Main topic 5: Using technology and data to inform and monitor conservation and novel approaches to address threats to biodiversity

Chairing: Andy Pearce (UK); Question-masters: Jodey Peyton & Lord (John) Randall; Rapporteur: Keith Bensusan (Gibraltar)

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5.19 General topic discussion

Introduction

Andy Pearce, UKOTCF Council Member and Former Governor of Montserrat

Andy Pearce

Welcome, everyone — good morning, good afternoon, good evening, and perhaps even good night, depending on where you're joining us from. It is a pleasure to welcome you to Session 5, which focuses on "Using Technology and Data to Inform and Monitor Conservation, and Novel Approaches to Address Threats to Biodiversity."

We are now halfway through the conference and the momentum continues to build. My name is Andy Pearce, I serve on the UK Overseas Territories Conservation Forum Council, and I'm a former Governor of Montserrat – in whose honour, I might add, Mike Pienkowski is proudly wearing a tie today.

Due to some last-minute changes, including Lord Randall being called away to Parliament, we have slightly adjusted the facilitation of questions for this session. Jodey will begin the Q&A, followed by John, and then Jodey will resume. Thank you in advance for your flexibility as we adapt.

We are also fortunate to have Keith Bensusan acting as rapporteur for this session. Keith has already broken all records for the speed and accuracy of his reporting, and we are grateful for his contributions in keeping the documentation process on track. With a packed agenda ahead and strict instructions to keep things moving briskly, let's dive straight into the session.

Lord (John) Randall

Dr Jodey Peyton

Dr Keith Bensusan

The use of satellites for environmental monitoring in the UK Overseas Territories: Social considerations for the collection and use of data

Jasper Montana (Australian National University; University of Oxford)

Jasper Montana

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With reduced costs and easier access to data, there are growing opportunities to use satellites for environmental monitoring in the UK Overseas Territories (UKOTs). Remote sensing by satellites can be used for a range of applications, including monitoring the movement of fishing vessels in UKOT waters, tracking the spatial distribution of important marine or terrestrial species, and detecting changes in coastal erosion or coral bleaching. However, there are important insights that can be drawn from past experience around the world about the collection and use of data in environmental management that can inform future practices. This paper identifies some lessons learnt about the use of satellites and other technologies for tracking and monitoring environmental change. Specifically, the paper sets out the importance of a) paying attention to what is included and excluded from monitoring and tracking data; b) who has access to that data and how, and finally; c) the assumptions made in the use of that data about what policy and practice options are the most appropriate and why. The paper explores these lessons through two cases from the UKOTs: one focused on tracking marine turtle distribution around the Turks and Caicos Islands; and one focused on monitoring fishing vessel activity to support marine protection around Ascension Island.

Dr Jasper Montana

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Background

The UK Overseas Territories (UKOTs) are home to a vast array of iconic landscapes and rare species (Churchyard *et al.* 2016), which are vulnerable to human-induced pressures (i.e. Clubbe *et al.* 2020; O'Leary *et al.* 2019; Weber & Weber 2020). Threats such as climate-change, pollution, coastal development and invasive species can have devastating effects on this biodiversity, and lead to knock-on effects for the social and economic wellbeing of local communities. The use of satellites for environmental monitoring is one tool to support biodiversity-conservation and environmental management in the territories. However, the social considerations of producing and using satellite-derived data need also to be taken into account (Montana 2025).

Remote sensing technologies, such as satellites, provide access to viewpoints that are otherwise impossible for human perception. Collecting data from satellites can help scientists to understand everything from large-scale processes of the ocean to the small-scale movements of a bird searching for food. Satellites can be used to monitor ice-loss, the movement of greenhouse-gases, and to detect trends in habitat-degradation. In combination with machine-learning technologies, remote sensing and other Earth Observation technologies offer powerful new means of more automated monitoring of life on Earth and can help to fill data-gaps in areas that are otherwise understudied or inaccessible to ground-based researchers (Bennett *et al*. 2022; Maxwell *et al*. 2018).

With reduced costs and easier access to satellite-derived data, there are growing opportunities to use satellites for environmental monitoring in the UK Overseas Territories (UKOTs). Remote sensing by satellites has already been used actively for a range of applications, including monitoring the movement of fishing vessels in UKOT waters as part of the Blue Belt Programme, tracking the spatial distribution of important marine or terrestrial species in the planning of marine protection strategies, and detecting changes in coastal erosion

or coral bleaching. While the technical opportunities and challenges of using satellites for environmental monitoring are widely known and discussed, this is only part of the picture. There is need also to draw insights from past experience about the social considerations of collecting and using data from satellites in environmental management.

Why social considerations matter for satellite-based monitoring?

Critically, how we organise data infrastructure for the environment is never neutral. Social-science research has challenged the widely held misconception amongst some technical communities that digitally-mediated data-production offers "a neutral, more comprehensive picture of the planet" (Nost & Goldstein 2021: 4) The infrastructures we make for producing and using environmental data involve many human choices that are shaped by individual and collective preferences and values. For satellite-monitoring, this includes choices about what to monitor, how to monitor, who is involved, who has access to the data, how the data are presented and shared, etc. And all of these choices are in turn shaped by the uneven distribution of resources and power. Scholarship has argued that environmental management should attend to these "value-laden choices" (Nost & Goldstein 2021: 4).

