

Institution: University of Exeter		
Unit of Assessment: UoA 5 Biological Sciences		
Title of case study: <i>Protecting Marine Biodiversity in the Tropical Atlantic</i>		
Period when the underpinning research was undertaken: 2000-2019		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Prof Annette Broderick	Professor of Marine Conservation	2003 – present
Dr Sam Weber	Associate Research Fellow	2016 – present
Dr Nicola Weber	Lecturer in Biosciences	2017 – present
Period when the claimed impact occurred: 2014-2019		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact Research by the University of Exeter (UoE) has increased knowledge of the spatial ecology and distribution of threatened and globally important marine megafauna, leading to changes in policy and practise benefiting biodiversity and the designation of >495,000km² of Marine Protected Areas (MPAs). This has improved the status of marine environments in the territorial waters of three countries. At Ascension Island, research contributed to the designation of the second largest fully protected no-take MPA in the Atlantic Ocean. In Gabon, research underpinned the implementation of 20 MPAs, creating the largest MPA network in sub-Saharan Africa protecting more than 20 species of whales and dolphins, 20 species of sharks and rays and four species of marine turtles. In the Turks and Caicos Islands, research resulted in legislative changes to increase the protection of breeding marine turtles.		
2. Underpinning research Our research has focused on understanding the status, distribution and behaviour of marine vertebrate species of commercial or conservation importance and the habitats that they utilise. Our group use a multidisciplinary approach combining the latest cutting-edge technologies of vessel and animal tracking, at-sea surveys, acoustic and video surveying to map marine biodiversity together with socio-economic studies that consider ocean user groups (e.g. fishers) and how to encompass their needs and behaviour in marine planning. Our research has led to both legislative change and/or the designation of protected areas in the three countries detailed below. Ascension Island Research into biodiversity at Ascension Island led by UoE researchers, in collaboration with Ascension Island Government and other partners, and primarily funded by the Darwin Initiative, has focused on the spatial ecology of marine vertebrates [3.1,3.2]. Most notably, research has described the status, behaviour and distributions of green turtles (<i>Chelonia mydas</i>) [3.1] and the global importance of this site, a nesting population of 15,000 females, the largest rookery in the south Atlantic and of all the UK Overseas Territories. Tracking of seabirds, turtles, sharks and other fish has highlighted the importance of this mid-Atlantic island for marine megafauna [3.2,5.2], and in particular the seamounts as critical habitat for migrating and resident species. Gabon Since 2008, a consortium of multidisciplinary researchers from the UoE has conducted research in partnership with government and national implementing agencies to provide the data required to underpin a new MPA network. Researchers have utilised large-scale coastal and aerial surveys, satellite tracking, at-sea surveys, and species distribution modelling to characterise the spatial ecology, distribution and population status and threats to marine		

vertebrates that were previously considered data deficient by the International Union for the Conservation of Nature (IUCN) [3.3]. These studies revealed, amongst other things, that Gabon hosts the world's largest nesting colony for the leatherback turtle with an estimated 28,500 breeding females and was fundamental in highlighting the inadequate scope of existing MPA networks to protect marine vertebrates [3.4]. This consortium also employed a range of interdisciplinary methods to map small-scale fisheries, shipping and the social and economic interests of different user groups. These data and all other available marine biodiversity data were presented to the Government of Gabon and analysed to provide recommendations for the designation of MPAs [5.5].

Turks and Caicos Islands (TCI)

Research led by UoE in collaboration with the Marine Conservation Society (UK) and the TCI Government has shown that the TCI has one of the largest legal marine turtle fisheries in the Caribbean, with approximately 500 green (IUCN Endangered) and hawksbill (*Eretmochelys imbricate*: IUCN Critically Endangered) turtles landed annually and has also documented the seasonality of both turtle breeding and the fishery itself [3.5,3.6]. Prior to this research, the fishery had not been empirically quantified, there was no closed season and the only restrictions for turtles caught at sea was that they had to be ">20 inches in size or >20 lb" in weight, meaning breeding adults could be legally caught. Our recommendations for a closed season and a change to size limits to protect breeding adults [3.5,3.6] were put forward to the TCI Government and resulted in legislative amendments enacted in 2014 [5.9, 5.10].

3. References to the research.

Exeter authors in bold.

