DST/NRF Centre
of Excellence at the

Percy FitzPatrick Institute

Annual Report
January – December 2007

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University of Cape Town

Board Members:

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Dr G. Avery (Wildlife and Environment Society of Southern Africa)
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Prof. K. Driver (UCT, Dean of Science, Chairman)
Prof. M.A. du Plessis (UCT, *ex officio,* Director PFIAO)
Prof. M.T. Hoffman (UCT, *ex officio*, Director PCU)
Assoc. Prof. J. Hoffmann (UCT, *ex officio,* HoD, Zoology)
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Dr I.A.W. MacDonald (co-opted) Jan-Mar
Prof. M.E. Meadows (UCT)
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Mr J.D.F. Niven (FitzPatrick Memorial Trust)
Mr P.N.F. Niven (FitzPatrick Memorial Trust)
Prof. T.J. Robinson (University of Stellenbosch, co-opted) Jan-Mar
Prof. L.G. Underhill (UCT)
Mr F. van der Merwe (co-opted)
Dr G. Verdoorn (BirdLife South Africa)

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The Annual Report may also be viewed on the Percy FitzPatrick Institute's website: http://www.fitzpatrick.uct.ac.za

Introduction

Previous Director's Preamble

When I arrived at the Percy FitzPatrick Institute as its Director in late 1996, I stepped into the vacuum left by Roy Siegfried's retirement, followed by eight months of part-time acting directorship by someone external to the Fitztitute. It was also a time at which the University was applying pressure to collapse the Institute structure into the Zoology Department – a move that, in the opinion of many, would not serve the best interests of the University, the Zoology Department or the Fitztitute. Several years of unproductive and at times acrimonious negotiations took place culminating in an agreement between the Percy FitzPatrick Memorial Trust (PFPMT) and UCT in March 2001. The unsung champion of this protracted process was none other than Patrick Niven, one of the founder members of the Institute.

I start on this somewhat unconventional and (perhaps) less positive note only to record and acknowledge Patrick Niven's singular commitment to ensuring the best future for the Percy FitzPatrick Institute (avidly supported by Peter Johnson). Another current Board member, Francois van der Merwe, played a leading role in effecting a reasonable binding arrangement that was perceived to provide a mutually beneficial arrangement for both UCT and the founding Niven family. More recently, the wisdom of this arrangement was affirmed by the recognition bestowed upon the Fitztitute when it was granted DST/NRF Centre of Excellence (CoE) status.

It has been a great privilege to work with many dedicated Board members and I thank you all for making my association with the Fitztitute such a positive one. I thank Prof Cheryl de la Rey, outgoing DVC for Research for her strong and sober support of the Fitztitute, and more recently of the CoE. Many of the staff members who remain at the Fitztitute – and who will carry it through any manner of adversity or success – went through the hands of Roy Siegfried. Roy has also been my mentor over many years, yet has never imposed his views on me. His advice has been based on a very deep commitment to the Fitztitute. I trust that my successor will also have an extended opportunity of seeking Roy's council.

The past 11 years have included some of the best of my life. I therefore leave the Percy FitzPatrick Institute with a heavy heart. However, change in leadership often brings many positives and I am confident, given the sound institutional base of the Fitztitute within the University of Cape Town, this will also be the case here. It is ultimately the critical mass of the senior staff body that provides the backbone during transition phases, and the current staff have been precisely that. I have great respect and gratitude for the commitment of among others Phil Hockey, Peter Ryan, Graeme Cumming, Penn Lloyd and Tim Crowe. Moreover, the support staff form the marrow within the backbone, and I am grateful to Chris Tobler, Hilary Buchanan, Margaret Sandwith, Lionel Mansfield and Charlene Jacobs for their massively important contributions to the Institute.

I shall take great interest in the successes of the Institute into the future and look forward to the 50th anniversary celebrations in 2010. Meanwhile the leadership will change. Long live the Fitztitute!

Morné A. du Plessis
Director January-August 2007

Acting Director's report: Sept-Dec 2007

Following Morné du Plessis's move to the Worldwide Fund for Nature, I was asked to fill the shoes of Acting Director pending a permanent appointment being made. Both Morné's resignation and my temporary appointment happened within a fairly short time window, and some rapid planning took place. I took over responsibility for Mandy Ridley (post-doc) and Martha Nelson (PhD) and for the ground-hornbill project, while Penn Lloyd took over management of the Ant-eating Chat research project at Benfontein. Happily, all these transitions occurred without too much hiatus and

seemingly without adverse fall-out.

At the time I took over, most (and at times all!) of the Institute's academic staff were either away or on sabbatical. This left me in the novel position of having to make decisions about, for example, the CB class intake for 2008 at the same time as performing substitute teaching in the Zoology Department, who were also experiencing a sabbatical drain. However, the 2008 CB class should hit the floor running. I was also able to secure, in conjunction with Board member Peter Johnson, a new bursary for a CB student which, in 2008, will be taken up by Ms Tendai Musvuugwa from Zimbabwe.

As a result of the reviews and workshop in 2006 and 2007 concerning the CB curriculum (see 2006 Director's report), Graeme Cumming (Pasvolsky Chair in Conservation Biology) has made several changes to the course structure for 2008. Conservation Biology is an ever-changing science and these curriculum adjustments have been made to ensure that we keep the Institute's CB course at the forefront of the field and thus equip our graduates to compete with others from throughout the world.

Some staffing issues were also resolved, and a series of decisions was taken regarding the streamlining of the Niven Library. These included effecting substantial savings by reducing paid hard-copy subscriptions to journals available at no cost through the UCT on-line system. We also made substantial progress in reinstating journal exchanges that had ceased as a result of NISC's decision to cancel all exchanges with *Ostrich*. This progress was possible through the offices of Africa Geographic, who very generously offered *Africa Birds and Birding* as an alternative exchange. Many of the organizations we approached have accepted this offer. The Institute has a very close relationship with Africa Geographic's two main publications, to which we have supplied much material since the magazines' inception. We, in turn, would like to thank Africa Geographic for their reciprocal support.

Only a few weeks after taking the reins, I attended my first Centre of Excellence Board meeting (relying heavily on input from Penn Lloyd). I am pleased to be able to report that the DST and NRF are very happy with our progress – we have equalled or exceeded all targets set for us. I would like to take this opportunity to congratulate the Institute's staff, students and associates for their dedication and scientific acumen that made this achievement possible. I can also report that, at the same meeting, we were given verbal assurance that our Centre of Excellence funding for the second five-year phase was secure. Whilst this gives the Fitztitute some security and breathing space until 2013, I must point out that DST/NRF Centres of Excellence have finite lifespans. One of the great challenges facing the Fitztitute will be to ensure that we are able to continue the momentum developed by the Centre of Excellence when the DST/NRF funding component comes to an end.

Staying with Centre of Excellence matters, we received a minor setback in late December when Charlene Jacobs, the Centre's senior secretary, resigned for family reasons. At the time of writing, however, I can report that we have secured a well-qualified replacement, Tania Jansen, who will be starting work at the beginning of February 2008.

Awards are always something to be proud of. In December, Tim Crowe was made a Fellow of the University of Cape Town. Graeme Cumming received a UCT Fellow's award – an award made to outstanding young scientists: he also received a Meiring Naudé Medal from the Royal Society of South Africa.

It must not be forgotten that we have team members from outside the immediate Fitztitute, as well as Research Associates. In terms of the former, I am delighted to be able to report that Dr Andrew McKechnie (Wits) recently received a President's Award from the NRF – no mean achievement, congratulations Andrew! Physically closer to home, Dr Rob Simmons' UCT Research Associateship was renewed, and former PhD student Dr Andrew Jenkins was made a UCT Research Associate for the first time. Readers should be aware that UCT-level Research Associateships are not dispensed lightly and require not only strong motivation, but also a proven track record, both in terms of publications and student supervision. These awards are made by the Science Faculty, not by the Fitztitute.

When a change is made at any helm, its ripple effects are bound to reach people throughout the vessel. Management techniques change, decisions may be made in different ways and the ways in which progress is monitored may shift. I would like to thank all staff and students, and especially those with whom I interact on a daily basis over management, communication and budgetary issues, for the extraordinary support they have provided in ensuring that the transition was smooth and trouble-free. For their support and advice, I would also like to thank the DVC for Research, Prof. Cheryl de la Rey, the Dean of Science, Prof. Kathy Driver, the Head of Zoology, Prof. John Hoffmann and Kirsty Edwards from the Human Resources Department.

And finally, recognition must be given to Morné du Plessis and his achievements during the more than 10 years for which he was Director of the Fitztitute. He did not arrive in the position at an easy time and it needed all of his political and business acumen to steer the Institute along what was, at times, a fairly rocky road. But despite the roller-coaster years, Morné led the Fitztitute to, *inter alia*, Centre of Excellence status. He also negotiated the appointment of the Chair in Conservation Biology and was extremely successful in promoting the Fitztitute as an attractive venue for post-doctoral students, with outstanding results. I can safely say that his vision and management style contributed greatly to placing the Fitztitute in the strong academic position that it occupies today. We at the Fitztitute wish him well in his new career as Chief Executive Officer of WWF. We hope firstly that he bears happy and proud memories of his time here, secondly that he won't be a stranger in the future, and thirdly that he finds his new career both challenging and fulfilling.

Phil Hockey
Acting Director September-December 2007

Changes in Personnel

Morné du Plessis *resigned as Director of the Fitztitute with effect from 30 August 2007.* ***Phil Hockey*** *was appointed Acting Director from 1 September.*
Peter Ryan *(Mar-Dec) and* ***Jane Turpie*** *(April-Oct) have taken sabbatical leave in the reporting period. Peter was promoted to Associate Professor.*
Tim Crowe *was elected as a Fellow of the University of Cape Town.*
Andrew Cockburn *and* ***David Grémillet*** *spent their sabbatical leave at the Fitztitute.*

Graduates

PhD: Keith Barnes, Colleen Seymour, Mareile Techow *(June 2007);* ***Douglas Loewenthal, Hugo van Zyl, Ross Wanless*** *(Dec 2007)*
MSc:
Conservation Biology MSc: Matthew Bird, Patrick Boundja, John Burnside, Fahiema Daniels, Helen Gordon, Helen Hill, Julia Jenkins, Lindy MacGregor, Mwema Musangu, Dimby Raharinjanahary, Jeremy Shelton, Pip Schultz, Hannah Thomas *(June 2007);* ***Lisa Nupen*** *(Dec 2007)*
BSc Hons: Aphiwe Bewana, Louise Brown, Meghan Laird, Caitlin Smith, Jacqui Stephenson *(Dec 2007)*

External Graduates:

BSc Hons: Lauren Inglethorpe

New students

PhD: Adams Chaskda *(supervised by Phil Hockey);* ***Viviane Barquete Costa*** *(supervised by Peter Ryan);* ***Genevieve Jones*** *(supervised by Peter Ryan);* ***Potiphar Kaliba*** *(supervised by Tim Crowe and Rauri Bowie);* ***Michael Mills*** *(supervised by Graeme Cumming* ***Graeme Oatley*** *upgraded from MSc (supervised by Tim Crowe);* ***Angela Ribeiro*** *(supervised by Penn Lloyd) and*
MSc: Kathryn Lannas *(supervised by Jane Turpie),* ***Mduduzi Ndlovu*** *(supervised by Graeme Cumming and Phil Hockey)*
Conservation Biology (CB) MSc: *Twelve students began the CB MSc in January 2007.*

Personnel

Director

Du Plessis, M.A. PhD (Cape Town) Professor * Jan-Aug
Hockey, P.A.R. PhD (Cape Town) Associate Professor * Sept-Dec

Academic and Research Staff

Crowe, T.M. PhD (Cape Town) Professor *
Cumming, D.H.M. PhD (Rhodes) Honorary Professor
Cumming, G.S. PhD (Oxford) Professor *
Hockey, P.A.R. PhD (Cape Town) Associate Professor *
Lloyd, P. PhD (Cape Town) Manager, Centre of Excellence
Milton, S.J. PhD (Cape Town) Honorary Professor
Ryan, P.G. PhD (Cape Town) Associate Professor*
Turpie, J.K. PhD (Cape Town) Senior Lecturer

External CoE Team Members

Bloomer, P. PhD (Pretoria) - University of Pretoria
Bowie, R.C.K. PhD (Cape Town) - University of California at Berkeley
Mandiwana, T. MSc (Cape Town) - Botany Dept, University of Cape Town
McKechnie, A.E. PhD (Natal) - University of Witwatersrand

Research Associates

Barnard, P.E. PhD (Uppsala)
Dean, W.J.R. PhD (Cape Town)
Jenkins, A.R. PhD (Cape Town)
Kemp, A. PhD (Rhodes)
Knight, A. MSc (NMMU)
Milewski, A. PhD (Murdoch University, W. Australia)
Simmons, R. PhD (Wits)

Visiting Scientists

Cockburn, A. PhD (Monash)
Grémillet, D. PhD (Kiel)
Dale, J. PhD (Cornell)

Postgraduate students

Post-doctoral students

Bruinzeel, L. PhD (Groningen)
Eising, C.M. PhD (Groningen)
Fuchs, J. PhD (MNHN, Paris)
Johansson, U. PhD (Stockholm)
Ridley, A.R. PhD (Cambridge)
Roxburgh, L. PhD (Ben Gurion)
Taylor, W.A. PhD (Pretoria)

Doctoral

Barnes, K.N. MSc (Cape Town)
Chaskda, A. MSc (Jos, Nigeria)
Cohen, C. BSc (Hons) (Cape Town)
Costa, V.B. MSc (Furd, Rio Grande)
De Ponte, M. MSc (Cape Town)
Jones, G. MSc (Cape Town)
Kaliba, P. MSc (Cape Town)
Little, I.T. MSc (Cape Town)
Loewenthal, D. MSc (Cape Town)
Mandiwana, T.G. MSc (Cape Town)
Mills, M. MSc (Cape Town)
Nelson, M. MSc (Vancouver)
Ngoma, P. MSc (Malawi)
Oatley, G. BSc (Hons) (Cape Town)

Petersen, S. BSc (Hons) (Cape Town)
Ribeiro, A. MSc (Porto, Portugal)
Seymour, C. MSc (Cape Town)
Techow, M. MSc (Cape Town)
van Zyl, H. MSc (Cape Town)
Wanless, R. MSc (Cape Town)

Masters by Dissertation

Hampton, S. BSc (Hons) (Cape Town)
Lannas, K. BSc (Hons) (Cape Town)
Ndlovu, M. BSc (Hons) (NUST, Zimbabwe)
Teroerde, A. BSc (Hons) (Rhodes)
Vincent, Z. BSc (Hons) (Port Elizabeth)

Masters in Conservation Biology 2007

Babiker, H. BSc (Hons) (Juba, Sudan)
Chaudhry, M.J. MSc (BZU, Multan, Pakistan)
Child, M. BSc (Hons) (Cape Town)
Hempson, T. BSc (Hons) (Cape Town)
Humphrey, G. BSc (Hons) (Rhodes)
Joseph, G. MBChB (Cape Town)
La Grange, R. BSc (Hons) (Stellenbosch)
Lipsey, M. BA (Middlebury, Vermont)
Mann, G. BSc (Hons) (Cape Town)
Okes, N. BSc (Hons) (Cape Town)
Puttick, J. BSc (Hons) (Cape Town)
Wistebaar, P.N. BSc (Hons) (Fort Hare)

Masters in Conservation Biology 2006

Bird, M. BSc (Hons) (Cape Town) Jan-June
Boundja, R.P. BSc (Hons) (Marien Ngouabi, Congo) Jan-June
Burnside, J. BSc (Hons) (Imperial College) Jan-June
Daniels, F. BSc (Hons) (Cape Town) Jan-June
Gordon, H. B.Comm (Hons) (KwaZulu-Natal) Jan-June
Hill, H. BSc (Hons) (Cape Town) Jan-June
Jenkins, J. BSc (Hons) (Canterbury) Jan-June
Nupen, L. BSc (Hons) (Cape Town) Jan-Dec
MacGregor, L. BVetSci (Pretoria) Jan-June
Musangu, M.M. BSc (Hons) (Moi, Kenya) Jan-June
Raharinjanahary, D. BSc (Hons) (Antananarivo, Madagascar) Jan-June
Schultz, P. BVet Sci (Murdoch, Australia) Jan-Jun
Shelton, J. BSc (Hons) (Cape Town) Jan-Jun
Thomas, H. BSc (Hons) (Exeter) Jan-Jun

Zoology (Hons)

Bewana, A. BSc (Mthatha)
Brown, L.H. BSc (Cape Town)
Davies, O. BSc (Cape Town)
Laird, M. BSc (Cape Town)
Smith, C. BSc (Cape Town)
Stephenson, J. BSc (Cape Town)

Externally registered students

Doctoral

Flower, T. MSc (Pretoria) - registered at U.Cambridge
Golabek, K. MSc (Bristol) - registered at U. Bristol
Hermann, L. MSc (Pretoria) - registered at U. Pretoria
Kleynhans, E. MSc (Wits) - registered at U. Groningen
Pichegru, L. MSc (Paris) - registered at U. Strasbourg
Raihani, N. MSc (Cambridge) - registered at U. Cambridge
Symes, C. MSc (Pretoria) - registered at U. Pretoria

Masters

Burney, C. BSc (Hons) (Florida) - registered at U. Florida
Smit, B. BSc (Hons) (Wits) - registered at Wits

Honours

Inglethorpe, L. BSc (Wits) - registered at Wits
Swanepoel, D. BSc (Pretoria) - registered at U. Pretoria

Research Assistants

Brown, L.H. (Jan-June)
Gill, A. (Oct)
Hofmeyr, S. (Oct-Dec)
Hagens, Q. (June-Dec)
Herrmann, E. (Jan)
Jongwe, T.I. (Oct)
Meyer, E. (Jan-Apr)
Nkosi, D. (Jan-Dec)
Nonyane, A. (Oct)
Scholtz, R. (Jul-Sept)
Shabane, T. (Feb-Nov)
Tukker, I.R. (May-July)
Verhoog, N. (Mar-June)

Support Staff

Principal Technical Officer

Tobler, C.J.*

Administrative Assistant

Buchanan, H.J. *

Senior Secretary, Centre of Excellence

Jacobs, C.

Library Staff

Sandwith, M.* (Librarian)
Dalgliesh, S. (Volunteer)
Hans, P.
Ntsham, N.
Sotashe, N. (Intern)

Departmental/Accounts Assistant

Mansfield, L.F.*

Webmaster

Stander, M.J.

* Denotes permanent member of the UCT staff establishment. All other personnel are contractual or ad hoc appointees held against posts supported by grants in aid of research or are bursary holders or part-time postgraduate students employed outside the Fitztitute.

MISSION STATEMENT

To promote and undertake scientific studies involving birds, and contribute to the practice affecting the maintenance of biological diversity and the sustained use of biological resources.

Prof. Tim Crowe
is an Elected Fellow of the Willi Hennig Society of Systematic Biology; a member of the International Ornithological Congress Committee and the Board of the South African Biological Information Facility, and a research associate at the American Museum of Natural History in New York. He acted as external examiner for undergraduate courses in conservation biology at the University of Venda.

Tim co-ordinates the Postgraduate Programme in Conservation Biology and runs the module Characterizing Biodiversity. In the year under review he supervised or co-supervised three MSc and three PhD students. He taught a module to one undergraduate class. He was author or co-author of three scientific papers. He gave talks to two membership-based societies. He refereed 14 scientific papers for six different journals, reviewed two applications for research grants and assessed one local researcher for personal scientific evaluation for the National Research Foundation.

Assoc. Prof. Peter Ryan
also leads the ***Island Conservation Programme*** *and the* ***Seabird Research Programme***

Systematics and Biogeography

Programme leaders
Prof. Tim Crowe
Assoc. Prof. Peter Ryan
Assoc. Prof. Paulette Bloomer (University of Pretoria)
Asst Prof. Rauri Bowie (University of California, Berkeley)

Research team
Dr Keith Barker (University of Minnesota, USA)
Dr John Bates (Field Museum of Natural History, Chicago, USA)
Dr George Barrowclough (American Museum of Natural History, New York, USA)
Prof. Michael Bruford (Cardiff University, UK)
Prof. Adrian Craig (Rhodes University)
Dr Michael Double (Australian National University, Australia)
Dr Christine Dranzoa (Makerere University, Uganda)
Dr Gareth Dyke (University College, Dublin, Ireland)
Dr J. Steven Farris (Swedish Museum of Natural History, Stockholm)
Prof. Jon Fjeldså (Zoological Museum, University of Copenhagen, Denmark)
Dr Pablo Goloboff (Instituto Superior de Entomología, Argentina)
Dr Jeff Groth (American Museum of Natural History, New York, USA)
Dr Shannon Hackett (Field Museum of Natural History, Chicago)
Prof. Martine Hausberger (University of Rennes)
Prof. Terry Hedderson (Department of Botany , UCT)
Dr Dai Herbert (Natal Museum, Pietermaritzburg)
Charles Kahindo (Makerere University, Kampala, Uganda)
Tshifhiwa Mandiwana (Department of Botany, UCT)
Rick Nuttall (National Museum, Bloemfontein)
Dr Colleen O'Ryan (UCT, Department of Molecular and Cell Biology, UCT)
Asst Prof. Bret Payseur (University of Wisconsin, USA)
Dr Eric Sande (Makerere University, Uganda)
Prof. Mike Sorenson (Boston University, USA)
Dr Gary Voelker (University of Memphis, USA)

Overview
Systematics and taxonomy underpin all biological sciences. Only once we understand the diversity of organisms and their relationships can we study and conserve them effectively. There is a common misconception that bird taxonomy and systematics are fully resolved. In fact this is currently a vibrant field of research that is taking advantage of recent developments in molecular genetics, and combining these findings with rigorous analysis of more traditional lines of evidence (e.g. morphology, behaviour). In particular, rapid advances are being made in understanding the phylogenetic (evolutionary genealogical) relationships among bird taxa, and we are only just starting to infer the biogeographical factors that have promoted the evolutionary diversification of birds.

Members of this programme tackle a range of projects aimed at discovering and determining the taxonomic status of species, inferring their phylogeographic (within species) or phylogenetic relationships, and identifying and explaining patterns of species distributions and diversity (biogeography).

Gamebirds
The year under review started off with a bang with the news that conclusions of the paper featured in last year's report on the phylogenetics, biogeography and classification of, and character evolution in gamebirds *Aves: Galliformes* had been challenged in a critique submitted to the journal *Cladistics*. The key challenge concerned the placement of fossils on the published tree and their use to calibrate molecular 'clocks'. The author of this critique, Gerald Mayr, is a palaeornithologist at

the famed Senckenberg Museum in Germany, and has pioneered efforts to provide a paleontological data base for the calibration of divergences based on molecular genetic data. Mayr maintained that the 54 million-year-old fossil *Gallinuloides wyomingensis* should be placed at the base of the gamebird tree of life. Crowe and other team members place it much higher up in the tree. This disagreement is serious in that the higher placement is crucial to Crowe et al's conclusion that gamebirds evolved in the Southern Hemisphere (promoted by the breakup of the palaeo-supercontinent Gondwana) before the Cretaceous/Teritiary Event (the collision of a large meteor with Earth 65 million years ago – leading to the extinction of most dinosaurs and ancient birds). In April, while he was examining a PhD candidate at University College, Dublin, Tim Crowe (with team member Gareth Dyke) drafted a rebuttal (now in press with Cladistics) to Mayr's critique, refuting it decisively. Tim visited the British Natural History Museum and American Museum of Natural History to study the anatomy of a range of gamebird species important in the PhD research of team member Tshifhiwa Mandiwana. In September-October, funded by the French CNRS and the NRF, Tim and Tshifhiwa visited the University of Rennes to conduct research on the taxonomic and phylogenetic significance of vocalizations in francolins and spurfowls. They then revisited the British Museum to complete Tshifhiwa's anatomical studies.

Helmeted Guineafowl Numida meleagris. *Tim's work on gamebird systematics continues to raise feathers. Photo: Peter Ryan.*

African White-eyes (*Zosterops* spp.)

Graeme Oatley upgraded his MSc to a PhD on the systematics of sub-Saharan African *Zosterops*. The main aim of the study is to use a combination of data sets collected from *Zosterops* populations throughout their distributional ranges to reassess the systematics of this notoriously taxonomically complex genus. Data sets being used include morphological measurements, quantitative and qualitative plumage colour scoring, vocalizations and mitochondrial and nuclear DNA sequences. Morphological analyses support the recognition of four evolutionarily significant units (ESUs) that may be discriminated according to the colour of underparts. Yet preliminary DNA analysis using both mitochondrial and nuclear DNA reveals the presence of only three ESUs. Further work will include an analysis combining both morphological and molecular data to determine the true number of ESUs. A fine-scale investigation of relationships between ESUs that may be undergoing speciation will also be completed. Microsatellites needed for this fine scale investigation have been developed. Further specimens from the potential hybrid zone between *Zosterops pallidus* and *Z. virens virens* in the Free State need to be collected before lab work can be completed.

