Research Article

ANTIQUITY OF STONE-WALLED TIDAL FISH TRAPS ON THE CAPE COAST, SOUTH AFRICA

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ABSTRACT

This paper attempts to answer a long-standing question in South African archaeology: the age of stone-walled tidal fish traps generally believed to date back to pre-colonial times. Since the stone walls cannot be directly dated, we sought datable fish bone in nearby archaeological sites. Four open shell middens at Paapkuil Fontein, near Cape Agulhas, were excavated and analysed and the contents of two previously excavated middens at Still Bay were studied. Both areas are renowned for their numerous fish traps, but lack detailed archaeological studies. The middens yielded very little, if any fish bone, so are probably unrelated to the traps. There is, by contrast, a great deal of archival evidence for the building and use of stone fish traps by historical communities, with traps repeatedly built and dismantled in the late 19th and 20th centuries. Given the lack of any direct evidence in Later Stone Age sites, a pre-colonial age for the practice of fishing with stone-walled tidal fish traps can no longer be entertained.

Keywords: fish trap, weir, Later Stone Age, shell middens.

INTRODUCTION

Stone-walled tidal fish traps (hereafter referred to as fish traps) are a well known feature of the Western Cape coast, especially along the Indian Ocean coastline (Fig. 1). These structures consist of stone-walled enclosures which are submerged at high tide, enabling fish to swim into them. The catch is then corralled when the water recedes, and can be collected by netting or spearing. Although some traps remain in use today, they are generally believed to be of considerable antiquity. Goodwin (1946), on the basis of his work at Oakhurst Rock Shelter, first proposed that they might have been used by pre-colonial Khoe-San people. Avery (1975, 1976) proposed dates of *c.* 3000–2000 BP, while Poggenpoel (1996) suggested that they could have been in use as early as the mid-Holocene. A widely-distributed poster published by the Directorate of Marine and Coastal Management (a section of the Department of Environmental Affairs and Tourism), and displayed in many localities along the Cape coast, refers to 'ancient tidal fish traps'

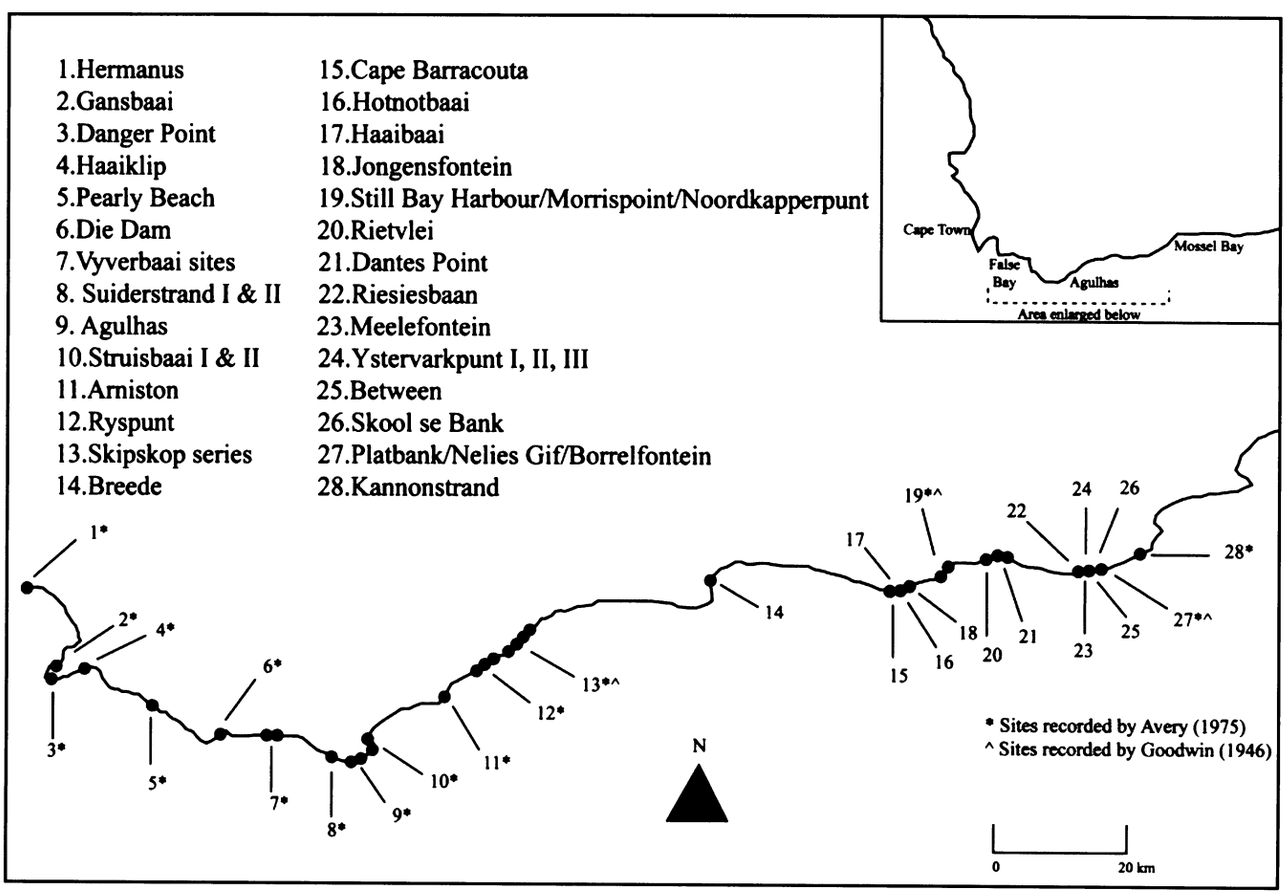

FIG. 1. *Distribution of fish traps along the south coast of the Western Cape. Map adapted from Kemp (2006).*

and their use by Khoe-San people. There is, however, little evidence on which to base such claims. The primary aim of this paper is to evaluate the antiquity of fish traps in the Western Cape.

