

# Chagos Scientific Research Expedition Outline

19<sup>th</sup> November – 13<sup>th</sup> December 2012



THE UNIVERSITY OF  
WESTERN AUSTRALIA



University  
of  
St Andrews

## Overview

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Between 19<sup>th</sup> November and 13<sup>th</sup> December 2012, a scientific research expedition will take place in the Chagos Archipelago (British Indian Ocean Territory (BIOT)), supported and facilitated by the Foreign and Commonwealth Office and numerous other institutions. Thirteen scientists and supporting team members will participate in the second full scientific expedition since the no-take marine protected area (MPA) was established in April 2010. Our research plans prioritise the establishment of pelagic monitoring methods within the MPA with the outcomes of the expedition will generate a series of recommendations for the establishment of a long-term monitoring programme for pelagic species in the marine reserve. We believe our initiatives will assist BIOT in understanding and managing the world's largest fully no-take MPA, maintaining this area of extraordinarily rich marine and terrestrial biodiversity.

## Research Objectives

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### 1. Monitoring pelagic fish assemblages (Jessica Meeuwig, Tom Letessier, Kirsty Kemp, Lloyd Groves, Dave Tickler)

Objective: Trial a method for quantifying characteristics of pelagic species (diversity, abundance, and size).

Sampling pelagic fish and sharks represents a significant scientific challenge. SISSTAs (Stereo Imaging System for Shark and Tuna Assessment) are light-weight (15kg) baited, pelagic stereo camera systems that are designed to operate between 5 and 40m below the ocean's surface. They have been developed to provide a non-extractive method for documenting the structure of pelagic fish and shark assemblages, with specific relevance to sampling within no-take marine reserves such as the Chagos Archipelago. An array of 15 SISSTAs will be deployed at designated survey sites.

### 2. Acoustic sampling (Philipp Boersch-Supan, Martin Cox,)

Objective: Characterise pelagic fish biomass using acoustic techniques to complement species, relative abundance and size data from SISSTAs.

Acoustic sampling transects will be undertaken using a calibrated scientific echosounder to measure animal distribution and biomass at the same locations where SISSTAs are deployed. Acoustic sampling on this expedition will follow procedures developed specifically for surveying tuna and their prey and, combined with SISSTAs, will provide estimates of biomass.

### 3. Shark Tagging (Matthew Gollock, Gabriel Vianna)

Objective: Determine the residency of priority pelagic shark species within the MPA and the degree to which there are hotspots of activity in the region

Satellite tagging technology will be used to determine movement, residency and behaviour of pelagic sharks within the Chagos Marine Reserve. As a first priority, we will tag 10 blue shark (*Prionace glauca*), the major elasmobranch by-catch species of tuna fisheries around the globe, and in the Chagos. If we are not successful catching blue sharks, we will focus tagging on silky (*Carcharhinus falciformis*), short fin mako (*Isurus oxyrinchus*) or oceanic whitetip sharks (*Carcharhinus longimanus*). This work will be the first tagging of large pelagic species undertaken within the Chagos Marine Reserve and data will be used to understand patterns of movement within and outside the reserve, and the spatial scale of the home range of these species. During tagging, small tissue samples will be taken for a planned genetics-based population study of blue sharks in the Indian Ocean.

#### **4. Long-term monitoring of bird populations (Peter Carr)**

Objective: Continue the long-term monitoring and research of the internationally important breeding seabird colonies in the Chagos, with a focus on the relationship between seabirds and pelagic fish aggregations.

Seabird activity can be the sign of the presence of pelagic species and as such will be used as a potential indicator of the presence of tuna and other species. To this end, seabird activity will be quantified by at sea censuses during vessel transit and more detailed counts conducted at each study site. Seabird abundance and foraging behaviour will be quantified to also complement data being collected on their reproductive activity at their terrestrial nesting grounds within the Chagos Archipelago.

