Stone Age Archaeology and Paleoecology of the Geelbek Dunes, West Coast National Park, South Africa
Report on the 2000 Fieldwork

Introduction

The fieldwork in 2000 can be seen as a direct continuation of the 1998 and 1999 seasons; the principal research questions and goals of the Geelbek project have been presented in the previous two reports to the National Monuments Council and will only be alluded to in the current report.

The 2000 field season at Geelbek ran for 16 weeks from January 10th to April 28th. As in the previous two seasons, a doctoral candidate, T. Prindiville , two archaeological technicians, A. Kandel and M. Jones, and the project director, N. Conard, formed the nucleus of the research team. Students from Tübingen and to a lesser extend the University of Cape Town made up the majority of the field crew. During the first 8 week period these students included: M. Barth, T. Bluhm, C. Meister, T. Tonner, S. Wurster and K. Hlongwane. For the second 8 week period the first group was replaced by the second, which included the following students: S. Feine, M. Franken, F. Hillgruber, U. Mauerer, S. Rathje and H. Seely. Throughout the season, the crew typically consisted of 7 – 10 members, with two-thirds of the crew members usually in the field and one-third in the lab.

The field research in 2000 had three principal components: 1) the excavation and analysis of numerous geological profiles, 2) the survey and excavation of new deflation bays, and 3) the re-mapping and excavation of previously studied bays. Beyond this work, considerable time and energy was invested in the analysis refitting and illustration of diverse materials in the Geelbek field laboratory. Two experiments in actualistic archaeology were also conducted.

Chronostratigraphy

Significant progress in the study of the chronostratigraphy at Geelbek has been made since the submission of the 1999 report to the National Monuments Council. This development is due to three factors: the study of multiple geological profiles in the dune systems; the numerous new U-series, infrared stimulated luminescence and radiocarbon dates from the Quaternary Dating Research Unit in Pretoria; and the systematic analysis of the stratigraphy by P. Felix-Henningsen from the Institute of Soil Science and Soil Conservation in Giessen, Germany.

While many details of the stratigraphic system at Geelbek are not yet resolved several points are becoming clearer. At a minimum the following stratigraphic units moving from bottom to top have been identified: a sand from *below* the calcrete at Stella has been dated with IRSL to 147 ± 12 ka. The underlying lower calcrete at Stella has yielded a U-series date of *146 ± 11 ka*. Moving upward in the stratigraphic sequence, the sand underlying the calcrete at Rhino has yielded an IRSL age of 61 ± 5 ka while as the age of the overlying primary calcrete from Rhino has been dated with U-series measurements to 67 ± 3 ka. These four dates form the framework for the earliest finds from Geelbek and confirm the existence of at least 2 chronologically distinct calcrete formations. The age estimates for the upper calcrete are supported by the minimum radiocarbon age of ca. 41 ka on a snail shell from within the calcrete. Additional stratigraphic observations suggest the presence of other chronostratigraphic units, but these units cannot yet be integrated into the system. At least two dune sand deposits, each with its own humic development, overlie this series of sands and calcretes. This entire sequence is covered by the modern, unconsolidated sands of the Geelbek Dunefield. The lower fossil dune is relatively well consolidated and usually dark brown in color, while the upper fossil dune is orange-yellow in color and characterized by ubiquitous rhizoliths. The lower part of the upper fossil dune in Stella yielded a minimum ISRL age of ca. 11 ka, while in a stratigraphically higher position in Stella, The upper fossil dune has yielded an ISRL date of ca. 5 ka. Other age determinations are

underway in Pretoria to try to resolve the uncertainties in the system and to refine the simplified chronostratigraphic system. Unstratified human remains recovered last year from locality Homo have been dated with the AMS radiocarbon method to 1,100 ± 50 bp and document relatively recent use of the Geelbek area during the LSA. Finally, two samples of roots from the lower fossil dune at Rhino have been dated to 210 ± 15 ka and 130 ± 45 ka. These roots must be considered intrusive. Further U-series, stimulated luminescence, and radiocarbon measurements are underway to gain better chronological control over the Geelbek sequence. Remaining questions include establishing the number, distribution and age of distinct calcrete and fossil dune units.

