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THE REMEDIATION OF KRUGER CAVE: A LATER STONE AGE AND LIVING HERITAGE SITE IN THE WESTERN MAGALIESBERG

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ABSTRACT
We report on a programme of work to remediate Kruger Cave, a Later Stone Age painted rock shelter in the western Magaliesberg, South Africa. Kruger Cave, excavated in the 1980s and never backfilled or stabilised, has deteriorated through forty years of erosional and quotidian processes that have significantly reduced the extent of the archaeological deposit. The cave is currently occupied by a lay Christian pastor whose activities at the site place the remaining archaeological deposit at further risk. Remedial work was undertaken on what remains of the archaeology-bearing sediment. We also present the preliminary analysis from two small-scale excavations that aimed to document the site's stratigraphy. We explore the ambivalence of Kruger Cave's living heritage status within the context of current heritage management practices and discuss how our remedial work is designed to be responsive and respectful to both the archaeological and living heritage priorities.

Keywords: Kruger Cave, Oakhurst, Magaliesberg, living heritage, remedial archaeology

1. Introduction

Kruger Cave is a painted rock shelter with Holocene deposits overlooking the Hex River in the western Magaliesberg, South Africa (Fig. 1). Immediately east of the cave is the Olifantsnek Dam, which was completed in 1932 and has been a popular fishing spot ever since. The cave, which is one of only seven recorded rock painting sites in the Magaliesberg, is currently the occasional home of a lay Christian pastor who has been living at the site intermittently since 2013, and since 2018 on a semi-permanent basis (Bradfield & Lotter 2021). Situated on what is now public land, the footpath past the cave entrance is frequently traversed by weekend revellers to the angling club grounds below, and by pedestrians from the R24 road above, both of whom seem to be in search of a secluded rendezvous. Cartons of sorghum beer litter the alcoves behind the dam wall.

Originally excavated in 1956, the site underwent a large-scale excavation in the early 1980s in response to persistent vandalism (Unknown Author 1982; Mason 1988). The rationale for the 1982-1983 campaign, which removed approximately two-thirds of the deposit, was to 1) rescue data before further damage occurred, 2) ascertain the relationship between the rock art and the occupation of the site, and 3) gather more information about the plant material that people were using in the region between 10 000 and 1000 BP (Mason 1988). The deposit was excavated along a NW to SE grid and the sediment removed in 10 cm spits and sieved through an 8 mm mesh (Steele 1987). Approximately 460 kg of sediment, which we estimate to be about 3% of the total excavated material, was floated and sieved through a 2 mm mesh to retrieve small, light-weight botanical remains (Friede 1987). A fence erected to protect the site at the conclusion of the 1983 excavation had proved ineffectual by 1986, having been, by that stage, partly torn down and removed (Alan Retief pers. comm. January 2020).

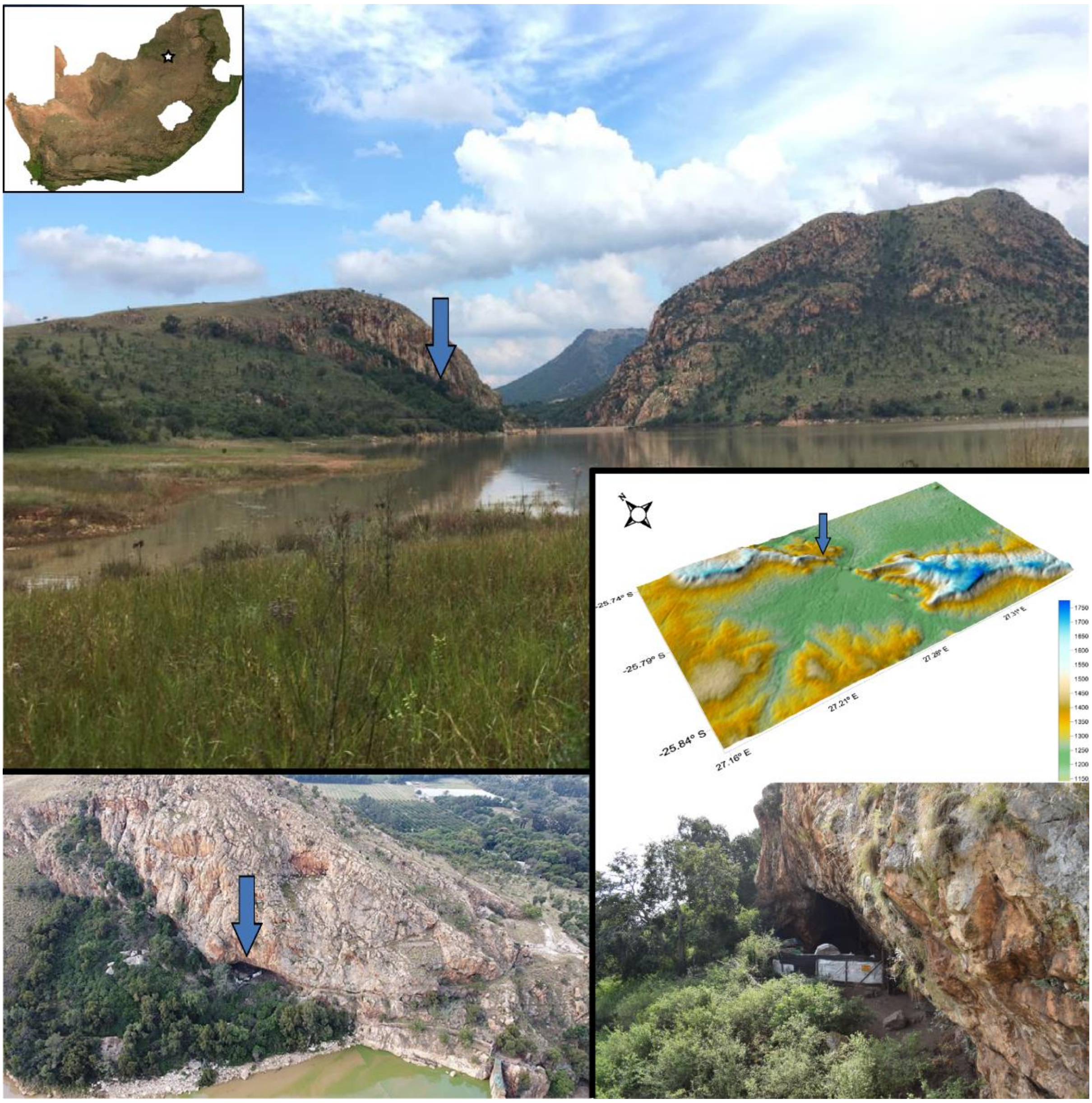

Figure 1. Location of Kruger Cave and its entrance as it appears in 2022. The elevation map (heights in meters) is provided courtesy of Fernando Colino (using data from the NASA EOSDIS Land Processes Distributed Active Archive Centre [LP DAAC]). Aerial photograph provided courtesy of Vincent Carruthers.

Contrary to standard archaeological excavation procedure (e.g., Du Toit & Küsel 2015; Vogelsang 2017), Kruger Cave was never backfilled at the conclusion of the 1983 season. Consequently, the open excavation trench has been subject to 40 years of natural erosion and anthropogenic deterioration. Figure 2 presents a rough timeline of photographs showing the extent of erosional slump and surface deflation as of April 2022. Based on our conservative estimates, a further 22.8 m^3 of archaeological deposit has been lost to erosion. The fact that the site is currently inhabited places an additional risk to the remaining deposit, as normal quotidian activities (e.g., sweeping the floor) can be destructive, however unintended.