Previous research on fish traps has been sporadic and has focused primarily on mapping their distribution on the landscape, recording fish catches and assessing living invertebrate populations therein (Goodwin 1946; Avery 1975, 1976; Gribble 2005; Kemp 2006). By contrast, our focus here is purely on the antiquity of the traps. Since the stone walls themselves cannot be dated, we excavated several shell middens in close proximity to fish traps. The aim was to investigate the depositional history of the middens, with particular emphasis on the identification and vertical distribution of fish remains. Recognizing and dating fish species more likely to have been caught in fish traps than by other means should give an indication of the antiquity of the traps.

Fish are well represented in coastal Holocene sequences of the Western Cape, yet we know relatively little about their role in prehistoric economies (Poggenpoel 1996; Inskeep 2001; van Niekerk 2004). Material remains relating to the technology of fishing are not well represented in southern African archaeological assemblages. Stone 'sinkers' and fish gorges are known from only a few sites and only some time periods (Louw 1960; Deacon 1970; Parkington 1977; Poggenpoel & Robertshaw 1981; Schweitzer & Wilson 1982; Inskeep 1987; Orton & Halkett 2007), and their use in the way the names imply is by no means certain. If coastal fish traps do, in fact, constitute a fishing method of considerable time-depth, there are wider implications for our understanding of mid- to late Holocene lifeways. The labour required to build and maintain these traps, and the ability to harvest large quantities of food would undoubtedly have tied people to particular localities and influenced settlement patterns. From the mid-Holocene, hunter-gatherer societies were undergoing fundamental social and economic restructuring, *viz.* delayed return systems in the form of storage of plant foods in the south eastern Cape (Deacon 1976; Hall 1990), possible processing and preservation of shellfish along parts of the west coast (Jerardino 1996), complex ritual behaviour (Hall & Binneman 1987; Hall 1990, 2000), and increased sedentism and territoriality (Sealy 2006). Populations were growing and there appears to have been pressure on food resources. Were fish traps first built and used at this time? Another possibility is that they are linked with the appearance of Khoe-San herders in the Western Cape after 2000 BP.

Fish traps are principally geared towards the exploitation of shoaling species. The species most commonly caught are haarders or mullet belonging to the Mugilidae family (especially *Liza richardsonii*, the southern mullet and *Mugil cephalus*, the flathead mullet), which favour inshore shallows and estuaries and are rarely caught with hook and line (van der Elst 1993). Recent research has shown that *Liza richardsonii* may comprise up to 100% of catches in fish traps (Kemp 2006), and up to 8000 mullet have been reported from a single trapping event (Haddad 2003). Other species are also taken, most notably *Dichistius capensis* (galjoen), *Sparodon durbanensis* (white musselcracker), *Sarpa salpa* (strepie) and *Pomatomus saltatrix* (elf) (Avery 1975; Kemp 2006). A wide range of species may be caught in fish traps, and van Niekerk (2004) has suggested that this diversity should be reflected in archaeological assemblages. We expect, however, that the use of fish traps should yield large quantities of *Mugilidae* spp. It is possible that not all fish were consumed at the trap site. Some may have been preserved for transport to other locations (as in the modern-day drying of mullet, known locally as *bokkoms*). Historically, the minimum period for sun- and wind-drying of fish in the southern Cape in good weather conditions was 4–5 days (Tothill 1899 *in litt.*). The entire process of making *bokkoms*, which involves salting and then drying, can take up to two weeks (Anon. 2005). Any processing probably took place close to the catch site, in order to prevent spoilage. We would, therefore, expect at least some fish bone to be present in middens as a result of meals consumed during the processing period. If processing involved removal of heads or other parts, then evidence should be visible in the archaeological record.

Mullet bones are generally more fragile and less likely to survive in archaeological sites than those of larger bodied fish. Coastal shell middens in the winter rainfall area of South Africa, however, offer extremely good conditions for bone preservation, and bones of small fish species are preserved at a number of sites (Poggenpoel 1996; van Niekerk 2004). Considering the large quantities of mullet trapped today, taphonomic processes ought not to have entirely removed this species from fish-trapped archaeological assemblages. A recent study (Nagaoka 2005) demonstrated that the use of 3 mm mesh screens is adequate to ensure recovery of mullet remains from archaeological deposits. All controlled archaeological excavations along the Western Cape coast, at least during the last 40 years, have used sieves with 3 mm or smaller mesh sizes. This means that archaeological assemblages recovered during this time can be used to assess the importance of mullet in the faunal remains.

PREVIOUS RESEARCH

The first systematic investigation into fish traps was conducted by Goodwin (1946) in his paper "Prehistoric fishing methods in South Africa". The stimulus for this work lay in his excavations at Oakhurst Rock Shelter (Goodwin 1938), located about 14 km inland from the coast. He noted a marked increase in the frequency of vertebrate fish remains in the mid- and late Holocene, compared with older layers. This suggested that the inhabitants had the technology to catch fish regularly and in quantity at that time. Since no artefacts were found that seemed likely to have been used for fishing, Goodwin suggested the possible use of fish traps, and he further proposed that the best way to investigate this hypothesis would be through archaeological excavation of nearby shell middens. Unfortunately, there is no detailed report on the Oakhurst fish remains, so we do not have species identifications and abundances. However, increased reliance on fish during the mid-Holocene is consistent with the picture of hunter-gatherer groups widening their dietary breadth and emphasizing small package food items (Hall 1990). Inskeep (1987) reported a substantial increase in the quantities of fish recovered from post-Wilton levels (i.e. those post-dating 3300 BP) at Nelson Bay Cave.

Graham Avery (1975, 1976) studied fish traps between Kleinmond and Cape Agulhas. As in Goodwin's earlier work, the focus was on location and mapping. Avery also provided important information on the operation and function of the traps, including statistics from local informants on the species and numbers of fish caught. Using what was then known about past sea-levels, Avery suggested a likely age for fish traps of 3000–2000 years, after sea level had stabilized at approximately its present position.

