The Archaeofauna from Xaro on the Okavango Delta in northern Botswana

Wynand J. van Zyl[1]*, Shaw Badenhorst[2], Elene Taljaard[3], James R. Denbow[4,5] and Edwin N. Wilmsen[5]

[1]Department of Anthropology and Archaeology, University of South Africa, P.O. Box 392, UNISA, 0003 South Africa
E-mail: wynandvanzyl@ymail.com

[2]Archaeozoology and Large Mammal Section, Vertebrate Department, Ditsong National Museum of Natural History (formerly Transvaal Museum), P.O. Box 413, Pretoria, 0001 South Africa, and
Department of Anthropology and Archaeology, University of South Africa, P.O. Box 392, UNISA, 0003 South Africa
E-mail: shaw@ditsong.org.za

[3]Department of Anthropology and Archaeology, University of Pretoria, Private Bag X20 Hatfield, 0028 Pretoria, South Africa
E-mail: elene.taljaard@yahoo.com

[4]Department of Anthropology, University of Texas at Austin, 1 University Station C3200, Austin, TX 78712-0303, U.S.A.
E-mail: jdenbow@austin.utexas.edu

[5]School of Geography, Archaeology, and Environmental Sciences, University of the Witwatersrand, Private Bag 3, WITS, 2050 South Africa
E-mail: anaw630@uts.cc.utexas.edu

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We report on the fauna from the sites of Xaro 1 and Xaro 2 located on the Okavango Delta in northern Botswana. Carbon isotopes from two human graves at Xaro Lodge located approximately 500 m south of Xaro 1 suggest an economy oriented toward wild plants, fish and game similar to that of the modern baNoka, or 'River Bushmen'. The faunal remains from Xaro 1 and 2 corroborate this suggestion. Pottery from the Early Iron Age, radiocarbon dates from the Later Iron Age, and glass beads from the European trade indicate there were two occupations at both sites, one belonging to the 18th and 19th centuries and an earlier one containing ceramics consistent with a first millennium AD date. The fauna from both occupations is dominated by fish and Chelonia (likely tortoise or terrapin). The people also hunted a variety of game animals, most of which are associated with aquatic conditions. Sheep remains were recovered from the later occupation of Xaro 1.

Keywords: baNoka, River Bushmen, Okavango, Botswana, Fauna.

INTRODUCTION

Relative to the size of the country, few archaeological sites have been excavated in Botswana (e.g., Hall, 1996: 78–80; Lane *et al.,* 1998). Research has gained some momentum during the last few decades and since then various mapping and surveying projects have been undertaken. Few large faunal assemblages have been studied from Botswana compared to South Africa (Plug and Badenhorst, 2001). Notable exceptions include sites such as Bosutswe (Plug, 1996; Denbow *et al.,* 2008), Divuyu, Nqoma (Turner, 1987*a*), Toutswemogala (Welbourne, 1975), Toteng (Robbins *et al.,* 2005, 2008), Matlapaneng (Turner, 1987*b*) and Taukome (Denbow, 1986). Pastoralism in southern Africa may have originated in northern Botswana (Westphal, 1963; Ehret, 1967; Heine *et al.*, 1977; Elphick, 1977; Ehret and Kinsman, 1981; Henshilwood, 1996) and it is one of the gateways through which domestic livestock spread to southern Africa (Robbins *et al.,* 2005, 2008). In this paper, we aim to contribute to the steadily growing number of archaeofaunal studies from Botswana.

*Author for correspondence.

Xaro Lodge and Xaro 1

The Xaro sites are located at the apex of the Okavango Delta in northwestern Botswana (Fig. 1), about 40 km northeast of Tsodilo Hills (Denbow and Wilmsen, 1986; Wilmsen, 1990; Wilmsen and Denbow, 1990, 2010). Three excavations were conducted, namely Xaro 1, Xaro 2 and Xaro Lodge (Fig. 2). Two radiocarbon dates were obtained for Xaro 1, AD 1270–1420 (Tx7437) from a blocky clay level just above the lowest artefact horizon, and a date of AD 1650–1960 for a second, later component found above the clay layer. During excavations, no evidence was found for grain cultivation or