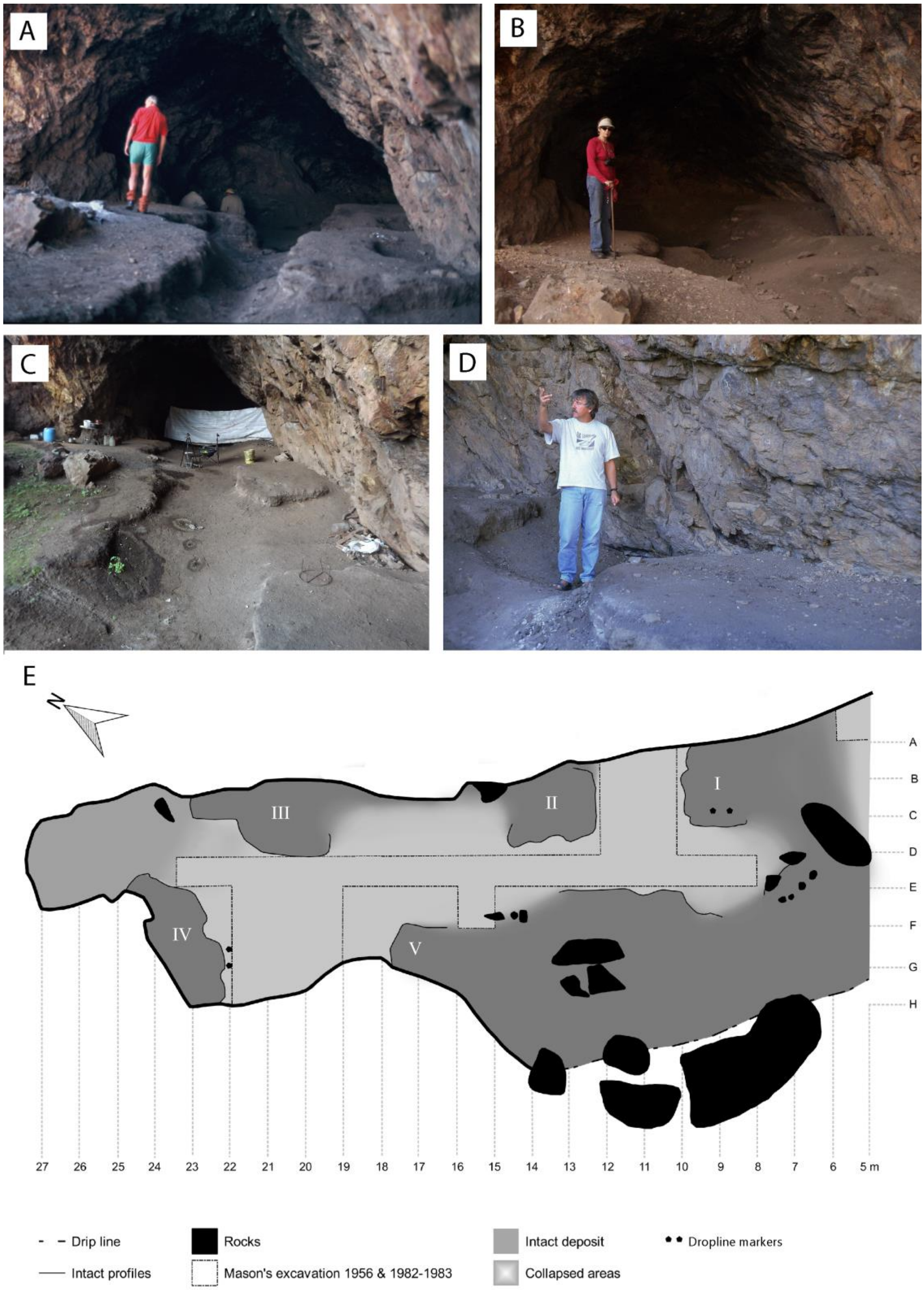

Figure 2. Chronological site photos. a) looking towards the rear of the cave in 1997; b) looking towards the rear of the cave in 2007 with the same boulder in the left foreground; c) the site in 2021 showing the makeshift partition erected by Pastor Voyi for privacy in the rear and Mason's AC 10-12 excavation in the fore; d) Simon Hall standing in the AC 10-12 excavation in 1997. Below is our map showing the intact deposit in dark grey and slump deposit in light grey. The stabilised bulks are labelled I-V. A rectified version of Mason's excavation grid is superimposed for reference (used throughout when referring to locations, i.e., excavations). Twin pentagons indicate our dropline markers, between which are the rear profiles of our two small excavations. Historical photographs supplied courtesy of Vincent Carruthers.

It is not uncommon to revisit a site decades after it was originally excavated. Scientific, technological and methodological advancements present opportunities for higher resolution palaeoenvironmental information, better dating and reassessment of stratigraphic contexts and site formational history. Analytical and digital recording technologies, such as aDNA and DStretch, that were not available 40 years ago can provide new information about a site that contributes to broader archaeological questions. A host of southern African Pleistocene and Holocene sites have been re-excavated in recent years, including Olieboomspoort (van Der Ryst 2006; Val et al. 2021), Elands Bay Cave (Porraz et al. 2016), Grassridge Rockshelter (Collins et al. 2017), Border Cave (Backwell et al. 2018), Mwulu's Cave (de la Peña et al. 2019), and Klipfonteinrand (Mackay et al. 2020), all with encouraging results. Several others are ongoing (e.g., Justin Pargeter's re-excavation of Boomplaas Cave). Kruger Cave, with its exceptional organic preservation and unique finds, similarly has the potential to contribute to our knowledge of Holocene subsistence strategies, human diseases, palaeo-pharmacology, responses to inter-ethnic contact and the material culture repertoire of Holocene hunter-gatherers, but only if it is preserved from further effacement.

Here we present the programme of work carried out in April 2022 to stabilise the remaining intact deposits in order to preserve them for future scientific research, while being responsive to the living heritage status of the site and the needs of its current occupant. Apart from not being backfilled, Kruger Cave was excavated rather crudely in 10 cm spits, instead of following the natural (and clearly visible) stratigraphy. Most of the material was sieved through course 8 mm mesh, which would have missed many small finds. We therefore also present the findings of two small-scale excavations in the fore and rear of the cave undertaken specifically to document the stratigraphy of the site and to attempt to correlate the 1983 radiocarbon dates with stratigraphic layers. Further analyses of the excavated materials are ongoing.

2. The archaeology of Kruger Cave

In this section we summarise the findings from Mason's original excavations of Kruger Cave; results of our new work are described below. Steele and Mason recognised five depositional lenses, interchangeably referred to as carapaces or clusters, of which three are dated and described (Mason 1988). Using the latest radiocarbon calibration curve for the Southern Hemisphere (Hogg et al. 2020) Lens One dates to 10 751-7956 BC, Lens Two to 6222-3901 BC and Lens Four to AD 641-1217. Lens One contains an Oakhurst technocomplex lithic signature, with Lens Two evincing a slightly smaller variant of the same lithic technology. Lens Two represents a late expression of the Oakhurst as it overlaps with the Wilton technocomplex at contemporaneous sites like Boomplaas Cave and Jubilee Shelter (see Deacon 1984; Wadley 1987). Lens Four abuts the NE wall in the fore of the shelter and appears to have been cut into the older underlying deposits by the first millennium AD occupants (Mason 1988). The sediment deposit is largely determined by the natural slope of the shelter floor. Very little sediment is present in the SE section, whereas the depth of deposit in the NW section is approximately 90 cm. Natural sediment stratigraphy is horizontal to a depth of ~40 cm, below which more complicated grass and vegetal layers (5657-5331 BC) occur. In one section in the rear of the cave (DE 23-24) there is evidence that these grass layers were dug into the older underlying Lens One deposit (Mason 1988). The first millennium AD occupation appears to have been restricted to the outer section of the shelter, near the drip line, and it is likely that the paintings date to this period (Mason 1988). The artefacts from this final period of occupation resemble contemporaneous assemblages from other sites in the wider area, such as Munro Cave and Oliebooomspoort, and are consistent with a final Later Stone Age attribution (*sensu* Lombard et al. 2012). Lithic raw material is dominated by quartzite, hornfels, dolerite, chert and andesite.

Hunting provided the bulk of the meat supply throughout the three occupations, although fishing was also practised. The only noticeable change in subsistence activity in the first millennium AD occupation from the preceding Oakhurst occupations is the prevalence of freshwater mussels, particularly *Unio* and *Aspatharia* sp. (Brown 1987). Some of the remarkable organic finds from this site include: a bladder cap with human hair preserved; a bone quiver with bone arrowheads inserted, poisoned bone and wooden arrowheads, one of which has beautifully preserved ochre paint; finely plaited plant-fibre rope, and chewed bark. Eggs from two parasites, *Trichuris* sp. and *Ascaris* sp. were found in a human coprolite (Evans et al. 1996) suggesting the potential for the site to inform on palaeo-parasitology (see Rifkin et al. 2017). Two individuals of the extinct springbok (*Antidorcus bondi*) were also identified in the deposit (Brown & Verhagen 1985).

Kruger Cave is one of only seven recorded rock art sites in the Magaliesberg. Pager (1987) recorded 57 poorly preserved and crudely executed monochrome paintings on the NE wall of the shelter, the overwhelming majority (70%) of which are depictions of humans, with men carrying weapons constituting the dominant theme. Birds and animals are also recorded. Pager noted that the human depictions at Kruger Cave are on average slightly larger than comparable depictions at other sites in the Magaliesberg and Drakensberg. Although the paintings have not been dated, they are thought to be contemporaneous with the Lens Four deposit or first millennium AD occupation (Mason 1988).

Along with other hunter-gatherer sites in the Magaliesberg, Kruger Cave was unoccupied between AD 300 and AD 600 when the first Bantu-speaking farmers infiltrated the landscape. Kruger Cave preserves the earliest record (in the form of pot sherds) of Iron Age occupation of the Magaliesberg (Mason 1962), although there is no evidence for farmer occupation of the cave itself. Between AD 600 and AD 1300 climatic deterioration is thought to have pushed the farmers out of the area. As with other sites in the region, Kruger Cave was re-occupied by hunter-gatherers during this period, after which they permanently abandoned the region when the farmers returned. The remaining archaeology at Kruger Cave is from the early twentieth century when the blacksmith working on the dam wall had his shop in the cave entrance.

3. Approaches to conservation of living heritage sites

The primary objective of cultural conservation is to protect heritage from loss or damage and to mitigate those causes of destruction such as neglect, decay and mismanagement. Conservation measures of archaeological sites range from structural stabilisation to camouflage and barricading, all of which may affect the way a site is experienced and interpreted by the community (Matero 2008; Sullivan & Mackay 2012; Du Toit & Küsel 2015; Vogelsang 2017). For an archaeological site to be relevant to a community they must be able to appreciate it, visit it and interact with it (UNESCO 1972; Miura 2005; Smith 2006; Jones & Yarrow 2013; Williams 2018). Indeed, part of the mandate of any conservation management plan should be to ensure the retention of cultural significance (Sullivan & Mackay 2012).

But what happens at living heritage sites? Broadly defined, living heritage is the aesthetic, spiritual, symbolic and social traditions, including other intangible aspects, such as traditional knowledge, ritual, music and oral traditions that are practised at a site (UNESCO 2003; Deacon 2004). Such practices may not necessarily be related to the site's original purpose, and in fact they seldom are (e.g., English Heritage 2009; Moephuli 2016). While contemporary uses may add to the social and symbolical value of an archaeological site, they may also threaten its integrity, where integrity is understood as relating to the site's original function (Lala 2014). One of the challenges of conserving a living heritage site is what to prioritise. While some would argue that conservation must consider the authenticity of a site (Matero 2008), there has been a steady call to re-evaluate and broaden received notions of authenticity (Ndoro 2003; Bwasiri 2011). It is now widely recognised that archaeology is a constantly evolving process that sometimes leads to conflicting perspectives of what is relevant (Pwiti 1996; Ouzman 2003; Harrison & Schofield 2010; González-Ruibal 2014; Lala 2014). What is relevant to contemporary local communities may not be what was important to the community in the past or what is relevant to the science community. Core to the concept of living heritage conservation is that it must be cognisant of such dichotomies and responsive to the needs of contemporary communities, regardless of whether they are related to the original inhabitants (ICOMOS 1994; Agnew 1997; Jokilehto 2007; Poulios 2011; Ndoro 2015; Williams 2018). The best results are often achieved when living heritage is incorporated into management plans to the financial benefit of local communities (Miura 2005; Bwasiri 2011; Lala 2014). We return to these issues in respect of Kruger Cave below.