#### **5. Monitoring physical oceanographic parameters (Jessica Meeuwig, Lewis Fasola)**

Objective: Characterise oceanographic conditions where pelagic species are observed.

Oceanographic data will inform the interpretation of spatial distribution patterns of pelagic fish detected through SISSTAs and acoustic techniques. Conductivity, temperature and depth profiles will be recorded at each site with a CTD (in profile mode) with a fluorometre combined with water samples used to estimate chlorophyll.

#### **6. Monitoring demersal fish and shark assemblages (Jessica Meeuwig, Tom Letessier, Kirsty Kemp, Lloyd Groves)**

Objective: Characterise demersal fish and shark assemblages at features associated with pelagic species.

BRUVS (baited remote underwater video systems) are a now well-recognised technique for sampling fish assemblages, with particular application at depths below safe diving limits as is the case for this expedition. BRUVS are video systems consisting of two cameras and a bait bag fixed to a frame, and are deployed to the seabed from a surface vessel. BRUVS were deployed successfully in the Chagos during the February 2012 expedition and we will here undertake a limited amount of sampling to characterise the demersal seabed and fish community associated with the deeper seamounts where the pelagic community is sampled. We will deploy BRUVS for a period of 1 hour with eight samples collected at each site that is targeted for pelagic sampling.

#### **7. Outreach (Rudy Pothin)**

We will document the expedition through a blog, still photography and underwater videography. In addition to scientific papers in peer-reviewed journals, we anticipate several popular science articles following completion of the expedition and will highlight outcomes through media outlets, in consultation with and agreement of the FCO.

## Team Biographies

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### Professor Jessica Meeuwig (Expedition Chief Scientist)

Jessica is the Director of the Centre for Marine Futures, University of Western Australia. Her main expertise is marine and fisheries conservation, and quantitative modelling. Her research group works across a range of taxa, from humpback whales to sharks to bony fish and includes some benthic ecology with key questions centring on how animals use habitat and the impacts of human activities on their ecology, population biology, energetics etc. Her group also has a strong interest in the development of video and image based sampling methods and maximising the power of information obtained from these methods. Jessica has worked as a marine ecologist in a wide range of temperate and tropical ecosystems and is a keen science communicator.



### Philipp Boersch-Supan (Scientist)

Philipp is a doctoral student in the Pelagic Ecology Research Group, University of St Andrews, and an Academic Visitor at the Department of Zoology, University of Oxford. His research focuses on the ecology of mid-trophic level open ocean animals (micronekton), their interactions with seamounts and islands, and their interactions with pelagic predators. He has led fisheries acoustics surveys on multiple research cruises in the Atlantic and Indian Ocean.



### Pete Carr (Scientist)

In conjunction with the RSPB, Peter has recently (2011) published *Birds of BIOT*, a book that summarises the avifauna of the Territory; he was also the author of the original paper that designated the ten IUCN categorised Important Bird Areas (IBAs) within BIOT. As a member of the Chagos 2010 Scientific Research Expedition he was co-responsible for terrestrial monitoring, focusing on ecological restoration priorities, Odonata distribution as well as seabird censuses. For the past three years he has spearheaded forest and wetland restoration work whilst working on Diego Garcia.



### Dr Martin Cox (Scientist)

Martin Cox is a quantitative ecologist working as an Australian Research Council Super Science Fellow at the Australian Antarctic Division. Martin's current research uses a variety of statistical techniques to probe the interactions between marine animals and their environment, and draws heavily on data collected using scientific echo sounders. Previously, Martin has worked at the University of Melbourne studying optimal monitoring for managing plant pest outbreaks, and before that as a research fellow at the University of St Andrews.