The Orange River White-eye Zosterops pallidus *was until recently considered merely a subspecies of Cape White-eye* Z. capensis*. Photo: Peter Ryan.*

Southern African Cisticolas

Modern taxonomy aims to identify units of biodiversity that represent biologically legitimate entities that may be of use in conservation biology, evolutionary biology, ecology and other related fields. Cisticolas are a diverse group of small, almost exclusively African, insectivorous passerine birds; they are also notoriously difficult to identify due to their highly conserved anatomy. The differences traditionally used to distinguish between *Cisticola* species are often as variable as those that characterize geographical variation within polytypic *Cisticola* species and this has resulted in confusion about the taxonomic status of the genus and its constituent taxa. MSc student Lisa Nupen incorporated multiple independent sources of evidence (morphology, genetics, behaviour, life-history and ecology) to delineate the taxonomic boundaries within and between five putative species of southern African cisticolas. She found that many of the existing subspecies of *Cisticola* she studied do not stand up to rigorous taxonomic investigation, although her molecular analyses did not include samples from all named subspecies. She did confirm that the currently recognised species are phylogenetically distinct, except for Ayres' Cisticola

Assoc. Prof. Paulette Bloomer

is based at the Department of Genetics, University of Pretoria. During 2007, Paulette continued to serve on the IUCN Specialist Group on Afrotheria; the Yellowfish Working Group Scientific Advisory Panel and was elected to the SABI steering committee. She has been vice-president of the South African Society for Systematic Biology since 2005 and took over as president for the next three years in January 2008. Paulette and her students did not attend any bird-related conferences this year, but Paulette gave invited talks at a number of UK universities (Bangor, Glasgow, Cardiff and Cambridge) reflecting aspects of her Fitztitute-related research. She refereed ornithological papers for two journals. She supervised one CoE part-time PhD student.

Asst Prof. Rauri Bowie

is based at the Museum of Vertebrate Zoology at the University of California, Berkeley. He is an editor of the bird journal Ibis, heads the African Working Group for the All Bird Bar-coding Initiative, and sits on the Global Steering Committee for the same initiative. During the review period he supervised or co-supervised three masters students, 13 PhD students and three post-doctoral fellows. Four of his students presented papers of which he was co-author at international and local conferences. Rauri gave three talks to different interest groups, reviewed 55 papers for fourteen journals and his lab published eight papers (with a further 11 in press).

C. a. ayresi, which shares haplotypes with Cloud Cisticola *C. textrix major* where they co-occur and Zitting Cisticola *C. juncidis terrestris*, which consists of two phylogenetically distinct units (possibly cryptic species, pending further investigation). The combined cladistic analysis, which included all molecular and morpho-behavioural characters and represents the best evidence for delineating taxonomic boundaries, confirmed that Grey-backed Cisticola *C. subruficapilla*, Neddicky *C. fulvicapilla* and Ayres' Cisticola are distinct evolutionary units. This preliminary study is the first to consider molecular evidence in the classification of the taxa investigated. Further research with increased taxon sampling and molecular evidence (nuclear genetic markers) needs to be conducted before the taxonomy and evolutionary history of this genus can be fully understood.

The Zitting Cisticola Cisticola juncidis *is one of the most widespread Old World passerines. Lisa Nupen found surprising genetic diversity within birds from South Africa. Photo: Peter Ryan.*

Bustards

Callan Cohen is investigating a range of anatomical, behavioural and molecular evidence to study the taxonomy and phylogeny of bustards and other selected sub-Saharan African birds. During the period under review the bulk of the molecular evidence needed for bustards was generated. Callan has also completed a project investigating two enigmatic gamebirds, the Stone Partridge *Ptilopachus petrosus* (a small gamebird confined to the arid savannas north of the central African rainforests) and Nahan's 'Francolin' *Francolinus nahani* (a bird of pristine tropical rainforest). This research confirms that they are each other's nearest living evolutionary relatives and are, in turn, distantly related to quails from North America but to no other forms from the Old World.

Oystercatchers

The research conducted by honours student Dalemarí Swanepoel in 2006 was extended by Paulette in 2007. This work is using microsatellite markers to examine the within-species genetics of the African Black Oystercatcher *Haematopus moquini*. Three loci previously developed for the European oystercatcher and 12 loci developed by Dalemarí and Paulette were initially tested for variation among oystercatchers from three sampling sites (East London, Saldanha Bay and Possession Island). Although there are generally few alleles per locus, analyses of these loci should shed additional light on the biology of this *Near-threatened* shorebird. Two manuscripts will be completed in early 2008, one describing the newly developed loci and one documenting the population genetic structure among seven localities along the southern African coast and at offshore islands. The latter paper will be a product of collaboration with Prof. Mike Bruford of Cardiff University, where Paulette spent part of her sabbatical leave.

A Socotra Sparrow Passer insularis *from the island of Samha showing the relatively small bill and small black bib characteristic of this population, which we propose as a new* subspecies Passer insularis samhaensis*. Photo: Peter Ryan.*

Island buntings and sparrows

A paper on the evolution of *Nesospiza* buntings at Tristan da Cunha was published in the prestigious journal *Science* in March. Subsequently, while on sabbatical in New Zealand, Peter Ryan gave talks on this work at several universities. During September-November, Peter returned to Gough and the Tristan islands, where he collected additional material from the buntings, especially at Nightingale Island, which has been relatively poorly collected to date. It is planned that a masters student will be appointed in 2008 to investigate the genes controlling bill size in this fascinating group of birds.

In a related study, blood samples and morphometric data were collected from Socotra Sparrow *Passer insularis* populations on three of the four islands in the Socotra archipelago. The sparrow is the only Socotran endemic landbird that occurs on the satellite islands of the Socotra archipelago, occurring on Abdelkuri, Samha and Darsa as well as the main island of Socotra. Lisa Nupen generated sequence data from mitochondrial DNA to support a recent call to elevate the Abdelkuri population to species level, Abdelkuri Sparrow *P. hemileucus*. Our data suggest that the two species diverged 1.2-4.0 million years ago. Sparrows on Samha are not genetically distinct from those on the main island of Socotra, but are appreciably smaller. We propose a new taxon, *Passer insularis samhaensis*, for this population.

Bar-throated Apalis

Apalis thoracica is a complex of 21 recognized subspecies widely distributed south of the Equator, preferring afromontane forests, but also making extensive use of the surrounding areas. One of the aims of Lucille Hermann's PhD research under the supervision of Paulette Bloomer and Peter Ryan is to elucidate the intra-specific patterns of genetic diversity in this complex. A clear genetic divergence has been identified between the more northerly subspecies and the six most southerly subspecies, with a contact zone in KwaZulu-Natal. However, more thorough sampling is still urgently needed in KwaZulu-Natal, firstly to elucidate the contact zone between the northern and southern African groups accurately, and secondly to determine the processes present within this contact zone. There are strong indications of an ancient northerly migration along the Afromontane archipelago progressively giving rise to the more northerly subspecies. This migration can now be further tested in light of recent systematic studies. The patterns of genetic diversity among the three subspecies from eastern Africa, *griseiceps*, *uluguru* and *murina* are also being investigated in collaboration with Prof Jon Fjeldså. These subspecies are closely related, with *uluguru* being the most genetically diverse. Three of the subspecies, *fuscigularis*, *lynesi* and *flavigularis*, are of conservation concern. They are each thought to be distinct from all other *thoracica* subspecies and are treated by BirdLife International as putative species, pending taxonomic resolution. While *fuscigularis* and *lynesi* do seem to represent unique genetic lineages, their species status is not supported by the available mitochondrial and nuclear genetic markers. Five nuclear markers that have previously proven to be useful in passerines have been tested, but none has shown significant genetic divergence in *Apalis*.

A Bar-throated Apalis Apalis thoracica *from the Western Cape with cold grey upperparts. Photo: Peter Ryan.*

Studies of birds and mammals throughout the Malawi Rift

Potiphar Kaliba's PhD research examines the biogeography, phylogeography and genetic diversity among selected avian and mammalian taxa throughout the Malawi Rift. The resulting data will be used in combination with morphological evidence to determine species boundaries and relationships across the geographical region from southern Tanzania (Rungwe Mountains) through Malawi (Misuku Hills, Nyika Plateau, Ntchisi Highlands, Mount Zomba and Mount Mulanje) to northern Mozambique (Mount Namuli). Previous research on thrushes (*Turdus* spp.) by Rauri Bowie and others has shown that the central and southern Eastern Arc Mountains, and northern Malawi Rift taxon *Turdus abyssinicus nyikae* is closely related to the Albertine Rift taxa *T. a. baraka* and *T. a. bambusicola* and Kenyan highland *T. a. abyssinicus*. These taxa are both genetically and morphologically distinguishable from the Eastern Arc endemics *T. helleri* and

T. roehli, as well as the southern African clade *T. olivaceus olivaceus*. The sister relationship of these clades suggests that the southwestern East Africa, central Africa and the Kenyan highlands were linked biogeographically. A better understanding of the Malawi Rift system is critical if we are to understand the linkages and relative roles of ecology and history as processes separating the east African avifauna from that of southern Africa. For example, e.g. Olive Thrushes *T. olivaceus* differ greatly between southern Malawi (subspecies *milanjensis*) and northern Malawi (subspecies *nyikae*) with *milanjensis* more closely related to the southern African forest forms. Determining how general this pattern of faunal turnover is in Malawi forms the central theme of this study.

Petrels

Mareile Techow completed her PhD research on the phylogeography of giant petrels *Macronectes* and selected *Procellaria* petrels, graduating in June 2007. One paper on geographic variation in *Procellaria* petrels has already been submitted for publication, and two others are in the final stages of polishing before submission. After graduating, Mareile completed her study of variation in giant petrels using microsatellites thanks to extra funds from the UK. This work is now also being readied for publication. Mareile will stay on at the Fitz in 2008 as a post-doc studying breeding productivity of albatrosses (see section on Seabirds), working with PhD student Genevieve Jones.

A Blue-billed Malimbe Malimbe nitens *trapped during the field trip to Cameroon. Photo: Jerome Fuchs.*

Field trip to Cameroon

Postdoctoral fellow Jerome Fuchs undertook a one month field trip to Cameroon with the primary objective of collecting samples for some of our ongoing research projects on the systematics of Laniidae, Ploceidae, Picidae and Pycnonotidae. The field work was performed with three mammalogists from the Museum National d'Histoire Naturelle in Paris and a parasitologist from the University of Yaounde. Three sites were visited, all situated in the lowlands: Campo Ma'an National Reserve, Dja Biosphere Reserve and Korup National Park. At each site, six to ten mist-nets devoted to birds were set. These mist-nets were complemented by flat traps baited with meal worms, as well as by five to ten nets more specifically devoted to bats (usually close to fruiting trees and at a height of 6-9 m). The combinations of these three techniques greatly increased the species diversity of birds caught. All together, samples from 67 species were obtained.

Highlights

- Tim Crowe was elected as a Fellow of the University of Cape Town.
- A paper on the evolution of buntings at Tristan da Cunha was published in *Science*.
- Mareile Techow (petrels) and Keith Barnes (larks) completed their PhD studies and graduated in December and June, respectively and Conservation Biology student Lisa Nupen graduated with distinction in December.
- Graeme Oatley's MSc research on the systematics of African White-eyes *Zosterops* spp. was upgraded to a PhD.
- Pothiphar Kaliba expanded his research on the systematics and biogeography of Malawian birds and mammals and registered for a PhD.
- Dr Ulf Johansson, a post-doctoral student during 2007, was appointed Curator of Birds and Mammals at the Swedish Museum of Natural History in Stockholm.

Students

Callan Cohen (PhD, supervisors Tim Crowe & Rauri Bowie) *The evolution of the bustards and other selected non-passerine birds: implications for African biogeography, evolution of display and conservation.*

Lucille Hermann (PhD Pretoria, supervisors Paulette Bloomer & Peter Ryan) *Comparative phylogeography of forest avifauna.*

Tshifhiwa Mandiwana (PhD, supervisors Tim Crowe & Rauri Bowie) *Taxonomy, phylogenetics and biogeography of francolins and spurfowls.*

Graeme Oatley (MSc now PhD, supervisors Tim Crowe & Rauri Bowie) *Exploring species boundaries within the Cape White-eye* Zosterops virens *and Orange River White-eye* Z. pallidus *complex using organismal and molecular evidence.*

Potiphar Kaliba (PhD, supervisors Rauri Bowie & Tim Crowe) *Faunal turnover between east and southern African birds and small mammals: is Malawi the geographical break?*

Acknowledgements

The National Research Foundation, Department of Science and Technology and French Centre National de la Recherche Scientifique (National Center for Scientific Research) for financial support. The American Museum of Natural History (New York), Field Museum (Chicago) University College (Dublin), University of Pretoria and Boston University for access to facilities, specimens and logistical support.

Dr Penn Lloyd
is the Manager of the DST/NRF Centre of Excellence at the Percy FitzPatrick Institute. He coordinates a long-term project on avian life-history strategies at Koeberg Nature Reserve, and has taken over the coordination of long-running studies on Sociable Weavers and Ant-eating Chats from Prof. Morné du Plessis. He serves on the Steering Committee of SAFRING.

He supervised two PhD students, one MSc student, and the research project of one BSc Hons student, and convened a BSc Hons discussion group on 'Cooperative breeding in birds'. During the review period, he authored or co-authored four papers, peer-reviewed six manuscripts for four journals, and reviewed one NRF rating application.

Life History Strategies

Programme leader:
Dr Penn Lloyd

Research team:
Dr Penn Lloyd
Prof. Morné du Plessis
A/Prof. Phil Hockey
Dr Andrew Taylor (postdoc)
Dr Rob Simmons (research associate)
Mr Adams Chaskda (PhD student)
Ms Ângela Ribeiro (PhD student)
Mr David Nkosi (field assistant)
Dr Claire Spottiswoode (Cambridge Univ., UK)
Dr Rauri Bowie (UC Berkeley, USA)
Prof. Thomas Martin (University of Montana, USA)
Dr Tamas Szekely (Bath University, UK)
Dr Ricardo Lopes (University of Porto, Portugal)
Mr René van Dijk (Bath University, UK)
Mr Âkos Pogány (Eotvos Lorand University, Hungary)

Overview

Life-history strategies describe the anatomical, physiological and behavioural adaptations that control how individuals invest in reproduction and self-maintenance in response to their environmental conditions. A major challenge in evolutionary biology is to explain why life-history strategies vary among species along a slow-fast continuum. Species at the slow end of the spectrum are characterised by slow metabolism and development, delayed reproduction, low reproductive investment, long life, long-term pair bonds, and a greater propensity for cooperative breeding, with the opposite expression at the fast end. The South African avifauna comprises species with life-history strategies that span much of the slow-fast continuum, making it an ideal region in which to study environmental influences on life-history strategies.

The incubation period for Grassbird Sphoenecus afer*, normally 17 days, can be shortened by up to 3 days if the eggs are incubated by White-backed Mousebirds. Photo: Peter Ryan.*

Environmental and parental influences on embryonic development

Variation in embryonic development rate among passerine birds, measured as incubation period, is thought to be influenced largely by body mass (slower

development in larger species) and intrinsic physiological constraints linked to offspring quality (slower development for higher offspring quality among longer-lived species). Research at Koeberg Nature Reserve outside Cape Town, examining variation in incubation parameters among 18 species, contributed to an important paper (Martin *et al.* 2007) that used data from 80 species on three continents to examine the potential additional influences of embryonic mortality rate (higher nest predation risk selecting for faster development) and parental influences on embryonic temperature (lower parental nest attentiveness and incubation temperature leading to slower development). The results largely conflicted with accepted theory. Tropical and southern hemisphere species, exhibited slower development than northern hemisphere species and small species developed more slowly than larger species. Nest predation risk explained some of the variation in development rate among species within regions, but not between regions. Much of the remaining variation was explained by differences in parental incubation behaviour. Species that exhibited lower nest attentiveness (percent of time spent on the nest incubating) had cooler minimum and average embryonic temperatures that were correlated with longer incubation periods independent of nest predation risk or body size. This correlation was tested experimentally at Koeberg by swapping eggs of species with cool incubation temperatures with eggs of species with warm incubation temperatures and similar egg mass. Incubation periods changed (shortened or lengthened by up to three days) as expected and verified the importance of egg temperature on development rate. Slower development resulting from cooler temperatures may simply be a cost imposed on embryos by parents and may not enhance offspring quality. Yet, incubation periods of transferred eggs did not match those of the host species that incubated them. Thus, intrinsic differences among species do exist, and may result from nest predation and other selection pressures.

The White-fronted Plover Charadrius marginatus *has higher adult survival prospects and a lower divorce rate than comparable northern hemisphere plovers. Photo: Peter Ryan.*

Adult survival influences divorce and dispersal among plovers

A short paper (Lloyd 2007) based on a long-term monitoring study compared various life-history traits of the White-fronted Plover *Charadrius marginatus* with those of northern hemisphere plovers. The White-fronted Plover has high annual adult survival (90%), equivalent to tropical species. High adult survival correlated with stronger territoriality and more limited availability of alternative breeding opportunities. This correlated, in turn, with substantially lower divorce rates and more limited breeding dispersal among tropical and southern hemisphere plovers when compared with northern hemisphere plovers.

Sociable Weavers Philetairus socius *occupying larger colonies take greater care of themselves, invest less in their offspring, and live longer than those in smaller colonies. Photo: Peter Ryan.*

Colony size affects survival and life-history adaptation in Sociable Weavers

Claire Spottiswoode published the first article to appear from her PhD study on Sociable Weavers *Philetairus socius*. She examined how variation in colony size (range 4 to 140 individuals) influenced adult and juvenile survival, and how differences in age-specific survival might influence investment in reproduction. Adult survival was higher, but nest survival was lower in larger colonies because of greater nest predation by snakes. Under these conditions, adults in larger colonies are expected to invest less in each reproductive attempt and invest more in their own survival. These predictions were supported. Firstly, adults in larger colonies were in better condition, had lighter parasite loads, yet laid smaller eggs. Secondly, nestlings experienced greater risk of starvation and larger parasite loads in larger colonies, suggesting reduced parental investment.

Greater Kestrel response to nest predation risk

Rob Simmons continued to examine the breeding of Greater Kestrels nesting on telephone poles in tree-less habitat in the Northern Cape, where crows (potential nest predators) have been increasing in number. He hopes to test the prediction that kestrels nesting close to an active crow nest will: (a) suffer

greater nest predation; and (2) will reduce egg size and/or clutch size in response to this increased predation risk.

The importance of territory and male quality to female investment decisions

Adams Chaskda started a new PhD study using the Bar-throated Apalis *Apalis thoracica* population at Koeberg Nature Reserve to examine three inter-related questions: (1) does variation in territory quality affect individual fitness; (2) is the size of a male's black breast-band a reliable indicator of territory and/or male quality, i.e. does it function as a 'badge of status'; and (3) do females adjust their investment in reproduction on the basis of territory and male quality? This project builds on an earlier study by Corine Eising on female investment in this species.

Sexual conflict in birds: comparative behavioural analyses of north- and south-temperate Penduline-tits

Sexual conflict, which stems from the antagonistic interests of males and females during breeding, is a powerful evolutionary process that is thought to be important in the evolution of body size, appearance, and behaviour. A bilateral Hungary/South Africa project is testing predictions of sexual conflict theory by comparing the behaviour, plumage and ecology of the Eurasian Penduline -tit *Remiz pendulinus* in Hungary and Cape Penduline-tit *Anthoscopus minutus* in South Africa. Dr Tamas Szekely, together with PhD students René van Dijk and Âkos Pogány visited Koeberg Nature Reserve during August-September for the second and final breeding season of data collection for this project.

PhD student Ângela Ribeiro examining a Kalahari Scrub Robin Cercotrichas paena*. Photo: Penn Lloyd.*

Environmental and life-history influences on population-genetic structure

Ms Ângela Ribeiro started a new PhD project that investigates the influences of geography, life-history, and past climate and geological changes on population genetic structure at a range of spatial and temporal scales in southern African endemic robin species. At a broad spatial scale, genetic data from populations sampled across the southern African range of selected species will be integrated with Geographic Information Systems (GIS) data on geomorphology and climate to plot genetic boundaries in space. This should identify current environmental barriers to dispersal and gene flow between populations and therefore their influence on current population structure. At a broad temporal scale, the study will examine the influence of Plio-Pleistocene climatic oscillations in shaping genetic variability in forest versus arid-adapted species. At finer spatial and temporal scales, the project will examine how life-history differences between cooperative and non-cooperatively breeding species influence local genetic structure and behavioural ecology.

After three wide-ranging field trips during 2007, and the help of several enthusiastic bird ringers around the country, we have collected 410 samples from over 30 different sites for the four main species, Karoo Scrub Robin *Cercotrichas coryphoeus*, Kalahari Scrub Robin *C. paena*, Brown Scrub Robin *C. signata*, and Cape Robin Chat *Cossypha caffra*. An existing database of 1,650 blood samples for Karoo Scrub Robin and 210 samples for Cape Robin Chat from Koeberg Nature Reserve is also being used to address the finer-scale research questions.

Students

Adams Chaskda (PhD, supervisors Phil Hockey & Penn Lloyd) *Is territory quality the coded message in the breast-band of the male Bar-throated Apalis?*

Ângela Ribeiro (PhD, supervisors Penn Lloyd, Rauri Bowie & Ricardo Lopes) *Unravelling temporal and spatial genetic patterns among southern African robins*.

Visitors

Dr Tamas Szekely (Bath University, UK) visited in August-September, accompanied by PhD students René van Dijk (Bath University, UK) and Âkos Pogány (Eotvos Lorand University, Hungary).

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Prof. Morné du Plessis
serves as a member of the International Ornithological Congress Committee, the Council of BirdLife South Africa, the Steering Committee of SAFRING and the Advisory Committee of the Mammal Research Institute at the University of Pretoria. He also serves as a Trustee to WWF-SA, and as Chair of WWF-SA's Conservation Committee. He serves on the editorial board of the Southern African Journal of Wildlife Research. Morné supervised or co-supervised one PhD student, and worked with four post-doctoral researchers. He also co-supervised two MSc Conservation Biology students, and co-supervised two students registered at other universities. He regularly participates in nature programmes on both radio and television and gave two presentations to membership-based societies. He reviewed numerous NRF proposals, as well as 7 applications for research grants and 12 manuscripts submitted to various scientific journals.

Dr Mandy Ridley
is a postdoctoral researcher. She is the principal investigator of the Southern Pied Babbler Research Project located in the Kuruman River Reserve, southern Kalahari. In addition to doing her own research, Mandy oversees all research conducted on the project as well as the maintenance of project databases. Mandy supervised two PhD students, two MSc students and four Honours students. In addition, she participated in convening the weekly postgraduate seminars held at the Institute. During the review period Mandy authored or co-authored twelve papers in international journals, wrote one semi-popular article and peer-reviewed five manuscripts.

Cooperative Breeding and Sociality in Birds

Programme leader
Prof. Morné du Plessis (Jan-Aug)
Dr Mandy Ridley (Sept-Dec)

Research team
Dr Penn Lloyd
Dr Matthew Bell (Cambridge University, UK)
Dr Andrew Radford (Bristol University, UK)
Dr Nicola Raihani (Cambridge University, UK)
Dr Mandy Ridley (UCT)
Dr Andrew Taylor (UCT)
David Nkosi (field assistant)
Mark Anderson (Northern Cape Nature Conservation)
Eric Herrmann (Northern Cape Nature Conservation)

Overview
Cooperative breeding behaviour, where non-breeding adults assist in raising the young of others, has been a major area of ethological research for several decades. This is because the theory of natural selection, at first glance, predicts that individuals will be selfish rather than cooperative, and in doing so will pass more of their own genes onto the next generation. The problem with this is that cooperation occurs relatively often in the animal world. The most extreme case is the occurrence of sterile workers in eusocial insect colonies. There are however, a number of bird and mammal species where adults delay their own reproduction and instead assist in raising the young of others. In southern Africa there are many bird species, found across a broad range of habitats, that display social behaviour. This sociality ranges from colonial and communal breeding (where individuals all invest in their own breeding attempts but cooperate in terms of vigilance and territory defence), to facultative helping behaviour (where the occurrence of helpers is sometimes observed but pairs can breed successfully), to obligate cooperative behaviour (where pairs cannot successfully raise young without the assistance of helpers). Current research aims to explain the occurrence of these different kinds of cooperative breeding behaviour within the framework of natural selection.