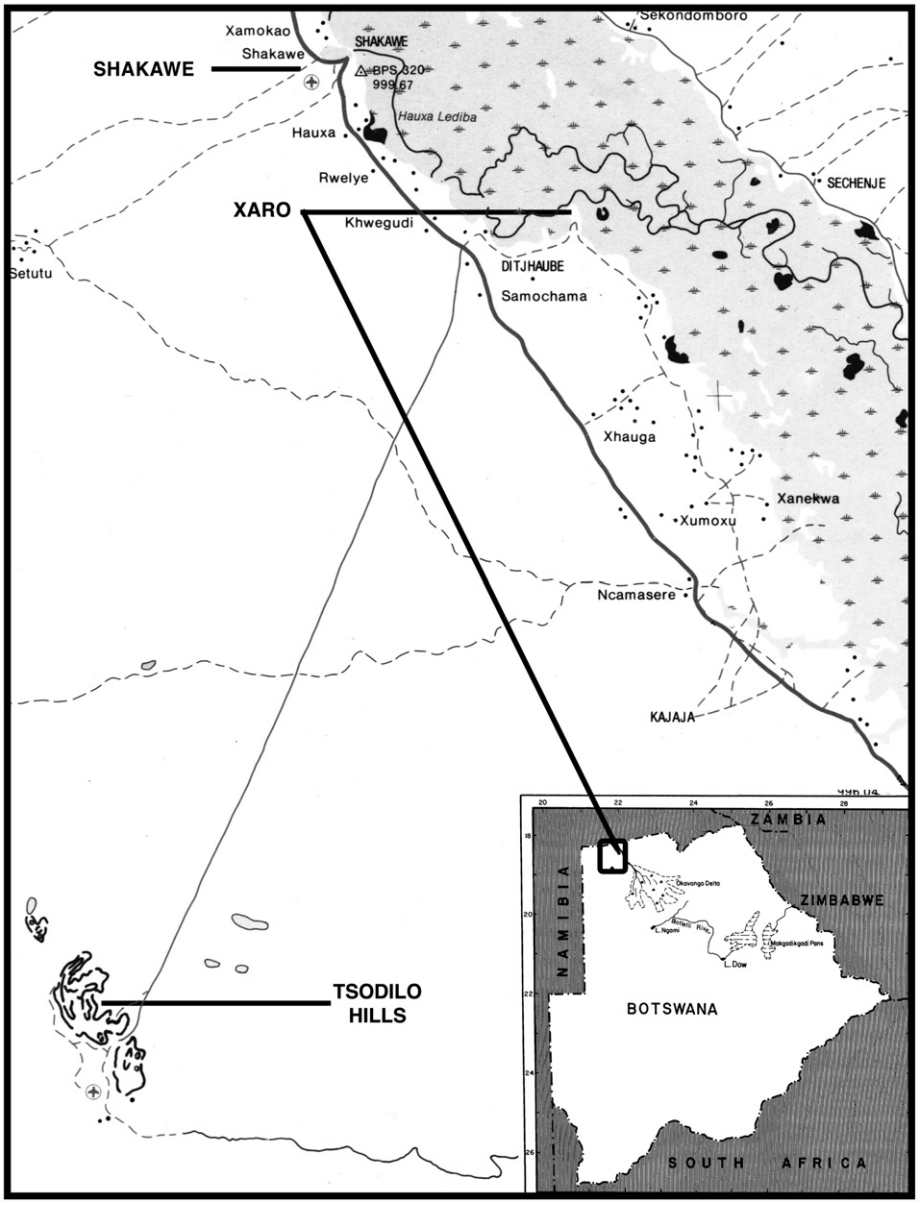

Fig. 1
Location of Xaro in Botswana.

metallurgy (Denbow and Wilmsen, 1986), which may have suggested occupation by farmers. However, ceramics found link the site with a western variant of the Early Iron Age extending northward into Angola and possibly northwestern Zambia (Denbow and Wilmsen, 1986; Denbow, 1990; Wilmsen and Denbow, 2010; Denbow, 2012). A handful of un-diagnostic stone flakes were recovered from both components of the site.

The first Xaro excavations were conducted by one of us (J.R.D.) after a human grave was discovered during construction work at Xaro Lodge. The grave was found about 1 m below the modern ground surface in a sandy soil deposit, some 50 m from the edge of the water. The body was found in a horizontal, flexed position. A Divuyu potsherd dating from the Early Iron Age was found underneath the leg of the individual. The skeleton is that of a 50–60-year-old