Archaeological Results

Ten bays were studied for the first time in 2000. These included Nora, Stone Ring, Loop, Crow, Equus, Shelly, Hetero, Olifant, Bovid and Toaster. The salient features of these localities are summarized below. Figure 1 shows the position of these and the other localities that have been studied at Geelbek. Table 1 summarizes the finds from the new bays, and Figures 2-11 present distribution plots and topographic maps of these localities.

Nora is an irregularly shaped small- to medium-sized bay in northern part of the dune system (Fig. 2). Despite its relatively small size (ca. 1900 m^2), the bay produced a large number of finds (Tab. 1). The rhizolith sands of the upper fossil dune are present in most areas of the bay. Absolute dates of this sand (ca. 5 ka) suggests that more recent archaeological finds may be expected. This is confirmed by the presence of pottery and ostrich egg shell beads. Only a sample of the OES beads have been measured and the diameter of these range in size from 2.9 to 3.4 mm. In terms of assemblages, this locality shows affinities with the locality Pottery documented in 1999 and again in 2000. A small number of diverse stone tools were recovered while lithic artifacts smaller than 1cm were particularly abundant in Nora. The main lithic sources include quartz, quartzite, silcrete and metamorphic raw materials. Marine mollusks, of which black mussel was most abundant, are present in the bay. Many fragments of ostrich egg shells and many complete ostrich egg shell beads were recovered.

Stone Ring is a relatively large (ca. 6100 m^2), elongated, northwest-southeast oriented bay located in the north central part of the main dune lobe (Fig. 3). Here two distinct calcretes could be documented in a geological profile through the karstified upper calcrete onto the lower, impenetrable hard-pan. Although samples for dating with luminescence and U-series have been taken from this profile, it is, at present, unclear whether or not these calcretes correlate with the dated calcretes at Stella and Rhino. At a higher stratigraphic location, on the upper ancient dune, this locality yielded the best-preserved ceramic vessel thus far recovered at Geelbek. This relatively short spouted pot has several small bosses near the main opening and a conical base. Not far from the location of the pottery a bored stone was recovered. While the bay was generally not very rich, in addition to the later LSA finds mentioned above, it did provide some older finds from the widely exposed upper calcrete of the bay. These included the skull of a large bovid and in a separate location a concentration of vertebrae, which could not be removed from the calcrete.

Loop is a medium to large size bay located in the northern part of the dune system. The bay covers an area of ca. 5,000 m^2, but visibility was best in the central and northern parts of the locality, while in the eastern and western parts of the bay loose sand and vegetation significantly reduced the visibility (Fig 4). One unmineralized, well-preserved human radius was recovered in an area which produced 12 pottery fragments. Other human bones were not recovered, and it remains unclear, whether or not the association between the human bone and the pottery is of circumstantial or cultural origin. Excavations around the area of the human radius yielded no other human remains. Possible traces of carnivore damage to the bone suggest that the specimen derives from a disturbed burial at another location. Other finds from this bay included 6 ostrich egg shell beads of a larger size (range in diameter = 3.3 to 7.4 mm) than the ones from Pottery, Nora or Shelly. Ten fragments of perforated ostrich egg shell were recovered. These represent the remains of at least one ostrich egg shell bottle. About 100 pieces of marine shell were plotted in Loop. These included 8 species of which black mussel made up roughly 60% of the assemblage. The mammalian fauna included a relative abundance

of mineralized specimens from larger bovids. Loop provided a particularly rich lithic assemblage including 950 chipped artifacts. The majority of these finds were pieces of quartz under 1cm in size, but diverse quartzites, graywackes and other materials are also present. Tools include several hammerstones, adzes, scrapers and backed blades and backed points.

