area. All the middens yielded a Kabeljous quartzite Industry with large segments (Table 12).

C2/M4

The shell sample taken from this midden was also dominated by *S. capensis* (32,2% [52,7%]), followed by *P. cochlear* (22,0% [8,8%]) and *P. perna* (21,3% [20,6%]). *D. serra* was of little importance to the diet (Table 11). The ERR was 39,5%.

COMPLEX 3

This area comprised mainly pastoralist sites. Large numbers of sheep remains and pottery (Fig. 7) were collected from a cluster of middens (Table 13 & 10). A small surface sample from the area yielded remains of 117 sheep and nine *Bos taurus*. Several cooking platforms were also found between the middens.

C3/M4

This midden was some 70 metres long and 20 metres wide. A small sample was taken to establish the shellfish content. *S. capensis* (72,7% [88,0%]) was the dominant species, followed by *P. perna* (16,7% [12,0%]) (Table 11). The ERR of 62,3% was the highest recorded for the research area. The midden has been radiocarbon dated to 1270 ± 50 (Pta-4616) BP.

Discussion

The data collected from the Goedgeloof middens indicate that the distance from the coast played an important role in the choice of shellfish. The remains indicate that collecting trips were undertaken mainly during new and full moon phases to take maximum advantage of the low tide. *S. capensis* was the most important species collected by both the HCF and pastoralist groups. When the total collected shellfish weight, the edible meat mass and transport distance are taken into account, it is evident (Table 10) that the groups that lived far from the coast (5 km) were far more economical in their selection of shellfish species than those groups that lived along the immediate coast. Pastoralists (C3/M4) practised the most economic shellfish collecting strategy with 62,3 % of the total weight being edible. The Kabeljous groups, although notably lower than the pastoralists, also collected and transported a relatively high edible shellfish meat mass percentage. At C1/M1 (edible meat mass of 51,3%) a lower percentage of *S. capensis* was collected and a higher percentage of *P. perna* and *D. serra*. The latter two species were responsible for the lower percentage of edible meat mass per total

Table 12. Frequencies of stone artefacts from Seal Point, De Hoek, Tony's Bay Goedgeloof and Thysbaai middens.

	Seal Point		De Hoek		TB	Goedgeloof					Thysbaai	
	SP1	SP2	DH2	DH8	FTS	C1/1	C2/4	C3/1	C3/2	C3/4	WM1	WM2
WASTE												
Chips		2										
Chunks	1	9									2*	6*
Small cores											23*	52*
Cobble cores	2		1			1						
CRP											3*	8*
Flakes	5	72	2	4	4	8	2			2	100*	234*
TOTAL	**8**	**83**	**3**	**4**	**4**	**9**	**2**			**2**	**128**	**300**
UTILISED												
Hammerstones							1					
Hammer/rubber								2				
Rubbers	2											
Milled edge												1
Flakes						4					6*	14*
TOTAL	**2**					**4**	**1**	2			**6**	15
FORMAL											4*	14*
Scrapers											2*	2*
Adzes												1*
Borers												1*
Backed flakes												
Large segments						13	10					
Bored stones						3+						
Sinkers						1+			1#			
Misc. retouched						5					3*	4*
TOTAL						**22**	**10**		**1**		**9**	**22**
OTHER												
ochre	1	1		1								

All quartzite unless indicated differently.

* Silcrete + Hornfels # Calcrete

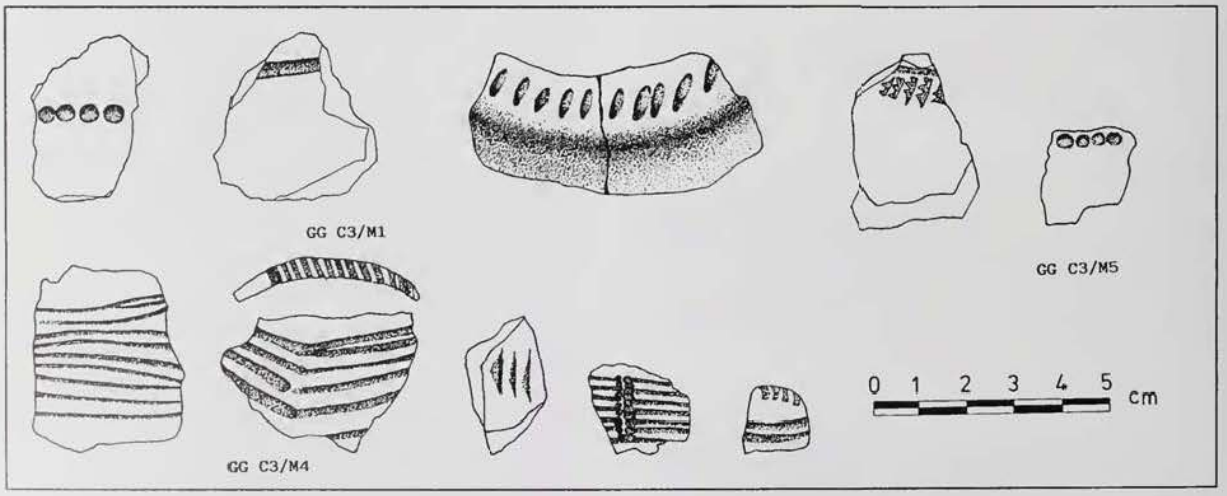

Fig. 7. Decorated pottery from Goedgeloof Complex 3.

Table 13. Minimum numbers of faunal species from the Goedgeloof middens.

	C1/M1	C2/M4	C3/M1	C3/M3	C3/M5	C3/M6	C3/8
MAMMALS							
Canis sp.				1			
Felis sp.				1			
Panthera leo		1					
Arctocephalus pusillus				1			
Diceros bicornis			1	1			
Equus sp.					1		
Hippopotamus amphibius	1	1		1			1
Raphicerus sp.			1	3	1		
Alcelaphus buselapus	1			2	1	2	1
Silvicapra grimmia				1			
Damaliscus sp.							1
Tragelapus strepsiceros				1			
Syncerus caffer		2		1			
Lepus sp.				1			
Ovis aries							
fetus				2			
juvenile			4	8			
sub-adult			4	8		1	
adult			22	22		17	
old			5	12	1	8	3
cf. Bos Taurus				3	3		3
Bovidae - general							
Small				1			
small medium				1		1	
large medium		1	1	1			
large		1		2		1	
TOTAL	**2**	**6**	**38**	**74**	**7**	**30**	**9**
REPTILES (tortoise)							
Homopus areolatus	3		2	1		1	1
MARINE BIRDS							
P. c. lucidus					1		
M. capensis					1		
S. demersus		1			1		
TOTAL		**1**		**1**	**3**		

weight. An even lower percentage of *S. capensis* was collected at C2/M4 (edible meat mass of 39,5%), but a higher *P. perna* percentage. *D. serra* is virtually absent and a higher percentage of *T. sarmaticus* was collected instead, which is responsible for the substantial lower edible meat mass per total weight.