The objectives of cooperative breeding research at the Institute are (a) to uncover the factors that lead to the occurrence of different kinds of cooperative breeding behaviours; (b) to use experimental manipulations to determine the benefits of sociality and how changes in the costs vs benefits affect the degree of sociality; (c) to test current theoretical models on the occurrence of cooperative breeding data using empirical data from a broad range of cooperative breeders in southern Africa; (d) to investigate the ecological factors underlying reproductive sharing and the proximate causes of variation in the degree of help provided by non-breeding adults, and (e) to determine life-history benefits of cooperative versus non-cooperative breeding.

Southern Pied Babbler Research Project
The Southern Pied Babbler Research Project, located in the southern Kalahari, is involved in research into population and behavioural ecology, bioacoustics, and evolutionary biology. The Southern Pied Babblers *Turdoides bicolor* at the study site are all colour-ringed and fully habituated to observation within a few metres. In addition, Mandy established a habituated, colour-ringed population of Fork-tailed Drongos *Dicrurus adsimilis* in order to study their interactions with Southern Pied Babblers. Research at the Southern Pied Babbler project continued to expand in 2007, with the addition of several new researchers, including Matthew Bell (University of Cambridge) and Tom Flower (University of Pretoria & University of Cambridge), who will both study aspects of Southern Pied Babbler and Fork-tailed Drongo behaviour, and Jacqui Stephenson (University of Cape Town), who is working with

the Southern Pied Babbler database. 2007 heralded an unusual year for research at the project. Following a severe drought over the 2006/07 summer season which depressed breeding activity to very low levels, we observed behaviours never before seen in the population. These included adoption of young from neighbouring groups, divorce and infanticide. Martha Nelson installed cameras at the nest of some groups for the reproductive conflict aspect of her PhD research. This resulted in the first ever record of females eating each other's eggs and gives the potential for fascinating research on conflict and compromise in reproductive opportunities.

Habituation levels in the Southern Pied Babbler Turdoides bicolor *population allow researchers to get an intimate view into the daily lives of this social species. Photo: Andrew Radford.*

The severe drought resulted in the complete extinction of several of our research groups. By the start of the 2007/08 summer season our study population had more than halved. This provided some interesting data on territory vacancies and dispersal dynamics as well as allowing a comparison of the productivity of pairs versus groups (with pairs being more common than prior to the drought, when they were very rare). Luckily, heavy rains returned to the area and the 2007/08 breeding season has turned out to be especially productive. Some groups were observed to begin incubating second broods before first broods had even fledged. Already the population has nearly returned to pre-drought levels.

Research at the project currently focuses primarily on the following topics:

Mate choice: Owing to their highly aggressive defence of territory borders, females (the dispersing sex) appear to have limited opportunities to assess potential mates at close quarters. This is of significance because prospecting females must fight with resident females for access to group males. Fighting among females is costly – it can last for several days and result in significant weight loss. Females should therefore be sure that the male they are fighting for is of high quality to justify the cost involved. Data from the previous four years confirms that females prefer heavier males, yet it remains unclear how they are able to assess male quality prior to initiating a fight for 'ownership'. We suggest that the long-distance calls produced by adults provide prospectors with important information about individual quality. In 2008, we plan to use a series of playback and feeding experiments to manipulate call structure and observe behavioural responses. We propose that females not only need information on the quality of their potential mate but also the relative strength of their rival, as this will provide information on the likelihood of winning a fight for a 'sexy' male.

Reproductive conflict and group stability: There is increasing evidence that reproductive conflict results in a decrease in group productivity. The most productive groups in our population are those that comprise an established pair and their retained offspring. Death and dispersal results in group disruption, and where there are two or more females that can potentially breed with the dominant male breeding disruption occurs. This disruption includes nest desertion, intra-sex aggression, delayed onset of breeding, and infanticide. We plan to use current data and theoretical modelling to determine the benefits of subordinate reproduction versus the cost of group disruption. We will use this to test current models predicting when subordinates should disperse versus when they should stay at home to help raise future young.

The dominant male and female of each Southern Pied Babbler group spend considerable periods of time allopreening each other. This behaviour may reflect the strength of the pair bond. Photo: Sarah Knowles.

Individual patterns of helping behaviour: Continuing on data collection from previous years, Mandy is looking at causes of individual variation in helping behaviour in terms of the costs versus benefits of such behaviour. Included within this research is sex-biased preferential care, where individuals may prefer to care for the sex that will provide them with the greatest benefits in the future.

In 2007, members of the Southern Pied Babbler Research Project published 11 papers in international peer-reviewed journals and 3 articles in wildlife magazines. Research from the project received extensive coverage in international media, including appearances on radio and TV shows. Three film crews visited the study site to film aspects of Southern Pied Babbler behaviour.

Green Wood-Hoopoe Project

Following the departure of Morné from the Institute, 2007 heralded one of the last years of his involvement in data collection on Green Wood-Hoopoes *Phoeniculus purpureus* at the Morgan's Bay study site in the Eastern Cape. Morné and BSc Hons student Louise Brown visited the study site in July for the purposes of ringing and life-history data collection. The massive dataset that has now accumulated from over 28 years of research on the population has provided some fascinating information on lifetime reproductive success and helper benefits. These include the fact that delayed breeding actually increases the lifetime reproductive success of females, contrary to traditional life-history theory expectations, a finding which received considerable international media attention. In addition, Louise found that in some cases helpers may decrease breeder survival. Usually helpers are found to either increase reproductive output, or increase breeder survival by 'lightening the load', enabling breeders to stay in good condition for longer. These new and intriguing results will undoubtedly contribute much to our understanding of the causes and consequences of cooperative breeding behaviour.

Karoo Scrub Robins

Penn Lloyd and Andrew Taylor completed another field season of intensive monitoring of reproductive effort, success and survival of a colour-marked population of Karoo Scrub Robins occupying 100 territories at Koeberg Nature Reserve. They are currently working on several manuscripts reporting on the results of the first four years of this study. Ângela Ribeiro is using the database of blood samples from this study to investigate the influence of fine-scale population genetic structuring on mating strategies in this species (see under Life History Strategies programme). Rauri Bowie has also been sexing the broods of offspring to expand upon an earlier Honours student project testing whether there is any skewing of primary sex ratios towards the helping (males) or dispersing (females) sex.

Ant-eating Chats

Penn Lloyd took over the coordination of this research project from Morné du Plessis during 2007. David Nkosi spent several months at Benfontein capturing, colour-ringing and blood-sampling unbanded birds in the study population occupying some 30 territories, and monitoring the annual fecundity of all groups. A large dataset for the years 2003 to 2007 now awaits analysis, but a student has yet to be found to build upon this pilot study. Ant-eating Chats *Myrmecocichla formicivora* are opportunistic cooperative breeders in which the decision to delay breeding is apparently made based on prevailing environmental conditions. However, the genetic relatedness between breeders and helpers remains unclear. We hope to use the existing database of blood samples from over 60 family groups and their complete broods of offspring to first unravel the species' mating system, before framing further questions around the opportunistic nature of cooperation during the breeding season in this species.

David Nkosi reaches down a burrow to access an Ant-eating Chat Myrmecocichla formicivora *nest. Photo: Penn Lloyd.*

Visitors

Professor Andrew Cockburn (The Australian National University, Canberra) visited the Institute from February until July to pursue his research on cooperative breeding in birds. He devoted his time to writing papers derived from his long-term research on Superb Fairy-Wrens *Malurus cyaneus*, and comparative analysis of the causes of cooperative breeding among birds. The latter work benefited from visits to the long-term study sites for ground-hornbills and pied babblers. He continued attempts to develop robust conceptual and statistical approaches to the study of cooperative breeding. Zero-inflated Poisson models were applied to the case where reproductive success had two modes, one of which was zero. The most novel result was the observation that females use the presence of helpers to enhance their own survival rather than the fitness

of their offspring. This result was featured on the cover of *Science*. Andrew's relatively short stay at the Fitz will probably count among the most productive of any visiting associates to the Institute.

SCIENCE COVER: In Superb Fairy-Wrens Malurus cyaneus*, helper males can assist females by providing extra food to their chicks. When this is the case, females lay smaller eggs that give rise to lighter chicks. Females benefit from increased survival*. Photo: BIOS Ruoso Cyril/Peter Arnold Inc.

Dr Andy Radford (Bristol Univ.) visited Morné du Plessis for a week to discuss a range of analyses that need to be done in order to do further justice to the long-term Wood-Hoopoe dataset. Five key questions were identified and these will form the initial basis of collaboration between them over the years to come. Andy has previously demonstrated a high level of publication productivity and this collaboration will continue to provide the Fitztitute with Wood-Hoopoe outputs. The field work that was commenced by Morné in 1981 was brought to a close in July 2007. This is partly due to the demands of the field work and partly because the latter would require focused supervision no longer available with Morné's departure from the Institute.

Lectures

Penn Lloyd led a discussion group for UCT Honours students on: 'Ecology and evolution of cooperative breeding: delayed natal dispersal and helping in birds'. Andrew Cockburn gave a number of seminars at UCT and Stellenbosch on his research into cooperative breeding behaviour. Team members led a postgraduate workshop on cooperative breeding behaviour, looking at current findings and future research directions.

Seminars on various aspects of pied babbler research were given at the Universities of Bath, Bristol, Cambridge and Cape Town. Seminars were also presented to each Earthwatch Team visiting the study site in the Kalahari.

Highlights

Several aspects of cooperative breeding research received a large amount of scientific and media attention over the past year. These include:

- The publication of a high-profile paper on reduced egg investment by female Superb-Fairy Wrens in the presence of helpers (Russell et al 2007, *Science*).
- The publication of the first experimental evidence for teaching behaviour in a cooperative bird (the Southern Pied Babbler) (Raihani & Ridley 2008, *Animal Behaviour*).
- The publication of a high-profile paper on the differential effects of delayed breeding on male vs female Green Wood-Hoopoes (Hawn *et al*. 2007, *Current Biology*).
- Nichola Raihani was awarded the runner-up prize in the New Scientist essay competition (UK) for her essay entitled 'Who's the king of the castle?' about her PhD research on Southern Pied Babblers.
- In all, 18 scientific papers and four magazine articles were published by members of the group on aspects of cooperative breeding and sociality.

Students

Thomas Flower (PhD, Cambridge, advised by Mandy Ridley) *Deceptive vocal mimcry by Fork-tailed Drongos* (Dicrurus adsimilis)*: a test of adaptive strategies*

Krystyna Golabek (PhD, Bristol, supervised by Andrew Radford) *Social communication and information transfer in Pied Babblers: implications on social behaviour*

Martha Nelson (PhD, supervisors Phil Hockey, Colleen O'Ryan, Mandy Ridley) *Kin recognition: mechanisms and consequences in the cooperatively breeding Pied Babbler* Turdoides bicolor.

Nichola Raihani (PhD, Cambridge, co-supervised by Mandy Ridley) *Cooperation and conflict in Pied Babblers.* Thesis submitted December 2007.

Louise Brown (BSc Hons, supervised by Morné du Plessis, co-supervised by Mandy Ridley) *The influence of helpers on reproductive success and breeder survival in the cooperatively breeding Green Wood-Hoopoe,* Phoeniculus purpureus.

Jacqui Stephenson (BSc Hons, supervised by Mandy Ridley) *Is bigger necessarily better? The influence of weight on breeding success in the cooperatively breeding Southern Pied Babbler.*

Acknowledgements

The Northern Cape Conservation Authority for research permits for drongos and pied babblers, and the Kuruman River Reserve Trust and private landowners in the Vanzyl's area (Mr & Mrs H. Kotze, Mr & Mrs F. de Bruin) for land access. De Beers Consolidated Mining, especially Mr Johan Kruger, for supporting the long-term research station at Benfontein, Kimberley.

Assoc. Prof. Phil Hockey *is a member of the Editorial Board of the journal Biological Conservation.*

Phil co-ordinates the Oystercatcher Conservation Programme, which has proved to be a high-impact subregional project. He was Editor-in-Chief of Roberts - Birds of Southern Africa (second, revised impression printed March 2006) and a co-author of the best-selling Sasol Birds of Southern Africa, the larger edition of which was republished in second edition in 2005. In the period under review, he supervised the work of three PhD students, six MSc students and one honours student. He authored or co-authored seven scientific papers, with a further four in press and one submitted, and five semi-popular articles. He also refereed six papers for five journals.

Ecology of Migration

Programme leader
Assoc. Prof. Phil Hockey

Research team
Prof. Paulette Bloomer (University of Pretoria)
Prof. Graeme Cumming (PFIAO)

Common Swifts Apus apus *have undergone a major southward range expansion in South Africa in the past two decades, probably in response to climate change. Photo: Trevor Hardaker.*

Overview

In recent years we have directed much effort at unravelling ecological correlates of short- to medium-distance migrations among African birds. Migration patterns are, *inter alia*, closely linked with climatic seasonality, habitat structure, diet and foraging mode. These findings are summarised in a book chapter authored by Phil Hockey and published in 2005 (John Hopkins University Press).

Locally, we have continued studies of movement patterns of juvenile African Black Oystercatchers *Haematopus moquini*, monitoring the occurrence of individually colour-banded birds along the South African and Namibian coasts. We have also started investigation of the seemingly complex and poorly resolved movement patterns of southern African anatids (ducks and geese). Many waterbirds in southern Africa are nomadic or highly dispersive. Understanding their movement patterns is crucial to population/habitat management and predicting the spread of pathogens such as avian influenza (see Spatial Parasitology and Epidemiology).

Multi-species studies

Following on from Phil Hockey and Jane Hamblin's studies of ecological correlates of differential migration patterns, Hassan Babiker (CB MSc), Phil Hockey and Mandy Ridley investigated the potential of this information for predicting which southern African bird species are likely to show the most rapid distributional changes in the face of changing climate. Working on the premise that responses to changing climate should mirror responses to seasonally changing weather (i.e. responses to food supply), mixed models were used to determine whether variables related to mobility

and habitat use of birds can predict which species should change their ranges. In other words, rather than analyzing range changes *post hoc*, this study attempts to validate a mechanistic model of why some species should move while others do not. Results at this stage are very encouraging.

Movement patterns of Egyptian Geese Alopochen aegyptiaca *have been the focus of a MSc study by Mduduzi Ndlovu.*

Anatid movements

Monitoring schemes, such as the Atlas of Southern African Birds (SABAP), bird ringing (AFRING) and waterbird counts (CWAC), aim to provide information about bird distribution, density, and movements. Hannah Thomas (CB MSc) used Red-billed Teal *Anas erythrorhyncha* as a model species for interrogating these datasets to determine whether they supported conclusions drawn from published studies. Her findings, submitted to *Ecological Applications* in early 2008, demonstrated weaknesses in large-scale monitoring efforts that lack detailed research objectives. She concluded that monitoring protocols could be improved by including abundance and sampling effort data into SABAP, broadening the geographical coverage of AFRING, and improving the temporal resolution and spatial representativeness of waterbird counts.

In the same field, Mduduzi Ndlovu (MSc) has been investigating movement patterns of Egyptian Geese *Alopochen aegyptiaca*. Preliminary results indicate high turnover at individual sites, supporting the hypothesis derived from ringing data that these birds are highly mobile. Mduduzi is also monitoring seasonal changes in body condition and moulting patterns as potential indicators of why birds move when they do. In the near future, geese will be fitted with satellite tracking devices so that their movements can be followed in real time and related to local environmental conditions.

African Black Oystercatcher Movements

In recent years we have documented extensive movements of juvenile oystercatchers in the subregion (see 2005 Annual Report), although these birds also exhibit strong natal philopatry. Thus, while movement potentially promotes gene flow, natal philopatry does not. Based on observations of juvenile birds, westward gene flow is more likely than eastern gene flow (although rates of both are expected to be slow). In a study aimed at linking observational and genetic data, during 2006 we successfully developed five polymorphic microsatellite loci from our blood samples with the use of the FIASCO protocol. This has now been increased to 10, and increasing this number further will be a primary research objective of Prof Paulette Bloomer in early 2008.

Students

Douglas Loewenthal (PhD, supervisor Phil Hockey, graduated Dec 2007) *Population dynamics and conservation of the African Black Oystercatcher* Haematopus moquini.

Mduduzi Ndlovu (MSc, supervisors Graeme Cumming, Phil Hockey) *Movement strategies of Egyptian Geese.*

Hassan Babiker (CB MSc, supervisors Phil Hockey, Mandy Ridley) *Is climate change affecting the distributions of southern African birds?*

Hannah Thomas (CB MSc, supervisors Phil Hockey, Graeme Cumming, graduated June 2007) *Understanding the movements of waterbirds in southern Africa: can the long-term ornithological data collection programmes reveal the pattern?*

Increasing numbers of African Black Oystercatchers Haematopus moquini *are predicted to result in changes in juvenile movement patterns. Photo: Jessie Walton.*

Acknowledgements

Tropical Biology Association (for support to Hassan Babiker), Gains (for support to Mduduzi Ndlovu), University of Cape Town Research Committee (for support to Hannah Thomas).

Dr Andrew McKechnie *is a Senior Lecturer in the School of Animal, Plant and Environmental Sciences at the University of the Witwatersrand, Johannesburg, but in early 2008 will be taking up an Associate Professorship in the Department of Zoology & Entomology at the University of Pretoria. During the review period, he supervised one MSc student and one BSc Honours project, and co-supervised two PhD students. He is currently an Associate Editor for the journal Ostrich. Two peer-reviewed papers were published and a further three manuscripts were accepted for publication during the review period, and he authored four popular articles. Members of the research team gave seven conference presentations.*

Ecological and Evolutionary Physiology

Programme leader
Dr Andrew McKechnie

Research team
Prof. Mark Brigham (University of Regina, Canada)
Dr Blair Wolf (University of New Mexico, USA)
Prof. Barry Lovegrove (University of KwaZulu-Natal)
Dr Barend Erasmus (Wits University)
Prof. David Gray (Wits University)
Prof. Sue Nicolson (University of Pretoria)
Dr Stephan Woodborne (CSIR, Pretoria)
Dr Walter Jetz (University of California, San Diego, USA)
Prof. Robert Freckleton (Oxford University, UK)
Dr Corine Eising (postdoc)
Dr Jim Dale (Max Planck Institute for Ornithology, Germany)

Overview
Ecological and evolutionary physiology links physical and chemical processes at a cellular level to whole-animal responses and performance. By bridging the gaps between physics, chemistry, ecology and evolution, these fields of study reveal how internal and external environments affect the interactions between an organism's genotype, phenotype, short-term performance and long-term performance. Ecological and evolutionary physiologists have a particularly important role to play in understanding the current and future responses of animals to climate change.

Ben Smit (MSc student) with a Southern White-faced Scops Owl Ptilopsis granti *at our study site in Molopo Nature Reserve, Northwest Province. Photo: Andrew McKechnie.*

Phenotypic plasticity in avian metabolic rates
Many birds reversibly adjust their metabolic machinery over short time scales in response to changes in energy supply and/or demand. Some of the most impressive metabolic adjustments occur in long-distance migrants, but there is increasing evidence that quantitatively similar physiological changes takes place in many non-migrant species. For instance, many species that are year-round residents in

temperate latitudes in the Northern Hemisphere show impressive seasonal changes in metabolic rate, with metabolism generally up-regulated in winter. In contrast, almost no information is currently available on seasonal metabolic adjustments in species from the Southern Hemisphere.

The review period saw the start of a project investigating seasonal adjustments in a bird community in the Kalahari Desert. Recent advances in technology have made it possible to measure avian metabolic parameters in the field, and we set up a portable respirometry system in Molopo Nature Reserve, Northwest Province. This system allowed Ben Smit (MSc student), to measure metabolic rates in a phylogenetically diverse group of species in the winter of 2007. In January 2008, he will be returning to Molopo to obtain summer measurements. These data will provide insights into seasonal metabolic adjustments in Southern Hemisphere species, and will allow us to develop a more balanced global picture of seasonal physiological changes.

Torpor and hibernation in southern African birds

Many birds employ torpor, a physiological state in which body temperature is suppressed far below normal levels, to offset the energetic costs of maintaining a high, constant body temperature. The occurrence of torpor in southern African species remains a strong research focus, and in 2006 Andrew and his students documented torpor in the Freckled Nightjar *Caprimulgus tristigma*. In 2007, the focus shifted to a group of birds that has long been somewhat puzzling in terms of torpor use – the owls. Owls are thought to be closely related to nightjars, and bear numerous ecological similarities. However, whereas torpor is common in nightjars and their allies, all previous studies of owls have failed to document this phenomenon.

During winter 2007, Ben Smit investigated the occurrence of torpor in two small southern African owl species, the Pearl-spotted Owlet *Glaucidum perlatum* and the African Scops-Owl *Otus senegalensis*. Unlike previous studies, which involved captive birds, Ben studied wild, free-ranging owls, using temperature-sensitive transmitters to monitor the owls' movements and simultaneously record their body temperature. Pearl-spotted Owlets showed no signs of torpor, but African Scops-Owls regularly decreased their body temperature, on some occasions by as much as 10°C. Typically, the scops-owls would lower their temperature shortly after returning to their roosts before sunrise, and would rewarm a few hours later. These exciting data reveal that at least one species of owl does indeed possess the capacity to employ shallow torpor, and provide new insights into the ecological significance of this phenomenon.

Climate change and birds in hot deserts

Many of the approaches that ornithologists and other biologists have used to predict the effects of climate change have been based on distribution patterns, for example the range of temperatures included within a species' current range. Ecological and evolutionary physiologists have a vital role to play in predicting climate change impacts, because much of their research focuses on the physiological processes that determine the interactions between birds and their physical environments. As an example of a more mechanistic approach, we are currently developing a model that links water requirements in desert birds to predicted increases in maximum air temperatures. Because many birds living in hot deserts require comparatively large amounts of water to avoid fatal hyperthermia on extremely hot days, increasing maximum temperatures are likely to challenge these birds with more frequent, potentially fatal bottlenecks in water balance in coming decades. As climate change accelerates, desert bird communities are likely to experience more frequent catastrophic mass mortality events similar to those occasionally observed in the Australian deserts during the 20th Century. Although there is no published evidence yet that more frequent and/or severe heat waves have adversely affected desert bird populations, large-scale mortality was recently documented in Australian bats during unusually severe heat waves.

A Pearl-spotted Owlet Glaucidium perlatum *with a temperature-sensitive transmitter attached. The transmitter measures skin temperature between the owl's scapulars. Photo: Andrew McKechnie.*

Conservation physiology

One of the most exciting recent developments in the field of ecological and evolutionary physiology has been the emergence of conservation physiology as a distinct discipline. A major component of conservation physiology involves the use of glucocorticoid hormones as indicators of chronic stress induced by human activities. These endocrine approaches can provide quantitative insights into the negative effects of habitat fragmentation, ecotourism and other anthropogenic stressors.

The review period saw Andrew and his students begin developing a research program in the field of conservation

physiology, focusing on corticosterone, the major stress hormone in birds. The main focus of this study will be the development of endocrine tools for assessing stress levels in wild bird populations. During 2007, Lauren Inglethorpe (CoE-funded BSc Hons student at Wits) examined stress levels in Laughing Doves *Streptopelia senegalensis* housed under different captive conditions, and found that doves housed in indoor cages were significantly less stressed than those housed in outdoor aviaries. In 2008, Lauren will be starting a MSc, examining phylogenetic and seasonal variation in avian stress responses.

Stable isotopes: scaling up nutrient and energy fluxes from individuals to landscapes

This project involves the use of stable isotopes (carbon, nitrogen and hydrogen) to trace and quantify fluxes of nutrients, energy and water between plants and avian consumers in North American and southern African habitats. In North America, we are investigating the role of columnar cacti such as the Saguaro *Carnegiea gigantea* as food and water resources for Sonoran Desert bird communities. In southern Africa, Craig Symes is using similar isotopic approaches to trace nutrient fluxes between flowering *Aloe marlothii* and avian consumers. There are numerous similarities between these two systems; both involve a diverse suite of bird species utilising a seasonally available food resource, and both involve significant diet shifts for many avian consumers. However, whereas saguaro nectar and fruit is available during the hottest time of the year when many birds breed, *A. marlothii* flowers in winter, when few species breed. The southern African component of this work has been made possible by collaboration with Dr Stephan Woodborne at the CSIR, where facilities are available for stable isotope analysis.

A portable respirometry system used to measure metabolic rates of wild birds in the field. Photo: Andrew McKechnie.

