Session 4: Posters not related to a particular topic session

Those posters relating to one of the conference main themes are incorporated in that section. Other posters are included. This section is placed in the sequence at the time of the main poster session (although posters were on display throughout the conference).

The South Atlantic Environmental Research Institute (SAERI) Maria Taylor (South Atlantic Environmental Research Institute (SAERI))
Campaigning against illegal bird trapping in Cyprus Tassos Shialis (BirdLife Cyprus)
6 of UKOTCF's set of 18 posters (other 12 in meeting room) UKOTCF
Living Islands: Environmental and Heritage Tourism, a sustainable economic tool for island communities? Roland Gauvain (Manager, Alderney Wildlife Trust) & Victor Brownlees (CEO, States of Alderney)
The Department of Conservation Services: Who We Are & What We Do Alison Copeland & Drew Pettit (Department of Conservation Services, Bermuda)
Human heritage and the natural environment: interactions and opportunities Pat Reynolds (Heritage People CIC)
Falklands Conservation Esther Bertram (Falklands Conservation)
Off the Grid Research Community Maya Doolub (Guardian Integrators)
Incl. St Helena (Isabel Peters)
Work of Gibraltar Dept of Environment Sera Fromow
JNCC Overseas Territories Programme Tara Pelembe
RSPB UK Overseas Territories Programme Jonathan Hall

Setting up the poster room

The South Atlantic Environmental Research Institute (SAERI)

Maria Taylor (South Atlantic Environmental Research Institute (SAERI))

Taylor, M. 2015. The South Atlantic Environmental Research Institute (SAERI). p 120 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The South Atlantic Environmental Research Institute (SAERI) is an academic organisation based in the Falkland Islands, conducting research in the South Atlantic from the tropics down to the ice in Antarctica. SAERI's remit encompasses environmental research in a variety of disciplines including; marine and terrestrial biology and ecology, oceanography, geology and geomorphology, climatology and upper atmosphere sciences and geographic information systems. It aims to:

- Coordinate and increase the volume and impact of environmental scientific research in the South Atlantic by establishing world class research platforms in each of the UK South Atlantic Overseas Territories.
- Enhance, encourage and promote existing local research activities that will strengthen environmental protection, progress economic development and support policy formulation in the South Atlantic.
- Further develop capacity to conduct environmental research and management, both nationally and internationally.
- Increase international awareness of and involvement in environmental research in the South Atlantic.
- Increase the UK South Atlantic Overseas Territories ability to leverage international funding and commercial contracts.

SAERI currently has eight full time members of staff and four PhD students working on a range of projects and has strong collaborations with the other South Atlantic overseas territories including, Ascension Island, St Helena, Tristan da Cunha and South Georgia & South Sandwich Islands. In the three years since its inception, SAERI has already established strong international collaborations and attracted a number of research grants to increase the output and capacity of environmental science being done across the entire South Atlantic Overseas Territories.

Maria Taylor, Ecologist - BEST III project, South Atlantic Environmental Research Institute - SAERI mtaylor@env.institute.ac.fk

Above: Sea cushion; Left: Orca. Photos: Dr Judith Brown

Campaigning against illegal bird trapping in Cyprus

Tassos Shialis and Natalie Stylianou (BirdLife Cyprus)

Shialis, T. & Stylianou, N. 2015. Campaigning against illegal bird trapping in Cyprus. pp 121-126 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The campaign against illegal bird trapping is one of the key activities of BirdLife Cyprus, as illegal trapping constitutes a persistent phenomenon on the island of Cyprus and poses a serious conservation problem for migratory species along the Africa – Eurasia flyway. The campaign started in 2002, with help from RSPB, and it is separated in three categories: systematic monitoring, awareness-raising and lobbying.

The methods used in Cyprus for bird trapping are limesticks, mist-nets and calling devices. These methods are illegal by both national and EU law because of their non-selective nature and the large-scale killing they contribute to. Field data have shown that at least 152 bird species are affected, of which 78 are threatened. BirdLife Cyprus estimated that 2.5 million birds were killed in 2014 from these methods in Cyprus. The trapped birds are sold as an expensive 'delicacy' known as ambelopoulia by law-breaking restaurants or for domestic consumption, turning this illegal activity into a profitable business of the order of 15 million euros per year (Game Service position paper 2010).

The current situation with illegal trapping of birds is out of control both in the Republic of Cyprus (RoC) and the Eastern Sovereign Base Area (ESBA). Within the RoC, the use of limesticks is widespread and the law-breaking restaurants serving ambelopoulia are found almost entirely in the Republic. As for the ESBA, it has turned into a hard core mist-netting hotspot, where large areas of acacias (*Acacia saligna*) have been planted and managed solely for the purpose of bird-trapping with mist-nets. In the last few years, trapping with mist-nets has increased dramatically within the ESBA. The latest autumn 2014 report of BirdLife Cyprus showed an increase of 199% for autumn 2014 in comparison to 2002, highlighting the industrial scale of trapping that takes place in the ESBA.

Unfortunately the general public still considers this a socially acceptable 'traditional' practice and has the false impression of small-scale trapping with limesticks, whereas the reality is that it has become a demand and supply activity with organised trappers making illegally thousands of euros every year.

It is evident that illegal bird-trapping is a complex problem requiring an array of solutions in order to be addressed. For this reason, BirdLife Cyprus led the initiative in 2013 to develop a national Strategic Action Plan (StAP) to tackle illegal bird-trapping in Cyprus (with funding from the MAVA Foundation). The development of a common and joint strategy to tackle this multi-faceted problem was discussed in detail with all key stakeholders, including enforcement agencies and environmental NGOs. The key actions identified and highlighted in the StAP document include: enforcement, courts, policy, awareness-raising, habitat-management, economic consequence, and monitoring & coordination. Sadly, adoption of this StAP document has been slow and pending since May 2014, mainly due to the lack of political will from the Republic of Cyprus Government. BirdLife Cyprus is intending to make progress in 2015 on the StAP implementation with the stakeholders that have adopted this strategy, including the SBA Administration.

Figure 1. Set mist-net set for illegal bird trapping ©BirdLife Cyprus

Figure 2. Cyprus scops owl Otus scops cyprius*, endemic subspecies, trapped in a set mist-net ©BirdLife Cyprus*

Introduction

The campaign against illegal bird-trapping is one of the key activities of BirdLife Cyprus, as illegal trapping constitutes a persistent phenomenon on the island of Cyprus and poses a serious conservation problem for migratory species along the Africa-Eurasia flyway. The campaign started in 2002, with help from RSPB, and is separated in three categories: systematic monitoring, lobbying and awareness-raising actions.

The methods used for illegal trapping are mist-nets (a method originally intended for bird-ringing and scientific research, used for an illegal purpose, see Figures 1 and 2) and limesticks (see Figure 3). Limesticks are usually made from pomegranate branches covered in a glue-like substance derived from the fruit of the Syrian plum-tree and are placed in bushes and trees which are pruned specifically for this purpose (see Figure 4). In order to multiply the catch trappers nowadays use illegal calling devices to lure birds into the traps.

These methods are illegal by both national and EU law because of their non-selective nature and the large-scale killing they contribute to. Bird-trapping in Cyprus has been illegal since 1974, when legislation on hunting was introduced with Cypriot Law 39/74 and non-selective methods (mist-nets, limesticks and other traps) were prohibited. In 1988 Cyprus ratified the 1979 Bern Convention on the Conservation of European Wildlife and Natural Habitats, adopting a long list of birds as protected, including the blackcap *Sylvia atricapilla* (blackcaps are the main target species of illegal trapping in Cyprus). When Cyprus joined the EU, the Birds Directive was transposed into Cyprus Law, prohibiting anew the use of non-selective methods including mist nets, limesticks and calling devices, as well as the possession of trapping equipment, trapped birds and the trading and eating of trapped birds.

Historically, trapped birds – mostly blackcaps – were a food supplement for the mostly poor island inhabitants living off the land. The practice of bird trapping in Cyprus has been recorded in historical documents from the Middle Ages and even earlier times. However, trapping as practiced in

Figure 3. Red backed shrike Lanius collurio *trapped on limestick ©BirdLife Cyprus*

Figure 4. Limesticks set in a tree for bird trapping ©BirdLife Cyprus

Cyprus today bears no relation to the 'traditional' or historical situation, and the threats faced by migratory birds today are many more than in the past.

Nowadays, bird-trapping in Cyprus is widespread and extensive, contributing to the large scale killing of hundreds of thousands of migratory and wintering birds. This illegal activity has become a profitable business which is controlled to a large extent by the 'big' trappers who are also involved in organised crime. Field data have shown that at least 152 bird species are affected, of which 78 are threatened. BirdLife Cyprus estimated that over 2 million birds were killed in autumn 2014 by these methods in Cyprus (BirdLife Cyprus, March 2015). Autumn is the main trapping period in Cyprus. However, trapping also takes place during spring and winter seasons. The trapped birds are sold as an expensive 'delicacy' known as *ambelopoulia* ('ambelopoulia' refers to approximately 30 different species, which includes the blackcap) by law-breaking restaurants or for domestic consumption, turning this illegal activity into a profitable business of the order of 15 million euros per year (Game and Fauna Service 17/3/2010).

Systematic monitoring

A systematic, continuous surveillance programme regarding illegal bird-trapping in Cyprus was developed and implemented by BirdLife Cyprus and the RSPB, in consultation with the Cyprus Game & Fauna Service and the British Sovereign Base Area (SBA) police at the start of the programme in autumn 2002. The programme applies the 'Bird Trapping Monitoring Protocol' that was developed and has given BirdLife Cyprus the longest record of field data and the ability to deduce reliable long-term trends and to have an overview of the bird trapping situation in Cyprus. BirdLife Cyprus is one of the few environmental organisations that has a systematic monitoring programme for an illegal bird killing activity along the Africa-Eurasia flyway. Figure 5 shows the map where bird-trapping takes place in Cyprus; monitoring is concentrated in the two main areas (numbered 1 and 2) where extensive trapping takes place, due to limited resources:

1. Kokkinochoria area (Eastern Larnaca/ Famagusta area) – this area also includes the Dhekelia Eastern Sovereign Base (ESBA) area), and
2. Ayios Theodoros and Maroni area (Western Larnaca).

The monitoring is undertaken by visiting a random selection of sample squares (1 km^2) within the survey area (total survey area covers 406 km^2) during daytime hours, with a focus on detecting

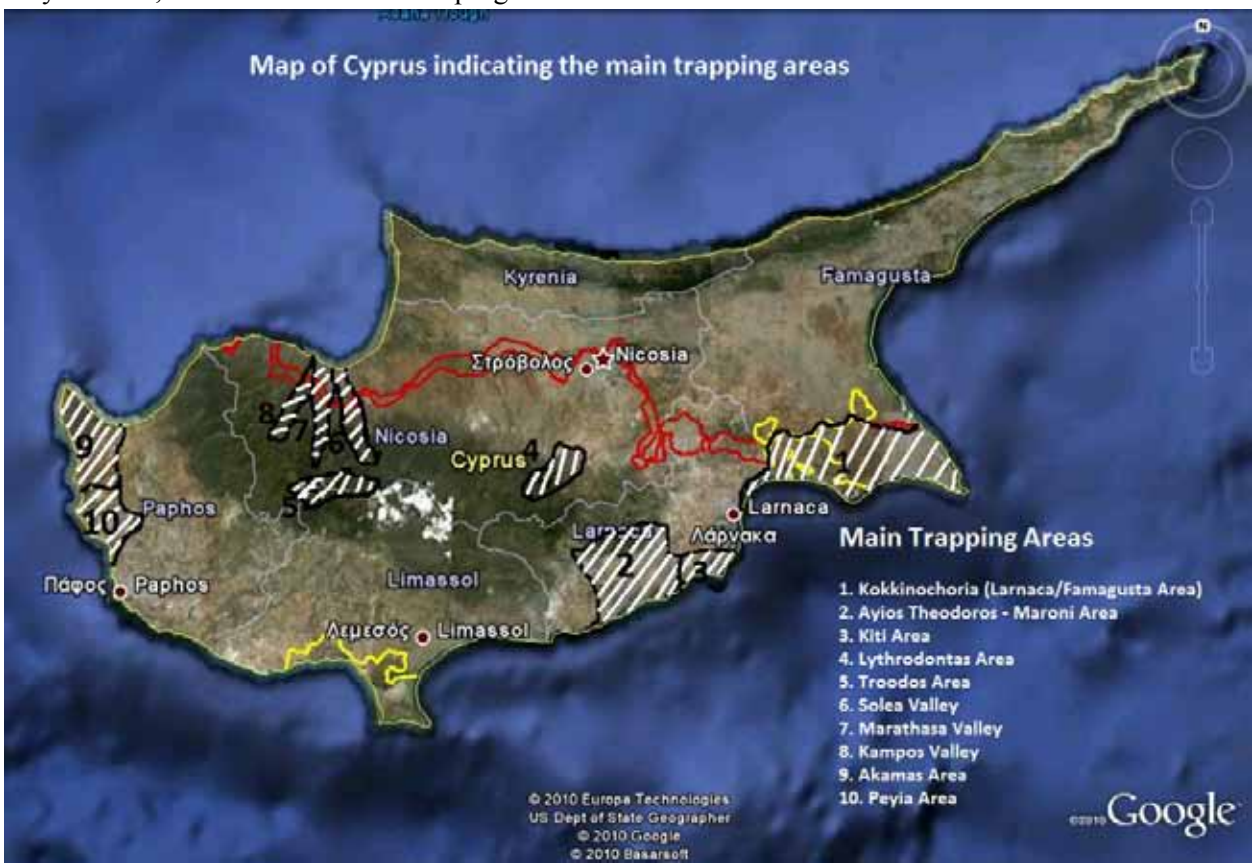

Figure 5. Map of Cyprus showing the main trapping areas – survey area includes no 1 and 2 trapping areas.

mist netting activity, while limesticks are also recorded if detected. The number of squares is stratified to ensure a representative coverage of areas under ESBA administration and the Republic of Cyprus. The project is undertaken in close co-operation with the competent authorities of the Republic of Cyprus (the Game & Fauna Service and the Cyprus Police Anti-poaching unit) and the SBA Police. When trapping paraphernalia is found, the relevant enforcement authorities are informed. It should be noted that the BirdLife Cyprus observers never confront suspected trappers and never remove trapping paraphernalia. BirdLife Cyprus would like to thank the RSPB for supporting the project financially since the beginning, and NABU (partner of BirdLife International in Germany) and the Heinz Sielmann Stiftung Foundation for their financial support from 2013 onwards.

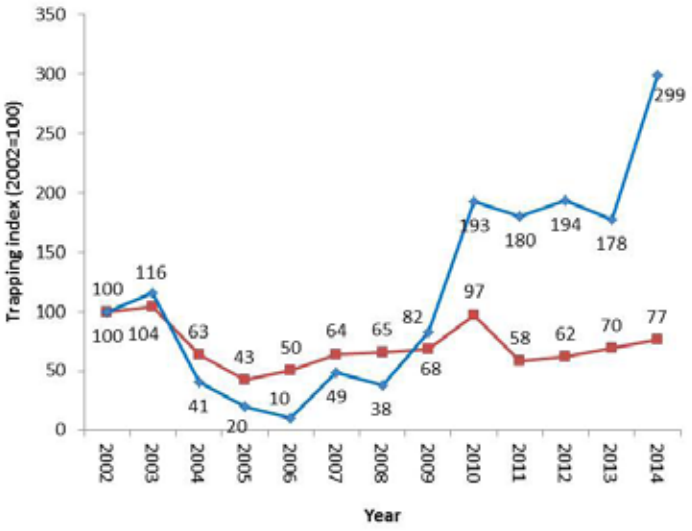

Figure 7. Trends in trapping activity for mist-netting within the Republic of Cyprus (RoC - red) and within the UK Dhekelia Sovereign Base Area (SBA - blue) (BirdLife Cyprus, March 2015).

Autumn 2014 trapping report

The autumn 2014 trapping report (BirdLife Cyprus, March 2015) shows a dramatic situation of illegal trapping taking place at record levels. The analysis of the survey data showed that 16km of net-rides were active during the autumn season of 2014 within the survey area. More than 6,000 limesticks were reported from enforcement agencies and other NGOs, underlining the extensive and industrial use of mist-nests and limesticks taking place. With these trapping levels, BirdLife Cyprus estimated that over 2 million birds could have been killed across the whole of Cyprus in autumn 2014.

Illegal trapping of birds is out of control both in the Republic of Cyprus (RoC) and the Eastern Sovereign Base Areas (SBA). Within the RoC the use of limesticks is widespread and the law breaking restaurants serving *ambelopoulia* are found almost entirely in the Republic. As for the Eastern SBA, it has turned into a hard-core mist-netting hotspot, where large areas of acacias (*Acacia saligna*) have been planted and managed solely for the purpose of bird-trapping with mist nets (see Figure 6). In the last few years trapping with mist-nets has increased dramatically within the ESBA. The latest autumn 2014 report of BirdLife Cyprus showed an increase of 199% for autumn 2014 in comparison to 2002, highlighting the industrial scale of trapping that takes place in the Eastern SBA (see Figure 7).

Figure 6. Acacia saligna *has been planted and managed solely for the purpose of bird trapping with mist-nets*

Lobbying - Strategic Action Plan (StAP) for tackling illegal bird-trapping in Cyprus

It is evident that illegal bird-trapping has become a persistent and complex problem requiring an array of solutions in order to be addressed. For this reason, BirdLife Cyprus led the initiative in 2013 to develop a national Strategic Action Plan (StAP) to tackle illegal bird trapping in Cyprus (with funding from the MAVA Foundation – see Figure 8). The development of a common and joint strategy to tackle this multi-faceted problem was discussed in detail with all key stakeholders, including enforcement agencies and environmental NGOs, and the following key elements were identified to be included in the strategy: enforcement, courts, policy, awareness raising, habitat management, economic aspects and monitoring & coordination.

A Final StAP document for adoption was sent to all key stakeholders (enforcement agencies,

Figure 8. Workshop on 24th April 2013 for the development of a Strategic Action Plan (StAP) to tackle illegal bird trapping © BirdLife Cyprus

environmental NGOs etc) since April 2014, and most of the stakeholders adopted it, including the UK Sovereign Base Areas Administration. A major obstacle has been the lack of political support from the Cyprus Government, which has impeded any progress for this initiative. On the contrary, the Council of Ministers of the Republic of Cyprus has approved a catastrophic StAP on the 13th May 2015, by including the possibility of legalising hunting of blackcaps with the use of a derogation (Article 9 of the Birds Directive), without any prior consultation with any of the stakeholders which participated in this initiative. Lobbying from the environmental NGOs in Cyprus is now focused on the withdrawal of this derogation that has been included unilaterally in the approved strategic plan by the Council of Ministers of the Republic of Cyprus, and to approve the StAP that was discussed and agreed by all the stakeholders during the 2013-2014 consultation.

Awareness-raising

Sadly, the general public still considers illegal bird trapping a socially acceptable 'traditional' practice and does not consider it a serious problem, with false impressions about the extent, scale and impact of this practice. Public awareness is key to solving this issue and to make the general public realise that it has become an illegal demand and supply activity with huge tax free profits being made from organised trappers. In addition, according to a study done by an environmental NGO, *Terra Cypria*, the losses in revenue due to the bad reputation created from trapping range between 40 to 100 million euros every year (*Terra Cypria*, May 2011).

The awareness-raising element of the anti-trapping campaign includes the development and dissemination of information material (leaflets, stickers), advertising (newspaper, online, highway billboards, radio spots), promotion in social media (Facebook, Twitter), organisation of social events and presentations at targeted groups (schools, local communities). With regards to schools (see Figure 9), BirdLife Cyprus has developed an educational package (presentation, animation film and bird migration board game) and is targeting the schools in the areas of Larnaca and Famagusta that are trapping hotspots, in an effort to stop the recruitment of future trappers and poachers, as well as schools in the city of Nicosia in an effort to reconnect city children to nature.

BirdLife Cyprus is a registered, non-governmental, not for profit organisation (NGO) that dedicates itself to the conservation of wild birds and their habitats in Cyprus. It was formed in 2003 through the merger of the two Cyprus Ornithological Societies and now has offices in Strakka, Nicosia comprised by professional staff. www.birdlifecyprus.org/.

Figure 9. Children playing the board game after a presentation at a primary school. ©BirdLife Cyprus

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BirdLife Cyprus, March 2015. Update on illegal bird trapping activity in Cyprus - Covering the autumn 2014 findings of BirdLife Cyprus' continuing monitoring programme for illegal bird trapping in Cyprus and providing an overview of the latest developments regarding the problem. http://www.birdlifecyprus.org/upload/Trapping%20Reports/Autumn2014TrappingReport.pdf.

Cyprus Game and Fauna Service. 17/3/2010. Position paper regarding the 'Law modification for the Protection and Management of Wild Birds and Game legislation'.

Terra Cypria, May 2011. The impacts on the economy of Cyprus from the illegal trapping and slaughter of migratory birds of Europe.

Set of display boards

UK Overseas Territories Conservation Forum

UKOTCF 2015. Set of display boards. p 127 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

One board for each of most UKOTs, and three as cross-territory introductions. These boards can be viewed at www.ukotcf.org/territories/index.htm

Living Islands: Environmental and Heritage Tourism, a sustainable economic tool for island communities?

Roland Gauvain (Manager, Alderney Wildlife Trust) & Victor Brownlees (CEO, States of Alderney)

Roland Gauvain

Victor Brownlees

Gauvain, R. & Brownlees, V. 2015. *Living Islands*: Environmental and Heritage Tourism, a sustainable economic tool for island communities? pp 128-131 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The *Living Islands* Project is a joint undertaking by the Royal Society of Wildlife Trusts, the Alderney Wildlife Trust and the States of Alderney, working in partnership with the island's heritage organisation (the Alderney Society), and was created as a mechanism by which local government and the Wildlife Trusts could explore the scope and sustainability of using existing interest in heritage and natural history related tourism. From this point the project aimed to create a strong economic impetus for government and island community better to protect, and potentially develop, the island's key ecological and historic resources for their long-term value to the island's economy and the quality of life experienced by both visitors and islanders. The project looked to utilise the existing organisational structures and resources of government and non-governmental organisations to deliver its aims and, in doing so, strengthen the ties between the organisations and create a multiplier effect through mutual co-operative working.

This poster will look at the lessons learned from the project, and the future developments it has led to within the Alderney context, with a view to potential case study value of the project for the wider CDs and UKOTs.

Roland Gauvain, Trust Manager, Alderney Wildlife Trust. manager@alderneywildlife.org
Victor Brownlees, Chief Executive, States of Alderney. Victor.Brownlees@gov.gg

This 2-year Heritage and Natural History Tourism project is attempting to link the island's heritage historic and wildlife resources with Alderney's tourism effort in a sustainable effort manner between government and NGOs.

Partners

States of Alderney – Core Funder (funded £10,000 Research Development Assessment, £50,000 over 2 years *Living Islands* and a further £10,000 towards project development costs): Aim to develop previously under-developed aspects of Alderney's resource, both physical and economic (*i.e.* tourism), with a view to developing a unique selling point for the Island's tourism/ marketing strategy and developing closer working links with NGOs in the sector.

Royal Society of Wildlife Trusts (RSWT) – Core funder (£50,000 over 2 years Strategic

Puffins on Burhou © AWT Ltd (Photographer Bill Black)

Development Fund): Aim to develop stronger links between the island Trusts and wider movement by exploring the development of Wildlife Tourism and joint working practices with local government in order to deliver movement wide local sustainability.

Alderney Wildlife Trust (AWT) - Key Partner and project originator (in excess of 5,000hrs of staff and volunteer support commitment): Aim to establish a clear link between Alderney's natural environment and the island's long term economic sustainability and in doing so develop closer links with government with a view to developing the AWT's commercial viability (*i.e.* service provision).

Alderney Society (AS) – Key Partner (in excess of 2,000hrs staff and volunteer support): To Aim to secure the future of several key historic sites and to develop closer links with government.

Research Base

Core to the project was an understanding of the existing tourism market and its value when considered in the light of the island's natural and heritage resource. A Research Development Assessment (RDA) was undertaken in 2013 by Yorkshire Wildlife Trust and Leeds Metropolitan University.

The RDA utilised both visitor questionnaires and an assessment of established metrics, such as airport and harbour passenger figures, to establish the existing market value of these forms of tourism to Alderney. The results were surprisingly strong and helped to strengthen the argument for Government involvement in the project and also created greater interest from the resident community Tables 1 & 2).

The RDA confirmed worrying trends such as the declining number of visitors and the reduction

Visitor type	Number of visitor days (leisure visitors only)	Total spend	% linked to wildlife	Value of wildlife tourism
Day visitors	7,213	£ 355,754	25%	£ 88,938
Overnight tourists	66,531	£ 10,196,399	25%	£ 2,549,100
Total	**73,744**	**£ 10,552,153**		**£ 2,638,038**

Table 1. Estimated contribution of wildlife tourism to Alderney

Visitor type	Number of visitor days (leisure visitors only)	Total spend	% linked to heritage	Value of heritage tourism
Day visitors	7,213	£ 355,754	18%	£ 64,036
Overnight tourists	66,531	£ 10,196,399	18%	£ 1,835,352
Total	**73,744**	**£ 10,552,153**		**£ 1,899,388**

Table 2. Estimated contribution of heritage tourism to Alderney

Mode	2006	2007	2008	2009	2010	2011	2012	7 year average		Estimated arrivals
Ferry	7,313	4,241	4,306	3,665	3,587	3,160	3,357	4,233	**pax**	**4,233**
Crew	22,640	15,826	28,450	30,105	29,380	26,680	19,620	24,672	**nights**	**8,224**
Other sea	309	42	4,458	3,016	2,342	2,806	2,989	2,280	**pax**	**2,280**
Air	37,442	39,877	38,202	36,870	34,351	34,422	31,847	36,144	pax	**36,144**

Table 3. Passenger numbers air and sea extracted from airline and harbour records (extract Alderney RDA 2013)

(Above and right) The development of key sites, such as the Cambridge Battery Fort, have been crucial not only to visitor interest but also in engaging the local population in the project. A wide variety of volunteer groups was engaged with the practical work of the project, and existing effort and staff from Government departments were also involved, even volunteering their effort out of hours.

in available beds accross all sectors (Table 3). However, it also helped to clarify the lack of existing metrics which could be used to assess the tourist market on Alderney and helped to set measures by which the project's success could reasonably be assessed.

Principal Achievements

- Significantly raised Alderney's profile across the Channel Islands, south coast of England and Normandy/Brittany and also achieved good national coverage overall. This has primarily been achieved through:
  - Direct contact with press (travel and general) and heritage/wildlife tour companies who manage their own marketing.
  - Social media (Facebook & Twitter) and website
  - Word of mouth from satisfied visitors
  - Television; particular success was achieved with French Television and in coverage for the commemoration of the island's Evacuation during WWII
  - Joint working on media coverage with partners to put out a brand image when dealing with diverse fringe publicity, *i.e.* heavy media coverage for new seabird tagging project co-ordinated with Visit Alderney and *Living Islands* to gain added benefit.
- Has helped to begin the process of better describing key aspects of Alderney's natural and heritage resource (*i.e.* defining specific sites and buildings) and their value to the

Good coverage in UK and French press

Collaborative working ensured increased TV coverage: BBC Natural History Unit.

island in the mind of the project partners and the island community

- Posed questions to politicians as to the value and role tourism should play in the island's economic and development strategy
- Has significantly strengthened relationship between the project partners on island, most especially the States of Alderney and the AWT
- Developed new visitor opportunities through wildlife and heritage tour companies
- Improvement of the resource, and access to the resource, *e.g.* 2 significant historic sites preserved and opened to the public
- Started the process of joint management planning between the States of Alderney and AWT on countryside access, areas of common access and wildflower significance etc.

The problems we have encountered

- Scope of the project too broad and the partnership roles lacked definition, leading to confusion at times. This was especially important given the diversity of the partners involved and gave rise to points of friction.
- In an attempt to deal with issues and problems generated by the broad partnerships involved, and with a mind to the creation of an 'equal' footing between partners, the project ran into the pitfall issue of structural over-engineering. This in turn created a lack of flexibility which caused complications for the project team.
- Goals too wide and all-encompassing; this has led to a number of goals being removed at the first year review.
- The development of measures through which to assess not only the *Living Islands* project but broader tourism impacts on the island. Whilst simple measures have been successfully established, little progress has been achieved on metrics such as airport-user statistics. This has been largely due to transport providers' inflexibility and resource constraints but will be a primary concern to address in 2016.

Living Islands Into the Future

It can be argued that the complexity and scope of the *Living Islands* project went well beyond what was first envisaged. The ensuing problems, though limiting certain aspects of the proposed work, did not however prevent the project having a significant net benefit to the project partners.

On island tourism numbers in the niche markets have apparently increased (figures currently under assessment as part of project conclusion). Visitor satisfaction has improved when measured from 2013-15, and there has been a real increase in understanding of the value of the *Living Islands* resource amongst the island's resident population.

Responding to this success, the States of Alderney has agreed to adopt formally the project to become a mainstay of its tourism and marketing programme 2016/17 with the on-island partners continuing to grow their support.

The outcomes of the project will also be incorporated into a case-study in the development of wildlife tourism and inter-government/NGO relationships for use by the Island Wildlife Trust's across the British Isles.

Developing infra-structure to allow for the Living Islands *'experience' was vital.*

The Department of Conservation Services: Who We Are & What We Do

Alison Copeland & Drew Pettit (Department of Conservation Services, Bermuda)

Copeland, A. & Pettit, D. 2015. The Department of Conservation Services: Who We Are & What We Do. pp 132-133 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The Department of Conservation Services (DCS) was created in 2002 following the division of the former Department of Agriculture and Fisheries. At present, the Department is within the Ministry of Health, Seniors and the Environment. The Department is responsible for managing the Bermuda Government's field ecology programmes, the Bermuda Aquarium, Museum and Zoo (BAMZ), government nature reserves and maritime cultural heritage (shipwrecks). The Department of Conservation Services is unique within the Bermuda Government as it works in a dynamic collaboration using Government, NGO and volunteer resources to carry out its mandate. That mandate includes research, education, advocacy and restoration of threatened habitats and species.

The major components of the Department are the Ecology Section (16 employees) and the Bermuda Aquarium, Museum and Zoo (29 staff). The AZA-accredited Bermuda Aquarium, Museum and Zoo is one of Bermuda's top tourist attractions and one of its finest environmental education facilities. Additionally the Natural History Museum and library act as a repository for biodiversity data, including physical specimens, multimedia and publications. BAMZ has two support charities, the Bermuda Zoological Society and the Atlantic Conservation Partnership, which deliver high-quality environmental education and visitor outreach programmes, and provide vital fund-raising and volunteer support.

The Ecology Section of DCS is charged with managing the Government nature reserve system and historic shipwreck sites. DCS staff provide consultations on planning matters related to the marine and terrestrial environment, marine heritage and arable land. The ecology section manages a number of invasive species control programmes and protected species recovery programmes, which are supported by in-house services such as GIS mapping and wildlife rehabilitation. DCS provides oversight and enforcement of several pieces of legislation, particularly the Protected Species Act 2003, Historic Wrecks Act 2001 and Protection of Birds Act 1975.

Alison Copeland, Biodiversity Officer, Dept of Conservation Services, Government of Bermuda aicopeland@gov.bm

Mission Statement

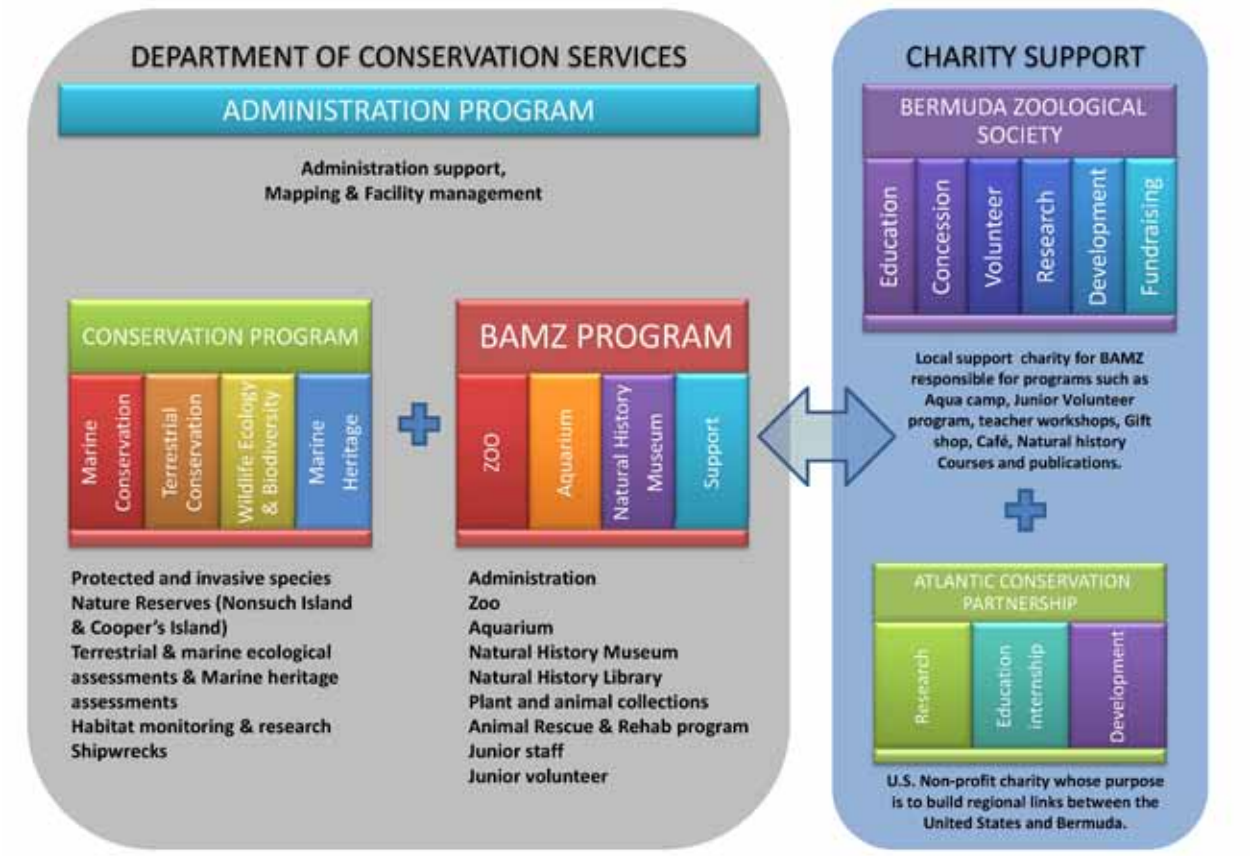
To conserve and promote Bermuda's Natural and Marine Heritage through research, education, advocacy and restoration.

Purpose

The primary purpose of the Department of Conservation Services is to conserve Bermuda's ecosystems, its plants, animals and their critical habitat.

The Department is responsible for managing the Government's field ecology programmes, the Bermuda Aquarium, Museum & Zoo (BAMZ), Government nature reserves and underwater cultural heritage (shipwrecks).

The mandate of the Department can be broken into the following functions, that being to research,



educate and advocate for the preservation of Bermuda's biodiversity, management of invasive species and underwater heritage while working to restore threatened habitats.

Biodiversity (or biological diversity)

Refers to the variety of life. It includes all the millions of animal, plant and microbial species on Earth, and includes the diversity found between individuals of the same species (their genetic diversity), as well as the diversity between different species and of habitats and larger eco-systems of which they are all a part.

Protecting Bermuda's Biodiversity

Bermuda's efforts to preserve its unique ecology are guided by the Bermuda Biodiversity Action Plan (BAP). Developed in 2003, the BAP is a blue-print to guide the island's efforts to preserve threatened species and habitats through research, monitoring, education and restoration..

For information on the Bermuda Biodiversity Action Plan or to find out more about Bermuda's interesting species and habitats, visit www.conservation.bm

Human heritage and the natural environment: interactions and opportunities

Pat Reynolds (Heritage People CIC)

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This poster explores the interactions between human heritage and the natural environment, and the opportunities to enhance the sustainability of both through integrated management.

Human heritage covers diverse areas:

- below ground archaeology;
- above ground archaeology, including buildings and monuments;
- landscape archaeology;
- objects;
- archives (including video, sound and visual archives);
- languages and dialects;
- stories and jokes;
- songs, music, dance and other performances;
- rituals and festive events and other social practices (including food and drink);
- knowledge and practices concerning nature and the universe; and
- craft skills.

These areas of heritage are often interlinked – a historic building may, for example, be the focus of a festive event involving music on historic instruments which are maintained using traditional craft skills. The poster argues that the histories and environments of the UK Overseas Territories have lead to patterns of heritage which would benefit from an integrated management approach, which would particularly address the sustainability of intangible cultural heritage (the lower part of the list above – heritage which exists in people, rather than things). The relationships between heritage and environment and other areas, including tourism and health are also noted.

The poster explores the potential for collaboration and co-operation between the UKOT bodies with an interest in heritage.

The poster concludes with introducing the work of Heritage People, a newly established Community Interest Company which seeks to support governments and NGOs wishing to improve understanding of heritage and/or heritage management. Heritage People CIC is particularly interested in supporting partners from UK Overseas Territories. This includes ways to meet the information needs of those involved with managing heritage as governments, NGOs or individuals. Heritage People and UKOTCF are in touch to explore coordinating help to territories.

Heritage People CIC contact details:
info@heritagepeople.co.uk, +44 1904 541411

Human heritage and the environment are closely intertwined. There are opportunities to enhance the sustainability of both through integrated management.

What is human heritage?

Some answers -

- below ground archaeology: *Figure 1 (Wessex Archaeology)*

- above ground archaeology, including buildings and monuments: *Figure 2 (All 'cc' and unattributed images Attribution-Non-Commercial-ShareAlike 4.0 International: CC BY-NC-SA 4.0)*

- landscape archaeology: *Figure 3*

- objects: *Figure 4*

- archives (including video, sound, oral history and visual archives): *Figure 5*

- languages and dialects: *Figure 6 (cc Shirozazan)*

- stories and jokes: *Figure 7 on next page (cc Melanie Holtsman)*

- songs, music, dance and other performances: *Figure 8 (cc Jtrant)*

- rituals and festive events and other social practices (including food and drink): *Figure 9*

- knowledge and practices concerning nature and the universe: *Figure 10 in next column (permission Nuttunbaffin.com)* ; and

- craft skills: *Figure 11.*

These areas of heritage are often interlinked – a historic building may, for example, be the focus of a festive event involving music on historic instruments which are maintained using traditional craft skills.

Human heritage is inseparable from its environment because material and immaterial culture are produced by humans living in an environment or environments. Human heritage in the UK Overseas Territories is as diverse as the landscapes and seascapes of the UKOT, but heritage here shares some common features:

- Expert knowledge of the local terrain and waters have been key for survival
- Rooted in close connection to local environmental resources for building materials, foods, crafts, etc – often a continuing connection (or until fairly recently)
- Lack of economic resources and natural disasters have resulted in communities with a rich intangible heritage, and less reliance on

material culture for identity

- Local isolation/Global integration: – island communities with common heritage of globalisation, colonisation, migration, and often of slavery.

The poster argues that the histories and environments of the UK Overseas Territories have led to patterns of heritage which would benefit from an integrated management approach, which would particularly address the sustainability of intangible cultural heritage (the lower part of the list above – heritage which exists in people, rather than things).

Secondary benefits from human heritage include:

Health – dance, food production as activity, etc.

Health – eating fresh local produce, traditional medicines, complimentary therapies

Health – community support, identity, self worth, respect

Economic – use of resources which would otherwise need import, or not be exploited

Economic – added value for tourists focussed on environment or heritage, deepening experience, 'bad weather' options, etc.

What is integrated heritage management?

An integrated heritage management plan, which acknowledges and builds upon the linkages between environment and human heritage, and additional linkages to economy and health could be more sustainable than traditional management

- more economically sustainable
- more socially sustainable
- more environmentally sustainable.

Integrated nature of government in many Overseas Territories, and integrated nature of NGOs with responsibility for environment and human heritage in many Overseas Territories could make integrated heritage management easier to plan and to implement.

Heritage People CIC and UKOTCF are exploring ways of coordinating help to territories. Collaborations and cooperation could include skill sharing, resource sharing, common procurement, programmes and projects, Heritage People, a newly established Community Interest Company which seeks to support governments and NGOs wishing to improve understanding of heritage and/or heritage management. Heritage People CIC is particularly interested in supporting partners from UK Overseas Territories. This includes ways to meet the information needs of those involved with managing heritage as governments, NGOs or individuals.