The shellfish remains from all three complexes indicate that the collectors visited different coastal habitats on a regular basis. Collectors would have had to travel a minimum distance of 10 km each time they visited the Kromme River Mouth or the nearest rocky shore. It is also possible that they collected from all three habitats on each trip. A round trip would have been some 14 km, starting either at the river mouth or at the rocky shore. If they started at the river mouth, where they collected *S. capensis*, they would have had to travel another 4 km along the sandy beach to the nearest rocky outcrops. Along the sandy beach they would have collected *D. serra* and at the rocky shore mostly P. perna (as in the case of C1/M1). Virtually no *D. serra* was present at the other two areas. The high frequency of *P. cochlear* at C2/M2, indicates that the trips to the coast, or at least those to the rocky shore, were undertaken during spring tide low. The pastoralists at C3/M4 concentrated only on two species, *S. capensis* and *P. perna* and did not collect *Oxystele* spp. as the 'ceramic' groups did.

The remains of 117 sheep and nine *Bos taurus* recovered from complex 3 (mainly surface collections) place this area

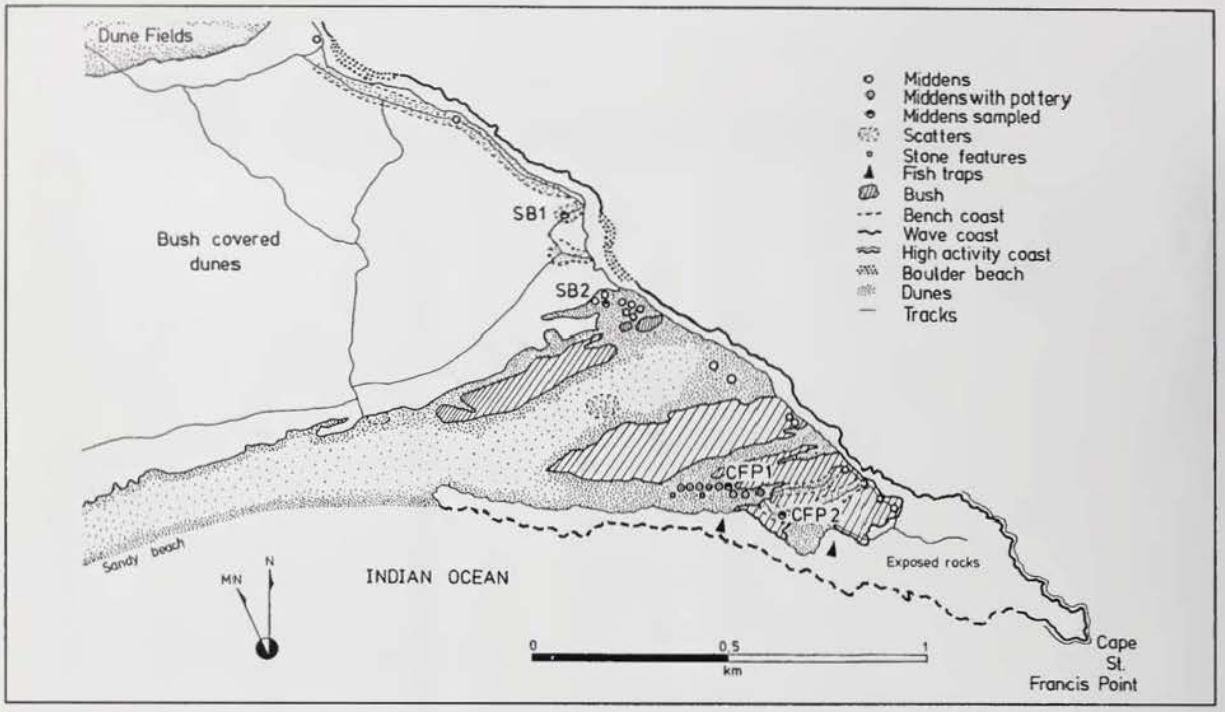

Fig. 8. Map of the archaeological sites and features at Second Bush and Cape St Francis Point..

among the richest Stone Age pastoralist sites in southern Africa. Sixty one of the individuals were adults based on tooth wear studies (J. Brink, pers. comm.). This pattern is different from that found at other pastoralist sites in southern Africa. At Boomplaas Cave (Von den Driesch & Deacon 1985), Kasteelberg and Die Kelders (Klein 1986) most of the remains are those of young to very young animals. The sheep remains from complex 3 represent animals which were necessary to ensure flock viability. The reason for the slaughter of reproductively active adults is not known as yet, but it may be related to social practices. Apart from herding domesticated animals, the pastoralist also hunted a high number of terrestrial animals (Table 13).

SECOND BUSH AREA

The Second Bush middens were situated between the Dune Field area and Cape St Francis Point and located at a large boulder beach (Fig. 8). Many middens were exposed in tracks crossing through former dune fields now covered by dense dune vegetation. The 'ceramic' middens in these two areas did not yield any remains of domesticated animals. Two surface samples were taken in this area (SB1 & 2). SB1 was situated on the northern side of a boulder coast (SFB area side), and SB2 on the southern side of the same boulder coast (Cape St Francis Point side) (Fig. 8). The samples were taken to illustrate the different collecting strategies between 'ceramic' groups and HCF in the same habitat.

SB1 & 2

SB1 was eroded from a road cutting on the northern side of the boulder beach and was dominated by species from the lower balaniod zone. *P. cochlear*, 27,4% [20,3%] was the most important species, followed by *Oxystele* spp., 14,6% and *P. tabularis*, 9,9% [17,8%]. However, *H. midae* (0,5%, [23,4%]) and *H. spadicea* (5,2%, [23,5%) contributed the highest meat mass (Table 14). The ERR was 32,3%.

SB2 was a 'ceramic' midden situated on the southern side of the boulder beach and displayed different shellfish frequencies to that of SFB1. *Oxystele* spp., 29,4% [10,1%] was the most important species, followed by *P. perna*, 17,2% [35,6%] and *Burnupena* spp., 15,6% (Table 14). *T. sarmaticus* was represented by a low frequency (7,8%), but contributed 29,7% of the meat mass. The ERR was 25,9%.

CAPE ST FRANCIS POINT AREA

A large number of shell middens and stone features were situated in the small nature reserve at Cape St Francis Point (Fig. 8 & 9). No excavations were conducted here, but two middens, one with pottery and one without, were sampled for shellfish comparisons. The Point area is a high activity coast with a bench coast on the western side. Two possible fish traps were also found and may be those reported by Goodwin (1946).

CFP1 & 2

CFP1 (Fig. 8) was associated with pottery and the shellfish content was dominated by *Oxystele* spp., 66,1% [20,6], followed by *T. sarmaticus*, 17,7% [61,0%] and *P. oculus*, 12.1% [18,5%] (Table 14). The ERR was 22,7%. It is evident that the 'ceramic' group only exploited the upper

Table 14. Shellfish frequency percentage per species and percentage meat mass contribution from Second Bush and Cape St Francis middens.