4. Programme of work and findings

As part of an ongoing programme to reinvestigate some of the findings from the 1982-1983 excavations, a direct date was obtained from the bladder cap that Mason (1988) had interpreted to be of 19th century

Ndebele origin. This relative date was based on the fact that the bladder cap was found in the upper 20 cm of the deposit and that only Nguni groups are known to have used gall bladders as part of their headdresses. Our direct date on the bladder tissue, however, returned a result of 500±46 bp (IT-C-3305), which calibrates to AD 1398-1504. This clearly indicates that the upper levels of Kruger Cave are much older than previously thought. It is precisely these levels that have been most adversely affected by erosion and deflation, and which are most at risk of further effacement.

The continuing deterioration of the archaeological deposit at Kruger Cave as a result of the Pastor's activities was carefully monitored between 2017 and 2022. Although damage was negligible, it was present. What damage occurred during this time was mostly the incidental result of quotidian activities that paled in comparison to the natural, erosional degradation that had already taken place since 1983. Nevertheless, the potential of Kruger Cave to contribute to our knowledge of Holocene hunter-gatherers is sufficient inducement to protect what remains of the archaeological deposit. It was therefore decided to stabilise the intact deposit in a manner that would both protect the remaining archaeology and be accommodative of the pastor's needs.

Excavations to document stratigraphic profiles

Prior to stabilisation, we selected two areas, in the fore and rear of the cave, near to where Mason had obtained some of his radiocarbon dates and that had clearly visible and intact stratigraphic profiles. Following Mason's grid reference, we chose squares BC8 and FG22 as being representative of all three chronological lenses. To obtain clean stratigraphic profiles we removed the slump material to bedrock and then excavated back a ~30x50 cm area. The rear profile wall of each excavation is shown as a pair of pentagons on the map in Figure 2. When removing the slump material in front of FG22 from the area indicated by Mason to be in his excavation trench, we discovered *in situ* deposit. We therefore proceeded with careful excavation of this deposit back to the edge of the exposed bulk and down to bedrock but were consequently unable to incorporate the exposed bulk into our excavation. The top layer (VDGB) of FG22 therefore lies below the 6452-5331 BC dates obtained from adjacent squares and most likely represents only the oldest dated lens. Figure 3 shows our two small excavations and the 'step' of exposed, intact deposit above our excavation. Figures 4 and 5 present the stratigraphic profiles of each section.

Figure 3. Top row: excavation and profile images of FG22. Note the step of intact bulk above, and set back from, the surface of our excavation. Bottom row: excavation and profile images of BC8.

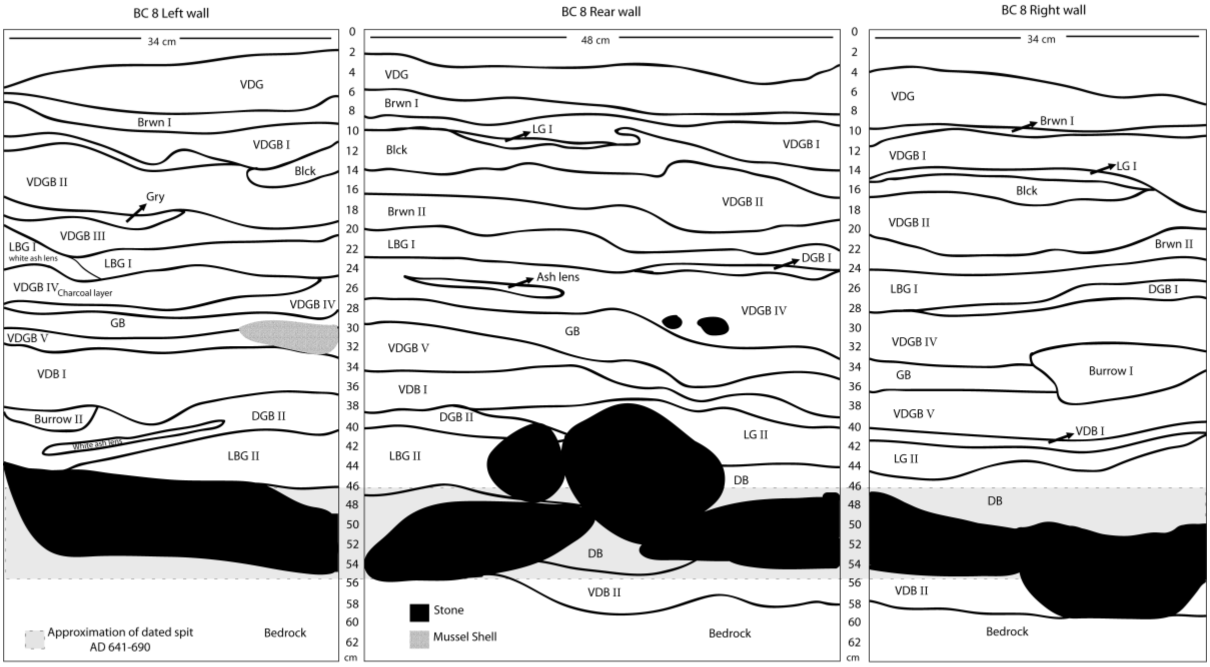

Figure 4. Profile drawings of BC8.

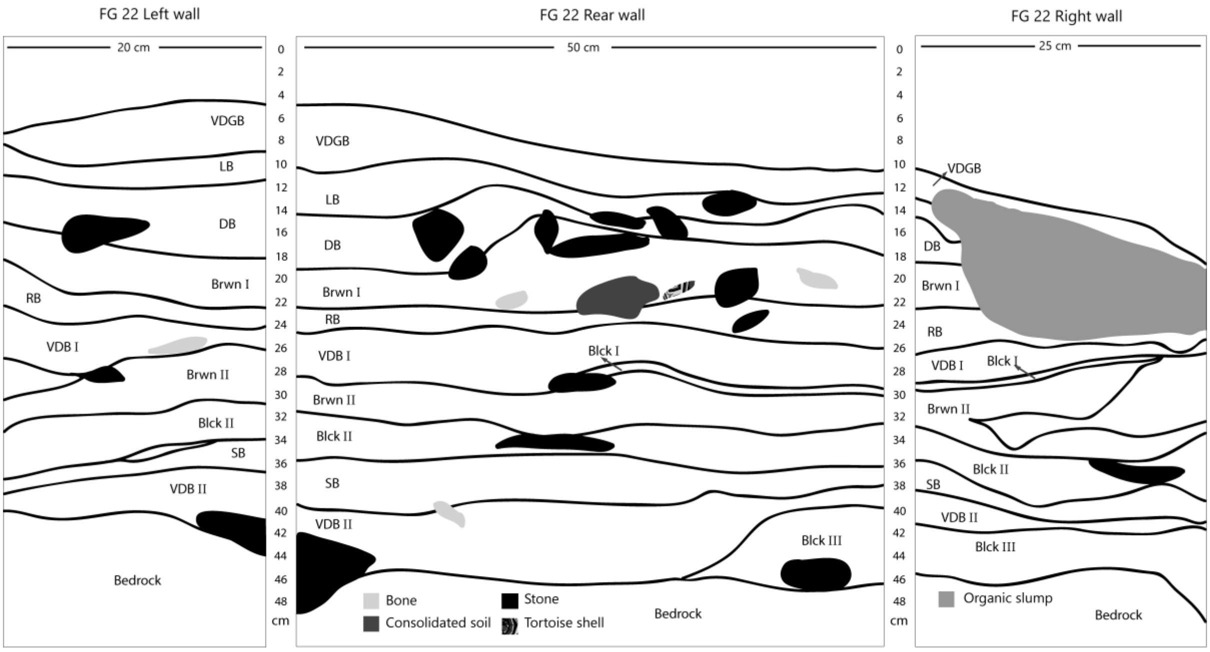

Figure 5. Profile drawings of FG22.

Excavation followed similar protocols to that used at Border Cave (Backwell et al. 2018). Each excavated stratigraphic layer was assigned a Munsell colour code and named accordingly. Duplicates of the same name are distinguished by Roman numerals. It should be noted that even though the same names sometimes repeat in BC8 and FG22, this does not necessarily indicate that the layer is contiguous, merely that there is a colour correspondence. All excavated material was sieved through 2 mm and 1 mm meshes, sorted and weighed. The nett weights of sorted material per category are presented in Table 1. A full analysis of the material is pending. Four soil samples were taken from each of the rear profile walls for future sediment DNA analysis. In both excavations a large quantity of material was recovered from the slump deposits, highlighting the volume of previously *in situ* deposit that has been contextually lost due to erosion. Metal and silica globules are present in the upper layers of BC8 and probably relate to the blacksmith's workshop. The silica globules form when molten metal comes into contact with the sandy floor, causing the silica in the sand to melt and congeal around the molten droplet (Thy et al. 2015). In general, our findings from the two excavations concur with Mason's.

Table 1. Sample weights per stratigraphic layer. All values are in grammes. Note that * indicates that weight is skewed due to the presence of a large hammerstone. Whereas any tortoise bones are included in the 'bone' column, tortoise carapace and plastron has been given its own column in the table.