Crow is a relatively large locality covering nearly 6,300 m^2 (Fig. 5). Here two calcretes appear to be present. The upper, heavily weathered calcrete has a rather limited horizontal distribution in the northeast, while the lower hard-pan is exposed over large surfaces in the southwest. The situation is similar to that of Rhino. Roughly 420 lithic artifacts were recovered. The majority of these artifacts are finds of quartz porphyry, quartz, quartzites and silcretes, as well as graywacke, magmatite, and other raw materials. One well-defined scatter of quartz porphyry was documented in the north-central part of the locality. Tools included grindstones and a silcrete segment. Few marine shells were documented here. The mammalian fauna includes many small fragments of mineralized bone that appears to stem from large bovids or similarly sized animals. Particularly interesting is the presence of several worked bone points or link shafts. The largest of these fragments is 105.9 mm long and 5.5 mm in diameter. These pieces are heavily weathered, but preserve easily recognizable blunted and pointed ends.

Equus is the largest deflation bay studied thus far. The long axis of the locality is oriented northwest to southeast, and the bay covers an area ca. 10,200 m^2 (Fig. 6). Like Rhino and Crow this bay appears to contain a heavily weathered upper calcrete as well as an older, lower-lying calcrete. Lithic artifacts are relatively rare at this locality, with quartz, quartzite, quartz porphyry, and silcrete being the most abundant raw materials. Among the silcrete tools, backed forms including a relatively large segment are present. The mammalian fauna is dominated by mineralized size-class 4 bones. T. Prindiville has tentatively identified these remains to the extinct species *Equus capensis* and *Pelorovis antiquus*. Ostrich egg shell is the most common category of find at Equus. Over 1,200 pieces of ostrich egg shell were recovered including at least 56 pieces that preserve rim fragments of water bottles. Many of these finds could be refitted. Thus far these refits have demonstrated the presence of no fewer than seven, two-holed water bottles. Much of the ostrich egg shell appears to originate from calcrete and could thus predate similar finds from the fossil dunes at other localities. The remains of three dispersed stone hearths are present in the northwestern part of the locality. As in other localities, these features represent the deflated remains of stone hearths that were probably used as roasting or cooking platforms.

Shelly is a medium sized bay in the west-central part of the dune system. It covers ca. 4700 m^2, and with the exception of a small exposure of calcrete in the southeastern part, the surface consists of the fossil dune deposits with rhizoliths that typify the upper part of the stratigraphic sequence (Fig. 7). As the name suggests, the deflation bay produced a great abundance of mussels and provides the best evidence thus far for intensive exploitation of sea resources at Geelbek. In addition to the usual materials, one fragment of a bone point was recovered. While macrofaunal remains were relatively scarce, ostrich egg shell beads were recovered in moderately high numbers. Diverse lithic artifacts were recovered, including a large blade core of green metamorphic rock and an abundance of hammerstones and ground stone tools. Much small and micro debitage, predominantly quartz, was also recovered. As always, many tortoise remains were documented, but it remains difficult to demonstrate a clear association between these remains and the human occupation of the locality.

Hetero is a series of small deflation hollows immediately to the east of Stella (Fig. 8). This locality was studied after probable human bones (shaft fragments of a tibia and fibula) were discovered during a 2000 survey of the dunes. The bay yielded no artifacts and only a small number of other faunal elements (Tab. 1). No excavation was undertaken here.

Bovid locality is situated on the western edge of the central part of the dune system. The bay is large, but poorly defined. For this reason, only the northern portion of the bay was recorded (Fig. 10). The finds were documented on the upper fossil dune characterized by rhizoliths. The locality contained many bones from a single large bovid. The bones generally lacked signs of carnivore damage, but included many shaft fragments which appeared to have been broken while in a fresh state. This

...ion may well be of anthropogenic origin. In addition to the bovid concentration diverse ... faunal materials were collected from the surveyed portion of the bay.