	SB1#				SB2*				CSFP*				CSFP#			
	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %
Perna perna	6	2,8			62	17,2	446,4	35,6	5	1,0			149	41,5	1132,4	52,0
Donax serra	3	1,4														
Patella argenvillei	12	5,7			1	0,3			1	0,2			5	1,4		
Patalla barbara	16	7,5			6	1,7			2	0,4			3	0,8		
Patella cochlear	58	27,4	162,4	20,3	40	11,1	112,0	8,9	1	0,2			18	5,0		
Patella longicosta	12	5,7			7	1,9			1	0,2			24	6,7		
Patella miniata	1	0,5			1	0,3			1	0,2			1	0,3		
Patella oculus	20	9,4			31	8,6	195,3	15,6	58	12,1	342,2	18,5	33	9,2	270,6	12,4
Patella tabularis	21	9,9	142,8	17,8	7	1,9										
Haliotis midae	1	0,5	184,4	23,4												
Haliotis spadicea	11	5,2	188,1	23,5												
Oxystele spp.	31	14,6			106	29,4	127,2	10,1	318	66,1	381,6	20,6	66	18,4		
Turbo sarmaticus	9	4,2	119,7	15,0	28	7,8	372,4	29,7	85	17,7	1130,5	61,0	58	16,2	771,4	35,5
Burnupena spp.	5	2,4			56	15,6			9	1,9			2	0,6		
Dinoplax gigas	6	2,8			15	4,2										
TOTAL	212	100,0	800,4	100,0	360	100,0	1253,3	99,9	481	100,1	1854,3	100,1	359	100,1	2174,4	99,9

Buckets sample	1	1	1	1
Buckets analysed	1	1	1	1
Meat mass/volume	800,4	1253,3	1854,3	2174,4
Total collecting mass	2632,3	4846,4	8151,0	7337,4
% meat mass of total mass/volume	**32,3**	**25,9**	**22,7**	**29,6**

* Pottery present # Kabeljous Industry

Only those shellfish species which contributed relatively high meat mass are considered.

Fig. 9. Shell middens in the dunes at Cape St Francis Point.

balaniod zone. Several other 'ceramic' middens in the vicinity display similar patterns. Some of the 'ceramic' middens contain many large quartzite flakes.

Pottery was absent from midden CFP2 and the shellfish content was also different from the 'ceramic' midden. P. perna, 41,5% [52,0%], was the dominating species, followed by *Oxystele* spp., 18,4% and *T. sarmaticus*, 16,1% [35,5%] (Table 14). Although the HCF also concentrated mainly on the upper balaniod zone, they also exploited the lower. *Patella* spp. accounted for 23% of the total frequency, while in the case of the 'ceramic' midden, it only accounted for 13%. The ERR was 29,6%.

Discussion

The middens sampled at Second Bush and Cape St Francis Point clearly indicate the different collecting strategies employed between HCF and 'ceramic' groups occupying a similar coastal habitat. At Second Bush the HCF collected extensively from the lower balaniod zone, indicating that they exploited shellfish only at certain times of the tidal cycle (spring and neap low). Although the 'ceramic' groups also collected from the lower balaniod zone, their use of this zone was substantially less than the HCF. They also concentrated more on collecting species from the upper balaniod zone. The ERR for the Kabeljous midden (SB1) is 32,3%, which is notably higher than that of the 'ceramic' midden (SB2) (25,9%).

The shellfish collecting pattern as observed from the 'ceramic' midden at Cape St Francis Point indicates that these groups mainly collected those species which were to be found in the shallow intertidal pools. They generally collected limpets such as *P. oculus*, but not limpets from the lower balanoid zone. They also did not exploit the *P. perna* beds on the eastern side of the Point (a few hundred metres from the middens). The HCF on the other hand, collected *P. perna* from this part of the coast. It would appear that

Table 15. Shellfish frequency percentage per species and percentage meat mass contribution from the Seal Point middens.

	SP1#				SP2#				SP3#	
	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %
Perna perna	131	4,3	1218,3	10,1	216	8,8	1520,0	15,5	2	1,9
Donax serra	22	0,7			53	2,2	514,1	4,9		
Patella argenvillei	144	4,7	1008,0	8,4	188	7,7	1560,4	14,9	8	7,6
Patalla barbara	22	0,7			9	0,4			8	7,6
Patella cochlear	450	14,7	1260,0	10,4	740	30,2	2442,0	23,3	16	15,2
Patella longicosta	706	23,1	2118,0	17,6	277	11,3	997,2	9,5	12	11,4
Patella miniata	3	0,1			2	0,1			3	2,9
Patella oculus	344	11,3	2029,6	16,8	136	5,6	802,4	7,6	6	5,7
Patella tabularis	36	1,2			25	1,0	435,0	4,1	28	26,7
Haliotis midae					3	0,1			4	3,8
Haliotis spadicea	3	0,1			22	0,9	473,0	4,5	1	1,0
Oxystele spp.	895	29,3	1342,5	11,1	655	26,7	786,0	7,5	4	3,8
Turbo sarmaticus	255	8,4	3085,5	26,6	72	2,9	846,0	8,1	11	10,5
Burnupena spp.	38	1,1			44	1,8				
Dinoplax gigas	5	0,2			6	0,2			2	1,9
TOTAL	3054	99,9	12061,9	100,02	2448	99,9	10476,1	99,9	105	100,0

Buckets sampled	16	20	1
Buckets analysed	16	20	1
Meat mass/volume	753,9	523,8	
Total collecting mass	47849,1	36187,9	
% meat mass of total mass/volume	**25,2**	**28,9**	

Kabeljous Industry

Only those shellfish species which contributed relatively high meat mass are considered.

'ceramic' groups either preferred *Oxystele* spp. to *P. perna* when they had the choice, or they did not make the effort to travel a few hundred metres further to collect higher meat mass species. It is also anomalous that they collected certain limpets and not others. The ERR for the Kabeljous midden (CSFP1) of 29,6% was higher than that of the 22,7% of the 'ceramic' midden (CSFP2).

SEAL POINT AND DE HOEK AREAS

Seal Point

Most shell middens in this area were either destroyed or covered by houses and gardens, but a few were still visible between the houses in the holiday resort of Cape St Francis. On the northern side of Seal Point is a sandy beach and a boulder beach. The Point mainly consists of a high energy coast (Fig. 10). Two HCF middens (SP1 & 2) were excavated and one sampled (SPB). No suitable pastoralist/ 'ceramic' middens were found for sampling.

SP1 and 2

The two excavated middens were situated on the northern side of the boulder beach (Fig. 10). Both middens comprised mainly *Patella* spp. (Table 15). In the case of SP1, *P. longicosta* (23,1% [17,6%]), *P. cochlear* (14,7% [10,4%]) and *P. oculus* (11,3% [19,8%]) represented the important species. *Oxystele* spp. accounted for 29,3% [11,1%] and *P. perna* only 4,3% [10,1%]. *T. sarmaticus*, although it only accounted for 8,4% of the total frequency, contributed the highest meat mass [25,6%].

P. cochlear (30,2% [23,3%]) was the dominating species at SP2, followed by *Oxystele* spp. (26,7% [12,3%]). *P. perna* (8,8% [15,5%]) and *P. argenvillei* (7,7% [14,9%]) were the other main contributors to the total meat mass (Table 15). Pottery was absent from both middens. The ERR's (25,2% & 28,9%) for both middens were low and fall within the 'ceramic' range.

SP3

The shellfish sample taken from this midden, exposed in a road cutting directly opposite the boulder coast, was dominated by *P. tabularis*, 26,7%, followed by *P. cochlear*, 15,2% (Table 15). This midden is an excellent example of HCF collecting strategies. They ignored the small *Oxystele* spp. 3,8%, and collected the larger species from the lower balaniod zone. Other high meat mass species included *P. argenvillei*, 7,6%, *Haliotis* spp., 4,8% and *T. sarmaticus*, 10,5%.