Thirty years later, the South African Heritage Resources Agency (SAHRA), as part of the National Survey of Underwater Heritage, undertook extensive mapping and surveying of fish traps between False Bay and Mossel Bay. One aim was to produce high-quality digital orthophotos showing the locations of fish traps, and to verify them by means of ground surveys

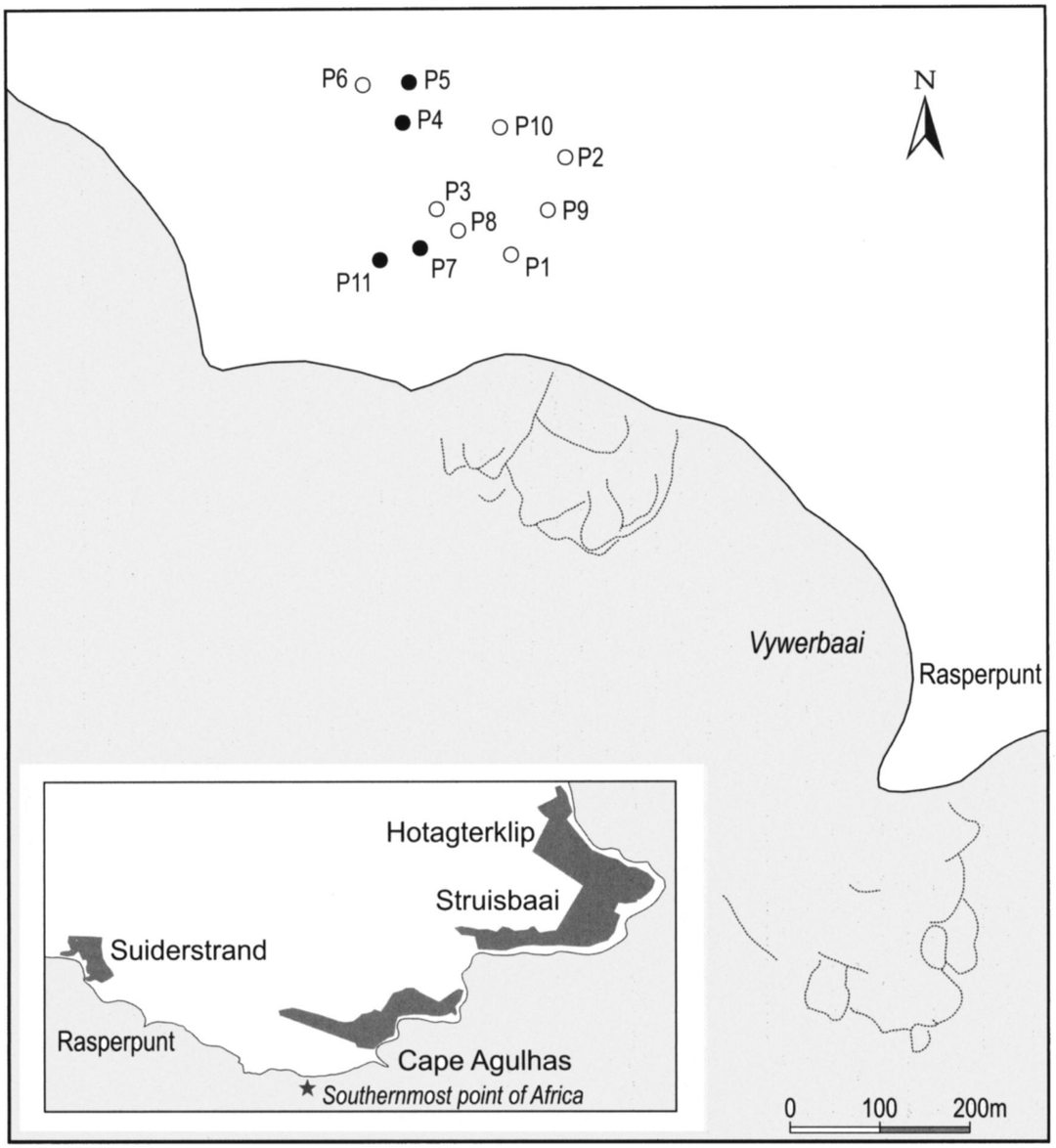

FIG. 2. *Locations of Paapkuil Fontein shell middens (solid dots show excavated sites, open dots unexcavated) and nearby stone-walled tidal fish traps (dotted lines). Shading indicates urban areas of Struisbaai, etc.*

(Gribble 2005). Much of the work done by the SAHRA group was described by Kemp (2006). There is now extensive documentation of all surviving fish traps along the south coast, including high-quality digital orthophotos. Kemp (2006) focused on the ecology of fish traps, their possible impact on fish populations and invertebrate communities, and their conservation as heritage resources. None of the above-mentioned studies provided clarity on the archaeological associations of the traps, if such exist.

RESEARCH AREA

To explore this issue, two localities along the south coast were earmarked for archaeological investigation. The first was Suiderstrand, part of the farm Paapkuil Fontein 281, near Cape Agulhas. This bay is also known as Vywerbaai, from the Afrikaans 'vywer' meaning a fish trap – evidence for the prominence of these structures in the bay (Figs 1 & 2). The second locality was Still Bay (Figs 1 & 3), which is famous for its fish traps (note numerous examples just north of Noordkapperpunt in Fig. 3). Both areas have shell middens in close proximity to fish traps, thereby providing an opportunity to investigate their possible association. At Paapkuil Fontein, 11 Later Stone Age shell middens have been located (Hart 2004), of which four were excavated. These were chosen on the basis of their proximity to the traps, their size, apparent limited degree of post-depositional disturbance, and (at three of the four sites) the presence in eroded deposit of stone artefacts, bone, etc. as well as shell. The remaining middens at Paapkuil Fontein consisted only of thin scatters of shell, probably disturbed by road-building or other activities.

At Still Bay, two shell middens known as Still Bay 1 (SB1) and Still Bay 2 (SB2) were investigated. Both are located above the existing harbour and had been excavated in the course of a previous project (Hart 1991), although there had been only a preliminary assessment of the contents. A full analysis of the material was carried out for this study.