Understanding the social considerations for satellite-based monitoring of the environment includes asking questions such as:

- Who participates and how in environmental monitoring?
- What values, worldviews and knowledge types are considered in the design of environmental monitoring?
- What justifications are made about the purpose of environmental monitoring and the decision-makers that will receive data?
- What are the social, cultural, political, and economic benefits and costs of environmental monitoring? Etc.

In this conference talk, I explore these questions through an examination of the literature and some previous work in the UK Overseas Territories.

Methods

This talk offers a short introduction to some lessons learnt from the use of satellites in environmental monitoring around the world and in the UK Overseas Territories. The study involved a review of literature on the social considerations of environmental data-collection and -use. This supplemented the collection of qualitative data (Bryman 2015), including 20 semi-structured interviews with marine managers and scientists involved in designing and implementing interventions involving satellite-based environmental monitoring in the UK Overseas Territories and observations at stakeholder-meetings for conservation-projects in the UKOTs, including the Blue Belt Programme, between November 2019 and July 2022. Ethical approval was provided through the Central University Research Ethics Committee of the University of Oxford in June 2019.

The two cases that I focused on mostly were the satellite-tracking of marine turtles in the Turks and Caicos Islands, and satellite-monitoring of fishing vessels around Ascenson. The satellite-tracking of turtles in TCI aimed to develop a long-term fishery-management regime for turtles through stakeholder-engagement, including management-planning, research, outreach and education (Richardson 2014). The project led to a set of proposed management-measures for updating legislation with regards to turtle-fisheries. These included the introduction of size-limits and closed-fishing seasons, which were approved and came into force in 2014 (Doherty *et al.* 2020). The second case involved the satellite-monitoring of fishing vessels around Ascension Island as part of the Blue Belt Programme, which sought to establish 4 million square kilometres of marine protected areas around a number of the UK Overseas Territories. Here, the use of satellites was deemed particularly important, because the vast ocean-areas around Ascension Island were beyond the surveillance-capacity of any patrol-ship-based approaches to monitoring and enforcement (Rowlands *et al.* 2019).

Findings

Through the review of existing literature and qualitative data-collection about specific examples in the UK Overseas Territories, this talk identifies some lessons learnt about the use of satellites and other technologies for tracking and monitoring environmental change.

1. Inclusions and exclusions

The first finding is that environmental data that are derived from satellite-monitoring draws attention to some things and ignores other things. For example, satellite-tracking of species typically leads to researchers receiving a series of coordinates - "a stochastic pattern traced across a blank page" – or what Benson (2014 39) terms a 'minimal animal'. These then need to be mapped on to a representation of physical space, such as a topographic or bathymetric map. This tells one some things, such as where the individual went in horizontal space, but it does not necessarily tell other things, such as why they went there and what they encountered along the way. Such two-dimensional maps, which are often used for management, have often been criticised for failing to show social dimensions, such as who owns the land and sea, why parts of the land or sea might be culturally (as well as ecologically) important, or other

local and traditional knowledge (Boucquey *et al*. 2019). Other scholars have noted that environmental monitoring with satellites can also sometimes underlie a limited ambition to understand and address the root causes of environmentally damaging activities, which are often social in nature and difficult to perceive through remote sensing (Toonen & Bush 2020: 133).

As such, anyone using satellite-monitoring data might want to be aware of what satellite-monitoring and -tracking data include and exclude. This means also ensuring that satellite-monitoring is complemented by other strands of work that attempt to capture these missing dimensions so they do not get lost or forgotten. In both the case of the Turks and Caicos Islands Turtle Project and the Blue Belt Programme, there has been productive attention to this point. In the Turks and Caicos Islands, satellite-monitoring was complemented by extensive on-the-ground social research working with the local communities to understand their practices and needs (Richardson *et al*. 2009). And, alongside the Blue Belt programme, a small amount of important work has been done to understand the motivations of regional communities to fish in parts of the ocean that may be subject to marine protection (Collins *et al*. 2021).

2. Access to data

The second finding is that there is likely to be unequal access to satellite-based monitoring data which has impacts on who can and cannot use it and for what purposes. Technologies such as satellites are recognised to have the potential – at least – to contribute towards "democratising" environmental governance (Toonen & Bush 2020: 134). However, this is not always the case. Even though satellite monitoring data may be made available on public websites, such as Global Fishing Watch or www.seaturtle.org, it does not mean that everyone everywhere has the knowledge and capacity to access and use that data equally. Different communities will also have different preferences for how they want to access information. Just because some communities are not interested in graphs and statistics, this does not mean that they are not interested in the underlying stories that those graphs and statistics might tell.

Therefore, anyone using satellite-monitoring data might want to consider equitability in access to satellite-derived data, and tailor access to the needs and interests of different communities. As one of the Turks and Caicos Islands Turtle Project team reflected, "we really disseminated that information to the community through posters, showing them maps of these migrations, and the tracks, along with text that was locally sensitive – written in a way that fishers would understand – and this would really help build support for the research and an understanding of what the project was doing" (interviewed in 2019). By involving also the local fishing community in the collection of data about the turtles, the team enabled them to have a first hand in the science and thereby build support for the uptake of new fishing regulations (Campbell *et al*. 2009). Thinking about what different audiences might need to understand and engage with environmental monitoring work is vital to increase the legitimacy and effectiveness of any subsequent policy or regulatory conditions based on that monitoring.