De Hoek

A complete survey of all visible archaeological sites was carried out in this area (Fig. 10). A large number of sites occurred along three kilometres of coast, most only visible in road cuttings. Several middens were sampled to contrast shellfish content between 'ceramic' and HCF middens (Tables 14 & 15). Some three kilometres west of Seal Point

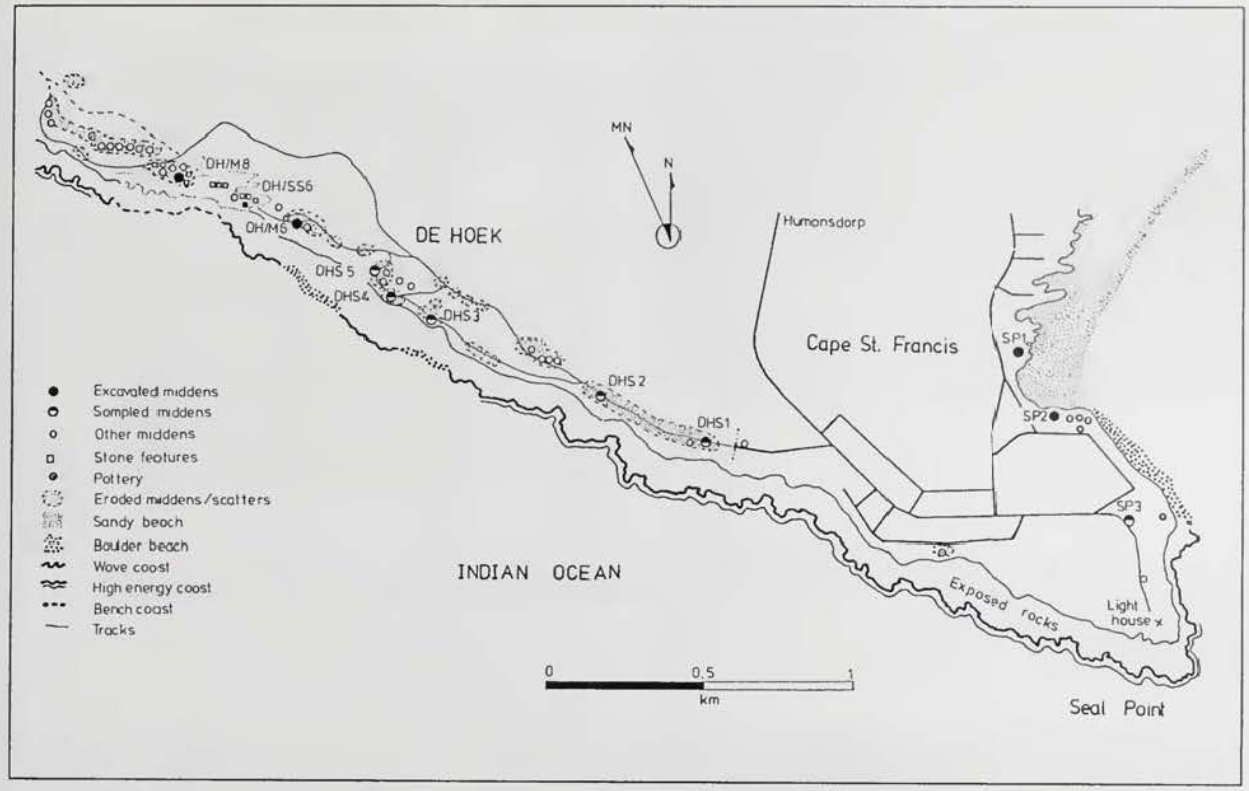

Fig. 10. Map of the archaeological sites and features at Seal Point and De Hoek.

Fig. 11. Shell middens in the dunes at De Hoek.

was a large concentration of middens and stone features (Fig. 11). Three small excavations were conducted there.

DH1 & 2

Two samples were taken from HCF middens adjacent to a high activity coast (Fig. 10). Both were dominated by *Patella* spp., mainly *P. cochlear* (55,8% and 44,3% respectively) (Table 15). *P. perna*, 16,5% and *P. argenvillei*, 15,6%, were also collected in fair numbers at DH1. At DH2 however, *Oxystele* spp., 16,5% and *T. sarmaticus*, 13,7% account for the next highest species. This midden was close to a boulder coast, and this may be the reason for the high frequencies of *Oxystele* spp. and *T. sarmaticus*.

DH3 & 4

Both these middens were of 'ceramic' origin, situated near a boulder coast. *Oxystele* spp. (74,9% and 53,8% respectively) were the most important species (Table 15). *Patella* spp. and other shellfish species were only present in low frequencies.

DH5

This HCF midden was situated next to DH3 and 4 ('ceramic' middens), but displayed a different collecting strategy. The main shellfish species were *P. cochlear*, 26,8% and *T. sarmaticus*, 20,5% (Table 15). Other species from the lower balanoid zone such as *P. tabularis*, 10,0% and *P. longicosta*, 10,5%, were also present. *Oxystele* spp., 5,3%, were largely ignored.

DH/M6

A small excavation was conducted at this badly damaged HCF midden. The midden was situated near a boulder and bench coast. The two most important species were *P. perna* (43,1% [54,1%]) and *P. cochlear* (2,9% [12,3%]) (Table 22). *Oxystele* spp. only comprised 12,3% [3%] of the total frequency. The ERR was 33,8.

DH/M8

Half a kilometre west of DHS2 a large concentration of

Table 16. Shellfish frequency and frequency percentage per species contribution from the De Hoek middens.

	DH1#		DH2#		DH3*		DH4*		DH5#	
	f	f %	f	f %	f	f %	f	f %	f	f %
Perna perna	56	16,5	11	3,1	20	4,3	16	5,5	7	3,7
Donax serra	6	1,8							1	0,5
Patella argenvillei	53	15,6	32	9,0	25	5,4	13	4,5	14	7,4
Patalla barbara	1	0,3	5	1,4	1	0,2	2	0,7	3	1,6
Patella cochlear	189	55,8	158	44,3	6	1,3	25	8,6	51	26,8
Patella longicosta	6	1,7	18	5,0	3	0,6	3	1,0	20	10,5
Patella miniata	2	0,6	1	0,3	1	0,2			7	3,7
Patella oculus	5	1,5	13	3,6	34	7,3	19	6,6	10	5,3
Patella tabularis	2	0,6	9	2,5					19	10,0
Haliotis midae			1	0,3	1	0,2			2	1,1
Haliotis spadicea	2	0,6			1	0,2	4	1,4	1	0,5
Oxystele spp.	6	1,8	59	16,5	349	74,9	156	53,8	10	5,3
Turbo sarmaticus	7	2,1	49	13,7	14	3,0	46	15,9	39	20,5
Burnupena spp.	2	0,6			11	2,4	6	2,1	2	1,1
Dinoplax gigas	2	0,6	1	0,3					4	2,0
TOTAL	339	100,1	357	100,0	466	100,0	290	100,1	190	100,0
Buckets sampled		1		1		1		1		1
Buckets analysed		1		1		1		1		1

