

Introduction

As human impacts on the environment become increasingly important, the Centre for Ecology and Conservation at the University of Exeter's Cornwall Campus is engaged in training top-flight students and conducting research to address these and other important biodiversity issues. From very humble beginnings, the Centre has rapidly grown over the last five years to its present size of 24 Academic staff with an undergraduate intake of close to 100 talented students per year, spread over three degree programmes. And we continue to grow.

In 2010, we were joined by several new members of staff, including two Independent Research Fellows, Dr Andy Young and Dr Clarissa House, and a new Honorary Fellow, Professor Paul Racey. Our student intake and tariff increased yet again this year, and our recently established Zoology degree programme is now our biggest recruiter. This is complemented by a thriving graduate programme and more than 50 postgraduate students completed their training with us in the last 12 months.

We also continue to excel in our research, with research grant income within the Centre topping £3 million, and we produced more than 120 publications in 2010, with papers in *Science*, *Current Biology* and other prestigious journals. In addition to this, we were one of a select group of biology departments across Europe to be awarded excellence Ranking for 2010 by the Centre for Higher Education Development (CHE), based in Germany, and our students and staff continue to secure prestigious awards for their work.

The Centre has also expanded our internationalisation, and exchanges with the Indian Institute of Science in Bangalore undertaken in 2010 are but one example of this. It seems that the successes enjoyed by the Centre increase on a year-by-year basis, and I fully expect next year's report to top this one, but by any standards, 2010 was a great year and I thank all our staff and students for their continued input into the success story that is the Centre for Ecology and Conservation.

Professor David Hosken – Centre Director

Research highlights

University of Exeter forges stronger research links with Fera

Bioscientists from the University of Exeter and the Food and Environment Research Agency (Fera) will now work in closer collaboration following a new agreement. A Memorandum of Understanding was signed in 2010 to promote the exchange of expertise and knowledge.

Fera is an executive agency of the Department for Environment, Food and Rural Affairs (Defra). It works to support and develop a sustainable food chain, a healthy natural environment, and to protect the global community from biological and chemical risks. The agency has already worked extensively with the Centre for Ecology and Conservation on projects looking at badger ecology to better understand TB transmission; bat migration to understand the risk of rabies entering the UK; and the establishment of new techniques for evaluating biodiversity. The new partnership will see even closer links formed to carry out research, teaching and develop strategy.



Allen Moore (right), Associate Dean for Research and Knowledge Transfer in the College of Life and Environmental Sciences at the University of Exeter and Adrian Belton, Chief Executive of Fera, look at a student's display of insect samples.

Brent geese show parents know best

Research by **Stuart Bearhop** and **Xavier Harrison** from a six year study on migrating light-bellied Brent geese (featured on Autumwatch and published in *Molecular Ecology*), suggests that the geese return to the same spots they were taken to as youngsters. They therefore learn their migratory destinations from parents, and this raises some interesting questions about why this species of goose demonstrates this behaviour.



A Brent goose guarding its eggs.

Threats to endangered turtles

Research undertaken by **Fran Humber**, **Annette Broderick** and **Brendan Godley** featured in the national news in November 2010 (*The Guardian* www.guardian.co.uk/environment/2010/nov/12/illegal-turtle-harvesting). The study revealed up to 16,000 endangered turtles are being caught each year by villagers in just one region of Madagascar, despite a government ban. The study highlights the extent of small-scale fishing, traditionally very difficult to monitor, and could be vital in finding a way to sustainably manage turtle fishing in the region. (Published in *Animal Conservation*.)



A captured green turtle on an island off the coast of Madagascar.

Research highlights continued

Banded brothers

In February work from **Mike Cant** and **Sarah Hodge** featured in the BBC2 documentary "Banded Brothers – The Mongoose Mob", a study of the social structure within a band of mongooses in Uganda. Mike also recorded an audio diary of his mongoose research in Uganda for the October 2010 Planet Earth podcast. This was also featured in the podcast highlights of the year. (Some of this work was published in *Current Biology* and featured in the *New York Times* and *Nature*.)