3. Environmental management is based on assumptions

The third and final finding is that when satellite-data are used, they are likely to be used in a world where a number of assumptions have already been made about what are the most appropriate policy and practice options. These assumptions may be wrong. For example, the management of tuna-fisheries in the Atlantic Ocean became challenged by monitoring data that showed that there was an interconnected tuna population across the western and eastern Atlantic. Persistent political interests have traditionally separated management regimes based on an assumption that there were two largely distinct populations (Havice *et al*. 2022). This is a classic example of a 'scalar mismatch' problem encountered when the scale of an environmental phenomena differs from the scale of the political organisations available to manage it (Cumming *et al.* 2006).

This example reminds that anyone using satellite-monitoring data might want to reflect critically on the assumptions that are made about how best to govern the environment and identify when these assumptions may be unproductive to achieve stated goals. One emerging example of this concern that I detected in the UKOTs pertained to the increasing interest and resource-capacities to carry out desktop-based environmental monitoring using satellite-imagery. On one hand, having access to historical and current images of changing environmental conditions can expand dramatically the area that individual environmental officers can monitor. But on the other hand, this approach may lead also to environmental officers spending more time in their offices rather than being out in the field. In small islands with small communities, in particular, the importance of face-to-face interactions and the ability of environmental officers to be on the ground talking with people and seeing first-hand what is happening is not to be undervalued. A shift to desk-based monitoring may not always be best, even when there are efficiencies to be found.

Conclusion

Social considerations matter when it comes to using satellites to monitor the environment in the UK Overseas Territories. This is because: the way we organise data-infrastructure for the environment is never neutral; environmental monitoring shapes and is always shaped

by people's imaginations of the environment. And it reflects and reinforces existing assumptions about how the environment should be governed. Designing and implementing satellite-monitoring of the environment will inevitably involve making choices that reflect our individual and collective preferences and values. But learning to be aware of the choices that are made, and understanding the impacts that they may have on the people and places that we seek to care for is critical to achieving desired environmental and social outcomes.

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Q&A

Andy Pearce: Thank you very much indeed, Jasper: a very crisp and clear excellent talk. Always when you get into the details of things, there are vastly more layers of complexity, and you exposed those very thoroughly and clearly for us.

Jodey Peyton: Thank you Jasper, that was a great talk. Very interesting, and it ties in very well with what we were talking about yesterday as well, to a degree. Interesting points you raised given the increasing use of remote sensing data.

Nancy Pascoe: Using remote sensing can help guide field-work on small islands which is important when staff and resources are limited, especially when boats are needed to monitor remote places.

Jodey Peyton: I was wondering, thinking about the key points from using satellite-data, or remote sensing data, is it paralleled by traditional field-surveys. Is it different because you are literally in the field doing surveys?

A: First of all, I just wanted to thank everyone for organising this conference and all the people I spoke to throughout the project. There are similarities between field-based data-collection and some of the challenges around that, and also remote sensing. I think that the difference potentially is that remote sensing can be done quite removed from communities and quite removed from the actual places you are trying to study. So it is a bit easier to fall into a trap of assuming, or forgetting, those details of the environment that might be really crucial: the environment or the communities and the social aspects that might be really important, to which to pay attention also if you are working in a remote capacity. One thing I thought was really interesting while I was doing this work, I think it was in St Helena, when they

were doing tagging tuna, they were also, there were some opportunities, for local communities to also go out and do tuna-tagging. Even that opportunity to understand what the scientists were looking at, and also how the science is done, helps the interpretation of that research later down the track, once the results come in, and the policies are being formulated. If people have had an opportunity to understand "Oh this comes from that complex tagging and satellite tracking process that I was part of", it helps people make sense of it a bit.

Jodey Peyton: Thank you. This ties in really well with what we were talking about in the poster session yesterday and, over the last few days, in sharing experiences with people, the co-creation of a project, of getting people involved from a really early stage to understand what is happening, and to understand the data.

Paul Edgar: Are some satellite-data available on a regular enough basis, e.g. daily, to carry on effectively real-time environmental monitoring of events such as storms or volcanic eruptions?

Jasper Montana: I don't know the specific context we are talking about here. Increasingly, satellite-data are being made available. Some are available under subscription (you have to pay to access), and other forms of data are available free, depending on the providers. Increasingly, there is more and more information available. You need to have the technical capacities to be able to interpret, download, process and represent it. I think that AI again detaches the human a little bit out of some of the data-collection and -analysis because you can actually automate remote sensing of the interpretation of images to an AI system. The major lesson is: let's keep the person, the people, in the picture and always recognise that we need to take account of: what are the other social factors that might be missing from the satellite remote sensing, but also what are the effects on people if we are automating or using remote sensing to understand the environment?

Jodey Peyton: If any GIS people are out there that might know the answer to the question about Sentinel data which Paul Edgar was asking about, maybe they could put that in the chat.

Thank you Jasper, that was really useful.

Andy Pearce: Thank you Jodey, and thank you once again Jasper; that was a really thoughtful. Keep people in the picture, I shall remember that. It seems simple, but it is clearly very important indeed.

Jodey Peyton: https://dataspace.copernicus.eu/data-collections/copernicus-sentinel-data/sentinel-2

Katie Medcalf: Sentinel pass about ever 3-6 days, so near real-time data are possible. However, in the Caribbean, the clouds can cause issues on Sentinel 2

Samuel Pike: Sentinel-1 imagery (radar, looks at things like vegetation-texture/structure) passes every ~6 days. This can 'see through' clouds (not massive storms though). It can be used also to map volcanic surface-deformation and lava-flows. It is quite tricky to process and interpret though.