Hormonal control of plumage expression in Red-billed Queleas

Male Red-billed Queleas *Quelea quelea* exhibit one of several discrete plumage types when in breeding condition. These different morphs do not appear to correlate with male quality, the traditional explanation. Instead, strong correlations in plumage morphology between fathers and sons suggest a strong genetic basis. Indeed the slopes of the father-son regressions are so high they suggest that females mate assortatively – females carrying the genes of a particular morph mate preferentially with a male of that morph, even though females do not express the plumage polymorphism. Drs Jim Dale and Corine Eising together with Caitlin Smith (Honours) and Tirelo Shabane (assistant) have been investigating whether they can induce the expression of the male morph plumage in a female by using hormone implants to manipulate endogenous levels of three different hormones: (1) testosterone, the male hormone that affects beak colour in many species; (2) estradiol, the female hormone that is thought to inhibit the expression of male-like secondary sexual characteristics such as plumage coloration; and (3) luteinizing hormone (LH) or the LH component in pregnant mare serum (PMSG) that may affect melanisation of plumage, such as the expression of yellow, melanin-based colours. Estradiol levels were manipulated by using either tamoxifen, which blocks estrogen receptors, or the aromatase blocker ATD, which stops the conversion of testosterone to estradiol.

Sample size was limited by a high rate of loss of the implants, but the results have been promising. Female beak colour became more yellow rather than red in response to testosterone treatment. Treatment with pure LH or PMSG resulted in some females clearly expressing male-like, yellow crown feathering, but only in those cases where ATD or tamoxifen treatment induced feather moult. In addition, when treated with LH, some females developed some black feathering on the throat and cheek, a feature lacking in wild birds.

Working with several collaborators, Corine also finalized a manuscript on maternal androgen levels in the Australian Brush turkey *Alectura lathami,* a species without parental care or sibling competition, now accepted for publication in *General and Comparative Endocrinology*.

Highlights

- A paper on phenotypic adjustments in metabolic rates in Laughing Doves was published in *Journal of Experimental Biology*, and a paper on torpor in Freckled Nightjars in *Journal of Avian Biology*.
- Ben Smit found the first evidence for shallow torpor in owls, and presented a paper on this work at the 4th Australasian Ornithological Conference.
- Andrew McKechnie was approached to write an invited review paper on phenotypic plasticity in avian metabolic rates for *Journal of Comparative Physiology B*.
- Honours student Lauren Inglethorpe graduated.

Conference presentations

Seven presentations were given by Andrew McKechnie or his collaborators at the following meetings: 33rd Bi-annual

Conference of the Zoological Society of Southern Africa, 7th International Congress of Comparative Physiology and Biochemistry, 4th Australasian Ornithological Conference and the 8th Neotropical Ornithological Congress.

Students

Ben Smit (MSc, Wits, supervisor Andrew McKechnie) *Facultative hypothermic responses and seasonal metabolic adjustments in small owls in an arid environment*.

Lauren Inglethorpe (BSc Hons, Wits, supervisor Andrew McKechnie) *An assessment of stress levels using faecal corticosterone in captive Laughing Doves: the effect of housing conditions*.

Elizabeth Kleynhans (PhD, Groningen, co-supervisors Andrew McKechnie, Profs. B.I. Tieleman and T. Piersma) *The influence of spatial and temporal heterogeneity on phenotypic plasticity in larks.*

Craig Symes (PhD, Pretoria, supervisors Andrew McKechnie, Sue Nicolson) *Avian nectarivory and pollination in* Aloe marlothii *Berger: interactions between bird communities and a winter-flowering succulent*.

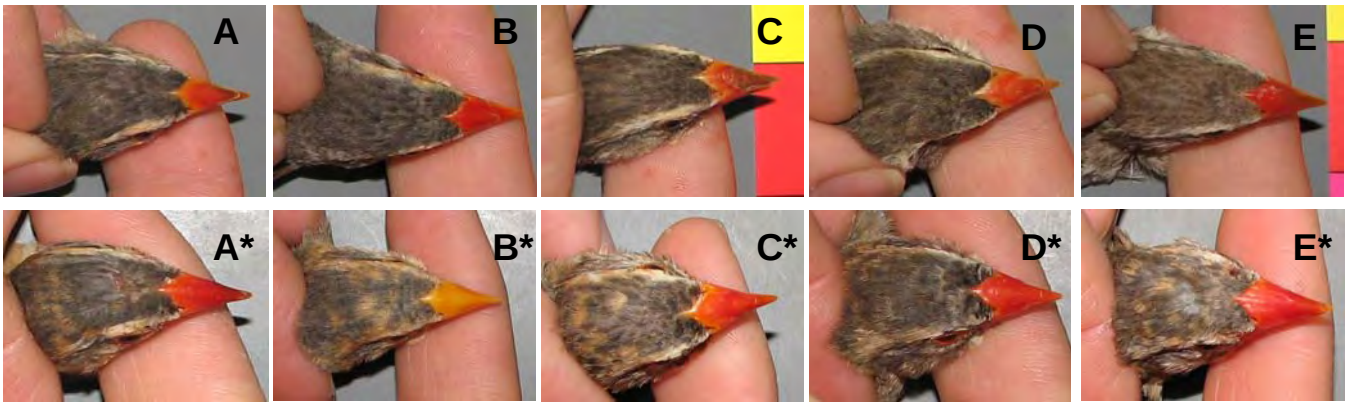
Caitlin Smith (BSc Hons (UCT), supervisor Corine Eising) *Ladies dressing in drag? The effects of androgenic hormone* manipulation *on the expression of male secondary sexual characteristics in both male and female red-billed queleas*.

Lectures, Workshops and Symposia

Andrew McKechnie presented seminars on his recent work on phenotypic plasticity at the University of Stellenbosch and Wits University, and gave a talk on nightjars in general and his recent research on torpor in Freckled Nightjars to the Rustenburg Wildlife Society. He also gave several guest lecturers to students participating in the Organization for Tropical Studies Semester Abroad Program in South Africa.

Acknowledgements

Claude Leon Foundation (for postdoc fellowship support to C. Eising).



Photographs showing the development of male-like crown plumage in 5 female Red-billed Queleas. A to E shows the winter plumage of the females before they received any treatments. A to E* shows the same females at the end of the study. Note the development of yellow, male-like crown plumage. During the course of the study, these females received the following treatments:* ***A****: tamoxifen and LH* ***B****: ATD and PMSG* ***C****: tamoxifen and PMSG* ***D****: ATD and PMSG* ***E****: tamoxifen and PMSG.*

Assoc. Prof. Phil Hockey *is also the leader of the* ***Ecology of Migration Research Programme*** *and co-leader of the* ***Spatial Parasitology and Epidemiology Programme***

Rarity and Conservation of Southern African Birds

Programme leader:
Assoc. Prof. Phil Hockey

Research team:
Prof. Paulette Bloomer (Pretoria)
Odette Curtis (former MSc student)
Dr David Grémillet (CNRS, France)
Quentin Hagens (Field Assistant)
Dr Lizanne Roxburgh (Post-doc)
Dr Rob Simmons (Research Associate)
Ross Wanless (PhD student)

The Aldabran Flighless Rail Dryolimnas [cuvieri] aldabranus *is thriving on Aldabra, thanks in part to a successful Fitztitute reintroduction of the species to Picard Island. However, demographic modelling has shown that the species is extremely vulnerable to accidental predator introduction. Photo: Ross Wanless.*

Overview

Birds are perhaps the best-studied group of vertebrates world-wide; the breadth of this knowledge may explain why *ca* 12% of the world's birds are included in the International Red Data Book. The forces that have driven birds towards extinction have changed over the past 400 years, from direct persecution to habitat loss and degradation, and invasion of alien taxa. For several years, researchers at the PFIAO have used a diversity of model taxa to investigate the reasons for avian rarity. In almost all cases, the search has been for the life-history stages at which demographic bottlenecks occur, and identifying the root causes of such bottlenecks.

This programme is something of a catch-all for miscellaneous conservation projects. However, underpinning these studies is the philosophy that conservation action is only likely to be effective if the root cause of the problem can be identified. Practical examples of this include managing the successful re-introduction of the Aldabra Rail *Dryolimnas [cuvieri] aldabranus* to Picard Island, and effecting a marked increase in African Black Oystercatcher numbers after identifying the key, two-week-long population bottleneck. The pool of expertise that the PFIAO has developed in the field of linking life-history studies with remedial action for threatened taxa is considerable. This expertise has been applied in locations as disparate as sub-Antarctic and tropical Islands, forests and highland wetlands. As increasing numbers of species are added

to Red Data Lists, continued development of this expertise will become ever more essential. We have already started this development by addressing problems associated with highly dispersed and/or rare taxa (e.g. Southern Ground-Hornbill *Bucorvus leadbeateri*, Blue Crane *Anthropoides paradiseus*, Rudd's Lark *Heteromirafra ruddi* and Chaplin's Barbet *Lybius chaplini*).

African Black Oystercatchers

The long-term, ongoing study of the population dynamics of the African Black Oystercatcher by Phil Hockey and Doug Loewenthal has involved gathering data throughout the species' breeding range and beyond at nursery areas in central Namibia where juveniles and subadults gather. During this study, significant environmental changes have affected the species' demographics, notably the invasion of the shore by an alien mussel species and the banning of off-road vehicles from South African beaches. This environmental change is spatially variable and has allowed us to fine-tune demographic models in response to observed changes in reproductive performance. Examination of local population dynamics which incorporate both periods of stability and population change has allowed us to model the effect of environmental changes, both natural and human-induced, on territorial behaviour and hence on local carrying capacity.

The African Black Oystercatcher's global population has increased by *ca* 45% over the past 25 years, from an estimated 4800 birds to 6670 birds: both the presence of the alien mussel *Mytilus galloprovincialis* and improved protection have benefited the species. Despite an increase in the global population, several local populations have experienced decreases in numbers. Most of these are a result of localised emigration from areas which have experienced human-induced habitat degradation, rather than because of unsustainable reproductive rates *per se*. Nevertheless, for several unprotected local oystercatcher populations, breeding success is below the minimum required to maintain a stable population (*ca* 0.28 fledglings.pair^{-1}.year^{-1}). In unprotected areas, uncontrolled dogs depredating chicks and the drowning of chicks hiding from humans and their pets appear to be the most important ways in which human activity impacts breeding success. The species exhibits high levels of both natal philopatry and adult site fidelity, suggesting limited connectivity between sub-populations. Despite the low potential for large-scale movements, long-term population viability analyses indicate a low risk of population extinction at a global or regional scale, even under unrealistically adverse conditions. Although improved reproductive success is likely to explain the global population increase, local increases in breeding numbers are largely a result of territory shrinkage in response to improved habitat quality, with a resultant influx of previously excluded, sexually mature birds. However, the long-term carrying capacity of breeding oystercatcher populations is determined almost entirely by resource availability, rather than competitor density. Overall, there has been a considerable improvement in the species' conservation status over the past two decades, partly as a result of improved coastal conservation measures and partly as a result of increased food supply. Given current trends it may well be possible in the near future to move the species' IUCN status from *Near-threatened* to *Least Concern*.

Based on our ongoing research, however, there are two important caveats to this seemingly 'happy' state of affairs. The first relates to the species' population history. Over the past decade, we have collected a large number of blood samples from throughout the species' southern African range. There were two main motivations for this: 1) to validate our predictions about limited gene flow between subpopulations, and 2) to determine whether the population has experienced one or more bottlenecks in the past. Molecular analyses undertaken in 2007 have identified a highly significant heterozygote excess, the most likely explanation for which is a severe and fairly recent bottleneck. The challenge now is to try to identify when this bottleneck occurred and hence what might have caused it. The second concern stems from an analysis of breeding performance carried out by Megan Laird, Phil Hockey and Mandy Ridley. The aim of this study was to use multi-variate analyses (Mixed Models) to try and determine which factors best explained inter-annual and inter-site variability in breeding performance. The analysis was based on more than 1000 pair-years of data from around the coast spanning a time period of almost 20 years. Despite the inclusion of numerous ecological parameters in the models, the two factors identified as best explaining variation in breeding success were predation pressure (not surprisingly) and average ambient temperature during the breeding season. In the case of the latter, breeding success was inversely related to temperature, i.e. success was lowest in the hottest summers, implying that this species (which is range-restricted and a habitat specialist) may be vulnerable to the effects of climate change.

We have discovered that the world population of Chestnut-Banded Plovers Charadrius pallidus *gathers in fewer than 10 sites in the austral winter. Photo: Peter Ryan.*

Conservation of other coastal birds

Collaboration between Namibian, South African, Botswanan and East African researchers has borne fruit in the form of a re-evaluation of the status of the enigmatic Chestnut-banded Plover *Charadrius pallidus* (published in *Bird Conservation*

International). This highly specialized species, which aggregates in fewer than 10 locations during the austral winter, qualifies as *Near-threatened*.

Long-term monitoring of a ubiquitous Benguela endemic, the Cape Cormorant *Phalacrocorax capensis*, also involves collaboration between Namibia and South Africa. Population and movement data over the past 50 years have been summarised in a recent paper in *Emu*. Fifty years ago, the world breeding population totalled *ca* 100 000 pairs: by the 1970s this had increased to *ca* 250 000 pairs. More recently, numbers have decreased to the levels of the 1950s, with the majority of this decrease occurring along the central Namibian coast. These changes mostly reflect changes in food abundance and distribution.

Another coastal bird study during 2007 targeted the ailing populations of Cape Gannets *Morus capensis* at Malgas Island on the west coast. These birds are specialist predators of pelagic shoaling fish, especially sardines and pilchards. In recent years, however, as stocks of these have decreased or moved eastwards, gannets have increasingly relied on discards from commercial trawlers, food of far poorer nutritional quality. These changes in diet have translated into reduced breeding success and shrinkage of the breeding colony. These ailing gannet populations have been the focus of Lorien Pichegru's PhD study (University of Strasbourg), but this year an additional study by Nicola Okes (CB MSc) was able for the first time to synchronise data on the gannet foraging distribution, diet, and chick growth and survival rates with data on pelagic fish standing stock biomass (from acoustic surveys), and both pelagic and demersal fishing effort and distribution. This will allow Nicola to a) develop an energetic model for the gannet population and assess the nature, degree and severity of their interactions with commercial fisheries, and b) determine whether additional conservation measures are warranted as a result.

Chaplin's Barbets

Lizanne Roxburgh began her postdoctoral fellowship in March 2005. The main objectives of her project were to determine the factors limiting the distribution of Chaplin's Barbet *Lybius chaplini*, a threatened barbet species endemic to a limited range within Zambia, and to determine whether habitat transformation is threatening this species. Surveys undertaken by Lizanne show that not only have Chaplin's Barbets disappeared from parts of their range, but their total population size has been over-estimated. Clearing of land for agriculture and urban development have reduced the extent of suitable habitat for the birds, while the removal of dead branches from trees, which are used as nesting sites, and recruitment failure by Sycamore Figs *Ficus sycamorus*, their main source of food, is leading to degradation of the remaining suitable habitat. Hunting of birds with bird lime and catapults is also widespread, and probably contributes to population decreases in areas adjacent to villages and towns. These surveys complement Lizanne's ongoing research on the ecology and cooperative breeding of barbets in the Nkanga River Conservation Area in Choma. Based on Lizanne's findings, Chaplin's Barbets have been upgraded from *Near-threatened* to *Vulnerable* in the 2008 IUCN Red List.

Fitztitute researchers have been studying the movements and breeding of Blue Cranes Anthropoides paradiseus *in Namibia, where the species is Critically Endangered. Photo: Peter Ryan.*

Blue Cranes

The close association of Rob Simmons with the Namibian Nature Foundation and the Namibian Crane Working Group has led to a study of the population dynamics of the isolated Blue Crane *Anthropoides paradiseus* population in Etosha National Park. The Blue Crane in Namibia is designated a *Critically Endangered* bird under IUCN criteria in the 2008 Namibian Red Data book that is now finished but awaits printing. Aerial and ground surveys have revealed that the population has remained stable at 60-70 birds over the past 10 years. In 2007 there was evidence of breeding inside the (predator-rich) Park but none of the birds outside the Park (in environments largely lacking natural predators) had bred. Former CB student Hannah Thomas found that, during the austral winter, many of the Etosha birds moved to Lake Oponono, an ephemeral water body north of Etosha. The cranes at Lake Oponono had a flight distance of about 1 km and it is highly likely that they are persecuted by gun-wielding herd boys. Namibian cranes are now being ringed on an increasingly frequent basis and some are being fitted with satellite transmitters to determine what proportion of the population moves outside the protection of Etosha National Park, and when and where these movements take place. This will assist in identifying likely threats that they face outside protected areas.

Southern Ground-Hornbills

This is a long-term study of Southern Ground-Hornbill *Bucorvus leadbeateri* breeding biology and social behaviour based at a consortium of private game reserves totalling *ca* 180 000 ha bordering the Kruger National Park. The field work is currently being undertaken by Quentin Hagens, under Phil

Hockey's supervision. Within the study area there are 29 ground-hornbill groups, totalling 103 birds. The average group size (3.55 birds) is the same as elsewhere in South Africa. Group density (1 group/6200 ha) is much higher than the national average (1 group/10 000 ha), but lower than the highest density recorded in southern Africa (1 group/2000 ha at Mana Pools, Zimbabwe). Thirty-three birds (32%) now carry unique colour-ring combinations, allowing us to identify 13 groups with certainty. An additional three birds carry radio transmitters. Since the study began, breeding success has been much higher than in the adjacent Kruger National Park, primarily because groups breed at higher frequency. Part of the reason for this may be the deployment of substantial numbers of artificial nest logs on the study site. The high breeding success is reflected in group demographics - at least 15 groups currently include juvenile and/or sub-adult birds. The habitat at the study site, mostly dense, bushy savanna, makes it difficult to follow birds on the ground (with lions, elephants and rhinos offering additional distractions!). For this reason, in early 2008 we plan to deploy solar-powered GPS transmitters on at least three birds to explore daily patterns of habitat use (which may explain the sizes of group home ranges) and roosting behaviour. However, we shall only do so once we are confident that problems previously experienced with the harness attachment of transmitters will not recur.

Aldabra Rails

Following the Institute's successful reintroduction of flightless Aldabra Rails to Picard Island, Aldabra Atoll, the population's growth has continued to be monitored, as have resightings of ringed birds. These additional data have allowed Ross Wanless and Phil Hockey to develop a model of the species' population dynamics and the potential consequences of an unintentional predator introduction to Malabar Island, which hosts the majority of the world population of this species. This model is important in that it takes into account the floater population (i.e. sexually mature birds that are prevented from breeding by established territory holders). Its applied value is that the model can predict the amount of time following predator introduction within which it would be necessary to implement conservation action. The model can also predict how many breeding pairs could be removed annually from Malabar Island for the purpose of other reintroduction programmes. The manuscript stemming from this is currently nearing completion.

Multi-species studies

In addition to single-species studies of threatened taxa, we have undertaken several multi-species studies with the aim of identifying existing threat or predicting future threat. Phil Hockey and Odette Curtis developed a simple model that appears robust in predicting the threat status of vertebrates, using birds and lemurs as examples: this study is currently under revision with *Conservation Biology*. Nicola Okes, in conjunction with Phil Hockey and Graeme Cumming, analysed range changes in southern African waterbirds and concluded that both range expansions and range contractions could be better predicted by ecological traits (such as habitat usage) than by life-history traits (published in *Conservation Biology*). Vanessa Stephen and Phil Hockey undertook an analysis of potential future threats to coastal bird populations stemming from an increasing frequency and intensity of Harmful Algal Blooms. This study was published in the *South African Journal of Science*.

Sarah Fox and Phil Hockey investigated the effects on bird community structure and function of replacing natural Strandveld vegetation with a 170 ha golf estate in which 46 ha of Strandveld vegetation was retained, in conditions ranging from pristine to moderately degraded. Species diversity, abundance and guild structure, and hence pathways of energy flow, were very different between the golf estate and an adjacent conservation area. The study highlighted the fact that biodiversity analyses and assessments based on species richness or species diversity alone can be misleading because they take no account of species representation and, more importantly, of ecological processes. The research was published in *South African Journal of Science*.

Using a similar research approach, Marisa Lipsey and Phil Hockey investigated whether grassland corridors in commercial forestry plantations in KwaZulu-Natal do indeed fulfil their intended conservation aims. Preliminary results clearly indicate that they do not. This study will allow us to make recommendations as to how conservation areas should be set aside in forestry areas in order to satisfy international conservation requirements attending the export of forestry products.

Staying with the theme of grassland bird conservation, Ian Little, supervised by Phil Hockey and John Donaldson (SANBI), started a study in late 2007 of bird reproductive success in the highland grasslands of Mpumalanga. This study will compare reproductive output across sites that vary in their management, specifically fire frequency and grazing pressure. It rests on the premise that reproductive success is a better measure of conservation status and value than is simple occurrence or density.

Highlights

- Doug Loewenthal obtained his PhD in December 2007, for his study on the population dynamics and conservation of the African Black Oystercatcher.
- Fitztitute research identified two species, Chestnut-banded Plover and Chaplin's Barbet, as requiring upgrading to higher risk status in the IUCN Red List. More gratifying is the fact that it should soon be possible to downgrade the threat status of the African Black Oystercatcher.
- Significant progress was made in developing methodologies to predict species' range changes in response to anthropogenic pressures, including climate change.

Students

Douglas Loewenthal (PhD, supervisor Phil Hockey, graduated

Dec 2007) *Population dynamics and conservation of the African Black Oystercatcher* Haematopus moquini.

Ian Little (PhD, supervisors Phil Hockey, John Donaldson [SANBI]) *Understanding and mitigating the impacts of land-use management strategies on grassland bird communities.*

Marisa Lipsey (CB MSc, supervisor Phil Hockey) *Assessing the value of grassland networks in commercial forests for the conservation of grassland birds.*

Nicola Okes (CB MSc, supervisors Phil Hockey, David Grémillet, Lorien Pichegru) *Fish and fisheries in the southern Benguela: is a management paradigm shift needed to conserve fish-eating birds?*

Megan Laird (Hons, supervisors Phil Hockey, Mandy Ridley, graduated Dec 2007) *Determinants of breeding success in the African Black Oystercatcher* Haematopus moquini: *is climate change a looming threat?*

Lectures

The team collectively gave many lectures to bird clubs, natural history societies, agricultural groups and other NGO's throughout the reporting period. Lizanne gave a public lecture on Chaplin's Barbet for the Zambian Ornithological Society in Lusaka, to increase awareness of this little-known species. She also gave a presentation on the impacts of fuelwood collection and farming on Chaplin's Barbet at the International Ornithological Congress in Hamburg in August.

Acknowledgements

Mondi Business Paper, Mondi-Shanduka, Ezemvelo-KZN Wildlife, Namibian MEAT, South African National Parks, CNRS.

Marisa Lipsey investigated the effectiveness of grassland corridors in forestry plantations for the conservation of grassland birds in the mist-belt grasslands of KwaZulu-Natal. The conclusion is that they don't work very well. Photo: Marisa Lipsey.

Assoc. Prof. Peter Ryan *is on the Editorial Board of Bird Conservation International and is a member of the IMAF Working Group of CCAMLR and the South Atlantic Island Plant Specialist Group, which is part of the IUCN Species Survival Commission. He is a Tristan da Cunha Conservation Officer and a member of the Tristan Biodiversity Advisory Group.*

Peter is the academic co-ordinator of the Conservation Biology MSc course. He was on sabbatical from May to December 2007, but still supervised six PhD and two MSc students, with three PhD and one MSc student completing their theses in the review period. During his sabbatical, he spent three months in New Zealand and more than two months at Tristan and Gough islands. Publications in 2007 include one book, ten scientific papers, two book chapters and seven popular articles. He gave several talks to bird clubs and other special interest groups. In addition to his editorial duties for Bird Conservation International, Peter reviewed 10 manuscripts for six scientific journals.

Assoc. Prof. Peter Ryan *is also the leader of the Seabird Research Programme, and together with* ***Prof. Tim Crowe****, leads the* ***Systematics & Biogeography Programme****.*

Island Conservation

Programme leader
Assoc. Prof. Peter Ryan

Research team
John Cooper (Avian Demography Unit, UCT)
Dr Rob Crawford (Marine and Coastal Management)
Dr Richard Cuthbert (Royal Society for the Protection of Birds, UK)
Dr Geoff Hilton (Royal Society for the Protection of Birds, UK)

Eugene Breytenbach removing Cotula australe *from a mixed stand with* Cotula moseleyi, *endemic to Nightingale Island. Photo: Peter Ryan.*

Overview
Oceanic islands – those that have never been connected to a continental landmass – are among the most sensitive of terrestrial ecosystems. Large surrounding stretches of open sea prevent many elements typical of continental biotas from colonising oceanic islands. The few terrestrial species that manage to reach the islands often evolve into endemic species, many of which lack appropriate defences against introduced predators, or are unable to cope with introduced competitors. Colonisation of these environments by man and his commensals has had catastrophic results – more than 90% of avian extinctions since 1600 have been of island forms. Even where species persist, they are often at greatly reduced population sizes, and are thus prone to extinction from chance events such as environmental variability and catastrophes. Land-bridge islands are less susceptible to disturbance, but off southern Africa all are small, and support large numbers of breeding seabirds, many of which are endemic to the region and globally threatened. Conservation of these breeding sites is thus of considerable importance. This programme dovetails with the Seabird Research Programme, but covers the broader issues of island conservation, including the control of alien organisms and conservation of land birds on islands.