	DH/M6#				DH/SS6*				DH/M8*			
	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %
Perna perna	1015	43,1	7917,0	54,1	19	6,2	121,5	12,3	32	1,7	185,6	4,1
Donax serra	4	0,2										
Patella argenvillei	202	8,6	1414,0	9,7					6	0,3	72,0	1,6
Patalla barbara	2	0,1										
Patella cochlear	517	21,9	2068,0	14,1					7	0,4		
Patella longicosta	48	2,0							8	0,4		
Patella miniata	6	0,3										
Patella oculus	20	0,9			4	1,3			119	6,3	785,4	17,3
Patella tabularis	10	0,4										
Haliotis midae	4	0,2										
Haliotis spadicea	60	2,5	1998,0	13,6	1	0,3			4	0,2		
Oxystele spp.	291	12,3			246	80,7	344,4	34,7	1570	82,6	2041,0	45,0
Turbo sarmaticus	94	4,0	1250,2	8,5	35	11,5	525,0	53,0	146	7,7	1460,0	32,0
Burnupena spp.	83	3,5							8	0,4		
Dinoplax gigas	3	0,1							1	0,1		
TOTAL	2359	100,1	14647,2	100,0	305	99,9	990,9	100,1	1909	100,1	4544,0	100,0
Buckets sampled			10				10				6	
Buckets analysed			10				10				6	
Meat mass/volume			785,3				99,1				757,3	
Total collecting mass			82823,4				4527,9				177703,3	
% meat mass of total mass/volume			**33,8**				**21,9**				**25,7**	

All grab samples

* Pottery present # Kabeljous

Only those shellfish species which contributed relatively high meat mass are considered.

middens and stone features associated with pottery were situated opposite a bench coast. A small excavation was conducted at one of the pottery middens to establish the shellfish content. The midden consisted mainly of *Oxystele* spp. (82,6% [45,0%]) and *Turbo sarmaticus* (7,7% [32,0%]) (Table 16). The ERR was 25,7%.

DH/SS6

This was a large stone feature eroding from a dune. A small excavation was carried out to investigate the feature (Binneman 2001, fig.18). Little shellfish, mainly *Oxystele* spp., 80,7 [34,7%]% and *T. sarmaticus*, 11,5% [53,0%], were recovered (Table 16). The ERR was 21,9%. Large quantities of charcoal were found between and underneath the fire cracked stones. This stone feature was probably a large hotplate for cooking shellfish. The feature has been radiocarbon dated to 290 ± 50 BP (Pta-3908).

Discussion

The ERR's of both middens at Seal Point are low (SP1, 25,2% and SP2, 28,9%) and are similar to that of 'ceramic' middens, for example, DH/M8 (25,7%) (Table 14). The reason being that *Patella* spp. contain a relatively low meat mass in relation to the shell size and weight. Large frequencies of *P. cochlear*, *P. longicosta* and *Oxystele* spp. are responsible for the low ERR's.

In the De Hoek area the shellfish samples from 'ceramic' and HFC middens indicated clearly that the two groups had different collecting strategies in the same habitats. 'Ceramic' groups preferred to collect easily available species from the upper balaniod zone such as *Oxystele* spp. and were generally not 'interested' in limpets or species from the lower balaniod zone. The HCF on the other hand, generally ignored small species and tended to collect from the lower balaniod zone that provided them species with higher meat mass per volume. This is evident from the ERR's (Table 14). The Kabeljous midden (DH/M6) has an ERR of 33,8% and the 'ceramic' midden (DH/M8) and stone feature (DH/SS6) 25,7% and 21,9% respectively.

THYSBAAI AND TONY'S BAY AREAS

Thysbaai

A large number of archaeological features were present east of Thysbaai and in the dune system adjacent to the coast (Figs 12 & 13). This dune system, now separated by vegetation, was once part of the main bypass system that stretches between Oyster Bay and St Francis Bay. On the eastern side of the sandy beach were a large number of shell middens, Middle Stone Age and Earlier Stone Age sites. A very dense mixed M.S.A. and E.S.A. site stretches along the crest of a fossilised dune over a distance of a kilometre (Binneman, 2001, fig. 6). Three types of middens occurred in the dunes, namely, those with pottery, those with a Kabeljous Industry and those with a microlithic silcrete Wilton Industry. The middens sampled were between one and 1,5 km from a high energy coast.

Fig. 12. Shell middens in the dunes overlooking Thysbaai.

TBW1

A surface collection of silcrete stone tools was made from this badly eroded midden. The collection revealed a high number of cores, while segments were absent (Table 12). A radiocarbon date of 1720 ± 50 (Pta-8653) was obtained for this midden.

TBW2

This was a large midden measuring approximately 65 x 15 m. The midden was situated on top of a high fossilised dune some 1,5 km from the coast. The midden carried a vast number of microlithic silcrete stone tools (Table 12). A sample of the shellfish was taken and a 15 minute surface collection of stone tools was also carried out. The assemblage also lacked segments, but yielded a large number of cores. A shell sample has been radiocarbon dated to 3760 ± 60 BP (Pta-5050) (true date). The sample was dominated by *P. cochlear*, 37,5% [22,3%] and *P. argenvillei*, 26,3% [27,2%] (Table 17). The ERR was 28,2%.

TBK2

This midden was part of a complex of middens stretching over a distance of some three hundred metres, and was situated about one kilometre from the coast. Apart from a few 'ceramic' middens, all revealed a Kabeljous Industry. The shellfish sample was dominated by *P. cochlear*, 49,1% [55,6%], *P. perna*, 11,4% [25,2%] and *T. sarmaticus* 5,1% [19,2%] (Table 17).The ERR was 27,8%

TBH3

This midden was one of a few 'ceramic' middens situated among HCF middens. The shellfish sample again illustrates the differences between 'ceramic' groups and HCF collecting strategies. *Oxystele* spp., 48,4% [13,8%] and *T. sarmaticus*, 29,8% [75,8%] were the two most important species (Table 17). Neither of these two species were collected in any great numbers at any of the HCF middens. The ERR was 22,7%.