Banded mongoose in the wild.

The secret life of snails

A national competition run by BBC Radio 4's "Material World" programme to find the UK's top amateur scientist has been won by a 69-year-old grandmother from Devon — with a little help from the CEC. **Dave Hodgson** spent several months working with Totnes-based amateur scientist Ruth Brooks to find out if snails have an 'internal sat-nav'. The research found that *Helix aspersa*, commonly found in UK gardens, can find their way back to their favourite spot from about 30 metres if moved. Judges at the British Science Festival picked the project as the outright winner of the competition.



Snails can find their way 'home' from about 30 metres.

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Battle of the sexes in the plant world

Research by **Clarissa House** and collaborators has shown for the first time that male plants can influence the size of seeds. Relatively few studies have been able to distinguish between the influence of paternal genotypes for offspring fitness and maternal effects. This study clearly demonstrated that paternal genes are important. (Published in *Proceedings of the Royal Society B*.)



Seed size is a key factor for breeding success.

Big brother in the wild

This study, by **Tom Tregenza** and **Rolando Rodríguez-Muñoz**, compared the behaviour and ancestry of field crickets in their natural environment, and allowed unprecedented insights into what insects actually get up to. The study also answered questions about what behaviours increase the number of offspring an individual has; something that has only been examined previously in the laboratory. (Published in *Science*.)



This is a pair of crickets with the male on the right and the female on the left with a light brown sperm packet that the male has attached to her rear end.

Polyandry

Known as 'polyandry' among scientists, the phenomenon of females mating with multiple males is common in animal species, from insects to mammals. This study by **Nina Wedell** (in conjunction with Liverpool University) suggests that polyandry reduces the risk of populations becoming extinct because of all-female broods being born. (Published in *Current Biology*.)



Drosophila pseudoobscura.

EcoSoc 2010

EcoSoc is the student-run society for all who are interested in natural history at the Cornwall Campus and includes students from the University of Exeter and University College Falmouth. Membership numbers are now over 200, with a large number being students from the Centre!



Tamar bird cruise November 2010 – watching spoonbills.

This year saw the inception of our highly successful Plant Identification days, which saw us tramping across diverse habitats. Since then, ID days have branched out to include birds and rockpool creatures, lichens and fungi. We have also gone out tracking down both local and vagrant birds and, as is becoming tradition, we have been on the Tamar birding cruise twice this year. Over the summer we joined in with CWT's basking shark watch and saw some amazing sights – some lucky members even saw the sharks breaching! On the mammal front we are forming strong links with Cornwall Mammal Group, which has included small mammals trapping.

We have also spent time doing habitat management with the National Trust, South West Lakes Trust and at our own exciting endeavour on a local farm. This has included bat box and bug hotel workshops. Venturing further afield, we have spent some successful weekends at Sharpham Manor in Devon working with the IgoMango project.

One of our aims is to get people from a wide range of courses involved in the society and we did this with our main social event this year – the enormously successful natural history pub quiz at Miss Peapods in Penryn. Over 80 people (including three staff teams) joined in and tackled questions on the bizarre and the ridiculous in a friendly, yet competitive atmosphere!

Emma Wood (EcoSoc President 2010/11)



Weekend away at Sharpham Manor in Devon.



Understanding the biodiversity impacts of marine renewable energy

Research and Knowledge Transfer Case Study

There is a growing imperative to derive energy from renewable sources but it is essential that emerging 'green' technologies are deployed with a coherent understanding of their environmental impacts. Many proposed wave farms will be positioned in areas that support diverse, complex and important ecosystems, but impacts on biodiversity, whether they be positive or negative, are as yet unknown.