Impacts and eradication of House Mice
Following the full-year study of House Mouse *Mus musculus* biology on Gough from Sept 2005 to Oct 2006, some follow-up work was conducted on Gough in 2007. Ross Wanless returned to the island in winter 2007, funded through a programme to

eradicate the invasive weed *Sagina procumbens* (Procumbent Pearlwort) from the island. In addition to working on the weed problem, Ross and assistant Martin Slabbert conducted a bait trial when the mice are at their lowest levels, and probably are most food stressed. This is the ideal time to conduct an eradication exercise. The aim of the bait trial was to check whether all mice in an area consumed bait. Accordingly, Ross and Martin hand-baited areas with dye-stained bait and then trapped in the core of the baited area. Virtually all mice were found to have consumed bait, and those that hadn't had almost certainly moved into the area after the first round of trapping. Ross also took the opportunity to mark out a sample of Atlantic Petrel *Pterodroma incerta* nests before their eggs hatched to estimate breeding success. Subsequent checks by volunteers from the weather station found that only one of 60 pairs managed to raise a chick.

Monitoring of Tristan Albatrosses *Diomedea dabbenena* also continued in 2007, with another complete incubator count in January and a count of large chicks in September. Once again, breeding success was poor (approximately 30%, less than half that expected for a great albatross). A major step forward this year was the setting up of a long-term study of marked albatrosses in Gonydale, where 120-140 pairs nest each year. Chicks have been banded in this area for more than 20 years, but the timing of the incubation period has prevented routine monitoring in this area until now. In January 2007 John Cooper led a *Sagina* control programme to the island, and also banded all breeding albatrosses. Subsequent checks of the marked nests in June and September showed relatively good breeding success in some areas of the valley, and very poor success in others. John is currently on Gough once again checking all breeding birds, which will provide the first estimate of the proportion of failed breeders that attempt to breed following the loss of a large chick.

Juvenile Gough Buntings Rowettia goughensis *have become scarce on Gough Island, probably as a result of predation of eggs and chicks by introduced mice. Photo: Peter Ryan.*

The most worrying finding in 2007 was a marked decrease in numbers of Gough Buntings *Rowettia goughensis*, probably as a result of mouse predation of eggs and chicks. Counts of buntings in areas surveyed in 1990 and 1991 found bunting numbers had decreased sharply, especially at the coast. Further evidence of the role of mice in this decrease was the abundance of buntings on Penguin Island, a vegetated, mouse-free stack 800 m off the coast of Gough. As a result of these observations, the Gough Bunting, Tristan Albatross and Atlantic Petrel have all been raised to *Critically Endangered* in the latest IUCN Redlist review.

Eugene Breytenbach cutting alien flax Phormium tenax *on the cliffs at Inaccessible Island. Photo: Peter Ryan.*

Eradication of other invasive species

Attempts to eradicate the invasive *Sagina procumbens* from Gough Island continued in 2007, with teams on the island during Dec-Feb 2006/07, June 2007, Sept 2007 and Dec-Feb 2007/08. This intensive regime has greatly reduced the numbers of seedlings emerging, and it is hoped that continued effort will see the plant entirely eradicated from Gough. Extensive searches adjacent to the infected area have not found any plants more than 200 m from the initial colonization site at the weather station.

Fortunately, follow-up can be more infrequent for the slow-maturing New Zealand Flax *Phormium tenax*. Initial clearing took place at Inaccessible in 2004 and Nightingale in 2005, and follow-up took place in Oct-Nov 2007. There had been considerable re-growth on Inaccessible Island, but few plants

had flowered, and almost all plants were removed during a 12-day visit. A longer than expected trip to Nightingale Island allowed a thorough search of this island for plants missed during the initial clearance, with 20 plants removed. The team also removed all *Cotula australe*, an introduced species that appears to be out-competing the endemic *Cotula moseleyi* along paths on the island. A photo guide and key to separate the two species was prepared for the Tristan website so that future visitors to Nightingale can also target this species. The Flax follow-up operations formed part of an OTEP-funded project that included a comprehensive survey of alien plants at the main Tristan islands with a view to identifying other potential problem species, and training the island community to recognize newly-arrived species. Niek Gremmen and his wife spent four months on Tristan during summer 2007/2008 working on this aspect of the project.

Ecotourism and environmental education at Tristan da Cunha

Tristan da Cunha and Gough Island are globally important sites for biodiversity conservation, thanks to large numbers of endemic species. The islands are an Endemic Bird Area and contain one of only two UK Natural World Heritage Sites. Tristan's Biodiversity Action Plan highlights the pressing need to diversify the island's economy, and identifies ecotourism as a key growth area. At the same time, one of the Action Plan's key objectives is to strengthen support for biodiversity conservation at Tristan. One way to attain both these goals is to promote awareness of the region and its biota. A photographic guide to the fauna and flora of the islands was published in 2007, funded by OTEP and the RSPB. One copy was supplied to each household on Tristan, and the remainder are being sold to tourists and other interested parties, with the proceeds going to Tristan's conservation fund.

Ross Wanless releasing a Gough Bunting that had been kept in captivity for two weeks to check the suitability of maintaining a captive population should a mouse eradication attempt occur on Gough Island. Photo: Peter Ryan.

Highlights

- Ross Wanless obtained a PhD for his work on the impacts of mice on Gough Island.
- A paper on mouse attacks on seabirds was published in the prestigious journal *Biology Letters*.
- The photographic field guide to the animals and plants of Tristan and Gough, edited by Peter Ryan, was published. The book has received critical acclaim, and copies were distributed to all households on Tristan.
- Follow-up work to remove invasive Flax *Phormium tenax* from the outer islands at Tristan da Cunha was completed.
- John Cooper set up a study colony of Tristan Albatrosses in Gonydale to obtain more robust data on the demographic impacts of mouse predation.
- Trials undertaken at Gough Island in winter to test the proportion of mice taking bait, as a precursor to a potential eradication attempt.
- An expert assessment concludes that an eradication attempt is technically feasible at Gough Island.

Students

Ross Wanless (PhD, supervisors Peter Ryan & Geoff Hilton) *The impacts of the introduced House Mouse on the seabirds of Gough Island* - completed Dec 2007.

Lectures, Workshops and Symposia

In March, Ross Wanless gave a talk at a meeting on rats on Islands in Honolulu, Hawaii, highlighting the potential problem posed by mice if rats are eradicated. Peter Ryan presented a seminar on seabirds and island conservation at the Department of Conservation head office in Wellington, New Zealand in May 2007. John Cooper was appointed conservation officer for the annual relief voyage to Gough Island in Sept-Oct 2007, which required briefing lectures to the new island team passengers and crew visiting the islands.

Visits and visitors

During his three-month visit to New Zealand, Peter Ryan was able to catch up with many of the latest developments in island conservation management. Like most oceanic islands, New Zealand faces severe conservation challenges, mainly from invasive species, and has come up with numerous innovative solutions to these problems. Of particular interest was the work being done on the eradication and control of introduced mammal predators.

John Parkes, LandCare (New Zealand), an expert in eradicating introduced mammals from islands, and Richard Cuthbert, RSPB, visited the Fitztitute in August to join the annual relief voyage to Gough Island.

Acknowledgements

I thank the UK Foreign and Commonwealth Office for the support of conservation work at Tristan da Cunha through the Overseas Territories Environmental Programme. Monitoring and research activities at the Prince Edward Islands are supported by the Department of Environmental Affairs and tourism, partly through grants to Dr Rob Crawford. We are grateful to the numerous people who together help conserve our fragile islands. The ongoing support of the Tristan community is especially important.

Assoc. Prof. Peter Ryan *also leads a programme on Island Conservation and, together with Prof. Tim Crowe, leads the Systematics & Biogeography Research Programme.*

Seabird Research

Programme leader
Assoc. Prof. Peter Ryan

Research team
Dr Sarah Converse (USGS Patuxent Wildlife Research Center, USA)
John Cooper (Animal Demography Unit, UCT)
Dr Rob Crawford (Marine and Coastal Management)
Dr Richard Cuthbert (Royal Society for the Protection of Birds, UK)
Dr David Grémillet (CNRS, France)
Dr Geoff Hilton (Royal Society for the Protection of Birds, UK)
Dr Akiko Kato (National Institute of Polar Research, Japan)
Dr Richard Phillips (British Antarctic Survey, Cambridge, UK)
Dr Yan Ropert-Coudert (CNRS, Strasbourg, France)
Prof. Les Underhill (Animal Demography Unit, UCT)
Dr Marienne de Villiers (Animal Demography Unit, UCT)
Barry Watkins (BirdLife South Africa)
Prof. Rory Wilson (University of Swansea, UK)

Overview
As a group, seabirds are among the most threatened birds in the world, with almost one third of all species included on the global red list. Seabirds also dominate the list of globally threatened species at a regional level in southern Africa. They are vulnerable to human activities both at sea and at their breeding sites. Consequently, the seabird research programme has a strong applied focus, assessing the magnitude of threats faced by various seabird species, and attempting to provide practical management solutions to mitigate against these threats. However, because many seabirds are easily observed and caught at their breeding colonies, they also provide excellent models for testing ecological and evolutionary theories. The programme thus includes several studies of a more academic nature. It forms the bulk of Peter Ryan's research activities, and overlaps to some extent with the island conservation programme.

Wandering Albatross Diomedea exulans *pairs that breed successfully do not suffer lower survival, as might be expected given the costs of reproduction. Photo: Peter Ryan.*

Individual variation in albatross reproduction
A study of individual variation in reproductive success among albatrosses commenced in 2006, taking advantage of the colonies of marked birds set up by John Cooper in

the 1980s. Albatrosses are classic examples of long-lived, monogamous birds, with delayed maturity and limited reproductive output (at most one chick per year). Like all birds, there is strong variation among individuals in terms of lifetime reproductive success. Two more years of fieldwork are planned at Marion Island, including both correlative and experimental approaches to tease apart the factors responsible for why some birds/pairs are consistently better at raising chicks than are others. The initial round of a cross-fostering experiment suggests that most failures among poor-performing birds occur before the chicks hatch, and that parental provisioning is less crucial. Genevieve Jones, the PhD student heading up the project, returned from Marion Island in May 2007, and will return to the island for another year's fieldwork in March 2008.

An Atlantic Yellow-nosed Albatross Thalassarche chlororhynchos *preens another bird on Nightingale Island. Divorce and mate swapping are fairly regular in this species. Photo: Peter Ryan.*

Demography of albatrosses

This project, closely allied to the preceding one, is using the latest multi-state maximum likelihood models to estimate demographic parameters for albatross populations studied at Marion and Gough Islands. MSc student Zach Vincent took an enforced leave of absence in 2007, but managed to spend some time working in collaboration with Hal Caswell and colleagues from Woods Hole Oceanographic Institution, USA. He has produced the first multi-state model for Wandering Albatrosses *Diomedea exulans* which simultaneously estimates the survival rate, likelihood of breeding and breeding success for adult albatrosses in four 'states': following successful or failed breeding attempts, following a year off after a successful breeding attempt, and following a year off after a failed breeding attempt. A similar model has been estimated by Sarah Converse for Grey-headed Albatrosses *Thalassarche chrysostoma* breeding at Marion Island, and is currently under review.

Multistate models cannot readily incorporate factors such as age, sex and experience on survival and breeding parameters. The influences of these factors on albatross demography are being inferred directly from our long-term breeding studies. Preliminary analysis of Wandering Albatross data from Marion Island confirms that young, inexperienced birds have reduced breeding success, but there is no evidence of a decrease in old birds. More surprisingly, Atlantic Yellow-nosed Albatrosses *Thalassarche chlororhynchos* show no increase in breeding success with either age or experience, which rather begs the question why many birds defer reproduction until they are more than 10 years old. A paper reporting the relatively high incidence of two-egg clutches among Atlantic Yellow-nosed Albatrosses was published in *Emu*. John Cooper also set up a new study colony of marked Tristan Albatrosses *Diomedea dabbenena* on Gough Island, which is important for estimating the impacts of mouse predation on chicks as well as fishery mortality of fully grown birds. The mouse-impact study is reported on more fully in the section on Island Conservation.

Foraging ecology of Cape Gannets and African Penguins

David Grémillet had a very productive sabbatical visit to the Fitztitute, producing numerous papers, including two on Cape Gannet foraging ecology in the *Journal of Applied Ecology* and the *Transactions of the Royal Society, London B*. PhD student Lorien Pichegru also had her first paper published in *Marine Ecology Progress Series*, contrasting the fortunes of gannets on the west and south coasts of South Africa. Lorien collected comparative data on foraging ranges of African Penguins to boost our sample to five colonies. These data are being used to help design sanctuaries around key breeding colonies, given ongoing decreases in penguin numbers and evidence of reduced adult survival. CB student Nicola Okes continued the monitoring of gannet foraging effort using GPS loggers at Malgas Island in October-November 2007. This is the sixth successive year that these data have been collected. They are also being used to assess the effects of changes in prey availability on a vulnerable seabird population, and to identify potential areas where fishing could be limited to reduce competition between birds and commercial fisheries.

An African Penguin Spheniscus demersus *struggles to swallow a gurnard. Penguins swallow most prey underwater. Photo: Peter Ryan.*

Foraging ranges of albatrosses

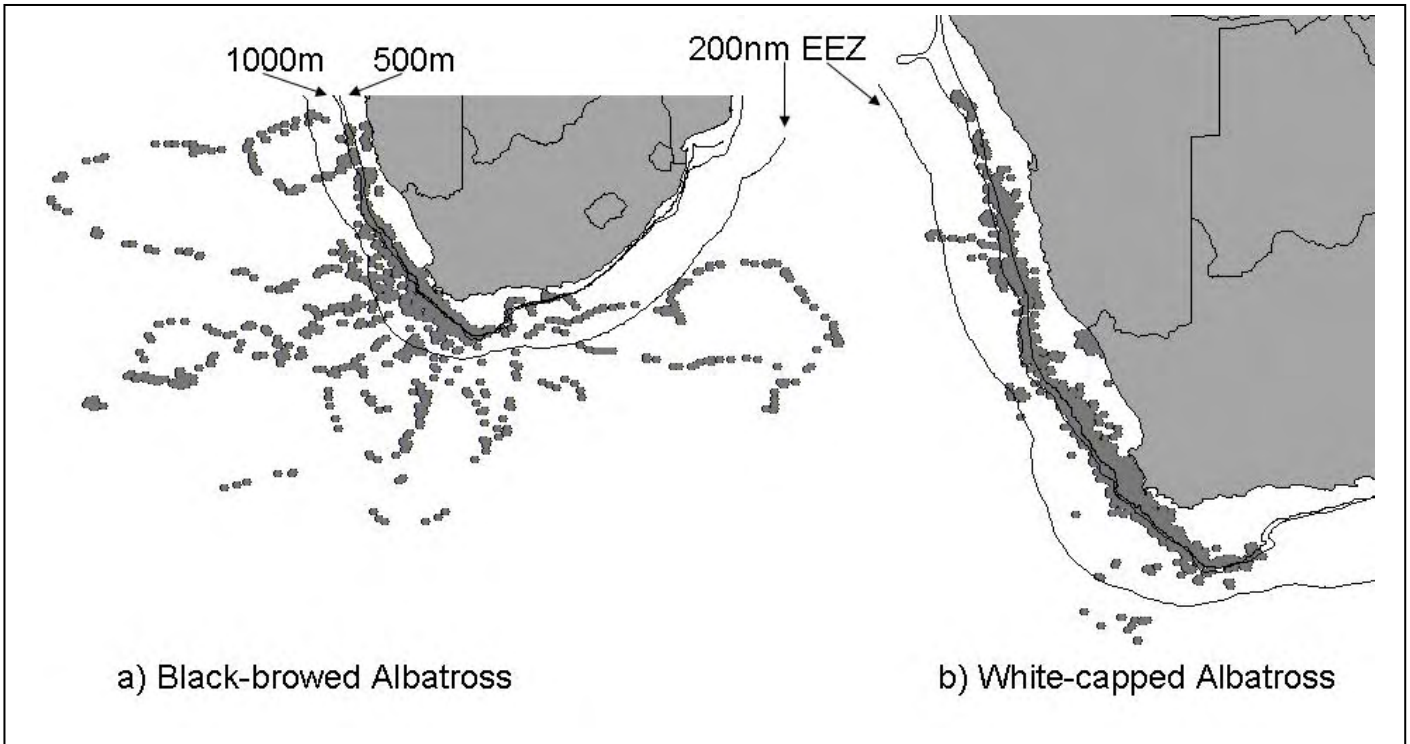
Progress has been slow on this project, largely due to bottlenecks in the processing of data from geolocation (GLS) loggers supplied by the British Antarctic Survey. Loggers have been recovered from five species of albatross, providing information on their year-round movements. In most cases these data augment foraging tracks of breeding albatrosses obtained with satellite tracking tags. It is planed to recruit a student to work on these data sets in 2008. More GLS loggers are currently being carried by Wandering Albatrosses from the long-term study colony at Marion Island to see whether there is a relationship between where the birds go, what they feed on (as indicated by stable isotope analysis of their feathers) and their condition when they return to the colony to breed. Genevieve Jones was fortunate to be allowed to field trial 'Daily Diary' loggers which were developed by Rory Wilson to reconstruct the activities of animals, on Wandering Albatrosses at Marion Island.

Incidental mortality of seabirds

Samantha Petersen is close to completing her PhD on the impacts of a suite of long-line fisheries on seabirds, turtles and sharks, testing mitigation measures to reduce bycatch, and attempting to understand the impediments to the implementation of mitigation measures. Sam has left BirdLife to head up the Responsible Fisheries Programme for WWF-SA, which works with fishers at sea to reduce the impacts of fisheries on non-target species, including seabirds. Barry Watkins has taken over BirdLife International's 'Albatross Task Force' team for southern Africa. This programme continues to monitor bycatch of seabirds killed in both long-line and trawl fisheries, and is working closely with the fisheries to ensure effective implementation of mitigation measures. Preliminary observations from the trawl fishery suggest that the bird-scaring or *tori* lines developed by Barry to reduce the numbers of birds being dragged under by warps have reduced seabird mortality by around 90%. Large numbers of fishery observers and compliance officials have been trained, resulting in a marked improvement in observer data quality. The bad news is that pelagic long-line vessels targeting tunas and swordfish continued to kill unacceptably large numbers of albatrosses and petrels in 2007, but from 1 January 2008 a cap will be placed on individual vessels, and after they have exceeded this number of birds killed, they will be required to stop fishing.

Other studies

PhD student Marta de Ponte has completed her fieldwork on the impacts of Great White Pelicans *Pelecanus onocrotalus* on breeding seabirds. She is currently working with A/Prof. Rauri Bowie to examine the genetic structure of southern Africa's pelican population, and will complete her thesis in 2008. MSc student Shannon Hampton handed in her thesis on the impacts of flipper bands on African Penguins. She found no significant effect on adult survival, but the tendency was for lower survival among banded birds, and statistical power was low due to the relatively short study period and small sample size. Banded penguins also made longer foraging trips, on average, than unbanded birds, again indicating a potential problem. Monitoring of the study continues, and the sample of marked birds has been increased. This question should be resolved before further banding of wild birds takes place. Finally, post-doc Greg Cunningham has submitted a paper suggesting that



Satellite tracks of the two most abundant albatrosses off South Africa show that White-capped Albatrosses remain tightly liked to commercial trawl grounds, whereas Black-browed Albatrosses range more widely into oceanic waters.

African Penguins *Spheniscus demersus* may use the scent of dimethyl sulphide, a pungent compound released by phytoplankton, to help locate their prey.

Marine debris and its impacts on seabirds

Although only indirectly linked to the rest of the programme, Peter Ryan retains an interest in marine litter dating back to his MSc on the impacts of plastic ingestion on seabirds. In 2007, he was invited to write a review paper on monitoring plastics in the environment (including the use of birds as monitors of plastics at sea) for a special issue on plastics in the environment for the *Transactions of the Royal Society, London*.

Highlights

- During 2007, six papers were published as well as three semi-popular articles and two reports to ACAP (the Agreement on the Conservation of Albatrosses and Petrels).
- An assessment of the bycatch of seabirds, turtles and sharks in the Benguela region was published.
- A change in the permit conditions for the pelagic long-line fishery puts a cap on bycatch of birds for each vessel (effective 1 January 2008).
- Studies continued into the foraging ecology of Cape Gannets and African Penguins off South Africa in relation to fishing activities.
- *Tori* lines designed for use in trawl fisheries reduce seabird mortality by around 90%.

Students

Marta de Ponte (PhD, supervisors Peter Ryan & Les Underhill) *Food supplementation, population growth and impacts of Great White Pelicans on breeding seabirds.*

Samantha Petersen (PhD, supervisors Peter Ryan, Les Underhill, Len Compagno & Ronel Nel) *Assessing and managing the impacts of long-line fishing on seabirds, turtles and sharks off southern Africa.*

Mareile Techow (PhD, supervisors Peter Ryan & Colleen O'Ryan, graduated June 2007) *Phylogeny and phylogeography of four Southern Ocean petrels*.

Ross Wanless (PhD, supervisors Peter Ryan & Geoff Hilton) *The impacts of the introduced House Mouse on the seabirds of Gough Island*– graduated Dec 2007.

Lorien Pichegru (PhD, Strasbourg, supervisors Peter Ryan & David Grémillet) *Foraging behaviour and chick growth of Cape Gannets.*

Shannon Hampton (MSc, supervisors Peter Ryan & Les Underhill) *The impacts of flipper bands on African Penguins.*

Zach Vincent (MSc, supervisor Peter Ryan) *Demography and individual variation in reproductive performance of Wandering Albatrosses at Marion Island.*

Lectures, Workshops and Symposia

Peter Ryan presented a seminar on seabirds and their conservation at the Department of Conservation head office in Wellington, New Zealand in May. Samantha Petersen presented a poster on tracking seabirds at the Society for Conservation Biology Conference in Port Elizabeth in July. She also attended the ICCAT Bycatch Working Group meeting in Madrid in February, the IOTC Bycatch Working Group meeting and Depredation Workshop in the Seychelles in July, the SEAFO (South East Atlantic Fisheries Organisation) meeting in Windhoek in October, the BCLME/BCC workshop in Swakopmund in November, as well as several fishery working group meetings in South Africa and Namibia. In July, Barry Watkins gave a talk on trawl impacts on seabirds at the Society for Conservation Biology Conference in Port Elizabeth. In October, Barry attended the BirdLife International Global Seabird Programme workshop in Melbourne and then went on to attend the CCAMLR meetings in Hobart, Tasmania. Both the BirdLife Seabird team and WWF's Responsible Fisheries Programme give regular lectures on seabird conservation to the public, and run training courses for skippers of fishing vessels, fishery observers and enforcement officials.

Visits and visitors

Following the visit by Ahmed Saeed to the Fitztitute in 2006, Peter Ryan visited Socotra in March-April 2007 to advise on seabird monitoring protocols at the archipelago. During a three-month visit to New Zealand from May to July, Peter was able to catch up with many of seabird biologists in New Zealand, and provide an overview of seabird conservation issues in southern Africa.

Long-standing collaborator Dr David Grémillet (CNRS, France) continued his sabbatical at the Fitztitute until June 2007. PhD student Lorien Pichegru was based at the Fitztitute until August, conducting additional fieldwork on Cape Gannets and African Penguins, then returned to France to complete her dissertation. Richard Cuthbert visited in Aug-Oct to accompany the seabird monitoring team to Gough Island.

Acknowledgements

Seabird research in the Southern Ocean is supported financially and logistically by the Directorate: Antarctica and Islands, Department of Environmental Affairs and Tourism. Bird research on Gough Island is co-funded by the Royal Society for the Protection of Birds, assisted in part through grants from the UK Overseas Territory Environment Programme. Studies on the foraging ecology of Cape Gannets were initiated as part of a collaborative NRF-French programme but are now supported by the CNRS and a grant from the European Union to David Grémillet. Studies of the impacts of long-line fishing are supported and funded by Marine and Coastal Management, the Benguela Current Large Marine Ecosystem Programme, WWF-SA, and the BirdLife partnership. The Charl van der Merwe Trust supported the study of the potential impacts of flipper bands on African Penguins. Colleagues both at the university and in the field are thanked for their assistance. This programme is a truly a collaborative effort.