Falklands Conservation

Esther Bertram (Falklands Conservation)

Bertram, E. 2015. Falklands Conservation. p 138 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Falklands Conservation is an NGO that works in partnership with the local community to take action to conserve land and seascapes for future generations. We work to achieve this through advocacy and providing advice to government on a range of industry activities occurring on the islands, such as the developing hydrocarbons industry and through supporting the implementation of the Falkland Islands Biodiversity Strategy, through research and planning. In addition we undertake outreach activities with our youth group and with local volunteers to carry out practical conservation such as replanting native tussac grass, essential for wildlife.

Esther Bertram, CEO, Falklands Conservation
CEO@conservation.org.fk

Off the Grid Research Community

Maya Doolub (Guardian Integrators)

Doolub, M. 2015. Off the Grid Research Community. p 139 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

About Guardian Integrators

Guardian Integrators (GI) is a for-profit organisation working to address climate change issues through market-based solutions. GI develops and implements a sustainable solutions-based programme dedicated to reducing island dependency on imports, particularly energy and food, and developing opportunities for economic growth on island. GI brings together expertise from around the world, forming a team of individuals who have worked with a number of organisations as part of the critical drive to demonstrate both the necessity for a response to climate change, and the economic opportunity that this presents.

About Guardian Integrators Off the Grid Communities

GI is a sustainability solutions programme focussed on creating Off the Grid Communities on islands.

The GI programme seeks to:

I. Develop a platform of commercial opportunities within the tourism sector by bringing together local expertise and talent with regional and global initiatives, focussing on eco-tourism, marine tourism, agri-tourism and cultural tourism

II. Integrate utilities and infrastructure in order to maximise efficiency of systems and technologies, resulting in reduced capital and operational costs and demonstrating a high performance 'utility and infrastructure ecosystem'

III. Demonstrate that sustainability solutions are profitable and present key economic opportunities on island, enhancing local job markets and skills

About Guardian Off the Grid Research Communities

GI are working to establish Off the Grid Research Communities which are:

- Self-funded, capital independent
- Inclusive of island and regional culture and fishing heritage
- Dedicated to protecting, restoring and managing island 'ecosystem services'
- Aligned with the objectives of regional and global oceans research organisations, presenting excellent opportunity for collaboration
- Designed to provide on the job training for local communities
- Demonstrate that sustainability solutions are profitable and present key economic opportunities on islands, enhancing local job markets and skills

Contact: maya@guardianintegrators.com

Work of Gibraltar Department of Environment

Anon. 2015. Work of Gibraltar Department of Environment. p 140 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

A series of posters and video material on the Department's work

JNCC Overseas Territories Programme

Pelembe, T. 2015. JNCC Overseas Territories Programme. p 141 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

(This poster-set was withdrawn at the start of the conference.)

RSPB UK Overseas Territories Programme

Anon. 2015. RSPB UK Overseas Territories Programme. p 142 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

A series of posters on the RSPB's work

The poster room overflows at refreshment break time before the field-trips.

Session 6: UKOTCF's Southern Oceans Working Group

Chairman: Nigel Haywood

Joint Secretaries: Sarah Barnsley & Tim Earl

The discussions at the Southern Oceans Working Group contributed to the Conclusions and Recommendations, and relevant points are incorporated in that section. Other discussions have been reported in the minutes of the meeting, circulated to participants and other members of SOWG.

From left: Tim Earl, Nigel Haywood, Sarah Barnsley

Above and next page:SOWG in session

Session 7: Conservation and Sustainable Use of Terrestrial Resources

Chairing & facilitating team: Kathleen McNary Wood (Turks & Caicos Islands), Esther Bertram (Falkland Islands), Farah Mukhida (Anguilla)

Environmental Sustainability: through the application of economic valuations – Ms Sharmer Fleming (Government of Anguilla, Department of Environment)
A New Framework for the Conservation of Species and Habitats in the Cayman Islands – Gina Ebanks-Petrie (Cayman Islands Department of Environment)
Attempts to achieve Management of protected Areas to Support Sustainable Economies - and discovering the realities of managing an EU funded project in a small Caribbean territory – Nancy Woodfield Pascoe (National Parks Trust of the Virgin Islands)
Ecosystem effects of eradicating invasive species – Jennifer Lee (Government of South Georgia & the South Sandwich Islands)
Establishing Stakeholders as Conservation Stewards – Amy Avenant, Katharine Hart, (Department of Environment & Maritime Affairs) and Kathleen Wood (SWA Ltd, Turks & Caicos Islands; UKOTCF) [This presentation will also link terrestrial & marine, the latter topic being mainly in the following session, after lunch.]
The Governor Laffan's Fern Recovery Project Alison Copeland[1],Margaret From[2] & Kimberly Burch[3] ([1] Department of Conservation Services, Bermuda; [2] Rare plant research lab, Omaha's Henry Doorly Zoo, USA; [3] Department of Environmental Protection, Bermuda)
Rediscovery of the Bermuda Land Snail *Poecilozonites bermudensis* Mark Outerbridge (Department of Conservation Services, Bermuda)
Attempts to achieve Management of protected Areas to Support Sustainable Economies - and discovering the realities of managing an EU funded project in a small Caribbean territory Nancy Woodfield Pascoe (National Parks Trust of the Virgin Islands)
Golden, spikey and blushing – Conserving the invertebrate of the UKOTs Vicky Kindemba (Buglife)

From left: Kathleen McNary Wood, Esther Bertram, Farah Mukhida

Environmental Sustainability: through the application of economic valuations

Ms Sharmer Fleming (Government of Anguilla, Department of Environment)

Fleming, S. 2015. Environmental Sustainability: through the application of economic valuations. pp 146-151 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Small Island Developing States (SIDS) are faced with limited resources for environmental and economic prosperity. Therefore, to achieve sustainable development effectively, there must be a distinct balance between development and the wise use of the island's natural capital. Achieving this requires mainstreaming the natural environment in the decision-making process, and the implementation of a National Development Plan (NDP) with priority consideration given to the environment and its services.

The Government of Anguilla has begun the process towards achieving sustainable development. This was started with the execution of a Greening Economy Workshop. The resulting report and a cadre of other projects (Tourism Value of Ecosystems in Anguilla, Valuation of Ecosystem Services in Anguilla and the production of Valuation Maps of Ecosystems and Ecosystem Services) have formed the foundation towards achieving sustainable development. These too are encapsulated in the Anguilla National Ecosystem Assessment (ANEA) Project which aims to develop a framework for the NDP.

There are key steps to conducting economic valuations. In relation to Anguilla, these have been done using a series of methodological approaches that are applicable to SIDS. However, key to this process is the involvement of stakeholders. The use of economic valuation tools such as: the Choice Experiment - Willingness to Pay Approach, as well as Geographical Information Systems and Remote Sensing, which are equally important in illustrating the economic status of key ecosystems. By applying these methodologies, Anguilla is progressing towards understanding the monetary and non-monetary value of the natural environment, in terms of the key ecosystems and their services. The knowledge gained and information compiled thus far are crucial for the National Development Plan and advancement in environmental conservation.

Key Words: Sustainable Development; National Development Plan; Natural Capital; Economic Valuations; Ecosystems; Ecosystem Services

Ms Sharmer Fleming, Co-ordinator Environment & Sustainable Development, Anguilla Department of Environment Sharmer.fleming@gov.ai

Introduction

Small Island Developing States (SIDS) such as Anguilla are heavily reliant on their natural resources for societal well-being and economic prosperity. However, there is a delicate balance between environmental conservation and degradation within these islands. This is due to their smallness, fragile environs and limited resources to allow for economic diversification and development. The interconnectivity of the island's ecosystems and their fragility to external shocks further places them in a peculiar position, whereby developmental decisions often results in some degree of environmental degradation.

As articulated by van Buekering *et al.* (2007), the application of monetary values to environmental and social impacts increases the chances for their effects to be considered in the decision-making process. This paper reports on the ecosystem valuation study conducted in the Caribbean

Figure 1. Image of Anguilla. Source: Department of Environment, 2014

UKOT Anguilla, titled 'The Tourism Value of Nature in Anguilla and the impact of beach erosion'. It serves to inform the other UKOTs on the methodology used, results discovered and lessons learnt, while illustrating the usefulness of economic valuations to alleviate environmental degradation and promote environmental sustainability.

Rationale for Conducting Ecosystem Economic Valuation

Anguilla is the most northerly of the Eastern Caribbean islands. It is of small size (35 square miles), under-developed and fairly isolated. Surrounded by 75km of coast, the island can be considered to be coastal in its entirety. It has very few land-based natural resources, but a breath-taking landscape and distinctive natural assets (Figure 1). These key resources have resulted in the development of a renowned tourist industry in Anguilla, an industry which is now the mainstay of the economy.

However, coastal erosion is a growing concern in Anguilla (Figure 2). The need to restore the once vibrant coral reef ecosystems, implement coastal management plans (coastal setbacks) and enforce proper land-use practices have been discussed relentlessly. Despite this, pre-emptive actions by the decision-makers are in the infancy stage. In fact, development still continues without thorough consideration being given to environmental conservation. This is a typical example of an environmental degradation for fiscal gains.

The degradation of ecosystem services and biodiversity has increased tremendously in recent times. The fact that SIDS are profoundly dependent on their ecosystems and are commonly regarded as biodiversity 'hotspots' is a cause for apprehension. This has been recognised by the United Kingdom Government, which has dedicated resources through the Joint Nature Conservation Committee (JNCC) to work with each of the UKOT Governments. The project managed by JNCC aimed to develop an understanding of the economic value of the natural environment in the UKOTs, the threats and options available for the management of those threats, and to enable environmental issues to be integrated in strategic decisions.

CANARI was contracted to conduct the assessment in Anguilla. A key finding of that assessment was that there is a poor weighting given to environmental issues than to fiscal issues in decision-making in Anguilla. The final report concluded also that the importance of the

Figure 2. Beach erosion impact on Upper Shoal Bay East Beach: 2002 (left) compared with 2015 (right). Sources: N. Envoy (2002); Department of Environment (2015)

success of actions is strongly dependent on a change in commitment of key policy-makers to give conservation of the natural environment a high priority in decision making (CANARI 2013).

Methodology

There are a number of methods that can be used to conduct an ecosystem economic valuation. For the purpose the study conducted, the choice experiment (modelling) was used.

Logical Framework

The approach used was quite similar to the methodology developed by Waite *et al.* (2014) for conducting the coastal ecosystem valuation to inform decision making in the Caribbean. It comprised of three distinct stages; scoping, analysis and outreach and use of results.

1. Scoping

This component established the context for conducting the ecosystem economic valuation study. The policy question was identified, all relevant studies were reviewed and the target group and key decision makers were recognised.

> ***Policy Question:*** What is the value of Anguilla's beaches to the Tourist Industry?
>
> ***Target Audiences:*** Six beaches were strategically selected for this study. The tourist visiting those beaches was the target audience.
>
> ***Informing Decision Makers:*** Prior to conducting the study, the consultants delivered a formal presentation on ecosystems economic valuation work done in Bonaire. Through this means, the consultants deliberated on the effectiveness of economic valuations and the applicability to Anguilla.

2. Analysis

At this stage, the scenarios were developed and the most suitable valuation method was selected. The data were collected, analysed and reported in a clear manner. The appropriate decision support tools were developed and applied. In addition, the changes in the specific ecosystem service were analysed.

a. Evaluation Method

Economic valuations are regarded as anthropocentric because human use and enjoyment of environmental services determines their economic value. In this instance, the economic value can be measured by the amount of money an individual is willing to pay for a good or service. Due to this, the choice experiment (modelling) evaluation method was used.

Choice experiments allow one to elicit the preferences for goods and services by studying the choices made by the respondents in the survey. As it pertains to the environment, the choice experiment presents a description of a hypothetical scenario concerning the management of a resource to the respondent. The respondent is given a number of choice sets (Figure 3) related to the different management scenarios. Each choice set contains alternatives which are described by unique combinations of attributes at different levels.

b. Analyse of changes in ecosystem services

As an addendum to the study, an analysis of the beach changes that have occurred during the period 2003 to 2013 was completed, to put into perspective the dynamic nature the beaches used in the study. This was important because, although ecosystem economic valuations are useful, they are not sufficient for coherent and consistent choices for the environment. Hence, other supporting evidence is essential.

c. Collect and analyse data

Questionnaires through one-on-one interviews were conducted with tourist visiting the beach. The tourist was firstly asked specific questions to determine their eligibility to participate in the survey. A number of choice-cards were developed and used in the survey. Using a Statistical Package, the data was configured to determine the respondents' Willingness to Pay.

3. Outreach and Use of Results

In this component, the results are synthesised and developed. The findings are communicated to the decision-makers. The study and the results were shared also with the community.

As it relates to the study, the final report was delivered to the decision-makers. A formal presentation explaining the results was given to the

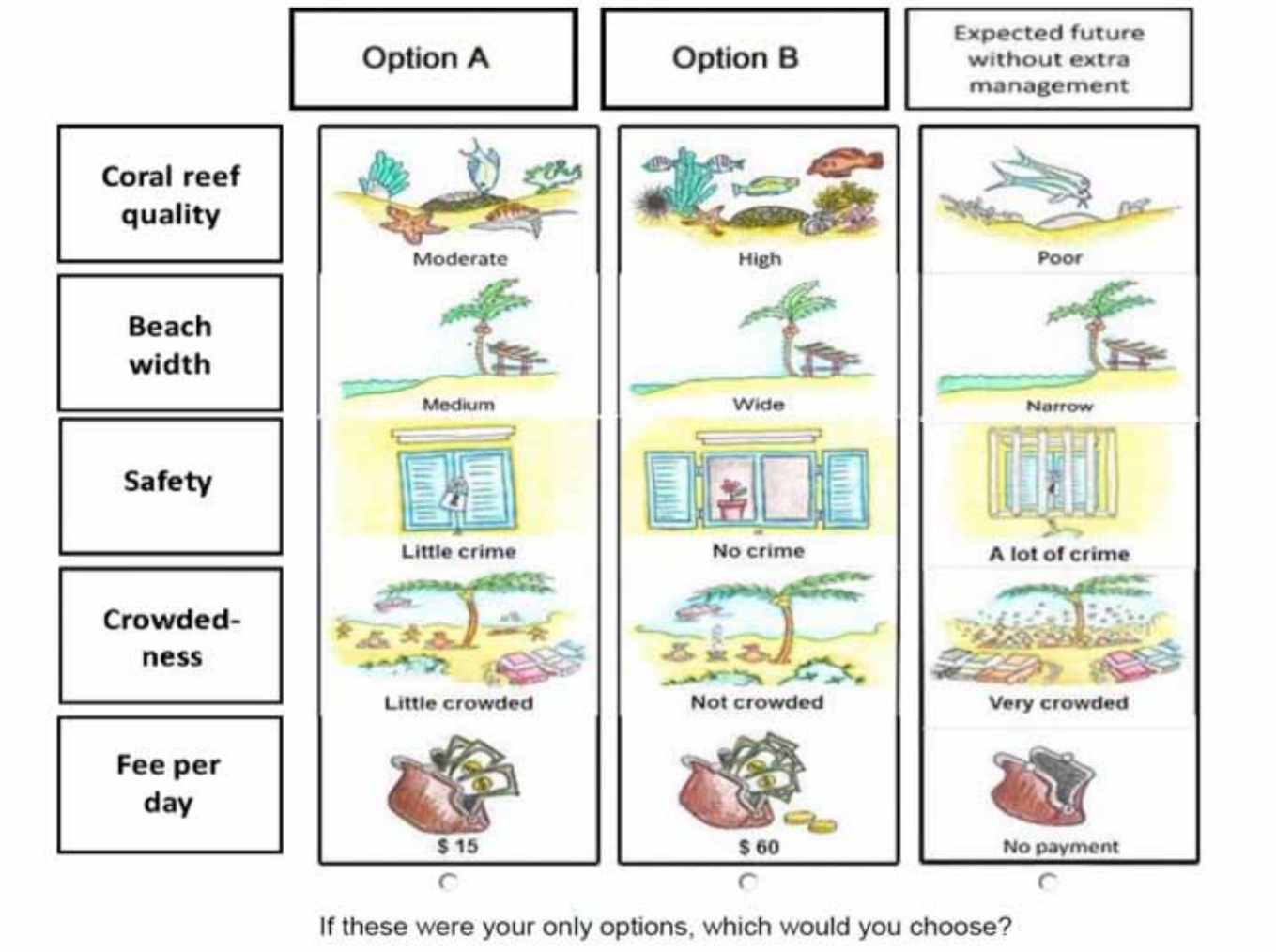

Figure 3. An example of the choice card developed and used in the survey. Source: extracted from Tieskens et al. *(2014)*

stakeholders in the tourism sector and decision-makers. To further expound on the results gathered, the values were incorporated in maps using GIS.

The incorporation of valuation data into a centralised GIS database is important, as it allows the decision-makers to access readily the information in a defined manner. These maps are also communicative tools through which the message can be dispersed to stakeholders, policy-makers and the community at large. Figure 4 presents an example of a map developed with valuation data.

The study included also a section which described the various management options available to cope with beach/coastal erosion. The cost for the hard and soft engineering types was calculated and presented. This allowed the readers to be able to envision the cost that is compensated by services freely provided by the marine/coastal ecosystems such as coral reefs.

Key Results

The study revealed the following results:

- People were willing to pay so that the beaches could remain in good condition.
- The beaches were considered to be highly valuable to the tourist. Hence, they contribute largely to Anguilla's economy.
- A percentage of the respondents thought it was Government's responsibility to conserve Anguilla's beaches.

Lessons Learnt and Recommendations

There were a number of vital lessons learnt while undertaking the valuation study.

1. Economic valuations are essential in building cases for environmental conservation/ protection, but it are useable only if they can be delivered clearly to the audiences. Furthermore, they cannot be used as the sole

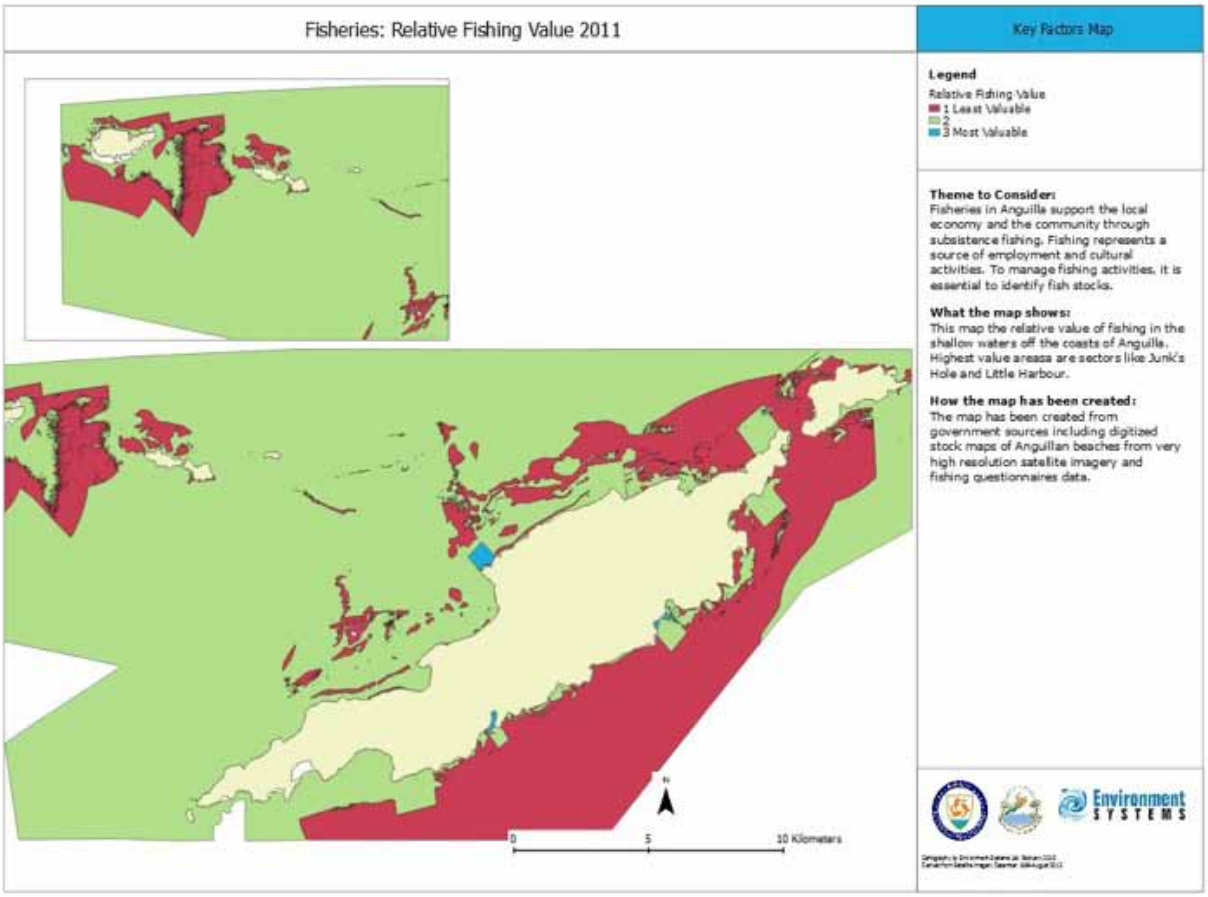

Figure 4. The relative fishing value in 2011 in respect to the coral reefs.
Source: Environment Systems, 2014

argument. There must be other supporting evidence to justify the cases further.

2. It is important to ensure that the appropriate data are available readily to support the economic evaluation. Although this report is based mainly on the valuation of the selected beaches in Anguilla, the vitality of historical data was recognised from the infancy stages.
3. Spatial and temporal scales must be taken into account. This is because the value of an ecosystem service or good can vary according to the people using that service or good. The study done in Anguilla focused on the visiting tourists only. Consequently, there is a need to conduct the same or similar survey with the local people to develop a more impactful outlook for the beaches in Anguilla.
4. Choice modelling involves complex data analysis and therefore can be very costly. As highlighted in van Beukering *et al.* 2007, choice modelling should therefore be used only when the necessary expertise and budget are available. In the case of Anguilla, VU University, Netherlands, was contracted to conduct this work. It is important ensure that adequate resources are available when conducting an ecosystem valuation study.
5. It would have been useful if the actual cost for some of the real estate on the coastline of the beaches studied was readily available. This would have provided additional support to the monetary worth of the said beaches, in the sense that when coastal property is left vacant how it devalues the beach or *vice versa*.
6. A monetary value cannot be attached to everything. Hence, there are non-monetary values that must also be factored in. It is most suitable to apply the monetary value to things which are tangible. In the case of this study, it was applied to an ecosystem (beaches) in which a value could have been easily attached.
7. Stakeholders should be involved throughout the valuation. Developing an understanding of the value of ecosystems and their services is critical to influence effective environmental management. This level of understanding by the stakeholders can advocate impactful change by the decision and policy makers.

Conclusion

Economic valuations have come a very long way since the 1960s. The publication of 'Valuing the Environment in Small Islands' toolkit provides a clear and very relevant document on the conditions and experiences in SIDS. The publication by the World Resources Institute is also an important source. The data generated from economic valuations are useful because they put into perspective the economic loss when ecosystems and their services are not taken into account in the decision making process.

As documented by CANARI (2013), there is a poorer weighting given to environmental issues than to fiscal issues in decision-making in Anguilla. By conducting the ecosystem valuation study for selected beaches in Anguilla, the case towards mainstreaming the environment in the decision-making process was advanced. It is hoped that the policy and decision makers alike will be more environmentally conscious about decisions made, if Anguilla is to truly achieve environmental sustainability.

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National Conservation Law: A New Framework for the Conservation of Species and Habitats in the Cayman Islands

Gina Ebanks-Petrie (Cayman Islands Department of Environment)

Ebanks-Petrie, G. 2015. National Conservation Law: A New Framework for the Conservation of Species and Habitats in the Cayman Islands. pp 152-159 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The Cayman Islands Government passed the much-anticipated National Conservation Law in December 2013. This presentation summarises how the new law impacts the conservation of species and habitats in the Islands, with emphasis on the role of species Conservation Plans and the protected areas and environmental assessment provisions of the law. Additionally, lessons learned are shared and some key strategies used in the process followed to get the law passed, including public consultation and engagement of NGOs and government agencies, are highlighted. Steps involved in the continuing implementation of the law, including the appointment and operation of the National Conservation Council, are also discussed.

Gina Ebanks-Petrie, Cayman Islands Department of Environment. www.doe.ky

Central Mangrove Wetlands

Until December 2013, the legal framework for conservation of habitats and species in the Cayman Islands was based on the Marine Conservation Law (passed in 1978) and the Animals Law (passed in 1976).

The new National Conservation Law, passed in December 2013, has a commencement clause and it requires each section to be commenced. I will discuss later which sections have been commenced to date.

Since that time, the Cayman Islands resident population has almost tripled, and the number of people visiting our islands has more than quadrupled. These laws were simply not adequate and did not provide the means to address current development pressures and issues (see below).

Why did we need a new law?

- Aspirations contained in the Constitution and commitments contained in the BoR;
- Current legal framework for conservation is outdated and inadequate:

The transformation from mainly natural to mainly unnatural environments, West Side, Cayman, 1972-2013

– No legal protection for any native or endemic plants;

– No legal protection for most of our endemic animal species (only birds and iguanas)

– No legal framework for EIA and no means of "operationalising" concepts of sustainable development

– Many loopholes in existing laws

– No enforcement powers conferred on CO's

- MEA Commitments

– A country that manages growth and maintains prosperity, while protecting its social and natural environment.

– A country that respects, protects and defends its environment and natural resources as the basis of its existence.

Protection of the environment

18.—(1) Government shall, in all its decisions, have due regard to the need to foster and protect an environment that is not harmful to the health or well-being of present and future generations, while promoting justifiable economic and social development.

(2) To this end government should adopt reasonable legislative and other measures to protect the heritage and wildlife and the land and sea biodiversity of the Cayman Islands that—

(a) limit pollution and ecological degradation;

(b) promote conservation and biodiversity; and

(c) secure ecologically sustainable development and use of natural resources.

Main Provisions

- Marine and terrestrial protected areas designation;
- Protected species schedule;
- National Conservation Council;
- Obligation on all entities to consult on environmental issues before approving plans or projects (includes mechanism for EIA);
- Recognition of Conservation Officers and provision of powers;
- Set out duties and functions of the NCC and DoE;
- Mechanism for management of the Environmental Protection Fund (EPF).

What are the Protected Areas provisions in the NCL?

- Only Crown land may be designated as a Protected Area or buffer zone (Section 6) so private land recommended to be designated as either will need to be acquired at fair market value;
- Council recommends establishment of protected areas based on prescribed criteria (Section 7);
- Extensive public consultation prior to designation prescribed in law (Section 8);
- Law requires Cabinet Approval to establish protected areas (Sect 6);
- Law provides for Cabinet to make Regulations governing the establishment of protected areas (Section 44 a & l).

Private land owners can enter into agreements with Government to establish Conservation Areas

There was concern expressed that privately owned land would be taken away for the creation of protected areas. While this was never the intent of the legislation, the law was redrafted to make it abundantly clear that only Crown land may be designated as a protected area. Privately owned land in areas recommended for protection first has to be acquired under a negotiated purchase process at fair market value (*N.B.* always the intention and the driving force for establishment of EPF). There are no compulsory purchase provisions in the law.

Species Protection

Protected Species Schedule and Species Conservation Plans

The Red List of the Flora of the Cayman Islands 2006 – an assessment of the conservation status of plants and trees following IUCN international guidelines – ranks 46% of the Cayman Islands' native flora as threatened with local extinction. There is currently NO legal means of protecting any of the plant species that occur in Cayman.

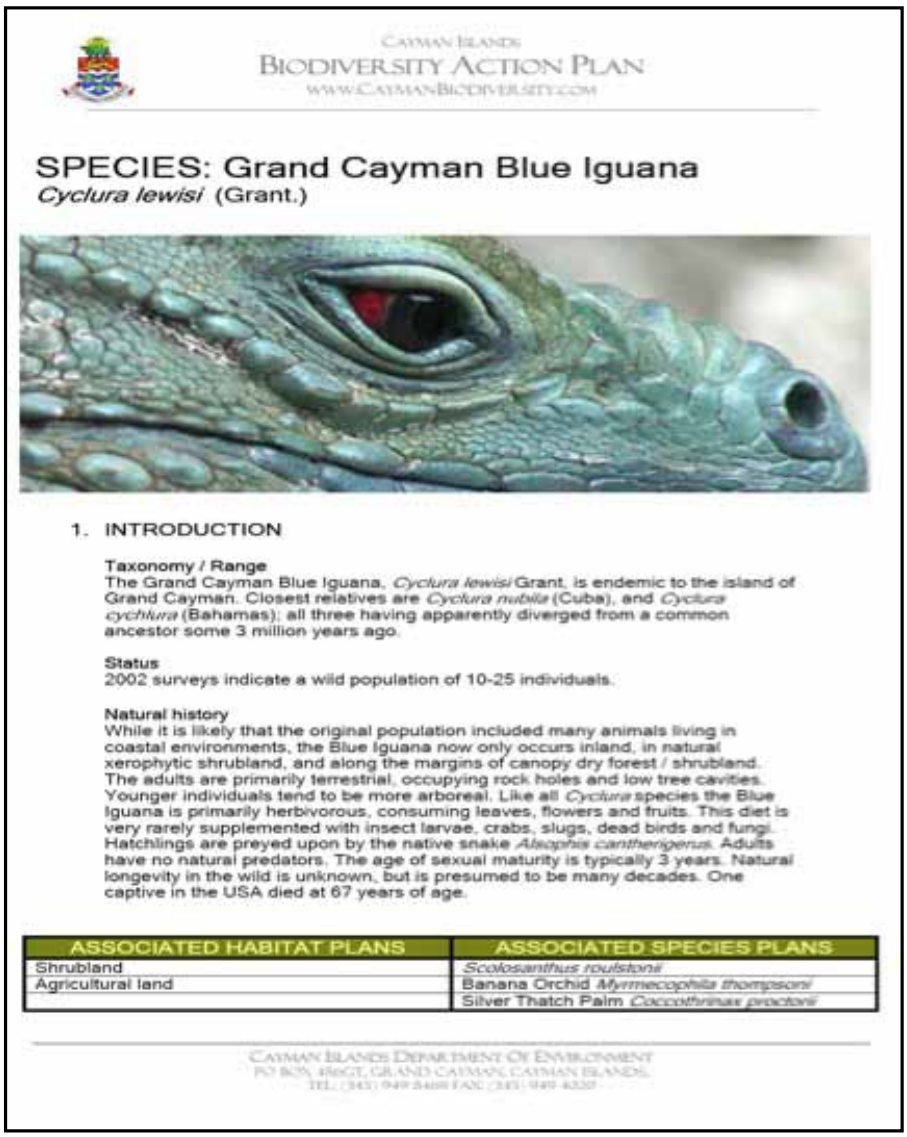
Despite there being numerous endemic species and sub-species of animals, only iguanas (and this includes the invasive green iguana because of legislation is so old that it makes no reference to which species of iguana is protected) and non-domestic birds have any protection locally.

Species listed on the Schedule are either:

- endangered under IUCN Red List criteria;

- endemic to the Islands (i.e. found only in the Cayman Islands);
- or already subject to protection obligations under environmental treaties to which Cayman is a party.

Part 1 listed species are those species which either already have full protection under existing Cayman Islands legislation (Animals Law or Marine Conservation Law) or have been assessed regionally or locally as being in need of full protection to ensure their continued survival. Part 2 listed species are those that may be hunted or collected except where regulations or a conservation plan (CP) would otherwise dictate. The whole point of Part 2 is to prevent animals from becoming Part 1-listed through employing conservation management tools.



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SPECIES: Grand Cayman Blue Iguana
Cyclura lewisi (Grant.)

1. INTRODUCTION

Taxonomy / Range
The Grand Cayman Blue Iguana, *Cyclura lewisi* Grant, is endemic to the island of Grand Cayman. Closest relatives are *Cyclura nubila* (Cuba), and *Cyclura cychlura* (Bahamas); all three having apparently diverged from a common ancestor some 3 million years ago.

Status
2002 surveys indicate a wild population of 10-25 individuals.

Natural history
While it is likely that the original population included many animals living in coastal environments, the Blue Iguana now only occurs inland, in natural xerophytic shrubland, and along the margins of canopy dry forest / shrubland. The adults are primarily terrestrial, occupying rock holes and low tree cavities. Younger individuals tend to be more arboreal. Like all *Cyclura* species the Blue Iguana is primarily herbivorous, consuming leaves, flowers and fruits. This diet is very rarely supplemented with insect larvae, crabs, slugs, dead birds and fungi. Hatchlings are preyed upon by the native snake *Alsophis cantherigerus*. Adults have no natural predators. The age of sexual maturity is typically 3 years. Natural longevity in the wild is unknown, but is presumed to be many decades. One captive in the USA died at 67 years of age.

ASSOCIATED HABITAT PLANS	ASSOCIATED SPECIES PLANS
Shrubland	*Sciolosanthus roulstonii*
Agricultural land	Banana Orchid *Myrmecophila thompsonii*
	Silver Thatch Palm *Coccothrinax proctorii*

CAYMAN ISLANDS DEPARTMENT OF ENVIRONMENT
PO BOX 486GT, GRAND CAYMAN, CAYMAN ISLANDS.
TEL: (345) 949-8469 FAX: (345) 949-4020

Species endemic to Cayman, by virtue of the small size of their populations and restricted range, are vulnerable to extinction by events such as major hurricanes or a disease epidemic. Actions specified under CPs for flora may include Millennium Seed Bank Project at Wakehurst Place (RBG Kew); the Blue Iguana Recovery Plan involves sending animals representative of the genetic diversity of the population to overseas zoos and institutions under breeding loan agreements.

Species can be recommended for inclusion and deletion by any person or agency who must provide the necessary information.

Law requires Council to develop and implement Conservation Plans for listed species; Public consultation and Cabinet approval required prior to adoption of plan.

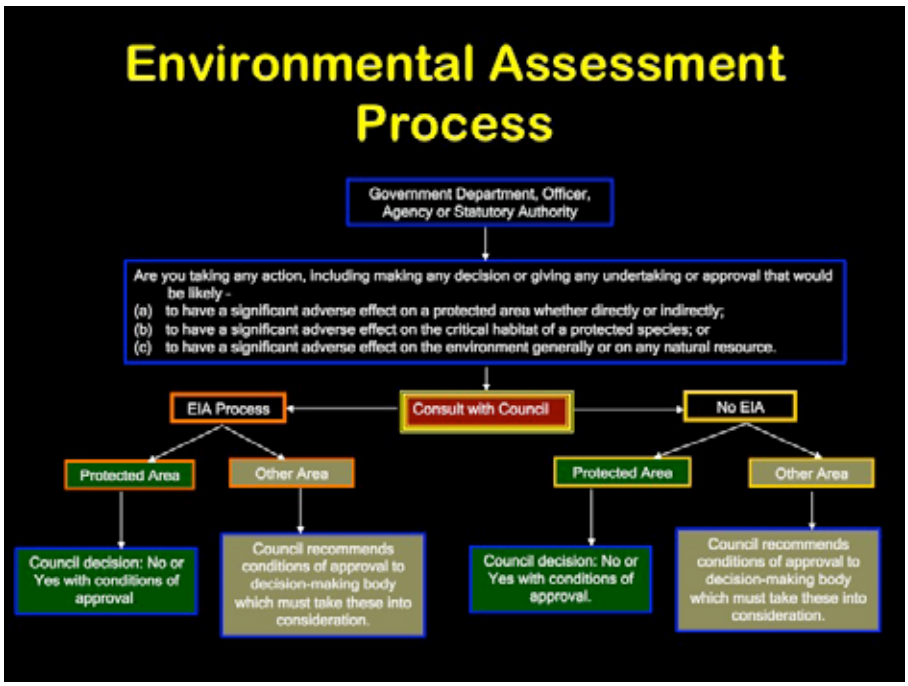
CPs will be species-specific – for example we already have a plan for the blue iguana that was developed collaboratively by DOE, NT, DoA, IUCN Iguana Specialist Group and Durrell. Reviewed every 5 years. Some CPs may at this stage be only about ensuring best practice; others may establish limits to take and closed seasons.

A new Amemdment requires public consultation process prior to Council adopting plans, and all plans will have to be submitted to Cabinet for approval prior to them being adopted.

Proposed activities may take place in accordance with the CP. For example, for silver thatch, it is permitted to retain a certain percentage of individuals present on property. Law provides for Council to exempt individuals from provisions of law through issuing permits. So a permit will be required only if someone wanted to exceed what was specified under the CP.

Environmental Assessment Process

Obligation to consult has been placed on government agencies (not individuals) to minimise impact of legislation on individuals. Environmental issues have been deprioritised for so long that



National Conservation Law's National Conservation Council

Made up of 13 members:

- Chair – appointed by Cabinet
- Director – DoE
- Deputy Director – Research
- Director of Agriculture
- Director of Planning
- National Trust Representative
- 7 persons appointed by Cabinet (district representation and technical/ scientific expertise).

this obligation has led to a surprising amount of "drama" from agencies such as DoP and DoA. This includes: projects requiring planning permission, projects requiring coastal works permission, project authorised by any other law, policies, plans, proposals.

Law requires consultation (EA) process to take place in accordance with Regulations passed by Cabinet. The process adopted is one agreed by public/private sector committee during the 2002 Development Plan review, which was updated to reflect involvement of Council and ensure compatibility with NCL .

A detailed process flowchart has been developed (below right) which will take the form of Regulations made by Cabinet. This includes detailed steps for the selection of consultants for comprehensive EIAs hired by the proponent but approved by an Environmental Assessment Board (EAB) appointed by the National Conservation Council. The proponent shall incur the costs associated with an EIA.

The EAB, together with the proponent and consultant, determine the scope of the EIA. The scope shall include the "No Project" option and address the country's need for the proposed development, where applicable.

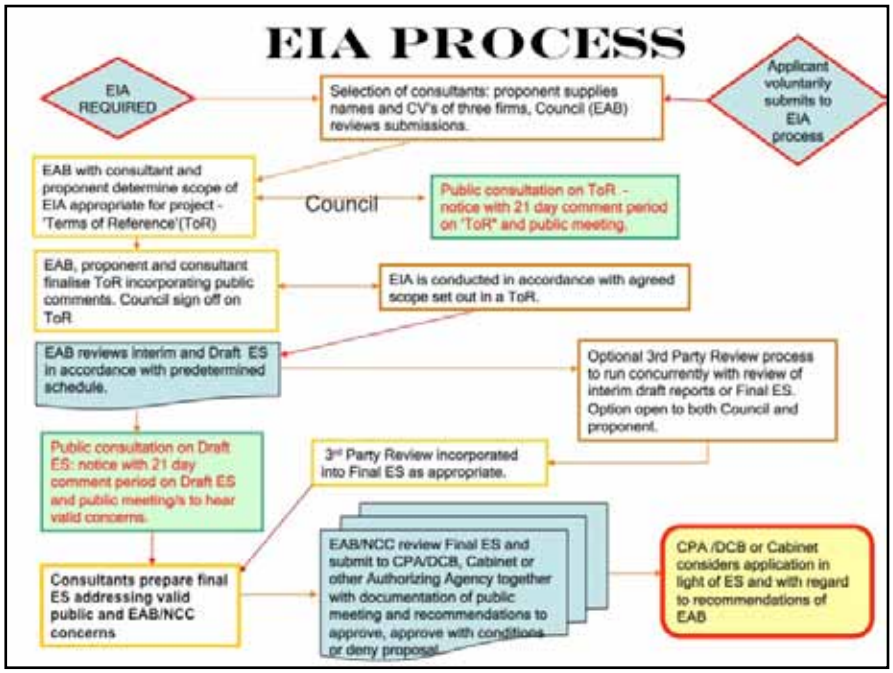
Council's autonomy

Section 49 provides for Cabinet to give written Directives to the Council from time to time: the Governor in Cabinet [*i.e.* the Government] may from time to time give to the Council in writing such general directions as appear to the Governor in Cabinet to be necessary in the public interest and the Council shall act in accordance with such directions.

Council's Functions

include:

- Managing and making recommendations on use of EPF;



- Promoting the biological diversity and the conservation and sustainable use of the natural resources of the islands;
- Recommending and maintaining protected areas and Conservation Areas;
- Conserving, maintaining and restoring populations and critical habitat of protected species;
- Providing guidance to all entities for the integration of environmental concerns in their decision-making processes.

Current Status and Priorities

Commenced:

- Parts 1&2 – Administration
- Part 3 – Protected Areas
- Part 4 – Protected Species & Schedules
- Part 6 – Penalties & Enforcement.

To be commenced by end of year:

- Parts 5 – Permits & Licences, and
- Part 7 – General (obligation to consult, EIA and EPF)

The old conservation framework provided for a fair amount of protection of marine resources, including the creation of Marine Parks. In fact the Cayman Islands were one of the first Caribbean countries to establish marine parks in 1986. Since then, additional species protection measures have been put in place (upper map right). However, as mentioned before, the Animals Law provided only minimal protection for landbased resources.