Square and layer		Bone	Charcoal	Lithics	Metal	OES	Plant	Shell	Silica	Tortoise	Total
BC 8	Slump	432	7	546	115	5	2	609	0	13	**1729**
	VDG	7	25	23	96	-	5	0	24	-	**180**
	Brwn I	5	39	12	-	2	4	0	18	-	**80**
	VDGB I	9	19	75	-	2	4	3	24	-	**136**
	LG I	6	5	12	-	2	3	3	-	-	**31**
	Blck	3	1	34	-	-	0	-	-	-	**38**
	VDGB II	15	15	13	-	3	6	5	-	-	**57**
	Gry	5	7	3	-	-	2	3	-	-	**20**
	Brwn II	11	11	38	-	0	1	0	-	-	**61**
	VDGB III	15	9	18	-	-	7	3	-	-	**52**
	LBG I	11	6	-	-	2	2	5	-	-	**26**
	DGB I	11	9	30	-	2	5	2	-	-	**59**
	VDGB IV	36	35	41	-	3	15	39	-	-	**169**
	GB	31	24	56	-	-	0	58	-	2	**171**
	VDGB V	79	16	38	-	0	1	77	-	1	**212**
	VDB I	50	37	26	-	0	0	240	-	0	**353**
	DGB II	30	13	913*	-	3	1	17	-	4	**981**
	LG II	52	19	61	-	1	0	86	-	-	**219**
	LBG II	66	21	74	-	0	6	34	-	3	**204**
	DB	36	8	23	-	-	3	2	-	3	**75**
	VDB II	45	9	275	-	2	2	-	-	2	**335**
	Total	**955**	**335**	**2311**	**211**	**27**	**69**	**1186**	**66**	**28**	**5188**
FG 22	Slump	852	38	843	-	19	155	24	-	63	**1994**
	VDGB	33	3	20	-	1	3	1	-	1	**62**
	LB	61	4	19	-	5	3	1	-	2	**95**
	DB	51	10	16	-	5	3	-	-	3	**88**
	Brwn I	267	5	301	-	15	4	-	-	38	**630**
	RB	129	5	44	-	9	1	-	-	7	**195**
	VDB I	102	9	13	-	-	2	-	-	15	**141**
	Blck I	18	7	5	-	2	3	-	-	7	**42**
	Brwn II	63	9	103	-	-	-	-	-	5	**180**
	Blck II	18	17	292	-	-	15	0	-	19	**361**
	SB	48	12	2	-	-	3	-	-	7	**72**
	VDB II	170	128	80	-	-	1	2	-	0	**381**
	Blck III	9	-	20	-	-	-	7	-	-	**36**
	Total	**1821**	**247**	**1758**	**0**	**56**	**193**	**35**	**0**	**167**	**4277**

Similar to Mason's excavations we found a low ratio of stone artefacts to excavated deposit. Unmodified flakes dominate the lithic technology category, while cores are relatively scarce (Table 2). Bladelet and split pebble cores are the most common throughout the deposit. The retouched tool category is dominated by scrapers. Along the outskirts of Kruger Cave many hammerstones and Oakhurst-style D-shaped scrapers made from dolerite and hornfels can be found lying on the surface (Fig. 6). These items recur in the FG22 deposit, whereas BC8 contains smaller scrapers on quartz and chalcedony, typical of the final Later Stone Age (Fig. 7). Although we have not performed use-wear on our sample, Johann Binneman (1987), working on a small sample from Mason's excavation, found that wood-working wear was evident on scrapers with hinge and step flaked edges, whereas scrapers with abraded convex edges tended to display wear consistent with hide scraping.

The fauna has not yet been analysed to taxon, but we do not expect it to differ substantively from what was identified by Brown (1987). The bone weight is almost double in FG22 compared to BC8 (Table

1). FG22 also has far more evidence of butchered bone (Fig. 8; Table 3). Butchery marks range from one or two precision cuts (Fig. 8a) to a crude sawing motion (Fig. 8c & e). Fourteen pieces of modified bone were recovered, including bone point fragments, one of which had multiple incised decorations, and a perforated abraded piece that could have been a pendant (Fig. 9; Table 3). These decorations are consistent with those found by Mason. Bone modification is more prevalent in the younger BC deposit. Most of the bone shaft fragments were made by grinding against an abrasive surface (Fig. 9f), whilst others were whittled with a sharp lithic blade (Fig. 9b & e). One piece recovered from the BC slump was ring-snapped and its opposite end ground smooth (Fig. 9a). This technique is common after 4000 BP at several Later Stone Age sites throughout southern Africa, including Kruger Cave (Bradfield 2014, 2015a). Ring snapping is a rejuvenation technique used to shorten a bone point in a controlled manner. Edge grinding was only found in the BC deposit. Patterned horizontal scratching below the flattened end may indicate that a metal arrowhead was affixed over the bone (Bradfield 2015b), but no such metal device has yet been found here or at any other archaeological site where these bone modifications occur.

Table 2. Main lithic categories per layer. Column names are as follows (C=core, HS=hammerstone, RF=rejuvenation flake, F=flake, Bl=bladelet, CP=convergent point, A=adze, BP=backed piece, S=scraper, RP=retouched piece).

Square and layer		C	HS	RF	F	Bl	CP	A	BP	S	RP
BC 8	Slump	3	1	4	1	1	1	-	-	-	1
	VDG	-	-	-	-	-	-	-	-	-	-
	Brwn I	-	-	-	-	-	-	-	-	-	-
	VDGB I	-	-	-	-	-	-	-	-	-	-
	LG I	-	-	-	-	-	-	-	-	-	-
	Blck	1	-	-	-	-	-	-	-	-	-
	VDGB II	1	-	-	-	-	-	-	-	-	-
	Gry	-	-	-	-	-	-	-	-	-	-
	Brwn II	-	-	-	-	-	-	-	-	1	-
	VDGB III	1	-	-	-	-	-	-	-	-	-
	LBG I	-	-	-	-	-	-	-	-	-	-
	DGB I	-	-	-	-	-	-	-	-	1	-
	VDGB IV	1	-	-	-	-	-	-	-	-	-
	GB	1	-	-	-	-	-	-	-	-	--
	VDGB V	-	-	-	-	-	-	-	-	-	-
	VDB I	-	-	-	-	-	-	-	-	-	-
	DGB II	-	1	1	-	-	-	-	-	-	-
	LG II	3	-	-	-	-	-	-	-	-	-
	LBG II	-	-	1	-	-	-	-	-	-	-
	DB	-	-	-	-	-	-	-	-	-	-
	VDB II	-	-	2	-	-	-	-	-	-	-
	Total	**11**	**2**	**8**	**1**	**1**	**1**	**0**	**0**	**2**	**1**
FG 22	Slump	3	-	1	2	2	-	1	-	5	1
	VDGB	-	-	-	-	-	-	-	-	-	-
	LB	-	-	-	-	-	-	1	-	-	-
	DB	-	-	-	-	-	-	-	-	-	-
	Brwn I	-	-	-	1	1	-	-	-	2	-
	RB	-	-	-	-	-	-	-	-	-	1
	VDB I	-	-	-	-	-	-	-	-	-	-
	Blck I	-	-	-	-	-	-	-	-	-	-
	Brwn II	-	-	-	-	-	-	-	1	1	-
	Blck II	-	-	-	-	-	-	-	-	1	-
	SB	-	-	1	-	-	-	-	-	-	-
	VDB II	-	-	1	-	-	-	-	-	-	-
	Blck III	-	-	-	1	1	-	-	-	-	-
	Total	**3**	**0**	**3**	**4**	**4**	**0**	**2**	**1**	**9**	**2**

In addition to bone, four pieces of ivory were found, some of which have been knapped (Fig. 9d). Based on gross morphology and provisional histology at the break facets, three of the four ivory pieces come from warthog (*sensu* Espinoza & Mann 1992; Locke 2008). The most intact warthog tooth has remnants of ochre paint near the tip (Fig. 9g). The ochre paint appears identical to that which was applied to the 6000 BP poisoned arrowhead recovered by Mason (for a colour photograph of this artefact see Bradfield & Choyke 2016: figure 3).

Figure 6. A typical sample of lithic material found lying on the slopes below Kruger Cave.

We recovered 41 ostrich eggshell beads (Fig. 10). Beads are concentrated in the lower half of the BC8 deposit and confined to the upper four levels of FG22 (Table 3). The total average diameter of ostrich eggshell beads is 3.9 mm, but when measured according to excavated square the FG22 bead average diameter is 3.5 mm compared to the slightly larger 4.5 mm for BC8. The median diameter is 3 mm across the board. Most of the beads were drilled from both ends, albeit unevenly.

Tortoise carapace and plastron occurred in large quantities throughout the FG22 deposit, but only in the lower half of BC8, where it occurred less frequently (Table 3). Unlike in the Mason excavation, we did not find any perforated tortoise shell. We did, however, find the articulated carapace of a baby tortoise *in situ* in FG22 Blck II (Fig. 11). This is a black hearth layer, rich in lithics and burnt seeds (Table 1).

All the pieces of carapace that we found are of a similar size, suggesting that people were deliberately targeting baby tortoises. Also in this layer, we found a dermal plate of a species of catfish (Fig. 11; cf. Ebstein et al. 2015). This is the first identification of this taxon at the site, although catfish are known from other riparian sites (e.g., Plug et al. 2010).