- 3.1. **Weber SB, Weber N**, Ellick J, Avery A, Frauenstein R, **Godley BJ**, Sims J, Williams N, **Broderick AC** (2014) Recovery of the South Atlantic's largest green turtle nesting population. *Biodiversity & Conservation* 23: 3005-3018. <https://doi.org/10.1007/s10531-014-0759-6>
- 3.2. Oppel S, **Weber S, Weber N**, Fox D, Leat E, Sim J, Sommerfield J, Bolton M, **Broderick AC, Godley BJ** (2017) Seasonal shifts in foraging distribution due to individual flexibility in a tropical pelagic forager, the Ascension frigatebird. *Marine Ecology Progress Series* 585:199-212. <https://doi.org/10.3354/meps12377>
- 3.3. **Pikesley SK**, Agamboue PD, Asseko GM, Bayet JP, Bibang JN, Bonguno EA, Boussamba F, **Broderick AC**, Coyne M, Faure FE, Fay JM, Formia A, **Godley BJ**, Gnandji MS, Kema Kema JR, Mabert BDK, Manfoumbi JC, **Metcalfe K**, Minton G, **Nelms, S**, Nzegoue J, Ogandanga C, Olwina CKK, Otsagha F, Parnell RJ, du Plessis P, Ngouessono S, Sounguet G-P, Wada M, White L, **Witt MJ** (2018) A novel approach to estimate the distribution, density and at-sea risks of a centrally-placed mobile marine vertebrate. *Biological Conservation* 221: 246-256. <https://doi.org/10.1016/j.biocon.2018.03.011>
- 3.4. **Witt, M.J.**, Baert, B., **Broderick, A.C.**, Formia, A., Fretey, J., Gibudi, A., Mounguengui, G.A.M., Moussounda, C., Ngouessono, S., Parnell, R.J., Roumet, D., Sounguet, G.-P., Verhage, B., Zogo, A. & **Godley, B.J.** (2009) Aerial surveying of the world's largest leatherback turtle rookery: A more effective methodology for large-scale monitoring. *Biological Conservation* 142: 1719-1727. <https://doi.org/10.1016/j.biocon.2009.03.009>
- 3.5. **Stringell TB**, Calosso MC, Claydon JAB, Clerveaux W, **Godley BJ**, Lockhart KJ, Phillips Q, Ranger S, Richardson PB, Sanghera A, **Broderick AC** (2013) Marine turtle harvest in a mixed small-scale fishery: Evidence for revised management measures. *Ocean and Coastal Management* 82:34-42 <https://doi.org/10.1016/j.ocecoaman.2013.05.004>
- 3.6. **Stringell TB**, Clerveaux W, **Godley BJ**, Lockhart KJ, Phillips Q, Ranger S, Richardson PB, Sanghera A, **Broderick AC** (2015) Protecting the breeders: research informs legislative change in a marine turtle fishery. *Biodiversity and Conservation* 24:1775-1796 <https://doi.org/10.1007/s10531-015-0900-1>

4. Details of the impact

Our research has led to the improved status of marine environments within the territorial waters of three nations, through new and amended legislation to protect individual species and the designation of protected areas, including 21 new protected areas totalling in excess of 495,000 km². This directly contributes to international biodiversity commitments and the UN Sustainable Development Goal to protect 10% of global ocean area by 2020 (SDG target 14.5), based on a large body of evidence on the benefits of marine protected areas to both biodiversity and food security. Throughout these projects we have worked in partnership with government agencies and non-governmental organisations in Ascension, Gabon and TCI to build capacity, support training and raise awareness for decision-making, monitoring and enforcement to ensure the efficacy of these protective measures are maximised.

Ascension Island - Designation of the second largest no take MPA in the Atlantic

A Darwin Initiative funded project led by the UoE team with partners including the Royal Society for the Protection of Birds, Centre for Ecology and Hydrology, Royal Botanic Gardens Kew, University of Lund and Queen Mary University of London, resulted in the production of a 2012 Biodiversity Action Plan (BAP) for Ascension Island, including 13 Species Action Plans and three Habitat Action Plans. The Darwin BAP project also resulted in new legislation (Wildlife Protection Ordinance (October 2013) and National Protected Areas Ordinance (2014)) being enacted for Ascension Island to underpin and enable protected area designation. In 2014, the three main marine turtle nesting beaches, and a major seabird colony were designated as National Nature Reserves thereby safeguarding important breeding grounds for these priority species from development. Dr Diane Baum, Ascension Island's Director for Conservation and Fisheries, testifies [5.1] that the Action Plans '*continue to be used to guide our conservation and management actions*'.