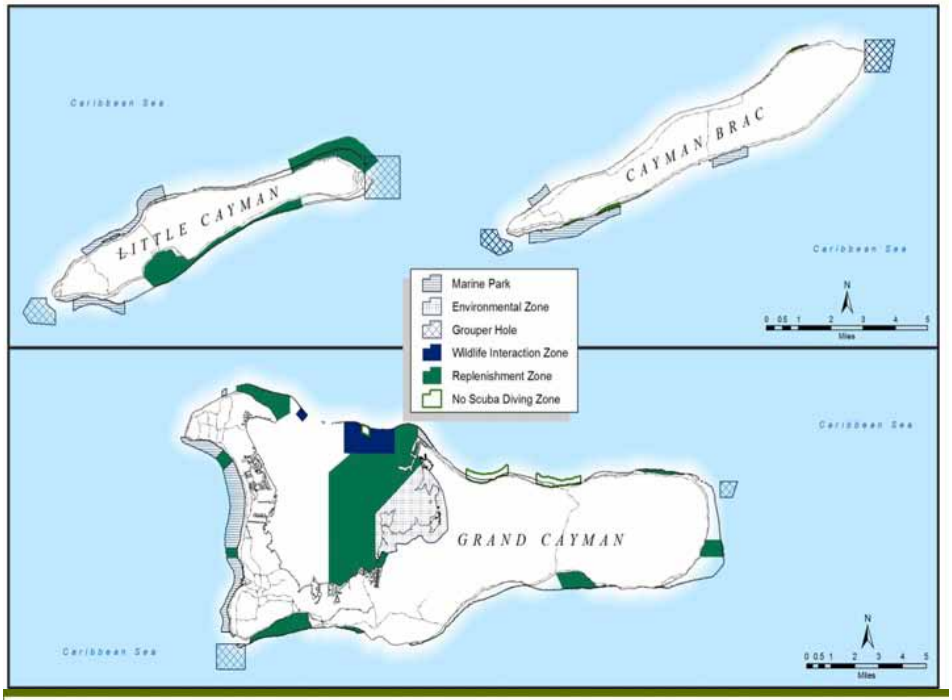
The lower map shows the final draft proposals which incorporate feedback and discussion acquired during public consultation.

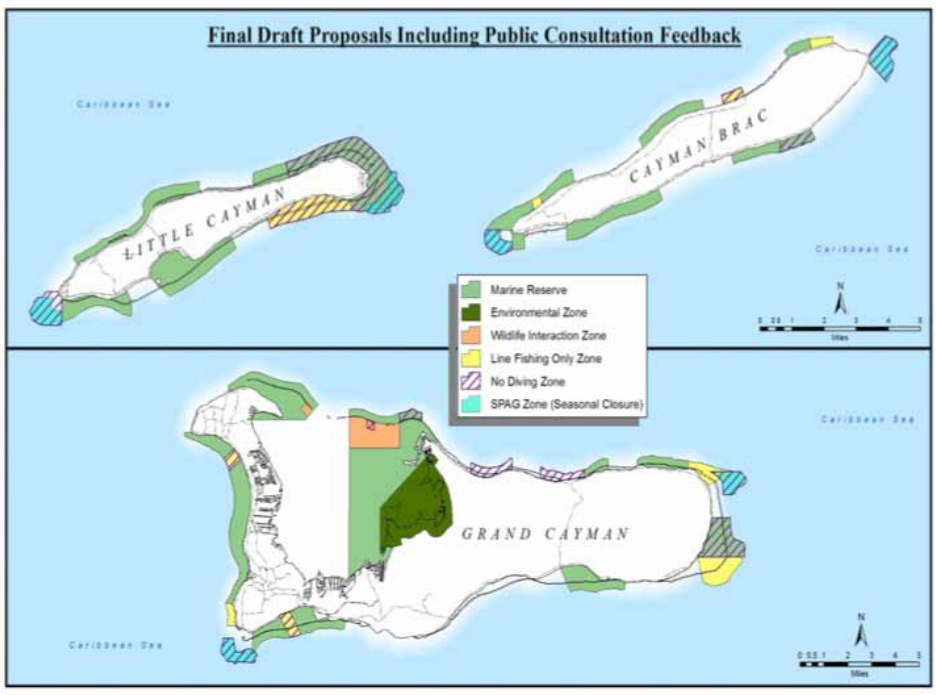
(We are in on-going discussions with East End, and Cayman Brac, facilitating optimal Marine Park designation for each community, which we hope to finalise shortly).

Consultations

On the next page is a snap shot of what the consultation looked like.

We spoke with all districts on all Islands, the Marine Conservation Board, DOE staff, various interested individuals, the Land and Sea Coop and the Angling Club, the CITA Board, the Ministers





Association, and the Cayman Islands Seafarers Association.

Aims:

1. To acquire feedback on all three Islands on carefully designed proposals for an enhanced system of Marine Parks for the Cayman Islands;
2. Carefully consider feedback to inform amendments to the proposals, such that an optimum design is submitted to Cabinet herein, based on both sound scientific research and public opinion.

- Meetings held: 29 public- and focus group meetings (all Islands).
- Permanent consultation display at DOE offices
- Staffed open exhibition displays in each district throughout the day prior to evening presentation by DOE Director
- Regular press activity: 10 CITN items, 19 press items, and 4 radio call-ins
- Much discussion: All feedback documented in detail and reviewed individually.

Consultation received extensive feedback on possible enhancements of Marine Parks in order to preserve the marine environment for continued fishing and tourism use

Of the 29 public and focus-group meetings and 588 written responses received, 203 written responses contained specific comments which were individually closely reviewed, and changes made where possible.

Further discussions regarding the specifics of marine park designation with DOE were facilitated (photos top of next column) for the districts of East End (Mr Arden Mclean, MLA, and Ms Delmira Bodden, Community Officer), North Side (Mr

Ezzard Miller, MLA) and Cayman Brac (Mr Moses Kirkconnell, MLA). These were initiated by the communities and supported by the Department of Environment.

Current Protected Areas Planning

Exercise facilitated by The Nature Conservancy and involving NT and DoE: using habitat maps (setting goals for protection of various habitat types) and locking in current land protected for conservation purposes (CIG and NT) – see maps on next page. Developing a risk layer (development pressure, gazetted roads etc).

What's next?

- Implementation of Consultation requirement;
- EIA Regulations;
- Licencing directives and guidelines;
- Processes for accessing and monitoring the use of the EPF

GOAL: Full commencement of NCL by December 2015.

Consultation requirement – guidance notes to help entities comply with the law were drafted by the DoE and have been approved by the Council;

EIA Regulations are currently with legal drafting;

DoE is working with NCC on licencing directives and guidelines;

Processes for accessing and monitoring the use of the EPF.

Lessons learned

Don't wait until the political climate is right or ideal – you have to have the information on species and habitats and you have to have thought through and even trialed processes

Make everything count – keep the big picture in mind (*e.g.* when someone asks you to chair a committee)

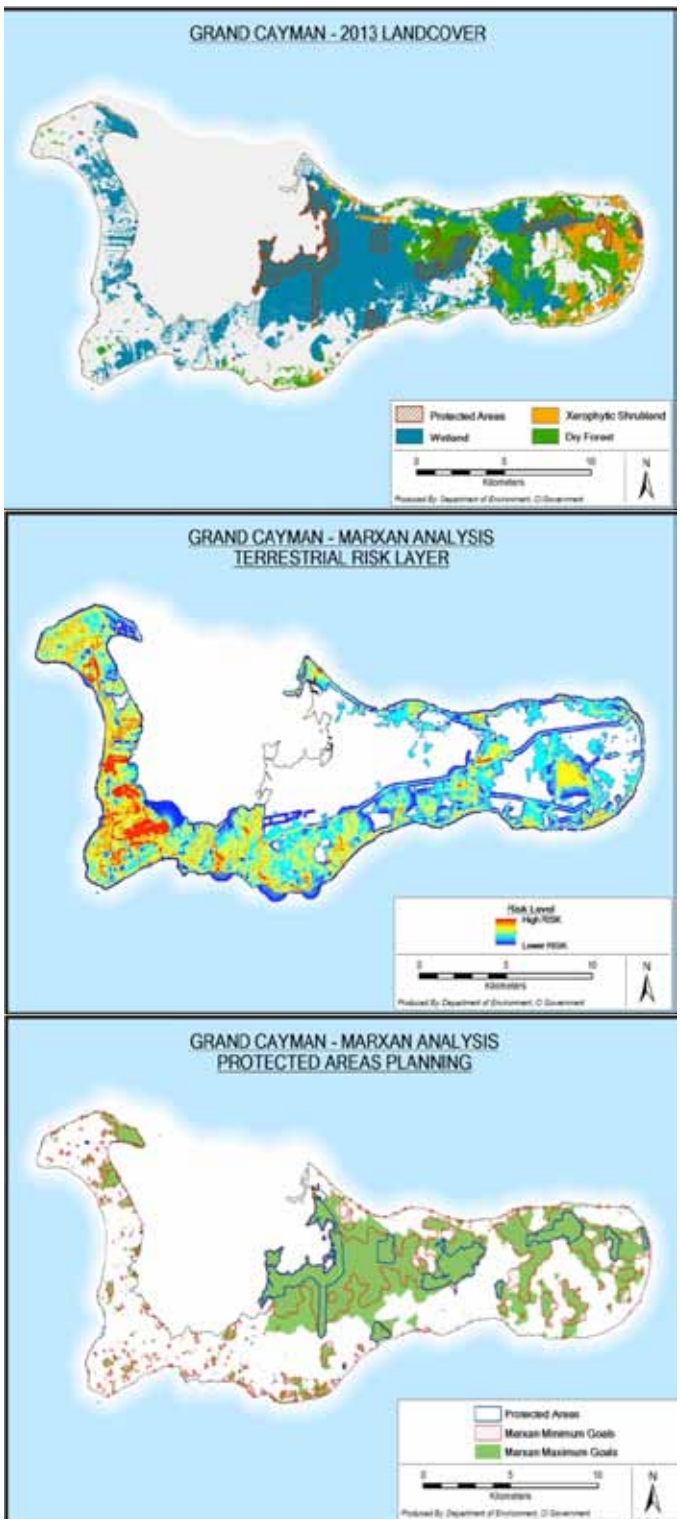
Working with a 13-member council is not easy but it could well be worth it.

Public consultation is hard work but necessary – particularly in small communities like ours.

Consistency and integrity are essential and pay off in the long run – do not be tempted to capitulate if you know it's wrong or not in the best interest of the country in the long term.

A copy of the Cayman Islands National Conservation Law can be found at : www.doe.ky/laws/national-conservation-law/

"*Unless someone like you, cares a whole awful lot. Nothing is going to get better, it's simply not.*" — The Lorax, Dr Seuss, 1971



Attempts to achieve Management of Protected Areas to Support Sustainable Economies - and discovering the realities of managing an EU-funded project in a small Caribbean territory

Nancy Pascoe[1], Lynda Varlack[1], Joseph Smith Abbott[1], Bernicia Herbert[1], Ronald Massicott[1], Ethlyn Gibbs-Williams[2], Christina McTaggart Pineda[3], Mike Pienkowski[4], Ann Pienkowski[4] ([1]National Parks Trust of the Virgin Islands, [2]Turks & Caicos National Trust, [3]Cayman Islands National Trust, [4]UK Overseas Territories Conservation Forum)

Pascoe, N.W.. , Varlack, L.. Smith Abbott, J., Herbert, B., Massicott, R., Gibbs-Williams, E., Pineda, C.M., Pienkowski, M. & Pienkowski, A. 2015. Attempts to achieve Management of Protected Areas to Support Sustainable Economies - and discovering the realities of managing an EU funded project in a small Caribbean territory. pp 160-162 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The National Parks Trust of the Virgin Islands (NPTVI) partnered with the Turks & Caicos Islands National Trust, the National Trust for the Cayman Islands and the UK Overseas Territories Conservation Forum (UKOTCF) on an EU-funded project entitled 'Management of Protected Areas to Support Sustainable Economies' (MPASSE). This project included consultancy services, capital infrastructure and purchase of equipment, but the Trusts all struggled with the strict contract rules set by the EU, which are in stark contrast to the familiar terms of the UK funding sources, such as the Darwin Initiative and OTEP. The project activities originally envisaged changed many times over the project period and, in the case of NPTVI, at least half of the project activities were unable to be achieved, as the small scale of the Virgin Islands in terms of expertise and suppliers could not fulfil the EU's rigorous tender rules. NPTVI and its project partners have learnt from this experience and wish to share advice for other UK Overseas Territories who share the same small scale economies so that expectations can be more realistic.
(Supported by a poster of the same title)

Nancy Pascoe[1], Lynda Varlack[1], Joseph Smith Abbott[1], Bernicia Herbert[1], Ronald Massicott[1], Ethlyn Gibbs-Williams[2], Christina McTaggart Pineda[3], Mike Pienkowski[4], Ann Pienkowski[4] ([1]National Parks Trust of the Virgin Islands, [2]Turks & Caicos National Trust, [3]Cayman Islands National Trust, [4]UK Overseas Territories Conservation Forum)
For more information, please contact:
Nancy Woodfield Pascoe, Planning Coordinator
National Parks Trust of the Virgin Islands
57 Main Street, Road Town
Tortola
British Virgin Islands
VG1110
planning@bvinpt.org

Flagship species for the tropical dry forest ecosystem, which was central to the project, Grand Cayman blue iguana

The National Parks Trust of the Virgin Islands (NPTVI) partnered with the Turks and Caicos National Trust (TCINT), Cayman Islands National Trust (CINT) and the UK Overseas Territories Conservation Forum (UKOTCF) on a European Union (EU) funded project entitled *Management of Protected Areas to Support Sustainable Economies* (MPASSE) from the 9th European Development Fund (EDF).

The expected results of the project's implementation fell under five broad areas including improved ecotourism facilities, improved awareness amongst citizenry, improved conservation measures, implementation of conservation management plans and improved institutional capacity.

This project included consultancy services, capital infrastructure and purchase of equipment, but the Trusts all struggled with the strict contract rules set by the EU, which are in stark contrast to the familiar terms of the UK funding sources, such as the Overseas Territories Environment Programme (OTEP) and the Darwin Initiative /Darwin Plus funds. The project activities originally envisaged changed many times over the project period and, in the case of NPTVI, at least half of the project activities were unable to be achieved, as the small scale of the Virgin Islands in terms of expertise and suppliers could not fulfil the EU's rigorous tender rules. NPTVI and its project partners have learnt from this experience and wish to share advice for other UK Overseas Territories who share the same small scale economies, so that expectations can be more realistic.

The initial project application, known as the 'Identification Fiche for Project Approach' was submitted in 2003. The UKOTCF took the lead on drafting the application and coordinating the list of activities to be included, based upon the five broad areas identified with a total EU amount of €2,475,000.00. The total BVI component amounted to €909,200.00 with €560,000.00 funded by the EU and the remainder by the BVI, either in-kind or through local funding. The length of time it took from the initial project application in 2003 to the BVI contract signing in 2010 meant that the activities and their associated budgets were very out of date by the time implementation started. This led to six budget re-allocations by the time the project ended in 2014, with nearly all of the funds being focused on the completion of the visitor centres as the construction costs were significantly more than had been originally anticipated due to inflation in this sector of the economy over the period since project inception.

Early on in the initial review of the project application by the EU, they required that a Technical Assistant be contracted to manage reporting to the EU, in addition to explaining the EU contract rules to the Territory partners,

Historic Copper Mine (above) and new visitor centre supported by the MPASSE project (below)

The Baths National Park, BVI, (above) and the patrol boat acquired via the project (below)

Visitor centre built via the MPASSE project at Sage Mountain National Park, BVI

assisting with executing tenders and negotiations. The consultant was based in the Turks and Caicos Islands (TCI) but travelled within the three Territories over the project period.

The assumptions and risks section of the original application form to the EU contained a brief straight-forward listing that would be applicable to any project receiving international funding, including such things as risk of hurricanes, readiness of organisations other than the main partners to be involved, cooperation of the Territory Governments and other such things. The reality was that none of the three participating Territories could have envisioned that the assumption was that the contract rules would be like any other UK-funded project proved so wrong, and that the risks should include trying to apply the EU's disproportionate contract rules in a small Caribbean Territory.

BVI Project List of Activities

NPTVI started out with an initial list of 25 actions under the project. Fifteen were capital infrastructure, two environmental education and public awareness related materials, two conservation measures (one of which was purchase of a patrol boat), one management planning action, five training or meeting related actions. From this activity list, eight activities were achieved and an additional four were added over the life of the project as the original list was updated and changed.

BVI Achievements through MPASSE at National Parks (NP) and Proposed Protected Areas

- Patrol vessel for Virgin Gorda parks
- Two vending units at the Baths NP
- Restrooms at Sage Mountain NP
- Visitor centre at Sage Mountain NP
- Visitor centre at the Copper Mine NP
- Visitor centre at the Anegada Rock Iguana Headstart Facility
- Updated Species Recovery Plan for the Anegada Rock Iguana, Cyclura pinguis
- Knowledge, Attitudes & Practices (KAP) Study

This was the first EU project that NPTVI had managed and it was a major learning experience, as it was very different to the management of UK funds, of which NPTVI has extensive experience. The contract rules were very stringent and the administrative processes to be followed to ensure the contract rules were followed were very specific and required an in-depth knowledge of EU terminology and procedures, something which NPTVI did not have. The Technical Advisor that was contracted by the EU early on in the project to assist the three Territories was invaluable as it would not have been possible to navigate the contract rules without his guidance.

Recommendations when considering applying for EU funding as a small UKOT

- Limit number of activities and be realistic (add in Caribbean time)
- Limit number of tenders, group tenders and show the budget limit
- Dedicate one or more staff to the project's management; it is all consuming
- Partner with a UK organisation and have them be the lead partner where possible. (This was intended with this project, but the European Commission changed the structure.)
- Start activities as soon as possible as the EU contract rules are very specific and the tender procedure can be very difficult to achieve successfully in small economies where there are small numbers of qualified bidders.

Plans for Colliers Reserve interpretation centre, Grand Cayman, initiated under MPASSE

Ecosystem effects of eradicating invasive species

Jennifer Lee (Government of South Georgia & the South Sandwich Islands)

Lee, J. 2015. Ecosystem effects of eradicating invasive species. pp 163-165 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Invasive alien species pose a significant threat to biodiversity. Their eradication is a key element of many environmental management plans. However, those who are tasked with implementing these plans face difficult decisions in prioritising which species to invest resources into eradicating and over what time-frame each project should be tackled. Often the inter-relations between introduced and native species are complex, and so a holistic, ecosystem based approach is required.

In the last five years, several major initiatives have been undertaken with the aim of restoring South Georgia's habitats. This provides a useful exemplar to examine the complex ecosystem effects and interactions of large eradication projects.

The Government of South Georgia & the South Sandwich Islands reindeer eradication programme saw the removal of almost 7,000 reindeer from nearly 40,000 ha of the ice-free ground on South Georgia. In the presence of reindeer, large areas of coastal vegetation became almost entirely denuded causing a shift in plant community composition and a reduction in soil stability.

In the absence of grazing pressure, both native and non-native plant species are able to grow, flower and set seed unhindered. However, because of their life history traits, in some areas, it is the invasive species that are responding more rapidly. The Darwin-funded weed management project, was designed to dove-tail with the reindeer eradication and utilise this narrow window of opportunity to assess the distribution of non-native plant species whilst they are at their most visible and then instigate a control programme to reduce target populations to zero density before they spread.

Dr Jennifer Lee, Environment Officer, Government of South Georgia and South Sandwich Islands env@gov.gs

South Georgia is a wildlife haven and is home to about five million seals of four different species, and 65 million breeding birds of 30 different species. However, past human activities have had profound impacts on the flora and fauna. Sealing began in the late 1700s and, by the early 1800s, fur seal populations were severely depleted. Then, between 1904 and the 1960s, a shore-based whaling industry hunted and killed tens of thousands of whales, bringing some species to the brink of extinction. As well as having profound impacts on target populations, these operations resulted in the introduction of a range of non-native species. One of the most destructive was rats that were inadvertently introduced by sealing parties along the entire north coastline. Then, in the early 1900s, reindeer were introduced by a Norwegian whaling station manager, Carl Larson. The animals were introduced to two peninsulas, the Barff and Busen, for recreational hunting and as a reminder of home and, in the absence of disease or natural predators, were able to thrive and multiply rapidly (Figure 1).

South Georgia is also home to a range of non-native plant species. Some species, such as annual meddow grass *Poa annua*, were likely introduced during the early sealing and whaling era and are now wide spread. Others, like bittercress *Cardamine glacialis*, are thought to be more recent

introductions and still have a relatively restricted distribution

These invasive alien species pose a significant threat to South Georgia's biodiversity, and their eradication is a key element of the island's environmental management plan and a commitment under the Government of South Georgia and the South Sandwich Islands (GSGSSI) Environmental Charter. However, because inter-relations between introduced and native species are complex, a holistic, ecosystem-based approach was required when deciding what order to conduct eradication programmes and in determining what monitoring and follow-up work would be required. In the last five years, several major initiatives have been undertaken with the aim of restoring South Georgia's habitats, and these provide a useful exemplar to examine the complex ecosystem effects and interactions of large eradication projects.

The GSGSSI reindeer eradication programme was conducted in collaboration with the Norwegian Nature Inspectorate (SNO). It involved the removal of almost 7,000 reindeer from nearly 40,000 ha of the ice-free ground on South Georgia. In the presence of reindeer, large areas of coastal vegetation became almost entirely denuded causing a shift in plant community composition and a reduction in soil stability. After reindeer had been removed, both native and non-native plant species were released from grazing pressure and were able to grow, flower and set seed unhindered.

Two monitoring programmes were established to track changes in vegetation. The first aimed to quantify fine-scale changes in community composition and involved establishing thirty-six 10 x 10 m plots across three peninsulas: the Busen and Barff Peninsulas, which had reindeer, and the Thatcher Peninsula, which did not and acts as a control. The plots are sited across the four main vegetation types: tussac, wet grassland, dry grassland and scree. At each monitoring site, five 1 x 1 m quadrats are randomly selected and the overall species composition and coverage, vegetation height and the presence of flowers or seed heads recorded (Figure 2). The monitoring has been carried out twice, once before the reindeer eradication and once after. It will be some time before the full effects of the reindeer eradication are seen but early indications are that vegetation is getting taller and that more species are growing to maturity and developing flower-heads.

The second project aimed to monitor vegetation change on a landscape scale. In collaboration with the British Antarctic Survey, GSGSSI has embarked on a remote sensing project. High-resolution multi-spectral satellite images from Digital Globe have been acquired from before the reindeer eradication (Figure 3). Data from satellite images will be paired with field spectral data gathered using an ASD field spectrometer provided by the NERC Field Spectroscopy Facility, and vegetation communities differentiated. These maps will provide a baseline against which future change can be measured. In addition to contributing to post-eradication habitat recovery monitoring, the data may also be used in the future to assess changes in vegetation cover in relation to climate change and glacial retreat over a longer timescale. When analysed in conjunction with data on bird and invertebrate populations, these data may also provide a powerful tool in assessing impacts of climate and other changes in ecosystem function.

Invasive plants may also benefit from the removal of reindeer and, because of their life history traits, may respond more quickly than some of the slower growing native species. In recognition of this, GSGSSI worked with the Royal Botanic Gardens Kew to develop a successful funding application

Figure 1. Invasive reindeer on South Georgia

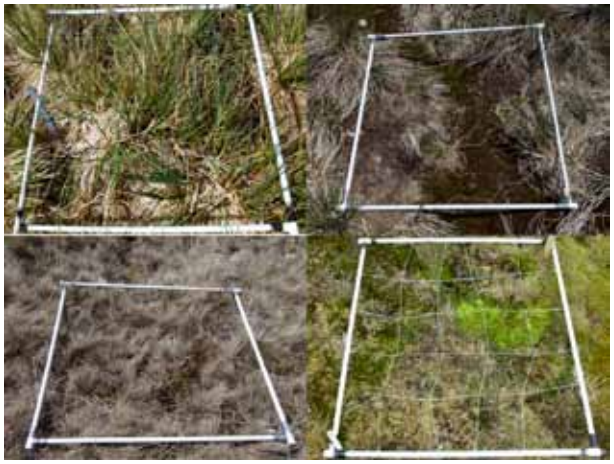


Figure 2. Examples of quadrats used at the vegetation monitoring sites

Figure 3. Example of a satellite image of South Georgia

to DEFRA's Darwin Initiative. This project was designed to dove-tail with the reindeer eradication and utilise this narrow window of opportunity to assess the distribution of non-native plant species whilst they are at their most visible, and then instigate a control programme to reduce target populations to zero density before they spread. In the first year of the project, over 6,000 ha have been surveyed and distributions of the majority of the non-native plant species present on the island have been assessed. This information is now being collated in the South Georgia weed management database and will be used to inform a weed management strategy.

Establishing Stakeholders as Conservation Stewards

Amy Avenant, Katharine Hart, (Department of Environment & Maritime Affairs) and Kathleen Wood (SWA Ltd, Turks & Caicos Islands; UKOTCF)

Katharine Hart

Kathleen Wood

Avenant, A., Hart, K. & Wood. K. 2015. Establishing Stakeholders as Conservation Stewards. pp 166-169 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Natural resources are utilised in some capacity by all public and private interests within a community. In the Turks and Caicos Islands (TCI), stakeholders in the tourism industry rely almost entirely on natural resources for their livelihoods; however, historically, the onus of stewardship has fallen upon government. While private stakeholders absorb the benefits of well-managed natural resources, the public sector almost exclusively bears the cost. In TCI, as with most small island developing states, the government (under the Department of Environment and Maritime Affairs, DEMA) has limited human and capital resources at its disposal, making it difficult to meet most of the stewardship needs of the natural environment. Due to these constraints, DEMA developed the Community Conservation Partner Programme (CCPP) in order to instil an ethic of shared responsibility for the resources of TCI. CCPP aims to allow DEMA to pass the responsibility of 'custodian' onto the greater community, while maintaining the role of government as the monitoring agent to which custodians are accountable.

In its preliminary stages CCPP is assisting various spheres of the community in identifying resources that they make use of on a regular basis. The CCPP is also educating stakeholders on the needs of the resources they utilise and the responsibilities they can adopt in order to sustainably work together in keeping TCI *beautiful by nature* (the country's motto). Resource users, including commercial dive-operators, hotels, schools, NGOs and others, are being encouraged to work with DEMA to maintain, improve and eventually become accountable for the natural resources upon which their livelihoods depend. The programme aims also to reinforce national development strategies, cognisant that TCI's main industry, tourism, is entirely dependent upon the maintenance of an ecological baseline of high integrity.

CCPP fulfils conservation management objectives by instilling an ethic of shared responsibility and stewardship for the environment in the various commercial and public spheres of the community and by developing relationships between DEMA and the greater public, which allow for information sharing and public and government partnering in order to promote sustainable development in TCI. Without such collaboration, it is doubtful that DEMA would be able to achieve targeted management goals, such as coral reef monitoring, water-quality testing, solid-waste management and public awareness.

Preliminary results of the programme are encouraging. Dive operators on Providenciales and Grand Turk have been trained in Reef Check monitoring and lionfish control and are actively undertaking those responsibilities. Other partners are conducting regular solid-waste clean-ups. Additional funding is now being sought to implement fully the programme to address all of TCI's conservation management needs.
[*This presentation also links terrestrial & marine sessions.*]

Amy Avenant, Katharine Hart, (Department of Environment & Maritime Affairs) and Kathleen Wood (SWA Ltd, Turks & Caicos Islands; UKOTCF)
Correspondence: Kathleen Wood, Director of Environment, SWA Ltd, Turks & Caicos Islands; kw@swa.tc

Introduction

The Turks and Caicos Islands (TCI) are a United Kingdom Overseas Territory (UKOT), located at the southeastern extreme of the Lucayan Archipelago (including the Bahamas and Turks and Caicos Islands), approximately 575 miles southeast of Miami, Florida. In this small island nation, more than nine-tenths of its territory is located underwater, and fisheries have been the primary means of livelihood for most of the Islands' human history (Sadler 1986). In recent decades, the country has experienced exponential developmental growth, primarily in tourism and related industries. In the short, 11-year, period between 2001 and 2012, the population of the country expanded from 20,014 to 31,618, a total of 58.2 percent (TCIG 2012). Unfortunately, funding for conservation has not increased proportionately, leaving government agencies with little revenue for necessary stewardship activities.

Natural resources are utilised in some capacity by all public and private interests within a community. In TCI, stakeholders in the tourism industry rely almost entirely on natural resources for their livelihoods; however, historically the onus of stewardship has fallen upon government. While private stakeholders absorb the benefits of well-managed natural resources, the public sector almost exclusively bears the cost. In TCI, as with most small-island developing states, the government (under the Department of Environment and Maritime Affairs, DEMA) has limited human and capital resources at its disposal, making it difficult to meet most of the stewardship needs of the natural environment. Due to these constraints, DEMA developed the Community Conservation Partner Programme (CCPP) in order to instil an ethic of shared responsibility for the resources of TCI. CCPP aims to allow DEMA to pass the responsibility of 'custodian' on to the greater community, while maintaining the role of government as the monitoring agent to which custodians are accountable.

What is the CCPP?

The CCPP was established with a dual purpose (1) to lessen the burden on DEMA, resulting from resource constraints required for proper and effective conservation and enforcement, and (2) to promote and develop a sense of environmental stewardship among the community at-large. Individuals, groups, private companies and other organisations agree to a Memorandum of Understanding (MoU) with the Department, where each party's responsibilities are outlined and committed to.

The CCPP fulfils the following objectives:

1. It instils an ethic of shared responsibility and stewardship for the environment in the various commercial and public spheres of the community.
2. It develops relationships between DEMA and the greater public, which allows for information sharing, and public and government partnering, in order to promote sustainable development in the TCI.
3. It supports targeted management goals, which would otherwise not be implemented due to a lack of resources, such as coral reef monitoring, water-quality testing, garbage clean-up and public awareness.

In its first year, the CCPP has assisted various spheres of the community in identifying the resources that they make use of on a regular basis and emphasising the need for stewardship of these resources. Stakeholders are being educated on the importance of the resources they utilise, and the roles and the responsibilities that they, as a

community, have and can adopt in order to work together in keeping the TCI *'beautiful by nature'* – the motto of the TCI. Resource users, including commercial dive-operators, hotels, schools and others, are being encouraged to work together with DEMA to maintain, improve and eventually become accountable for the natural resources that they so frequently access and utilise, and upon which their livelihoods depend.

The programme reinforces national development strategies and tourism products that are entirely dependent upon the maintenance of an ecological baseline of high integrity and acts as an 'umbrella' under which various, current projects may be incorporated. For example, the Native Plant Rescue initiative currently in the TCI educates school children about the importance of protecting native plants, and trains them to assist with plant rescue initiatives. CCPP provides DEMA with the ability to exercise more efficient and effective monitoring of the various initiatives in the country, as well as providing ease of management for the various current and future initiatives, aimed at resource conservation. Accountability on both sides of the partnership is another positive outcome: both DEMA and the conservation partner are obligated to fulfil the commitments outlined in the partnership agreement.

What has been achieved to date?

On Providenciales, a total of 20 partners have signed a MoU to become Community Conservation Partners, with an increasing interest in joining the programme by the private sector. Conservation partners include private sector companies in tourism, sports and recreation, and the energy sector. Individuals, community groups, and small businesses have also signed up to the programme. In Grand Turk, only one MoU has been submitted to the Attorney General's Chambers, with three currently in discussion and all of the four dive-operators showing interest in becoming conservation partners.

The results from current signatories to the CCPP are encouraging, and those who have become conservation partners appear to take the agreement seriously and fulfill their commitments. Many other companies and operators have informal or verbal agreements with DEMA. The CCPP is currently clarifying and formalising these relationships by outlining the accountability of all parties.

In 2014, dive operators in Providenciales and Grand Turk were trained in coral reef monitoring and lionfish control. Both of these courses were hosted by DEMA and supported by generous grants from the TCI Governor's Office and the Foreign and Commonwealth Office (FCO). As a result, when drafting MoUs for the CCPP, this participation and commitment is included. For example, dive-operators trained in the coral reef monitoring protocol agree to participate in regular coral reef monitoring in conjunction with DEMA. As the number of conservation partners increases, there is greater potential for coral reef monitoring throughout the TCI. Other conservation partners are conducting regular solid waste clean-ups, including assisting and organising their own beach and community clean-ups.

Challenges

During the course of the first year of the CCPP, a number of challenges has arisen that have restricted the number of official partners signed up to the CCPP. These challenges include:

1. ***Lack of institutional support*** – The inability of DEMA and the TCI Government to meet signatories "halfway" often hinders the finalisation of MoUs and hinders the implementation of proposed activities.
2. ***Review process*** – The length of time taken between confirming the MoU with an interested party and getting it approved by the Attorney General's Chambers can be between 3 and 4 months at times. During this period, the potential partner

Previous page, this one and next: Examples of Conservation Partners at work

often loses interest, and the momentum that is generated through the initial discussions dwindles.

3. ***Economic restraints*** – The cost of the programme is limited by costs of hosting stakeholder workshops and upholding the agreements committed to by DEMA. The CCPP would benefit from funding to promote and publicise the initiative, with the creation of stickers and decals for Conservation Partners to display in shop windows, boats, restaurants etc.

4. ***Time constraints and staffing limitations*** – In Providenciales, the programme has had a successful first year, with 20 signed or extended MoUs. It has been much slower in Grand Turk, primarily due to restricted staff and time available to promote the programme and develop the MoUs with potential conservation partners. On other islands with potential partners, *e.g.* South Caicos, Middle Caicos and North Caicos, the CCPP has not been initiated due to a lack of adequate DEMA staffing on those islands.

5. ***Pre-held judgments and existing poor relationships with DEMA*** – Due to strained relationships and a lack of trust in the past, some key environmental stewards in the community are unwilling to commit to a working 'contract' with DEMA.

Further steps

1. Sign up a broader range of conservation partners – While Providenciales enjoys a diverse group of signatories, commitment from larger hotel groups who directly occupy the Princess Alexandra National Park, is lacking. The other islands, as noted above, require additional staffing in order to effectively establish CCPP programmes.

2. Identify resources to allocate more time to dedicate to public awareness discussions with the community and resource users.

3. Streamline the process by which MoUs are approved.

4. Obtain funding for training and to develop positive incentive materials for CCPP partners to display at their business/organisation.

5. Work in conjunction with local and international NGOs to identify sources of funding to expand the programme to include a "wish list" of stewardship roles. This includes:

   a. Training and workshops on best practices for hotels for landscaping and wastewater treatment,

   b. Voluntary wastewater and coastal water quality testing by resorts, and

   c. Collection of baseline ecological data for the entire country, particularly sensitive areas with high ecosystem services values.

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The Governor Laffan's Fern Recovery Project

Alison Copeland[1], Margaret From[2] & Kimberly Burch[3] ([1] Department of Conservation Services, Bermuda; [2] Rare plant research lab, Omaha's Henry Doorly Zoo, USA; [3] Department of Environmental Protection, Bermuda)

Alison Copeland

Copeland, A., From, M. & Burch, K. 2015. The Governor Laffan's Fern Recovery Project. pp 170-174 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Governor Laffan's Fern *Diplazium laffanianum* is endemic to Bermuda. First identified in 1882, this species was impacted by habitat change and exploited by Victorian fern collectors to the extent that it has been considered 'Extinct in the Wild' since 1905. In 2003, with a remaining population of just 3 ferns, a recovery project began to pull it back from the brink of extinction. Spores were sent from Bermuda to Mrs Margaret From at the Rare Plant Research Laboratory at the Henry Doorly Zoo in Omaha, Nebraska, USA. Over the last 12 years, Mrs From and lab technician Melanie Landry have worked to produce thousands of *in vitro* cultures of Gov. Laffan's Ferns. Today the *Governor Laffan's Fern Recovery Project* is a partnership between the Henry Doorly Zoo and the Bermuda Government Departments of Conservation Services and Environmental Protection. The *Project* has 3 core components: (1) spore propagation; (2) pot culture; and (3) re-introduction to the wild. Recent progress includes the establishment of two collections of juvenile ferns in Bermuda, mapping of potential reintroduction habitat, environmental monitoring of reintroduction sites, public awareness activities and listing of the species on the IUCN Red List. The *Governor Laffan's Fern Project* reached a critical point in 2014. The spore propagation and pot culture trials have been so successful at building up the *ex situ* population of ferns that the species can now take the expected losses that will come with the trial and error of a reintroduction experiment. In November 2014, the first individuals were reintroduced to the wild. As of May 2015, a number of them have survived and put out new fronds; only time will tell if they survive the hot summer months.

The long-term goals of this project are to establish self-sustaining populations of Governor Laffan's Fern in the wild, to maintain as many individuals as possible in pot culture and to make the species available to the general public so that Bermudians may participate in the continued survival of this endemic species.

Alison Copeland, Biodiversity Officer, Dept of Conservation Services, Government of Bermuda. aicopeland@gov.bm

Discovery of the species

In 1880 Sir Robert M. Laffan, the British Governor of Bermuda sent some living plants of a unique fern from the islands to the Royal Botanic Gardens at Kew for identification and propagation. Mr. J.G Baker, the keeper of the Kew Herbarium described the species in 1882 and named it for Governor Laffan (Baker 1882).

Decline to extinct in the wild

Gov. Laffan's Fern was never abundant. As a habitat-limited island endemic, its existence has always been precarious. One of the largest contributors to it becoming so rare was the Victorian fashion for keeping ferns. As this 'fern craze' swept the US and UK, tourists came to Bermuda to add rare treasures to their collections. The hobby caught on in Bermuda, and large numbers of ferns were removed from the wild.

Figure 1. RGB Kew herbarium sheet of the fern sent to London in 1880 by Lt. General Sir Robert Laffan.

Most of what is known about the decline of this species comes from the writings of the curator of the New York Botanical Garden, Nathaniel Britton, who was a regular visitor to the islands. He noted the fern was *"Local in caves and crevices between Harrington Sound and Paynter's Vale, where it existed up to 1905, but has, since, apparently been exterminated"* (N.L Britton,1918).

Britton examined the species extensively on a trip to Bermuda in 1905, noting *"the plant was observed by us in the wild state in the autumn of that year, but we could not find it again at a known locality in 1913. Two plants were taken to a private greenhouse in Hamilton some years ago, where we had the pleasure of studying them in 1914, and afterwards made the attempt to raise plants from spores then obtained, unfortunately without success, the spores being immature"* (N. L Britton 1918).

It took just 23 years from the naming of the species in 1882 to its disappearance from the wild in 1905. Despite numerous searches of suitable habitats within its historic range over the course of the 20th century, no remaining wild specimens have been found. The fate of most of the potted specimens from the Victorian period is unknown. Ironically, it was the love of potted ferns that prevented total extinction of the species.

Ferns on the move 2001 – 2003

Mrs Christina Zuill gave a potted fern to the

Figure 2. Spores of Diplazium laffanianum

Bermuda Botanical Gardens around 1962. This was propagated by division and placed in the fern collection. In 2001, the remaining 5 specimens of *Diplazium laffanianum* were moved from the Botanical Gardens to the Government Plant Nursery at Tulo Valley, under the care of Nursery Superintendent Sarah Northcott. Recognising the precarious status of the species, she sent a small batch of spores to Mrs Margaret From at the Department for Plant Conservation at the Henry Doorly Zoo in Omaha, USA for propagation. The importance of this action cannot be overstated, as it is what ultimately saved the species from total extinction.

In September 2003, Hurricane Fabian destroyed the greenhouses at Tulo Valley, killing two of the ferns and damaging the other three. These died at some point after 2007. Today there are no remaining mature, spore-producing specimens of Gov. Laffan's Fern left in Bermuda.

Recovery project: 2003 to present

The collaboration between the Bermuda

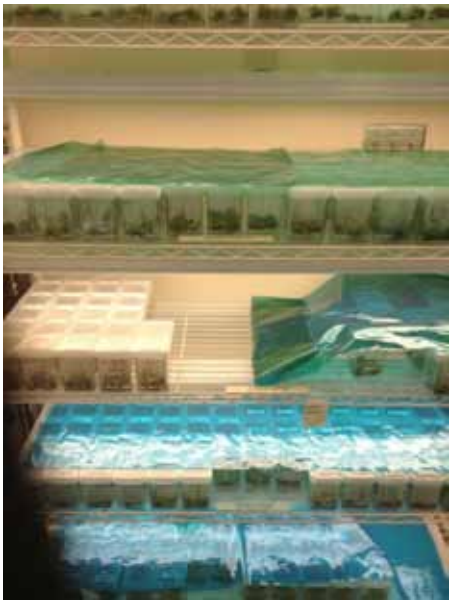

Figure 3. In vitro *Gov. Laffan's Ferns at the Department for Plant Conservation at Omaha's Henry Doorly Zoo*

Figure 4. Mature, spore-producing D. laffanianum *in the Omaha Zoo greenhouse*

Government and Omaha's Henry Doorly Zoo (OHDZ) continues today as the Governor Laffan's Fern Recovery Project. Currently the Project consists of three major areas of work; spore propagation, husbandry of potted specimens and reintroduction to the wild.

