

DECLARATION

I declare that the dissertation hereby submitted to the University of Limpopo for the degree of Master of Science has not previously been submitted by me for a degree at this or any other university, that it is my own work in design and in execution, and that all material contained therein has been duly acknowledged.

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(Candidate)

Date: _____

PREFACE

The study was carried out through the Department of Biodiversity in the School of Molecular and Life Sciences, University of Limpopo from January 2005 to October 2007, under the supervision of Professors S.M. Dippenaar and G.D. Engelbrecht. This study represents original work by the author and where the work of other authors has been used they are duly acknowledged in the text and listed as references.

Chapter 1 consists of a general introduction in which the broad characteristics and taxonomy of the *Alaudidae* family are discussed. The southern African representatives of the family are introduced with particular emphasis on the Short-clawed Lark *Certhilauda chuana* and the objectives of the study are outlined. Chapters 2 to 4 of this dissertation have been written in the form of research papers with the relevant tables and figures appearing at the end of each chapter. In chapter 2 the taxonomic status of the eastern population of the Short-clawed Lark is clarified by comparing molecular, vocalisation and morphometric data with that of the western population. Chapter 3 describes the distribution, population status and habitat preference of the eastern population of the Short-clawed Lark while chapter 4 details the vocalisations and territorial display of the species. Chapter 5 is a culmination of the findings of the previous chapters and includes an assessment of its conservation status, threats faced by the eastern population, research and conservation recommendations.

Large tables appear as appendices and a single list of references for all five chapters is included in the back of the dissertation. To give this manuscript a degree of uniformity, the literature cited and associated citations in all the chapters have been formatted according to the manuscript requirements of the Journal of African Zoology. Due to the format of this dissertation, a certain amount of duplication of information has resulted, particularly in the introductions of chapters 2 to 5.

Relevant scientific publications, papers read and posters presented at congresses and symposia are listed below (* presenting author):

ENGELBRECHT, G.D.*, GROSEL, J.I. & VAN TONDER, R. Comparative growth curve analysis of two sympatric lark species: the Short-clawed and Sabota Lark. Poster presented at the IVth Natural Forests and Woodland Symposium, Port Elizabeth, South Africa - May 2006

GROSEL, J.I., DIPPENAAR, S.M.* & ENGELBRECHT, G.D. The Lark and the Short of it: The status of the Short-clawed Lark in South Africa. Poster presented at the 5th South African Society for Systematic Biology Congress, Kruger National Park, South Africa – July 2006.

ENGELBRECHT, G.D.*, GROSEL, J.I. & DIPPENAAR, S.M. Concerning the “least concern”: Conservation of the Short-clawed Lark in South Africa. Paper read at the 24th International Ornithological Congress, Hamburg, Germany – August 2006.

GROSEL, J.I.*, ENGELBRECHT, G.D. & DIPPENAAR, S.M. The Biology and Ecology of the Short-clawed Lark (*Certhilauda chuana*). Paper read at the Environmental Research in Limpopo Congress, Polokwane, South Africa – November 2006.

ENGELBRECHT, G.D.*, GROSEL, J.I. & VAN TONDER, R. Conservation of the biodiversity of the Polokwane Plateau. Paper read at the 41st Annual Congress of the Grassland Society of Southern Africa, Bela-Bela, South Africa. July 2006.

ENGELBRECHT, G.D., GROSEL, J.I. & DIPPENAAR, S.M. 2007. The Western Population of the Short-clawed Lark Revisited. *Bulletin of the African Bird Club* **14**(1): 58-60.

ABSTRACT

The southern African endemic Short-clawed Lark *Certhilauda chuana* comprises two geographically isolated populations, consisting of a western and an eastern population. Several authors have suggested that the taxonomic status of the eastern population be verified. In an attempt to resolve the taxonomic uncertainty regarding the two populations, DNA molecular data was used in a comparative study of the two populations. The DNA sequence data was generated using standard methods of DNA extraction, PCR and automated DNA sequencing for partial sequences of the mitochondrial genes Cytochrome *b* and ND2. A total of 530 base pairs of the Cytochrome *b* gene were amplified for individuals representing both Short-clawed Lark populations. The results obtained from the amplified Cyt *b* sequences showed the populations to be identical. The amplified partial ND2 gene (972 base pairs) showed sequence divergence between the eastern and western populations ranging between 0.10 - 0.31%. The partial ND2 gene produced only four haplotypes for both the eastern and western individuals with a single mutational step separating each of the haplotypes. The results of the DNA analysis showed that there exists very little genetic diversity within and between the two populations.

Confirmation of the taxonomic status of the two populations was supplemented by comparing selected morphometric measurements and territorial song characterization. Apart from a statistically significant difference ($P < 0.05$) in the length of the tarsus, there were no other significant differences in the morphometric parameters analysed. A comparison of the territorial calls of males showed considerable individual variation between males within a population and statistically significant differences between males from the two populations for some of the parameters analysed.

The results of a habitat preference study for the eastern population was determined by analysis of the micro- and macro-habitat features within presently and historically occupied territories. It was established that as with the western population, Short-clawed Larks from the eastern population also show a fine-scale habitat preference within the broad, general habitat description of “open habitat, sparsely vegetated with small trees and shrubs”. The results of the present study explain the highly localized distribution of the species within its area of occurrence. The results also suggest that the species’ habitat preference is probably dictated as much by physiological requirements, e.g. short-grassed areas with bare ground for breeding and foraging, as it is by behavioural requirements, e.g. large open areas for aerial displays and small trees or shrubs for territorial calls.

In addition to the above, surveys were conducted to determine the species’ present extent of occurrence, area of occupancy and to obtain population size estimates. The results were compared with published data from the Southern African Bird Atlas Project and showed a dramatic range reduction of this species. Possible reasons for the range reduction include habitat loss, absence of formally protected habitat and altered ecological processes such as lack of fire and bush encroachment. It is estimated that the eastern population of the species comprise fewer than 380 breeding pairs. The observed range reduction and estimated population size suggests that the eastern population of the species requires urgent protection.

A comprehensive investigation of Short-clawed Lark vocalisations and displays was conducted. This study presents the first detailed analysis of the vocalisations of the Short-clawed Lark. Analysis of call data showed considerable variation in the number and placement of pulsed and whistle notes in their different calls. The extent of individual variation within the eastern population for the parameters analyzed, failed to reveal any dialects associated with the vocalisations of Short-clawed Larks from the eastern

population. Although Short-clawed Larks call and display throughout the year and during most parts of the day, most vocalisations and displays peak in the first 1-3 hours after sunrise in the peak-breeding season. This information is useful for identification and monitoring purposes.

This manuscript concludes with a discussion of the major threats facing the population, recommendations on how to address them, and conservation priorities for the eastern population and the species.

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**THE
SHORT-CLAWED LARK**
Certhilauda chuana