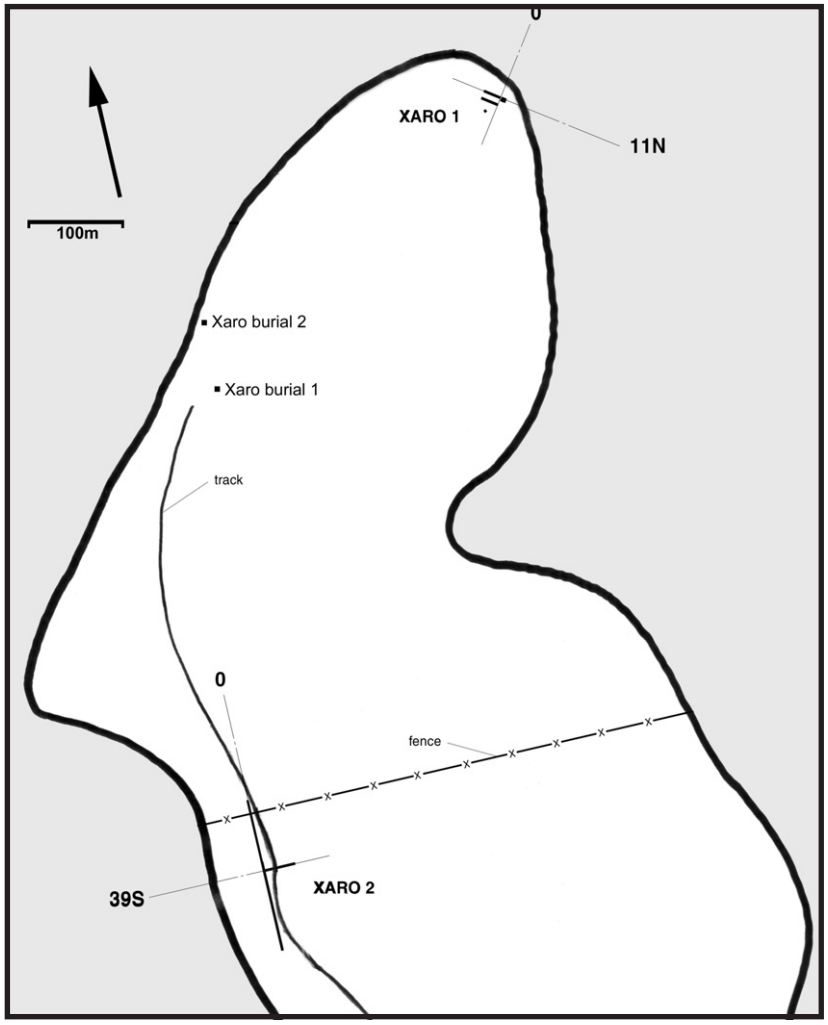

Fig. 2
Location of sites.

male. The skull shows similarities with both Khoisan- and Bantu-speaking populations (Mosothwane, 2010). The second skeleton was excavated by E.N.W. and Phenyo Thebe in 2006. It was located approximately two metres from a rapidly eroding river bank and about 60 m northwest of the first skeleton. It was found in a horizontal flexed position, with the head oriented towards the west. It is a male aged between 40 and 60 years of age at the time of death (Mosothwane, 2010). The two adult skeletons from Xaro Lodge have bone collagen $\delta^{13}C$ values indicating a foraging and fishing diet; this diet is similar to that of the modern baNoka (the so-called 'River or Water Bushmen'), who still live along the banks of the Okavango Delta (Mosothwane, 2010).

A brief survey in 1986 found ceramics similar to that from the original Xaro Lodge skeleton at a location approximately 500 m north of the Lodge. Two units were excavated at that location; at the time, this was called the Motorboat Site. Imported glass beads ($n = 14$) were found dating to the 18th–19th century AD in the upper 20 cm. The beads most likely came from European trade on the West Atlantic coast spreading along existing Iron Age trade routes (Denbow and Wilmsen, 1986). In 1991 a new series of excavations was carried out at Xaro 1, based on a grid with a 00.00 point established in the eroded area 11 m south of the original Motorboat units excavated in 1986 (Fig. 3). First, a series of three 1×1 m squares was excavated 40 cm west of the original units. Another unit was also opened 1 metre north of the original test pits. The stratigra-