EXCAVATION METHODS

The Paapkuil Fontein sites were excavated in 1m × 1m squares laid across the densest parts of the middens. Where possible, sites were excavated according to occupational layers or changes in sediment colour, consistency or texture. In sites

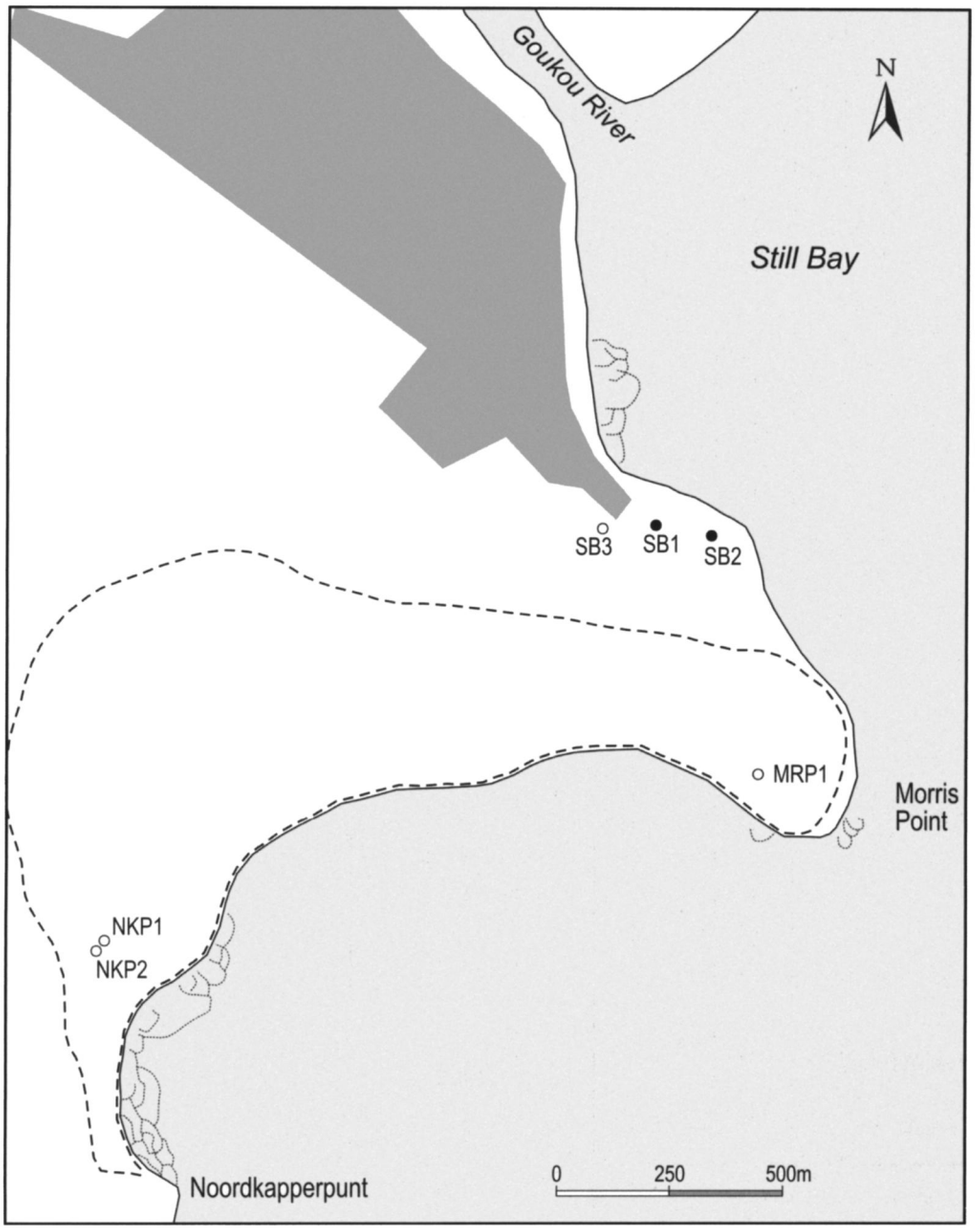

FIG. 3. *Locations of Still Bay shell middens (solid dots show excavated sites, open dots unexcavated) and nearby stone-walled tidal fish traps (dotted lines). Area enclosed by dashed line was carefully searched for middens; only the three shown were visible in 2006. Shading indicates the town of Still Bay.*

where stratigraphy could not be discerned, deposit was removed in 10 cm spits.

Unless otherwise stated, all deposit was passed through a 3 mm mesh sieve. All material recovered from the sieves was retained, clearly labelled and bagged for later sorting and analysis in the laboratory. At site P5, a very large quantity of material was recovered, and only the finds from the richest square (D11) have been analysed. These alone amounted to 82.9 kg of material.

A comprehensive description of the excavations and finds recovered at Paapkuil Fontein and Still Bay is presented elsewhere (Hine 2008). The most important observations are summarized in Table 1 and discussed below.

EXCAVATION RESULTS

LITHICS

Stone artefacts and manuports comprised the majority of the cultural remains recovered from the Paapkuil Fontein sites. Quartzite was the dominant raw material in all four sites, accounting for 72.5% of the stone artefacts recovered, followed by quartz (24.6%). At Paapkuil Fontein 5 and 11, quartz (especially quartz chips) was more common, suggesting some knapping on site. The numbers of stone artefacts were small and the range of activities conducted may have been limited. Radiocarbon dates for the four sites indicate occupation spanning the last 5000 years, but there are no detectable temporal patterns in the artefact assemblages. Retouched artefacts were extremely rare, with only four miscellaneous retouched pieces (MRPs). The lithics recovered at Still Bay comprised only seven manuports from SB1 and two manuports and two flakes from SB2.

MARINE SHELL

Marine shell comprised the bulk of the material excavated at Paapkuil Fontein and Still Bay. Nearly 240.9 kg of marine shell from Paapkuil Fontein was analysed, of which 80.4 kg came from square D11 at site P5. Considerably less shell was

TABLE 1. *Summary table of important finds. P: Paapkuil Fontein, SB: Still Bay. The Still Bay sites are referred to as SB1 and SB2 in this paper for consistency with Hart (1991), but it should be noted that SB2 is the same midden as that designated MP1 by Henshilwood and Yates (n.d.), and samples submitted for radiocarbon dating were labelled 'Morris Point 1'. Numbers of fish bones and retouched stone artefacts are in brackets. All radiocarbon dates were on shell. Calibrations are based on the Pretoria calibration curve for the southern hemisphere (Talma & Vogel 1993), updated in 2000. The two dates for P5 are for Shell Layer 1 and Shell Layer 2, respectively, the two major depositional units at the site. The two dates for SB2 are for shell taken from depths of 0.5 m and 1.5 m, respectively. Calibrated dates are given at a one-sigma range.*