Dr Andrew Jenkins

Is a research associate of the university and heads the Raptor Research programme with long-term studies of Peregrine Falcons and Black Harriers. He has co-supervised several students and invests much time in interpreting research results for the lay public.

Dr Rob Simmons

is a research associate of the PFIAO, co-founder of its Climate Change Programme and co-leader of its Raptor Research Programme. He combines evolutionary and population ecology with practical conservation issues such as rarity and persistence of small populations, and the responses of endemic, wetland and raptorial species to climate change. Rob also works on behavioural ecology issues such as the factors favouring siblicide and size dimorphism in birds of prey, and the evolution of secondary sexual characters. Rob reviews manuscripts for many journals, was NRF rated in 2006 and funded in 2007. During the review period, Rob supervised 2 CB masters students, co-supervised a masters-by-dissertation student and set up a BIOTA transect study of climate change in Namibia. He co-authored six papers, contributed three semi-popular articles and hopes the Namibian Red Data book, of which he is senior author, will be published in 2008.

Raptor Research

Program leaders
Dr Andrew Jenkins
Dr Rob Simmons

Research team
Mark Anderson (Northern Cape Department of Tourism, Environment & Conservation)
Dr Pat Benson (Wits University)
Andre Botha (Manager Birds of Prey Working Group EWT)
Odette Curtis (Overberg Conservancy Programme)
Ann Koeslag (resident Tokai, seconded to the research team)
Leo Legra (MSc student, University of Papua New Guinea)
Anthony van Zyl (PFIAO affiliate)
Zanne Macdonald (resident Northern Cape, seconded to the research team)
Adam Welz (MSc student, Botany Dept, UCT)
Lucia Rodrigues (resident south Peninsula, seconded to the research team)

Black Harriers Circus maurus *share a mid-flight reptile snack; their presence as breeders may be an indicator of high biodiversity value in remaining renosterveld patches in the Overberg. Photo: Rob Simmons.*

Overview

There are two basic core foci within the research programme on raptors. The first is the monitoring of populations of rarer species (e.g. Taita Falcons *Falco fasciinucha*) or those of conservation concern (e.g. Black Harriers *Circus maurus*, Cape Vultures *Gyps coprotheres*) to provide up-to-date research for effective management decisions. In these cases we liaise closely with regional and national conservation organizations to facilitate the transfer of results.

The second aim is to provide research results for species or populations that provide long term data on population ecology and dynamics (Peregrine Falcons *Falco peregrinus*, Black Sparrowhawks *Accipiter melanoleucus*), the effects of pesticides (e.g. African Fish-Eagles *Haliaeetus vocifer*), responses to climate and other systemic environmental changes (peregrines, sparrowhawks and vultures) or migratory species whose world populations visit the subregion (kestrels).

A new direction this year has been to look specifically at the effects of climate change on some of these species, particularly as raptors are good indicators of biodiversity, sensitive to changing food levels in the environment and to changing weather patterns. So for example, why peregrines are getting smaller, why migratory kestrels are arriving later in southern Africa, and how Papuan Harriers *Circus*

spilothorax can avoid annual grass fires have become key questions. The arrival of new breeding species in South Africa is a rare occurrence, so the appearance of mystery buzzards breeding in the Western Cape has caused quite a stir. A new programme will focus on these birds in 2008.

Monitoring of Black Harrier nests occurs throughout the Western and Northern Cape. Photo: Phoebe Barnard.

Black Harrier conservation

The Black Harrier is one of South Africa's rarest endemic birds numbering 1000-2000 birds. Found in the grasslands and fynbos of southern Africa, this species is classified as globally *Vulnerable*. The present study is in its 7th year and is investigating the breeding ecology and resource requirements of Black Harriers, with a view to improving management strategies to meet their conservation needs. There are three major components to this project:

(1) An overview of the life history of the species in different regions of South Africa. Results from 90 nests sites and over 250 nesting attempts indicate that in the Western Cape (i) smaller clutches and lower fledging success occur in inland sites such as mountains and Overberg habitats relative to coastal areas where mice are more numerous; (ii) breeding in the Northern and Eastern Cape is sporadic, occurring approximately two out of every three years; and (iii) polygyny occurs at a low level only in the mountains whose Reversed Size Dimorphism levels are relatively high.

(2) An investigation of the use of remnant patches of the Cape Floral Kingdom's most threatened habitat, renosterveld. Following on from Odette Curtis's MSc finding that Black Harriers only breed in renosterveld patches larger than 100 ha and radio-tracked males foraged only within natural habitat despite having agricultural and fallow lands available, we asked – are Black Harriers indicators of greater biodiversity value in the patches in which they breed?

(3) Julia Jenkins' CB masters project focused on assessing the density of small mammals, passerine birds and plant richness in those patches used by breeding harriers relative to controls of similar size that lack harriers. Results indicated (non-significant) trends showing passerine numbers were 3-fold higher in harrier-occupied patches and small mammal species diversity was also higher in these patches. Surprisingly, plant diversity showed no trends (possibly due to an inappropriate micro-sampling method). There is thus some evidence that harriers and other raptorial birds are rough indicators of high diversity of other taxa and this can be used by conservation managers to focus their conservation efforts.

In future studies, we hope to determine where Black Harriers spend the winter (in Namibia or Botswana) and examine possible links between this behaviour and the low population size of this species. This will be undertaken using tiny satellite transmitters weighing a mere 9.5 g each. Funds have already been raised for the tags and this project is a joint collaboration between Hawk Mountain (USA), Natural Research (UK) and the Institute.

Pippa Schultz puzzles over the slow flying speed of the vultures in Namibia's Waterberg! Photo: Rob Simmons.

Cape Vulture conservation in Namibia

An exciting project was undertaken by CB masters student Pippa Schultz, who combined satellite-tracking technology and experimentation to determine if foraging by the *Vulnerable* Cape Vulture is negatively affected by bush encroachment in its last Namibian stronghold.

Cape Vultures have almost disappeared from Namibia and a study of the use of habitat by Maria Diekmann, using satellite tags, was initiated in 2004 on six vultures. Pippa spent three months (i) following up previous satellite data to find old carcasses that had been eaten by vultures (hooves and skulls last a long time!) and the bush density in these areas, and (ii) experimentally providing carcasses in areas of varying bush

encroachment. Her results suggest (i) most naturally located carcasses were in open areas (e.g. game caught in fence lines) and none occurred at tree densities above 2600 trees/ha, and (ii) experimental provision of carcasses in areas varying from sparse to heavy bush encroachment indicated that vultures took longer to find carcasses in heavily encroached areas and never found them in areas with tree density above 2600 trees/ha. Unlocated carcasses pulled into the open from such areas were subsequently quickly exploited by vultures indicating the carcasses weren't simply an inappropriate food source. These impressive results demonstrate that the bush–thickened areas around the Waterberg, Namibia could reduce foraging efficiency of the vultures and be adding to the conservation problems for this very rare species.

One of the mystery (Red) buzzard Buteo sp. *juveniles photographed in Grabouw. Photo: Ann Koeslag.*

Mystery buzzards breeding in the Western Cape

Over the past few years there have been reports of buzzards breeding in the Western Cape that do not conform to the standard Forest Buzzard *Buteo trizonatus* phenotype which breed in our forests. These buzzards are either red or very dark brown in appearance and reports from Elgin suggest that they are replacing the typical Forest Buzzards in some areas. This raises the question of whether these "new" buzzards are driving the Forest Buzzards out, or hybridizing with them. More intriguing is the discovery that all dark buzzards are breeding successfully on rocky cliffs on Table Mountain, behaviour unheard of in Forest Buzzards. To determine why, Ann Koeslag and others sampled blood from chicks from four active nests in 2007 and tissues from two others was collected for DNA analysis. The typical Forest Buzzard male, paired with a deep red bird, was trapped and blood samples were also taken.

This project will undertake genetic analysis of the blood samples and a MSc student will be assigned to find and capture as many "Red" and Forest Buzzards as possible. Behaviour, morphology and DNA will be compared between these "Red Buzzards" and all other buzzards in southern Africa to determine their identity, phylogeny and geographic origin.

Papuan Harriers – the world's most elusive raptor?

To complete the phylogenetic tree of the genus *Circus* (the harriers), samples from two of the world's 16 species were still required. Unable to secure either museum specimens or recent tissue from researchers or museums in their countries of origin, Rob Simmons visited the tropical island of Papua New Guinea in May to hunt down the world's most elusive harrier. In that 3 week trip funded by Natural Research, Hawk Mountain and University of Heidelberg, both lowland and highland areas were searched in collaboration with local ornithologist Leo Legra. Many Papuan Harriers were seen moving through the few natural grasslands that occur but no nests were found in the highlands. Only when the lowlands were visited did we find nesting birds. Two of the first nests ever found were photographed, and more importantly, feather and DNA samples were secured from the chicks. These are now with Michael Wink in Germany where nuclear and mitochondrial DNA analyses will reveal their species status. Later this year we should learn where this large and elusive birds fits into the harrier phylogeny, and along with material recently secured from the Pied Harrier *Circus melanoleucos* of Mongolia, complete the entire *Circus* family tree.

First photograph of the egg and nestlings of the Papuan Harrier Circus spilothorax *discovered in May 2007. Photo: Rob Simmons.*

Booted Eagles breeding in Namibia

Analysis for the Namibian Red Data book brought to light another possible breeding record for Booted Eagles *Aquila pennatus* in the Brukkaros crater in southern Namibia. This would be only the second record for the rare southern African

subspecies *minisculus*. To investigate this, two trips to Namibia were undertaken in July and September and an apparent pair with young where found in the crater. The earlier breeding of this species in Namibia (July, compared with September in South Africa) may be explained by the earlier breeding of birds on which Booted Eagles feed. This occurs in May-July in Namibia, following the Namibian rains in late summer.

Breede River Fish-Eagle Project – looking for chemical connections

Research on the value of African Fish-Eagles as indicators of chemical pollution of freshwater systems continued this year, largely under the management of Adam Welz, and with significant input from Bill Bowerman of Clemson University, Michigan, USA and his colleagues in US Fish & Wildlife. The eagles on the Breede experienced a rather schizophrenic season, with some pairs breeding very early, some very late, and very few when we expected them to breed based on our observations in previous years. Nevertheless, we managed to locate a handful of new nests, and secure blood from nestlings at a decent sample of sites on the river, and more broadly across the Western Cape. These have been added to the growing body of material from this study. A sister study of Fish-Eagles breeding along the Vaal River has been conducted by Mark Anderson (Northern Cape Nature Conservation), and these samples also are awaiting analysis in the USA.

Rock Kestrels Falco rupicolus *have been monitored and ringed in the Cape peninsula for over a decade now and provide valuable long term data. Photo: Rob Simmons.*

In for the long haul – monitoring and marking raptors on the Cape Peninsula

Long-term banding studies of Peregrines, Rock Kestrels *Falco rupicolus* and Black Sparrowhawks on the Cape Peninsula were extended into 2007, with the project now nearing two decades of continuous population monitoring and over ten years of colour ringing. Black Sparrowhawk breeding continues to be monitored and the number of colour-marked pairs has been increased. One of the main findings from the Peregrine study is that birds are getting smaller and increase productivity with warm, fine spring weather. For the sparrowhawks, we demonstrated clearly that Egyptian Geese are the key negative influence on breeding success, aggressively usurping occupied nests and causing the hawks to desert.

Highlights

- In May, Rob visited Papua New Guinea to celebrate his half century and successfully chase down nests and tissue from the elusive Papuan Harrier.

Students

Julia Jenkins (CB MSc, supervisors Rob Simmons & Morné du Plessis) *Are Black Harriers indicators of renosterveld fragment quality? Conservation implications for a threatened species in a fragmented habitat.*

Pippa Schultz (CB MSc, supervisors Rob Simmons & Les Underhill) *An experimental and satellite-tagging study of the effect of bush-encroachment on foraging success of a threatened vulture in Namibia.*

Jamshed Chaudhry (CB MSc, supervisors Rob Simmons & Pat Benson) *The impact of climate change on Cape vulture* (Gyps coprotheres) *breeding at north vs. south facing cliffs of Manutsa, Kransberg and Potberg in South Africa*

Acknowledgments

The Black Harrier study is supported partially by the NRF. Assistance from numerous farmers and collaboration with Tilla Raimondo of CREW and Odette Curtis greatly facilitated Julia Jenkins' project. The study of the effects of climate change on Cape Vultures (Jamshed Chaudhry) has received excellent support from Pat Benson (Wits Univ) and Kevin Shaw (Cape Nature) who freely shared data and knowledge while showing Jamshed their vulture colonies. Previous work on Namibia's Cape Vultures was facilitated and supported by Maria Diekmann and John Mendelsohn. We also thank Anthony van Zyl (head: Migrating Kestrel project) for access to data and global interpretation of the results. The Papua New Guinea odyssey would not have happened without financial support from Natural Research (UK), Hawk Mountain (USA), and University of Heidelberg (Germany) and field support from Don Scott, John and Michael Simmons and particularly Leo Legra (University of Papua New Guinea). The Breede River Fish-Eagle Project is funded by Flight of the Fish Eagle Brandy, while the long-term demographic study of Peregrines on the Cape Peninsula is generously supported by Peregrine Properties. Several projects on raptors have been supported by a growing army of committed volunteers, chief among them Lucia Rodrigues, Zanne Macdonald and Ann Koeslag.

Prof. Graeme Cumming *is the Pola Pasvolsky Chair in Conservation Biology. Graeme currently leads two programs, 'Spatial parasitology and epidemiology' and 'Pattern-process linkages in landscape ecology'. During 2007, Graeme supervised six students at UCT (one honours student, one thesis MSc student, three CB MSc students, one PhD student) and a postdoc. Graeme published three peer-reviewed papers in international journals in 2007. He has another seven under review and three currently in press for 2008, as well as a co-edited book ('Complexity theory for a sustainable future', Columbia Press) that should appear in print in mid-2008. He taught the 4-week landscape ecology module on the CB MSc course and led an Honours "chatty" on sustainability. In 2007 he also served as external examiner for Walter Sisulu University; as an associate editor for two journals, Diversity and Distributions and the South African Journal of Wildlife Research; and as a member of the local organising committee for the next DIVERSITAS meeting (Cape Town, 2009). He reviewed 2 book chapters and 7 papers for 6 international journals, as well as two proposals for the NRF and one for the NSF (USA). Graeme presented a keynote address at a workshop organized by the Oxford University Centre for the Environment, gave a paper at the Society for Conservation Biology's annual meeting in Port Elizabeth, attended a Resilience Alliance science meeting in Corsica, and took part in a Wildfowl and Wetlands Trust course at Slimbridge, U.K. In 2007 he was a recipient of a UCT fellows' award, the Meiring Naude medal of the Royal Society of South Africa, and a B rating from the NRF. More importantly, his second child (Clara) was born on 18 September.*

Spatial Parasitology and Epidemiology

Programme Leader:
Prof. Graeme Cumming

Research Team:
Assoc. Prof. Phil Hockey (PFIAO)
Dr Celia Abolnik (Onderstepoort Veterinary Institute)
Dr Alex Caron (CIRAD)
Dr Leo Bruinzeel (Post-doc)

One of eight post-moulting Egyptian Geese Alopochen aegyptiaca *tagged with a satellite GPS transmitter at Strandfontein. The study will contrast movement patterns of 22 individuals, which are to be tagged in approximately equal numbers at Strandfontein, Barberspan, and Lake Manyame, Zimbabwe. Photo: Graeme Cumming.*

Overview

Pathogens have a high relevance for conservation, particularly in small protected areas, small or endangered populations, or localities in which anthropogenic influences are high. Conservation areas in Africa often occur in close proximity to agricultural systems, and in many countries, areas that have high conservation significance are also used for grazing by cattle, donkeys and goats. Many important pathogens of mammals and birds are carried by ectoparasites (such as ticks, fleas, tsetse flies and mosquitoes).

The community dynamics of most pathogens and parasites are dependent on both their host communities and on their immediate biophysical environment. The close proximity of wild animals, domestic animals and humans in Africa raises many interesting questions from both theoretical and applied perspectives. For example: does environmental modification (tree felling, heavy grazing, controlled burning, etc.) affect ectoparasite numbers or the prevalence of pathogens in avian populations? Do more diverse host communities harbour more diverse pathogen communities, and what would be the implications of this for the management of disease in wild populations? Are there thresholds in ectoparasite or pathogen abundance that dictate the likelihood of disease outbreaks occurring? Are there thresholds in host numbers that dictate the abundance of ectoparasites? And how would such thresholds be influenced by changes in stocking densities and the species composition of large mammals and birds?

It is only recently that ecologists have started to develop a food web and community ecology perspective on host-parasite-pathogen relationships, and even more recently that the field of veterinary conservation science has started to gain recognition. Within

this general area, we are working from a food web and community ecology perspective (but with links to other agendas and approaches) to understand the relationships between landscape heterogeneity, wetland dynamics, the movements of water birds, and avian influenza and malaria.

Mduduzi Ndlovu (Fitztitute) and Kim Labuschagne (National Zoo) collect a tracheal swab from a Kittlitz's Plover Charadrius pecuarius *at Barberspan, NW Province. Photo: Hannah Thomas.*

Water bird movements and avian influenza

The Institute, in partnership with the Onderstepoort Veterinary Institute and the Wildlife Conservation Society, is leading implementation of the southern African component of the USAID-funded GAINS initiative. The goal of the project is to undertake a regional study of the distributions and movements of ducks and the prevalence of avian influenza viruses in wild duck populations in five sites spread across South Africa (Strandfontein in the Cape and Barberspan in the Northern Province), Botswana (Makgadikgadi Pans and Lake Ngami), Mozambique (Lake Chuali) and Zimbabwe (Lake Chivero and Lake Manyame, near Harare). The primary aims of the project are twofold: first, to document the prevalence of influenza viruses (including but not limited to H5 strains) and malaria parasites in wild duck populations in southern Africa; and second, to obtain a better understanding of the regional movement patterns of wild water birds. Samples for influenza and malaria testing are being collected from ducks and waders at each site. These data are supplemented by standardized duck counts, measures of water quality and quantity, and a range of satellite image-derived measures of habitat type and quality. Twenty-two individuals of each of two species, Red-billed Teal *Anas erythrorhyncha* and Egyptian Geese *Alopochen aegyptiaca*, will be tracked in three focal locations from January 2008 using GPS telemetry; we are also undertaking a colour-ringing study on Egyptian Geese (see below) as part of Mduduzi Ndlovu's MSc research. The results of the study will contribute to a regional and global understanding of the potential role of wild birds in the epidemiology of avian influenzas, as well as shedding light on patterns of duck movements through the year and the causes of nomadism in duck populations in semi-arid areas.

Movement ecology of Egyptian Geese (Mduduzi Ndlovu)

Although there is an extensive literature about the biology of many Anatidae, little is known about the body condition dynamics, dispersal distances, movement patterns and moult biology of the Egyptian Goose. The Egyptian Goose is one of the most abundant and widespread ducks in southern Africa, has a wide habitat tolerance, and is increasing in numbers. However, studies focusing on its ecology are limited. The movements of wild ducks in South Africa are not well understood and ornithological programmes like SAFRING are currently unable to cast much light on the movement patterns of nomadic duck species. SAFRING data show that the dispersal distances travelled by Egyptian Goose range from just a few kilometres to over 1000 km in less than a year, but little is known about the proportion of the population that undertakes short- and long-distance dispersal and whether (and how) this phenomenon relates to physical environmental variation.

The lack of synchrony in life-history stages among Egyptian Geese across the region makes it difficult to understand the survival strategies of the species in response to environmental variation. Or is the lack of synchrony a survival strategy in itself? The objectives of this study are (1) to investigate how body condition, moult and population abundance of Egyptian Geese relate to annual environmental variations in photoperiod, rainfall and temperature; and (2), using satellite telemetry and colour rings, to determine the movement patterns and dispersal distances of Egyptian Geese banded at the study sites.

This research will attempt to unite behaviour, ecology, moult biology and movement into a broad overview of the responses of Egyptian Geese to environmental variation. In addition to its scientific interest, this information will also be essential for the development of epidemiological models of avian influenza transmission dynamics.

Helmeted Guineafowl parasites (Owen Davies)

Owen Davies (BSc Hons), supervised by Tim Crowe and Ray Jansen, examined levels of helminth worm parasitism of the gastro-intestinal tracts of Helmeted Guineafowl. He found that guineafowls carried heavy parasite loads, including six species of nematodes (round worms), five species of cestodes (flat worms) and a single species of acanthocephalan (thorny-headed worm). The intensity of parasite infection differed between males and females, and young guineafowl had nearly twice the level of infection of adults. Parasite infection was also lower among guineafowl occupying an agricultural landscape in comparison with those occupying a game reserve, possibly because of fewer intermediate hosts (e.g. insects) in the agricultural landscape.

Highlights

- A peer-reviewed paper was published in *Landscape Ecology* (Cumming 2007) on global biodiversity scenarios and landscape ecology. There are currently four related papers under review at different journals, so we are hoping for a bumper crop in 2008.
- Graeme is currently coordinating a special feature on 'Risk mapping for avian influenza' for the peer-reviewed journal *Ecology & Society*.
- The Fitztitute has been awarded a grant through WCS and USAID for research on water bird movements and avian influenza. The second year of support will total just under US$230,000.
- We have so far obtained samples for influenza and malaria testing from over 1600 birds at seven different locations in four countries.
- Over 40 different people have assisted in the field and been trained in ringing and sampling techniques.
- Hannah Thomas and Lindy MacGregor successfully completed their CB MSc degrees. Hannah presented her research on Red-billed Teal movements at the Society for Conservation Biology meeting in Port Elizabeth. Both projects have been written up for publication and are currently under review at *Ecological Applications*.
- Aphiwe Bewana successfully completed his Honours degree.

Students

Mduduzi Ndlovu (MSc, supervisor Graeme Cumming) *Understanding moult, condition, and the movements of Egyptian Geese in southern Africa.*

Lindy MacGregor (CB MSc, supervisors Graeme Cumming & Phil Hockey, graduated 2007) *Predicting the spread of avian influenza: the use of social network analysis to understand waterfowl interactions*

Hannah Thomas (CB MSc, supervisors Graeme Cumming & Phil Hockey, graduated 2007) *Understanding the movements of waterbirds in southern Africa: can long-term ornithological data collection programmes reveal the pattern?*

Aphiwe Bewana (BSc Hons, supervisor Graeme Cumming, graduated 2007) *Influence of water depth and chemistry on waterbirds at Strandfontein, Western Cape.*

Owen Davies (BSc Hons, supervisors Tim Crowe & Ray Jansen, graduated 2007) *Age and sex based variation in intestinal helminth infection of Helmeted Guineafowl* Numida meleagris*, with comments on the infection of Swainson's Spurfowl* Pternistis swainsonii *and Orange River Francolin* Scleroptila levaillantoides.

A Malachite Kingfisher Alcedo cristata *raises its crest in a threat display whilst awaiting examination for endoparasites. Photo: Graeme Cumming.*

Acknowledgements

This programme is currently funded by USAID through the Wildlife Conservation Society's GAINS program. We are also grateful to the many volunteers who have helped out in the field.

An early morning picture of flamingos at Strandfontein wastewater treatment works. Photo: Graeme Cumming.

Prof. Graeme Cumming
Is also the leader of the ***Spatial Parasitology and Epidemiology Programme****.*

Pattern-Process Linkages in Landscape Ecology

Programme Leader:
Prof. Graeme Cumming

Research Team:
Assoc. Prof. Jane Southworth (University of Florida)
Assoc. Prof. Grenville Barnes (University of Florida)
Assoc. Prof. Stephen Perz (University of Florida)
Prof. David Cumming (PFIAO and Tropical Resource Ecology Programme)

Zaccheus Mahlanga holds a measuring stick at the base of a large termitarium in Chizarira National Park, northern Zimbabwe. Photo: Glynis Humphrey.

Overview

The earth is currently entering an age that has been termed the anthropocene, when human influences dominate natural processes. Most individual anthropogenic impacts occur at relatively small scales, but the combined effects of many people making small-scale changes to ecosystems can cause large-scale changes. Humans and other organisms respond to landscape change across a range of scales. The central theme of this research programme is to unite fine-scale and broad-scale perspectives in landscape ecology through exploring the connections between landscape pattern and landscape process at multiple scales. We are also interested in the resilience of linked social-ecological systems and the ways in which management and landscape-level changes in ecosystems interact to determine social-ecological resilience to such events as climate change, disease outbreaks, and species loss.