Tony's Bay Area

The coastline between Oyster Bay and Thysbaai was

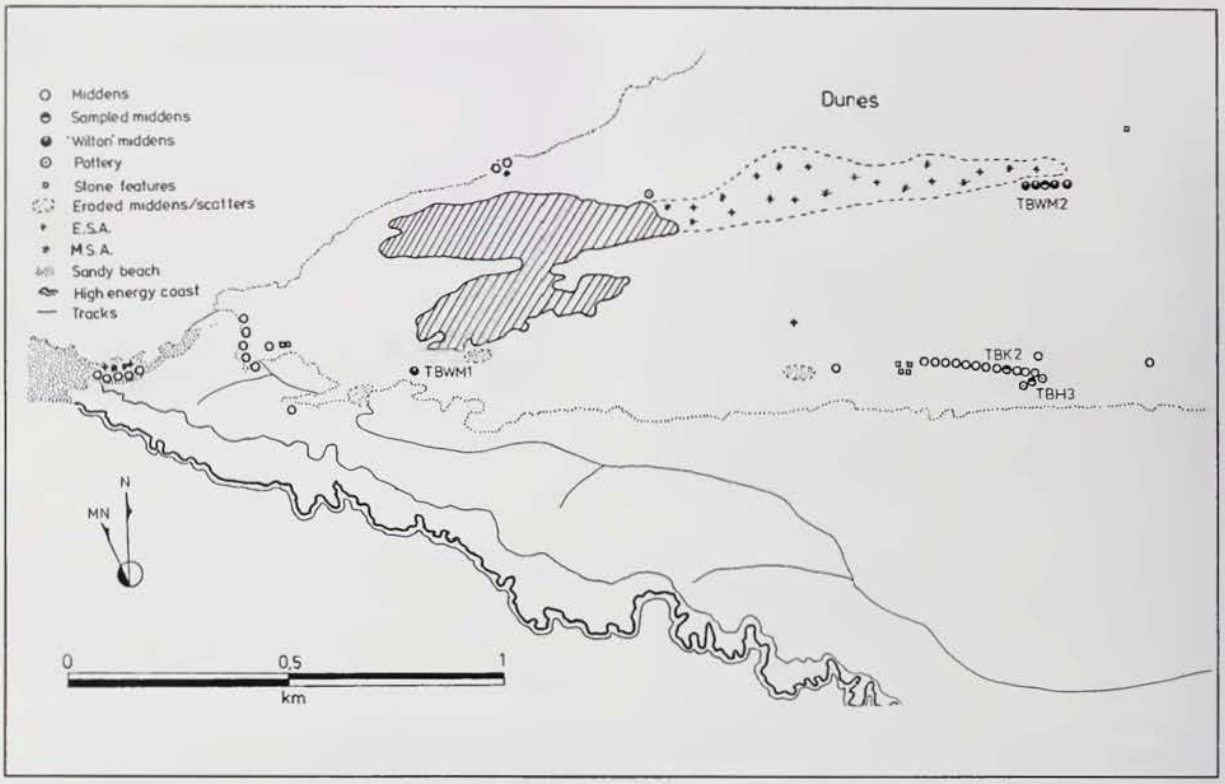

Fig. 13. Map of the archaeological sites and features at Thysbaai and adjacent dunes.

Table 17. Shellfish frequency percentage per species and percentage meat mass contribution from the Thysbaai middens.

	TBW2'				TBK2"				TBH3*			
	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %
Perna perna	27	9,2	210,6	10,6	47	11,4	366,6	25,2	5	1,5		
Donax serra					2	0,5						
Patella argenvillei	77	26,3	539,0	27,2	27	6,6			26	7,7	182,0	10,3
Patalla barbara	3	1,3			3	0,7						
Patella cochlear	110	37,5	440,0	22,3	202	49,1	808,0	55,6	14	4,2		
Patella longicosta	14	4,8			18	4,4						
Patella miniata												
Patella oculus	4	1,4			12	2,9			24	7,1		
Patella tabularis	19	6,5	281,2	14,2	9	2,2						
Haliotis midae	1	0,3	260,8	13,2	2	0,5						
Haliotis spadicea					7	1,7						
Oxystele spp.	19	6,5			53	12,9			162	48,4	243,0	13,8
Turbo sarmaticus	15	5,1	246,5	12,5	21	5,1	279,3	19,2	100	29,8	1330,0	75,8
Burnupena spp.	4	1,4			6	1,5			3	0,8		
Dinoplax gigas					2	0,5			2	0.6		
TOTAL	1022	100,0	1978,1	100,0	411	100,0	1453,9	100,0	336	100,0	1755,0	99,9
Buckets sampled			1				1				1	
Buckets analysed			1				1				1	
Meat mass/volume			1978,1				1453,9				1755,0	
Total collecting mass			7010,5				5234,3				7724,8	
% meat mass of total mass/volume			**28,0**				**27,8**				**22,7**	

' Wilton Industry " Kabeljous Industry * Pottery present

Only those shellfish species which contributed relatively high meat mass are considered.

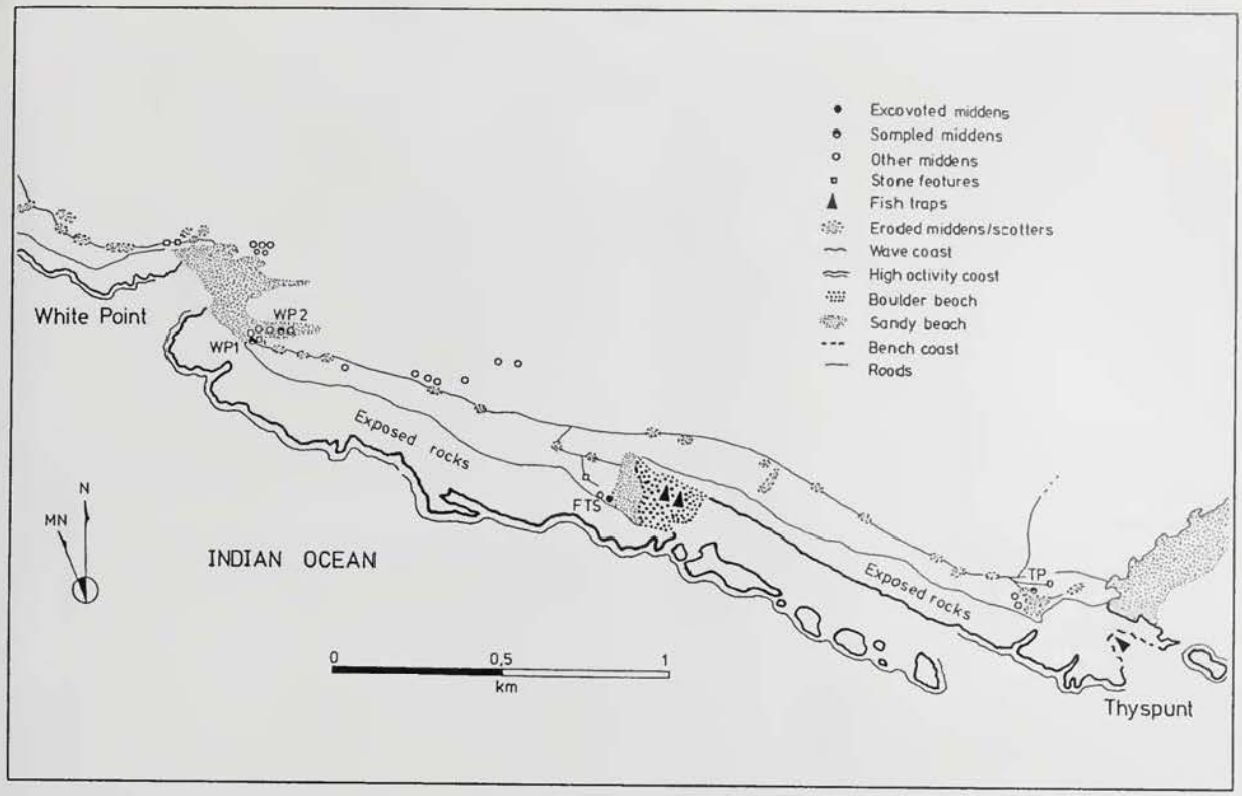

Fig. 14. Map of the archaeological sites and features at Tony's Bay.