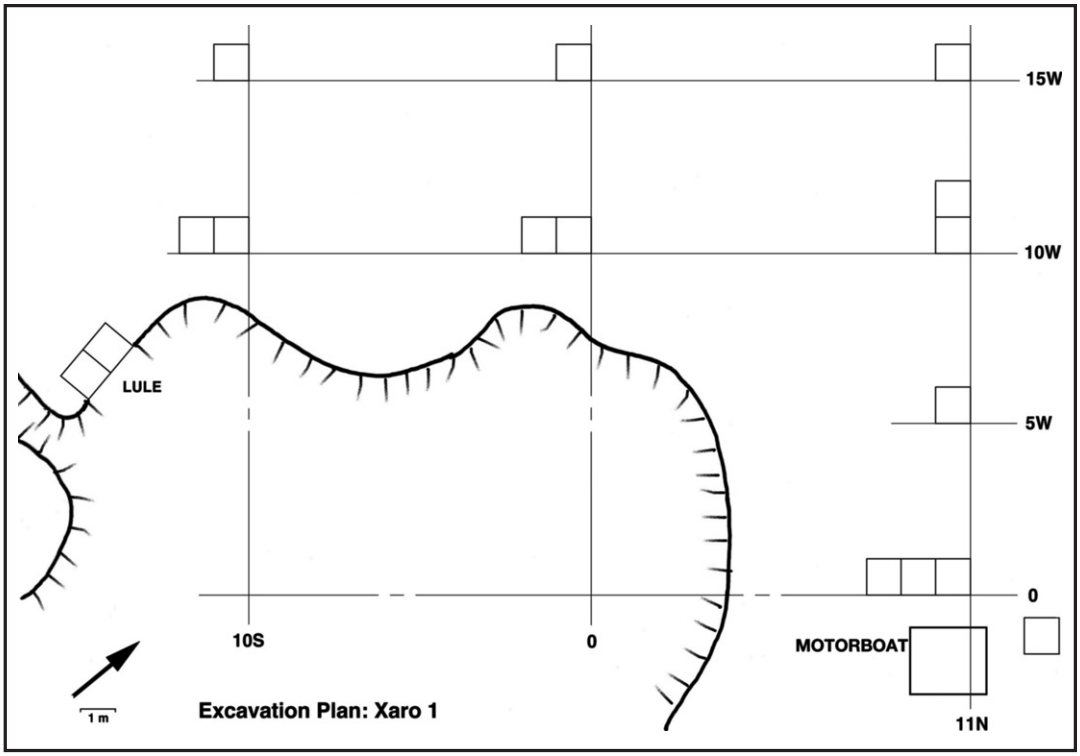

Fig. 3
Excavation plan of Xaro 1.

phy of these units replicated that found earlier:

0–20 cm: grey-black humus
20–40 cm: brown, blocky clay
40–60 cm: brown sand

As in the first excavation, three glass beads were recovered in the upper 20 cm along with pottery decorated with bands of crosshatching on the rim and false relief chevrons at the base of the neck. These materials are likely precursors of contemporary Hambukushu potting traditions. The blocky brown clay was practically sterile; artefacts being found again in the sandier levels between 40 and 60 cm below the surface. The material from these levels is closely related to those uncovered at Divuyu (Denbow, 2011) and the lower levels of Nqoma (Wilmsen, 2011) in the Tsodilo Hills.

With the completion of the first four units, and confirmation of the basic stratigraphy observed in 1986, a 5 × 10 metre grid was laid out over the site. The only exception to this systematic sampling strategy are the two units labelled as Lule, which were dug back from the edge of the erosion area at a point where several large fragments of pottery were observed eroding from the deposit. The cultural stratigraphy of these units replicated that found in the original excavation in the Motorboat area, though the blocky clay layer was not observed in the southernmost line of squares.

A radiocarbon date of AD 1650–1960 (Tx-7438), with five intercepts, was obtained from charcoal recovered between 10 and 20 cm below surface in Square 3. The 18th–19th century portion of this time range is consistent with the types of trade beads recovered from these levels (Denbow and Wilmsen, 1986). A second radiocarbon date of AD 1270–1420 (Tx-7437), with three intercepts, was obtained from the blocky clay level 30 to 40 cm below surface that separated the upper and lower components in Squares 2 and 3. Unfortunately, no charcoal was preserved that could adequately date the lower, first occupation below the blocky clay, although ceramics found were similar to those from the well-dated sites of Divuyu and Nqoma in the Tsodilo Hills. These two sites date between the 7th and 9th centuries AD. Apart from ceramics only eight fragments of stone, two with possible use wear, were recovered from Xaro 1. No metal artefacts were recovered from the site.