Site	Deposit excavated	Radiocarbon dates	Lab. number	Lithics	Fauna NISP	Shellfish% MNI
P4	3.5 m^2 (1.5 m^3)	4870 ± 80 BP 3083(2969)2887 BC	GX-32533	Quartzite only n = 37	54 (1)	*T. sarmaticus* 34% *S. longicosta* 22.9% *Oxystele* (all spp.) 15.6% *C. oculus* 8.7% *Burnupena* (all spp.) 5%
P5	5 m^2 (1.7 m^3) D11 (0.4 m^3)	2250 ± 60 BP 221(278)370 AD 2329 ± 70 BP 120(207)278 AD	GX-32529 GX-32531	Quartzite dominated n = 137 (2)	54	*Oxystele* (all spp.) 68.6% *O. tigrina* 47.2% *T. sarmaticus* 16.3% *C. oculus* 5.3% *D. gigas* 1.9% *Burnupena* (all spp.) 2.5%
P7	4 m^2 (0.8 m^3)	1450 ± 60 BP 1043(1103)1191 AD	GX-32530	Quartzite only n = 16	21	*T. sarmaticus* 43.5% *Oxystele* (all spp.) 38.6% *O. tigrina* 22.8% *C. oculus* 3.2% *Burnupena* (all spp.) 7%
P11	6 m^2 (0.53 m^3)	1319 ± 60 BP 1202(1259)1296 AD	GX-32532	Quartzite dominated n = 290 (2)	34	*Oxystele* (all spp.) 49.1% *O. tigrina* 32.7% *T. sarmaticus* 31.7% *C. oculus* 1.5% *Burnupena* (all spp.) 9.2%
SB1				Quartzite dominated n = 7	21 (7)	*Oxystele* (all spp.) 52.2% Limpet (all spp.) 39.3% Limpet spp. 25.9% *S.cochlear* 8.4% *P. perna* 5.3% *Burnupena* (all spp.) 0%
SB2		2455 ± 20 BP 28(56)77 AD 2890 ± 60 BP 552(466)388 BC	Pta-8465 Pta-8467	Quartzite dominated n = 4	202 (94)	*S. longicosta* 27.4% *Oxystele* (all spp.) 40.5% *T. sarmaticus* 16.4% *O. tigrina* 15% *S. cochlear* 4% *Burnupena* (all spp.) 0.4%

recovered from the limited excavations at the two Still Bay sites. Approximately 3.5 kg of marine shell was retrieved from SB1 and 14.1 kg of shell from SB2.

Examination of the shellfish assemblages at Paapkuil Fontein indicates that, in terms of food value, *Turbo sarmaticus* (alikreukel) was the most important species at all sites. However, at Paapkuil Fontein 5, 7 and 11, all dating to within the last 2000 years, *Oxystele* spp. (periwinkles), especially *O. tigrina,* were also abundant. The shellfish from SB1 were dominated by *Oxystele,* while the range of species at SB2 was similar to Paapkuil Fontein, with *S. longicosta* (27.4%), *T. sarmaticus* (16.4%) and *Oxystele* comprising the bulk of the assemblage. There was little clearly patterned change through the sequence, although this site was >1.5 m deep.

In general, these sites show a pattern of increased abundance of smaller species such as *Oxystele* (particularly *O. tigrina*) and *Burnupena* spp. and a decline in the number of limpets in more recent occupations. This matches the pattern described by Henshilwood (1995, 2008) for Later Stone Age middens at Garcia State Forest. In pre-2000 BP sites at Garcia State Forest, the focus was on shellfish from the lower littoral, such as *Turbo* spp., *Scutellastra argenvillei* and *S. tabularis,* and *Haliotis* spp. After 2000 BP, *Oxystele* spp. became more important and collection strategies appear to have focused more intensively on the shallower inter-tidal.

BONE

In the Paapkuil Fontein sites, bone was rare and usually fragmented, making identification difficult. No fish bone at all was found at Paapkuil Fontein 5, 7 and 11, while Paapkuil Fontein 4 yielded a single small, incomplete fish vertebra, which may have been brought on to the site by a non-human agent. The rarity of fish bone clearly indicates that fishing was not the major attraction for prehistoric people who occupied this stretch of coastline, despite the importance of fish traps in the bay today.

Fauna was almost as rare in the Still Bay assemblages. At SB1 seven fish bones were recovered, none of which could be identified to genus or species level. At SB2 94 fish bones were found, representing a minimum of three individuals: two *Rhabdosargus holubi* (Cape stumpnose) and one *Cymatoceps nasutus* (black musselcracker). These fish were small, about 120 mm long (Poggenpoel pers. comm.). Stumpnose enter estuaries and lagoons as juveniles, and remain there until they reach sexual maturity. The small size of these individuals is consistent with their having been caught in the mouth of the

nearby Goukou River. They would not have been swimming in the open sea.

ARCHIVAL EVIDENCE: HISTORICAL DOCUMENTS RELATING TO STONE-WALLED TIDAL FISH TRAPS

In a survey of early traveller accounts at the Cape, no reference was found to fishing along the coast with stone-walled tidal fish traps. There are, however, references to fishing with hook and line (Kolbe 1738 in Thompson 1913), spearing with sharpened wooden sticks (Tavenier 1660 in Raven-Hart 1971; Langhans 1694 in Raven-Hart 1971; Burchell 1824; see also Raven-Hart 1967), basket traps (Barrow 1806; Stow 1905), and the use of nets (Kolbe 1738 in Thompson 1913). Van Riebeeck's diary described how, in 1657, the Dutch bought a large quantity of steenbras (enough to feed the garrison for 3–4 days) from the local 'Kaapmans' who had speared them in a shallow lake at False Bay. Some of the fish had been salted to preserve them (Thom 1954). The only mention that we could find of stone-built fish traps used by indigenous people come from the interior of southern Africa. In his journal, General Janssens described the fishing methods of the 'Bosjemans' of the Orange River area: "...if they expect a swelling of the stream, while the water is still low, they make upon the strand a large cistern, as it were, enclosed by a wall of stones, which serves as a reservoir, where if fortune be favourable, a quantity of fish are deposited at the subsiding of the waters" (Lichtenstein 1815: 55). Schapera (1930: 138) described people in the Okavango building stone walls and reed fences to funnel fresh-water fish into reed traps.