UoE staff provided data on marine biodiversity hotspots and recommendations for MPA designation and co-wrote the policy report [5.2] that was presented to Ascension Island and the UK Government, in November 2018, detailing the evidence and options for MPAs. In March 2019, the UK Government accepted [5.3] the recommendations of this report and committed to designating 100% of the territorial waters of Ascension Island as a Large Scale Marine Protected Area (LSMPA), an area of 441,658 km². Commercial fishing will be prohibited in this area ensuring pressure on both fish stocks and bycaught species is reduced and areas of high biodiversity and species moving through the waters are no longer subjected to this pressure [5.2]. The designating of the MPA "*represents significant progress towards the government's Blue Belt programme, an initiative to provide long term protection of more than four million km² of marine environment across the UK Overseas Territories*" [5.3]. UoE staff also led the International Union for the Conservation of Nature (IUCN) Redlist assessment [5.4] for green turtle that utilised our data on nesting populations [3.1]. Dr Diane Baum [5.1] writes further: "*Staff from the University of Exeter have been working with Ascension Island Government for more than 20 years, collaborating on research that has underpinned changes to legislation and the management of our natural resources on land and at sea.*"

Gabon – Creating the largest MPA network in sub-Saharan Africa

In the case of Gabon, long-term support from the Darwin Initiative has provided the funding that has underpinned collaborative research between the UoE, national implementing agencies (e.g Gabonese National Parks Agency [5.7]) and the Wildlife Conservation Society. The research has demonstrably enhanced national and institutional capacity and awareness, ensuring that scientific evidence has influenced policy and practice. Data on marine biodiversity and ocean user groups provided by UoE staff were used to recommend areas for the designation of 9 new marine parks and 11 aquatic reserves [5.7]. These recommendations were accepted and led to the establishment of the first comprehensive MPA network in Central Africa [5.5], which is also Africa's largest network, covering 56,000 km² and increasing the

proportion of Gabon's territorial waters under formal protection from <1% to 26%. Formally announced at the IUCN World Parks Congress in 2014 [5.5], and signed into law in 2017 [5.6], this MPA network now far exceeds efforts of other more economically developed nations, as well as international commitments that call for countries to protect at least 10% of their waters by 2020. This network increases protection for over 20 species of whales & dolphins, 20 species of sharks & rays including guitarfish, one of the most threatened families of marine fish, and four species of marine turtles, including the world's largest breeding leatherback turtle population and the Atlantic Ocean's largest breeding olive ridley turtle population [5.5, 5.6]. Prior to designation, many of these species were threatened by high levels of fisheries activity, as well as oil and gas exploration. Gabon has been credited as showing 'great leadership' by taking steps to curtail exploitative and unregulated fishing, while 'guaranteeing the livelihoods of the people of the country – ensuring fisheries are sustained for future generations' [5.5].

Gabon's Minister for Forests, the Sea and the Environment, and former Director of Gabonese National Parks Agency, Professor Lee White, writes [5.7]: *"Through their published work...staff from the University of Exeter played a pivotal role in supporting the Gabon Bleu team to design this comprehensive network of marine protected areas".* He goes on to say, *"...this long-term partnership has been fundamental in ensuring that scientific evidence and international best practice has underpinned new legislation that has increased protection of the natural environment - for which Gabon is now celebrated as a global exemplar."*

Turks and Caicos Islands – Legislative changes to protect breeding marine turtles

Research in TCI was conducted in collaboration with the TCI Government and the Marine Conservation Society (UK), and supported by funding from Defra and NERC. Research on the marine turtle populations and fishery was discussed with local stakeholders, including fishermen and led to recommendations for revisions to the marine turtle fishery that were presented to the TCI Government in 2014 [5.8, 5.9]. These recommendations were accepted and legislation amended to introduce a closed season for the hawksbill turtle fishery from 1st August-31st March [5.8] and amended size limits for both green and hawksbill turtles to protect sub-adult and adult sizes [5.9]. These amendments prohibit the take of the reproductively valuable adults, critical for population recruitment and recovery and include a closed season during peak nesting of the critically endangered hawksbill turtle, ensuring adults of both species that migrate to TCI to breed are not taken at sea.