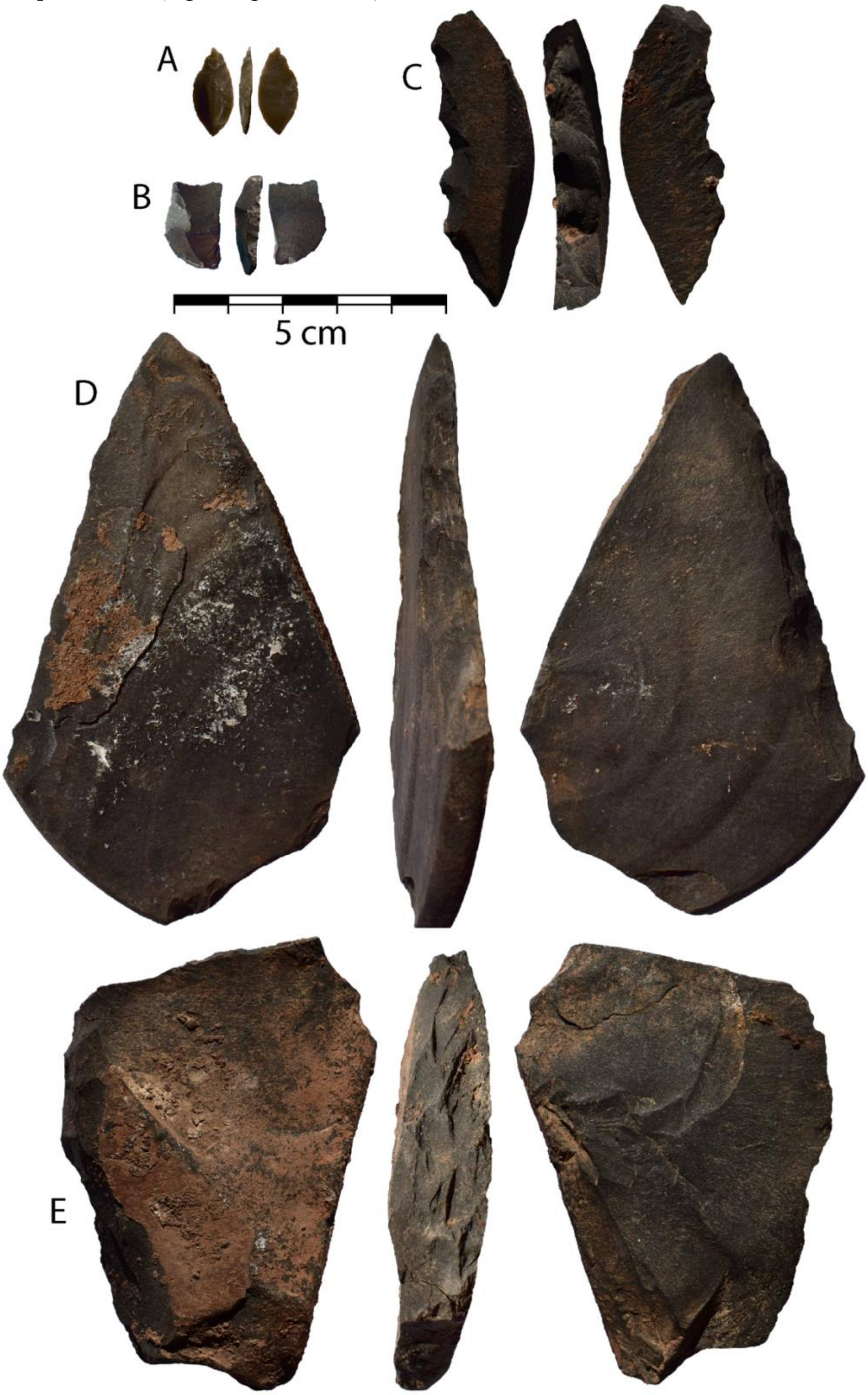

Figure 7. Lithics recovered *in situ*. a) a piece of chalcedony from the BC8 slump material retouched into a tear-drop shaped piece, possibly an arrow insert; b) a scraper from BC DGB; c) a dolerite adze recovered from the FG slump; d & e) D-shaped scrapers from FG Brwn I.

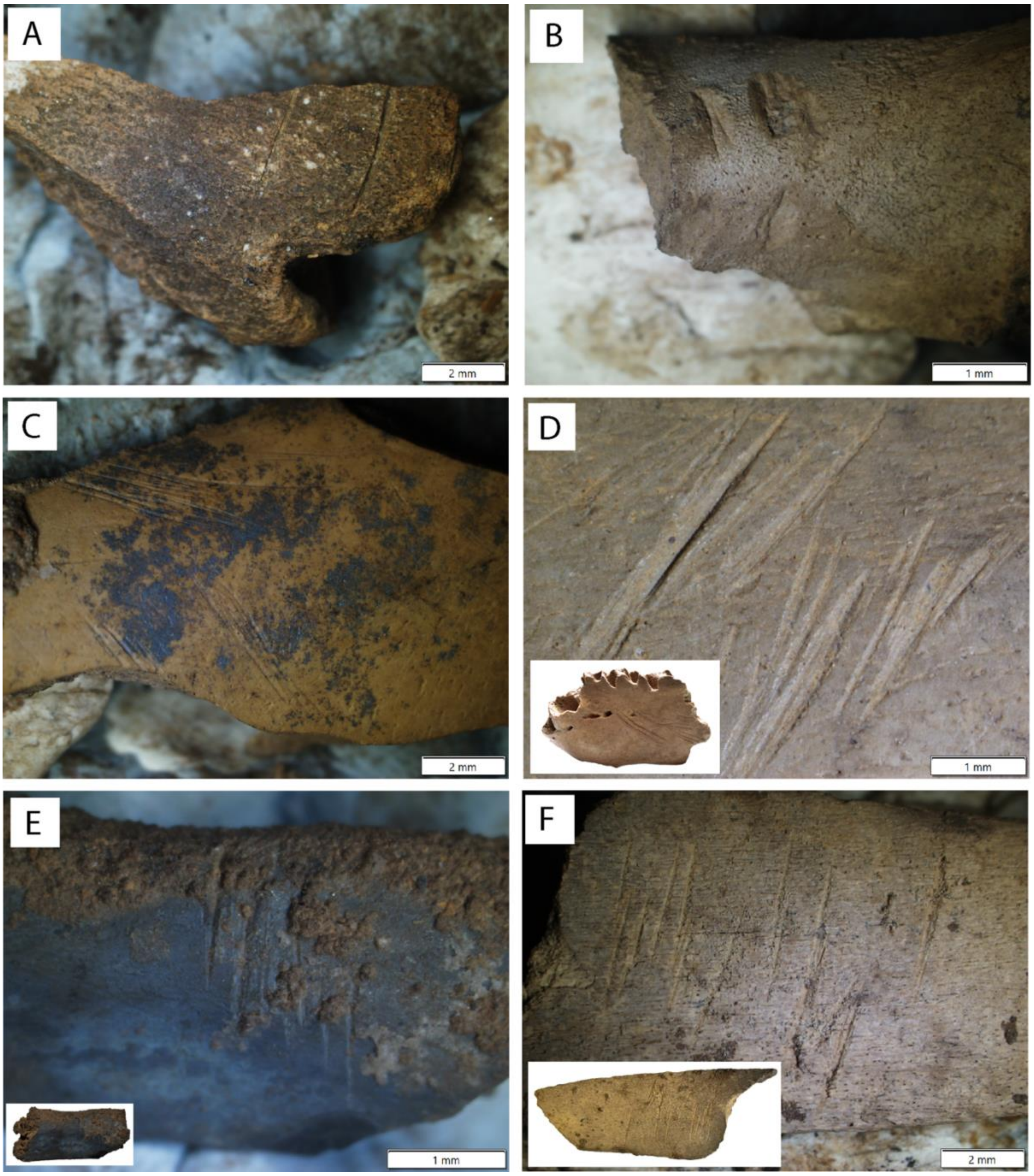

Figure 8. Butchery marks on bones from a) BC VDGB IV; b) FG VDB I; c) FG VDB I; d) FG Brwn I; e) FG Brwn II; f) FG slump.

Freshwater mussel proliferates in the first millennium AD deposit but is virtually absent in the older deposit (Table 1). Like Brown (1987), we found no other species of shellfish. Similarly, our cursory examination of the shell fragments did not identify any edge abraded pieces or other signs of use-wear. We did, however, find two pieces of perforated mussel shell and one piece that had a row of near-perforations (Fig. 12). Perforations appear to have been made using the same drilling technique used for ostrich eggshell beads. Indeed, the piece from BC8 LG II is additionally chipped and its surface abraded, presumably to make it resemble ostrich eggshell. Had it not broken we can suppose that it would have ended up perfectly resembling an ostrich eggshell bead. Although Mason's excavation did not recover any perforated mussel shells, he did remark on their occurrence at the nearby early Iron Age site of Broederstroom (Mason 1988). Coincidentally, the line of near-perforations slightly resembles a motif on a piece of tortoise carapace from 1500 BP levels at Broederstroom (Mason 1988: figure 48).

Figure 9. Worked bone and ivory. a) ring-snapped and edge abraded shaft from BC slump; b) a rare hexagonally faceted whittled bone shaft from BC slump; c) abraded piece of bone with perforation from BC VDGB I; d) ivory flake from BC VDB I; e) bone shaft with two sets of parallel incised decorations from FG LB; f) tip of a bone point from FG slump; g) warthog ivory tooth with ochre paint remnant near tip from FG slump, encircled.

Table 3. Showing cultural categories. The presence of burnishing (*), decoration (**) and perforation (#) per level is indicated, not necessarily the number of examples.

Square and layer		Modified bone	Butchered bone	OES bead	Ivory	Pottery	Perforated shell
BC 8	Slump	6	1	-	-	5**	-
	VDG	-	-	-	-	-	-
	Brwn I	1	-	-	-	-	-
	VDGB I	1#	-	1	-	-	-
	LG I	-	-	-	-	-	-
	Blck	-	-	-	-	-	-
	VDGB II	1	-	-	-	-	-
	Gry	-	-	-	-	-	-
	Brwn II	-	-	1	-	-	-
	VDGB III	-	1	--	-	-	-
	LBG I	-	-	1	1	2*	-
	DGB I	-	-	1	-	1	-
	VDGB IV	-	1	1	-	2*	-
	GB	-	-	-	-	-	-
	VDGB V	-	1	1	-	-	-
	VDB I	1	1	4	1	2	1
	DGB II	-	-	11	-	-	-
	LG II	-	-	1	-	-	1
	LBG II	-	-	1	-	-	-
	DB	-	-	-	-	-	-
	VDB II	-	-	1	-	-	-
	Total	**10**	**5**	**24**	**2**	**12**	**2**
FG 22	Slump	1	5	9	2	1	-
	VDGB	-	-	1	-	-	-
	LB	2**	-	1	-	-	-
	DB	-	2	1	-	-	-
	Brwn I	-	3	5	-	-	-
	RB	1	4	-	-	-	-
	VDB I	-	3	-	-	-	-
	Blck I	-	-	-	-	-	-
	Brwn II	-	3	-	-	-	-
	Blck II	-	-	-	-	-	-
	SB	-	-	-	-	-	-
	VDB II	-	-	-	-	-	-
	Blck III	-	-	-	-	-	-
	Total	**4**	**20**	**17**	**2**	**1**	**0**

Botanical remains consisted primarily of charred seeds, twigs and chewed bark, and occurred throughout the deposit of both excavations (Table 1). At least six types of seed were noted. Although a full taxonomic identification of the seeds is pending, they appear to represent the same species identified by Friede (1987), with *Mimusops* sp., *Strychnos* sp. and *Sclerocarya* sp. being the most common (Fig. 13). Several pieces of *Strychnos* exocarp were recovered from the FG slump material. One of these pieces appears to have a decorative line carved into it (Fig. 13e). This line has smooth, straight edges and does not resemble the pathological or taphonomic damage prevalent on most other pieces. Instead, its overall size, morphology and depth resemble the decorative carvings on *Strychnos* fruit that are still sold today (Sotran: dekorativ n.d.). Unfortunately, our attempts to refit the pieces of exocarp were largely unsuccessful, probably indicating that the remains are from several fruits. Nothing similar was reported by Mason. Chewed bark was recovered from the FG slump, FG LB and BC VDGB III (Fig. 13a). Many similar pieces were found in Mason's excavation and are identified by Friede (1987) as *Acacia natalia* (sic). This plant taxon has subsequently been reclassified as *Vachellia karroo* (Dyer 2014).