Coastal stone-walled fish traps have, since the late 19th century, been allowed to operate only under strict licensing conditions. As a result, records in local archives contain a wealth of information about the location of traps, size of catches and species diversity. There are three important periods: 1892–1905, 1910–1913 and 1924–1933.

The 1890s were a tumultuous period for the Cape fishing industry. In 1890, the Fish Protection Act was passed to protect fish stocks (mainly those of commercial value) by regulating catches. Nevertheless, by 1892 it was clear that fishing at the Cape was in decline and a Parliamentary commission was set up to investigate the cause. Commissioners interviewed stakeholders in the industry, including professional fishermen, boat owners, harbour administrators and owners of fishing companies. The first mention of fish traps found in the archives dates to 1892.

Johan Stephan of Stephan Bros., owner of a large fishing company at the Cape, reported on the use of fish traps on the Western Cape coast between Hoetjies Bay and Saldanha. He testified that "there is a practice among the farmers who reside near the reefs of rocks on the coast, of making 'kraals' or enclosures of stone for entrapping fish..." (Stephan 1892: 17 *in litt.*) and went on to note that these were excessively destructive. John Louis McLachlan of Stumpnose Bay echoed this: "certain parties in the vicinity destroy vast quantities of young fish by building sea walls among the rocks sufficiently high to allow the flood tide to cover the same, thereby entrapping fish which cannot escape at low water" McLachlan 1892: 19 *in litt.*). Morris Fox (1892: 25 *in litt.*), who lived near the mouth of the Goukou River at Still Bay, noted that people built "fibre walls of stone" which retained fish as the tide receded, and he proposed that this should require a license.

Today, recognizable fish traps are known from only a few isolated localities along the west coast, far fewer than the testimonies of Messrs Stephan and McLachlan would have us believe, suggesting that many late 19th century traps are no longer visible. It was clear from the testimonies to the Commission that tidal traps had a destructive effect on fish stocks. Section 10 of the summary of the S.C.R. (Select Commission Regarding) recommended that any future Act to do with the fishing industry should prevent the destruction of fish stocks through the practice of making 'kraals' or 'enclosures of stone' (Anon. 1892 *in litt.*).

As a result, in August of 1893, the Fish Protection Act of 1890 was amended. Section 2 stipulated that: "it shall not be lawful for any person or persons to construct or make use of any 'kraal' or enclosures below high-water mark, for the purpose of snaring or catching fish of any description" (Anon. 1893). This regulation was reiterated in Proclamations 353 of 1894, 393 of 1895, and 81 of 1897. Another Parliamentary commission was established in April 1904, this time to investigate the state of fisheries in the Caledon district, which included the farm known as Paapkuil Fontein. Mr H. van Breda, then owner of Paapkuil Fontein, commented that he allowed fishermen to camp on his property during the haarder (mullet) season (H. van Breda 1904 *in litt.*). Unfortunately, the exact location where fishing took place and the methods used were not mentioned. The information does, however, confirm that historically, the area was a favoured place for fishing, in particular for mullet.

In the early years of the 20th century, local authorities repeatedly appealed to have the ban on fish traps lifted, on the grounds that they provided livelihoods and sustenance for *bywoners* (tenant farmers) and other poor people living along the Riversdale coastline (e.g. A. Badenhorst 1924 *in litt.*). In November 1905, the Divisional Council of Riversdale introduced new regulations stating that owners of land abutting the sea, or their authorized representatives, would be allowed to use fish traps during the months of August to January to catch mullet during spring tides at new moon. Fish less than eight inches long could not be harvested (Anon. 1905 *in litt.*). During December 1905 Mr Morris Fox, acting Fishery Commissioner of the Riversdale District, inspected the fish traps at Still Bay and found that walls had not been maintained and the traps were full of sand, making them ineffective (Fox 1905 *in litt.*). It is important to note that the lack of maintenance since the use of fish traps had been banned in 1893 (only 12 years previously) rendered them unusable.

The reprieve was short-lived: the use of fish traps was banned once again by Proclamation 456 of 1908. The reluctance to lift the restrictions was based primarily on the difficulty of managing the use of traps, which were in many cases in remote locations. There were a limited number of mounted policemen to monitor fish trapping, and it was feared that inadequate policing would lead to abuse and unauthorized proliferation of traps (Janisch 1910 *in litt.*). There was also uncertainty over who was responsible for individual traps, since coastal farms were often owned jointly by a number of farmers who visited periodically throughout the year to fish. A major problem was that after these visits, fishing parties departed without breaching the walls to enable fish to escape from the untended traps.

In a letter dated 11 November 1910, H. and P. Lowrens, Attorneys at Law, petitioned the Provincial Government on behalf of farmers of the Riversdale and Mossel Bay Districts to grant permission "to again take up *vywers* to catch fish along the sea coast on their respective properties" (Lowrens & Lowrens 1910 *in litt.*). The farmers provided a map indicating the locations where they wished to build fish traps (Fig. 4). Members of the Provincial Council pointed out that traps were beneficial to farmers visiting the coast for holidays with their families. Unlike professional fishermen, these farmers were not equipped with the means (nets, boats etc.) to acquire fish for