Spore propagation

Over the last 12 years, micropropagation techniques for this species have been tested and refined. From the very small sample of spores sent from Tulo Valley, Margaret From and lab technician Melanie Landry have produced hundreds of cultures of Gov. Laffan's Fern. They also maintain a collection of about 15 mature potted ferns, which are the only spore source for the species. Most of the *in vitro* flasks contain prothalli (the gametophyte life stage) and a few small sporophytes in sterile conditions, which allows them to be transported back to Bermuda (From 2010).

Pot culture

Once the *in vitro* ferns arrive in Bermuda, they are de-flasked and spread on an inch of damp potting soil covered by an inch of soaked sphagnum moss in closed glass tanks or plastic containers. Once sporophytes (the frond producing, diploid life stage) reach about 2 inches, they are transferred to individual pots. Trials in the last few years have utilised different potting media, such as commercial potting mixes, sand and 'native soil' collected from the Walsingham cave complex. This work, headed by Kimberly Burch at the

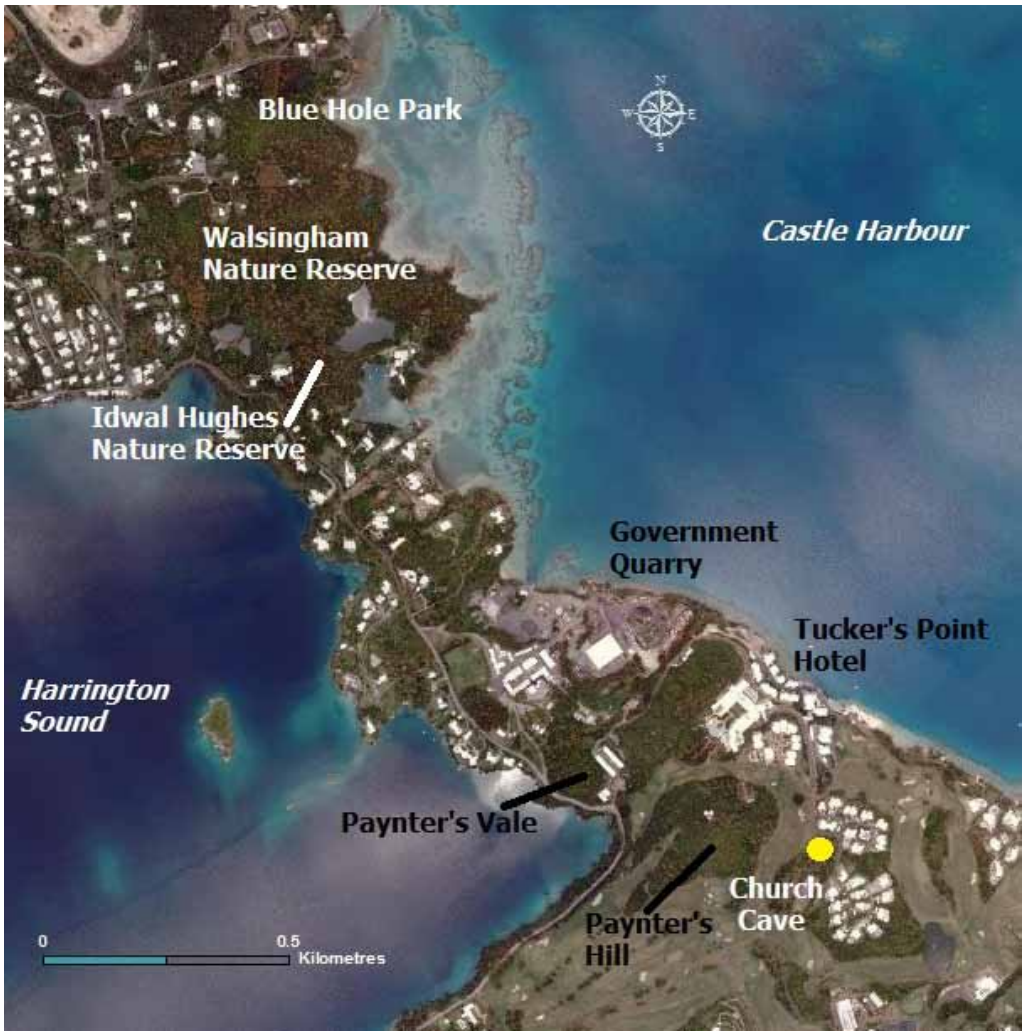

Figure 5. Map of the Walsingham area of Bermuda indicating the historic range of the species and reintroduction areas

Dept. of Environmental Protection, has shown the importance of native soil as at least a component, if not the total, potting media. Work has also been done on how to help the ferns' transition from enclosed containers to open growing conditions. This hardening-off process is a vital step toward reintroduction and keeping a long-term *ex situ* population. At present, several thousand young ferns are held *ex situ* by the Bermuda Government in 2 collections at the Department of Environmental Protection and Department of Conservation Services. Although reintroduction is seen by many as the ultimate goal of the project, the maintenance of a pot culture collection is how the species survived the 20th century, and is most likely how it will survive through the 21st.

Re-introduction site selection

The selection of the site has the greatest influence over the eventual outcome of the reintroduction. Very little is known about the ecology and habitat of the species. This has made growing it a challenge, and beginning a reintroduction difficult. We know from Britton (1918) that it grew in the Walsingham Tract *"... in caves and crevices between Harrington Sound and Paynter's Vale..."*; but little else has been written about its habitat or growth habits. Fortunately, the Walsingham Nature Reserve, Blue Hole Hill National Park, and the Bermuda National Trust's Idwal Hughes Nature Reserve together form a contiguous 14.532 hectares (35.91 acres) of protected habitat from which reintroduction sites can be selected.

Church Cave

The only named site where Gov. Laffan's Fern was known to have occurred is Church Cave (Gilbert 1898; E.G Britton 1905). Today, this cave lies between the driveway of the Tucker's Point Hotel and the Ship's Hill condominiums. In its present state the cave is not a viable reintroduction site but, by kind permission of the hotel, sets of environmental data-loggers have been placed around the cave. From these, we hope to learn more about the conditions at Church Cave and how they compare to the chosen reintroduction sites.

Habitat Management

The composition of Bermuda's woodlands has changed drastically in the 100 years since this fern last grew in the wild. The Bermuda Cedar Blight of the 1940s left over 95% of the indigenous forest dead, and led to a wave of new plant introductions to reforest the island quickly. Many of these new species became invasive on the landscape, altering the soil chemistry, light regime, and availability of water and growing space. Control of invasive plants is going to be a key, on-going step in managing Gov. Laffan's Fern.

Reintroduction

Between 24November 2014 and 4 March 2015, forty one Gov. Laffan's Ferns were planted at 3 sites in the Walsingham Nature Reserve. Additionally, in January 2015, eight ferns were placed in the Bermuda Audubon Society's nature reserve at Sear's Cave. Sear's Cave lies outside the known historic range of the species, but the habitat is similar to Church Cave and Sear's Cave already hosts populations of other rare ferns. Approximately forty two small patches of prothalli (gametophytes) were also placed across the 4 sites. Site 2 at Walsingham is a rockface with other extant fern species, while Sites 1 and 3 are dripping cave mouths, one with existing ferns of other species, one with none. Initial survivorship has been mixed across the sites. Bermuda typically experiences a dry season in April, May and June, followed by hot summer weather into October, which will challenge the remaining ferns. Further introductions are planned for the cooler months from November 2015 to January 2016.

Environmental monitoring

When ferns were planted at Walsingham and Sear's Cave, environmental data-loggers were placed at the sites (n=4) to record relative humidity, temperature and relative light intensity. Additionally, data-loggers were placed at 3 proposed reintroduction sites within the Walsingham Tract and Church Cave (n=5).

Figure 6. Reintroduced Gov. Laffan's Ferns in the wild at Walsingham

Figure 7. Environmental monitoring data-loggers at Church Cave. The HOBO U23-001 (top) records temperature and relative humidity, the HOBO UA002-64 (lower) records relative light intensity.

Protection

Gov. Laffan's Fern was given formal legal protection in 2007 when the first Protected Species Order was written under the Bermuda Protected Species Act 2003. This Act protects the species itself, alive or dead, and also protects the habitats of listed species. A recovery plan for the 6 species of ferns listed under the Protected Species Act, including *D. laffanianum*, was written in 2010 (Sarkis 2010). The plan outlines the policy, research and conservation activities need to improve the status of endangered ferns.

5-year goals of the Recovery Project

- Re-introduction plan written – in prep
- Additional shipments of prothalli from OHDZ to Bermuda – large shipments were received in September 2012, May and October 2014 and another is expected in September 2015 – done
- Taxonomy & genetic testing - research is ongoing to determine species status, endemic status and nearest relatives (Houser *et al.* 2015) – done
- Inclusion in IUCN Red List of Threatened Species – The assessment of this species was published in June 2014 in collaboration with RBG Kew (Copeland & Malcolm 2014) – done
- Suitable ferns (various life stages) hardened off for re-introduction - ongoing
- Identify suitable habitats and sites for re-introduction – done
- Develop monitoring programme for growth and survival - pending
- Raise funds for environmental monitoring equipment – done
- Awareness raising - ongoing
- Develop habitat management programme.

20- year goals of the Recovery Project

- Self-sustaining wild populations in at least 6 locations
- Habitat managed for invasive species and other threats
- Mature, spore producing plants in pot culture – Government held
- Genetic material banked in Omaha and elsewhere
- Down-listing from Level 1 of the Protected Species Act
- Pot plants distributed to the public.

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The Bermuda Land Snail *Poecilozonites bermudensis* – a Lazarus species recently discovered in the center of an urban environment

Mark E. Outerbridge (Department of Conservation Services, Bermuda)

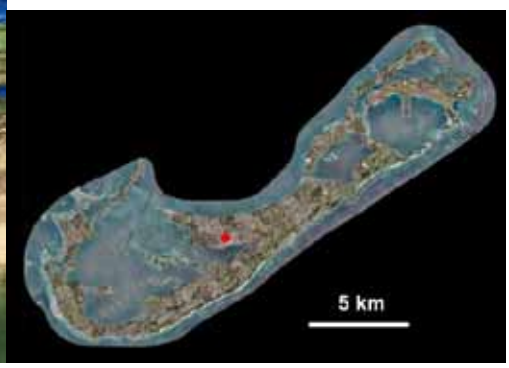
Outerbridge, M.E. 2015. The Bermuda land snail *Poecilozonites bermudensis* – a Lazarus species recently discovered in the center of an urban environment. pp 175-177 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Poecilozonites is a highly distinctive genus of zonitid snails that is one of the oldest endemic elements of the land fauna of Bermuda, having spent more than one million years surviving radical changes in land-area and ecology on these remote oceanic islands. Believed to be extinct by the early 1990s, a relict population of *Poecilozonites bermudensis* was found recently inhabiting a service alley and small courtyard measuring only 200 ft^2 in area within the city of Hamilton - the most urbanized region of Bermuda. A population assessment revealed that all size-classes were encountered and recruitment was occurring. The smallest snails measured 2.5 mm shell diameter while the largest measured 22.5 mm. Abundance was estimated to be 328 snails ≥10.0 mm shell diameter. Fifty four hatchlings and small juveniles were collected and taken to the Department of Conservation Services in order to establish a captive colony at the Bermuda Aquarium Museum and Zoo.

Mark E. Outerbridge, MSc., PhD., Wildlife Ecologist, Department of Conservation Services, Government of Bermuda. mouterbridge@gov.bm

The genus *Poecilozonites* is endemic to Bermuda. At least twelve different species are known from the fossil record, but only two were recorded as being extant in the mid-20th century: *Poecilozonites circumfirmatus* and *P. bermudensis*. The latter was believed to be extinct by the early 1990s. However, a relict population was recently found inhabiting a concrete alley and small courtyard measuring only 200 ft^2 in area within the city of Hamilton – the most urbanised region of Bermuda. A population assessment revealed that all size classes (2.5 to 22.5 mm shell diameter) were encountered and recruitment was occurring. Abundance was estimated to be 328 snails ≥10.0 mm shell diameter. Fifty four hatchlings and small juveniles were collected and taken to the Department of Conservation Services in order to establish a captive colony.

Poecilozonites is a highly distinctive genus of zonitid snails that is one of the oldest endemic elements of the



land fauna of Bermuda (Gould 1969) and has spent more than one million years surviving radical changes in land-area and ecology on these remote oceanic islands (Hearty & Olsen 2010). At least twelve different species are known from the fossil record and are believed to represent a single lineage that exhibited pulses in size and shape which correlate with fluctuating sea-levels throughout the Pleistocene era (Hearty & Olsen 2010). Furthermore, historical predation is considered the factor most likely to have selected for gigantism in the anagenetic lineage of *Poecilozonites*. During the last 500,000 years, pulses of gigantism in these snails corresponds with periods when the island was colonised by large vertebrate predators (specifically birds and a species of tortoise) which created selection pressure favouring large size and rapid growth in the snails (Olsen & Hearty 2010).

Only two species remained living on Bermuda by the middle of the 20th century, *Poecilozonites circumfirmatus* and *P. bermudensis*, but both declined rapidly island-wide after the introduction of several species of predatory snails during the 1950s and 1960s (Gould 1968, 1991). By the early 1990s, *P. bermudensis* was believed to be extinct (Gould 1991, 1993), although a survey in 1988 revealed several fresh dead specimens (empty shells with intact periostraca), suggesting that there may have been an extant relict population in one location (Bieler & Slapcinsky 2000).

On September 16th 2014, a member of the public contacted the Department of Conservation Services, saying that he had found an empty snail shell on his business premises in the city of Hamilton (Fig. 2, map on previous page) that looked like it might belong to the genus *Poecilozonites*. A live snail was encountered on the following day at the same location. Both were taken to the Bermuda Natural History Museum and subsequently identified as *Poecilozonites bermudensis* (Figs 3 & 4, above).

Given that previous terrestrial gastropod surveys failed to locate living specimens of *P. bermudensis* in recent decades (Bieler & Slapcinsky 2000; Lines 2002; J. Madeiros pers. comm.), it was surprising that a prompt examination around the discovery location revealed an extant population of *P. bermudensis* inhabiting approximately 200 ft^2 of area within the city of Hamilton – the most urbanised region of Bermuda. Population size was estimated via mark-recapture sampling and calculated using the Chapman estimator. The survey results revealed an estimate of 328 snails ≥10.0 mm. All size-classes were encountered (*e.g.* hatchlings to adult snails), with shell diameters ranging from 2.5 to 22.5 mm (Fig. 5, below). Snails were particularly abundant in and around

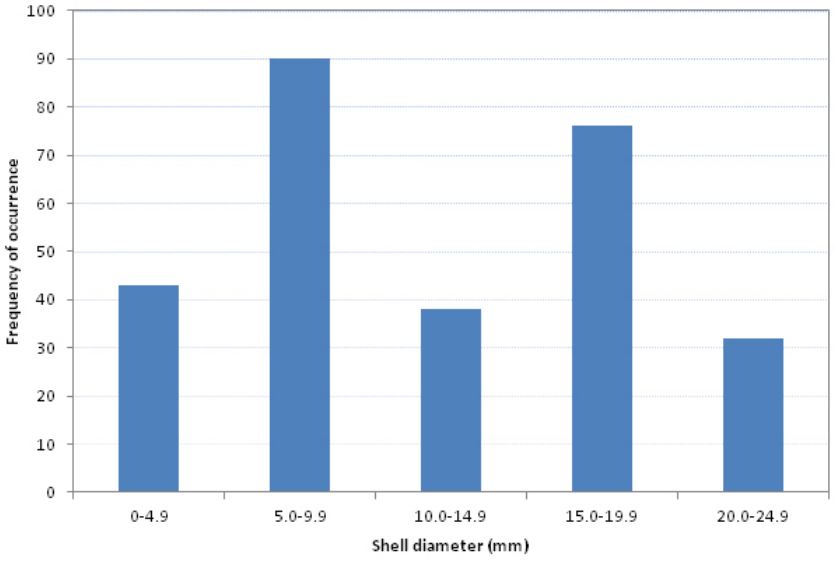


Figure 5. Length-frequency histogram of shell size for 279 P. bermudensis *snails*

a drainage channel running the length of the concrete alley, as well as in a small courtyard at the end of the alley (Fig. 6, left). The majority of the living snails were found at ground level, although a few were encountered on vertical surfaces within three feet of the ground. Those inhabiting the alley appeared to favour longitudinal cracks in the cement while those in the courtyard were found under various pieces of wood, among fern (*Adiantum bellum*), within the moist folds of plastic bags and beneath construction debris (most notably short lengths of metal and PVC piping as well as pieces of insulation material).

It is not known whether *P. bermudensis* colonised the site after it was developed commercially in the past or whether they were always present at that location and persisted in a favorable environment following development. Regardless, it is likely that their urban isolation has offered protection from invertebrate predators (especially the carnivorous snails *Euglandina rosea*, *Gonaxis quadrilateralis* and *Rumina decollata*) that are believed to have decimated *Poecilozonites* populations throughout the rest of Bermuda (Gould 1968, 1991, 1993). Additionally, this area appears to have had remained relatively unchanged for many decades, thereby providing environmental stability to the snail population.

At the conclusion of the survey, 54 hatchlings and small juveniles were collected and taken to the Department of Conservation Services in order to establish a captive breeding colony. Their care will be based on husbandry protocols developed by the Zoological Society of London (Walker & Pearce-Kelly 2006) for *Poecilozonites circumfirmatus*. Environmental parameters (such as temperature and humidity) for the alley and courtyard are unknown. Therefore a HOBO Pro v2 data-logger from Onset Computer Corporation was installed to collect data that will help to better inform the care of the captive specimens.

Plans are currently being made to send *P. bermudensis* to the Zoological Society of London in order to establish an *ex-situ* breeding colony. (This organisation already is caring for a captive colony of *P. circumfirmatus*). Furthermore, *P. bermudensis* is now being advocated for inclusion on the Bermuda Protected Species Act. (*P. circumfirmatus* is already protected.) Both *P. circumfirmatus* and *P. bermudensis* are being considered for IUCN red-listing.

Acknowledgements

I am profoundly grateful to Bruce Lines for rediscovering this species and bringing it to my attention, as well as to Simieon Massey for assisting with the population assessment.

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Golden, spikey and blushing – Conserving the invertebrates of the UKOTs

Vicky Kindemba (Buglife)

Kindemba, V. 2015. Golden, spikey and blushing – Conserving the invertebrates of the UKOTs. pp 178-180 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The UK's Overseas Territories (UKOTs) hold over 1,000 invertebrate endemics. Despite the global importance of the UKOTs for invertebrates, there is very limited understanding of invertebrate biodiversity and, as a result, many of these important species are threatened by human impacts. Even though much of this endemic fauna is threatened, only a small percentage of invertebrate species have been IUCN Red-listed. As a result, there is a need to improve information and understanding of invertebrates and also their conservation needs in the UKOTs.

Buglife, with funding from the Darwin Initiative and in partnership with St Helena National Trust, St Helena Government and the Centre for Ecology and Hydrology, has been delivering *Bugs on the Brink* project for the last three years, to set up invertebrate conservation work on the island. Achievements of the project include a full baseline data-set of the island's invertebrates, Red-listing, training of professionals, identification guide, a reference collection; as well as outreach with schools and the wider island to improve understanding of St Helena's amazing invertebrates. The *Bugs on the Brink* project has also initiated the establishment of an IUCN invertebrate specialist group for the Mid-Atlantic tropical islands. This group of 22 experts, with knowledge of this region, will drive forward invertebrate conservation work on these islands that are rich in unique invertebrates. This group will cover the UKOTs Ascension, St Helena and Tristan da Cunha.

Vicky Kindemba, Buglife – The Invertebrate Conservation Trust, Bug House, Ham Lane, Peterborough. PE2 5UU, UK. vicky.kindemba@buglife.org.uk

The UK's Overseas Territories (UKOTs) hold over 1,000 invertebrate endemics. This rich and unique fauna means that the UKOTs are of global importance for invertebrates, but there is very limited understanding of this distinctive biodiversity and, as a result, many of these important species are critically threatened by human impacts. As a result, there is a need to improve information and understanding of these invertebrates and also their conservation needs in the UKOTs.

Museum staff training © Felix Driver

Buglife, with funding from the Darwin Initiative and in partnership with St Helena National Trust, St Helena Government and the Centre for Ecology and Hydrology, has led a flagship project over the last three years establishing invertebrate conservation work on the UKOT of St Helena. By providing information, training and resources, as well as integrating invertebrate needs into existing conservation work and so securing the long-term survival of this rich invertebrate fauna. This project can also be used as a template to inform and develop invertebrate conservation on other UKOTs.

Spiky yellow woodlouse © Ed Thorpe

Blushing snail Succinea sanctaehelenae *© RS Key*

The invertebrate fauna of the UKOTs

Oceanic islands are well known for their high percentage of endemic species, and so are key locations for species conservation efforts. In the UKOTs there has been a focus on birds, fish, plants and mammals, and invertebrates have been generally neglected.

The UK's Overseas Territories (UKOTs) hold globally important invertebrates species, with over 1,000 known invertebrate endemics, but many invertebrate groups are still under-recorded on the UKOTs. So this figure is likely to increase substantially. There is also a very limited understanding of invertebrate biodiversity; and so more basic research into ecological requirements and their distribution is needed. This will facilitate the conservation of the amazing invertebrates of the UKOTs. For example, in St Helena there are spectacular species such as the unusual spiky yellow woodlouse *Pseudolaureola atlantica*, the colourful blushing snail *Succinea sanctaehelenae* and the glinting body of the golden sail spider *Argyrodes mellissii*.

Golden sail spider © Roger Key

With human pressures more severe on oceanic island fauna compared with mainland sites, many of these species are under threat from impacts such as habitat fragmentation, non-native species, habitat loss and climate-change. Even though many endemic invertebrates are threatened, only a small percentage have been IUCN Red-listed, and so their importance and threat level is not acknowledged. As a result, there is a need to improve information and understanding of invertebrates and their conservation in the UKOTs.

'Bugs on the Brink' in St Helena

In 2012, the UK Government's Darwin Initiative awarded funds to the 'Bugs on the Brink: Laying the Foundations for Invertebrate Conservation on St Helena' project. This project has seen Buglife working in partnership with St Helena National Trust, St Helena Government and the Centre for Ecology and Hydrology over the last three years to set up invertebrate conservation on the island.

St Helena is home to over 400 species of endemic invertebrate, which included iconic invertebrates such as the giant earwig *Labidura herculeana*, giant ground beetle *Aplothorax burchelli* and St Helena darter (a dragonfly) *Sympetrum dilatatum.* However, these species have all become extinct within the memory spans of people living on the island now. As result, there is a real need to conserve the remaining endemic invertebrates on St Helena.

Achievements of the project to-date have been:

- Assembling knowledge of the island's land-based invertebrates, including a baseline dataset
- Local staff trained on invertebrate conservation management
- Development of resources, including an invertebrate identification guide for the island

- Integration of invertebrate needs into habitat management plans and threatened species added to the new species ordnance list
- Knowledge and tools allowing the restoration of native habitats as a functioning ecosystems
- St Helena's school children taught about the importance of invertebrates; and the development of an education kit and resources for school
- Public awareness has been raised on St Helena's special invertebrates
- The Red-listing of invertebrate species (16 completed and 93 in development)
- Long-term conservation planning

The 'Bugs on the Brink' project has also initiated the establishment of an IUCN invertebrate specialist group for the Mid-Atlantic tropical islands. This is a group of 22 international invertebrate experts, with knowledge of this region, who will drive forward invertebrate conservation work for these diverse and unique islands. This group will cover the UKOTs of Ascension, St Helena and Tristan da Cunha.

The future

We want to continue to create fantastic partnership projects in the rest of the UKOTs, using our knowledge and understanding from the 'Bugs on the Brink' project to facilitate the conservation of the UKOTs' amazing endemic invertebrates. If you are interested in working with us please contact vicky.kindemba@buglife.org.uk

Discussion

Much of the discussion addressed the conclusions and recommendations. If such items are adequately reported in the Conclusions and Recommendations section later in these proceedings, they are generally not repeated here. Instead, this section draws out some other aspects for which amplification may be useful, on of the discussions and ideas put forward for consideration.

Environment Funds / Funding

UKOTs raise funds for their environmental work in different ways. Present sources include: levies on tourists, entrance fees to National Parks, etc.

There were several examples of some cases where funds have been spent by governments for non-environmental projects, as the funds were not ring fenced, *e.g.* Cayman, Turks and Caicos. However, there are some developments where this is changing. For example, on Cayman, the fee was initiated in 1997. The Government did not set into a separate fund in law, as opposed to by public statement, so it went in to general revenue then got used and misused for many years. They did get some money for land purchase. The new National Conservation Law states that all fees and fines go in to the Conservation Fund held by the Treasury but as a separate fund.

On Anguilla, as part of Climate Change policy a fund has been set up and has been drafted but not implemented. BVI also has something similar. Some of these schemes were similar to the landfill tax credit scheme in the UK.

With regards to EU funds, a former reviewer for EU funded projects remarked that the EU were not interested in cheap, cost-effective projects as these cost the EU too much to run as, in their system, it costs them about as much to run a grant whatever its size. Also, with so many small EU overseas entities and limited allocated budget, the European Commission favours cross-territory projects to fund.

There were several suggestions made that UKOTs applying for funding should partner with a UK organisation as they often have administrative capabilities or experience which some of those in UKOTs do not have.

Matched funding is essential for some funding schemes and favoured by others. This is another factor which disadvantages small, efficient non-profit organisations. Some schemes allow work-time to count as matching funds; therefore good records of staff time must be kept, so that these can be accounted for appropriately as "in kind" contributions.

Private funding sources should not be ignored as they can provide significant contributions with less administration and reporting required.

Legislative Framework

In many cases, there is no legislative framework which enables a development project to be rejected based on factors relating to impacts on environmental. Planners and conservationists must keep planning and conservation legislation up-to-date. There were concerns that the UKOTs do not have much support when it comes to planning proposals and objections.

New changes occurring to National Biodiversity Action Plans and species and habitat BAPs in the Caribbean to ensure they meet legal requirements.

Should the UKOTs be considering biodiversity off-setting? There are major risks here, not just possible benefits.

Additional opportunities/resources

Other resources include: UKOTCF's organising of skilled volunteers matching with needs expressed by UKOTs/CDs, RSPB sabbaticals (which can be taken for a month after 7 years of service), equipment for remote sensing and camera-trapping which have reduced in cost over recent years, citizen scientists to get more people in community involved data collection (it will raise profile and enable better dialogue; examples in TCI with REEF).

Workers addressing invasive species must consider baseline surveys and make them as comprehensive as possible.

Engaging the community

Engaging the community is seen as vital in the success of removal of non-natives. Similar initiatives to the reindeer removal on South Georgia have been attempted elsewhere but there have been problems with local community opposition. On South Georgia, the timing of the planned removal was unfortunate. However, they wanted to engage in positive way. Objections were

received. However, they found that, as soon you sit people down and explain the massive benefits, then they were positive about it. It is important to work with partners to make sure that, in press releases, you have a consistent message so that it is reported to the media the same every time. Some remarked that, in terms of feeding back results, as a small team they do find this a challenge but have made improvements.; their Twitter feed has been particularly useful given that that messages must be 140 characters, which means they have to be short and to the point.

An additional example was that working with churches in small communities can give access to broader audiences.

Concerns were raised on how to get people to value the environment. Perhaps there should be less emphasis on economy and more on the well-being of residents and visitors.

Stakeholders as conservation stewards: many UKOTs reported that they have MOUs with local businesses, *e.g.* Gibraltar dive shops, DEMA in TCI. Activities they were involved in included: beach clean-up, report things back to them, informal discussions. The wealth of information and success stories shared at the conference is a great resource for other countries/people to tap into. Is there a way to pool all this information together? In addition to the proceedings, there is an on-going dialogue in UKOTCF's Working Groups. It was noted that collaboration is already in place between Dutch, French and British OTs, partly via UKOTCF linking with equivalent umbrella bodies for those countries. Branding of conservation stewardship is an important issue. Often NGOs can help with this by some kind of charter for responsible tourism. The Convention on Biological Diversity has recently published guidelines on tourism in sensitive areas. [This can be found at https://www.cbd.int/tourism/doc/tourism-manual-2015-en.pdf]

Recommendations from Discussions

A review is needed across the UKOTs to draw together all information on how the various UKOTs are raising the environmental funds. Those UKOTs without these funds could look to adopt some following the review. There was, however, some concern about international bodies with other agendas adopting this role to themselves in potential competition with small organisations.

Greater emphasis needed on identifying the non-monetary and cultural services offered by the environment, *e.g.* getting fishermen to feed a sense of pride/involvement in conservation projects.

A legislative framework is needed to support the appropriate rejection of planning proposals on environmental grounds.

Projects to report back to Darwin funders on how vital funding is and how successful the projects have been.

Create a standard charter for responsible tourism, which can be used to certify tour operators. If this is applied across the territories, it will be more visible.

Session 8: Conservation and Sustainable Use of Marine Resources

Chairing & facilitating team: Annie Glasspool (Bermuda), Tom Appleby (Blue Marine Foundation; UKOTCF), Peter Richardson (Marine Conservation Society), Drin Lutchman (South Atlantic, Gibraltar & elsewhere)

Governance in the Marine Environment – Tom Appleby (Faculty of the Environment and Technology, University of the West of England, Bristol/ Blue Marine Foundation/ UKOTCF)
Intra- and Inter-territory Environmental Research in the South Atlantic Supporting Strategies for Environmental Conservation and Management. – David Blockley (South Atlantic Environmental Research Institute (SAERI))
Pitcairn Islands: Integrating Research, Conservation Monitoring, Management and Sustainable Development – Terence P. Dawson[1], Jacqui Christian[2] and Michele Christian[3] ([1] School of the Environment, University of Dundee, DD1 4HN, UK; [2] European Representative of the Government of Pitcairn, Henderson, Ducie and Oeno Islands, Adamstown, Pitcairn; [3] Environmental, Conservation & Natural Resources Division Manager, Government of Pitcairn, Adamstown, Pitcairn.)
Towards a marine mammal transboundary management and governance in the Caribbean region: UKOTs on board with us? – Romain Renoux, (Réserve Naturelle de St Martin/SPAW-RAC/Agoa) and Amandine Eynaudi, Agence des aires marines protégées/ Sanctuaire Agoa/)
Sustainable fisheries management in the South Atlantic: Models of best practice – Indrani Lutchman
Tristan da Cunha – another example of registered sustainable fisheries and its recovery from the *Oliva* wreck – Jim Kerr (Tristan da Cunha Government)
Action Plan For Maintaining Coral Reef Health in the Turks & Caicos Coral recovery projects – Don Stark (Turks & Caicos Reef Fund)

From left: Annie Glasspool, Drin Lutchman, Peter Richardson and Tom Appleby

Marine Protection in Bermuda: Lessons Learned from 400 years of Management and a Range of Geographical Scales – Annie Glasspool (Bermuda)
Applying parts of UNCLOS (UN Convention on the Law of the Sea) to access data for use in mapping and monitoring in UKOT waters – Alan Evans (Marine Geoscience Group, National Oceanography Centre, Southampton, UK)
3-minute video: The Virtual Watch Room, Pioneering Technology to Help End Illegal Fishing – Jo Royle (The Pew Charitable Trusts)
Using Seabirds to Inform Marine Spatial Planning in the BVI – Susan Zaluski (Jost Van Dykes Preservation Society)
A sustainable marine and fisheries management plan for the Pitcairn Islands – Terence P. Dawson[1], Robert Irving[2] and Heather Koldewey[3] ([1] School of the Environment, University of Dundee, DD1 4HN, UK. [2] Sea-Scope Marine Environmental Consultants, Dulverton, Somerset TA22 9PW, UK. [3] Zoological Society of London, Regent's Park, London, NW1 4RY, UK
Widening Bermuda's Shipping Channels: Challenging Pre-Conceptions through EIA – A.F. Glasspool*,J. A. Ward* and J. Burnham** (*Bermuda Environmental Consulting Ltd., **Works and Engineering, Government of Bermuda)
Discussion

Governance in the Marine Environment

Tom Appleby (Faculty of the Environment and Technology, University of the West of England, Bristol/ Blue Marine Foundation/ UKOTCF)

Appleby, T. 2015. Governance in the Marine Environment. pp 185-187 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The governance of the UK Overseas Territories is complex, endlessly fascinating and often politically charged. There is no area where this complexity is more demonstrable than in the marine environment, where the issues of extended maritime boundaries granted under the United Nations Convention on the Law of the Sea, fishing and prospecting rights, marine conservation and competing sovereignty mean that the practical application of the law in this area is particularly difficult to interpret. This complex environment makes it challenging to undertake conservation activities. This paper focuses on the Mauritius and UK arbitration over Chagos Islands and, through analysis of this case study, explores marine governance issues for the UK Overseas Territories in general. In particular, the paper explores the difficulties of restricting fishing activities where, because of the long established *mare liberum* doctrine, the world's oceans have traditionally been treated as a fishery.

Dr Thomas Appleby, Faculty of the Environment and Technology, University of the West of England, Bristol/ Blue Marine Foundation/ UKOTCFCouncil Member. Thomas.appleby@uwe.ac.uk

Chagos Marine Reserve

On April 1 2010, the UK Foreign Secretary announced the creation of the world's largest continuous marine reserve in the Chagos archipelago.

The Chagos reserve, which is more than twice the size of the UK, is an unparalleled sanctuary for marine biodiversity where human influences are minimal. It is home to 220 types of coral, 1,000 species of fish as well as turtles, sharks and dolphins.

In 1965, UK gave undertakings to Mauritius that it would return the Chagos to Mauritius

when they were no longer needed for defence purposes. Recently, a UN arbitral tribunal found that Mauritius had an interest and should have been consulted on the creation of the marine reserve and a ban on fishing.

This presentation outlines some of the issues relating to governance in the marine environment, specifically those arising following the establishment of the Chagos Marine Reserve.

Background

On the face it, declaring a marine reserve – *i.e.* stopping an industrial activity conducted by a largely distant-water fleet of third party nations (though there was some artisanal fishing from Mauritius) – should have been relatively innocuous. But the Chagos,Islands, like many of the UK Overseas Territories, have their own history, and the reserve became part of that broader narrative.

For many years, there had been a campaign for a right to return for the original inhabitants, who had been evicted to make way for the base. The reserve was therefore interpreted in the context of this narrative.

De Santo (2011) wrote: "A marine protected area designation that precludes the return of local people to the Chagos archipelago will, from a human rights perspective, also sustain the injustice that the previous removal of these people represent."

This interpretation was supported by evidence from Wikileaks (Anon. 2010) which mentioned: "[Colin Roberts] asserted that establishing a marine park would, in effect, put paid to resettlement claims of the archipelago's former residents"

There was also a claim by Mauritius for sovereignty over the Islands and the reserve acted as a lightning rod for both these pre-existing claims and resulted in Mauritius taking the UK to international arbitration.

The Guardian newspaper reported the findings of that award as follows:

"Britain acted illegally in the way it has exercised territorial control over the Chagos Islands, a UN tribunal has ruled, raising questions over the UK's claim to sovereignty and offering hope of return to hundreds of evicted islanders. In a withering judgment, the UK is accused of creating a marine protected area (MPA) to suit its electoral timetable, snubbing the rights of its former colony Mauritius and cosying up to the United States, which has a key military base – allegedly used for the rendition of terrorist suspects – on the largest island, Diego Garcia"

Was *the Guardian* right?

In April 2010, Foreign Secretary David Miliband overrode officials to make the following Proclamation (*British Indian Ocean Territory Proclamation No.1 1st April 2010*):

"There is established for the BIOT a marine reserve known as the Marine Protected Area, within the Environment (Protection and Preservation) Zone which was proclaimed on 17th September 2003.

"Within the said Marine Protected Area, Her Majesty will exercise sovereign rights and jurisdiction enjoyed under international law …. , with regard to the protection and preservation of the environment of the Marine Protected Area and the implications for fishing and other activities in the Marine Protected Area and the Territory will be addressed in future legislation of the Territory."

This Proclamation does not, of itself create a marine reserve but sets the groundwork for further legislation to do so in the future, moreover it went no further than to restate existing international law. Article 192 of the United Nations Convention on the Law of the Sea NCLOS sets out.

The decision to suspend fishing (which was the main function of the reserve) was taken

under different legislation relating to fisheries management, rather than the marine reserve.

The Tribunal investigated in great detail the relationship between Mauritius and the UK, and found that the undertakings given prior to independence were binding on the basis of estoppel. Although the UK had consulted Mauritius, because Mauritius had a right to the islands once they were no longer needed for defence purposes, those consultations did not go far enough. Therefore, the Tribunal recommended the Declaration should be set aside (although confirming in that even the artisanal Mauritian-based fishery could be closed on sufficient justification). A minority of the judges (2/5) held that the detachment of Chagos from Mauritius was illegal at the start.

In reality though, everyone lost the case: the Chagossian cause was not advanced (despite *the Guardian's* article); Mauritius lost its sovereignty claim against the UK; and the UK's reputation was tarnished and its reserve was declared illegal, but it is not clear what effect that has since the ban in fishing emanated from other legislation.

Recommendations

- It is not enough to just do the conservation science.
- The legal landscape needs to be fully understood:
  - Historic access rights
  - Relations with neighbouring states.
- There is a need to understand decision-making framework of natural resource management and play by those rules.
- Most importantly, when establishing conservation measures to ensure that the conservation story does not get lost in competing narratives by engaging as far possible with those other interests. The Chagos reserve has ended somehow in a story of human rights verses the environment – these are both ethical causes and should never have been at loggerheads.

A full version of this paper is available at:

Appleby, T. 2015. The Chagos marine protected arbitration – A battle of four losers? J*ournal of Environmental Law*, 27 (3): 529-540.

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THE SUNDAY TIMES

Beauty and the reef: billionairess dives in to save coral

Britain's richest woman, a former Miss UK, is helping Belize set up a marine reserve

Robin Henry and Frank Page Published: 25 November 2012

HER last big purchase was a £100m superyacht, but now Britain's richest woman has splashed out on a Caribbean coral reef.

Kirsty Bertarelli, 51, a former Miss UK turned songwriter, and her husband, Ernesto Bertarelli, a Swiss biotech magnate, have channelled millions into safeguarding the future of a 300,000-acre expanse of ocean off the coast of Belize.

It comes as the descendants of the HMS Bounty mutineers on the British-controlled Pitcairn Islands are planning to turn the pristine waters around their secluded South Pacific home into the largest marine reserve in the world.

The islands' council recently voted in favour of banning commercial fishing from their "exclusive economic zone", or territorial waters, although subsistence fishing by islanders will still be allowed.

A spokesman for the Foreign and Commonwealth Office confirmed that it is considering the plan,

Another example of competing narratives in a marine MPA case

Intra- and Inter-territory Environmental Research in the South Atlantic Supporting Strategies for Environmental Conservation and Management

David Blockley (South Atlantic Environmental Research Institute (SAERI))

Blockley, D. 2015. Intra- and Inter-territory Environmental Research in the South Atlantic Supporting Strategies for Environmental Conservation and Management. p 188 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The UK Overseas Territories, Crown Dependencies and small island communities face the same environmental challenges as the larger and more developed nations of the globe, but often with fewer resources with which to meet them. Key to addressing complex environmental conservation challenges is good understanding of the natural environment based on rigorous science. The complex nature of ecosystems means that a holistic approach is required to fully understand the interactions amongst the biological and physical components. Compared to other parts of the world, most of the overseas territories are relatively understudied. This paucity of research and the availability of data are a key contributor to the dearth of scientific understanding of the local natural environment.

The South Atlantic Environmental Research Institute (SAERI) was set up to overcome some of these problems by localising scientific research within the Falkland Islands and the wider South Atlantic region. This not only ensures a research focus that aligns with the specific environmental needs of the territories but builds local expertise and capacity. SAERI not only carries out research itself, but coordinates and facilitates research by other regional and international organisations and groups providing support and structure and leveraging funding. Coordination of research and expertise amongst and within the South Atlantic is an important benefit of a dedicated scientific research institution within the territories. This has particularly been demonstrated by the data management systems that SAERI has had a leading role in establishing and has helped to overcome the chronic fragmentation of data. The scientific outputs of SAERI are able to give environmental managers greater independence from external advisors and consultants and more input into the necessary environmental research that underpins decision making.