25 years of collaboration: combining field data, genetics, seed biology, and GIS for conservation planning

Thomas Heller (Royal Botanic Gardens Kew) & Nancy Woodfield Pascoe (National Parks Trust of the Virgin Islands)

Thomas Heller
Nancy Pascoe

Heller, T. & Pascoe, N.W. 2025. 25 years of collaboration: combining field data, genetics, seed biology, and GIS for conservation planning. pp 158-164 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

With over 25 years of collaboration between the National Parks Trust and Kew, there is a huge body of data on plant distribution across the BVI . With technological advances in GIS, remote sensing, seed biology, and DNA sequencing, the ways that this data can inform on-the-ground conservation is greatly expanding. From Important Plant Areas, phylogenetic diversity, species distribution modelling, genetic fingerprinting, and identification of ecosystem services for climate change mitigation, this presentation will give an overview of the range of tools used in conservation planning in the BVI.

Thomas Heller (Royal Botanic Gardens Kew) & Nancy Woodfield Pascoe (National Parks Trust of the Virgin Islands)

In this presentation, we wanted to take a broad look at the range of technologies and approaches that have been used in plant-diversity research in the 25+ year collaboration between the National Parks Trust of the Virgin Islands and the Royal Botanic Gardens, Kew. We wanted to reflect on how advances in techniques become particularly powerful when paired with a solid foundation of field-data built up over this time. The presentation is structured around the approaches, rather than the projects in which they were used.

The Virgin Islands are part of the Caribbean Biodiversity Hotspot – a region with an exceptional concentration of endemic vascular plants that have experienced also huge loss of habitat. Though historically visited by botanists collecting herbarium specimens from across the region, the BVI were still relatively understudied and much of that knowledge not easily accessible to those responsible for conservation-practice in the BVI. This was reflected in the existing protected areas, with the conservation of plant-diversity tending to be underrepresented.

The National Parks Trust of The Virgin Islands (NPTVI) was established under the National Parks Ordinance of 1961 as a statutory body, responsible for parks and protected areas. Our mission is to "preserve and manage designated natural and cultural areas in order to improve the quality of life in the British Virgin Islands."

Kew's mission is "to understand and protect plants and fungi, for the wellbeing of people and the future of all life on Earth". One of our five commitments in our "manifesto for change" is to "deliver science-based knowledge and solutions to protect biodiversity and use natural resources sustainably". Kew has had a dedicated UKOTs team for over 20 years.

Documenting plant distributions – vital baseline data

The first Darwin collaboration between NPTVI and Kew looked at plant inventories inside and outside protected areas in Gorda Peak National Park and Anegada, and created a vegetation map for the first time for Anegada. It involved also training people from different Government Departments to consider plant-diversity in their work. So, we invited Town Planning, Agriculture, Conservation and Fisheries and, of course, the NPTVI staff to start learning about the BVI's plants.

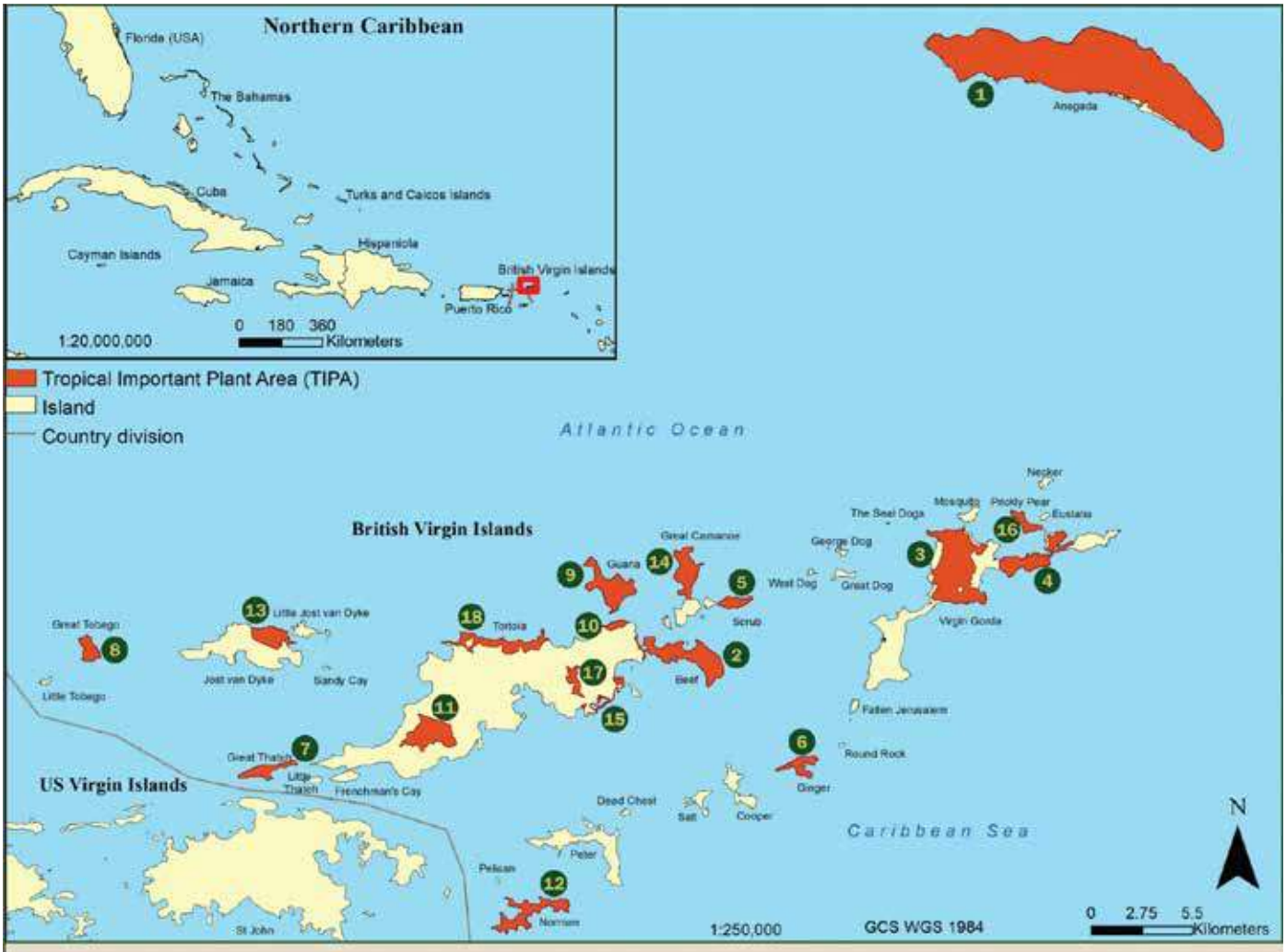
Thus, through a series of Darwin and Darwin Plus projects from 1998 to 2015, involving several partners including the BVI Government, as well as colleagues at the University of Puerto Rico and US Fish and Wildlife, over 6000 plant occurrence records were made, supported by herbarium-vouchers and/or photographs. Further field-surveys in the years since have continued to fill spatial and taxonomic gaps, almost doubling the point-data in the