Fig. 15. Shell middens and stone features in the dunes at White Point.

rich in shell middens (Fig. 14). The dune field adjacent to Tony's Bay contained a large number of Middle Stone Age sites with well preserved bone (Binneman 2001, fig.7). Most of the sites were situated on old deflation surfaces, calcretes and fossilised dunes. A complete survey of the visible archaeological features along the coast was conducted.

The middens along the coast were mainly visible in road cuttings, except for a large accumulation at White Point (Fig. 15). A few middens were sampled to establish the shellfish content of the different types of middens. The middens associated with stone features did not contain pottery as did those at De Hoek. Middens were also sampled between White Point and Thyspunt. Two fish traps are present along this part of the coast, a small one at Thyspunt and a large one between Thyspunt and White Point. A small midden (FTS) which contained abundant fish remains and pottery was sampled at the large fish trap.

WP1 & 2

A large concentration of middens associated with stone features were situated at White Point, near a small sandy beach flanked by high activity wave beaches (Fig. 9). Two HCF middens were sampled here, one associated with a stone feature (WP1) and one which displayed an interesting content of shellfish remains (WP2). The shellfish sample from WP1 consisted mainly of *P. longicosta*, 28,2% [37,1%], followed by *P. perna*, 16,5% [25,5%] and *P cochlear*, 14,6% (Table 18). The ERR was 25,1%.

WP2 yielded interesting information. This is the only open-air HCF midden investigated which was dominated by *Oxystele* spp. (39,3% [16,6%]) (Table 18). *P. longicosta*, 15,8% [13,4%] accounted for the second highest number. Another interesting aspect is that *D. serra*, 9,7% [35,1%] was also represented at the midden, which suggests that the collectors had to travel at least 3 km to either Thysbaai or Slangbaai to collect them. The ERR was 30,3%.

Table 18. Shellfish frequency percentage per species and percentage meat mass contribution from the Tony's Bay middens.

	FTS*				WP1#				WP2#				TP#			
	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %	f	f %	mm/gr	mm %
Perna perna	55	7,6	286,3	18,7	78	16,5	592,8	25,5	52	8,8	384,8	18,4	13	5,6		
Donax serra	1	0,1			2	0,4			57	9,7	732,9	35,1				
Patella argenvillei	7	1,0			24	5,1	326,4	14,0	19	3,2			21	9,1	207,9	2e+18
Patalla barbara	1	0,1			20	4,2			4	0,7			2	0,9		
Patella cochlear					69	14,6			47	8,0			23	9,9		
Patella longicosta	20	2,8			133	28,2	864,5	37,1	93	15,8	279,9	13,4	50	21,6	150,0	
Patella miniata	4	0,6			6	1,3			3	0,5			3	1,3		
Patella oculus	69	9,5	365,7	23,3	28	5,9			19	3,2			32	13,8	156,8	
Patella tabularis					2	0,4			6	1,0			7	3,0		
Haliotis midae													1	0,4	264,7	
Haliotis spadicea	2	0,3	276,0	17,6	4	0,8							1	0,4		
Oxystele spp.	230	69,9	642,6	40,9	42	8,9			231	39,3	346,5	16,6	25	10,8	518,7	
Turbo sarmaticus	63	8,7			41	8,7	545,3	23,4	26	4,4	345,8	16,5	39	16,8		
Burnupena spp.	24	3,3			19	4,0			30	5,1			4	1,7		
Dinoplax gigas	1	0,1			4	0,9			1	0,2			11	4,7		
TOTAL	4674	100,2	1570,6	100,0	472	99,9	2329,0	100,0	588	99,9	2089,9	100,0	232	100,0	1298,1	
Buckets sampled				4				1				1				1
Buckets analysed				2				1				1				1
Meat mass/volume				785,3				2390,0				2089,9				1298,1
Total collecting mass				3349,8				9511,2				6906,5				4043,1
% meat mass of total mass/volume				**23,4**				**24,5**				**30,3**				**27,5**

* Pottery present
\# Kabeljous Industry

Only those shellfish species which contributed relatively high meat mass are considered.

FTS

This midden was situated at a boulder beach which also housed a large fish trap. The midden yielded pottery, a few quartzite flakes (Table 10 & 12) and a large quantity of fish remains. The sample taken from this midden was totally dominated by *Oxystele* spp. (65,9% [17,6%]). Three other species were also important as far as the meat mass was concerned, namely, *T. sarmaticus* (8,7% [40,9%]), *P. oculus* (9,5% [23,3%]) and *P. perna* (7,6% [18,2%]) (Table 18). The ERR was 23,4%.

TP1

This midden was situated at Thyspunt near a bench coast and a small fish trap. A sample was taken to contrast a hunter-gatherer midden near a bench coast with that of FTS. As expected, *Patella* spp. dominated the sample, with *P. longicosta*, 21,6% [11,6%], accounting for the highest frequency, followed by *T. sarmaticus*, 16,8% [40,0%], *P. oculus*, 13,8% [12,1%], *P. cochlear*, 9,9% and *P. argenvillei*, 9,1% [16,0%]. *Oxystele* spp. only comprised 10,8% (Table 18). The ERR was 32,1%.

Discussion

The shellfish remains confirmed the different collecting strategies between HCF and 'ceramic' groups. The HG and HCF middens were dominated by *Patella* spp. and the 'ceramic' middens by *Oxystele* spp. Samples from large Wilton (TBW2) and Kabeljous (TBK2) middens provided ERR's of 28,2% and 27,8% respectively, which are higher than the 'ceramic' midden which has a ERR of 22,7% (TBH3) (Table 16). The enormous middens in this region may indicate that this area was occupied by large groups for extended periods of time. It is interesting that this area was also used by Early and Middle Stone Age people.

Similar to all the other 'ceramic' middens, FTS was also dominated by *Oxystele* spp. and therefore has a low ERR of only 23,4% (Table 18). However, one of the Kabeljous middens at White Point (WP1) (Fig. 9), dominated by *Patella* spp, has only a marginally higher ERR of 25,1%. Similar results were obtained from another Kabeljous midden sampled at Thyspunt (TP) which has a ERR of 32,1%. The reason being, as pointed out earlier, that although *Patella* spp. are relatively large the ERR was lower than mussels, but on the other hand higher than *Oxystele* spp. This is well illustrated by midden WP2 where *D. serra* were collected which increased the ERR to 30,1% (Table 18). The interesting point at this Kabeljous midden is that *Oxystele* spp. account for the highest frequency collected. This is the only Kabeljous/Wilton open-air midden found where *Oxystele* spp. were collected in such a high percentage frequency (39,3%). However, the other middens in the same area contained virtually no *D. serra*. In

general, the Tony's Bay sites displayed similar patterns as observed elsewhere for shellfish collecting between 'ceramic' and HG/HCF groups.

DISCUSSION OF THE OPEN-AIR MIDDENS

The survey of open-air shell middens along the Cape St Francis coast revealed that approximately 80% were located within 300 m of the coast. More than 95% were situated along the rocky coasts. This pattern is similar to that experienced elsewhere (Avery 1976). However, this is the type of pattern expected for this part of the coast, because the sandy beaches do not have any significant *Donax serra* populations as elsewhere along the eastern Cape coast. Large middens were also found up to 5 km from the coast which indicates that people did not depend on shellfish as a staple food and their resources did not dictate where they could stay.