... is likewise a poorly-defined locality which was briefly investigated to recover the elephant ... (tooth fragments). Although all of the 42 finds were piece-plotted with the Leica Total ..., the borders and topography of Olifant were not documented

... is a medium-sized bay in which both the rhizolith sand of the upper dune and a hard-pan ... are exposed. Although the context of this locality is similar to that of Nora, Pottery or Shelly, ... differences in the assemblages recovered here. The relatively large faunal sample from this ... is dominated by small bovid remains; even remains of a large, as-of-yet unidentified carnivore ... present. In terms of both raw materials and tool types, the lithics from Toaster compare well with ... microlithic LSA assemblages documented on this sand body at other localities in the Geelbek ..., and differ only in degree. Several distinct concentrations of blackened calcrete blocks were ...mented here. All these finds taken together with the presence of pottery and occasional OES ..., indicate that this site may, too, represent the remains of an ceramic-LSA occupation of ...ficant duration, as in Pottery.

In addition to the nine localities described above, several bays including Pottery, Rhino, Snoek, Homo Bay 35 and Stella were subject to recollection and survey. This work clearly showed that the dunes are highly active and can move as much as 25 meters in a year, with average movement of approximately 9 to 12 meters. In some cases movement of several meters could be documented during the course of the 2000 field season. The re-collection of these localities was of great importance, as can be illustrated with a few examples. At Rhino, many new finds from a scatter of quartz porphyry were documented. These finds all stemmed from the lower fossil dune rather than the calcrete which produced the rhinoceros bones recovered in 1999. At Snoek, additional specimens from a size class 4 bovid with cut-marked bones were recovered from dark brown sand above the calcrete. At Stella a new concentration of rhinoceros bones was recovered from the northeastern part of the locality. At other localities which had only been partially recorded, such as Pottery and Homo, the new collections greatly added to the amount of material documented. Re-survey and re-collection provide the possibility to gain better stratigraphic control over the origin of the finds and provide important insight into the geological and taphonomic conditions that affect the finds from Geelbek.

Two archaeological experiments conducted during the 2000 season are also noteworthy. In one experiment three sets of lithic and faunal materials were prepared and placed in a controlled fashion on three substrates. The goal of this experiment is to see how the density and shape of various kinds of materials affect their movements in the dunes. This study includes case studies on loose sand, a fossil dune and on calcrete. Through the monitoring of these simulated sites, new insight onto the taphonomy of the Geelbek dunes and other similar settings can be gained.

The other experiment was conducted in connection with Graham Avery and involved the plotting of tortoises remains and other materials in areas burnt during the bush-fires of January 2000. This study took place in April in the vicinity of Elandsfontein farm. In total, ca 2 hectares were systematically studied. This work should help to establish criteria for distinguishing archaeological tortoise remains from the background accumulation of this material. At the same time, areas of burnt calcrete were examined with the intention of establishing better criteria for distinguishing archaeological features from naturally occurring burnt materials.

Future Research

These three years of survey and excavation from 1998 – 2000 effectively end the first major phase of work by the University of Tübingen at Geelbek. In 2001 and beyond the project will enter a phase of monitoring the dunes, in which collection of large assemblages of archaeological materials will no longer be the principal goal. Instead work will focus on analyzing of the existing collections and advancing the geo-ecological research at Geelbek. While, in the coming years, the project will

study the migrations of the dunes and the chronostratigraphy of the regional system, only seasons of a few weeks are initially planned for the recovery the more important of the exposed finds.