Map of over 6000 plant records made 1998-2015 from across the BVI

database. This has provided the foundation for much of the following work.

IUCN Red List assessments and Tropical Important Plant Areas (TIPAs)

Another big area of work has been undertaking global extinction-risk assessments and identifying a network of globally important sites for plants in the BVI, in many ways a synthesis of the field-data. IPAs are not a legal designation, but a process to help prioritise sites, habitats, and species for conservation. 18 sites were



Network of 18 TIPAs of the BVI

1. Anegada Island
2. Beef Island and the Channel
3. Central Virgin Gorda
4. Eastern Virgin Gorda
5. Eastern Scrub Island
6. Ginger Island
7. Great Thatch Island
8. Great Tobago Island
9. Guana Island
10. Hawks Nest
11. Mount Sage
12. Norman Island
13. Northeastern Jost van Dyke
14. Northern Great Camanoe
15. Paraquita Bay and Bar Bay
16. Prickly Pear Island
17. Sabbath Hill
18. Tortola North Shore

Map showing the network of 18 Tropical Important Plant Areas in the BVI

identified based on threatened species, botanical richness, and threatened habitats (https://natureconservation.pensoft.net/article/73544/). More than 30 IUCN Red-List assessments were completed for the TIPAs process. Current project activities include global assessments for the entire native flora, over 700 species. This would not be possible without a robust dataset of plant-records.

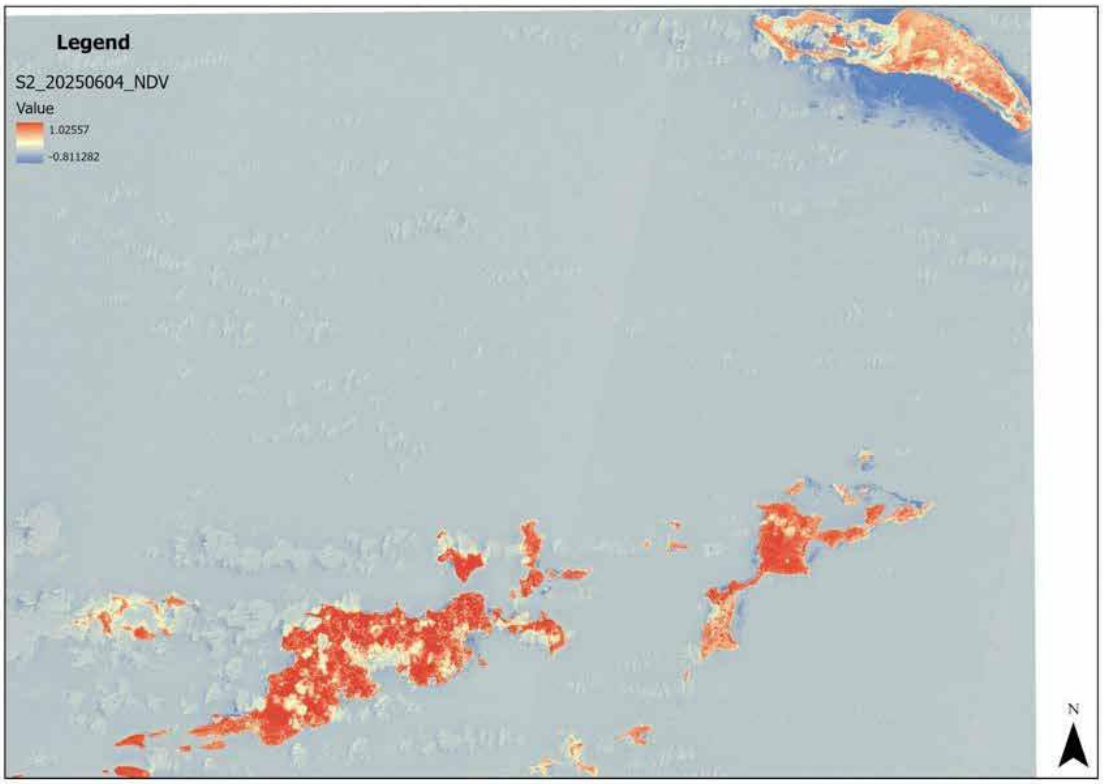
We have used all of these plant data to inform protected-area planning. After identifying the TIPAs we had to narrow these down into the areas that we would recommend for national-park status as some areas were too big and encompassed entire islands in some cases. We worked with an MSc student from Copenhagen University using MARXAN software to select the best areas (https://natureconservation.pensoft.net/article/116844/). We followed this same approach for marine-protected-area planning years ago and worked closely with the US-based organisation The Nature Conservancy, and they were very willing to provide assistance and advice for this terrestrial-protected-area planning exercise.