### **Lewis Fasola (Scientist)**

Lewis is in his final year of his degree in Environmental Engineering, with a major in ocean systems, at the University of Western Australia. Lewis is a Western Australian with a passion for surfing, fishing and diving. He has previous experience in the deployment of oceanographic equipment, and gained a biological and physical understanding of the Princess Royal Harbour in Albany, Western Australia. During the Chagos expedition, Lewis will focus on collecting oceanographic data from this very undiscovered, beautiful part of the world. He will be fortunate enough to turn these findings into the final year thesis of his Environmental Engineering Major.



### **Dr Matthew Gollock (Scientist)**

Matthew is presently the assistant manager for the International marine conservation programme and oversees the running and development of number of ZSL's conservation projects, ranging from the tidal Thames conservation project, to the establishment of the Chagos/BIOT Marine Protected Area. He gained his doctorate studying the European eel, and continues to work at the forefront of the conservation of this species. He has a particular interest in migratory species and their conservation.



### **Lloyd Groves (Operations Manager)**

Lloyd is the operations and logistics manager at the Centre for Marine Futures, University of Western Australia. Lloyd has worked closely on the design and development of the SISSTAs and participated in early field trials. He is also responsible for much of the image analysis generated from the videos. Prior to moving to UWA, Lloyd completed his BSc (Hons) Zoology at Bangor University in Wales. He is also an accomplished nature photographer and passionate environmentalist.



### **Dr. Tom Letessier (Scientist)**

Tom is a Research Assistant Professor at the Centre for Marine Futures, University of Western Australia. His main expertise is in the meso- and basin-scale processes at the low-end of pelagic ecosystems. His PhD research focused mainly on the ecology of the model zooplankton order Euphausiacea. He has participated in several research cruises in the Atlantic and Indian Ocean and previously conducted SCUBA-based research on coral reefs on fish and coral taxonomy in the tropical Atlantic and Pacific Oceans.



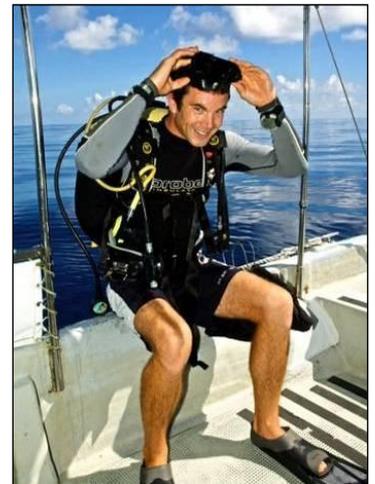
### **Rudy Pothin (Outreach officer)**

Rudy is the Chagos Environment Outreach Assistant at the Zoological Society of London. The Chagos outreach project began in April 2012 and aims to work with the Chagossian community in creating awareness of the environment, and to liaise with other partners to organise and facilitate training opportunities for the Chagossian community. Rudy will be in charge of outreach and reporting from the expedition.



### **David Tickler (Scientist)**

David is undertaking a MSc at UWA in collaboration with ZSL on the demography of reef and oceanic sharks in Chagos. David is a professional dive instructor and guide and has spent the last seven years working on charter and private vessels in various parts of the world, including Australia and Micronesia. As well as his diving qualifications, David has a Yachtmaster qualification and is a Diver Medic Technician. Prior to becoming a diving instructor he worked as an analyst for a bank in the UK, a think tank in Tokyo and a consulting firm in Sydney.



### **Gabriel Vianna (Scientist)**

Gabe is completing his PhD on the ecology and economic value of sharks at the University of Western Australia and with the Australian Institute of Marine Science. His ecological work is focused in Palau using tags to understand the horizontal and vertical distributions of reef sharks. He has conducted socioeconomic surveys in Palau and Fiji to highlight the economic value of sharks to tourism rather than a fisheries resource. He has extensive experience in tagging a wide range of shark species.



### **Dr Jasjot Singhota (Medical Officer)**

Jasjot is the expedition medic. She gained her degree in Medicine at Edinburgh University, during which time she worked in both Malaysia and New Zealand, and is an instructor for the Advanced Trauma Life Support course. She is a keen kayaker and climber.

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