Xaro 2

The Xaro 2 site was discovered along the sandy track leading to the Lodge. At that time, a fence with

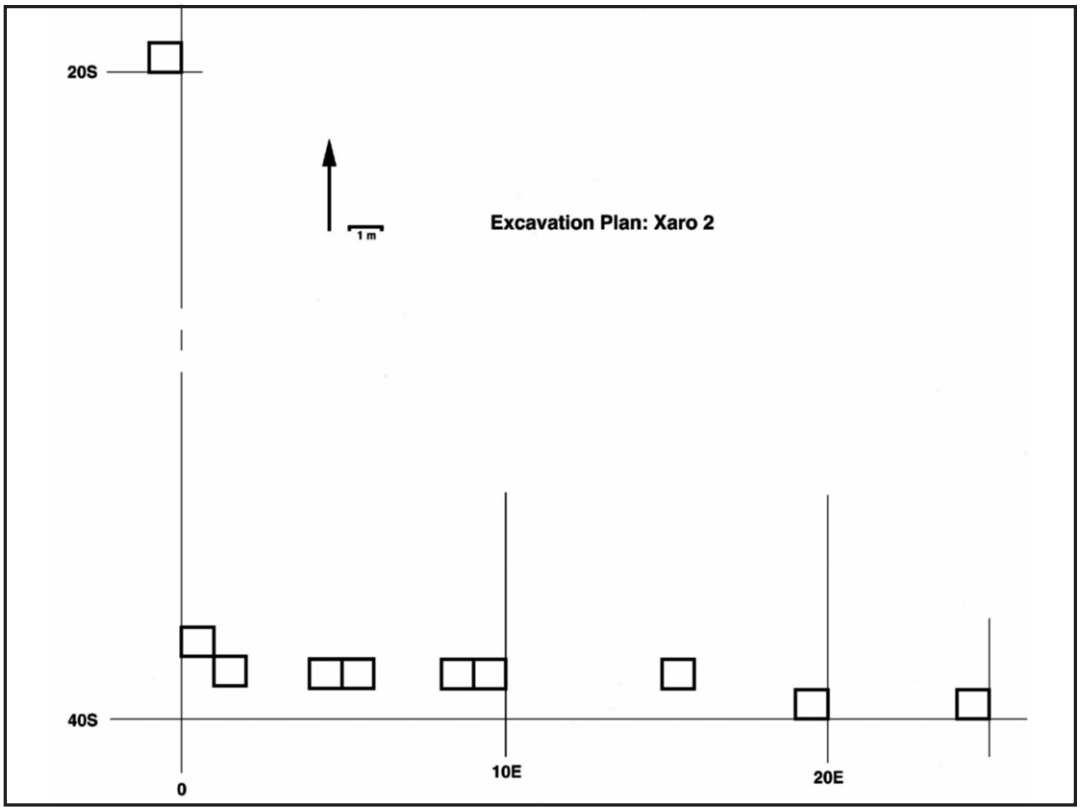

Fig. 4
Excavation plan of Xaro 2.

a metal gate cut across the peninsula approximately 500 m from the Lodge. A datum point was established 2 m metres west and 10 m south of the gate, and a series of test squares was excavated at 20 m intervals (Fig. 4). A west–east series of test squares was also excavated along a line established at 00.39 s. A final test square was placed north of the fence along the west side of the track.

In all of the units south of the gate the top 30 cm of deposit were composed of very loose, uncompacted, grey sand. Below 30 cm, the soil was damper and more compact. While no natural stratigraphy was observed, the artefact distributions indicate there are two artefact horizons at the site, the first occurring between 10 and 20 cm below surface, where artefacts similar to the upper component at Xaro 1 were recovered. A fragment of a locally made tobacco pipe was associated with these remains and suggests a 19th century date. The second horizon begins 50 cm below surface, where an increase in the number of ceramics, all charcoal-tempered, was found. The few decorated vessels recovered were stylistically similar to those recovered from the lower, earlier component at Xaro 1, and at Divuyu. In the 01e.60s unit, five chert flakes, one chert core, and one fragment of micaceous quartzite or schist were recovered from 30–80 cm below surface, along with charcoal-tempered ceramics. One iron bead and two interconnected links of iron chain were recovered between 70 and 90 cm below surface in association with the Divuyu-style ceramics. A single calibrated date of AD 1180–1390 (Tx-7436) was received for scattered charcoal fragments collected between 90 and 100 cm below surface in squares 38–39s, 1–5e. This date appears to be contaminated and should not be considered an accurate date for the lower, Divuyu component.

METHODOLOGY

The faunal samples from Xaro 1 and 2 were analysed separately per square and layer, and combined for this paper because the samples were too small to reach meaningful conclusions if considered per individual square and layer. The samples were analysed at the Ditsong National Museum of Natural History (formerly Transvaal Museum) in Pretoria. The analytical method used is that

Table 1
Identified and unidentified specimens from Xaro.