Figure 10. Ostrich eggshell beads from Kruger Cave (a-c=BC8; d-g=FG22). a) VDGB IV; b) VDB II; c) DGB II; d) VDGB I; e) LB; f) Brwn I; g) slump.

Figure 11. Articulated tortoise carapace and catfish dermal bone recovered from FG22 Blck II.

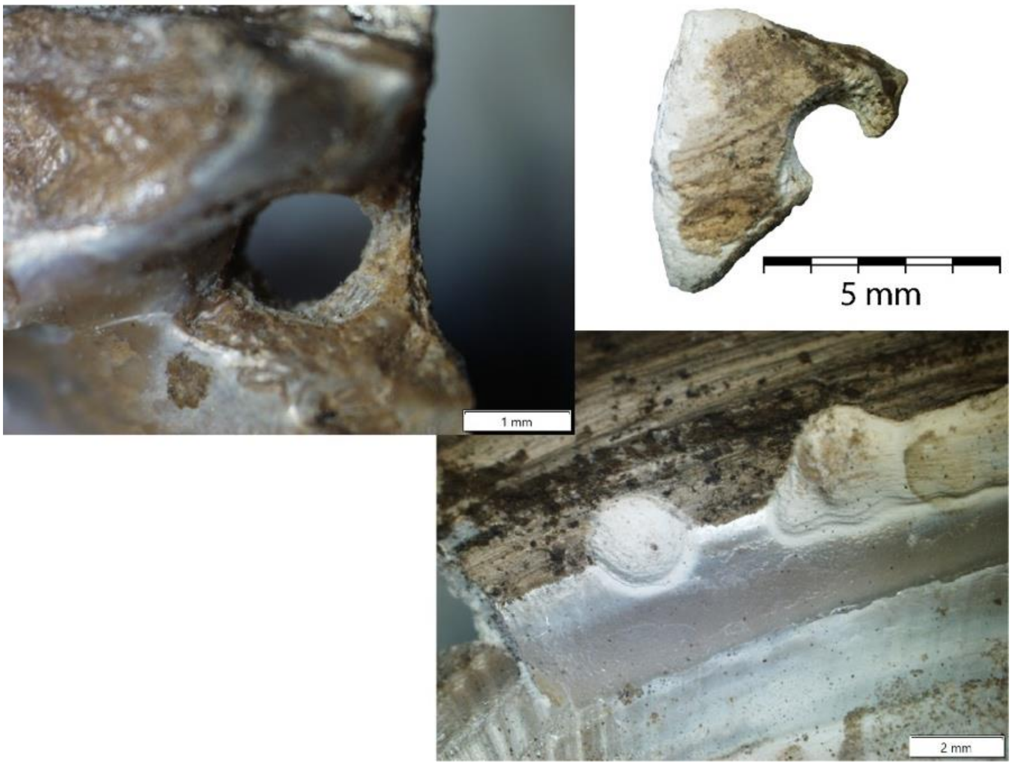

Figure 12. Perforated and near-perforated freshwater mussel shell. The broken abraded piece comes from BC LG II; the other two come from BC VDB.

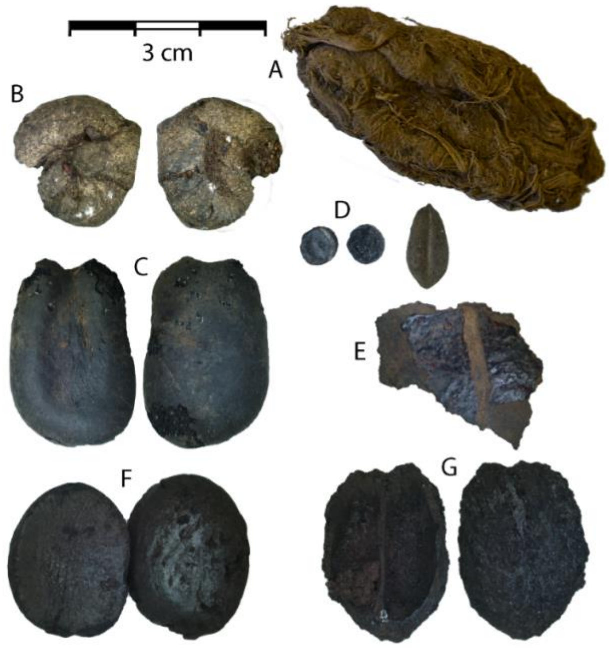

Figure 13. Botanical remains. a) chewed bark from FG slump; b) unidentified seed from BC VDGB I; c) *Strychnos* sp. seed from BC LBG II; d) unidentified seeds from BC LBG I; e) *Strychnos* sp. exocarp with putative decoration from FG slump; f) *Mimusops* sp. seed from FG Blck II; g) unidentified seed from FG Blck II.

Thirteen pieces of pottery were recovered from our excavation (Table 3). These included three rim sherds, of which two are decorated (Fig. 14), and two painted and burnished pieces. The rim sherds all come from the BC slump and match the motifs illustrated by Mason (1988: figure 59). The painted and burnished pieces come from BC LBG and BC VDGB IV and display a polished red hue on one or both sides respectively. Mason attributed the incised motifs to Kaditshwene Phase people, which correlates to Huffman's (2007) Uitkomst facies, although to us the decorative style seems more akin to facies within the Kalundu tradition than to what Huffman has illustrated as exemplars of Uitkomst (cf. Huffman 2007: 173). Mason noted the absence of Bupye (Huffman's Buispoort) pottery in the cave, despite its abundance in the surrounding countryside. We too did not recover anything that resembled Buispoort, although painting and burnishing is a feature common to this facies (see Huffman 2007).

Figure 14. Decorated rim pot sherds recovered from the BC slump.

Recording the rock paintings

In 2021, we photographed the entire length of the NE wall and ran all our photographs through the DStretch colour decorrelation algorithm. We were able to relocate only 38 of the 57 images recorded by Pager and were able to identify one that he missed. Paintings occur in two colours: red and black. The black figures are clustered together on the lower panel just inside the perimeter fence and may have been done at a different time or by a different artist than the other images. Figures 15-17 present some of the better-preserved images, with the originals on the left and colour-augmented versions on the right. The one that Pager missed is an antelope shown in Figure 17b, which is partly obscured behind an efflorescence flow. We were able to identify several red blotches through DStretch, which may be the degraded missing images that Pager recorded, or they may be mineral discolourations in the rock. Except for four images, all the missing paintings are from a 5 m densely clustered stretch near the base of the NE wall. Pager noted the generally poor preservation of the images consequent upon the effects of lichen growth and dust.

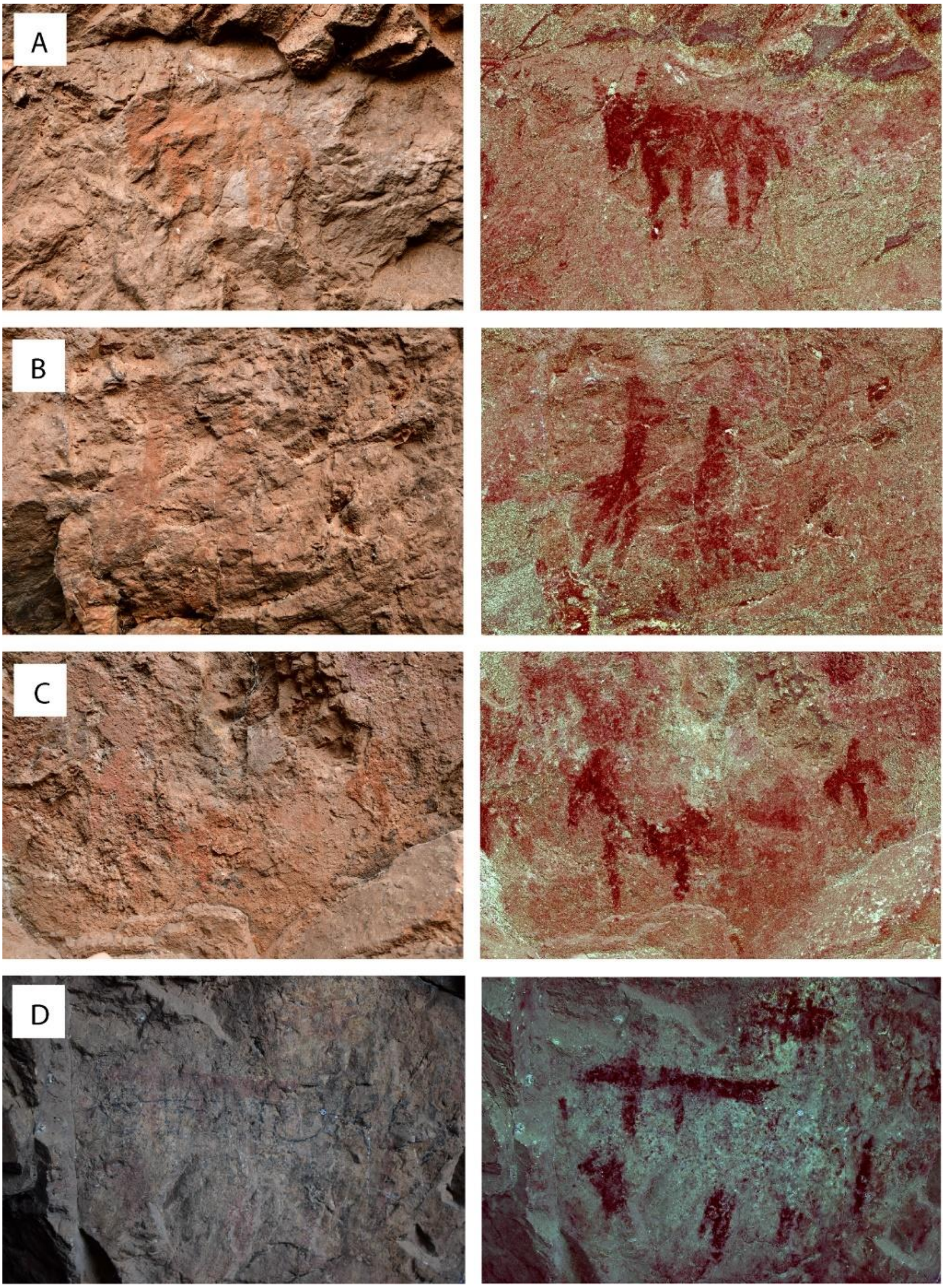

Figure 15. Rock paintings at Kruger Cave with digital photographs shown on the left-hand side and DStretch colour augmented images on the right.