The shellfish remains recovered from the different types of middens seem to follow two distinct patterns and can be explained in different ways. The HG, HCF and pastoralist middens displayed a similar shellfish collecting strategy. In general they collected those species with the highest meat mass available, and/or those which were abundant, providing they had a relatively high meat mass per species. This pattern is also observed among contemporary shellfish collectors (Bigalke 1973; Meehan 1982). These groups also collected extensively from the lower balanoid zone where the larger shellfish species are to be found, although these species do not necessarily provide the highest ERR's. In general this strategy was practised at all the different habitats. Although not clearly evident in all the middens investigated, it would appear that HG, HCF and pastoralists collected shellfish mainly during the new moon and full moon phases.

The distance between campsite and collecting place also played an important role in the species collected. In the cases where the campsites were far from the coast, for example the Goedgeloof sites, small numbers of small species were brought back. Only those with relatively high meat mass were brought back to the campsites in quantity. The collecting strategies at the Goedgeloof sites are of particular interest because it would appear that these groups collected mainly those species which provided them with the highest ERR's, such as *S. capensis, D. serra* and *P. perna*. They also exploited three different habitats.

The 'ceramic' middens, on the other hand (predominantly those without domesticated fauna), reflect a different collecting strategy. Groups that occupied these sites collected mainly abundant small, easy to collect species with a low meat mass per individual from the upper balaniod zone. In general they practised this strategy at all the different habitats. This collecting strategy was less economical than that of the other groups as is illustrated by the ERR's. This strategy may indicate that 'ceramic groups' collected shellfish regularly irrespective of the tide cycle, species or size, which suggests that they in general were more dependant on shellfish than the other groups. It may be argued that the pastoralists/'ceramic groups' had containers in which they could boil large quantities of *Oxystele* spp. However, there is no historical or ethnographic evidence that shellfish were boiled in pots. Pots were used mainly to boil fat (L. Webley, pers. comm.). 'Ceramic' groups also collected in the immediate area of their campsites. HG, HCF and pastoralists seemed to have often travelled between two to three kilometres from their campsites to the nearest sandy beach to collect *D. serra*.

As mentioned earlier, pastoralist sites reflect a collecting strategy similar to that of the HG and HCF. It is clear from the large number of sheep, presence of cattle (and other resources such as milk) and terrestrial faunal remains present at Goedgeloof that they had no 'shortage' of food. In addition to these resources they probably also built and maintained fish traps. Thus although shellfish were only supplementary to the diet, pastoralists still collected species with high meat mass per individual. The pastoralist middens in the Goedgeloof area also display the highest ERR recorded for the research area. The fact that HG, HCF and pastoralists collected shellfish only at specific periods (spring and neap tide low) when the larger species were available, may indicate that these groups were less dependent on shellfish than the 'ceramic' groups. Shellfish were collected to add variety to the diet, but at the same time the variety had to be supplied to probably large numbers of people. In the case of HG and HCF, shellfish were most probably collected during periods of aggregation. Pastoralists, it is presumed, always lived in relatively large groups. 'Ceramic' groups most probably consisted of smaller numbers of people and they collected shellfish more regularly than the other groups, and therefore collected whatever species were available irrespective of size and species.

Alternatively, it can be argued that pastoralist, HG and HGF were been more dependent on shellfish than 'ceramic' groups. In order to be able to stay in large groups for extended periods, for example during periods of aggregation, groups had to rely on large species as supplement to their diet. *P. perna* and *D. serra* were collected because these species provided the most substantial and profitable return of species available for exploitation. Only those species which were 'socially' to their advantage were collected; in other words, those which made it possible for groups to aggregate. The small species collected by the 'ceramic' groups may indicate that shellfish played a minor role in their diet and were only collected to provide variety. Whatever the case may be, ethnographic evidence seems to suggest that shellfish were only supplementary to the diet even when collected regularly (Meehan 1982). Large amounts of shellfish can in any case only be eaten for limited periods (Noli & Avery 1988).

The one to one explanation of shellfish collecting given above is not entirely convincing. Shellfish collecting, along with all other activities, took place within social contexts. Meehan (1982) and Bigalke (1973) reported that women collected shellfish among the Gidjigali and Nguni speaking peoples respectively, but that men performed this task

among the ǂAonin people (Budack 1977). Among all three groups men were responsible for catching fish. Whether men also collected shellfish among prehistoric pastoralist groups is not known. It is possible that the ǂAonin are an isolated case or that the role of shellfish collecting changed during historic times. No direct evidence is available for HG/HCF, but it is assumed that women also collected shellfish.

It can be speculated that the difference in the collecting strategies between pastoralists and 'ceramic' groups may reflect changes in the relations of power. The view taken here is that herding formed the ideological base through which relations of power were generated in and between pastoralist groups. When groups lost their stock, men, women and the group as a whole lost much of their power base. In other words, men lost a substantial amount of status as far as their role as food producers in the group was concerned. Although it is not possible to establish the role of domesticated animals in social relations and subsistence, it can be assumed that pastoralists were most probably dependent on milk and other related products at certain times of the year (Webley 1984). In order for men to remain important food providers they took over the role of collecting shellfish. By adding shellfish collecting to their existing activities of hunting and fishing, they regained some status and power as food providers. This meant that shellfish were collected more often than was the case previously. Alternatively, it can be argued that women also lost part of their power base when the group lost their stock, for example, milking and other related duties that accompanied it. In order to remain important as food providers they collected shellfish more regularly.

As I have explained earlier, one of the most interesting aspects of the open-air shell midden investigation is the fact that there existed two distinct lithic industries side by side along the coast, namely, a microlithic silcrete industry similar to that found in caves and shelters of the adjacent mountains and a quartzite cobble industry which I named the Kabeljous Industry. The industry is named after a shelter with the same name excavated by Dr John Hewit during 1925 (Hewit 1925). These two industries co-existed from ca 4700 BP (at Klasies River Cave 1) to 1720 BP along the Cape St Francis coast. The microlithic assemblages from the shell middens seem to lack backed tools such as segments, but segments were present in the cave sites. The Kabeljous Industry contains all the formal elements of the microlithic industry, only the elements are large and manufactured from a different raw material. Silcrete is absent from the coastal foreland but abundant resources are present in the adjacent mountains (Binneman 1985). In general silcrete is not present on Kabeljous middens, which indicate that these groups did not move beyond the coastal foreland, did not collect silcrete from middens and did not trade for the raw material with groups who brought it to the coast. Middens containing Kabeljous stone tools are distributed throughout the research area, but middens containing microlithic stone tools are concentrated only in the SFB2 and Thysbaai areas. It would appear that silcrete as a raw material is restricted to the western side of the Kromme River.

The Kabeljous Industry do not represent an 'adaptation' to a coastal environment, because the shell fish and the faunal remains are similar to those sites reflecting Wilton Industries. Therefore it would appear that there is no functional reason for the difference in the industries. One suggestion may be that the different lithic toolkits were powerful expressions of symbolic group identity and maintenance of social boundaries (Giddens 1979; Shanks & Tilley 1987; Henderson & Binneman 1997). This aspect and others mentioned above will be discussed in more detail once the research results from the caves and shelters are published.

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