As the BVI consists of 60 islands and cays, we divided the country into 3 geographic areas and set our conservation features and targets. This included 34 threatened plant-species and 5 threatened habitats, and then we ran the MARXAN software. The reason for dividing the country was to prevent bias to the island of Anegada, which has the most plant-data and highest biodiversity-value. This builds resilience into our protected-area network by spreading out the risk if something impacts one of the islands.

Using MARXAN to incorporate TIPAs data into protected areas planning

Using remote sensing data

NPTVI's partnership with Environment Systems Ltd has enabled the use of remote sensing data (predominantly Sentinel 2) to inform conservation planning and management. Beyond our shared Darwin Plus projects, we use Environment Systems Ltd data-sharing services to receive regular processed map-outputs such as NDVI, to give us regular updates on vegetation-health and drought-induced stress. This can inform fieldwork plans to ground-truth areas that stand out.



NDVI remote sensing data can be an invaluable insight into forest-health

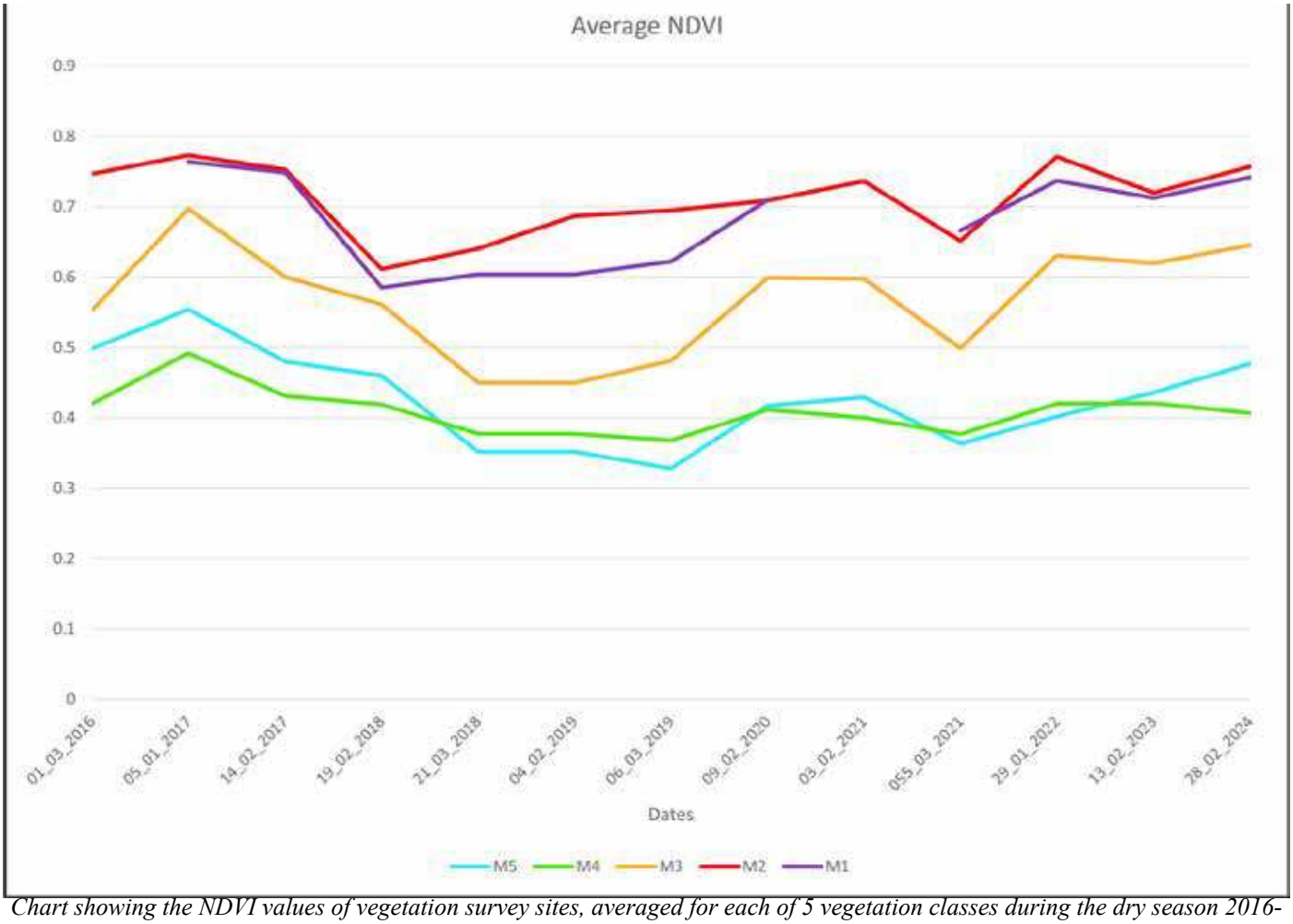


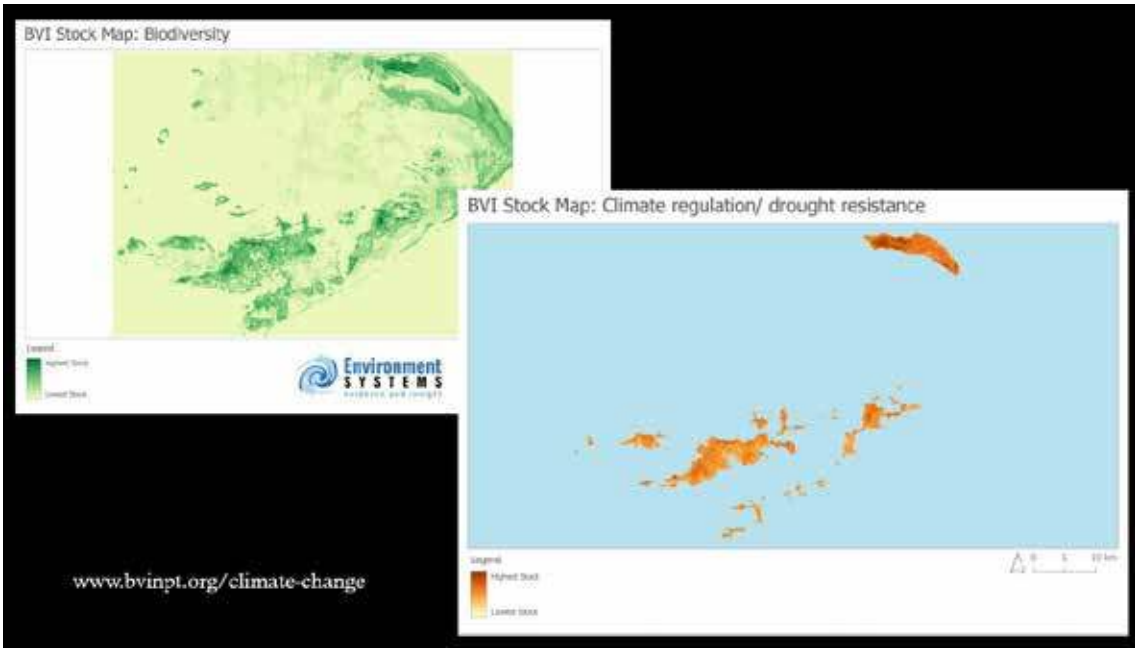
Chart showing the NDVI values of vegetation survey sites, averaged for each of 5 vegetation classes during the dry season 2016-2023

However, using NDVI as an indicator must be fully understood in the context of individual habitats and vegetation-types with a baseline-range created. Identifying the natural variation of an island or habitat's NDVI through different seasons where rainfall and temperature changes are critical.

Remote sensing and identifying ecosystem services

An example of the use of these kind of data from recent Kew MSc student Gaia Caravella: combining data from Rapid Botanical Surveys with NDVI across sites in the BVI in the aftermath of Hurricane Irma to understand habitat resilience, and how this relates to differences in vegetation composition (*image above*).

NPTVI has worked with Environment Systems Ltd using their SENCE tool to create a series of maps, including biodiversity stock maps to inform climate-change modelling and the associated impact on the BVI. SENCE stands for Spatial Evidence for Natural Capital Evaluation and it provides an up-to-date status of habitats and land use. The biodiversity stock maps were created using remote sensing data, our plant data and other biodiversity data that we have in the BVI and valuing the