Dr David Blockley, South Atlantic Environmental Research Institute - SAERI
DBlockley@env.institute.ac.fk

(Full version of paper not supplied)

Pitcairn Islands: Integrating Research, Conservation Monitoring, Management and Sustainable Development

Terence P. Dawson[1], Jacqui Christian[2] and Michele Christian[3] ([1] School of the Environment, University of Dundee, DD1 4HN, UK; [2] European Representative of the Government of Pitcairn, Henderson, Ducie and Oeno Islands, Adamstown, Pitcairn; [3] Environmental, Conservation & Natural Resources Division Manager, Government of Pitcairn, Adamstown, Pitcairn.

Dawson, T.P., Christian, J. & Christian, M. 2015. Pitcairn Islands: Integrating Research, Conservation Monitoring, Management and Sustainable Development. pp 189-192 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The Pitcairn Island group, located in the South Central Pacific Ocean, consists of two atolls: Oeno and Ducie (the most southerly atoll on earth), a raised atoll Henderson (a UNESCO World Heritage Site) and a volcanic island, Pitcairn. Only Pitcairn is inhabited, with a tiny population of around 50, mainly descendants of the *HMS Bounty* mutineers and their Polynesian partners who landed there in 1790. The islands are the last remaining Overseas Territory of the United Kingdom in the Pacific and are extremely remote, located at the south-eastern limits of French Polynesia, approximately equidistant between Chile and New Zealand. Pitcairn, along with many other small island developing states, share significant challenges that present a special case within the world community, including isolation, lack economies of scale, have high transportation and communication costs, and have limited means and capacity to implement comprehensive sustainable development goals (Solomon & Burnett 2014). In recent years, the main employment on Pitcairn has been in local government and community services, with additional income provided by the sale of wood carvings and curios to passing cruise ships, highlighting the island's historical and cultural heritage. However, current plans are underway to revitalise Pitcairn Island with plans to create a Marine Protected Area (the largest in the world), and the building of an alternative harbour development. Working with non-government organisations, the Pitcairn Island tourism department is developing new education and outreach initiatives with a focus on the natural features and biodiversity value of the islands and their marine environment. All of these activities will help to bring more tourism and cruise ships to Pitcairn and other islands in the group, to improve the local economy and support more sustainable livelihoods.

Terence P. Dawson[1], Jacqui Christian[2] and Michele Christian[3] ([1] School of the Environment, University of Dundee, DD1 4HN, UK; [2] European Representative of the Government of Pitcairn, Henderson, Ducie and Oeno Islands, Adamstown, Pitcairn; [3] Environmental, Conservation & Natural Resources Division Manager, Government of Pitcairn, Adamstown, Pitcairn.
Correspondence to Terence Dawson: t.p.dawson@dundee.ac.uk)

The Pitcairn Island group, located in the South Central Pacific Ocean, consists of two atolls: Oeno and Ducie (the most southerly atoll on earth), a raised atoll, Henderson (a UNESCO World Heritage Site) *(aerial views from top to bottom, below)* and a volcanic island, Pitcairn *(right)*. Only Pitcairn is inhabited, with a tiny population of around 50, mainly descendants of the *HMS Bounty* mutineers and their Polynesian partners who landed there in 1790.

The islands are the last remaining Overseas Territory of the United Kingdom in the Pacific and are extremely remote, located at the south-eastern limits of French Polynesia, approximately equidistant between Chile and New Zealand. Pitcairn, along with many other small island developing states, share significant challenges that present a special case within the world community, including isolation, lack economies of scale, have high transportation and communication costs, and have limited means and capacity to implement comprehensive sustainable development goals (Solomon & Burnett 2014).

The Exclusive Economic Zone (EEZ) of the 4 Pitcairn Islands span a vast area of ocean of about 836,000 km^2, more than three times the size of the UK

The islands have no air transport link. The nearest airport is on Mangareva in the Gambier Islands, French Polynesia, 330 miles away. Visits to the islands can only be made by boat or ship, with just four scheduled visits of the latter per year.

The islands have a rich cultural and natural heritage. There is worldwide interest in their Bounty Mutineers and Pre historic Polynesian History. In 1988, UNESCO declared Henderson Island a World Heritage Site. Five sites have been identified as proposed Ramsar Convention Wetlands of International Importance, but no progress has been made in designation for a decade. Recent scientific surveys have uncovered a veritable 'ark' of species from the inshore down to the deep-sea vents.

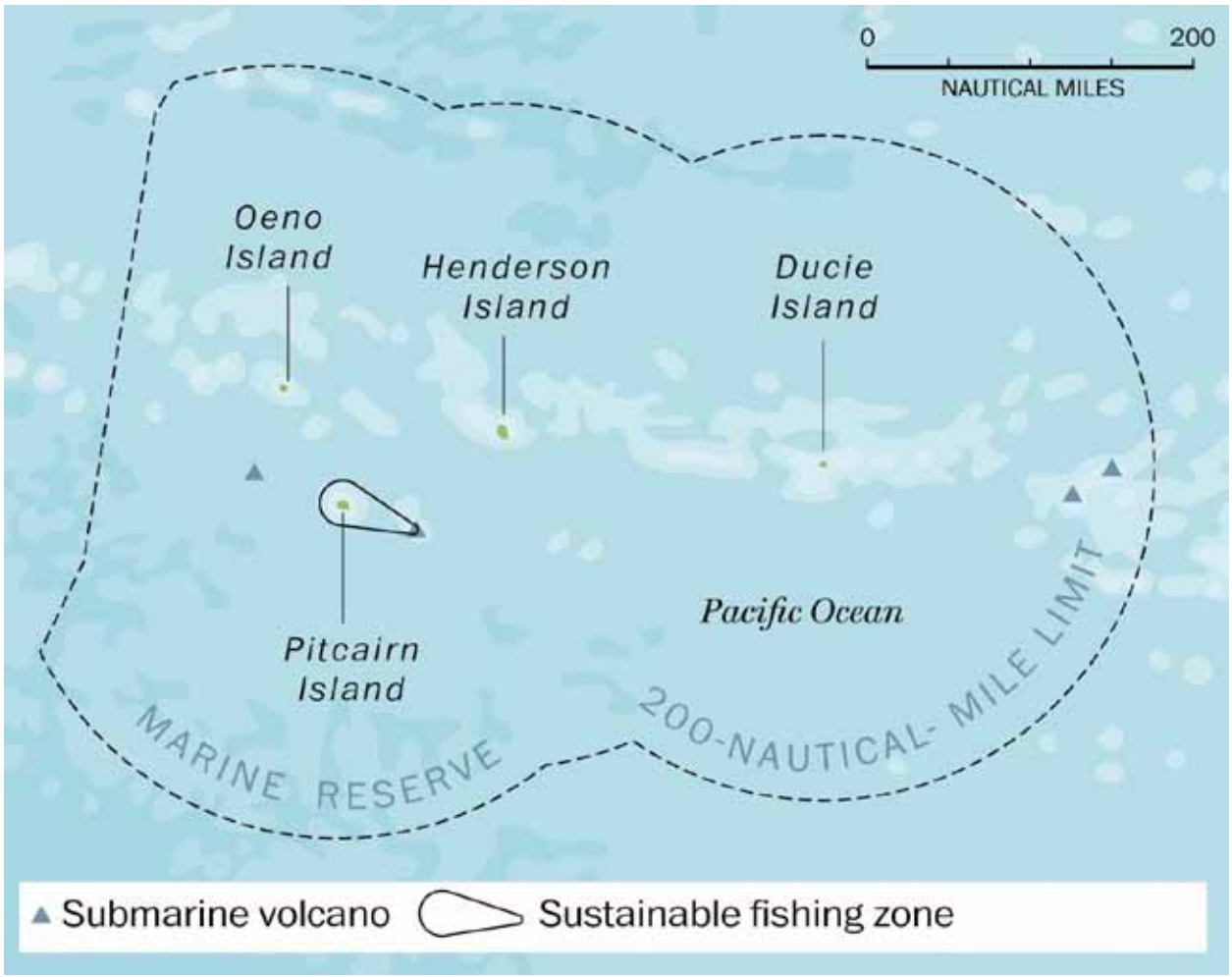
Pitcairn receives UK Budgetary Aid, which in 2012/13 totalled £2.9m, including: shipping/freight costs (£1.1m), professional salaries (£750,000), Pitcairn Island Office Auckland (£500,000) and infrastructure / repairs / capital equipment / local salaries.

In recent years, the main employment on Pitcairn

Above left: Pitcairn Islands organise a market of crafts on a visiting cruise ship (above right).

has been in local government and community services, with additional income provided by the sale of wood-carvings and curios to passing cruise ships, highlighting the island's historical and cultural heritage. Sales of island honey in Europe and elsewhere also provide an income stream.

Current plans are underway to revitalise Pitcairn Island with the creation of a Marine Protected Area (the largest in the world) (map below), and the building of an alternative harbour development (see picture at top of next page). Working with non-government organisations, the Pitcairn Island tourism department is developing new education and outreach initiatives with a focus on the natural features and biodiversity value of the islands and their marine environment. All of these activities will help to bring more tourism and cruise ships to Pitcairn and other islands in the group, to improve the local economy and support more sustainable livelihoods.



Proposed Pitcairn Marine Protected Area extent © Pew Charitable Trusts

Alternative harbour project: engineering works at Tedside, Pitcairn Island © Andrew Christian

Alternative harbour project: construction of the protective sea wall © Andrew Christian

On 18 March 2015, the UK Chancellor of the Exchequer, George Osborne announced in his Budget to Parliament that "The government intends to proceed with the designation of a Marine Protected Area (MPA) around Pitcairn".

Life in the seas around Pitcairn

Acknowledgents

Photographs courtesy of RSPB, Robert Irving, Enric Sala and Andrew Christian.

Reference

Solomon, R. & Burnett, K.. 2014, *Pitcairn Economic Review*, Solomon Leonard Ltd, Wellington, New Zealand. Available online at: http://www.government.pn/Pitcairn%20Islands%20Economic%20Report%20-%20Final%20Report.pdf (last accessed on 16th June 2015).

Towards a marine mammal transboundary management and governance in the Caribbean region: UKOTs on board with us?

Romain Renoux, (Réserve Naturelle de St Martin/SPAW-RAC/Agoa) and Amandine Eynaudi, Agence des aires marines protégées/ Sanctuaire Agoa/)

Romain Renoux

Amandine Eynaudi

Renoux, R. & Eynaudi, A. 2015. Towards a marine mammal transboundary management and governance in the Caribbean region: UKOTs on board with us? pp 193-200 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The marine mammal fauna of the Wider Caribbean Region (WCR) is diverse, and marine mammals have significant ecological, aesthetic and economic value to the countries and territories of the region. The wider Caribbean region is home to 32 different species of marine mammals. For many these, tropical waters serve as primary habitats for feeding, mating and calving. However, threats to marine mammals and marine ecosystems persist and new threats are emerging. Most marine mammals face multiple threats. Conservation measures that already are in force need to be evaluated and re-evaluated, and new approaches need to be developed to address threats that were unrecognized or non-existent until recently.

In 2008, the parties of the UNEP/SPAW protocol adopted a marine mammal action plan in order to assist participating governments in the region in their efforts to develop and improve marine mammal conservation policies and practices. Under this framework, regional initiatives have been undertaken:

- joint International Whaling Commission and UNEP workshops on marine mammal stranding and whale entanglement response;
- development of principles and best practice guidelines for marine mammal watching in the wider Caribbean;
- marine spatial planning and development of scenarios for marine mammal transboundary management in the insular Caribbean (LifeWeb project) highlighting critical areas for marine mammal preservation and suggesting management tools in more than 15 islands of the region.

In 2010, France and the local authorities of Martinique, Guadeloupe, Saint-Martin and Saint-Barthélemy declared the creation of the Agoa marine mammal sanctuary to ensure the conservation of marine mammals and their habitats. This area of 143,256 km^2 includes the territorial waters and EEZ surrounding the French Antilles. Improving scientific knowledge on species and habitats is a component of the Marine Mammal Action Plan for the Caribbean and the Agoa management plan. From 2012 to 2014, the French Marine Protected Areas Agency, with financial support from the SPAW-Regional Activity Centre, launched biannual transect lines and acoustic samples campaigns at sea to assess distribution and abundance of marine mammals within the sanctuary and its neighbour countries' waters, including those of Anguilla. MPA managers and staff were on board and trained in that regard.

As a complementary effort, the French MPA Reserve Naturelle de Saint-Martin and the SPAW-RAC have developed, in 2014, a satellite-tag mission on humpback whales. This is in partnership with the neighbouring islands of Anguilla, Saba, Sint-Maarten, and Sint-Eustatius, to assess migration routes of whales. Waters of Saint-Martin and Anguilla clearly host nursery and breeding grounds. Satellite tracking shows a strong connectivity between islands notably Anguilla, BVI, Dominican Republic, St Martin and St Barthélemy.

Multidisplinary, multi-islands teams' participation created new opportunities for collaboration and transboundaries management issues in the Caribbean. In that regard, the French MPA Agency is working on the establishment of sister sanctuary partnerships between existing and future sanctuaries, providing new avenues for collaborative action within and beyond the Caribbean Region.

Romain Renoux, Réserve Naturelle de St Martin/SPAW-RAC/AGOA
romain.renoux@rnsm.org
Amandine Eynaudi, Agence des aires marines protégées/AGOA
amandine.eynaudi@aires-marines.fr

The marine mammal fauna of the Wider Caribbean Region (WCR) is diverse, and marine mammals have significant ecological, aesthetic and economic value to the countries and territories of the region.

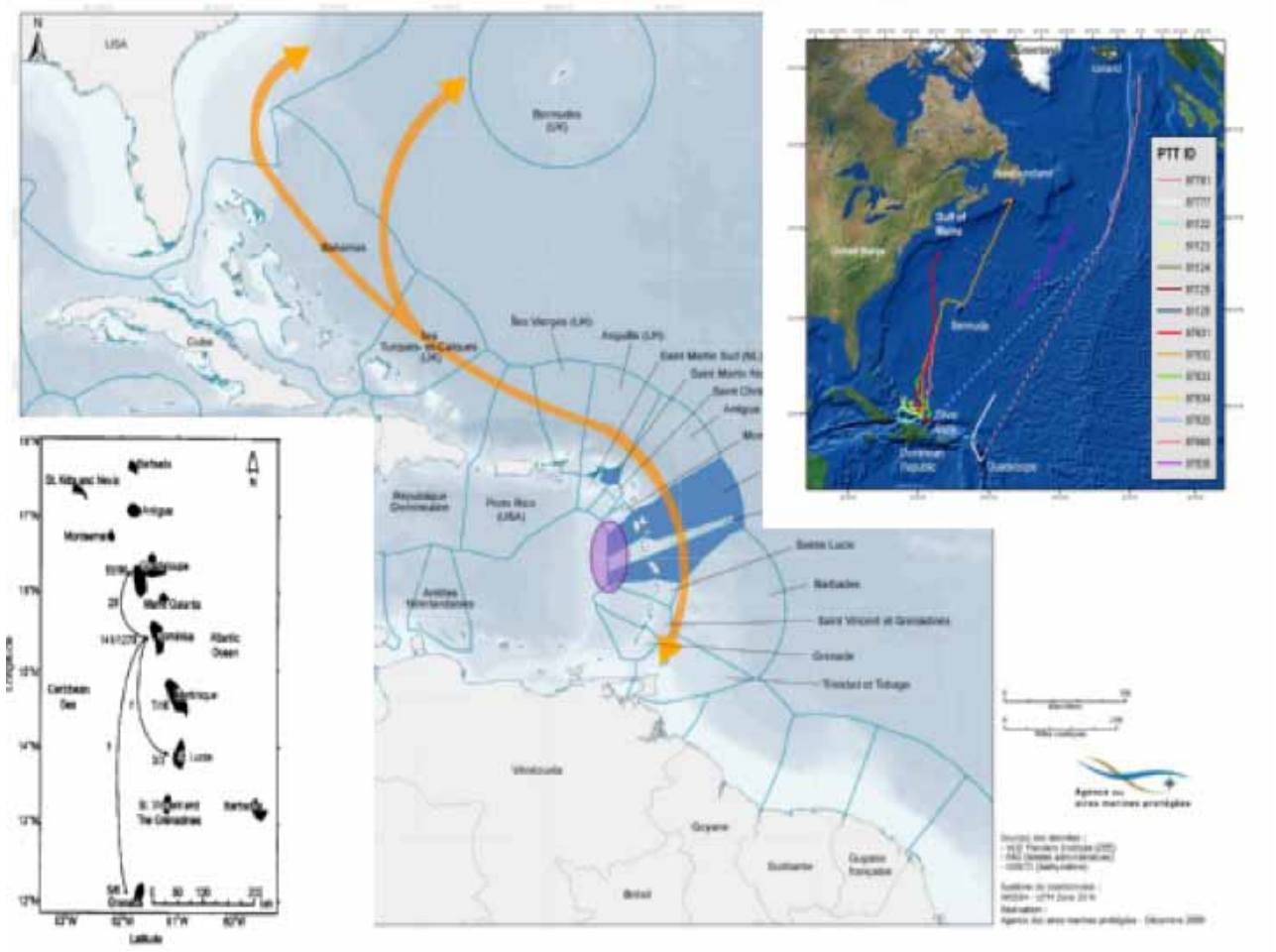
The wider Caribbean region is home to 32 different species of marine mammals. For many, these tropical waters serve as primary habitats for feeding, mating and calving. They also serve as important corridors 'stop-over points' connecting habitats in distant waters via long-ranging north-south migration routes in the Atlantic (see below and top of next page).

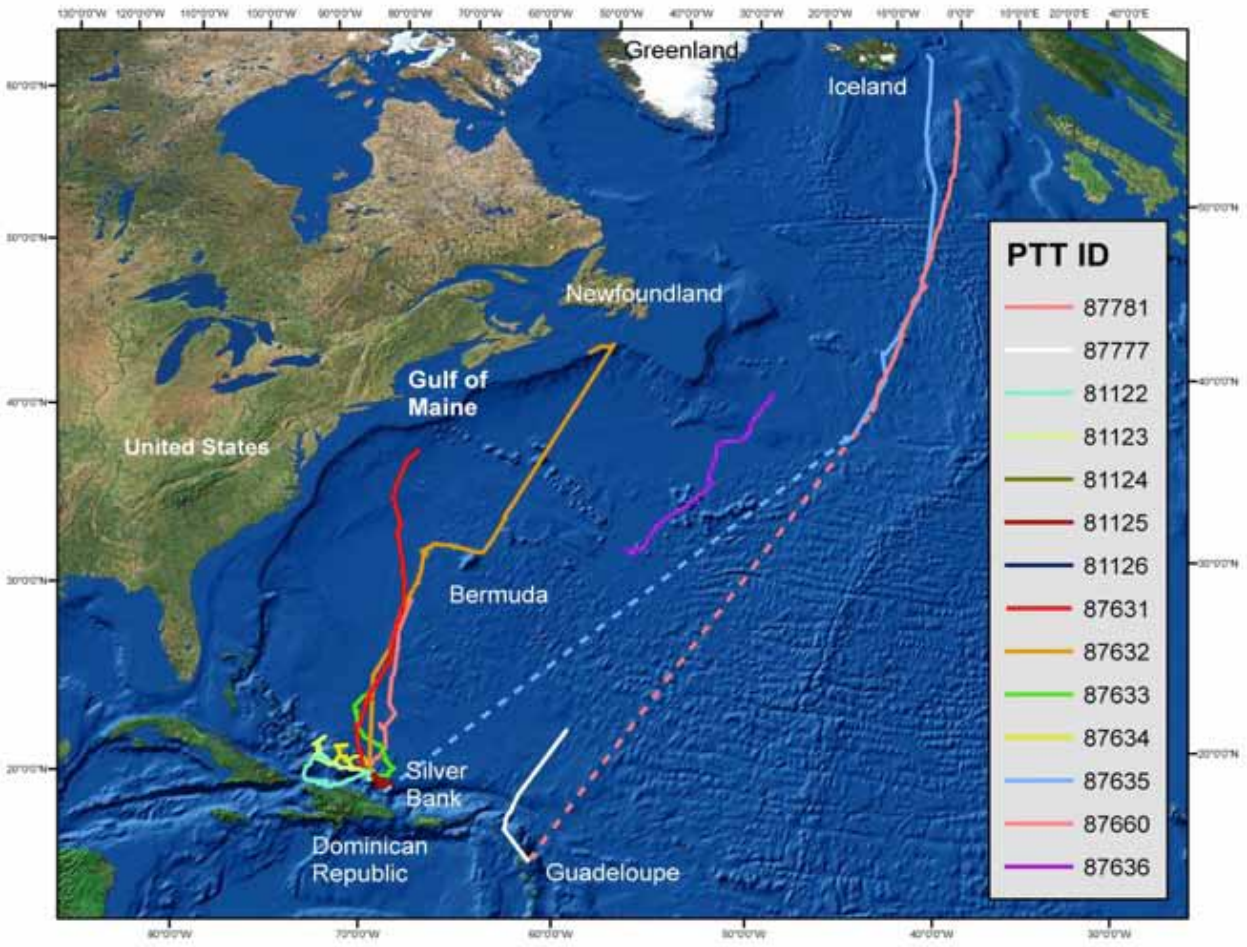
Nevertheless, threats to marine mammals and marine ecosystems persist and new threats are emerging. Most marine mammals face multiple threats such as maritime traffic, noise pollution, chemical and oil pollution, habitats degradation, and by-catch.

In 2008, the parties of the UNEP/SPAW protocol adopted a Marine Mammal Action Plan (MMAP) in order to assist participating governments in the region in their efforts to develop and improve marine mammal conservation policies and practices.

The MMAP goal is to assist participating governments in the region in their efforts to develop and improve marine mammal conservation policies and practices with two main objectives :

- Conservation and recovery of all marine mammal species and populations, and





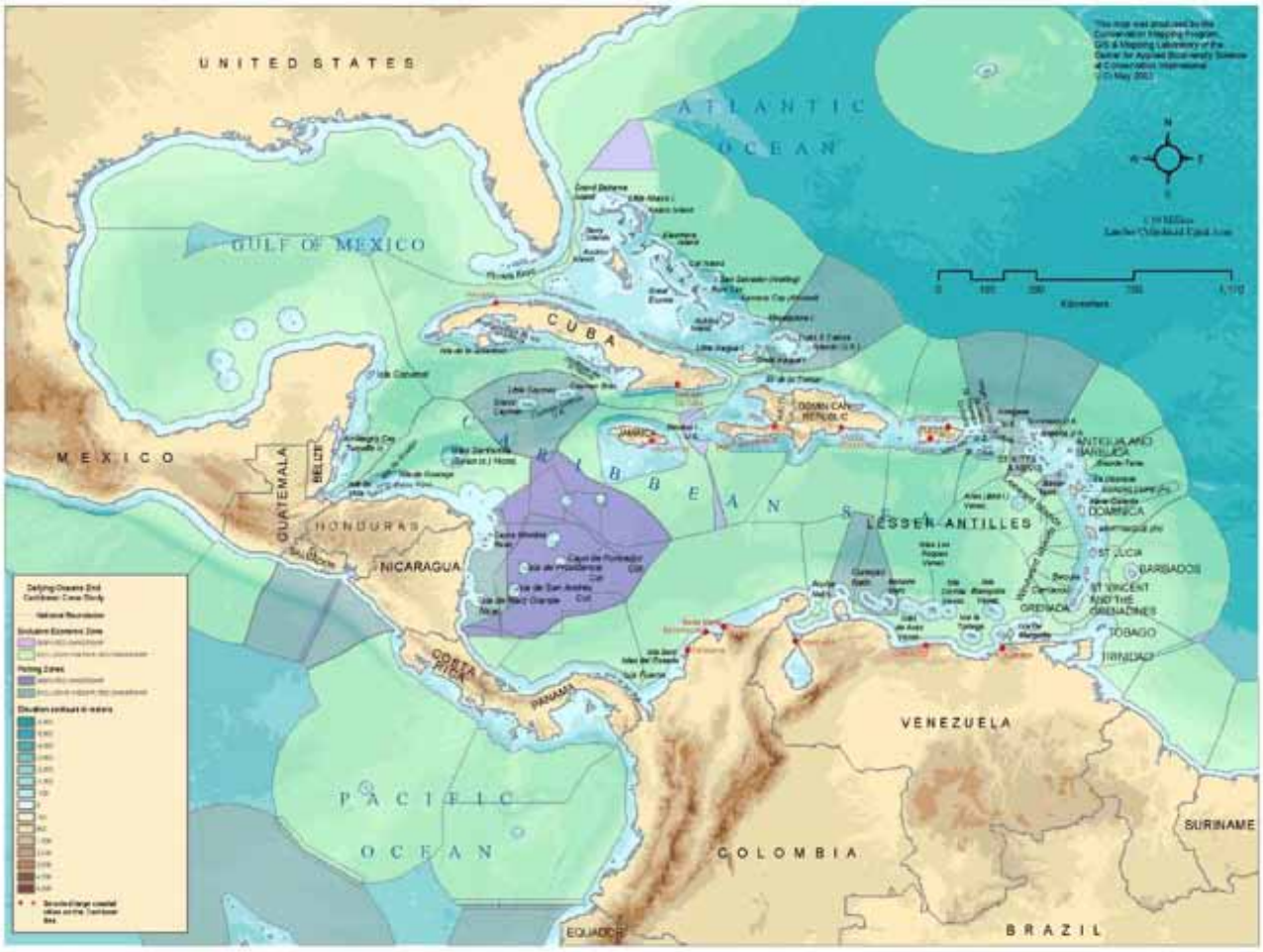
protection of their habitats in the region (*e.g.* feeding, breeding, and calving grounds, movement corridors).

- Establishment of regional cooperation programmes to increase scientific, technical, and educational exchange among relevant national, regional, and international organisations.

Sanctuaries that encompass most or all of a country's Exclusive Economic Zone are a powerful tool to ensure the conservation of marine mammal species, particularly cetaceans. Indeed, large protected areas are well adapted to the life-range of these species, whether resident or migratory, while the status of sanctuary allows for tailored measures and regulations that efficiently protect marine mammals without compromising human activities.

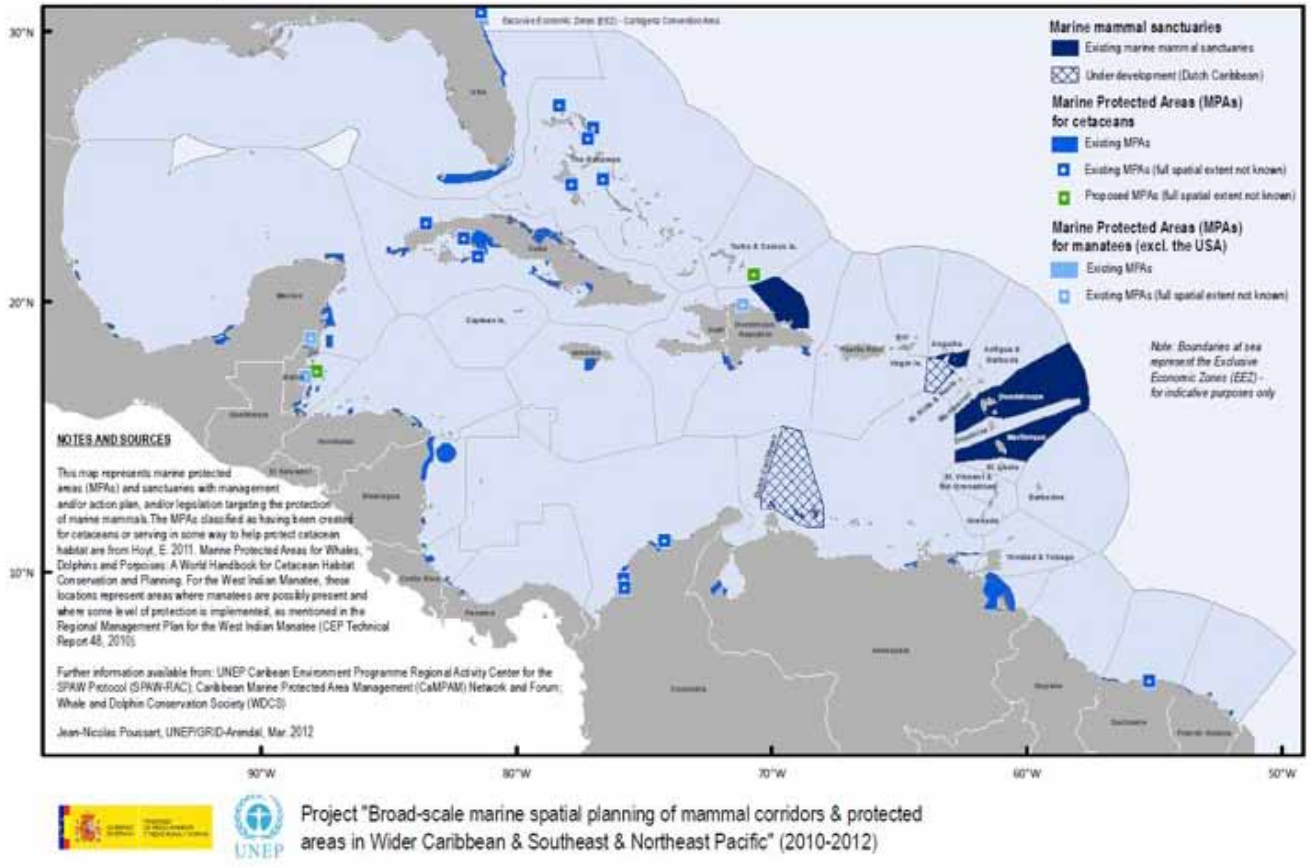
In the Wider Caribbean, several sanctuaries for the conservation of marine mammals have already been created over the years: the sanctuary for marine mammals in the Dominican Republic, that was established decades ago and which boundaries have recently been extended to protect banks such as Silver Bank, an important breeding and mating ground for the humpback whales. The government of France then declared, during the 6th Conference of the Parties to the SPAW Protocol in October 2010, the creation of the Agoa Sanctuary covering the entire EEZ of the French West Indies (St Martin, St Bart, Guadeloupe, Martinique). The Government of the Netherlands is planning as well in the near future to have the EEZ of Saba and Statia declared a marine mammal sanctuary. Finally, even if located outside of the Caribbean, the Stellwagen Bank sanctuary in the United States (Massachusetts) and Saguenay-Saint-Laurent Marine Park in Québec Canada are an important asset for the conservation of the Caribbean humpback whale, as it encompasses important feeding grounds that are used by the whales half of the year when they are not in the warm Caribbean waters for breeding and mating.

Of particular importance is also the network(s) on which a sanctuary can rely. Because of their wide range and their often migratory behaviour, marine mammal species are often known to cross the boundaries of marine protected areas, even when the latter are very large. It is therefore an asset for a newly established sanctuary to establish partnership with neighbour or more distant sanctuaries with which it shares the same marine mammal populations.

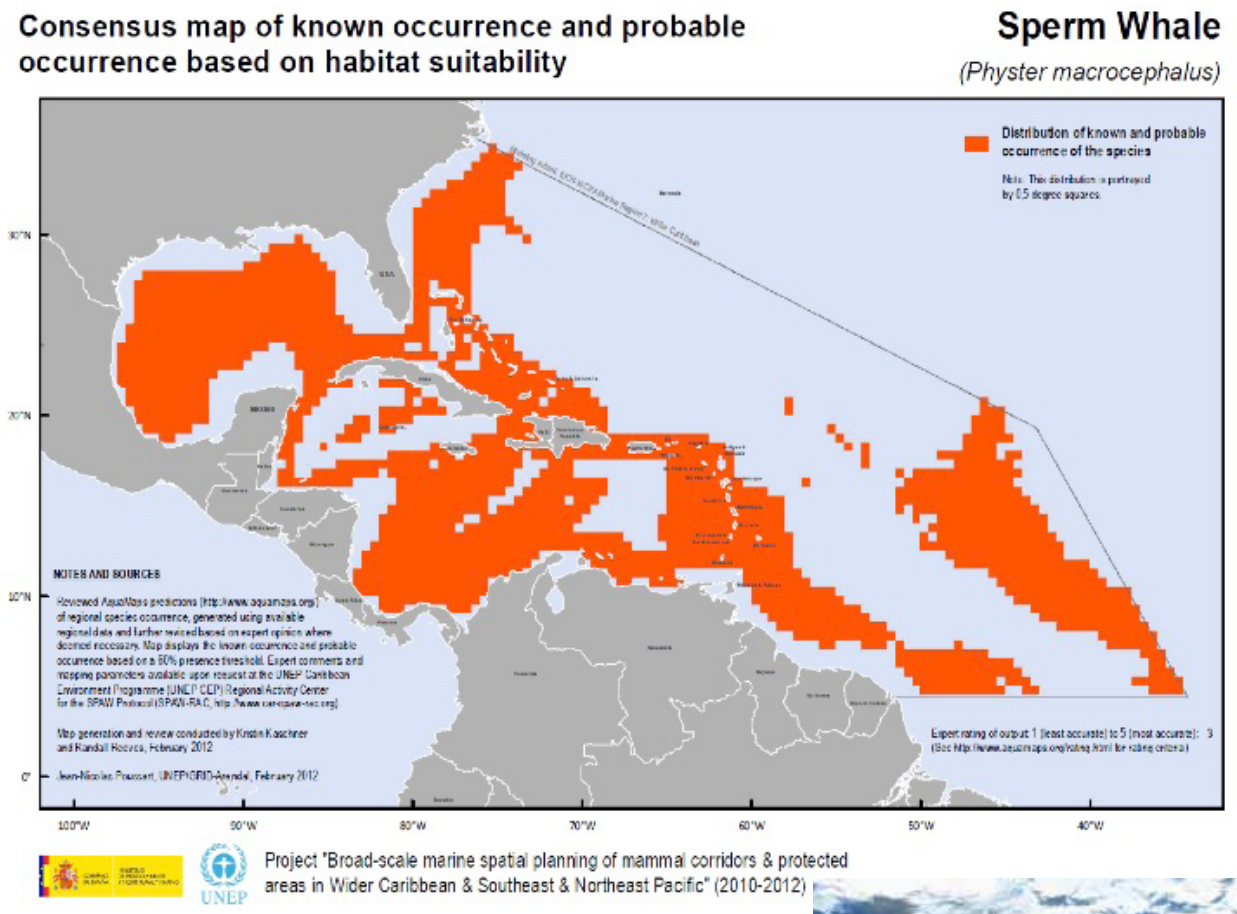


Marine Mammal Protection (1)

Sanctuaries and protected areas



Project "Broad-scale marine spatial planning of mammal corridors & protected areas in Wider Caribbean & Southeast & Northeast Pacific" (2010-2012)



In this way, several sister sanctuary agreements have already been signed: between the US (Stellwagen Bank) and the Dominican Republic (Marine mammal sanctuary of the Dominican Republic), between France (Agoa) the US

(Stellwagen Bank) and the Canada (the Saguenay-Saint-Laurent Marine Park). New agreements are expected to be signed in the near future, especially between France and the Dominican Republic, and also to connect Agoa and the future sanctuary in the EEZ of Saba and Statia.

Of interest is also the declaration of intent between the partners involved in sister sanctuary agreements that was announced during the 2nd International Conference on Marine Mammal Protected Area in La Martinique in November 2011, and where the partners confirmed their will to work together and with other interested parties to establish agreements between their respective sanctuaries, develop common activities for monitoring, management and capacity-building.

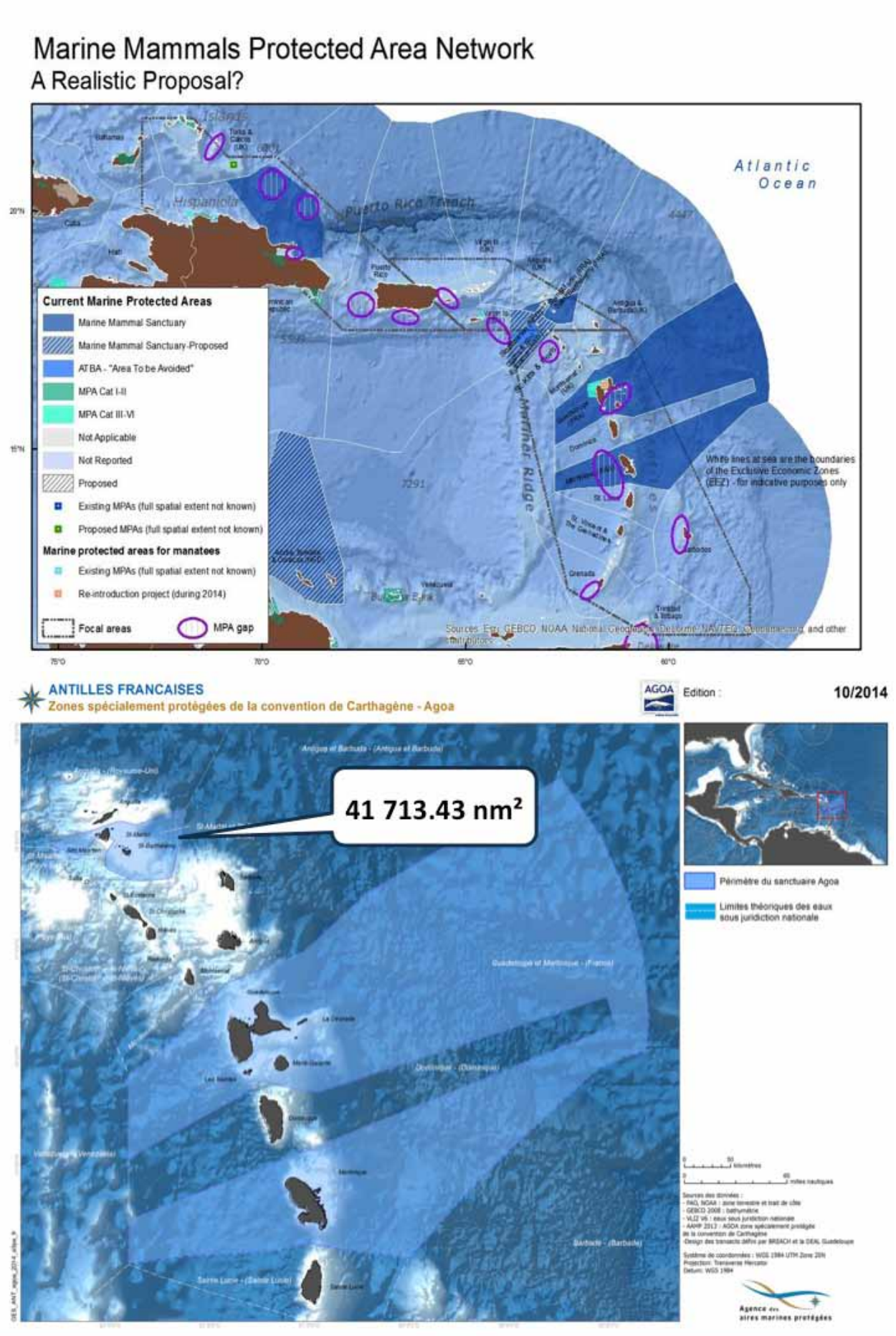
For this purpose, a first marine mammal sanctuaries cooperation meeting was organized on St. Maarten in 2012 and a second one in March 2015. Participants from the USA, France, Caribbean Netherlands and the SPAW Regional Activity Center (RAC) agreed to work together as marine mammal MPAs, cooperating on research and monitoring projects. The participants decided that the name for this group of cooperating partners is to be Marine Mammal Protected Areas Network – MAMPAN

Furthermore, a project coordinated by UNEP, UNEP-CEP and the SPAW-RAC called "Broad-scale Marine Spatial Planning of Mammal Corridors and Protected Areas in Wider Caribbean" aimed at developing scenarios for transboundary management of marine mammals based on marine spatial planning. Its main goals were to enhance national capacities for broad-scale marine spatial planning, including guidance on transboundary management and governance, and to assist in the implementation of Regional Marine Mammal Action Plan in the Wider Caribbean Eastern Caribbean. Analysis of overlaying ecological and socio-economic maps with maps of various threats provided a way to identify critical areas in the region.

In 2010, France and the local authorities of Martinique, Guadeloupe, Saint-Martin and Saint-Barthélemy declared the creation of the Agoa Marine Mammal Sanctuary to ensure the conservation of marine mammals and their habitats. This area of 143,256 km² includes the territorial waters and EEZ surrounding the French Antilles.

Improving scientific knowledge on species and habitats is a component of the Marine Mammal

Action Plan for the Caribbean and the Agoa management plan. From 2012 to 2014, the French Marine Protected Areas Agency launched biannual transect lines and acoustic samples campaigns at sea to assess distribution and abundance of marine mammals within the sanctuary. With financial



support from the SPAW-RAC, marine protected areas managers from neighbouring countries, including Anguilla, were on board and trained in that regard.