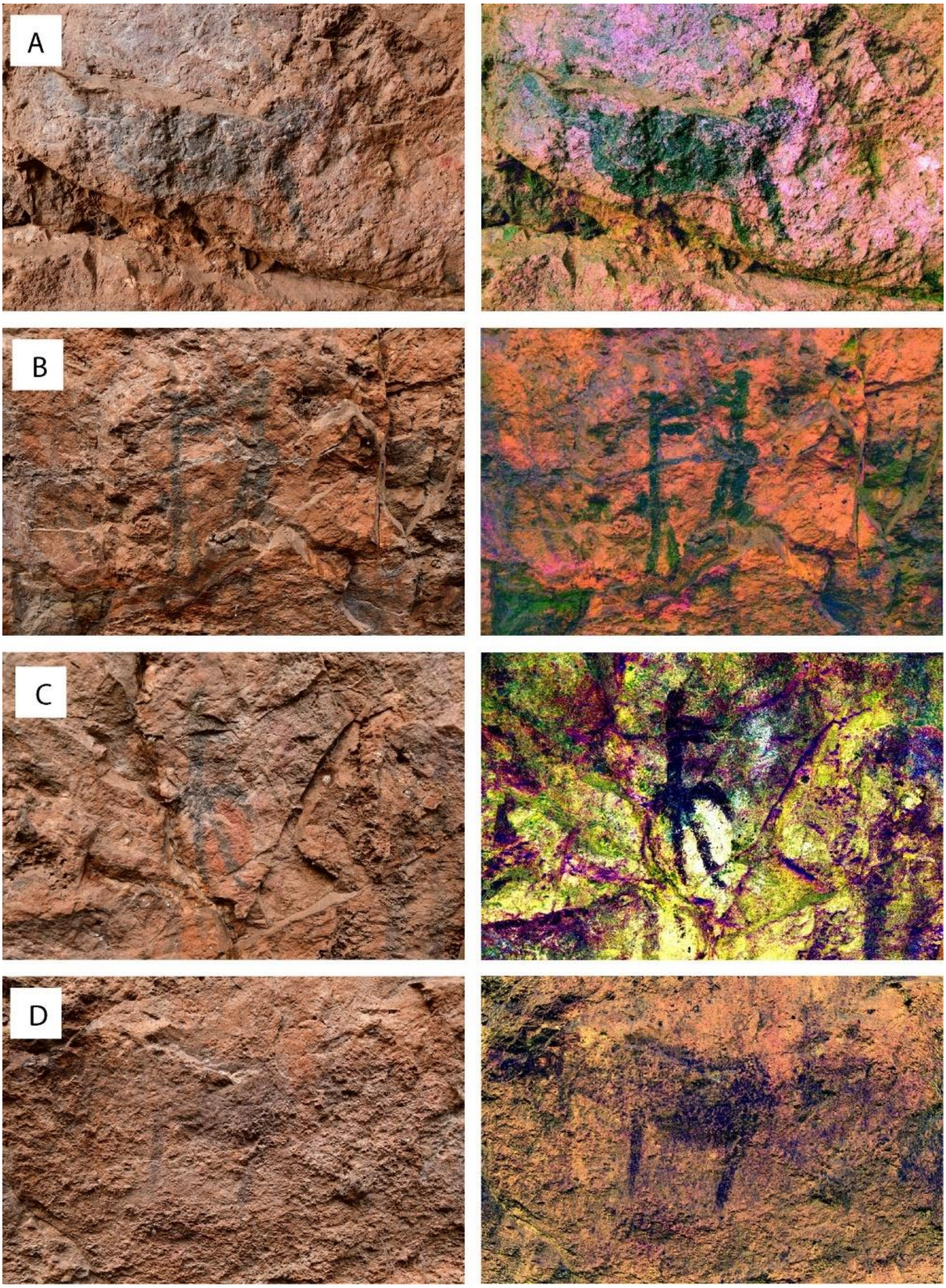

Figure 16. Additional rock paintings at Kruger Cave. Digital photographs shown on the left-hand side and DStretch colour augmented images on the right.

There is much graffiti on the wall at Kruger Cave. Most of the graffiti clearly mimics the paintings in theme, being drawings of stickmen carrying bows. The rest is of seemingly random assortments of letters and names – possibly of the 'artists'. There is only one case where graffiti overlays a painting (Fig. 15d). Pager (1987) does not mention graffiti in his report, but whether this is because it was not present at the time or because he simply did not regard it as relevant is impossible to say.

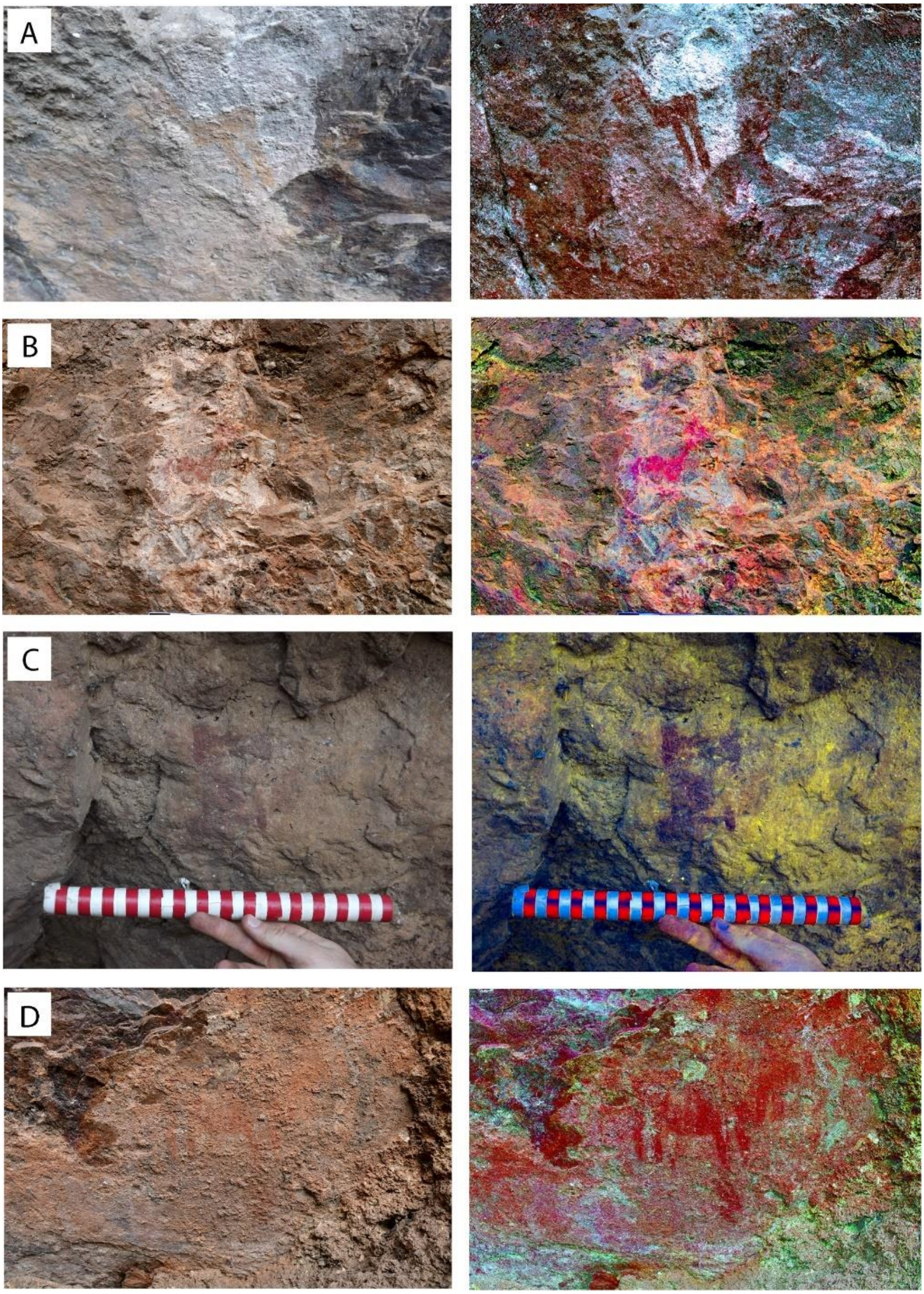

Figure 17. More rock art. Digital photographs shown on the left-hand side and DStretch colour augmented images on the right. The antelope image (b) which Pager did not record is partly obscured by efflorescence.

Stabilisation of the deposits

As a site that is currently occupied, Kruger Cave poses some challenges to traditional rehabilitation measures. Ordinarily, when closing a site, the excavated trench is partially filled with sandbags, which are then covered with loose sand closely approximating the natural sediment (Du Toit & Küsel 2015; Vogelsang 2017). The edges of the trench are lined with a geotextile tarp and then hidden by the loose sand, thus effectively camouflaging the excavation. This would not be an effective approach at a site that needs to serve the purposes of habitation. Simply walking around and sweeping the floor clean of leaves would soon remove the camouflage layer. Besides, our view is that disguising a site actually detracts from its authenticity (*sensu* Matero 2008). A site that has been excavated will always remain so, and there is no need to hide that fact. The excavation is part of the site's history. At Kruger Cave there are two places where sediment was removed in antiquity and replaced by more recent archaeological deposits. The first is in the rear of the cave where the grass bedding layer from the 5000-7000 BP occupation was dug into a hollow that removed some of the older 9000-10 000 BP deposit. The second is along the NE wall in the fore of the cave where the first millennium AD occupants removed the underlying deposit, which was subsequently filled in with their own material culture. The process of archaeological removal and accrual is part of the living heritage of Kruger Cave.