This programme area is one in which both theoretical and practical development are of prime importance. We have identified several focal areas in which research into specific cases will provide more specific ways of developing the necessary theory and should provide insights of broader relevance. These currently include (1) the role of nutrient hotspots in the landscape, and their contribution to community composition and resilience; (2) the spatial relationships between functional and taxonomic diversity; and (3) the influence of connectivity and other spatially explicit variables on the resilience of linked social-ecological systems. This research will feed usefully into attempts to develop more effective, better-informed approaches to ecosystem management and biodiversity conservation.

Nutrient hotspots and community composition

This project is progressing well and received a substantial boost with the award of an NRF grant for SADCC collaborative research to David and Graeme Cumming. Michael Mills has started his PhD research on the influence of large termitaria on bird communities, focusing on the potential contribution made by termitaria to overall system resilience. Glynis Humphreys and Grant Joseph spent a month doing their CB project research at Chizarira and came back with plenty of stories and some interesting data sets describing the relationships between large termitaria and vegetation and bird communities respectively. Both projects are currently being written up. We envisage that a number of additional projects in Chizarira will be available for honours and coursework MSc students in 2008. Data on wetlands and their ecological influence on duck communities (to be collected through the water bird project described under the spatial parasitology and epidemiology programme) will also contribute to this project theme.

Spatial relationships between functional and taxonomic diversity

Matthew Child completed an honours project in 2006 that compared spatial patterns of functional and taxonomic diversity. The results, which are based on the Roberts' database and additional beak morphological measurements, indicate that taxonomic richness is not always a good surrogate for functional richness in South African bird communities. This research has been further added to by Graeme and Matt using an *a priori* classification scheme and is now close to submission for a special feature in *Philosophical Transactions of the Royal Society*. In the meantime, Matt is further extending the analysis for his CB MSc project by looking at functional and taxonomic differences in bird communities inside and outside protected areas.

Spatial influences on resilience

This project is currently being supported by an NSF grant that was awarded to Steve Perz, Grenville Barnes, Graeme Cumming and Jane Southworth. We are exploring the influence of the (currently under construction) trans-Amazon highway on the MAP (Madre de Dios, Accre, and Pando) area of the Amazon basin, where Bolivia, Brazil and Peru meet. MAP is an intriguing case study because it includes three areas with similar biophysical templates and vastly different institutions and political systems. We predict that resilience of Amazonian social-ecological systems will be greatest when their physical connectivity is intermediate, because the system receives new inputs from outside but is not overwhelmed by them. As connectivity changes with the construction of the Trans-Amazon highway, we are tracking changes in social systems, household economies and plant communities. These data will be integrated with time series of land cover change, initially using space for time substitutions, to test whether system resilience changes as connectivity changes. A conceptual framework for the project was published in *Ecosystems* in 2005 (Cumming et al., 2005). Much of the remotely sensed data for the project has now been processed, and Graeme is in the process of hiring a postdoc to help with work on the modelling component.

Highlights

- Four peer-reviewed papers were published or accepted for publication as part of this programme in 2007: in *Proceedings of the National Academy of Sciences* (Houlahan et al., 2007) on community dynamics; in *Landscape Ecology* (Spiesman & Cumming 2007) on spatial patterns in ant communities; in *Ecological Applications* (Daniels & Cumming, 2008) on predicting wetland loss from a landscape setting; and on quantifying spatial and temporal patterns in changes in land tenure (Cumming & Barnes, 2007).
- Matt Child received an award at the student conference at UCT for his presentation of his honours project.
- An edited volume titled '*Complexity theory for a sustainable future*' (Norberg & Cumming, Columbia Press) is due for publication in 2008.

Chizarira National Park is one of Zimbabwe's least accessible protected areas. Photo: Glynis Humphrey.

Students

Michael Mills (PhD, supervisor Graeme Cumming, David Cumming) *The influence of termitaria on biodiversity and ecosystem function: consequences for bird communities*.

Matt Child (CB MSc, supervisor Graeme Cumming) *Assessing the impact of agricultural transformation on avian taxonomic and functional richness.*

Glynis Humphrey (CB MSc, supervisor Graeme Cumming, David Cumming and Lindsay Gillson) *Large termitaria as indicators of species diversity and tree height structure in a modified* Brachystegia/Julbernadia *miombo woodland in Chizarira National Park, Zimbabwe.*

Grant Joseph (CB MSc) supervisors Graeme Cumming, D *Large termitaria provide refugia for cavity-using birds in a modified miombo woodland system.*

Acknowledgements:
We are grateful to Zimbabwe's Wildlife Management Authority for allowing us to work in Chizarira; to the NRF for funding research on termitaria through a SARC grant to Graeme and David Cumming; and to the NSF (USA) for supporting the MAP program.

Dr Jane Turpie

Is a part-time staff member of the Fitztitute. Her research and consulting interests incorporate resource economics, conservation planning and estuarine ecology. She teaches the Resource Economics module of the Conservation Biology MSc course and applied ecology at second-year level. Jane is on the editorial board of the African Journal of Marine Science and associate editor of the South African Journal of Wildlife Research. She sits on the steering committees of Water Research Commission projects concerning estuarine ecology, management and economic evaluation. During the review period Jane supervised two PhD and four MSc students in environmental economics. Jane was on sabbatical for six months during 2007.

Environmental and Resource Economics, Water Resources and Estuarine Ecology and Conservation

Project leader
Dr Jane Turpie

Overview

This programme is multidisciplinary, integrating ecological, social and economic research in order to inform policy and decision making relating to the conservation of biodiversity and socio-economic development. The programme has particular emphasis on water and aquatic ecosystems. Projects during the review period included an ecological study of the avifauna of intermittently open estuaries, the integration of economics into conservation planning, and wetland valuation, including an ecological model and economic valuation study of the East Kleinemonde estuary.

A Tanzanian fisher is questioned about his household's use of aquatic resources in the Pangani River Basin. This information forms part of an integrated river management decision tool that is being developed to help with water allocation in the basin. Photo: Jane Turpie.

Integrating economics into conservation planning

The aim of this study was to identify a set of no-take protected areas for 149 temperate South African estuaries taking economic trade-offs into account. Larger estuaries were divided into two planning units to allow partial protection. Targets were defined for habitats, bird and fish populations based on levels of estuarine dependence and overall rarity. Management costs were estimated on the basis of estuary size. Opportunity costs were considered in terms of the cost of withholding water for alternative uses, because more water would have to be reserved for estuaries with protected status. Future changes in the subsistence, recreational, nursery and existence values of each estuary were estimated for full protection, partial protection and no-protection scenarios. Using stakeholder input, reserve selection algorithms were run using (A) an 'efficiency set', in which only unfeasible options were excluded and existing protected areas included, and (B) a 'consensus set', which forced the inclusion of voted estuaries. Using a minimum set approach, 50-60 planning units would be required to meet targets. This increases to 63-70 units when the object is to minimise management and opportunity costs. If changes in estuary values are taken into account, then the optimum set is 122-124 planning units, far more than required to meet targets. Because the benefits of partial protection outweighed the management and opportunity costs in many cases, a much greater level of protection of estuaries is desirable from a socio-economic perspective than would be necessary just to meet biodiversity conservation targets. The outcome supports a zonation strategy for estuary conservation.

Integrating socio-economics and ecology in determining environmental flows

One of the key challenges in resource economics is estimating the changes in values of aquatic ecosystems as a result of changes in environmental flows, and then integrating these findings into the decision-making process. The ecological methods for determining environmental flows have been established and tested, but relatively few studies have taken socio-economic implications into consideration. Following primary research, a tool was developed for assessing the socio-economic implications of alternative water allocation scenarios for aid in the decision-making process for the Pangani River Basin in Tanzania.

The benefits of conserving estuaries such as the Mpekweni in the Eastern Cape include recreational value and nursery value particularly for Kob and Steenbras fisheries. These benefits have to be weighed up against the opportunity cost of supplying them with sufficient water to perform these functions. Photo: Jane Turpie.

Economic analysis of the East Kleinemonde estuary

The CB class Resource Economics project investigated how the value of the East Kleinemonde estuary would vary under different management scenarios. The study involved a survey of 137 households, as well as key informants. The Kleinemonde estuary was estimated to contribute at least R3.4 million and R1.75 million per annum to the real estate and trade sectors, respectively. This is a relatively small proportion of the use value of the area, largely because of the high value associated with the surrounding unspoilt beaches. The value of the estuary is threatened by water use and future development in the area. The Conjoint Valuation method was used to estimate changes in value as a result of future changes in the estuary and surrounds. In the worst case scenario, expenditure by visiting users on goods and services in the local area could be expected to drop by 39%, or some R2.8 million per year. The Contingent Valuation method was used to estimate the existence value of the estuary's biodiversity, which includes the endangered River Pipefish *Sygnathus watermeyeri*, but this proved difficult because people were dissatisfied with the Ndlambe municipality and this affected their willingness to pay. Estimates ranged from R1-30 million. The study also included an analysis of the feasibility of reducing impacts on the estuary by instituting water-saving measures in local households.

Valuation of the ecosystem services of wetlands

This project falls under the Wetland Health and Integrity project being conducted for the Water Research Commission of South Africa. Katy Lannas is focusing her MSc work on the provisioning services offered by wetlands in terms of the natural resources they provide to surrounding communities. Its primary aim is to devise a way to assess the relative dependency of communities on wetland areas. Two case studies were conducted, contrasting a remote, rural wetland called Letseng-la-Letsie in Lesotho with semi-urban wetlands in the Mfuleni township in Cape Town. In both cases it was found that the predominant use of wetlands was for grazing livestock. Around Letseng-la-Letsie the average annual economic value added to households from livestock was R25 488, whilst in Mfuleni this was approximately R44 788. In both areas a small amount of hunting was reported and in Mfuleni some food gardening was carried out on the wetland. The study is now contrasting the provisioning services provided by these wetlands to the surrounding communities with other wetlands in South Africa. Key indicators of dependency will be highlighted and a rapid measure of the value of wetlands will be developed. Meanwhile, work has also begun on quantifying the regulating and cultural services provided by wetlands.

Conference presentations

- "Integrating socio-economics and ecology in determining environmental flows" presented at the 10th International River Symposium and Environmental Flows Conference, Brisbane, Australia, September 2007.
- "Dependency of communities on wetland resources in South Africa" presented at the Academia Engelberg Dialogue on Science Conference, Switzerland which was focusing on the topic "Water: a public or private good", October 2007.
- "Valuing wetland provisioning services" presented at the Wetlands Indaba, Johannesburg, October 2007.

Students

Hugo van Zyl (PhD, supervisors Jane Turpie & Tony Leiman, School of Economics, UCT, graduated Dec 2007) *The use of property value approaches to value urban aquatic environments: case studies and their management implications for Cape Town.*

Peter Ngoma (PhD, supervisor Jane Turpie) *Valuation of inland fisheries in the Zambezi Basin: The case of Lower Shire and Kafue floodplain fisheries.*

Anja Teroerde (MSc, supervisor Jane Turpie) *The influence of mouth dynamics on the avifauna of intermittently open estuaries.*

Katy Lannas (MSc, supervisor Jane Turpie) *Determining the socio-economic value of wetlands and devising an evaluation metric for South Africa*

Helen Gordon (CB MSc, supervisor Jane Turpie, graduated June 2007) *The relationship between rural income and natural resource use: implications for the development of the Kavango-Zambezi transfrontier conservation area.*

Climate Change Vulnerability and Adaptation

Programme leaders
Dr Rob Simmons
Dr Phoebe Barnard (Birds & Environmental Change Partnership, SANBI)

Research team:
Dr Res Altwegg (Animal Demography Unit; SANBI)
Mark Anderson (N. Cape Department of Tourism, Environment & Conservation)
Dr Pat Benson (Wits University)
Dr Niels Blaum (BIOTA, University Potsdam, Germany)
Bernard Coetzee (Stellenbosch University; SANBI),
Dr Richard Dean (Research Associate)
Dr Barend Erasmus (Wits University)
Prof. Phil Hockey (PFIAO)
Prof. Brian Huntley (Durham University, UK)
Dr Guy Midgley (Global Change & Biodiversity Programme, SANBI),
Thabiso Mokotjomela (Stellenbosch University; SANBI)
Dr Jeff Price (California State University at Chico, USA)
Dr Terry Root (Stanford University, USA),
Dr Colleen Seymour (SANBI)
Dr Clelia Sirami (Global Change & Biodiversity Programme, SANBI)
Prof. Les Underhill (Animal Demography Unit)

Overview
There are few greater challenges facing biodiversity today than that posed by anthropogenic climate change. Africa is widely accepted to be the continent most vulnerable to climate change, and least equipped to adapt to it Climate change impacts on southern African biodiversity are expected to be equally significant given the high levels of endemism found here. Climatic impacts are increasingly understood to be exacerbated by other global change drivers, such as land use change, biotic invasion and desertification. The magnitude and pace of these problems demands a concerted research response, coupled to tools for conservation planners, policy makers and habitat managers.

Together with SANBI's Birds and Environmental Change Partnership, based at Kirstenbosch, in 2005/06 the Institute established a programme focusing on the vulnerability of bird species to climate change, and other drivers of environmental change. Research work is done jointly by the Institute, the Animal Demography Unit, UCT, and SANBI, with international partners. The policy and planning translation is undertaken mainly by SANBI with partners' inputs.

Key themes and questions
It is critical that conservation management responses to climate change are focused, well-informed by solid research, achievable and cost-efficient. Our approach therefore relies on a hierarchy of questions, from basic to applied.

Which species are most vulnerable, and why?
Which ecological, behavioural and life-history traits influence birds' vulnerability to range changes? Our initial analysis of six species predicted an average 40% range loss, but only one species, Blue Swallow *Hirundo atrocaerulea*, is currently on South Africa's Red Data List. Drs Wilfried Thuiller and Res Altwegg are developing advanced bioclimatic envelope and demographic modeling techniques, which we will combine in more sensitive analyses. Using a comparison of present and past distribution patterns, Prof. Phil Hockey, Dr Mandy Ridley and CB student Hassan Babiker are analyzing which ecological traits might pre-dispose southern African birds to respond rapidly to climatic change.

Dr Rob Simmons
Is also co-leader of the ***Raptor Research Programme.***

Dr Phoebe Barnard
coordinates the national Birds and Environmental Change Partnership at the South African National Biodiversity Institute (SANBI) and co-founded the joint SANBI-UCT programme on Climate Change and Birds. Phoebe is on the editorial board of Biology Letters, Animal Conservation and African Journal of Ecology, is active in the Society for Conservation Biology, and mentors young scientists nationally and across Africa. Formally she supervises three PhD students, collaborates with two post docs and oversees the work of SANBI's summer interns in the Birds and Environmental Change Partnership. Her interests include applying insights from behavioural, population and evolutionary ecology to conservation biology, and how species will cope with global change challenges in real-world, fragmented landscapes.

How do differences in vulnerability affect populations?
Large-scale range shifts on their own are an incomplete way of understanding impacts. We need to establish how populations are affected in detail – which individuals or age classes suffer most and why; how breeding, migration and feeding are affected; and whether normal activities carry increased costs (e.g. energetics) and risks (e.g. predation) for individuals as the climate changes. This work is constrained by the availability of long-term data, but collaborative manuscripts are emerging.

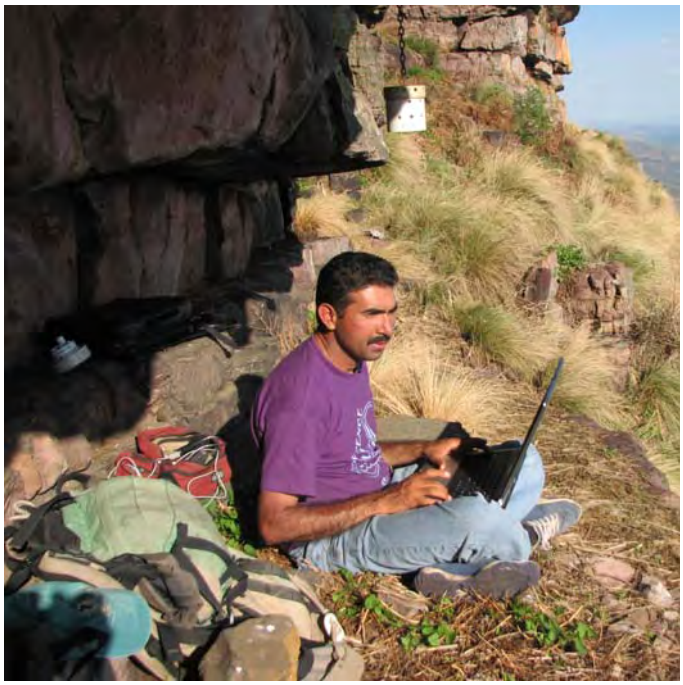
Using current climates to predict future changes to species assemblages

In 2007 a new initiative began in collaboration with the German-funded BIOTA programme to assess bird species richness across one of the steepest rainfall gradients in Africa. Five study sites from East (415 mm) to West (115 mm) in central Namibia were surveyed for birds in three habitat types – open grassland, bush thicket and riverine. Preliminary findings suggest that bird species richness and diversity in two of the habitats (open and bush thicket) decreased as expected with decreasing rainfall. Under a drier climate in Namibia within these habitats we might therefore expect a decrease in avian diversity. However, the importance of rivers (or attributes of them) was apparent in the data for riverne birds across the same gradient – both species richness and diversity increased as the environment became drier. The implications of this will be explored in 2008.

How can conservation planning, policy and management respond to these challenges?
Finally, in work led by SANBI, the results of climate change research will be increasingly fed into the science-policy interface through, for example, uptake of data in State of the Environment (SoE) reports. Although this component is still in its infancy, long-term datasets and large-scale projects (such as the 2nd Southern African Bird Atlas Project and its successors) which can inform public policy are being secured financially by SANBI. The goal is to track southern Africa's bird species over time and space and provide baselines and snapshots of environmental change. Such work is urgently needed to shape and strengthen appropriate conservation strategies for the future.

Vultures and climate change

The plight of the continent's vultures continues to be a litany of bad news. More birds poisoned, populations decreasing, and species retracting into their core areas, despite innovative re-introduction and education programmes. The traditional focus on poisons, reduced food resources and persecution as agents of decline may have clouded our perceptions of a larger "elephant in the room". In a provocative paper, Rob Simmons and Andrew Jenkins suggested that all trends that we see for declining Cape *Gyps coprotheres* and Bearded Vultures *Gyps barbatus* are consistent with climatic warming factors. Whereas the retraction of Cape and Bearded Vultures into the highlands of Lesotho has been ascribed to poisons and human disturbance in lowland areas, it is also consistent with climate change pushing temperature-sensitive species into cooler upland areas. The two northern-most colonies of Cape Vultures (and equatorial Bearded Vultures) have gone extinct as predicted under climate warming scenarios – in spite of a long-term feeding and education programme. Few Cape Vulture colonies are found on the hotter north-facing cliffs and CB Masters student Jamshed Chaudhry is comparing the one known north-facing colony with others. Jamshed visited two active colonies in northern South Africa, one south (Kransberg), and one north-facing (Manutsa), and compared behaviours of chicks and parents there with the southern-most colony, Potberg. With long-term breeding success data provided by Dr Pat Benson (Wits University) from the northern colonies and Kevin Shaw (Cape Nature) from Potberg, Jamshed is currently looking at breeding success in relation to annual temperature extremes.



Jamshed Chaudhry perched above the Kransberg vulture colony collecting data on vulture behaviour for his MSc CB project. Photo: Pat Benson.

Highlights

- 2 articles and 1 review were published in the second year of this programme.
- Rob Simmons cemented links with BIOTA in Namibia.
- Presentations were made at the international Society for Conservation Biology meeting at Port Elizabeth.

Students

Jamshed Chaudhry (CB MSc, supervisors Rob Simmons, Pat Benson & Peter Ryan) *Are Cape Vultures* (Gyps coprotheres) *feeling the heat? Behavioural differences at north- and south-facing colonies in South Africa*.

External/Contractual lecturers

Dr Rauri Bowie *(Museum of Vertebrate Zoology, UC Berkeley)*

Prof. John Hoffmann *(Zoology Department, UCT)*

Rainer Krug *(University of Stellenbosch)*

Prof. Sue Milton *(University of Stellenbosch)*

Prof. Norman Myers *(Oxford University)*

Prof. Dave Richardson *(University of Stellenbosch)*

Dr Tony Starfield *(University of Minnesota)*

Prof. Christian Wissel *(University of Leipzig)*

Conservation Biology Masters Programme

Course co-ordinators
Assoc. Prof. Peter Ryan
Prof. Tim Crowe

In Orangekloof during the Community Ecology module: Prof. Jeremy Midgley explains to the class how fire determines the dynamics of fynbos and forest and the interaction between them. Photo: Tessa Hempson.

The 15th cohort of Conservation Biology students completed their projects early in 2007, with 13 of the 14 students graduating in June 2007, and the final student graduating in December 2007. Seven students obtained their degrees with distinction: Helen Gordon, Helen Hill, Lindy Macgregor, Mwema Musangu, Lisa Nupen, Philippa Schultz, Hannah Thomas. The 16th cohort started in January 2007, comprising 12 students from four countries, including our first students from Sudan (Hassan Babiker) and Pakistan (Jamshed Chaudhry). All 14 survived the coursework component of the programme, and are currently completing their individual research projects.

Following the two-day planning workshop held near Stellenbosch in March 2007, the structure of the CB coursework component has been modified in 2008 to ensure that the course remains among the leading intensive post-graduate conservation programmes in the world. With Peter Ryan on sabbatical from May 2007, this process was led by Graeme Cumming, the Pasvolsky Chair of Conservation Biology, who from 2008 will replace Tim Crowe as the formal co-ordinator of the programme. Novel modules in the revised curriculum include Philosophy of Science and Conservation (to be led by David Cumming), Conservation of Aquatic Ecosystems (Jackie King and Colin Attwood), Complex Systems Concepts (Graeme Cumming) and Societies and Natural Resources (Sheona Shackleton, Rhodes, and Michael Schoon, Indiana). The modules have been put in a more logical sequence, and there will be a two-week synthesis and review at the end of the course. The restructuring sees the departure of two long-standing contributors, Tony Starfield and Christian Wissel. Both have been involved in the evolution of the course from its early, fledgling years, leading modules that consistently have been ranked among the most valuable and best taught by the students on the course. We will greatly miss their wisdom and experience.

We are extremely grateful to the many people who contribute to the ongoing success of the programme. Foremost among these are the module leaders, many of whom are based outside the Fitztitute: John Hoffmann, Rainer Krug, Sue Milton, Norman Myers, Dave Richardson, Tony Starfield, and Christian Wissel. Former CB

student Rauri Bowie stepped in to teach conservation genetics to fill the void left by the departure of Colleen O'Ryan. We were indeed fortunate that he could find time in his busy schedule, given his recent appointment at UC Berkeley. Many other people contribute through guest lectures or practicals. The programme also couldn't run without the sterling support of the Fitz and Zoology support staff, especially Meg Ledeboer who handles a plethora of queries from potential students, and Hilary Buchanan who administers the project examination process as well as handling numerous administrative and domestic arrangements for the newly arrived foreign students.

Phil Hockey explains how forces structuring marine communities differ from those operating on land. Photo: Gareth Mann.

Conservation Biology projects: 2007/08

Chaudhry, Jamshed: *Are Cape Vultures* (Gyps coprotheres) *feeling the heat? Behavioural differences at north and south facing colonies in South Africa*. Supervisors: R. Simmons, P. Benson, P. Ryan.

Child, Matthew: *Assessing the impact of agricultural transformation on avian taxonomic and functional richness.* Supervisor: G. Cumming.

Babiker, Hassan: *Is climate change changing the distributions of southern Africa's birds?* Supervisors: P. Hockey, A. Ridley.

Hempson, Tessa: *Impacts of dynamite fishing on coral reef communities in the Tanga region, Tanzania.* Supervisor: C. Griffiths.

Humphrey, Glynis: *Large termitaria as indicators of species diversity and tree height structure in a modified* Brachystegia/Julbernadia *miombo woodland in Chizarira National Park, Zimbabwe*. Supervisors: G. Cumming, D. Cumming, L. Gillson.

Joseph, Grant: *Large termitaria provide refugia for cavity-using birds in a modified miombo woodland system.* Supervisors: G. Cumming, D. Cumming.

la Grange, Reda: *Avian phylogenetic diversity within southern Africa: A case study using the Phasianidae (francolins and spurfowl), Motacillidae (Pipits, Wagtails and Longclaws) Alaudidae (Larks) and the genus* Monticola *(Rock-Thrushes)*. Supervisors: T. Crowe, T. Hedderson.

Lipsey, Marisa: *The* value *of open area networks in commercial forests for grassland bird conservation in Kwazulu-Natal, South Africa.* Supervisor: P. Hockey.