The Centre of Ecology and Conservation, through the Peninsular Research Institute for Marine Renewable Energy (PRIMaRE) – a collaboration of the Universities of Exeter and Plymouth – has been engaged in a long-term study that will afford insights into the impacts of marine renewable energies on marine ecosystems and biodiversity. This work has been focused at the site of the world's first pre-commercial wave farm (Wave Hub) off the north coast of Cornwall.

The work of the Centre of Ecology and Conservation at Wave Hub focuses on large marine vertebrates, in particular, seabirds, dolphins, whales and other mobile species, including lobsters, crabs, bony fishes and sharks. Work is made difficult by the remote nature of development sites. As such, staff use a wide range of techniques to survey these species. Several remote sensing technologies are utilised – one such device is the CPOD, used for the monitoring of dolphins and porpoises. The CPOD is a Cornish designed technology, produced by Chelonia Ltd, and provides round-the-clock acoustic monitoring – recording the presence of these creatures via the sounds they make while going about their daily lives.

In 2010, significant milestones were made, including the testing and deployment of large scale CPOD detection array around the coast of Cornwall; deployment of broadband acoustic recording hardware to be used to describe changes in anthropogenic noise; and the deployment of underwater baited video camera systems to describe the diversity and distribution of mobile species. This work has seen extensive collaborative research emerge with the Cornwall Wildlife Trust, Cornwall Seal Group and additional EU funded research.

This research will feed into policy development in relation to the inevitable expansion of marine renewable energy, helping to inform mitigation, ease planning consents and hopefully allow future changes in the seascape to be markedly positive for biodiversity.

CEC Publications

Papers:

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CEC Publications continued

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CEC Publications continued

Book chapters:

Bleakley BH, JB Wolf, **AJ Moore**. 2010. Evolutionary quantitative genetics of social behaviour. Pp. 29-54 in: *Social Behaviour: Genes, Ecology and Evolution*. T Székely, AJ Moore, J Komdeur (eds.). Cambridge University Press.

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Books:

T Székely, **AJ Moore**, J Komdeur (eds.). 2010. *Social Behaviour: Genes, Ecology and Evolution*. Cambridge University Press.



Final year CEC undergraduates undertaking mammal behaviour studies in the Cape Region of South Africa.

Awards and prizes

Joanna Alfaro-Shiget (Winner-Conservation Oral) and **Catherine McClellan** (Runner Up-Biology Oral) both won awards for student papers at the International Sea Turtle Symposium in Goa, April 2010.

Naomi Gregory, one of the Centre's third year undergraduates, was awarded the Prize in Environmental Science from the Cornwall branch of Campaign to Protect Rural England (CPRE) for her research project on Cornish bumble bees.

Iain Stott received the prestigious Bob May Prize for best postgraduate author of a paper in 2010 for his paper 'On reducibility and ergodicity of population projection matrix models' published in *Methods in Ecology and Evolution* (supervised by Dr Dave Hodgson).

Dr Sam Weber was awarded the 2010 Thomas Henry Huxley Award and Marsh Prize by the Zoological Society of London, for his PhD thesis 'Maternal effects in the green turtle' (supervised by Dr Jon Blount and Dr Annette Broderick).

Congratulations to the following CEC students who were awarded PhDs in 2010:

Chloe Bird. Thesis title: Genetic influences on parental care in *Nicrophorus vespilloides*.

Ross Dwyer. Thesis title: Ecological and anthropogenic constraints on waterbirds of the Forth Estuary: population and behavioural responses to disturbance.

William Pitchers. Thesis title: Trait integration as a constraint on phenotypic evolution.

Manmohan Dev Sharma. Thesis title: Sexual selection in *Drosophila simulans*.

Lorna Shaw. Thesis title: Investigating the role of socioeconomic status in determining urban habitat quality for the house sparrow, *Passer domesticus*.

Damian Smith. Thesis title: Sex peptide evolution and the impact of selfish genetic elements.

Sam Weber. Thesis title: Maternal effects in the green turtle (*Chelonia mydas*).