NPTVI and Environment Systems Ltd biodiversity stock maps as part of the SENCE tool

ecosystem-services that these areas provide.

We were then able to create maps that show the best areas for climate-regulation and drought-resistance as healthy natural ecosystems help to balance our climate by regulating temperature through the presence of trees and vegetation. They also promote rainfall, whilst helping to retain and channel rainwater into the soil, reducing flash-flood events and reducing erosion.

Conservation in the age of genomics

Molecular methods have been previously used to study two BVI threatened species: *Varronia rupicola* (phylogenetic analysis of ITS and trnL-trnF DNA sequences, population genetics using microsatellites, Martin Hamilton) and *Vachellia anegadensis* (AFLP, Sara Barrios). Newer target-capture approaches (Hyb-seq) have been a huge advance in genetic studies: able to generate sequence data for hundreds of genes, sourced from historical material (herbarium-specimens), as well as purpose-collected tissue-samples. These have been used in resolving broad-scale phylogenetic relationships, species delimitation, as well as a source of infra-specific population genetic data.

These have already been used to resolve taxonomic uncertainty in *Zanthoxylum thomasianum* and patterns of genetic diversity across populations in the Virgin Islands – useful information in formulating a conservation plan. (This work is being prepared for publication.)

Current project activities aim to sequence all native and non-native angiosperms in the BVI. These data are used to construct a 'tree of life' for the native plants, giving insights into phylogenetic diversity in the BVI, as well as a reference library for DNA fingerprinting in the identification of invasive species.

GIS and Species Distribution Modelling

A further approach that such a rich data-set (alongside regional data from GBIF) enables, when combined with increasingly sophisticated analytical methods, is Species Distribution Modelling. Incorporating spatial data such as climate (temperature, rainfall) and physical (elevation, slope, aspect), it is possible to model the suitability of habitats for plant-species based on recorded locations and, with these models combined, maps of predicted species-richness can be generated. Alongside Red-List assessments and phylogenetic diversity, these provide a suite of metrics on which to base conservation decision-making.