Site	Identified specimens	Unidentified specimens	Total	% Identified
Xaro 1	780	885	**1665**	47
Xaro 2	99	375	**474**	21
Total	**879**	**1260**	**2139**	**41**

suggested by Driver (2005). According to this method, any specimen is considered 'identifiable' once the element (e.g., humerus, radius, femur) could be determined. Bovid size classes follow Brain (1974). The order of the mammals follows Meester *et al.* (1986), and the nomenclature Skinner and Chimimba (2005). The measurements are those suggested by Von den Driesch (1976). The Number of Identified Specimens (NISP) was used to quantify the fauna (Grayson, 1984; Reitz and Wing, 1999). Skeletal part representation for Bovidae was not calculated, due to the relatively small sample size.

RESULTS

A total of 2139 faunal specimens was analysed from the two sites, of which 780 (47%) were identified from Xaro 1, and 99 from Xaro 2 (21%) (Table 1). Most are from Xaro 1, totalling 1665 specimens. The percentage identified specimens is higher at Xaro 1 than at Xaro 2. This does not necessarily suggest that fragmentation was higher at Xaro 2, but rather that the presence of large numbers of fish and shells from the order Chelonia (likely tortoise or terrapin) increased the percentage identified specimens at Xaro 1. Few remains were present in the deeper levels of both Xaro 1 and 2.

The assemblage from Xaro 1 and 2 consists of mammals, birds, fish, reptiles and molluscs (Table 2). Carnivores identified include (possible) dog and spotted-necked otter. Plains zebra, (possibly) hippopotamus, sheep, (possibly) sheep/goat, sitatunga and lechwe were also present. Moreover, a Galliformes bird, Chelonia (likely tortoise or terrapin), (possibly) Nile monitor, catfish, freshwater mussels and the giant African land snail were also identified from the assemblages. There is variation between Xaro 1 and 2, but this may be due to sample size, and not human predation. The two most common taxa in both samples are fish and Chelonia. The Chelonia are mostly represented by shell (both plastron and carapace) fragments.

During analysis, taphonomic modifications were noted (Table 3). A total of 207 specimens was burnt. Black was the most common colour of burning. A further 16 specimens had cut marks. Xaro 1 yielded a possible bone tool. The specimen was from Unit 4, layer 10–20. It was a metacarpal shaft of a Bov II/III individual, and the outer cortex was smooth.

Only two specimens were complete enough to be measured. Both are from lechwe, and were found at Xaro 1 in Unit 2, layer 10–20. Both specimens are proximal phalanges (Table 4). The two phalanges may be from the same individual.

DISCUSSION AND CONCLUSION

The faunal analysis from the Xaro sites adds to the growing knowledge of subsistence practices in northern Botswana during the last two millennia. Open-air sites in the region cannot be grouped into convenient categories such as farmer, pastoral or hunter-gatherer (*cf.* Sadr, 1997). For example, Toteng yielded domestic livestock, pottery and lithics (Robbins *et al.,* 2008) whilst at Xaro 1 evidence of pottery was present from the early component and sheep from more recent times. Isotopes from the two undated human skeletons excavated at the Xaro Lodge indicate that people subsisted on *inter alia* fish and collected plants. This subsistence pattern is very similar to that of the modern-day baNoka (Mosothwane, 2010).

The wild mammals in the samples – spotted-necked otter, plains zebra, hippopotamus, sitatunga and lechwe – are still present in the area (Plug and Badenhorst, 2001; Skinner and Chimimba, 2005).

Sheep have been present in northern Botswana for more than 2000 years (Robbins *et al*., 2005, 2008). Early sites in southern Africa with sheep remains are often found in association with Later Stone Age communities (Plug and Badenhorst, 2001: 147). From the northern parts of southern Africa, sheep then spread further south to South Africa (e.g., Henshilwood, 1996). No sheep remains were associated with the early components at Xaro 1 and Xaro 2, though they were recovered from the upper component of Xaro 1, which dates to the 18th–19th century. The sheep could have been acquired from farmers and herders in the area.

There are many diseases that affect domestic animals. One of these, nagana, is transmitted by tsetse flies (Mönnig and Veldman, 1976). Large areas can become completely unsuitable for herding (e.g., Le Roux, 1977). Tsetse fly belts are known

Table 2
Taxa present at Xaro1 and Xaro2 (NISP).