The French Agency for marine protected areas (*Agence des aires marines protégées*) decided to conduct a series of aerial surveys – REMMOA surveys (*REcensement de la Mégafaune Marine*

par Observation Aérienne; Census of Marine Megafauna by Aerial Observation). This follows a standardised methodology that allow comparisons, within and between regions as well as temporally, for the identification of hotspots of abundance and diversity and the establishment of a future monitoring scheme of cetacean and other pelagic megafauna across the French EEZ. This ambitious programme allows the identification of preferential habitats and areas of potential risks in a management and conservation perspective, and is the first of this kind to be conducted in the areas covered.

The general study areas of the REMMOA surveys include all sectors of the French EEZ in the tropical Atlantic (French West Indies and Guiana), southwestern Indian (Reunion Island, Mayotte and the Scattered Islands) and south Pacific (French Polynesia, New Caledonia, Wallis and Futuna).

The first phase started in 2008 and its field work component was totally completed January 2015, whereas its initial analysis is still in progress and is planned to be achieved in 2016. The monitoring phase should revisit all four regions (Caribbean-Guiana, south-west Indian Ocean, south-west Pacific Ocean, and Polynesia) and would start in 2016 in the French West Indies EEZ (Martinique, Guadeloupe, Saint-Barthélemy, Saint-Martin), and we hope across waters of adjacent countries in a context of regional co-operation thanks to several partnerships that need to be build.

As a complementary effort, the French MPA *Réserve Naturelle de Saint-Martin* and the SPAW-RAC have developed in 2014 a satellite-tag mission on humpback whales in partnership with the neighbour islands of Anguilla, Saba, Sint-Maarten, Sint-Eustatius to assess migration routes of whales.

Waters of Saint-Martin and Anguilla are clearly a nursery and breeding grounds. Satellite tracking shows a strong connectivity between islands, notably Anguilla, BVI, Dominican Republic, St Martin and St Barthélemy.

Multidisplinary, multi-islands teams' participation created new opportunities for collaboration and transboundaries management issues in the Caribbean.

Several messages and decisions encourage national initiatives of creating additional sanctuaries in the Wider Caribbean

In the declaration that established the Agoa Sanctuary, the Government of France had also wished to invite other countries to consider establishing their own sanctuaries, and offered to partner with them as appropriate. Are UKOTs on board with us ?

Sustainable fisheries management in the South Atlantic: Models of best practice

Indrani Lutchman

Lutchman, I. 2015. Sustainable fisheries management in the South Atlantic: Models of best practice. pp 201-207 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Sustainable fisheries management draws on fisheries science in order to find ways to protect fisheries resources so that sustainable exploitation is possible. In addition, governmental systems must adopt appropriate management rules on defined objectives and a mix of management means to implement the rules – including monitoring control and surveillance as well as the use of observers to ensure compliance. The management of fisheries resources by the Government of South Georgia and South Sandwich Islands (GSGSSI) and the Falkland Islands Government (FIG) are internationally recognised as examples of best practice by the Marine Stewardship Council (MSC) and regional bodies such as the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). This paper provides a brief overview of the status of these fisheries including the current fisheries management regimes implemented to ensure long term sustainability of marine resources in the South Atlantic. The role of specific measures such as the use of rights-based management (licensing) to control access to the fisheries in the Falkland Islands, and marine protected areas (MPAs) in South Georgia and the South Sandwich Islands (SGSSI) will also be discussed. The applicability of these measures to the management of fisheries in other UK territories is also examined.

Indrani Lutchman, ilutchman@gmail.com

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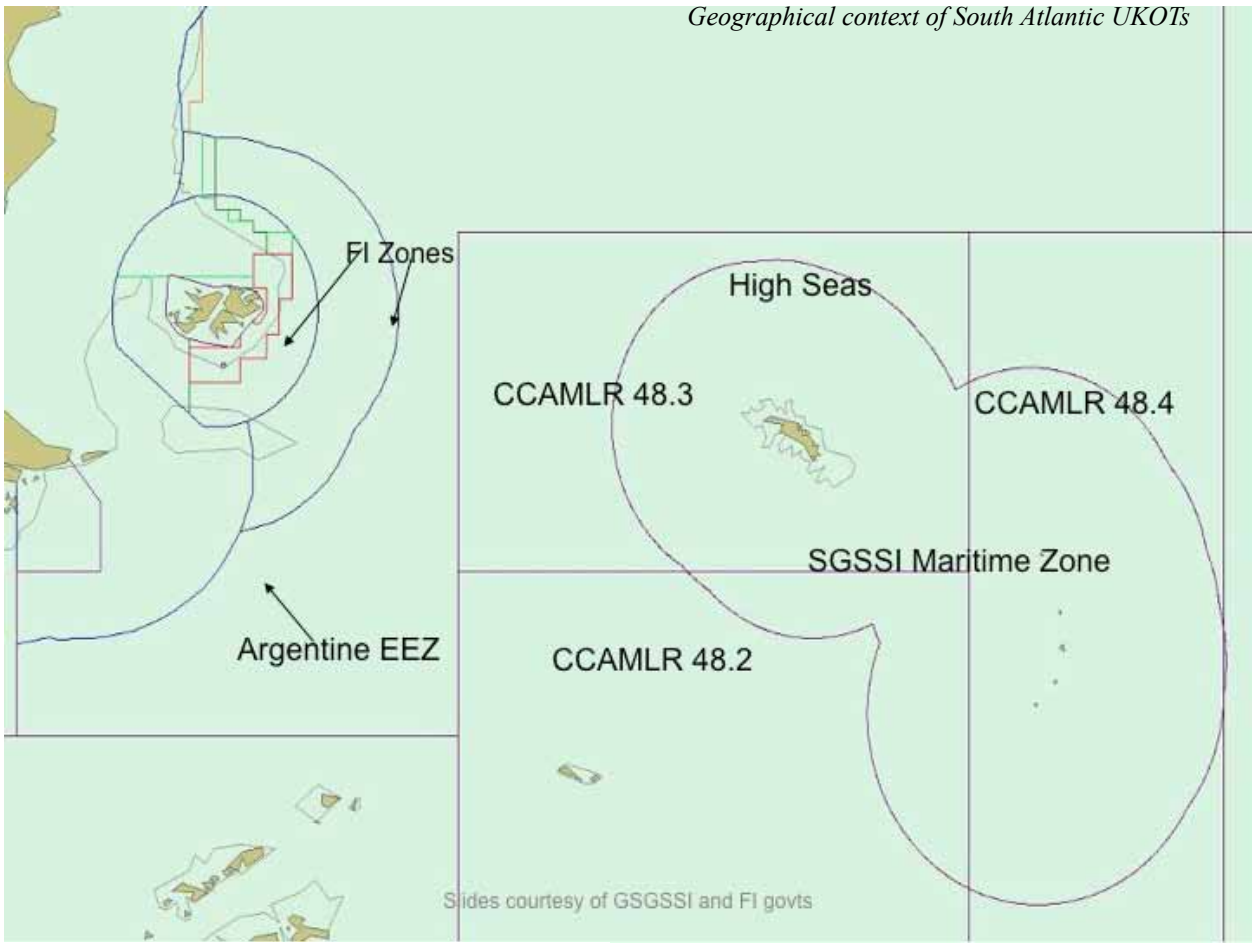
This presentation provides an overview of the status of these fisheries including the current fisheries management regimes implemented to ensure long term sustainability of marine resources in the South Atlantic. The role of specific measures such as the use of rights-based management (licensing) to control access to the fisheries in the Falkland Islands, and marine protected areas (MPAs) in South Georgia and the South Sandwich Islands (SGSSI) are discussed. The applicability of these measures to the management of fisheries in other UK territories is also examined.

All photo credits: Government of South Georgia & the South Sandwich Islands and Falkland Islands Government

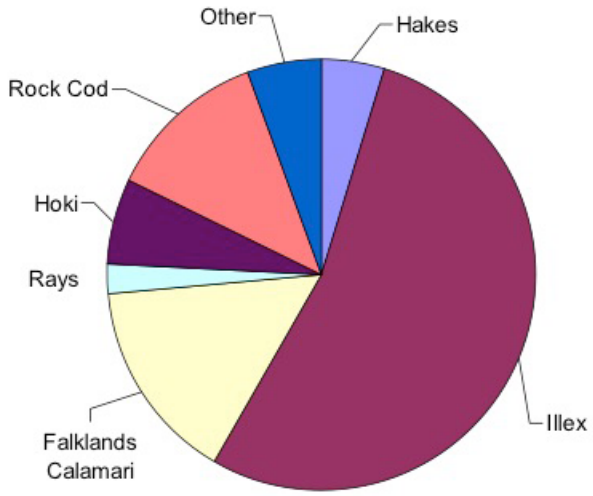
Falkland Islands fisheries

The main commercial fisheries are the two squid species, *D. gahi* and *Illex.* But there is a variety of other demersal species including hake, kinclip and toothifish and rock cod.

The total annual catch is 200,000 tonnes. This is not a large fishery in world terms but a significant squid fishery and significant in terms of global supply.



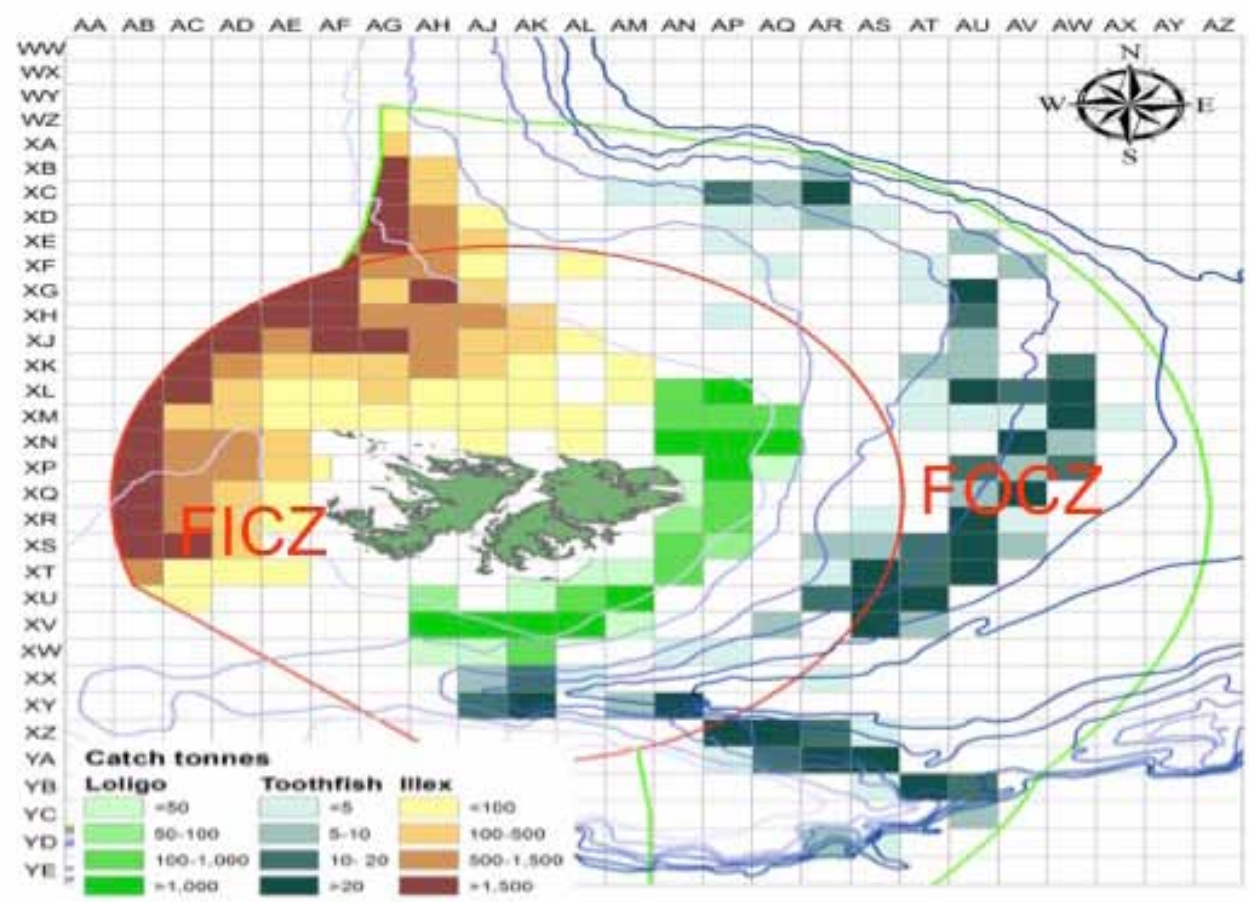
Geographical context of South Atlantic UKOTs



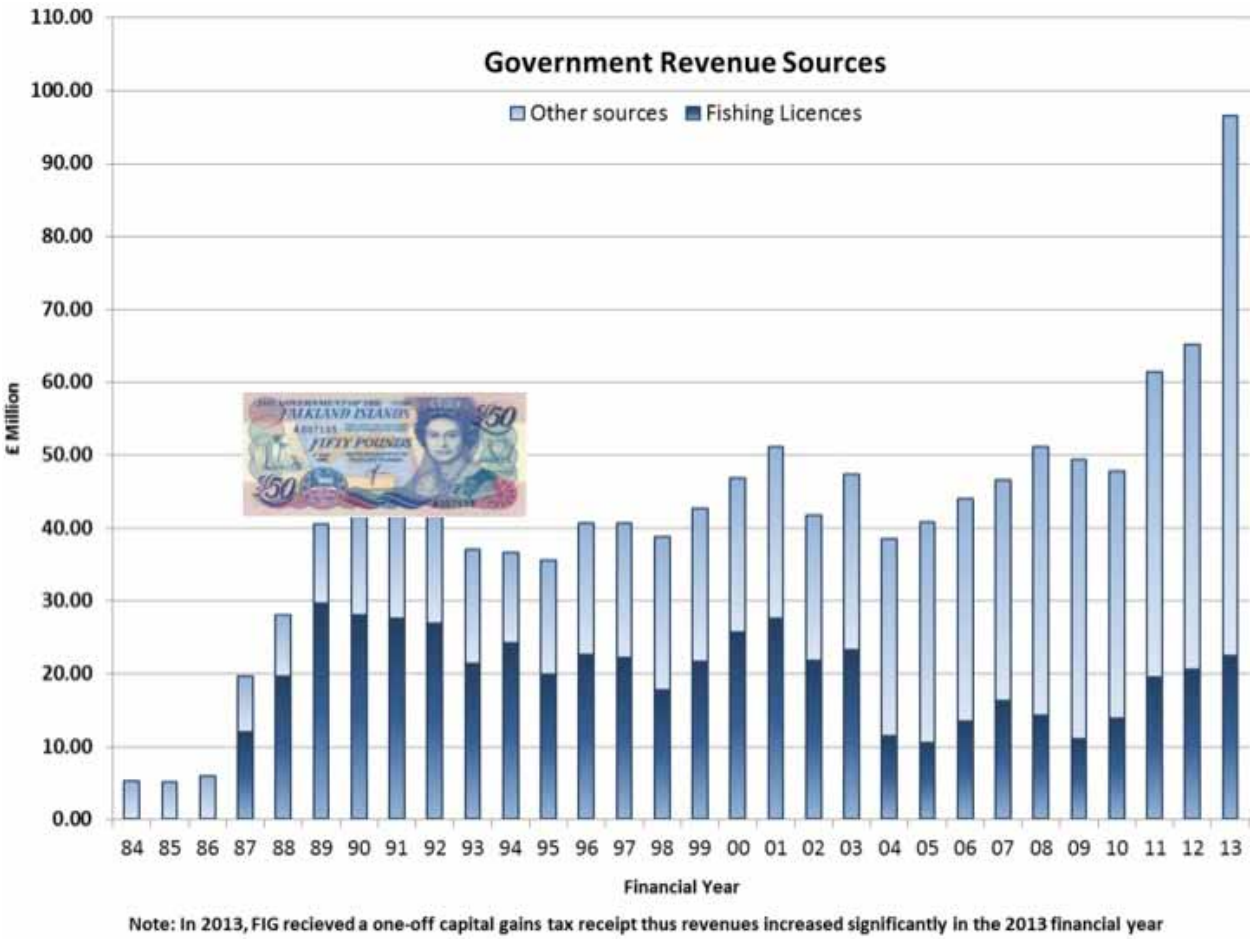
FI Fisheries (Total Catches 2013)

The squid (both species) usually account for 75% of the annual catches by jiggers or trawlers. *Illex* catches over the last couple of decades fluctuate more than the Falklands squid, and it is highly migratory. *Illex* is caught outside of FICZ into FOCZ in the North; *Loligo* caught entirely within the FICZ (see top of next page). Toothfish is another highly migratory species but less importantly economically important than squid, (at least in the FI context compared to SG); highest catches are in the FOCZ to the East.

The revenue generated by the licenses (next page) has sustained the FI economy since 1987. Fisheries revenue has averaged around £20 Million per annum although more recently revenue has declined to £12-15M per annum as a result of several very poor *Illex* seasons. Squid stocks can be quite volatile due to their one-year life cycle. Fisheries revenue has averaged around £20 million per annum although more recently revenue has declined to £12-15M per annum as a result of several very poor *Illex* seasons. Squid stocks can



be quite volatile due to their one-year life cycle. Fisheries revenue has averaged around £20 Million per annum, although more recently revenue has declined to £12-15M per annum as a result of

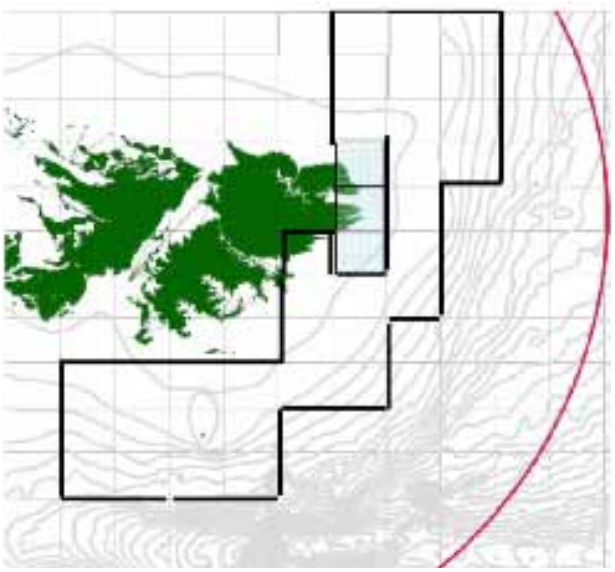


Note: In 2013, FIG recieved a one-off capital gains tax receipt thus revenues increased significantly in the 2013 financial year

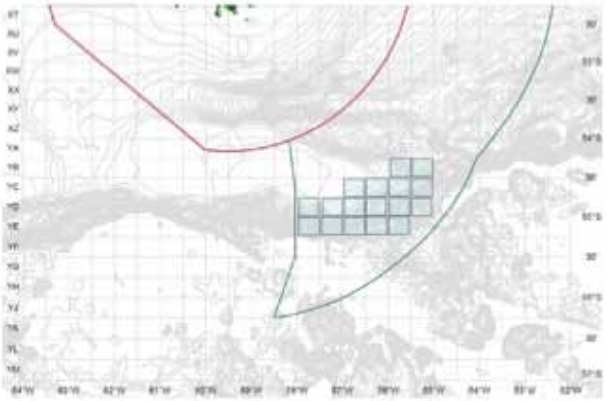
several very poor *Illex* seasons.

Falkland Islands management regime
The key objective is to manage the fisheries using the precautionary approach to achieve MSY (maximum sustainable yield). Rigorous stock assessments are conducted using commercial catch-and-effort statistics, observer data, life-cycle research and surveys. Also the FI use an innovation with research equipment and laboratory: 42 days research time per year (fitted on commercial vessel).

Since 2005, Falkland Islands Government (FIG) has sought to develop and stimulate Falkland Islands involvement in the fishery through a change in policy. The policy has attempted to maintain a number of the partnerships formed during the time that the joint venture scheme was in place and encouraged the development of new partnerships with Falkland Islands' companies. The main purpose of the policy has been to promote and develop a commercial fisheries sector within the economy of the Falkland Islands. The policy has also sought to create opportunities for Falkland Island companies and residents. Whilst the policy has allowed a variety of commercial arrangements, joint ventures and vessel ownership have proved the most popular. There are currently 13 companies in Falkland Islands which hold Individual Transferable Quotas (ITQ) until 2013, the Falklands fleet includes 16 trawlers and 2-3 long lines; their number is slowly increasing.



Falkland Islands- temporal and spatial closed areas

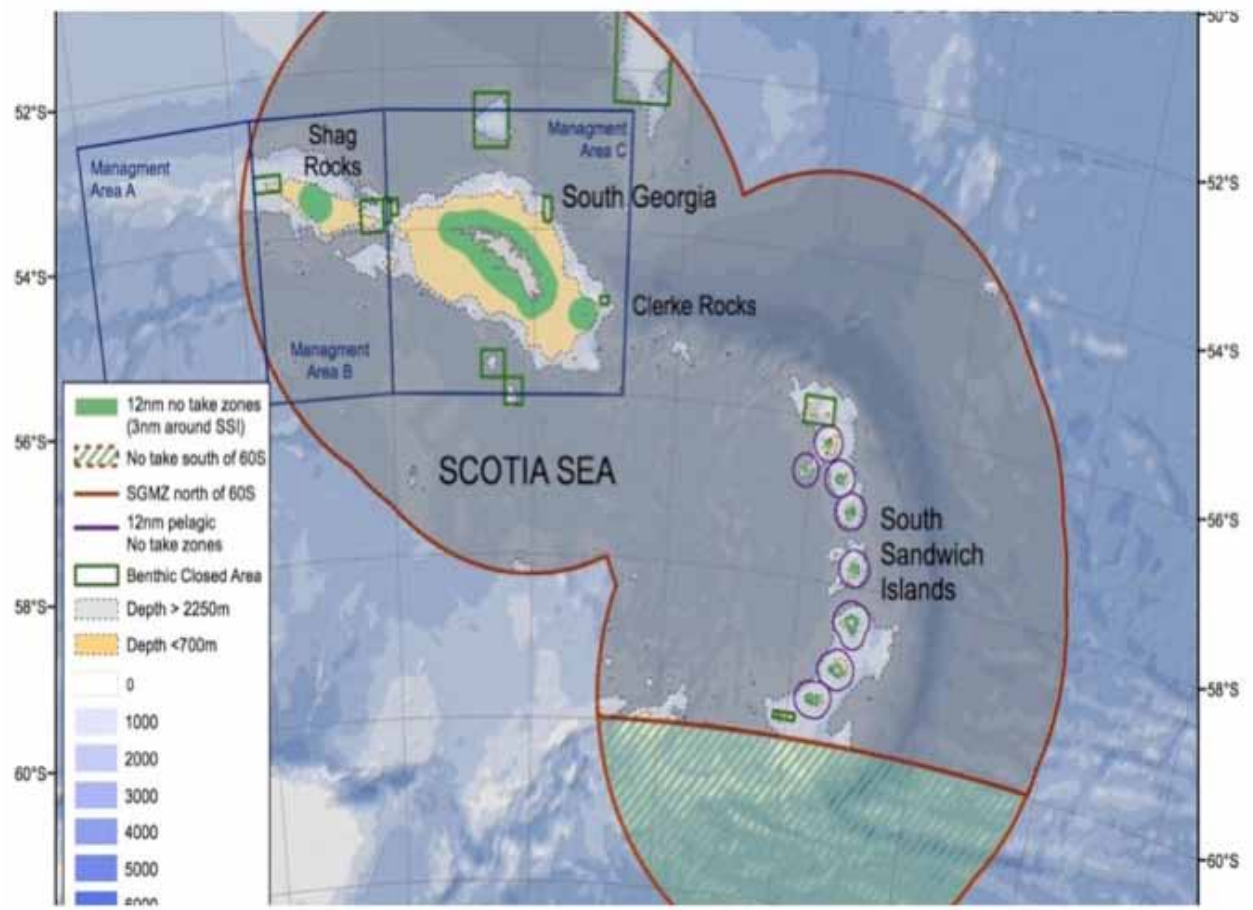


South Georgia and the South Sandwich Islands

- Sub-Antarctic island group;
- Maritime zone of 1.3 million km^2;
- South of the Polar Front;
- Cold surface water < 4 C;
- Highly productive region;
- Relatively pristine;
- Abundant Antarctic krill;
- Large numbers of charismatic predators.

Patagonian toothfish

- Demersal longline
- Deep-water
- High value
- 2000 tonnes p.a.
- Seabird by-catch issues
- £4 million per year



Mackerel icefish

- Pelagic trawl
- Krill-eater
- 4000 tonnes p.a.
- Prey of penguins and fur seals
- £0.5million per year

Antarctic krill

- Pelagic trawl
- High volume: low value
- 70,000 tonnes in 2014
- Key species in food-web
- £1 million per year

Toothfish management measures

CCAMLR

- Seasonal closures;
- Night-setting;
- Line-weighting;
- Streamer lines;
- 100% observer coverage;
- CDS, VMS;
- 5-day reporting; monthly reporting.

GSGSSI

- Closed areas;
- Tagging 1.3 fish / tonne;
- Fishing vessel safety;
- Marked hooks;
- Ban on netting;
- Vessel specific CFs;
- Catch verification;
- Daily reporting, VMS, AIS.

SGSSI – environmental issues

- Ecosystem effects (krill predators) from expansion of the krill fishery
- Environmental effects (benthic impacts) – specifically in Vulnerable Marine Ecosystems (VMEs)

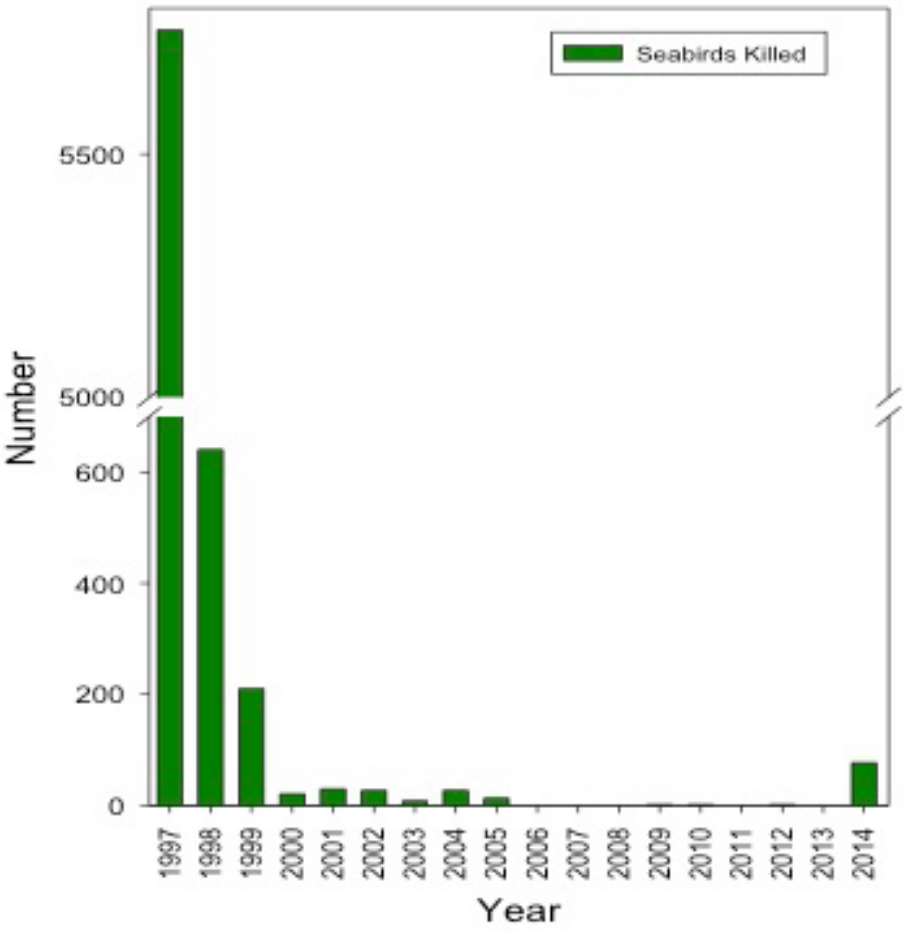
Elements of good practice

Science and research

- Data collection (commercial and research)
- Stock assessments
- Peer reviewed science

Tailored management

- Licenses (limiting access and effort)
- Closed areas/seasons



- Mitigation Measures/ technical measures

Partnerships

- With the companies licensed to fish in FI andSG
- Collaboration and partnerships at regional/ international level

Inspection

The impact of regulations

IUU fishing down to zero due to increase MCS including inspections and aerial surveillance

Seabird mortality was reduced from 1990s level although a small by-catch post 2010 due to the experimental extension of the season.

South Georgia and South Sandwich Islands MPA

- Initial meetings in 2010 to establish process;
- Reviewed existing fisheries regulations;
- Implement existing fisheries measures to create sustainable use MPA: 1.07 million km^2 (2012)
- Since 2012:

  Identify objectives and threats;

  Review existing data;

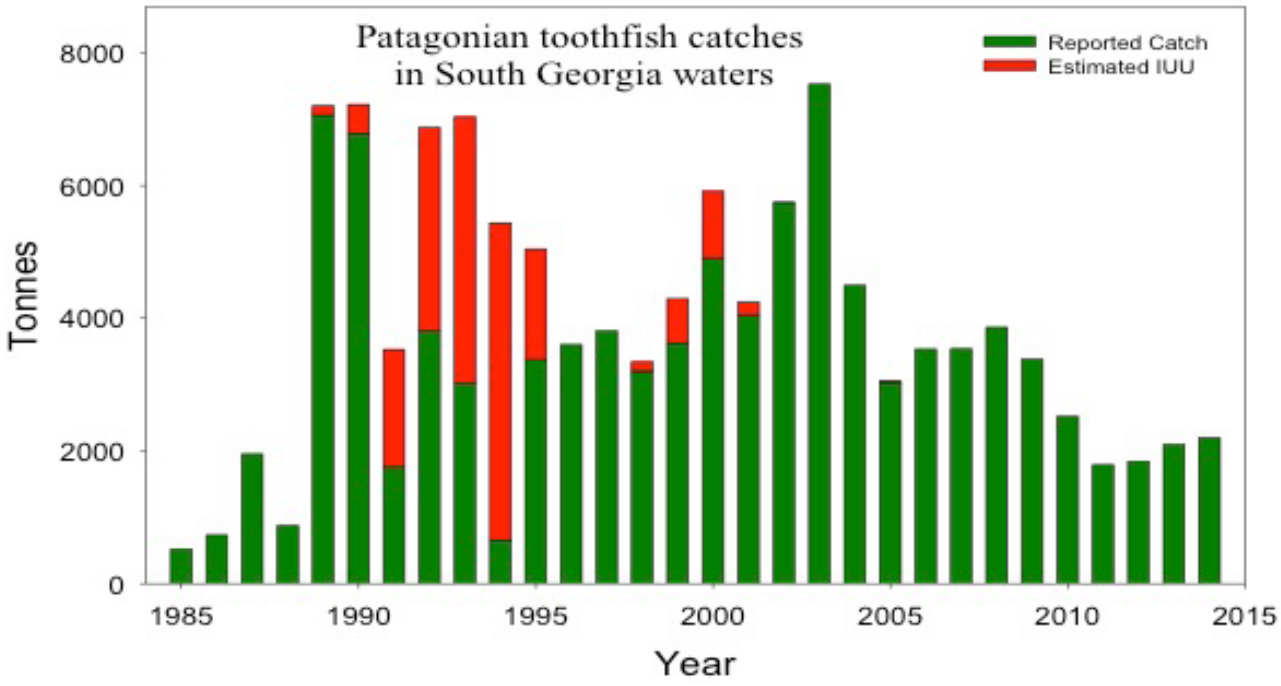
  Identify research priorities;

  Scientific workshops;

  Legislation.

Revised MPA 2013

- 1.07 million km^2 sustainably managed MPA;



- Prohibition of bottom trawling;
- Coastal no-take zones around South Georgia, Shag Rocks, Clerke Rocks and SSIs;
- Seasonal closure of the krill fishery to protect krill-eating predators;
- Bottom fishing only allowed between 700 and 2250 m;
- Suite of additional Benthic Closed Areas;
- Only 8% of the sea-floor subject to fishing.

Elements of best practice

- Falkland Island and South Georgia fisheries now well established
- In early days - limited data as basis fisheries development and management
- As data improved FIG and GSGSSI use precautionary and adapted management
- FI and GSGSSI use – licenses, good science; MCS; sanctions; MSC
- Partnerships and collaboration.

Implications for UKOTs

From the UK White Paper:

1. Continued and improved coordination, cooperation and knowledge sharing on environmental management between the UK and its Territories, and between the Territories themselves.
2. Continued delivery of UK technical advice and direct support on environmental issues within the UKOTs to where it is most needed.
3. Supported and facilitated mainstreaming of the value of the natural environment into the decision making of Governments, businesses and communities of the UKOTs.

Conclusion

- South Atlantic (SGSSI and FI) UKOTs present opportunity for showcasing best-practice fisheries management
- SGSSI and FI – very lucrative fisheries; great investment and political will
- Lead by example and transfer of expertise
- Expertise exists in the UKOTs – how to proceed in establishing protocols, assessments etc.

Tristan da Cunha – another example of registered sustainable fisheries and its recovery from the *Oliva* wreck

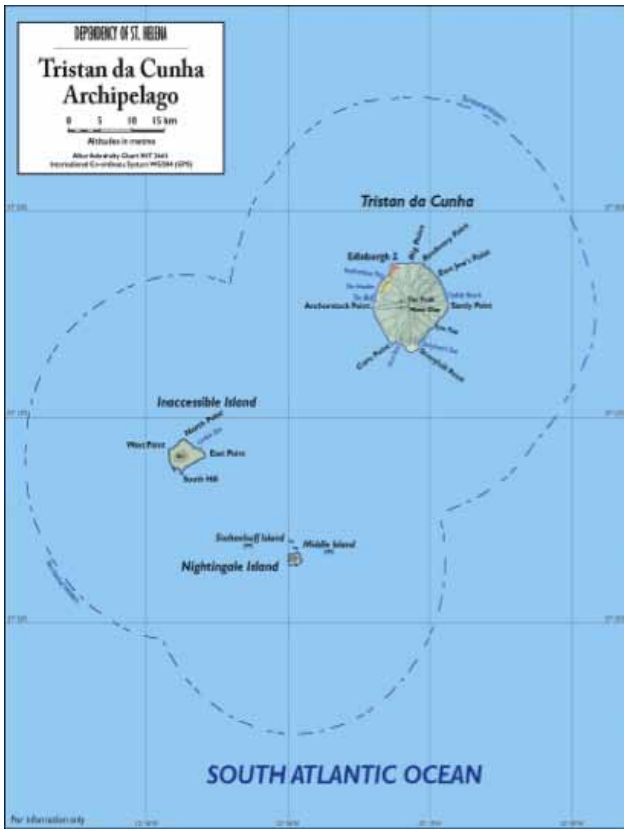
Jim Kerr and James Glass (Tristan da Cunha Government)

Kerr. J. & Glass, J. 2015. Tristan da Cunha – another example of registered sustainable fisheries and its recovery from the Oliva wreck. pp 208-214 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

1. Location of Tristan da Cunha and its outer islands; population, and remoteness. Island sustainability largely dependent on the fishery.
2. Brief history of the lobster fishery.
3. Fishery management - single user has incentive to invest in long term sustainability. Good management supplemented by adding minimum size, seasonal closures, boat and trap restrictions, catch quotas and ban on taking egg-bearing females.
4. Description of fishery. Vessel based on outer islands, catches processed and frozen on board. Island-based fishermen in small boats around Tristan itself using hoops and traps. Catch landed at Calshot Harbour and delivered live to processing factory on the island.
5. Workforce, two company representatives and 23 full time islanders. Fishing days supplemented by fisherman usually employed by TdC Government. Evenings further islanders employed in processing, approximately 140 at that time.
6. Factory and Markets: 3rd factory opened in 2009 built to EU standards. Marine stewardship award 2011 led to wider markets. Fish currently exported to USA, Japan, Australia and EU.
7. *Oliva* disaster March 2011: Description of incident at Nightingale. Leakage of 1500 metric tons of heavy fuel oils, 70,000 l diesel and loss of 65000mt of soya beans. Seabirds, especially penguins, affected by oil, soya sludge on sea floor 10 months after the wreck and lobster flesh contaminated. Fisheries at Nightingale and Inaccessible closed. Fish tested monthly until no contamination detected. Fishery reopened 2012 /13 season with TAC set to 40mt at Nightingale. Precautionary approach taken to present day, and Nightingale showing excellent signs of recovery.
8. Regulation and licensing: TACs and minimum size limits set annually for each island and 4 islands managed separately. CPUE (catch per unit effort) is the primary input to assessment and all other available data used to produce age-structured production models. Annual independent biomass surveys running since 2006. Harvest control rules and operations management procedures have been developed recently and are in place.
9. Threats to sustainability include illegal fishing and the state of Calshot Harbour.
10. Future Development: Increased knowledge base and understanding of Tristan's marine ecosystem. Further education and training. Exchange/sharing of expertise and ideas with other UKOTs.

[Jim Kerr, UK Adviser – Government of Tristan da Cunha
Head of Education – Tristan da Cunha 1985-1992
Education Adviser – Tristan da Cunha 2009-2014
Honorary Tristan da Cunha Conservation Officer]
James Glass – Head of Fisheries – Tristan da Cunha

Tristan is located 1519 nautical miles to the west of the nearest mainland of Cape Town, and is home to unique marine wildlife, found nowhere else in the world. The islands consists of the main inhabited island, Tristan da Cunha, with two smaller islands, Inaccessible and Nightingale around 20 nautical miles from Tristan, and Gough Island (not shown on map below) some 223 nautical miles to the SSE (Inaccessible and Gough constitute a World Heritage Site). Tristan da Cunha is known as being the most isolated inhabited community in the world, with a population in the region of only 270.



Tristan's fishery is for the Tristan lobster *Jasus tristani* (photo at top of next column) that is distributed among several isolated islands and submerged seamounts in the South East Atlantic Ocean. This species occurs only at the Tristan da

Cunha group and in international waters at Vema Seamount, 1680 km ENE of Tristan. All these populations are exploited commercially. The catch, processing and export of *J. tristani* is the most important economic activity for the inhabitants of Tristan da Cunha, providing the livelihood of many families and accounting for approximately 80% of the Island's revenue.

Fishing started in 1949, when the fish were tinned in a small processing plant that was buried by the lava of the 1961 volcano that also caused the evacuation of the island. It was not until freezer shipments to South Africa in the late 1960s and the introduction of steel traps on longlines in 1974 that commercial exploitation began in earnest.

Declines in the catch per unit effort (CPUE), and size composition led to the introduction of a size limit of 70mm in 1983. However catches continued to decline and, following an independent analysis of the stock status, total allowable catches (TAC) were introduced in 1991.

The previous concession holder contested the right of the Government to impose TACs and subsequently lost the concession when it was put up for tender at the end of 1996. At that time, new restrictions were written into the agreement and enforced and, as a result, the fishery started its recovery.

The uniqueness of the Tristan fishery is in the way it is managed. The island has an agreement with a single user to ensure that the licensee has a strong incentive to invest in the long-term sustainability of the resource. Tristan Islanders are acutely aware that fishing is the mainstay of the island's economy and, if sustained, will ensure employment for the next generation.

Although an exclusive concession should provide adequate incentives for good management, over the years it has been supplemented by adding a minimum size, seasonal closures, boat and trap

restrictions, a ban on taking egg-bearing females and catch quotas.

Tristan has two distinct lobster fishing sectors: a vessel-based fishery and an island-based fishery. The two sectors are closely linked as they share the same resource and markets, however, they differ in many key aspects:

Deploying lobster traps on longline's

Hauling lobster traps

The vessel-based fishery is operated by concession that employs a large ocean-going fishing vessel from Cape Town in South Africa that targets fishing grounds around the three outer islands of Inaccessible, Nightingale and Gough Island using long-lines with monster traps.

Deploying a 5 m dory

This vessel deploys also three 5m dories which fish close inshore using smaller lobster pots/ traps. Catches are processed and frozen on-board, consisting of tails only, whole cooked, whole raw and sashimi. The crawfish bodies are also packed for the Japanese market.

Tristan local fishing boat hauling a hoop net

The Island-based fishery is operated solely by island fishermen that is restricted around the island of Tristan da Cunha, using 7-8 m power-boats operating with hoop-nets and powerboat traps, (no plastic traps are allowed to operate within the fishery). All traps within the fishery have open access, so there is no ghost fishing if lost.

All catches are landed at one central point, Calshot Harbour, and transported to the fish factory for processing. The fish are delivered live and purged before processing, a requirement for sales into the EU.