Director of the Department of Environment and Coastal Resources (DECR), TCI Government, Ms Lormeka Williams [5.10] writes: *"The results of the research partnership were presented to the TCI DECR. Portions of the findings were published in Stringell et al 2013 and 2015, highlighting the need to improve existing legislation to protect breeding adults. Consequently, the TCI amended the legislation in 2014 to introduce a closed season and size limits for marine turtles taken in the fishery... It is believed that the amendments have had a positive impact on our marine turtle populations, protecting breeding turtles in our waters and ensuring our populations are afforded the opportunity to recover."* Mrs Williams concludes the University of Exeter has aided 'policy and management decisions that will have a lasting impact on our marine environment.'

5. Sources to corroborate the impact

Ascension Island

5.1. Letter from Dr Diane Baum, Director of Conservation and Fisheries, Ascension Island Government. Extract:

"...research focusing on the marine environment by the team at the University of Exeter contributed to the designation of a Marine Protected Area around Ascension Island, and the Blue Belt Overseas Symposium co-hosted by the University of Exeter helped to showcase this achievement...."

5.2. Ascension Island Government. 2018 Ascension Island Marine Protected Area evidence options document. This document includes the following statement on the cover page:

"The evidence and options presented here have been developed by Ascension Island Government, with support from the University of Exeter, the Blue Belt Programme delivery partners (MMO and CEFAS), and SAERI's Natural Capital Project"

5.3. Press release from Department for Environment, Food and Rural Affairs, Foreign and Commonwealth Office, The Rt Hon Michael Gove MP and The Rt Hon Jeremy Hunt MP. 14th March 2019: <https://www.gov.uk/government/news/uk-takes-step-forward-in-global-marine-protection>

"The UK Government has backed plans by Ascension Island to designate over 150,000 square miles of its waters as a fully protected 'no-take' Marine Protected Area (MPA) – closing the off-shore area to any fishing activity and safeguarding important marine habitats for future generations".

5.4. Broderick, AC, Patricio, A.R. 2019. *Chelonia mydas*, South Atlantic Population. The IUCN Redlist of threatened species

<https://www.iucnredlist.org/species/142121866/142086337>

Data from Ascension Island were provided for the IUCN RedList assessment for the South Atlantic, incorporating all other data for this species in the region and was led by UoE staff.

Gabon

5.5. National Geographic (2014) <https://blog.nationalgeographic.org/2014/11/12/a-massive-new-marine-protected-area-network-in-gabon/>

Authored by John Robinson, Executive Vice President for Conservation and Science at the Wildlife Conservation Society and Vice President of the IUCN

"Key to this news is the science behind it. The new marine protected area system used data collected over two decades of work by WCS Gabon, Gabon's Agence Nationale de Parcs Nationaux (ANPN) and the University of Exeter to identify priority areas for parks."

5.6. Wildlife Conservation Society Press Release (2017) <https://newsroom.wcs.org/News-Releases/articleType/ArticleView/articleId/10114/Gabon-Announces-Vast-Marine-Protected-Area-Network-at-UN-Ocean-Conference.aspx>

Researchers and technicians from Gabon's Institute for Scientific Research (CENAREST), the National Parks and Fisheries Agencies, WCS, University of Exeter, private fishing and oil companies, and Aventures Sans Frontières and Manga- two local non-governmental organisations (NGOs) specializing in sea turtle conservation- contributed to this work.

5.7. Letter from: Professor Lee White, Minister for Forests, the Sea and the Environment, Government of Gabon and former Director **Agence Nationale des Parcs Nationaux (ANPN)**, Gabon. Extract:

"...this long-term partnership has been fundamental in ensuring that scientific evidence and international best practice has underpinned new legislation that has increased protection of the natural environment - for which Gabon is now celebrated as a global exemplar."

Turks and Caicos Islands

5.8. Fisheries Protection (Hawksbill Turtle) (Close Season) Order 2014.pdf

5.9. Fisheries Protection (Amendment) Regulations 2014.pdf

5.8 and 5.9 are the new and amended regulations that introduce a closed season for hawksbill turtles and an amendment to size limits for both species.

5.10. Letter from Mrs Lormeka Williams, Director of the Department of Environment and Coastal Resources, TCI Government. Extract:

"The project partnership with the University of Exeter has provided the TCI government with scientific evidence in aid of policy and management decisions that will have a lasting impact on our marine environment."