Acknowledgements

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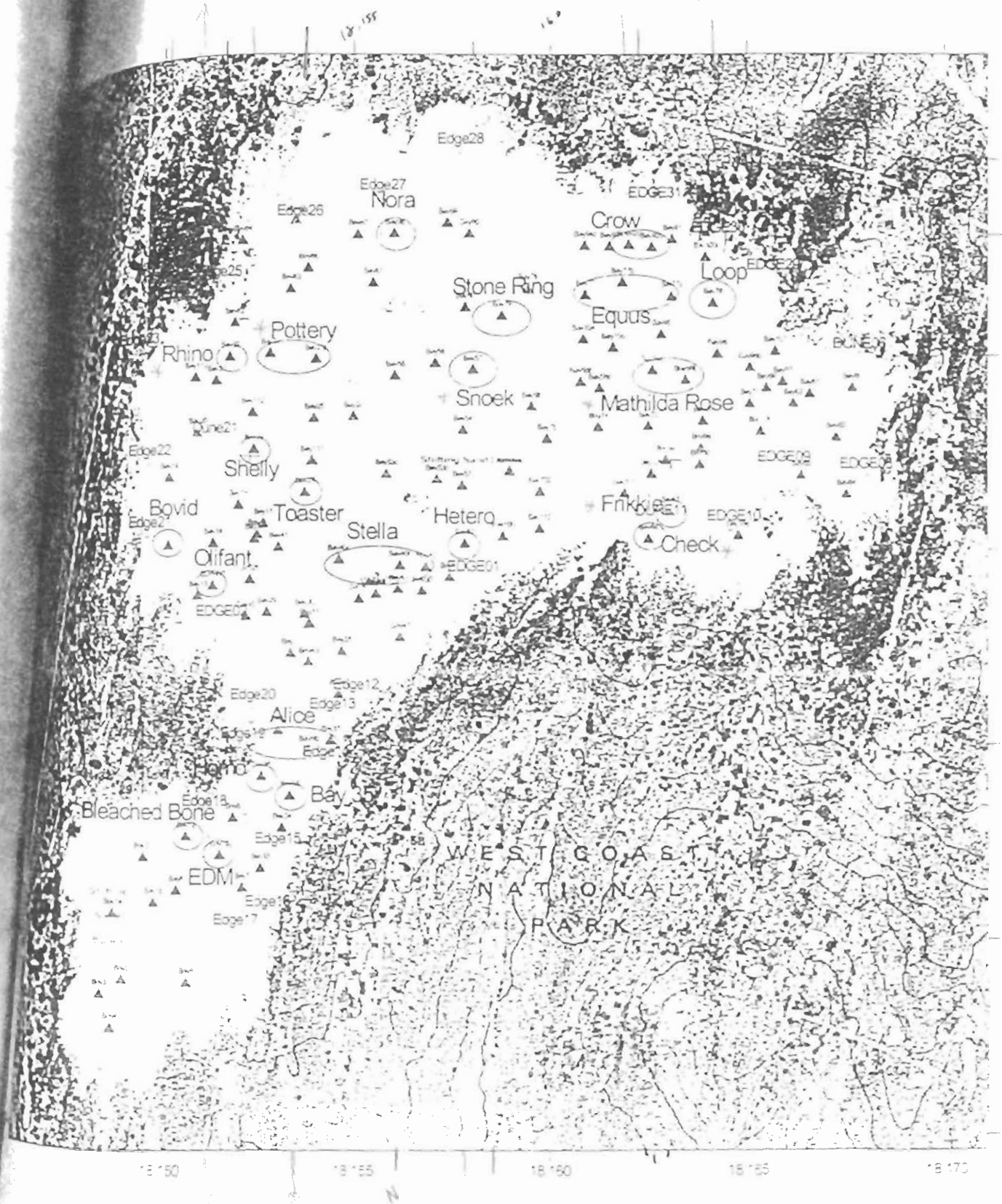
(Data and graphics compiled by Timothy J. Prindiville, Andrew Kandel, Maria Malina)



Geelbek 2000
Location of Deflation Bays as Mapped by the Garmin 12XL

Figure 1