Taxa	Common name	Xaro 1		Xaro 2		Total
		0–30 cm	> 30 cm	0–30 cm	>30 cm	
cf. Canis familiaris	Possibly dog	3				**3**
Lutra maculicollis	Spotted-necked otter	3				**3**
Carnivore small	Small carnivore			1		**1**
Equus quagga	Plains zebra	8				**8**
cf. Hippopotamus amphibius	Possibly hippopotamus	1				**1**
Ovis aries	Sheep	2				**2**
cf. Ovis/Capra	Possibly sheep/goat	1				**1**
Tragelaphus spekii	Sitatunga	1				**1**
Kobus leche	Lechwe	3			2	**5**
Bov I	Small bovid	1				**1**
Bov II	Medium bovid	10	1			**11**
Bov II non-domestic	Medium bovid non-domestic	1				**1**
Bov II/III	Medium–large bovid	9			1	**10**
Bov II/III non-domestic	Medium–large non-domestic bovid	1				**1**
Bov III	Large bovid	6	1	1	11	**19**
Bov III non-domestic	Large bovid non-domestic	5		5		**10**
Mammal medium	Medium mammal	11		2		**13**
Mammal medium–large	Medium–large mammal		4			**4**
Mammal large	Large mammal	4		2		**6**
Galliformes	Chicken/pheasant/guinea fowl	2		1		**3**
Bird small	Small bird	1				**1**
Bird small–medium	Small–medium bird	1				**1**
Bird medium	Medium bird	1				**1**
cf. Pelusios rhodesianus / bechuanicus	Side-necked terrapin	1				**1**
Chelonia	Tortoise/terrapin	84	2	52	1	**139**
Varanus cf. niloticus	Possibly Nile monitor	1				**1**
Varanus sp.	Monitor	8				**8**
cf. Reptilia	Possibly reptile	1				**1**
Clarias sp.	Catfish	3	1			**4**
Clarias / *Synodontis*	Catfish	220	17	19		**256**
Fish small	Small fish	22				**22**
Fish medium	Medium fish	199	7		1	**207**
Fish medium–large	Medium–large fish	7				**7**
Unionidae	Freshwater mussel	39				**39**
Achatina sp.	Giant African land snail	10	22			**32**
Terrestrial gastropod	Land snail	36	11			**47**
Total		**713**	**67**	**83**	**16**	**879**

to decrease and expand again very rapidly (e.g., Punt, 1958). For example, in recent times there was a nagana outbreak in a previously disease-free region around Lake Ngami, located south of the Okavango Delta (e.g., Rey, 1932). While sheep and cattle are heavily affected by nagana, goats are more resistant (Badenhorst, 2002, 2006).

Dogs were present at Early Iron Age sites in southern Africa. Some of the earliest evidence is from Diamant in the Limpopo Province, dating to the 6th century AD (Plug, 2000). In Botswana, Bosutswe also yielded dog remains (Plug, 1996). Dog remains are not common in archaeological deposits. Most would have died from natural causes or during hunting activities (Plug and Badenhorst, 2001: 37). The (possible) dog from Xaro could have been used for protection and hunting.

Table 3
Taphonomy from Xaro (number of specimens).

Modification	Xaro 1	Xaro 2	Total
Localized burning	4		**4**
Burnt black	33	103	**136**
Burnt white, grey or blue	55	12	**67**
Cut marks	14	2	**16**

Table 4
Measurements (mm) from Xaro 2.

Taxa	Element	Measurement (mm)
Kobus leche	1st Phalange	GL: 51.04, Bp: 13.66, Bd: 12.28, SD: 11.8
Kobus leche	1st Phalange	GL: 51.45, Bp: 14.21, Bd: 12.8, SD: 12.37

Hippopotami are dangerous animals (Skinner and Chimimba, 2005) and were often killed in pitfall-traps (Hall, 1977), or in the Okavango by the Khoisan and Bantu-speakers using iron-tipped harpoons in more recent times (Schapera, 1930: 136; Andersson, 1856). The use of pitfall-traps is seemingly an old custom in southern Africa, with the earliest evidence dating from the Middle Stone Age (Milo, 1998). It appears feasible that the (possible) hippopotamus from Xaro 1 was hunted in a similar fashion. However, the alternative explanation cannot be excluded that meat was scavenged from dying hippopotami. A buried skull of a hippopotamus was uncovered at Toteng 1. Although the role of hippopotami varies considerably in Africa, in the Okavango Delta of Botswana, the traditional manner for Wayeyi (a Bantu-speaking group) boys to become men involve killing a hippo from papyrus rafts using spears. The death of a hippopotamus was believed to ensure good flooding of the Delta (Robbins *et al.,* 2008: 137). Hippopotami have also been associated with rain-making rituals (e.g., Deacon, 1988: 133–134).