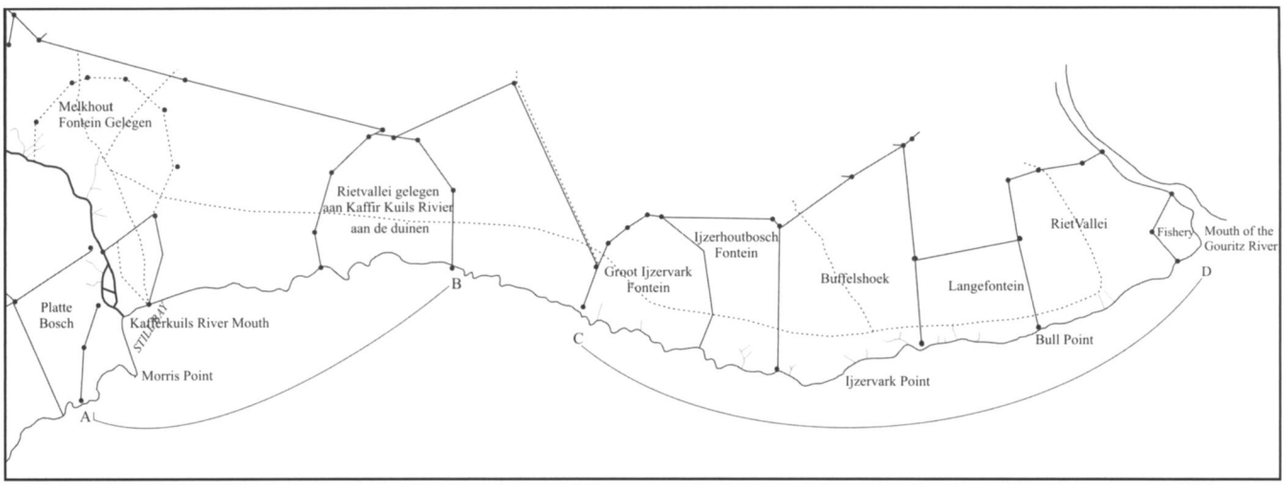

FIG. 4. *Map accompanying Riversdale farmers' 1910 petition to the Provincial Government. Areas marked A–B and C–D indicate where they wished to build fish traps; note how these are adjacent to demarcated farms. The Kafferkuils River is now called the Goukou River. Cape Archives PAN 6 A120/B/13.*

their own consumption. These appeals were successful, and revised regulations were published in the Fisheries Ordinance, no. 12 of 1911, Proclamation 223. These permitted limited use of fish traps, on condition that, first, any person wishing to construct a fish trap obtained a written permit from an officer authorized by the Provincial Administrator. Second, applicants had to submit sketch plans showing the locations and dimensions of the proposed traps. Third, successful applicants were required to demolish their traps if subsequently instructed to do so by the Administrator (Anon. 1911 *in litt.*). Furthermore, fish caught in traps could not be sold commercially. Seventeen farmers applied for permits, of whom only three were successful: Mr D.P. du Toit of the farm Prins Kraal, Mr T. Wilson of Skipskop and Mr J.W. Myburgh of the farm Vogelgezang. The granting of these permits caused considerable tension, especially between farmers and local fishermen who thought that they should hold the permits. There was concern over fish traps being situated at the best locations, thereby restricting the places traditionally used by fishermen, particularly when fishing for mullet.

In 1913, the Fishery Officer inspected the coastline from Port St Johns to Cape Town to report specifically on the distribution of fish traps. None were reported from Port St Johns, Port Alfred, Port Elizabeth, Jeffreys Bay, Plettenberg Bay, Knysna Lagoon, George or Mossel Bay. Fish traps were noted only in the Riversdale District. The Fishery Officer wrote: "the method of trapping fish, by constructing the fish kraal or *vijver*, seems to have been a regular practice engaged in by both farmers of the district and fishermen alike, and the whole coast, wherever there is a rocky reef, shows signs of dismantled walls of these kraals which were used some years ago" (Cripps 1913 *in litt.*). At 'Riet Vlei' fish traps were found to be in use (Weisbecker 1913). This was reported to the police in Albertinia and a mounted trooper was requested to demolish them. All three of the traps authorized under Proclamation 223 of 1911 were found to be in contravention of the legislation. The traps were demolished and the owners informed that none would be allowed in the future.

There are few references to fish traps in the archives from 1913 until the mid-1920s, when the police began to implement the regulations more vigorously. In a letter to the Provincial Secretary, the Magistrate of Riversdale stressed the importance of fish traps for the subsistence of poor people in the area, especially at Still Bay (Badenhorst 1924 *in litt.*). J.D. Gilchrist, the Fishing Administrator, reiterated some of the concerns already mentioned in his recommendations to the Provincial Secretary. He noted the Natal Government's decision to abolish all fish traps in its waters, except for a few in the mouths of the Tugela, Umzimkulu and Tongaat Rivers and observed that there were still hundreds of fish traps in Portuguese East Africa that were gradually being demolished (Gilchrist 1924 *in litt.*).

In 1925, Section 17 of the Fisheries Ordinance No. 30 of 1920 was amended to allow construction and use of fish traps, provided that these retained sufficient water at low tide to keep fish alive until the next high tide, when they would be able to escape (Anon. 1925). Because no permits were needed, it was difficult to identify the owner of any particular trap, and the regulation of trapping became much more difficult. There is little information from this period, although a few individuals continued to apply to the Provincial Government to build traps, despite this not being necessary under the new regulations. Some applications came from as far away as Johannesburg and Natal (Webber 1930 *in litt.*; Stansfeld 1933 *in litt.*). There are references to the use of fish traps along the Still Bay coastline, from the Duivenhoks River to the Gouritz River mouth (Fig. 4) (Badenhorst 1924 *in litt.*).

In February and March 1931, Dr. C. van Bonde inspected the fish traps at Cape Agulhas, Struis Bay, Arniston and Skipskop (van Bonde 1931 *in litt.*). He was concerned about their proliferation along the Bredasdorp coastline, leading to the destruction of immature haarders, but nothing could be done because the traps complied with the 1925 regulations. This was the last mention of fish traps found in the archival record but even today the battle between the fish trap advocates and the authorities continues.

From the evidence summarized above it is clear that, during the late 19th and early 20th centuries, fish traps were used primarily by farmers and their *bywoners*. It is striking that fish traps occur most often where farms had been established immediately adjacent to the coast, especially in the Bredasdorp region between Cape Agulhas and Skipskop, and along the Still Bay coast between Noordkapperpunt and the Gouritz River Mouth. These two areas contain the highest densities of fish traps found anywhere along South African coast. Other regions such as the Namaqualand coastline lack tidal fish traps entirely, despite the presence of many suitable localities along rocky shores with gently sloping topography (Hart & Halkett, personal observation). This is poor farming country and was not densely settled in historical times, although there is abundant evidence of pre-colonial occupation.

DISCUSSION

The documents and evidence from fishermen who still use the traps today (Avery 1975, 1976; Kemp 2006; see also documentary film *Johnny Appels – The Last Strandloper*), emphasize that stone-walled tidal fish traps are dynamic structures. In the late 19th and early 20th centuries they were repeatedly built, altered and demolished as local communities complied with, challenged or tried to circumvent changing legislation. Fish traps were highly politicized facilities, and as the summary above shows, their ownership and use were heavily contested. This contestation occurred *because the traps were so effective.* This effectiveness underscores the significance of the rarity of fish bone in the Paapkuil Fontein and Still Bay sites described above.