Marisa Lipsey keeps an eye on Hassan Babiker measuring Mimetes *plants on a field trip during Peter Ryan's module. Photo: Peter Ryan.*

Mann, Gareth: *Getting SMART about baboons: applying multi - criteria decision analysis to baboon management in the Cape Peninsula, South Africa.* Supervisors: A. Jarre, J. O'Riain.

Okes, Nicola: *Fish and fisheries in the Southern Benguela: is a management paradigm shift needed to conserve fish-eating birds?* Supervisors: P. Hockey, D. Gremillét, L. Pichegru.

Puttick, James: *Land degradation of municipal commonage: Can they provide sustainably for the lives of the urban poor?* Supervisors: M.T. Hoffman, J. Gambiza.

Wistebaar, Thuli: *Mapping habitat degradation at the landscape scale using remote sensing and expert knowledge in Bushmanland, South Africa.* Supervisors: T. Hoffman, P. Desmet.

Relaxing after a hard day in the field! Photo: Reda la Grange.

Librarian
Margaret Sandwith

Intern
Nomonde Sotashe

Contract Staff
Nomgcobo Ntsham
Phelisa Hans

Volunteer
Sally Dalgliesh


Nomonde Sotashe


Nomgcobo Ntsham


Phelisa Hans


Sally Dalgliesh

Niven Library

Overview

A generous offer from Africa Geographic has enabled the Institute to resurrect many of the previous BirdLife SA exchange journals which were cancelled during 2007.

The library internship was completed in October 2007 with the successful development of an online database on all aspects of fynbos ecology in South Africa. An interactive CD was produced under the joint aegis of CAPE and the PFIAO.

The shortage of space in the Niven Library remains an urgent problem with no short-term solution in sight. Library maintenance became an issue during the wet 2007 winter.

Staff and staff development

Nomonde Sotashe's internship project, funded by the capacity-building programme of the Table Mountain Fund through WWF-SA, was completed in October 2007. This internship culminated with the production of an interactive CD entitled Fynbos i-forum, which is in effect a third edition of the Bibliography of Fynbos Ecology, 2nd ed. produced in 1989 by the South African National Scientific Programme. The project also produced an online searchable database on fynbos ecology. The Succulent Karoo Ecosystem Programme approached the Niven Librarian to compile a similar online database and searchable CD to support research in this ecosystem. Funds have been made available by the Critical Ecosystem Partnership Fund through the Botanical Society of South Africa. Nomonde stepped in to develop this project and to continue to assist with the running of the Niven Library.

Nomgcobo Ntsham worked as a volunteer in the Niven Library during 2004 and 2005 while she was completing her UWC B.Bibl. degree. She went on to work as a contract librarian at the Harry Molteno Library at SANBI for a couple of years and towards the end of 2007 was the successful candidate in a permanent librarian post at the Observatory Library.

Phelisa Hans was originally employed in the Niven Library by NISC to photocopy abstracts for inclusion in the Afrotropical Bird Database. She was employed by the Fitztitute during 2007 on a renewable contract basis to assist with routine tasks in the Niven Library. Phelisa works nine hours per week to enable the Niven Librarian to research and write-up the history of the Niven Library and assist with the research into the history of the PFIAO towards the 50th Anniversary in 2010.

Sally Dalgleish has continued to work in her own time on the reprint collection, both the paper and electronic copies, providing a valuable service to the Niven Library.

Library liaison

During March 2007 the Niven Library hosted a meeting of the Specialist Libraries' Interest Group, LIASA. Subsequent to this meeting the Niven Librarian and the Library Intern were invited to visit the Gilchrist Library at Marine and Coastal Management. The Gilchrist Library and the Niven Library provide mutual support from their collections and this visit strengthened the link between the two libraries. The Internship project has provided the impetus for forging closer links with the Harry Molteno Library at SANBI.

Library development

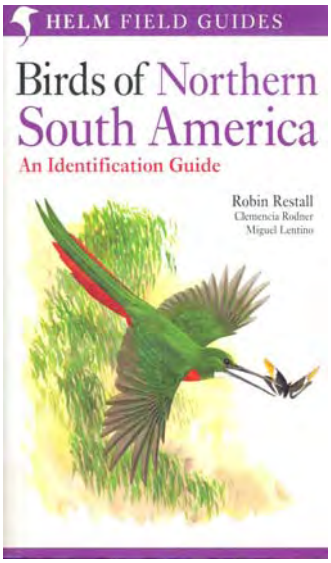
Space management:

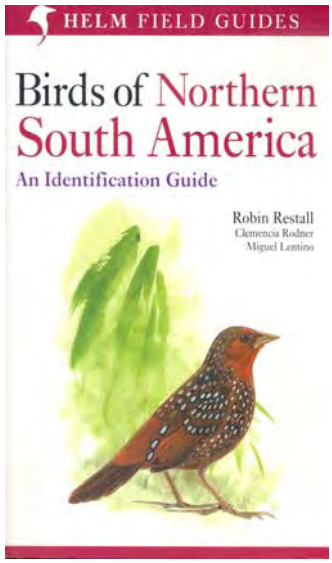
During June 2007 a selection of journals belonging to UCT Library and previously housed in the Niven Library were returned. A book weeding exercise was also continued. Reduction of the collection in this way only addresses the space problems in the library in a limited way. The Librarian presented the problem of space shortage to a Zoology Staff meeting in August 2007. Items minuted were a budget for compact storage, the future of journal titles in the Niven Library which are duplicated electronically and held by UCT Library, and additional storage space for the library.

Library maintenance:
Maintenance of the south side of the library became an issue during June 2007 when creeping damp and a leak emerged in the journal room. This was reported to the UCT building maintenance team who made an inspection visit in August 2007. A current project and the continued damp weather precluded any immediate action being taken.

Collection management
Journals: The remaining BirdLife SA exchange journals for *Ostrich* were cancelled during 2007 and negotiations with NISC for an affordable alternative failed. Africa Geographic generously offered to exchange *Africa Birds & Birding* for targeted titles at no cost to the Fitztitute. A number of essential titles were identified by the Niven Librarian and the parent organisations were approached with the offer. 90% of these organisations were very happy to exchange their title for *Africa Birds & Birding* enabling the Niven Library to keep these journal runs intact and to continue to support ornithological research in southern Africa. At the beginning of 2007, UCT library took out subscriptions to Blackwell and Springer journals. Many general ecological journals to which the Fitztitute had subscribed are published by these companies. This allowed the Fitztitute to reallocate limited funds to additional ornithological titles previously received through the BirdLife SA exchange agreement.

Reprints: The reprint collection continues to grow both in electronic and paper format continues to grow, with the count of pdfs amounting to 1357 items. A concerted effort has also been made to compile a collection of staff papers in electronic format. For archival material this involves scanning the paper copy, a time-consuming task which is undertaken when a request is received and has to be e-mailed. The count of electronic copies of staff papers stands at 523.





New Books: New books acquired by donation, purchase or through book reviews during the period under review amounted to 102 titles, 13 of which were received as review copies. Some significant titles acquired during this period are:

- Albatrosses, Petrels and Shearwaters of the world
- Birds of northern South America, 2 volumes
- Reproductive Biology and Phylogeny of Birds, 2 volumes
- Birds of the world: recommended English names
- Managing protected areas: a global guide
- Waterbirds around the world
- The Meinertzhagen mystery
- C.J. Skead's photographs 1912-2006
- Atlas of bird distribution in New Zealand
- Oiseaux de Tunisie
- Oiseaux d'Algerie

Staff Books published during 2007
Aronson, J., Milton, S.J. & Blignaut, J.N. (eds) Restoring natural capital: science, business, and practice. Washington D.C., Island Press, 2007
Ryan, P. (editor) 2007. Field guide to the animals and plants of Tristan da Cunha and Gough Island. Pisces Publications, Newbury for the Tristan Island Government.

Niven Library Database
The Niven Library continues to utilise the Open Source software CDS/ISIS from UNESCO for the library database and OPAC. The system is acceptably stable and the OPAC is sufficiently user friendly. A counter was installed in August 2007 which provides interesting statistics of the usage of the Niven Library catalogue. The greatest use is local within the Western Cape. Other users during 2007 are located in Gauteng and further afield in Mauritius, Hungary, USA, France, Spain and the Netherlands.

Use of the Library
Table 1. Niven Library stock circulation over the past four years

	2007	2006	2004/05	2003/04
Monographs	376	410	438	519
Reprints	88	60	82	83
Theses	45	24	42	-
Journals	265	298	345	278
Audio Visual	5	15	9	7
Total	779	807	916	887

Document Delivery
Table 2. Niven Library inter-library loans over the past four years

	2007	2006	2004/05	2003/04
Items requested (by staff/students)	90	95	166	95
Items supplied	86	91	485	403
Requests not satisfied	4	4	35	24

Cash redeemed from coupons received in payment for inter-library loans totalled R905.00. A further R269.36 was billed to UCT Library for requests for titles held in the Niven Library.

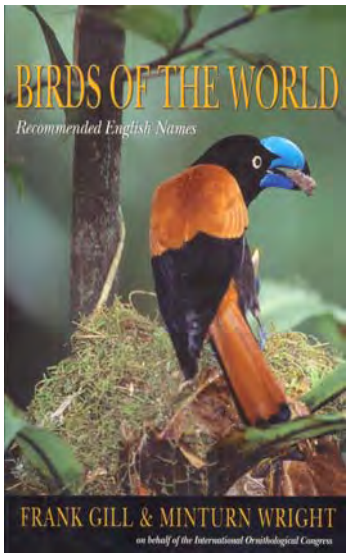
Reprint requests

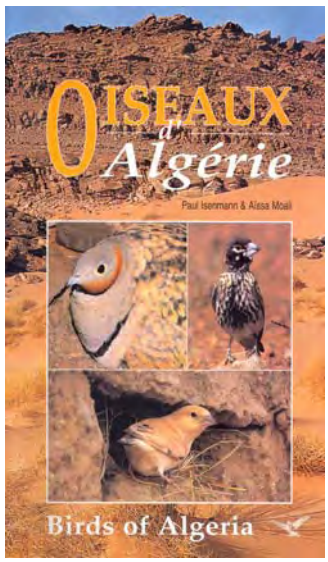
During 2007 there were 258 requests for reprints of the Percy FitzPatrick Institute's staff and student publications. The majority of these were e-mail requests and pdfs were supplied where possible. The increase in 2007 is due to staff members passing on the statistics of reprint requests which they had personally distributed. This helps to get a better picture of the impact of Percy FitzPatrick Institute research around the world.

Table 3. Requests for PFIAO Reprints

Reporting Period	2007	2006	2004/05	2003/04
Number of reprint requests	258	165	211	275
Number of countries	36	29	21	37

The breakdown by countries is: Argentina 3, Australia 7, Belgium 2, Botswana 2, Brazil 4, Canada 3, Chile 1, Columbia 1, Czech Republic 1, Ecuador 2, France 7, Germany 7, Hawaii 1, India 2, Italy 4, Japan 3, Madagascar 2, Malawi 1, Mexico 2, New Zealand 4, Nigeria 1, Norway 5, Poland 11, Portugal 3, Singapore 2, South Africa 87, Spain 3, Switzerland 1, Taiwan 1, Trinidad 1, United Kingdom 21, United States of America 25, and Zambia 18.





Cash photocopying

3212 cash copies amounting to R1228.80 were made on the photocopier in the library during 2007. The charge for photocopying was increased to 40c per page during June. As in previous years the availability of electronic journals has enable printing of articles, which is a more cost-effective way of reproducing material. A further R200.00 was received for the supply of material requested from the Niven Library from users within South Africa.

Research requests

A total of 1641 requests for information were received during the period under review, with approximately 45% of these requests generated by staff and students of the Institute. 922 pdf or jpg files were supplied by e-mail to users locally, nationally and internationally. The number of hard copy articles supplied (287) remains similar to previous years. In addition 63 literature searches were compiled and e-mailed to users. Other usage of the library was for verification of information, the supply of URL's and e-mail addresses and numerous other general queries. The Library received 744 research requests from the staff and students of the PFIAO, 177 from Zoology staff and students, and 103 from ADU staff and students. These numbers are lower than in 2006 and can be explained by the access to relevant ecological electronic journals through Blackwell and Springer, which became available through UCT Library at the beginning of 2007. 108 requests for information were also received from elsewhere on the UCT campus, and nationally and internationally.

Requests for information

Requests for information over and above interlibrary loan requests were received from the following national and international organisations and individuals.

Bird NGOs: Karen Dixon, BirdLife Gauteng; Elizabeth Horne, Ajubatus Marine Rescue and Rehabilitation, Cape St Francis, EC.; Frank & Janet Hallett, Cape Bird Club; Zephné Bernitz, Safring; Neil Deacon, Zimbabwe Falconers' Club, Zimbabwe; Brian Marshall, BirdLife Zimbabwe; John Penhallurick, WorldBirdInfo.

Conservation NGOs: Conservation International; South African National Biodiversity Institute; CapeNature

Government affiliations: City of Cape Town, Dept of Environment & Tourism; Ntombe Makwabe Department of Environmental Affairs & Tourism; Ruth-Mary Fisher, Table Mountain National Park.

Publishers: Media24 Women's Magazines.

Private Companies: Bushwise Safaris, Mpumalanga.

Schools: Wynberg Girls' High School; Elkanah House, Table View.

Some interesting Individual queries: Anthony Sherratt, artist Johannesburg – looking for images of the Venda and Ovambo Chicken; Bob Gosford, Indigenous Bird Knowledge Project - Ethno-Ornithology.

Museums: National Museum, Bloemfontein; Museum of London, Archaeology Service

South African Universities: Cape Peninsula University of Technology

International Universities: Sudan University

Acquisitions and collection building

At the end of December 2007 the bibliographic records on the OPAC system totalled 47421 representing an increaseof more than 1500 compared to 2006]. The numbers of individual items received in the Niven Library are shown below:

Table 4. Niven Library acquisitions over the last four years

	2007	2006	2004/05	2003/04
Monographs	102	206	194	108
Journals	530	597	819	520
Newsletters	272	294	474	304
Reprints	93	63	2182	1078
PDFs	1357	1482	2351	-
AudioVisual	8	5	8	-

Books added to the collection were either ordered by members of the Institute, donated or were review books for Ostrich. UCT's Zoology Dept, SAFRING, Animal Demography Unit and the African Seabird Group continued to donate their exchange journals. A number of books and journals, including an almost complete duplicate run of *Ostrich*, were donated by Andrew Rand on behalf of the estate of his father, the late R.W. Rand. A specialist on the Cape Fur Seal, Bob Rand was the biologist of the Government Guano Islands during the 1940s and 1950s and also published extensively on the seabirds of the Guano Islands off South Africa and Namibia.

Donations

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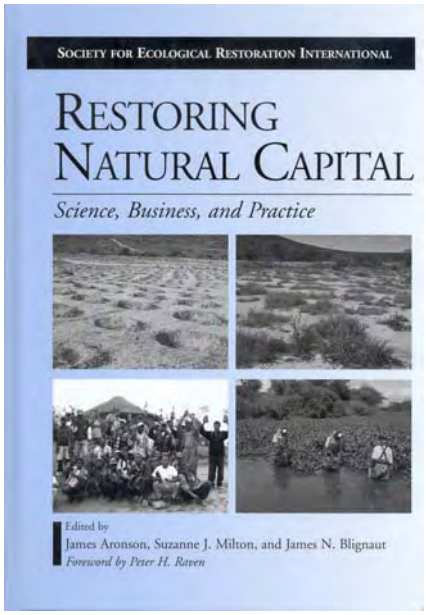

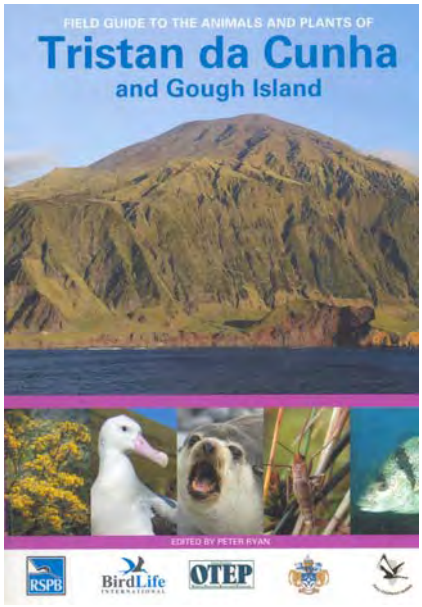

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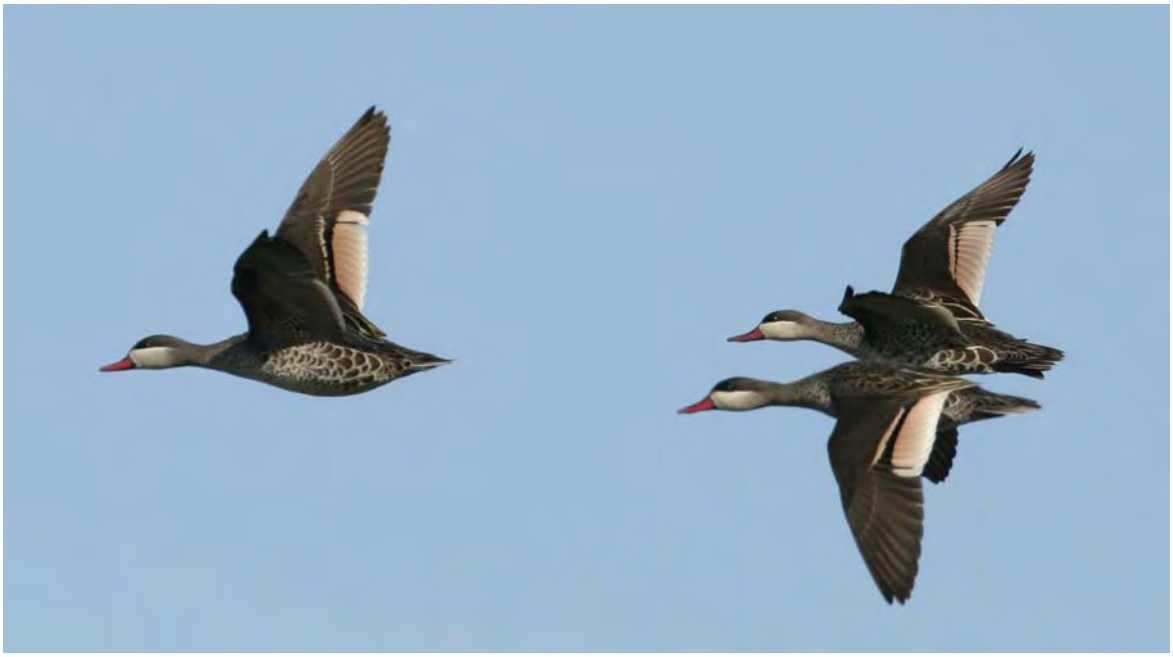

Red-billed Teals Anas erythrorhyncha*, one of the target species in our studies of anatid movements. Photo: Peter Ryan.*

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Appendix 1
Seminars 2007

February 21: Prof. Andrew Cockburn, Australian National University, Canberra.
Oh brother: where art thou: why are cooperatively breeding birds so diverse?

March 19: Ben Smit, Wits University.
Patterns of thermo-regulation and seasonal metabolic adjustments in small owls in an arid environment.

May 22: Charmaine Uys (Potential MSc candidate).
Invertebrate diversity in Afrotemperate forests.

June 15: Anne Treasure (Potential PhD candidate).
A current status report of the Limpopo-Shashe Transfrontier Conservation Area, southern Africa, as tool to promote and improve adaptive management.

June 15: Julia Jenkins, MSc student, PFIAO.
Black harriers as bio-diversity indicators of Renosterveld fragments.

June 15: Mwema Musangu, MSc student, PFIAO.
Can breeding sea-birds of Dassen Island survive pelican predation?

July 10: Dr Craig Allan, Nebraska Co-op Fish and Wildlife Research Unit.
Discontinuities, resilience and novelty in complex systems.

July 18: Sally Hofmeyr, (Potential PhD candidate).
Giraffes and the pollination ecology of knobthorns (Acacia nigroscens).

August 8: Lorien Pichegru, PhD student, CNRS, France.
Seabird foraging strategies in a variable environment.

September 4: Genevieve Jones, PhD student, PFIAO.
Individual variability in albatross reproductive success.

September 6: Graeme Oatley, PhD student, PFIAO.
Taxonomy, phylogenetics & biogeography of African White-eyes (Zosterops spp.)

September 6: Potiphar Kaliba, PhD student, PFIAO.
Faunal turnover between east and southern African terrestrial vertebrates: is Malawi the geographical break?

September 11: Bryan Gates, University of British Columbia.
Beautiful Baja California: birds, mammals and landscapes.

October 26: Robert Gosford, Ethno-ornithology group, Australian National University, Canberra.
Ethno-ornithology - a discussion of the recent past, present and prospects for the future.

December 4: Dr Ross McGregor, Florida State University.
Life history traits and trades offs in tropical birds.

Fitztitute Director moves to WWF

After 11 years at the helm, Morné du Plessis has left the Directorship of the Fitztitute to take up the post of Chief Executive Officer at WWF-SA. It seems appropriate, therefore, to place on record some of the changes that Morné was instrumental in effecting during his tenure as Director.

The period from 1996–2007 has seen the Fitztitute build on its solid foundation as a postgraduate research institute at the University of Cape Town. In fact, the Institute has acquired such an impressive international reputation that, in 2004, it was recognised as one of only six national Centres of Research Excellence across all disciplines in science and technology. This award, which is backed by substantial funding from the South African Department of Science and Technology and the National Research Foundation, is for a 10-year period. It also contractually obligates the Fitztitute to reach certain targets in terms of postgraduate training and research publication.

Prior to Morné's advent, the Fitztitute of the 1980s and 1990s had a substantial contingent of researchers working on contract, a system that worked well at a time when emphasis was placed on quantity rather than quality of research. However, the past decade has seen a significant switch towards building a cadre of postdoctoral researchers: approximately 10 or 12 postdocs now regularly work at or in association with the Institute. These researchers are mostly from abroad and are at an extremely productive stage of their careers, serving not only to generate high-quality primary research, but also as catalysts for the research undertaken by postgraduate (Honours, MSc and PhD) students. The postgraduates themselves have also come from an increasing diversity of countries, and to date students from more than 40 different nations have passed through the Institute's doors.

Morné du Plessis, Director of the FitzPatrick Institute 1996–2007.

In particular, the MSc Programme in Conservation Biology has attracted a large number of African students from countries to the north of South Africa. This was due in part to a generous grant awarded by the MacArthur Foundation over a five-year period, which annually resulted in as many as 40 to 60 applications for MSc-level study by African students. As a result, many talented young conservation biologists who completed the course have returned to their countries of origin to play a significant role in conservation. Many former Fitztitute graduates now occupy influential conservation positions across Africa and elsewhere in the world. As evidence of this, at a recent International Congress of the Society for Conservation Biology, Fitztitute graduates comprised five per cent of the 1 700 delegates.

Morné's time at the Fitztitute also saw the publication of a totally rewritten edition of *Roberts Birds of Southern Africa*. This project consumed many Fitztitute staff for several years and is a milestone that is not only considered to be an internationally trendsetting work, but also draws together more information about southern African birds than any other publication, making it an invaluable research tool.

Recognition of the Fitztitute's pivotal role in the fields of ornithology and conservation biology is reflected in several important bequests that have been made to the Institute over the past decade. First, there was the Jack Broadley Bequest, which is used in support of deserving student bursary top-ups. Second, the late Dr Phillip Clancey bequeathed a substantial sum of money for the furtherance of 'research on birds that is of an evolutionary nature'. Finally, Mrs Pola Pasvolsky left a bequest that supports the post costs of a Chair in Conservation Biology bearing her name. The current incumbent of this Chair is Prof Graeme Cumming, a young Zimbabwean who pursued an academic career in the USA before returning to the opportunities offered by Africa.

In summary, the Fitztitute of 2007 is perhaps internationally better known and better connected than ever before. The reasons for this are partly the international acceptance of South African contributions to ornithology that followed the political changes of 1994 and partly the rewards of a focused effort to internationalise the Institute. The significant numbers of international students, postdocs, associates and visitors are visible evidence of this. In addition, Fitztitute researchers have solidified their own international reputations to the extent that until recently, a total of six staff members had been evaluated by the National Research Foundation as 'enjoying considerable international recognition by their peers for the high quality and impact of their recent research outputs'.

Until such time as UCT appoints a new Director, Phil Hockey will be filling the role of Interim Director. □

Visit the FitzPatrick website: *http://www.fitzpatrick.uct.ac.za*

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Financial Report

The Financial Report is available on request from the Percy FitzPatrick Institute.