Fishermen sorting their catch

The harbour is susceptible to damage from storms, and weather conditions for much of the year restrict the use of the harbour. On average there are

Calshot Harbour and fishing boats

Above and below: Calshot Harbour in a storm

only 65 fishing days per year.

Tristan's sustainability as a community is dependent entirely on the harbour, and damage from storms is a constant anxiety for the people. The islanders would like a new harbour built in a better location to the East of the existing one and believe that, in the long term, this would be more viable economically. In the meantime there is an agreement with the UK Government to maintain the existing harbour when necessary.

The workforce is entirely Tristanians, except for two company representatives of the fishing

The lobster-processing factory

company. The fish factory only employs 23 people fulltime, but when there is a suitable fishing day a dong is rung and people working for Government PWD go fishing for that day. In the evening when the boats return to the harbour a siren beckons the ladies (clerks, nurses, shop assistants, etc) to come to the factory to process the catch. At this time approximately 140 people are employed.

Three lobster processing factories have been built, the first one a cannery was buried under the 1961 volcano, the second one was destroyed by fire in 2008, and the third and present one opened in 2009 and was built to European Union (EU) standards.

In 2011 Tristan da Cunha won a Marine Stewardship Council award (photo above) and gained international recognition as a high quality and sustainable fishery. This has enabled Tristan to widen its lobster market and develop further its fishing industry, which is vital for the sustainable future of the community.

The product goes to a variety of markets: tails to the USA; whole cooked, whole raw and bodies to Japan; and whole raw to Australia. After ten years of hard work to comply with EU standards, in October 2014, the first Tristan lobster was

Above: products; and below:on sale in Selfridges

imported into the European Union (Germany, France, Switzerland, Holland), and in the UK at Selfridges, The Little Chelsea Fish Market and Roka, a group of Japanese Restaurants in Central London). There is also a by-catch of octopus which usually sells in South Africa.

In March 2011 a bulk carrier, the *Oliva* ran aground at Nightingale Island. She broke up and sank a few days later. This led to a leakage of some 1500 tonnes of heavy fuel oils and approximately 70,000 litres of diesel, which spread around both Nightingale and Inaccessible Islands.

Oliva *aground at Nightingale Island*

18 March 2011: Oliva *broke in half and sank: all 65,000 tonnes of the soya cargo lost*

Oliva *stern section*

After the ship broke up, all her cargo of some 65,000 metric tonnes of soya beans was lost. Much of this sank, rotted and formed pockets of thick black sludge on the sea floor, some of which was still there 10 months after the sinking of the *Oliva*.

There was wide scale oiling of several seabird species, most notable 4000 rockhopper penguins (below) at Nightingale.

Sadly despite huge rescue efforts, it is estimated only 10% of the penguins rescued survived.

Oiled rockhopper penguins captured and taken to Tristan for cleaning and attempted rehabilitation

Following the *Oliva* incident, the lobster fishery was closed at both Nightingale and Inaccessible. There was contamination of the lobster flesh, and a "test fishing" exercise was conducted at both Nightingale and Inaccessible during the months July 2011 to January 2012.

Lobster samples were subsequently collected inshore/offshore over a period of six consecutive months, and sent to a laboratory in Aberdeen Scotland for testing until no contamination was found. The results of this test fishing resulted in the fishery remaining closed at Nightingale the following season, as well as a reduction in the TAC at Inaccessible.

Biologists with expertise in this area consider that the oil is most likely to have impacted the juvenile (aged 1-3) lobsters (above), which tend to be found clinging to shallow vertical rock surfaces and in tidal pools. However, the effect of the oil on the juvenile lobsters will become evident only around 2017 onwards, and therefore the TDCG has set a conservative TAC. Recent CPUE results at Nightingale show excellent signs of recovery, and it could be that the lobsters just moved into deeper, cleaner water and went of the bite, rather than died as was the first thought and have now started to return to their habitat. The closure of the fishery for that length of time was also one of the main factors in its recovery.

The most important management measure for the

Illegal, Unregulated and Unreported (IUU) Fishing Figures: A. Jigging Fishing Gear – B. Lobster Trap – C. Gill Netting D. Surface Longline (Snood on top) – E. Bottom Longline – F. Springer Line – G. Trawl netting

Tristan Fishery has been the imposition of TACs for each island, introduced in 1991.

The 4 islands (3 inner Tristan islands and Gough Island) are managed separately, using annual TACs and minimum size limits. Catch per unit effort is the primary input to the assessment model. The stocks are assessed using all the available data as input to age structured production models. Fishery independent biomass surveys which have been running since 2006 are also carried out before the start of fishing each season.

The Tristan Fisheries Department and the Marine Research and Assessment Group (MARAM) UCT have been working together to produce Harvest Control Rules (HCR), and Operation Management Procedures (OMP) as part of a requirement for MSC certification, which are all currently in place and will be used in due course for setting annual TACs.

The greatest threat today is posed by illegal, unregulated and unreported (IUU) fishing, and there is virtually no capacity to assess, let alone control this activity. (See previous page for illegal fishing gear,) The Director of Fisheries, acting as a Sea Fishery Observer onboard a trawler this year in January, observed six different types of illegal fishing gear on the seamounts. Although there is 100% observer coverage on the fishing ship, the island's fishery Patrol boat (a Pacific 38) cannot even reach the closest seamount, which is 90 miles from Tristan, and our harbour only gives us approximately 65 working days a year.

Sustainable management of the marine environment and resources of Tristan da Cunha

especially the dynamics of the lobster stock, so that progress can be monitored through the gradual implementation of scientifically defendable fisheries management procedures. It would also like to increase its research and monitoring capacity.

The Darwin Plus project currently running at Tristan (Sustainable management of the Marine Environment and resources of Tristan da Cunha) is helping to achieve some of this.

Education and training for those involved in Tristan's fishery, and the possibility of exchanging and sharing skills with other Overseas Territories will help also to ensure the long-term future of Tristan's fishery and community.

The ability of Tristan to police its waters effectively has conservation importance that extends beyond the need to limit seabird by-catch, especially with Tristan's revenue usually being less than £1 million annually.

For the future, Tristan's Fishery Department would like to increase its knowledge-base and understanding of the marine ecosystems,

Action Plan For Maintaining Coral Reef Health in the Turks & Caicos Coral recovery projects

Don Stark (Turks & Caicos Reef Fund)

Stark, D. 2015. Action Plan For Maintaining Coral Reef Health in the Turks & Caicos Coral recovery projects. pp 215-218 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

There are many threats to coral reefs around the world. Higher ocean temperatures as a result of climate change and ocean acidification are just two events threating the lives of coral reefs. But other, more direct, threats also exist. Lionfish love to eat parrotfish. Without parrotfish, algae will smother coral reefs. Shark fishing can significantly reduce the shark population on reefs, and sharks are needed to maintain a healthy reef ecosystem. The actions of man, such as anchor damage to reefs and environmentally unsound development projects, can have major and rapid adverse affects on coral reefs. But there are actions that can be taken to help fix the damage done and prevent future damage. Lionfish control, coral nurseries, coral restoration and monitoring, artificial reefs and shark protection are just some the activities being pursued in the Turks and Caicos Islands. In addition, through the acquaintances made via the UKOTCF, inter-island collaborations and information sharing are benefiting the efforts in the TCI and elsewhere in the UKOTs.

Don Stark, Chairman, Turks & Caicos Reef Fund
donstark@tcreef.org

The objective of my presentation today is to outline the key threats that we see facing the coral reefs in the TCI and some of the action steps we are taking to address these threats.

First, let me tell you a little bit about the Turks & Caicos Islands. It is a independently-governed UK territory consisting of approximately 40 islands and cays with a total land mass of approximately 430 square kilometers. The TCI are located just south of the Bahamas and just north of the island of Hispaniola where Haiti and the Dominican Republic are located. The TCI has a population of just over 30,000 souls with just over two-thirds of those living on the island of Providenciales. The islands see just over a million visitors each year, the vast majority are short-term visitors to the cruise ship terminal on Grand Turk. Only about 300,000 visitors are considered longer-term visitors, and the vast majority of those spend their days on the world famous beach of Grace Bay located on Providenciales. The average per capita gross domestic product is US$23,100, and the main industries are tourism, financial services and fisheries. We claim to have the third largest fringing barrier reef system in the world and approximately 4% of the reefs are located in Marine Protected Areas.

Everyone in this room is aware that coral reefs are under significant threat from many factors. The biggest three are climate change, overfishing and pollution. In fact, according to the US National Oceanic and Atmospheric Administration, approximately 20% of all coral

reefs in the world are damaged beyond repair. Approximately 50% of those remaining are under risk of collapse. In addition to the big three of climate change, overfishing and pollution, coral disease, tropical storms, vessels running aground or anchoring on reefs, tourist damage to reefs and invasive species add to the pressure on coral reef systems around the world.

In the near term at least for the TCI, the three biggest threats to our coral reef system come from climate change, invasive species and tourists.

Our biggest invasive species threat is the ascendency of the lionfish (above) population which has occurred throughout the tropical Atlantic and Caribbean. One of the main concerns with lionfish is their potential impact on the population of herbivore fishes, especially parrotfish. Parrotfish are one of the main inhibitors of algae overgrowth on coral reefs, and any significant reduction in their population will have a negative impact on the health of the TCI coral reefs. From dietary studies, parrotfish are one of the main species of fish eaten by lionfish in the Caribbean and tropical Atlantic. In addition to threatening the coral reefs by decreasing parrotfish (below) populations and allowing algae overgrowth to occur, lionfish also are a threat to an already stressed commercial fishery in the TCI. Catches of commercially important species such as snapper, grouper, lobster and conch are down significantly due to overfishing, and the consumption of juveniles of these species will not help with recovery of these fisheries. It is critical that we control the population of lionfish within TCI waters.

To accomplish this, we are working toward establishing a lionfish fishery in the TCI. We have attempted to incentivise local fishers to catch lionfish. Unfortunately the financial incentives we have offered have not been enough to motivate fishers to fish for lionfish. We have been successful, however, in getting several restaurants on Providenciales to agree to buy all the lionfish we can supply, so there is a demand. We want also to promote lionfish consumption to tourists but, until we can ensure that they can order lionfish at a number of restaurants, we have not pursued this aspect of the effort. So we have had limited success to date and we have shifted gears a bit. Our plan now is to work with a single fisher who will agree to focus on lionfish and, once we can clearly show that this fisher is being financially successful catching lionfish, we will present his success story to the other local fishers. We are also hoping that, as the ability to catch other commercially attractive species continues to decline, fishers will see lionfish as a new and attractive opportunity.

Climate change is affecting all of us in the tropical Atlantic and Caribbean, as well coral reef systems elsewhere in the world. One key step in understanding the impact climate change is having is understanding how the coral populations are changing over time. In other words, we cannot know how much impact climate change is having if we are not monitoring for its effects. To that end, we are attempting to establish a regular coral monitoring programme with DEMA – the TCI governmental department responsible for

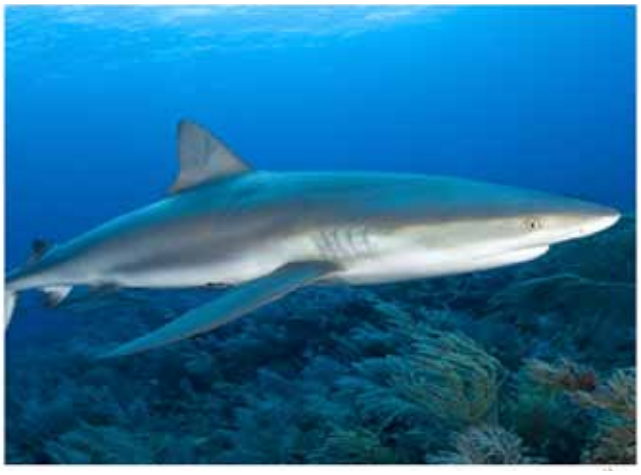
the environment and maritime affairs. We are working also with a partner to establish coral nurseries to help rebuild damaged reefs around the TCI. As with most coral reef monitoring efforts, funding has been difficult to secure, so we are attempting to implement financing mechanisms to support the monitoring effort. One is an "Adopt-a-Coral" programme where visitors can pay US$50 to adopt a newly transplanted coral on a shallow near-shore reef. Another financing mechanism we are pursuing is enticing resorts to pay to have reef-ball reefs installed in the shallows in front of their resort. They will recoup their investment by charging guests a US$2 per night "conservation fee" – half of which the resort retains and half goes our organisation to support coral monitoring and maintenance of the reef-ball reef.

Tourism drives our economy in the TCI, so there is a constant push to grow that part of the economy. The addition of a cruise-ship terminal on the capital island of Grand Turk produced a tremendous increase in the number of individuals visiting the country, if only for a few hours. The push by Government is now on to find other ways to increase tourist traffic. One proposal is to allow the high-density hotel developments. Historically, the TCI has been noted for its low-density, high-end tourism business. But the desire to grow tourism is tempting the Government to move away from that successful business model. More tourists mean more pressure on the reefs from snorkels and

divers, pollution from sewage, trash, landscaping chemicals and petroleum products. More tourists mean more vessels on the reefs and an increase of vessel groundings. Finally, there is also a push to build a second cruise-ship terminal on the pristine island of East Caicos, along with a trans-shipping centre. Such a development, if it goes forward, would destroy one of the most pristine coral reefs left in the Caribbean and tropical Atlantic.

What can we do to address these threats? We are working diligently to protect the reefs that are frequently visited by tourists. We have installed boundary buoys around a shallow inshore reef to help keep snorkelers off the shallow parts of the reef. We have installed new moorings all around the islands for snorkel boat and dive boat operators to use instead of dropping anchors. We are attempting to educate tourists through our Adopt-a-Coral programme and we are actively lobbying the government against approving high-density developments and dredging for new developments such as those proposed for East Caicos.

One other item I want to mention, primarily because it is an area where we have had a recent success (sort of), is protection of shark populations in the TCI economic enterprise zone. The TCI has one of the healthiest populations of sharks in the tropical Atlantic and Caribbean. Sharks are seen



on almost every dive and snorkeling excursion. Fortunately, shark fishing has not been a problem in the TCI waters and we hope to keep it that way. We are lobbying to have the Government make the entire economic enterprise zone a shark sanctuary. Thus far, Government has passed regulations banning the export of shark products. These new regulations were to take effect on 1 June 2015, but there implementation date has been delayed along with other major fishery regulation changes that had been proposed and passed. We remain optimistic that the shark product export ban will ultimately be implemented. In the meantime, the Pew Charitable Trust has been working with us and others in the TCI to educate the Government and locals about the importance of sharks to a healthy reef environment.

Since we founded the TCRF just over 5 years ago, one of the biggest benefits we have found has been our relationship with the UKOTCF and its Wider Caribbean Working Group (WCWG). Through this relationship we have established liaisons with other like-minded individuals in other UKOTs and have begun to establish the early stages of a coral monitoring network. We have been able to meet with and share ideas on lionfish control issues. And we are exploring potential collaborative funding opportunities. We are grateful to the UKOTCF for their support and assistance in moving many of our projects forward.

Thank you all for your time and attention.

Marine Protection in Bermuda: Lessons Learned from 400 years of Management and a Range of Geographical Scales

Annie Glasspool and Jack Ward (Bermuda)

Glasspool, A.F. & Ward, J.A. 2015. Marine Protection in Bermuda: Lessons Learned from 400 years of Management and a Range of Geographical Scales. pp 219-223 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Continuously populated since 1609, Bermuda represents the northernmost coral reef system in the world. With a land mass of just 55 km^2, the main islands of Bermuda sit on the only emergent seamount of the 7 seamounts within the Island's EEZ, which comprises an area of 466,000 km^2. This oasis of life, encircled by the unique ecosystem of the Sargasso Sea, lies in an otherwise largely oceanic desert, and exists largely by virtue of the northerly extension of subtropical systems to this latitude; a phenomenon that can be attributed to the transport of warm waters by the Gulf Stream.

The Island's evolution from a strategic outpost of rich resources ripe for replenishing mariners supplies, to an attractive tourist destination and subsequent international business hub, where its major assets were no longer its harvestable resources but rather its location, natural beauty and comfortable climate, has seen a major shift in the pressures placed on the natural environment. Accompanying this 400-year evolution has been a barrage of marine-based conservation measures, some reactionary, some proactive, some evidence-based, some precautionary, some successful, some irredeemable failures; some indeed that have sorely divided the community and shaken public confidence in the whole idea of marine spatial planning. The scale has changed too - from the establishment of two of the world's earliest coral reef preserves in 1966, to the more recent Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea, which extends Bermuda's stewardship commitments to beyond its EEZ. New management frameworks are also being explored; a prospective marine Ramsar Site at Castle Islands, also part of the World Heritage Site of St George's, and possible plans for a Marine Spatial Plan extending around the Island to the 200 m depth contour. This more far-reaching approach is in direct recognition of, and in part actively driven by, an expanding diversity of user groups, and with this the need to embrace a more pragmatic approach to the sustainable development of the island and its people.

Dr Annie Glasspool, Vice-President, Bermuda Environmental Consulting Ltd
annie@environmentbda.com

Continuously populated since 1609, Bermuda represents the northern most coral reef system in the world. With a land-mass of just 55 km^2, the main islands of Bermuda sit on the only emergent seamount of the 7 seamounts within the Island's EEZ, which comprises an area of 466,000 km^2. This oasis of life encircled by the unique ecosystem of the Sargasso Sea lies in an otherwise largely oceanic desert, and exists largely by virtue of the northerly extension of subtropical systems to this latitude – a phenomenon that can be attributed to the transport of warm waters by the Gulf Stream. Although Bermuda lies to the east of the path of this northerly flow, spin-offs bring warm water to the islands. These eddies are not predictable but are believed to provide larval transport of tropical species to the islands.

Image: Bermuda Zoological Society

Over the succeeding years, the Island evolved from a strategic outpost of rich resources ripe for replenishing the early mariners' supplies, to an attractive tourist destination and subsequent international business hub, where its major assets were no longer its harvestable resources but rather its location, natural beauty and comfortable climate. This has resulted in a major shift in the pressures placed on the natural environment and the management measures needed as a result.

The need for marine management action was recognised early in Bermuda's history, with possibly the earliest conservation legislation in the New World enacted in 1620. Concern over the decline in numbers of the Bermuda's nesting Green Turtle *Chelonia mydas* population led the Bermuda Assembly to enact legislation to prohibit harvesting of the smaller turtles, and only allowed continued harvesting of larger specimens. Whilst this might not seem an unreasonable management approach, it turned out to be critically flawed on account of erroneous understanding of their biology. It allowed the ongoing decline of Bermuda's own nesting population (the larger turtles), whilst protecting young turtles from the Caribbean, which migrate to Bermuda as juveniles and return to their nesting beaches further south as adults. Bermuda's own turtle population was extirpated.

The key legislation leading effectively to spatial protection of marine resources has really occurred in the past half century and includes:

1966 Coral Reef Preserves Act – Coral reef protection at Bermuda was first effected with the 1966 Coral Reef Preserves Act, a private bill introduced by the then Curator of the Bermuda Aquarium, due to fear based on threatened nearshore land reclamation on the shallow reefs to the west and north of the islands. This fear was generated by the large scale degradation of environmental health due to the dredge and landfill construction of the airfield in Castle Harbour in the 1940s. Two coral reef preserves were established with complete protection of all attached animals and plants within two substantial areas of Bermuda's shallow waters.

1972 Fisheries Act – Enacted in response to overfishing concerns, this introduced seasonal protection of grouper spawning grounds and banned trawl and gill netting, the latter leading *de facto* to protection of fish in certain areas. It was the fishermen who petitioned the Government to protect the spawning grounds.

Image: Bermuda Department of Conservation Services

1978 Protected Fisheries Order – All corals have been protected since 1978, under the Fisheries Protected Order. This established effectively the whole of Bermuda as a coral preserve. Marine mammals, sea turtles and selected molluscs were also afforded complete protection under this Act. A highly regulated fishery continued to evolve in Bermuda, with expanded seasonally protected areas, protected species, limited entry, gear restrictions and bag-limits.

1990 Fish Pot Ban 'TAKE 2' – In 1990, Bermuda further enhanced its reputation for stringent fisheries management when it banned the use of fish-pots. This was preceded by a major public campaign orchestrated by local NGO, Friends of Fish calling for a ban of fish pots.

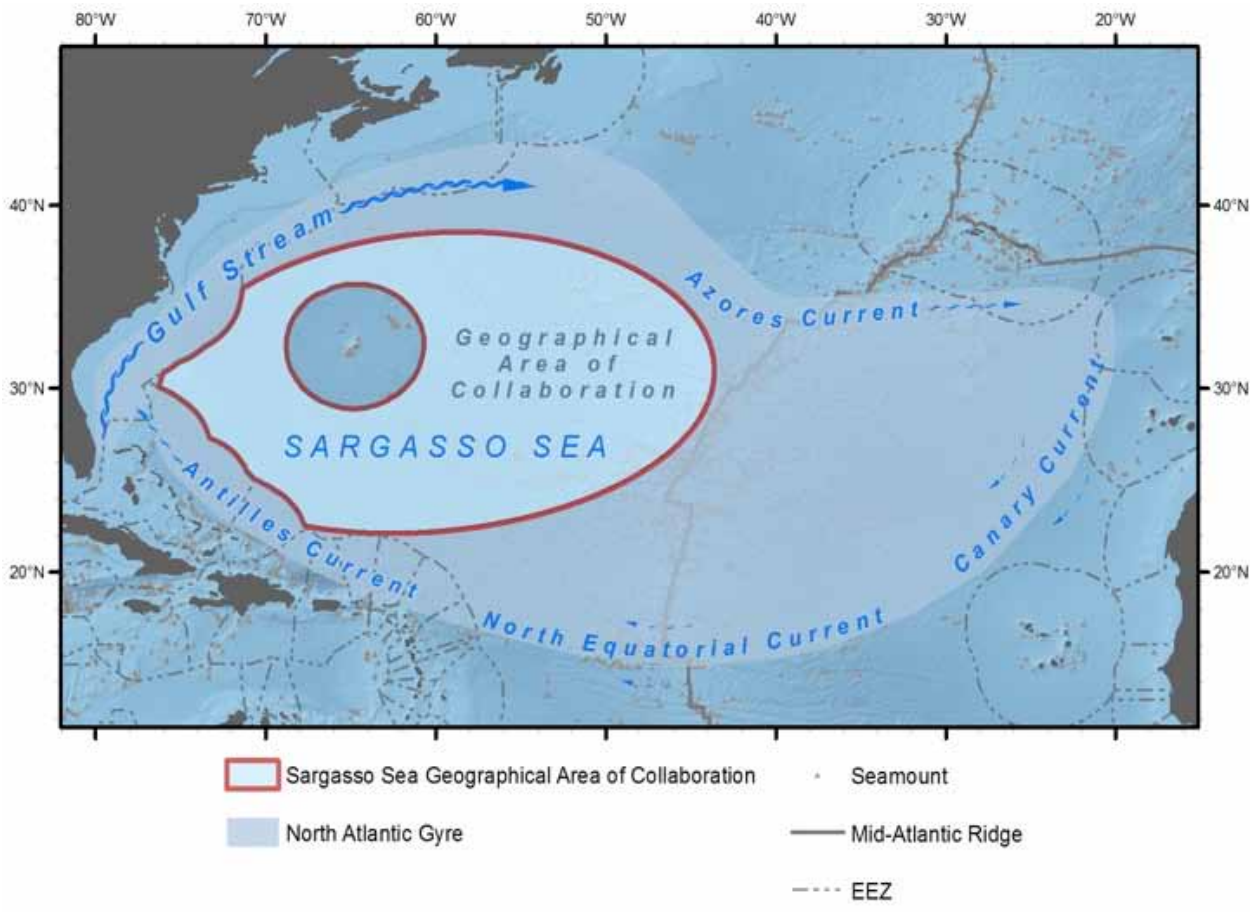


Image: [1]Ardron, Halpin, Roberts, Cleary, Moffitt, and Donnelly, 2011.
[1]Marine Conservation Institute and Duke University Marine Geospatial Ecology Lab.

This was recognised throughout the region as a shining example of marine conservation.

2000 Protected Dive Sites – In response to some user conflict between fishermen and SCUBA divers, Friends of Fish again petitioned Government, this time to establish a suite of Protected Dive Sites. With the help of local recreational divers, 29 of these have been set up. This story is interesting, not least because the original reason for establishing these protected sites has been lost in corporate memory, and a fairly recent study concluded that these sites had not demonstrated any significant increase in fish numbers compared with adjacent sites; *i.e.* had not been effective. This was never the intent, and there were no data to suggest that fishing pressure was ever heavier on the immediately adjacent sites.

The Sargasso Sea

In 2009, Bermuda decided to explore ways to improve its stewardship of the surrounding seas beyond the shallow water platform, within their EEZ and into the wider Sargasso Sea. The Saragasso Sea is the world's only sea not bordered by land, and the only holopelagic seaweed ecosystem. Lying within a large ocean gyre which concentrates pollutants and which has a variety of oceanographic processes that impact its productivity and species diversity, the Sargasso Sea plays a disproportionately large role in global ocean processes of carbon sequestration, and provides essential habitat for a wide diversity of species many of which are endangered or threatened. It is the only breeding location for the threatened European and American eels and is of importance to local and global economies.

Leading conservation and marine science organisations formed the Sargasso Sea Alliance, which began to investigate opportunities within current mechanisms for High Seas governance with the aim of affording protection for it.

In 2014, Bermuda, UK, USA, Azores and Monaco signed the Hamilton Declaration. It is a non-binding political statement. The Signatories agree to hold a regular Meeting of Signatories and endorse the establishment of a Sargasso Sea Commission to encourage and facilitate voluntary collaboration toward the conservation of the Sargasso Sea. http://www.sargassoalliance.org

The Sargasso Sea Commission was established

with the following over-arching goals: promote international recognition of the unique ecological and biological nature and global significance of the Sargasso Sea; encourage scientific research to expand existing knowledge of the Sargasso Sea ecosystem in order to further assess its health, productivity and resilience; and develop proposals for submission to existing regional, sectoral and international organisations to promote the objectives of the Hamilton Declaration.

The stated priority activities of the Sargasso Sea Commission are: international recognition of ecological importance, fisheries and fisheries habitat conservation, impacts from international shipping, impacts to the sea-floor and seabed and conservation of migratory species.

The Blue Halo Initiative

The Convention on Biological Diversity (CBD) called for the world to create a network of marine protected areas (MPAs), representing at least 10% of the world's marine regions. Currently, less than 0.5% of the global oceans are no-take reserves. The proponents of the Blue Halo initiative advocated that Bermuda designate 95% of its EEZ (extending from 85 miles offshore to 200 miles) as no-take.

The rationale behind the initiative was to position Bermuda so that it could have the conservation credibility to lead on the creation of the much larger Sargasso Sea Reserve. However, there was no defined management objective for the area itself and the project got derailed because:

- There was a failure to establish clearly and manage the scope of work to be undertaken by the overseas consultants brought in by the Bermuda Government to coordinate the local stakeholder consultations. Stakeholder consultation was limited, and many locals felt the initiative came with a prescribed template to which they had to conform.

- Bermuda has long been a leader in successful marine resource management, yet many felt the process failed to recognise this legacy. This led to resentment and a feeling of being disrespected.
- Vocal outside pressure served only to cause further resentment.
- For many Bermudians, this was the first time they realised that the UK had ceded ownership of the EEZ to the Island. This was thus the first serious conversation locals were engaged in regarding this newly 'discovered' asset.
- The case for support demonstrated the value of the environment but did not demonstrate the threats, nor identify objectives or targets. This failure led some to dub the initiative "Faith-Based Conservation". Going forwards, the Blue Halo initiative is effectively stalled.

Whilst new management frameworks are being explored, including a prospective marine Ramsar site in part of the World Heritage site of St George's, and possible plans for a Marine Spatial Plan extending around the Island to the 200 m depth contour, the recent experience has shaken many key stakeholder groups who are now wary about the whole concept of marine spatial planning, the process by which a marine spatial plan would be developed and agreed by the community, and outside influences driving the processes.

Lessons Learned

- Marine resource management initiatives have been instigated with equal success by diverse proponents: Government, key user-groups, environmental NGOs and private citizens.
- Successful initiatives have sought to address an identified problem based on a sound scientific foundation. Those that have stumbled have lacked convincing evidence.
- The UKOTs are unique and a 'cookie-cutter' [one-size-fits-all] approach is rarely appropriate.
- For most UKOTs, a project is unlikely to succeed if local 'ownership' is not secured.
- A failed process can have long-term negative impacts on subsequent initiatives.
- To subscribe honestly to the concept of sustainable development, the environmental community needs to uphold the same standards of evidence-based planning that they require other 'developers' to demonstrate through the EIA process.

Applying parts of UNCLOS (UN Convention on the Law of the Sea) to access data for use in mapping and monitoring in UKOT waters

Alan Evans (Marine Geoscience Group, National Oceanography Centre, Southampton, UK)

Evans, A. 2015. Applying parts of UNCLOS (UN Convention on the Law of the Sea) to access data for use in mapping and monitoring in UKOT waters. pp 224-228 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Knowledge of the marine environment is a critical need for effective decision-making. The more that is known about the marine environment, the better people's interaction with it can be managed. There is an unawareness of marine spatial data relating to the offshore waters in the UK's Overseas Territories. Furthermore, local marine research is not well developed in many of the UK's Overseas Territories due to a lack of funding and research institutions. Lack of data and research capacity hampers the potential development of new sectors and is a major impediment to effective marine management and planning.

Studies have shown that significant areas of the UK's Overseas Territories have already been surveyed with high resolution multibeam bathymetry, in some instances accounting for more than 70% of the territory's maritime area, and yet the territories themselves are unaware of this valuable asset. Provisions contained within the United Nations Convention on the Law of the Sea (UNCLOS) enables a state to participate on scientific expeditions, providing a means for capacity building as well as providing the right to request data acquired during marine scientific research within a States' maritime area. It is, however, apparent that such provisions are alien to many of the UK's Overseas Territories. As a result, data that are key to enabling responsible use of the marine area are not being made available to the appropriate responsible agencies. A programme of identifying marine data that can be used in marine habitat mapping and environmental well-being will provide the foundation upon which future research can be developed.

Alan Evans, Marine Geoscience Group, National Oceanography Centre, Southampton, UK. Alan.Evans@noc.ac.uk

Application of Parts of UNCLOS

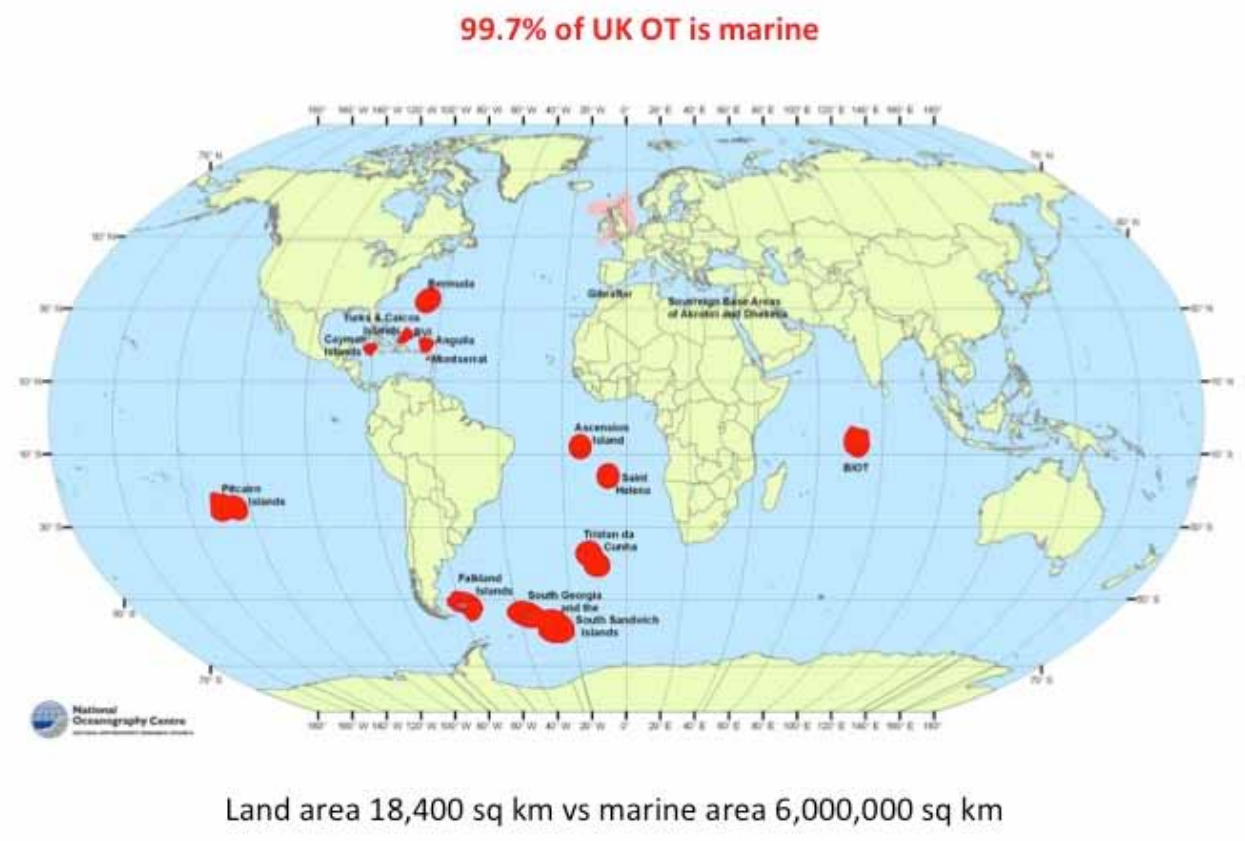
99.7% of the area generated by the UK Overseas Territories is marine (18,400 sq km land area vs 6,000,000 sq km marine). UNCLOS provides the framework by which diplomatic clearance requests for marine scientific research (MSR) within a states' maritime area are made, as well as providing the states with their rights and responsibilities for MSR within their waters. Part XIII of UNCLOS comprises six sections and 27 articles. However, of key importance to this paper are Articles 246, 248 and 249 of Section 3, where the more relevant texts are included below:

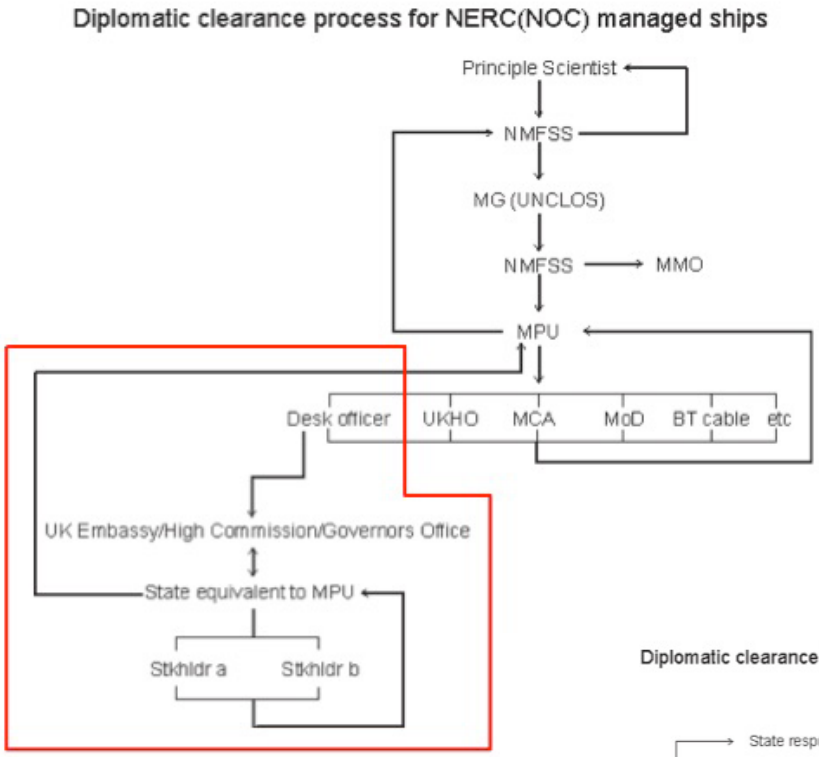
Article 246: Marine scientific research in the exclusive economic zone and on the continental shelf

Paragraph 2. Marine scientific research in the exclusive economic zone and on the continental shelf shall be conducted with the consent of the coastal State.

Paragraph 3 […] To this end, coastal States shall establish rules and procedures ensuring that such consent will not be delayed or denied unreasonably.

Article 248: Duty to provide information to the





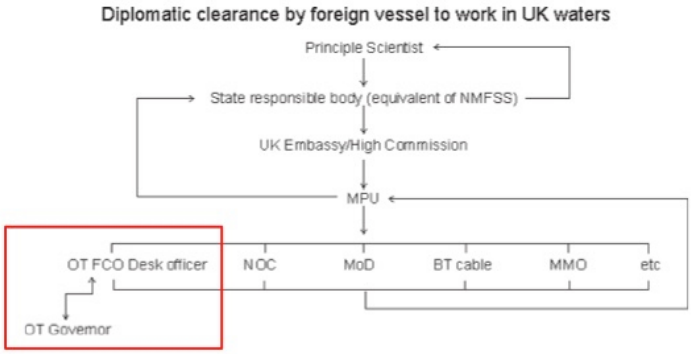
coastal State

Article 249: Duty to comply with certain conditions

Paragraph 1(a) ensure the right of the coastal State, if it so desires, to participate or be represented in the marine scientific research project, especially on board research vessels and other craft or scientific research installations […]

Paragraph 1(c) undertake to provide access for the coastal State, at its request, to all data and samples derived from the marine scientific research project […]

To provide added guidance as to how best to address MSR, the UN also published *Law of the Sea Marine - Scientific Research - A revised guide to the implementation of the relevant provisions of the United Nations Convention on the Law of the Sea, 2010*, where information relating to the history and conduct of MSR are addressed. Also included is



Need to improve diplomatic clearance process to ensure data become available

a template Form A which can be used by states to ensure that applicants include comprehensive details of the proposed scientific expedition.

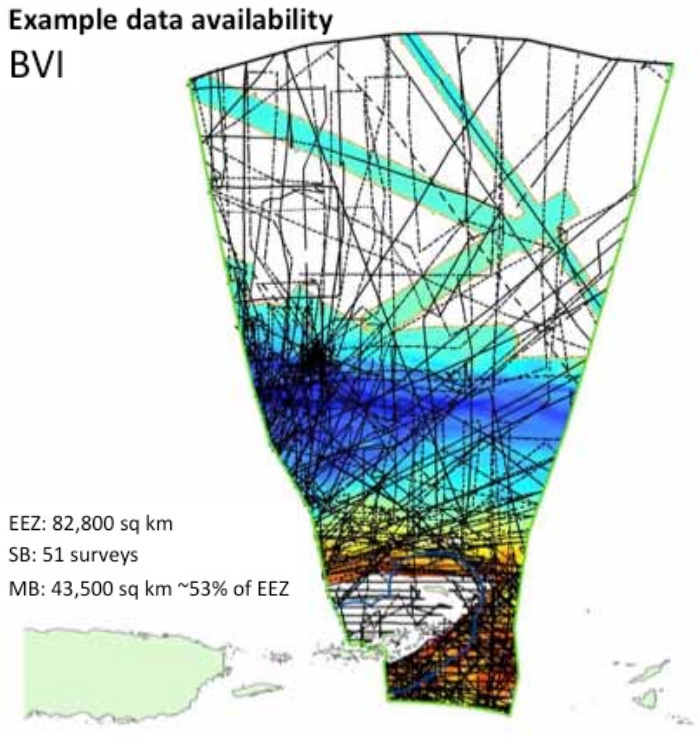
In order to determine the extent of a states' maritime jurisdiction, it is important to establish agreed maritime boundaries with opposite or adjacent states. Ensuring this enables a state to understand unequivocally to what space it has rights, responsibility and obligations. In contrast, the absence of agreed boundaries can lead to uncertainty leading to an inability to manage the marine space. UNCLOS provides guidance as to what states are expected to achieve where their respective coastlines are less than 24 nautical miles apart. Article 15, of Part II of UNCLOS, prescribes that, for delimitation of the Territorial Sea, the maritime boundary must be a *median line every point of which is equidistant from the nearest points on the baselines from which the breadth of the territorial seas of each of the two States is measured*. For boundary lines that extend beyond 12 nautical miles, UNCLOS is a little less certain, in that all that it suggests is that States resolve an *equitable solution* (article 74 of Part V and article 83 of Part VI of the UNCLOS). In absence of agreed boundaries, and in the spirit of article 6 of the 1958 Convention on the Continental Shelf, it is not unreasonable for a state to assume a median line as defining its sovereignty, understanding however that the line may be modified once agreed.