We also examined other middens, although we did not excavate them. Among these were a series of very large middens at Waenhuiskrans (Arniston), adjacent to fish traps that are still in use (as documented in the 2006 film '*Johnny Appels – The Last Strandloper*'). Careful search of the surfaces of these middens revealed bird and mammal bone, but not fish bone. The same applies to the middens at Noordkapperpunt (Fig. 3).

Could the records of the 19th–20th centuries merely reflect the most recent end of a long history of the building and use of fish traps extending back into the pre-colonial past? We argue that the archaeological evidence fails to support this idea. With the exception of Stofbergsfontein midden (which is on the Langebaan Lagoon, not on the coast) (Robertshaw 1978/1979), none of the assemblages of archaeological fish bone reported in the literature include large numbers of *Mugilidae* spp. (haarders or mullet), as one would expect from the use of traps. We also note that areas with high densities of fish traps do not necessarily have high densities of archaeological sites. This is particularly striking at Still Bay, with dozens of tidal fish traps, but where repeated surveys of the area adjacent to the shore by ourselves and other archaeologists have located relatively few middens. Sites we identified during a visit to the area in 2006 are shown in Figure 3. An earlier survey of the same area by Chris Henshilwood and Royden Yates reported additional middens that were not visible in 2006, but these authors commented "Given the extent of the rocky inter-tidal in the area, the absence of higher numbers of large middens … is surprising … Some … are, in effect, short occupation sites or 'lunch spots' that represent a single meal or overnight stop." They also noted that "All the sites … are relatively close to *viswywers* but there is scant evidence for the consumption of fish" (Henshilwood & Yates n.d.). By contrast, some areas have middens with fish bone, but apparently no fish traps.

It is worth mentioning one further site here: a kitchen dump associated with a local fisherman's house in the Hotagterklip area (now Argonauta Park) in Struisbaai (see Fig. 2). This midden probably dates to the early part of the 20th century, and contained large quantities of fish bone (Halkett 1996). Preliminary analysis showed a range of species including haarder, black and white musselcracker, elf, silverfish, red and white stumpnose, kabeljou, galjoen, dassie, sand steenbras, white steenbras and shark. With the exception of dassie, silverfish and red stumpnose, the species present are all commonly caught in fish traps. We cannot be certain how these fish were caught, and more than one method may have been used, including line-fishing, netting, etc. The site is, however, very close to fish traps, and dates to a time when we know that these were in use. The sheer quantity of fish bone makes this midden totally unlike pre-colonial sites in the area. Further excavation of historical middens in areas with fish traps would be a promising avenue for future research.

Could it be that in pre-colonial times, fish were caught in tidal traps and processed at sites other than middens, which we have not yet identified? This is possible, but unlikely. If significant quantities of fish were caught, they would have to have been processed and preserved immediately, probably by salting, smoking and/or sun- and wind-drying. As outlined above, this takes at least several days, and may need as much as two weeks. The process would have required close supervision to keep away scavengers and flies, necessitating camping nearby. With an abundance of fish at hand, people would surely have eaten some of it during this time. We simply do not see evidence of such behaviour.

Stone-walled tidal fish traps occur all over the world and the anthropological and archaeological literature describes examples in Australia (Dortch 1997; Randolph 2004; Angeles 2005), the United Kingdom (Bannerman & Jones 1999; Williams & McErlean 2002; O'Sullivan 2003), the Netherlands (Low Kooijmans 1987), Denmark (Pedersen 1995), parts of Africa (Breen *et al.* 2001), North America (Treganza 1945; Keegan 1986; Moss *et al.* 1990; Lutins 1992; Tveskov & Erlandson 2003, Foster 2005), al-Bahrain (Serjeant 1968) and Chile (Munita *et al.* 2004).

In several instances, stone-built fish traps previously thought to be of pre-colonial origin have been shown to be of more recent date, for example, through the use of aerial photography in Australia (Randolph 2004). At Lake Cahuilla, California, a number of 'ancient stone fish traps' occupying a series of rocky terraces 90 feet below the present high water line are in fact house depressions rather than fish traps. Local Cahuilla Indian stories of how these 'fish traps' were operated probably originated among whites, and the Native American community found it amusing to pass them on (Treganza 1945). This illustrates two points, first, that features can easily be misinterpreted, and second, that such misinterpretations can be absorbed in the stories and folklore of local indigenous peoples and can be difficult to debunk. Caution should be exercised when assuming the antiquity of features such as these without strong evidence. In the case of the Cape coastal fish traps, one of the problems has been that they were regarded as 'static' features, as artefacts 'captured' in time. As a result, suggestions that they might be ancient, as made by Goodwin and others, gradually became received wisdom.

CONCLUSIONS

Despite strenuous efforts, we could find no evidence of any association between stone-walled tidal fish traps and excavated pre-colonial sites. At Paapkuil Fontein, fish was absent from all but one site, which yielded a single vertebra. At the Still Bay sites, fish remains were rare and the size of the specimens identified suggests that they were caught in the estuary of the Goukou River. In stark contrast, there is clear documentary and distributional evidence linking fish traps with historical settlement, especially between Cape Agulhas and Arniston and at Still Bay. Active fishing in precolonial times is not in question: numerous Later Stone Age sites contain quantities of fish bone. Many of these sites are nowhere near any known traps, and we know precolonial fishermen had other ways of catching fish; some coastal midden sites have yielded the bones of deep-water fish species that could only have been obtained by line fishing (Deacon 1970, Inskeep 1987; Poggenpoel 1996). This study set out to search for evidence of a pre-colonial age for stone-walled tidal fish traps, but has found none whatsoever. There is, therefore, no reason to believe that the use of stone-walled tidal fish traps on the Cape coast stretches back more than a few centuries. This scenario provides opportunities

for future work: how was this method of fishing introduced to the Cape? Was it imported by immigrant settlers (or slaves)? Why is there an especially high density of fish traps between Hermanus and Mossel Bay? What were the historical processes that led to their development and proliferation along this particular stretch of coast? These and many other questions remain to be answered.

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