Aquatic food sources were exploited at Xaro. This is evident from the otter, (possible) hippopotamus, lechwe, sitatunga, terrapin, (possible) water monitor, freshwater mussels and fish remains. The African sharp-tooth catfish is the best-known member of the genus *Clarias* in South Africa, and is common in many river systems of Africa. It is a large fish that can grow up to two metres in length, with the skull measuring up to 60 cm across. The meat is red, of good quality, has few bones, and is rich in oil (Brandt, 1982: 14–15). At least two families of catfish are present in the samples, and they were distinguished based on the morphology of the dorsal fins. Among the contemporary peoples of the Okavango, fishing is as important as hunting. Common methods include the use of funnel-shaped traps of closely woven reeds, about three feet long (*c.* 91 cm) and 18 inches (*c.* 46 cm) to two feet (*c.* 61 cm) wide, narrowing towards the mouth. The traps are set in shallow water. Another technique is to use spears. Sometimes small stone dams are built from each bank that turn out into the river in a slanting direction, leaving a narrow opening in which a reed trap is placed. Yet another method is to built reed fences or stone dams across the beds of dry courses of rivers that overflow from time to time. After a flood, as the water begins to retreat, fish are trapped and caught. The poisoning of fish in small pools was a common practice, using the poisonous milky sap from the spurge or milkbush (*Euphorbia tirucalli*) (Tlou, 1972: 153; Mmopelwa *et al.,* 2005: 11). Wild foods including wild figs and biltong are important items traded by Okavango peoples from the northern Delta to Maun during the rainy season (Denbow, personal observation).

Excavations at White Paintings Rock Shelter in the Tsodilo Hills, 40 km to the west of the Okavango River yielded 15 barbed bone points associated with fishing spears. These date from the Late Pleistocene to the Iron Age, which suggests an exploitation of aquatic resources for a period of 25 000 years. As with the Xaro sites, fish and wetland antelope fauna were also well represented in the deposits of White Paintings Rock Shelter (Robbins *et al.,* 1994: 257, 260, 262).

The Chelonian remains from the Xaro sites may be either land tortoises or terrapins. Owing to the locality of the sites, it is possible that most of the indeterminate Chelonian specimens are from terrapins, although the high level of fragmentation makes it impossible to be certain. Tortoises are usually baked in the shell, and can easily supply a meal for a family of up to four people (Yellen and Lee, 1976: 41). It is likely that terrapins were treated in the very same manner. A few Chelonian shells were only burnt on the outer surface, which suggests that the animals were cooked in the shell (*cf.* Plug, 1978; FitzSimons, 1935).

Only the water monitor is (possibly) represented in the Xaro 1 sample, although the mountain monitor could also be present. According to Branch (1988: 172–174) both the mountain and water monitor are indigenous to northern Botswana and both species are edible, whilst the fat is '…used for tribal medicine.' The people from Xaro may not have necessarily used the fat of monitors for this purpose, but could simply have consumed them.

A variety of terrestrial molluscs are found in Botswana (e.g., Van Bruggen, 1963, 1966). The giant African land snail could have been exploited as a source of protein, as they are edible (Mead, 1961). Their shells are also used to manufacture beads. However, the presence of these snails may also be due to later intrusions into the sites (Plug, 1990). The inhabitants collected the freshwater mussels as a source of food (*cf.* Plug, 1988; Badenhorst, 2005). Appleton (1996: 8) comments that these large mussels have an average nutritional value of 100–575 kilojoules per individual, and when eaten in quantities, they would certainly be nutritious. Although mussel shells were often used as tools, such as implements for smoothing clay objects, or worked as beads, no evidence of modification was found to be present at Xaro.

Taphonomic modifications were noted in that a single bone fragment has a polished appearance, which can be attributed either to frequent handling as an implement, or trampling. Bones deposited in a soft matrix could develop a polished texture as a result of trampling (Reitz and Wing, 1999: 137). Burnt bone found is a consequence of exposure to a heat

source (coals or fire), resulting in colouring which could range from black to shades of grey to white – the latter indicating exposure to a more intense or prolonged heat source (Reitz and Wing, 1999: 133). Localized burning is evident in a dual coloured bone such as black (charred) and brown (meat covered) as a result of roasting (Driver, 2005). Grey and white coloured bones are mostly associated with disposal in fire pits (Reitz and Wing, 1999: 133). Most of the fish bones from Xaro 1 lack evidence of burning, which may be attributed to the possibility that fish were roasted or boiled whole over a relatively low heat.

Not many faunal assemblages have been studied from northern Botswana (Plug and Badenhorst, 2001; Lane *et al.,* 1998). However, livestock herding was established in the area by the advent of the Early Iron Age about two millennia ago (Robbins *et al.,* 2005, 2008; Turner, 1987*a*,*b*). The fauna from Xaro is consistent with the local environment, and adds to the growing number of faunal studies from the region.

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