

Final Research Report to the National Parks Board and the South  
African Heritage Resources Agency

Permit 80/98/11/01/51 exp 1 November 2000

**TITLE:** Geology & micropalaeontology of salt marsh, dune & evaporite pan environments of the West Coast National Park

**PROJECT LEADER:** Dr JS Compton, Department of Geological Sciences, University of Cape Town, Rondebosch 7700

**CO-WORKERS:** Ms G Franceschini, Department of Geological Sciences, University of Cape Town, Rondebosch 7700

**PERIOD COVERED:** 1 July 1998 to 1 November 2001

**OBJECTIVES:**

- (1) to obtain a transect of the microfauna and flora communities that inhabit the salt marsh and salt pan areas of the park.
- (2) to determine the grain size, carbonate and microfossil contents of the inland migrating dune plume between Yzerfontein and Geelbek. To date the dune migration history by radiocarbon ages of bulk carbonate and picked eolian foraminifers.

**FINAL REPORT:**

**Field work:** Numerous field trips were taken in 1999 and 2000 to collect samples from the salt marsh and active dune environments of the Park. Surface mud samples were collected in order to determine the microfaunal composition of the salt marsh. Salt marsh plant samples were also collected to characterise the flora and faunal community. Dune sand was collected from the Yzerfontein-Geelbek dune plume in order to determine what foraminifers it contains and to determine the grain size and carbonate content.

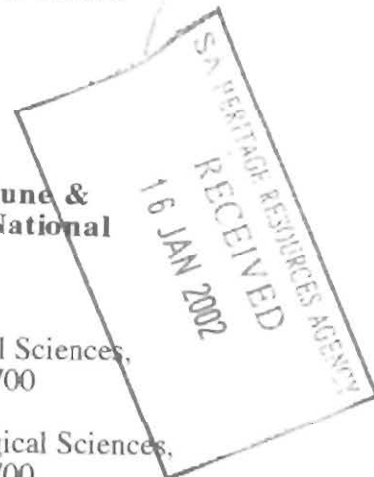
**Findings:** Most of the earlier results on depositional environments of the Langebaan Lagoon salt marsh and the sea-level history of the salt marsh are now summarised in a paper published in the journal *The Holocene* (see publications below). Two copies of this paper are attached to this report.

More recently, results have been obtained on the Sixteen Mile Beach Complex, including radiocarbon dates of beach and dune sand deposits. These results are summarised in the PhD thesis of Ms G Franceschini, entitled "Geology of aeolian and marine deposits in the Saldanha Bay region, Western Cape, South Africa." She submitted her thesis for examination in November 2001. Once Ms G Franceschini's thesis is finalised, it can be sent to those interested in obtaining a copy. Below, is a brief summary of the principal results of her thesis:

Chapters 1 and 2 are an overview of the study objectives and a literature review of past research in the area.

Chapter 3 presents the foraminiferal assemblages of the southern end of the Langebaan Lagoon with reference to tidal levels and vegetation types. The data are used to interpret Upper Pleistocene deposits at Monwabisi on the False Bay coast. These results have been submitted to the journal *Estuarine and Coastal Research*.

The Holocene evolution of the Sixteen Mile Beach Complex is presented in Chapter 4. A large number of bulk carbonate radiocarbon ages are presented to argue for the dynamics of the beach and dune environment of the Sixteen Mile Beach Complex.



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The beach sand was found to be 18 thousand years old at the southern end and to young to the north, with an age of 10,900 years near the northern rocky exposures at Kreefte Baai. The dune carbonate has radiocarbon ages of as old as 24,000 years. The difference between the age of the beach sand of 18,000 and the dune sand of 24,000, suggests that the mobile dunes have been active over the last 6,000 years and appear to have migrated inland at an average rate of 4 m per year. Radiocarbon dating of midden shell material also provides information on the history of human utilisation of the coast with evidence of human occupation in the area back to 6 or 7 thousand years ago. Chapter 5 presents data on the age of the aeolian deposits at the Tabakbaai quarry, located just north of the town of Saldanha. These aeolian deposits have a high carbonate content and are mined for agricultural lime, apparently the Saldanha Bay mouth is an effective barrier to quartzose sand transport by longshore drift from the south. These aeolian deposits are also much older than the Sixteen Mile Beach Complex. Strontium isotope values of a number of different biogenic grains (carbonate fossil foraminifera, mollusc shell and echinoderm spines) indicate a Miocene/Pliocene boundary age of around 5 million years, making them the oldest dune deposits in the area. Chapter 6 presents work on the onshore phosphorite deposits in the Saldanha Bay area using strontium isotopes to try and constrain the age of phosphorite formation. The age of most of the phosphorite appears to be Pliocene/Pleistocene and provides useful insights into sea-level fluctuations in the past. The conclusion and discussion of possible future research directions is presented in Chapter 7.

In regard to the salt pans, Ms Meris Smith completed an MSc degree at UCT in the Department of Geological Sciences in December 2000 entitled: "A geochemical investigation of the Darling and Ysterfontein saline pans, Western Cape, South Africa." She includes geochemical results on the Ysterfontein and Rooi Pan salt pans that may be of interest as these pans are located at the southern end of the West Coast National Park. These pans are interpreted to be coastal pans that were originally similar to Langebaan Lagoon but have since been cut off from the sea by aeolian dune deposits.

### **PUBLICATIONS:** (reprints are attached)

Compton, JS. 2001. Holocene sea-level fluctuations inferred from the evolution of depositional environments of the southern Langebaan Lagoon salt marsh, South Africa. *The Holocene* 11, 395-405.

Other papers have been submitted and reprints will be sent when they become available.

### **ACKNOWLEDGEMENTS:**

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