Having established an understanding of its maritime space, a state can address issues relating to the management of that space enabling a means to develop Marine Governance Policies by way of implementing Marine Spatial Planning (MSP) programmes for example. This paper draws on what UNCLOS provides in order to assist States to access what may already be available for use in better understanding the marine environment, as well as provide some example uses of these data.

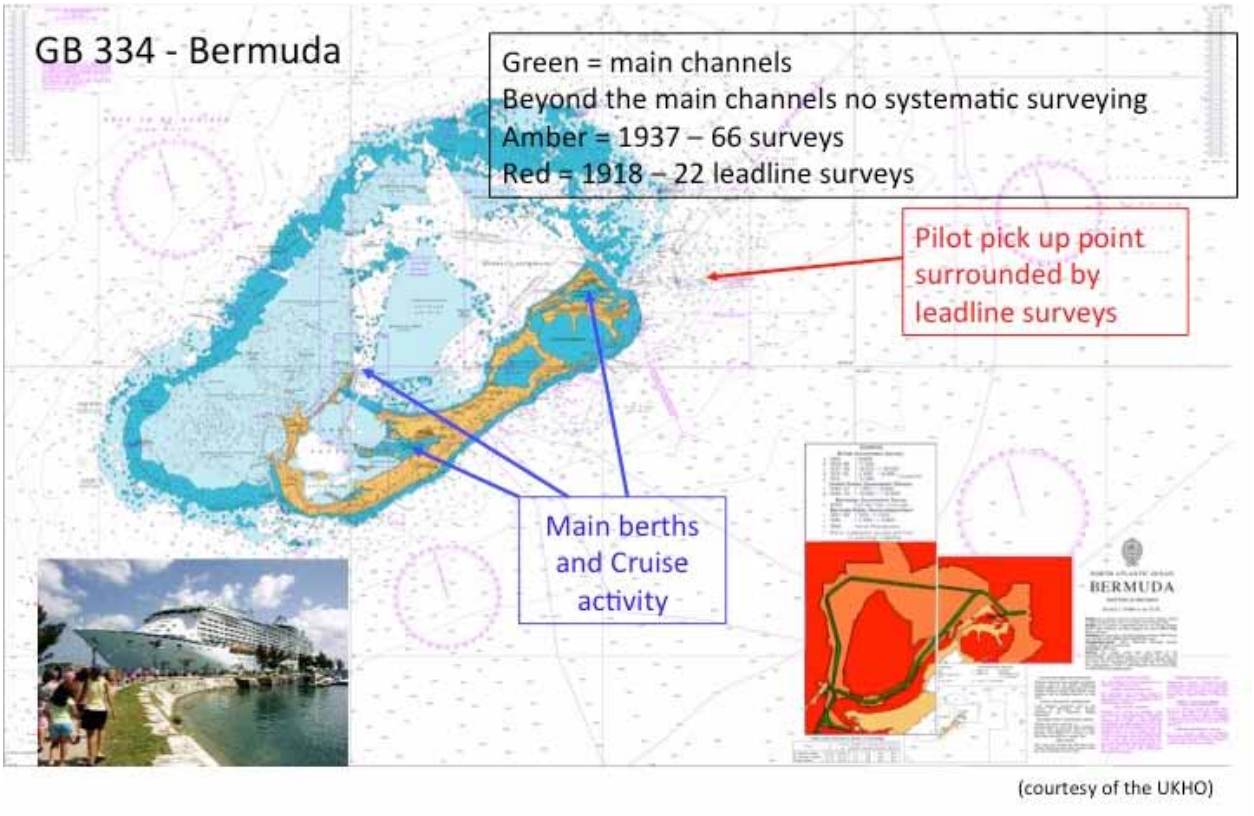
Data availability

The increased interest in developing Marine Protected Areas (MPAs) within the UK mainland areas as well as a desire to address issues relating to the UK Overseas Territories marine environment, as reflected in the 2009 UK Overseas Territories Biodiversity Strategy and the 2012 Overseas Territories White Paper, prompted research into identifying what data exist within the UK Overseas Territories marine areas that can be accessed readily and made available to the territories for marine management purposes. Initial findings were published in *Work Package 3* of a report funded by DEFRA *Investigating the feasibility of utilizing AUV and Glider technology for mapping and monitoring of the UK MPA network, 2012*, where an analysis of what data existed provided an understanding of where data had yet to be acquired and what the cost of mapping those areas would be.

Further calls reflecting a desire for assistance by some Overseas Territories seeking assistance for improving the long-term sustainable management, governance and development of the marine resources, as was the outcome of the Joint Ministerial Council 2013 and as reflected in the outcome of the UKOT Biodiversity Strategy Review Meeting at Kew in 2013, have resulted in subsequent efforts to update the findings from the above. This has resulted in a broadening of the scope of work to the extent that requests for data, as provided for by UNCLOS article 249, have allowed data to be provided to some Overseas Territories. It is apparent, since the initial study in 2012, that many more data exist and efforts to identify and access these are continuing.



To date, in excess of 210 survey data-sets have been identified within all of the UK's Overseas Territories. Of these, more than 150 have been accessed and used to start to develop an online tool that enables an Overseas Territory to examine its maritime boundaries, access information in relation



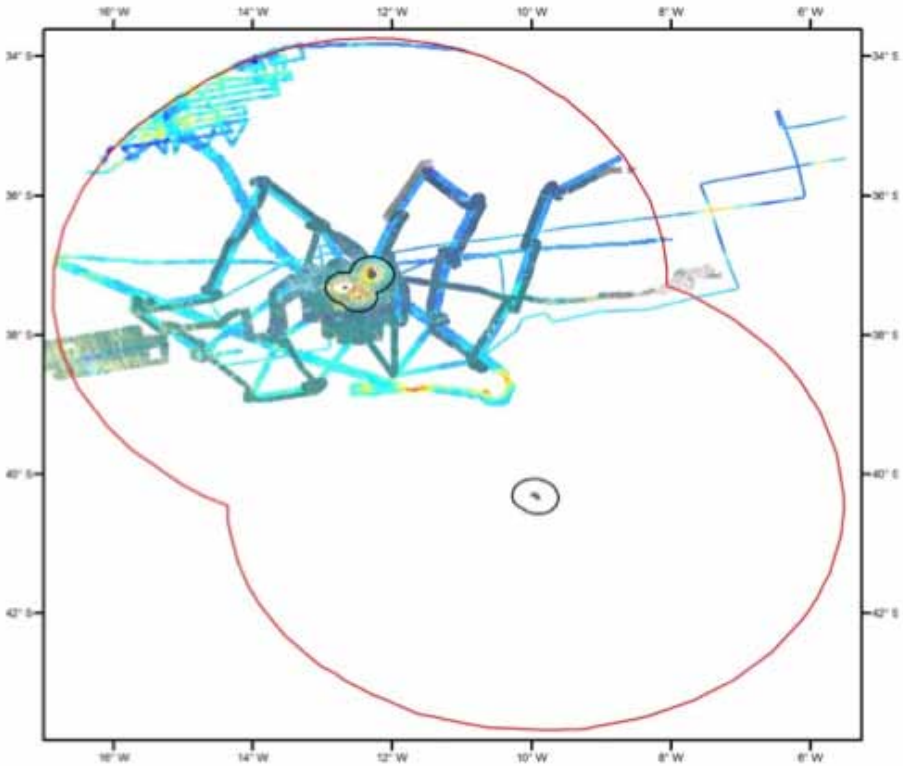
(courtesy of the UKHO)

to their EEZ (or fishery zone), identify survey navigation trackline information, with their associated hyperlinks, and recognise coverage that those data provide. Additional information, such as MPAs and areas of Ecological or Biologically Sensitive Marine Areas (EBSAs) are also included. Access to the online GIS, which is still very much under development and covers only the Caribbean Overseas Territories at present, can be made via the web page http://www.unclosuk.org/UK_OT_data.html.

Data uses

Not only does identifying and accessing data via the means provided by UNCLOS save several million pounds (£) worth of investment, it recognises also where data do not exist and, as such, enable future data-acquisition planning. Other example benefits are reflected here, where for example the provision of data to the Government of Anguilla enables them to use the multibeam bathymetry data in informing their national ecosystem assessment programme as well as be useful for marine spatial planning.

A research expedition by the Alfred-Wegener Institute, Germany, acquired significant multibeam bathymetry and backscatter data from within the waters of Tristan de Cunha. These data can be used to develop not only a classification of the seafloor, by way of understanding the geomorphology from the shallow waters offshore Tristan to the depths of the Mid-Atlantic Ridge section within Tristan's 200 nautical mile zone, but also be used



(courtesy of the UKHO)

in predictive modelling to identify physiographic features than can be related to specific habitats for use in habitat mapping.

Recognising where water depths are suitable for demersal fishing can enable a state to identify potential hot spots where trawling damage could result in the destruction of the seafloor and possible loss of habitat.

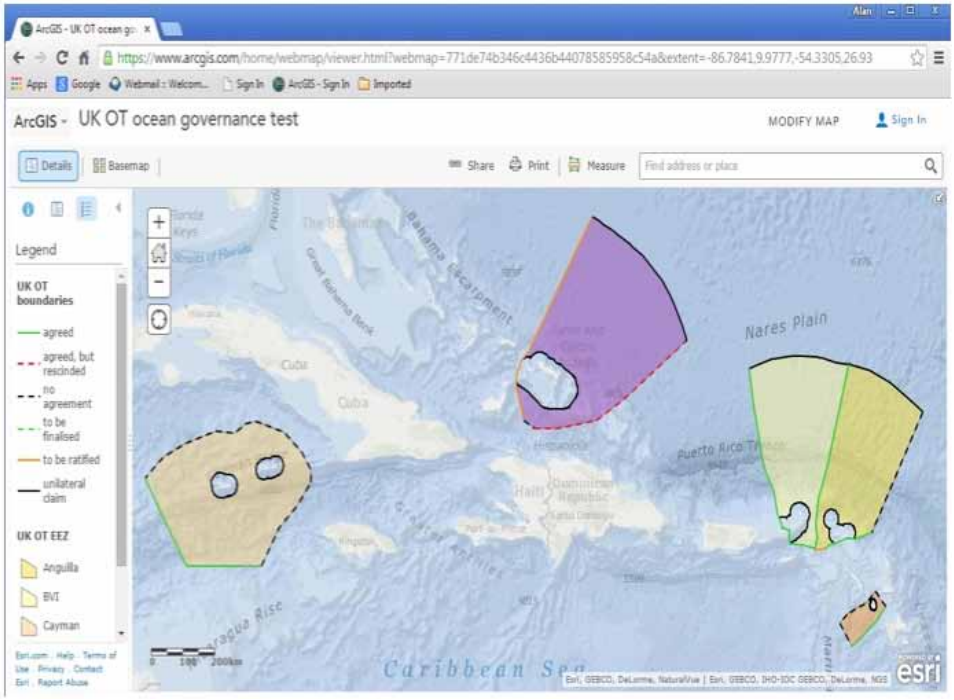
In light of the increase in cruise line traffic, in particular in the Caribbean, the UK Hydrographic Office undertook several workshops to address the shortfall of data within the these waters. Hydrographic Offices often depend on data acquired for non-charting purposes to improve their navigation charts. The International Hydrographic Organisation also recognises the value of bathymetry data for uses beyond charting, to the extent that, in 2014, the theme for the IHO's World Hydrography day was *Hydrography – much more the just nautical charts*.

The value of bathymetry data to the blue economy is also being recognised. The European Union has developed a strategy to support sustainable growth in the marine and maritime sectors, and see the seas and oceans as drivers for the European economy. One element of this strategy is the funding of the European Marine Observation and Data Network (EMODnet) Bathymetry (http://www.emodnet-bathymetry.eu/) project, which is tasked with assembling as complete as possible an inventory of bathymetric survey data. Understanding the off-shore environment can help with the development of a state's resource potential by enabling, for example, mega-yacht mooring projects, sustainable tourism or the identification of potential mineral wealth.

Higher-resolution bathymetry data can also help progress disaster mitigation plans, where improved modelling of tsunami wave impacts can be made.

Future plans

Whilst efforts to identify, access and make available more data will continue, other projects such as developing the concept of providing a mobile containerised facility, which could include an autonomous underwater vehicle (AUVs) and/or an autonomous surface vehicle (ASVs) and/or a glider would provide the Overseas Territories with the means to map their own waters without a need for the use for expensive survey vessels. Such a facility would greatly enhance the Territories ability to carry out bespoke surveys, addressing very particular needs, allowing them to map the marine environment to underpin their sustainable marine management plans. In addition, developing individual desk-top studies that would interrogate the diplomatic clearance process in state, which would identify more data as well as provide opportunities for capacity building and collaboration, combined with a review of each Territory's marine and maritime area, would greatly enhance their ability to better manage their marine estates.



The Virtual Watch Room, Pioneering Technology to Help End Illegal Fishing

Jo Royle (The Pew Charitable Trusts)

Royle, J. 2015. The Virtual Watch Room, Pioneering Technology to Help End Illegal Fishing. pp 229-230 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

3-minute video demonstrating this satellite-supported technology being applied in support of marine protected areas.

Jo Royle, Pew Charitable Trusts, London, UK. jroyle@pewtrusts.org

Monitoring and enforcement of marine reserves can be challenging in remote parts of the world, where many of the last near-pristine waters are found.

To help meet this challenge, the Pew Charitable Trusts have partnered with Satellite Applications Catapult, a UK government initiative created to help foster economic growth through the exploitation of space. Together, they have pioneered a system that enables government officials and other analysts to identify and monitor unlawful activities in global waters, particularly illegal, unreported, and unregulated fishing, sometimes referred to as pirate fishing. This cutting-edge technology merges satellite tracking and imagery data with other sources of information, such as fishing vessel databases and oceanographic data, to help monitor seas across the globe.

The partnership builds on work by the Catapult to develop a system that can synthesize and automate analysis of multiple data sources in near real time to identify vessels acting suspiciously. The system then can alert users so that they can investigate and take action. It is much more efficient than current processes, and drastically reduces the human power required to detect and analyse suspicious activities.

Pew has made this work a priority to help answer the question of how governments can protect large-scale marine reserves. In response to growing needs, Pew has initiated a Virtual Watch Room, focused on marine reserves that will be powered by the Catapult system.

The Virtual Watch Room for marine reserves is just one of the projects that Pew and the Catapult are working on to develop technological and policy approaches to stop illegal fishing in the world's oceans.

Using the Virtual Watch Room to identify suspicious activities

- The application is designed to hold and cross-reference vast amounts of data so that, when fused, the results can help identify suspicious vessel activity in an efficient and cost-effective way.
- The information includes multiple sources of satellite data, vessel and other specialist databases, international fishing and marine reserve boundaries, and oceanic data such as depth and temperature.
- The system can activate the most appropriate surveillance method to see vessels that are not transmitting their positions.
- Automatic alerts are triggered when the computer, using specially designed algorithms, detects:
    - Patterns of vessel movements or speeds typical of fishing.
    - When a vessel has stopped signaling its position.

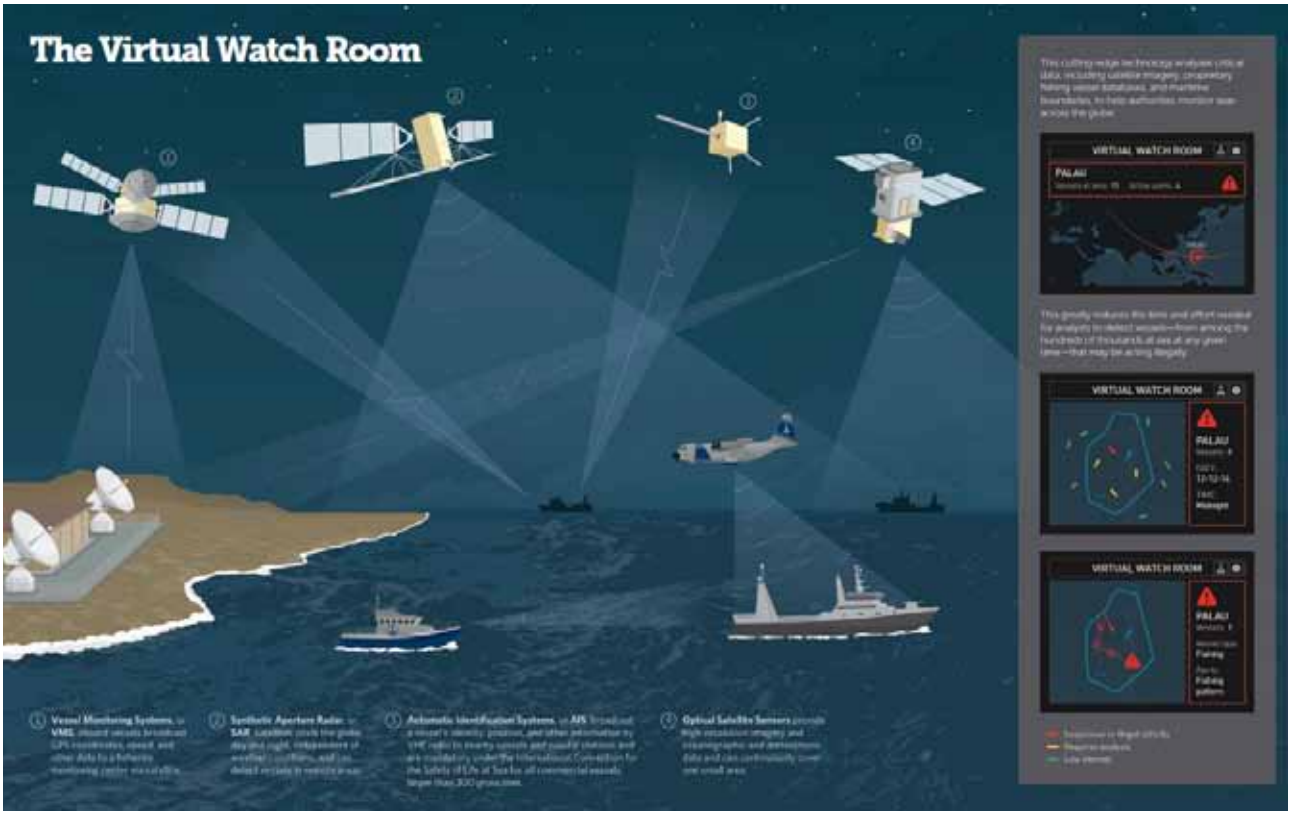
    - Two vessels in close proximity, a possible sign of transshipment of fish or other goods.
    - When a vessel crosses a virtual geofence to enter a marine reserve or other area of restricted use.
- Alerts are investigated by trained analysts.
- Analysts notify relevant government enforcement of highly suspicious activity and transfer a data package of supporting evidence.
- Governments proceed with enforcement action or other appropriate response.

As the system develops into the next phase, new data sources will be integrated to add emerging technologies and respond to evolving needs. Among the potential sources are additional satellite imagery, various types of optical imagery, imagery from unmanned aerial vehicles, crowd-sourced photographs and sightings, electronic signals such as radar on ships, and possibly radio broadcasts.

A video which illustrates this approach can be viewed at: https://www.youtube.com/watch?v=tBgRa8e6F24

Contact: Andrea Risotto, communications officer
Email: arisotto@pewtrusts.org
Project website: virtualwatchroom.org

Contact: Satellite Applications Catapult
Email: marketing@sa.catapult.org.uk
Project website: sa.catapult.org.uk



Using Seabirds to Inform Marine Spatial Planning in the BVI

Susan Zaluski (Jost Van Dykes Preservation Society)

Zaluski, S. 2015. Using Seabirds to Inform Marine Spatial Planning in the BVI. p 231 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

The British Virgin Islands host seabird populations recognised by Birdlife International as regionally and globally important. From 2013-2015, a UK Darwin Plus-funded programme, led by the University of Liverpool in partnership with the Jost Van Dykes Preservation Society and the National Parks Trust of the Virgin Islands, was implemented to: (i) help describe key foraging areas of a globally important population of magnificent frigatebirds to feed information into spatial planning to identify areas of conflict; (ii) identify current specific threats to the seabird population to guide policy-making in the ecosystem-based framework; (iii) establish a locally-driven monitoring programme to provide long-term data on seabird populations to be used in an ecosystem-based approach to marine planning and management; and (iv) to affix GPS and satellite (PTT) tags to magnificent frigatebirds over two field seasons. The maximum distance travelled from the colony during the breeding season was 1067 km; trip duration ranged from 7 hours to 8 days; and total trip distance ranged from 147 to 2291 km. Birds were recorded in the territorial waters of ten neighbouring islands, predominantly US Virgin Islands and Puerto Rico. These data will be used to increase awareness, among local partner NGOs and regional governments, of the role of seabirds in sustainable marine planning.

Susan Zaluski, Executive Director, Jost Van Dykes Preservation Society, British Virgin Islands susanjvdps@gmail.com

A sustainable marine and fisheries management plan for the Pitcairn Islands

Terence P. Dawson[1], Robert Irving[2] and Heather Koldewey[3] ([1] School of the Environment, University of Dundee. [2] Sea-Scope Marine Environmental Consultants, [3] Zoological Society of London)

Dawson, T.P., Irving, R. & Koldewey, H. 2015. A sustainable marine and fisheries management plan for the Pitcairn Islands. pp 232-233 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

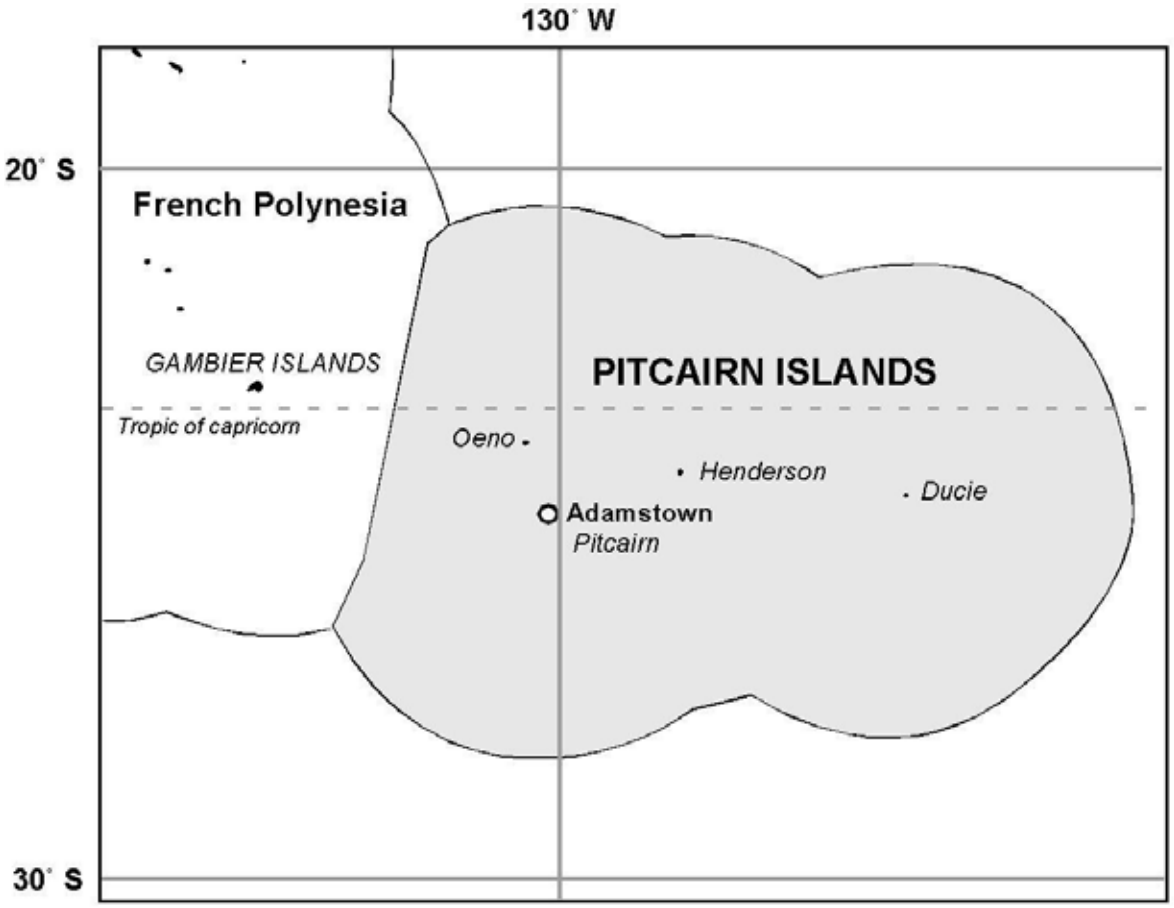
The UK and Pitcairn Governments, supported by the Pitcairn Island Council, intend to develop a more sustainable livelihoods and economic growth strategy for the Islands. Whilst tourism and fisheries currently represent the primary mainstays of the local economy, drawing upon the natural wealth and cultural heritage of the Islands, to date these have not been fully realised. Further, given their extremely isolated location and difficulties of access, the Pitcairn Islands' marine habitats are one of the UKOTs' least known ecosystems. Considering these challenges, the UK Darwin Initiative has funded a project to develop local capacity for adaptive fisheries management and to enhance tourism opportunities through cruise-ships visits and on-island facilities. A recent development within the project is to support the establishment of a Marine Protected Area, and to provide the underpinning management protocols and scientific evidence-base to ensure a sustainable future for Pitcairn's marine resources.

Terence P. Dawson[1], Robert Irving[2] and Heather Koldewey[3] ([1] School of the Environment, University of Dundee, DD1 4HN, UK. [2] Sea-Scope Marine Environmental Consultants, Dulverton, Somerset TA22 9PW, UK.
[3] Zoological Society of London, Regent's Park, London, NW1 4RY, UK.
Correspondence to Terence Dawson: t.p.dawson@dundee.ac.uk

Project Rationale

Given their extremely isolated location and difficulties of access, the Pitcairn Islands' marine habitats are one of the UKOTs least known ecosystems (Figure 1, next page). Currently, the scientific evidence for fisheries management of Pitcairn's Exclusive Economic Zone (EEZ) remains insufficient for responsible decision-making to ensure sustainable extraction (Irving & Dawson 2012). Global fishing pressures on migratory species, especially tuna and billfish, have resulted in commercial fishing fleets increasingly pressuring the Pitcairn Government to lease their fishing rights. Further, the Secretariat of the Pacific Community (SPC) has proposed that the Pitcairn community develop commercial reef fisheries for export to neighbouring Mangareva (Gambier Islands, French Polynesia). The environmental and economic sustainability of such proposals are unknown. Crucially, the small local community relies on fishing for food and, together with tourism, providing income support.

The local economy of the Pitcairn Islands is reliant on tourism as a source of income due to their geographic isolation, small size, and small population (given that it is one of the primary mainstays alongside fisheries). The community's income is boosted through the sale of souvenirs, the sale of fruit, fish and lobster to cruise ships, landing and accommodation fees charged to visitors and the sale of Pitcairn products such as honey, stamps, postcards, 'signature' clothing/ accessories and traditional crafts such as wood carvings. The number of cruise ships that stop at



Pitcairn has increased slightly in recent years and it is expected to continue to rise if the proposed Marine Protected Area is established. The creation of the world's largest marine reserve in the Pitcairn Islands will enhance the island's image to potential visitors. It provides an opportunity for increased awareness of the islands and their unique tourism experience on offer. This opportunity, and the consequent increased number of visitors, represents a realistic opportunity for building a sustainable economic future for the community.

Considering these challenges with socio-political and economic pressures, our project is undertaking a number of activities designed to facilitate informed decision-making by the Pitcairn Government for sustainable marine resource use by:

(1) underpinning the scientific evidence-base;

(2) developing local capacity for fisheries and environmental assessments;

(3) developing a marine management plan with the Pitcairn community and UK Government for fisheries and the proposed marine reserve;

(4) enhancing tourism opportunities; and

(5) increasing awareness of Pitcairn's importance in meeting the UK's biodiversity targets.

A key development within this project has been to work closely with the Pew Charitable Trust and the Pitcairn Island Council to support the establishment of a Marine Protected Area, and to provide the underpinning management protocols and scientific evidence-base to ensure a sustainable future for Pitcairn's marine resources. Indeed, on 18th March 2015, the UK Chancellor of the Exchequer, George Osborne announced in his Budget to Parliament that "The government intends to proceed with the designation of a Marine Protected Area (MPA) around Pitcairn" (BBC 2015). The project is now in a good position to build upon this foundation, and to ensure a successful long-term future for Pitcairn's biodiversity and well-being for the local community.

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Widening Bermuda's Shipping Channels: Challenging Pre-Conceptions through EIA

A.F. Glasspool*,J. A. Ward*, C. Rickards* and J. Burnham** (*Bermuda Environmental Consulting Ltd., **Works and Engineering, Government of Bermuda)

Glasspool, A.F., Ward, J.A., Rickards, C. & Burnham, J. 2015. Widening Bermuda's Shipping Channels: Challenging Pre-Conceptions through EIA. p 234 in *Sustaining Partnerships: a conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities, Gibraltar 11th to 16th July 2015* (ed. by M. Pienkowski & C. Wensink). UK Overseas Territories Conservation Forum, www.ukotcf.org

Application of EIA is not legislated in Bermuda, but a recent decision to accommodate the newest Quantum class of cruise-ship resulted in the Bermuda Government requesting an EIA to assess three possible channel upgrade options. Whilst flawed by the fact that the "do nothing" option was not under consideration, the resulting EIA process nevertheless provided a valuable framework and for engaging the community, analysing and determining the least impact option, and developing a structured approach for managing the impacts and implementing possible mitigation strategies. Through this process, the universally expressed pre-conception of local environmentalists regarding the option offering least impact to the marine environment was actually realised to be misguided and, with environmental, social and economic factors all aligned, general consensus was largely secured for the option to realign Bermuda's North Channel, despite its closer proximity to coral reefs than the other options. Coupled with a determination by all key stakeholders to arrive at the solution of least impact, the overall scale of the project was then further reduced.

Dr Annie Glasspool, Vice-President, Bermuda Environmental Consulting Ltd
annie@environmentbda.com

Discussion

Much of the discussion addressed the conclusions and recommendations. If such items are adequately reported in the Conclusions and Recommendations section later in these proceedings, they are generally not repeated here. Instead, this section draws out some other aspects for which amplification may be useful, on of the discussions and ideas put forward for consideration.

First question session

Chagos MPA

With respect to establishing the Chagos MPA, taking an ecosystem services analysis in the beginning would have been more effective.

The associated funding (that associated with Tom Appleby's work) has ended for Chagos. As to reopening the fishery, the cost of enforcement outweighed any money that was being earned on the fishery.

Some questions are beyond the conservation scope to answer.

There is potential to enforce using satellite imagery.

SAERI

A GIS specialist is currently visiting a lot of other UKOTs, not just in the South Atlantic. SAERI is well aware that there are similar issues and resource constraints between Territories.

There are advantages of regional organisations which can work more in a strategic way and less in an *ad hoc* way, SAERI is doing this already and wherever possible will carry on to do so through running training courses, etc.

Between South Atlantic territories, information is being shared, *e.g.* frameworks, licencing agreements, etc. This sort of information can also be shared easily between other UKOTs. Knowledge exchange and the exchange of personnel are very useful.

SAERI is looking into a freely available software which could act as an accessible resource base.

Cultural aspects linked to the marine environment

In the Pitcairn Islands, different marine species, *e.g.* corals have appeared on stamps over the years. There is also the *Bounty* wreck, which people dive to visit. The inhabitants of Pitcairn are seafaring folk and do respect this.

The Falkland Islands do not have a strong nautical/seafaring culture. The main economic activity is sheep farming. It is only recently that the cultural dependence upon the sea has emerged in terms of *e.g.* fisheries. The Falklands has an emerging culture, as opposed to historical.

The cultural landscape is part of the story that we have to tell people in the UK if we want to get them interested in the UKOTs. For example, perhaps had the Chagos story been structured in a different way, there would have been more access to military technology.

Second question session

Sustainable fisheries management

Whilst zonal fisheries management is used, we do not yet use zonal conservation management. The Falklands, in particular, have always used spatial and closed areas for sustainable fisheries. Management in the Falklands is for distinct fisheries.

Spatial and temporal closures in South Georgia and the South Sandwich Islands are to do with larger predators. For example, the krill fishery closures are timed so that fishing is not in conflict with predators.

Coral Reef Health

There is a sustainable jewellery practice in Bermuda using the lionfish. This involved collaborations with fishermen.

Tristan da Cunha

There was an insurance claim for the *Oliva* disaster which was successful. Part of the claim covered the cost of penguin rescue. Jim Kerr thought it also covered the closure of the Nightingale fishery (and Inaccessible fishery?) when closed.

Since the incident, large carriers are tracked very carefully when they are close to the island. They are more wary than before. With the *Oliva*, the problem was that the course was determined by somebody that was sat in an office in America. They had plotted the course and did not realise that

it went right across an island. There was a court of enquiry.

Marine Protection in Bermuda

Expanding upon Annie Glasspool's presentation regarding the Blue Halo Initiative, there was quite a lot of suspicion with Blue Halo Initiative coming in. There were suspicions that there might be a reserve (*e.g.* mineral) that an outside organisation was coming in to exploit.

Whilst through the project, some locals were engaged, there was a lot of pressure to meet a deadline, and people did not understand the rush. It was the most polarising situation that the islands ever seen in terms of the management of the environment. The fish-pot situation was bad, but this was worse. It fed into the racial politics as well.

Discussion session

Governance and MPAs

We welcome the opportunities to talk with neighbouring UKOTs while at this conference.

Regarding the establishment of whale and other marine sanctuaries, it may be that Territories have sanctuaries inadvertently. Coming from the TCI point of view, there may be other territories that have similar legislative situations. It would be good to get together and discuss this.

There were criticisms of how BVI established their shark sanctuary. The commercial fishing of sharks was banned, yet there was an incident recently where a hammerhead shark was caught off Anegada and a photo taken which went viral on Facebook. Makes you look like a laughing stock, despite doing everything correctly. There was involvement at the lower level regarding the shark sanctuary in the BVI with the Minister as the driving force. The current minster is very environmentally aware in BVI.

Regarding the shark sanctuary in Bermuda, there was a bottom-up approach, with a group of young people approaching the Government. There is strong enforcement as the Government is committed to their pledge.

The situation in TCI is a bit different. Regulations have been passed but not yet implemented. The local fishing population has not yet questioned it.

You very much need public consultation. With an outside group coming in, you are rarely successful if you do not take into account local values. Anyone else thinking of implementing a shark sanctuary might want to take this into consideration.

There is a difference between the TCI islands as well as between UKOTs, and this could be the same with other Territories. From the point of view of fishermen in Grand Turk, they asked why people were coming in and telling them what to do.

One issue with Pew was that its approach was straight across the board, and there cannot be a direct cookie-cutter (or one fits all) approach.

It is very important to take time to facilitate discussion between different stakeholders.

We work within a complicated governance framework. As a result, we have to be really careful with how structures are implemented. We have to knock out business models that are harmful and develop those that are beneficial.

For tracking species, tagging is very expensive. There are more basic structures to develop beforehand.

Sustainable fisheries

Not every Territory has access to resources to manage fisheries in the way described. In the Falklands, a lot of the fisheries are now under MSC procedures..

There is a large amount of white fish around Tristan, and island fishermen catch what they need for their families. There has never been any thought to use this in a commercial way.

It is a concern that fishermen have jumped overboard from Taiwanese fishing vessels. All of these people were interviewed, and the Falkland Islands Government does take this very seriously.

Data sharing and access

Regarding whether and how a SAERI-type approach could be set up in a different region, at this stage SAERI is not sure how all of the relationships will be or are working. There are a lot of different institutions and universities working there, and it takes a lot to bring all of that together. It also takes a lot of face-to-face time to build the relationships. As a developing regional scientific institute, it is important to know what is going on in the regions that they are working in. Fundamental relationships are really important for any area and communication is essential. It is

important to note also both the this is a research model, not a conservation one, and that the needs in other regions may already be covered, at least in part, by other approaches, which could be developed further, rather than starting a new institution.

Regarding project start-up costs, it is much cheaper to sustain these than to establish them in the first place. The main cost involves the establishment of the infrastructure.

One recommendation could be to establish research licences and the fees associated with that are being investigated.

One recommendation could be that all data collected meets ISO 95 data standards.

One problem is that maintaining the skill base can be done only through as much training as possible. It is important to engage actively in the training.

Especially relevant to the CDs, a lot of UK and French data are fed into a combined database.

With regards to the reliability of data, it is essential to have standard monitoring procedures.

In creating a metadata catalogue, a simple spreadsheet of data can be meaningless. You have to also know how it has been captured. Every data set should be accompanied by another dataset which contains this important information, *e.g.* the machinery used.

The US has a very well established way of disseminating its data, which can be downloaded pretty much in real time. The UK is catching up, with a similar system in mainland UK waters.

One issue encountered in Bermuda waters involved a research vessel which sent around a document about the killing of marine mammals. The aim was to inform local vets, but they had applied to the US State Department, rather than the Bermuda authorities, to come into Bermuda waters. Bermuda therefore did not know anything about it and there could have been a serious issue where they were taking marine mammals without Bermuda being aware. There is a need to be very cautious of a lack of communication.

There is a need to be wary of anything falling through the nets fairly easily.

It would be useful to have an outline of where data exist. For certain surveys, you can then connect to the data source itself and can get an immediate understanding of the data itself.

One issue with open access could be that anyone could access the data. There may be areas with mineral deposits (or sensitive species) among other areas that could be of commercial interest. It is important to have ways to be able to control that.

Some areas of data access may involve requesting the data. However, this could take a long time, *e.g.* it took some data 6 weeks to get to Tristan. There are therefore some issues with this data access.

GIBRALTAR CHRONICLE

Conservation takes centre stage for week-long conference

by Eyleen Sisti

A major five-day conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island communities starts tonight in Gibraltar.

The purpose of the conference is "to exchange best practice, discuss successes, explore innovation and forge partnerships with the overall aim to ensure that the wildlife and the ecosystems of the UK Overseas Territories and Crown Dependencies is secured for future generations by the people."

It has been six years since a conference like this was held, previously one was held in Gibraltar in 2001.

At a press conference yesterday Minister for Environment Dr John Cortes introduced Dr Mike Pienkowski, the honorary executive director of the UK Overseas Territories Conservation Forum (UKOTCF).

Dr Cortes commented that it was a special conference for him as he had been a member of the UKOTCF council.

Seventeen UK territories will be represented – some at ministerial level – together with nine other countries, resulting in over 100 people participating.

With many prominent people from conservation coming to

(Continued on page 2)

Conservation takes centre stage for week-long conference

(Continued from front page)

the Rock. Dr Cortes said: "The value of this conference is tremendous."

Referring to the cost of hosting such a large conference Dr Pienkowski said it would be somewhere in the range of £40,000. However, with all the experts giving their time for free, it is costing half that and for the many vast discussion groups and sessions that will be held it will be money well spent, said Dr Cortes, who added that he and the department's staff would be trying to glean as much information from these experts as they can.

Previous conferences have proven their worth before said the Government as several initiatives and projects have been launched including invasive species removals, scientific surveys and research, economic evaluation projects in several UKOTs, pilot work on tourism to protect wildlife, increased support from UK institutions and UK Parliament and input into EU funding policy.

One common aspect all experts will have is that they all work within the same boundaries or with the same issues other UK overseas territories do, for example climate change and sea level rise, unsustainable development, and alien species introduced by humans.

Each territory also has a set of unique challenges but share some similarities such as small human populations and small land areas.

Many of them are so unique they are home to endemic species some of which are not found anywhere else in the world. The threatened frog specie the Mountain Chicken, blue iguanas and spiky yellow woodlice are some examples.

Gibraltar will play a key role in all the discussions that will be held in addition to hosting some sessions such as Dr Cortes's session on 'Conservation: the Gibraltar perspective revisited'.

The ways that Gibraltar is dealing with the challenges to the environment will be discussed together with methods from other UKOT's such as the use of drones, remote sensing apps and citizen science to survey and carry out survey work, the use of controlled burns and native nurseries to save species from extinction and the use of satellites for surveillance of a legal fishing.

The conference is being organised by HM Government of Gibraltar and UKOTCF, with support from the Gibraltar Ornithological and Natural History Society.

In addition to the conference, Dr Cortes has organised a meeting of the environment ministers or their equivalents for next Thursday. Dr Cortes said the aim of the meeting was to exchange views, learn from each other and to work together so that the OT's have one voice when speaking to various bodies or organisations such as the UK or the EU.

A BIT OF COMMUNICATIONS MEDIA: Top left: Mike briefs the mic team before a conference session discussion. Lower left: Ann on duty at her video camera. Top right: The first of several almost-daily articles in the Gibraltar Chhronical. (Phtotos: UKOTCF & HMGoG). Lower right: Photographer photographed through a coach windscreen. (Photo: Boyd McCleary.)