We therefore opted for a remedial approach, focused on stabilising those bulks of intact archaeological deposit that hold potential for future excavations, and left the rest of the site as is. Each of the five bulks was covered with an 8 mm thick geotextile blanket (Fibretex F1000 AFS). This geotextile is designed for large groundwork projects and is a highly durable, non-abrasive fabric that allows water filtration and evaporation, and acts as a protective padding for the underlying deposit. It is easy to sweep clean and will protect the underlying sediment from further erosion and deflation. The geotextile fabric is held in place with woven polypropylene sandbags propped against the exposed profile walls to further protect the profiles from accidental damage occasioned by human activity (Fig. 18). Mason's excavation trench was left as is to allow a walkway through the site and also to serve as a drainage channel for the Pastor's washing water and other effluent. This arrangement protects the remaining archaeology while still allowing the site to be responsive to the daily needs of its occupant and, together with the signboard to be erected in front of the site, highlights to visitors that this is a protected archaeological site.

Custodial conservation

Some might argue that the visibility of our remedial action might encourage curiosity that will lead to further vandalism of the site. Visible intervention measures have a poor track record in Africa. Mason's fence, which was intended to discourage visitors, failed to do the job for which it was designed. Even sophisticated protective panelling erected to safeguard Blombos Cave, located along a remote stretch on the Southern Cape Coast, proved to be a spectacular failure (Henshilwood 2016), probably because it increased the site's visibility and served to attract the unwanted attention of passing fishermen. Barricades are patently ineffectual. It is human nature to peer behind the curtain wherever one is found. But Kruger Cave is different.

It has been argued elsewhere that Kruger Cave's current occupant, Pastor Voyi, serves both as a psychological deterrent to visitors and an informal custodian of the site (Bradfield & Lotter 2021). Most visitors would have a natural aversion to an unknown occupant whom they may perceive as dangerous or threatening and would therefore avoid the cave. Those who do venture to the cave would be more inclined to behave due to the presence of another person (*sensu* Bentham 1791). At the same time, the pastor keeps the site clean and can be elicited to help protect the remaining paintings and deposit from further effacement. It is not uncommon for archaeological sites in Africa to be managed *de facto* by traditional custodians, if not for their physical fabrics then at least for their spiritual values (Pwiti 1996; Ndoro 2005; Chirikure et al. 2015, 2017). In the absence of any ancestral community that claims an atavistic connection to Kruger Cave, it is apparent that the pastor is the only person to whom the site currently has a spiritual connection and relevance, and is therefore a natural choice for custodian (Bradfield & Lotter 2021). The pastor must therefore necessarily be involved in any conservation efforts that pretend cognisance of the continuing process of archaeology and the changing associations and functions of the site (Agnew 1997; Jokilehto 2007; Matero 2008).

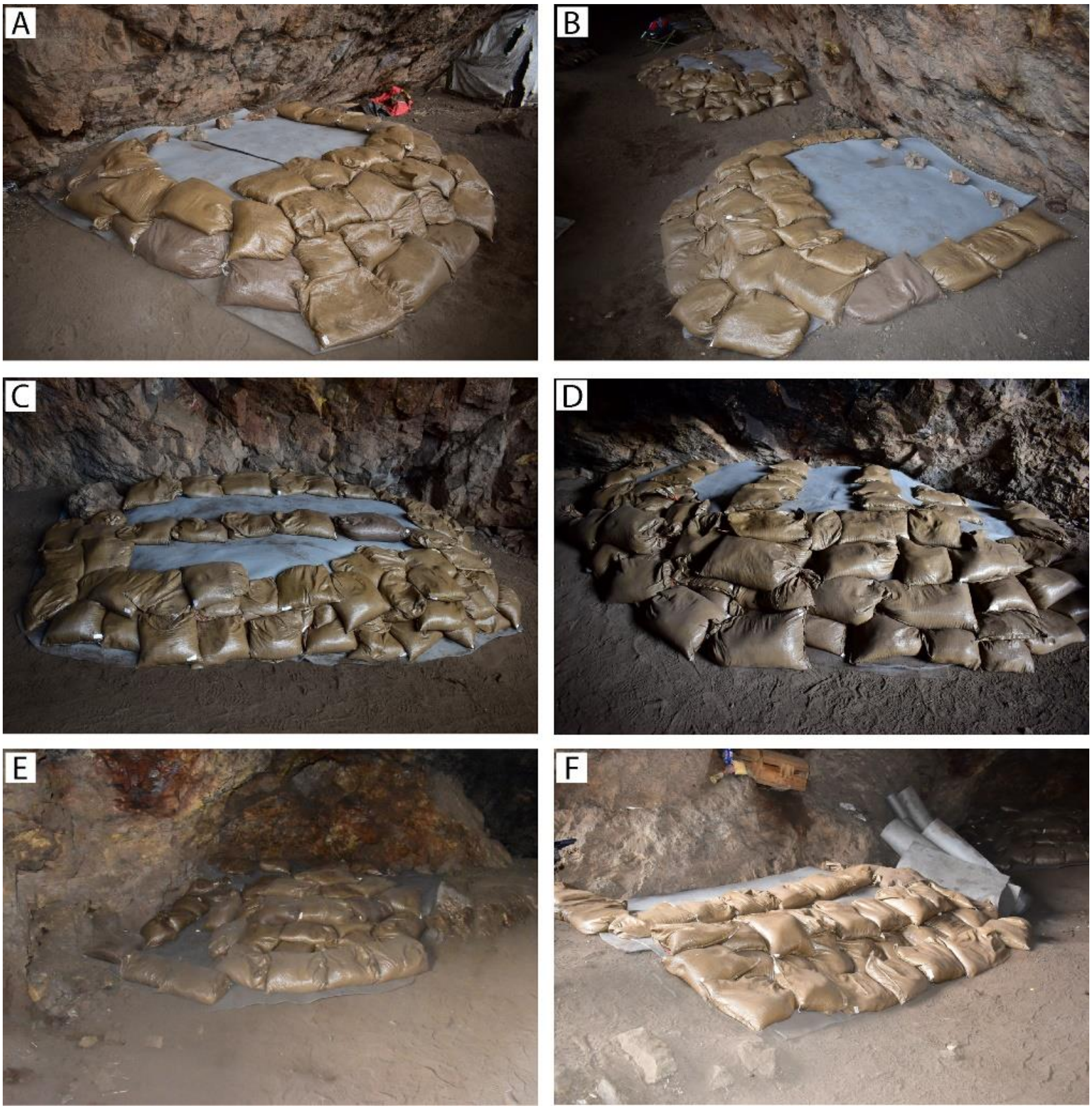

Figure 18. Stabilised bulks of intact archaeological deposit. Corresponding to the map in Figure 2, a) shows bulk A; b) showing bulk A in foreground and bulk B in the background; c) showing bulk B; d) showing bulk C; e) showing bulk D situated in the rear of the cave; and f) showing bulk E.

Pastor Voyi is aware of the archaeological significance of Kruger Cave and assisted with the stabilisation work. Together with other local stakeholders, including the ward council, angling club and irrigation board, we hope to formalise the pastor's role as custodian of Kruger Cave. Having a semi-permanent resident at the site will help protect it from intruders and will ensure that the sandbags and geotextile blankets stay in place, and that further graffiti on the walls is prevented. Formalising his role with relevant government and business entities that have an interest in developing the touristic potential of Kruger Cave will help to raise awareness of the site within the local Rustenburg and Olifantsnek communities. Through these channels, the pastor can help facilitate access to the site for legitimate visitors interested in learning about the archaeological history of the area. The site can serve a dual purpose that both honours and maximises the heritage potential of the site, and which also is sensitive to the pastor's functional and spiritual needs. In this way, Kruger Cave can become a signal example of a living heritage site.

5. Conclusion

Kruger Cave is one of those rare sites that preserves a wide array of organic remains in exceptional condition. There is still much scientific information that can be gleaned from the site, both in terms of what has been excavated and what remains to be excavated in the future. Grass bedding, fibrous rope, poisoned arrowheads and human hair are among the perishable material items that have preserved and from which we may yet derive information, such as palaeopharmacology and DNA. Just in our two small excavations we have found several things that were not recovered from the Mason excavations, including perforated shells, potentially decorated *Strychnos* exocarp, and the remains of a catfish. We also found a painted image not previously recorded. The direct date obtained from the bladder cap highlights the relative antiquity of the upper layers of the cave deposit – the very layers most at risk of deterioration. Kruger Cave is one of only two early Holocene sites in the Magaliesberg, making it important for understanding human responses to changing environments at this time (Mitchell 2002), and, if properly managed, has the potential to draw visitors and provide a source of revenue that could benefit the local community. It is unfortunate that the site was left to degenerate into such disrepair, despite being well known to the archaeological community. Nevertheless, about a fifth of the original deposit remains.

We have presented our efforts to stabilise the remaining deposit from further erosion and deflation. In line with recent heritage management practices (*sensu* Acabado et al. 2014), our approach has tried to foster the participatory involvement of the only local community that currently has a vested interest in the site, namely the pastor. Although the pastor's presence in the site subtracts from the archaeology, it simultaneously adds to it in the same way that has been ongoing at the site for millennia. Our remedial work has attempted to stabilise what remains of the archaeological deposit in a manner that is authentic and does not try to hide the fact that this is an archaeological site, while being accommodative of the pastor's needs. We have digitally documented what remains of the rock paintings, which now allows us to gauge their relative rate of decay and which we hope are better than Pager's tracings, which he admitted were at best "approximations or interpretations" of the faded paintings (Pager 1987: 228). Our ongoing analysis of the excavated material should yield new information regarding aDNA, mass spectral data and chronological refinement of certain levels. Further efforts at the site will focus on 1) the erection of an information board outside the cave for visitors, 2) fostering greater awareness of the site and its potential among local businesses and tourism agencies, and 3) formalising the pastor's role as a custodian at the site, which is, in our opinion, the best way to protect and manage the site.

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