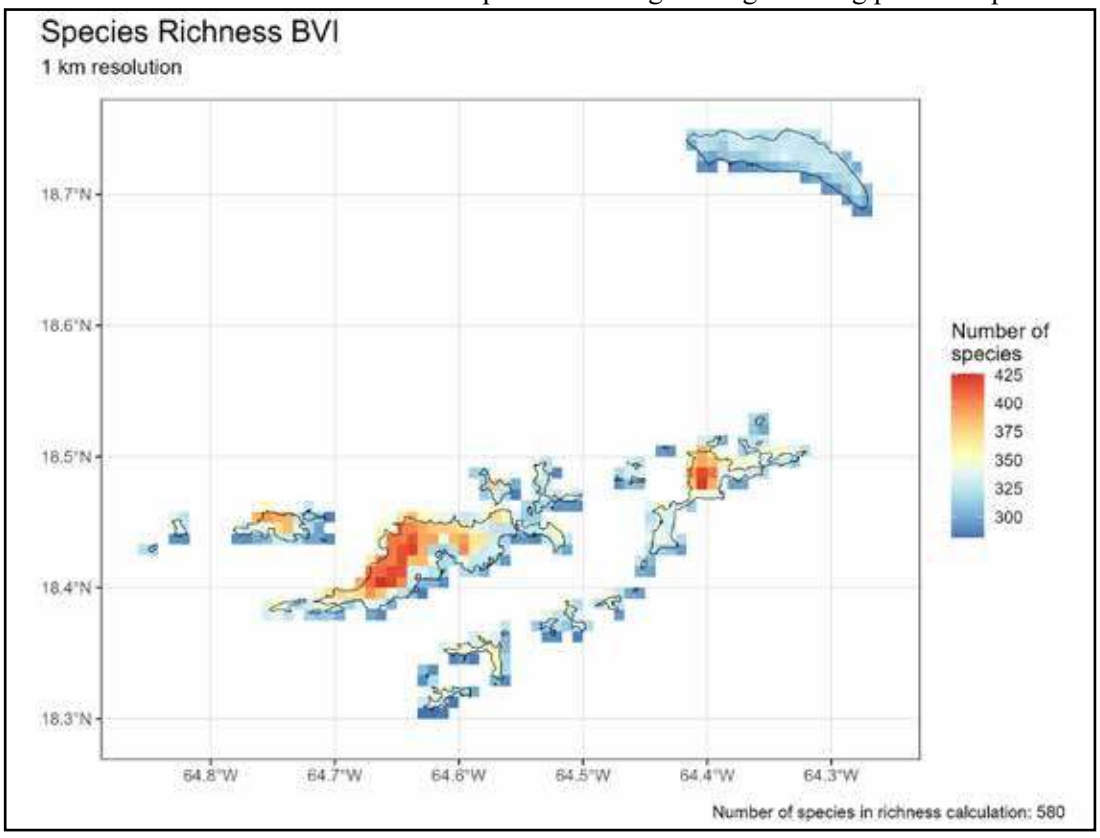
Seed biology – habitat restoration and invasive species

Seed-science has been a part of our collaboration for much of this time, with many of BVI's priority species collected and banked as part of the Millennium Seed Bank Partnership.

The application of seed-science is going further, applying it to invasive species and habitat-restoration. In parallel with the eradication of goats and invasive plant-species from Great and Little Tobago National Parks, we are investigating what plants are present in the soil seed-bank – both to understand possible future threats from invasive plants as well as natural regeneration from native species. Soil-samples are sent to Kew's Quarantine House and sown. This makes use of advances in genomics, as we can identify seedlings by genetic fingerprinting with reference to a genomic reference-library of all native and non-native angiosperms.

Future directions

We hope that this presentation gives you a sense of how advances in technology in a range of fields have opened up new approaches for understanding the environment, made possible through a long-standing partnership and



Draft species richness map of the BVI based on species distribution models

NPTVI's Simeon Cabral working with soil-samples from Great Tobago National Park in Kew's Quarantine House

the data collected through many weeks of field-work. It has also been exciting to see what building on progress through successive projects with different partners brings, as the remote sensing and GIS work with Environment Systems Ltd illustrates.

We use all of this to help us to determine what areas in our small islands provide the most value and should be given long-term protection. The genetic work will help to inform reforestation-activities and guide landowners in the BVI as to what species to protect and value. This is in a context where approximately 90% of land in the BVI is privately owned.

There are still outstanding taxonomic questions to address, along with several species which would benefit from conservation genetic studies.

In summing up, we are using all of this information to help the BVI to make informed decisions for development-planning, climate-change mitigation and biodiversity-protection.

Acknowledgements

We would both like to thank all our colleagues at NPTVI and Kew, both past and present, whose hard work this presentation showcases. In particular, we note those working on current Darwin Plus projects: Dr Cassander Titley O'Neal, Keith Grant, Creightanya Brewley, Dequan Leonard, Glendon Gregg, Chane Smith, Sara Barrios, Dr Juan Viruel, Dr Rosemary Newton, Freya Cornwell-Davison, Elloise Budd, Dr Carolina Tovar, Marcella Corcoran, Dr Felix Forest, Amy Barker, Dr Martin Hamilton and Dr Colin Clubbe. Also thanks to the Darwin Initiative and HSBC for funding much of this work over the past 25 years.

Q&A

Andy Pearce: Thank you very much indeed, Tom and Nancy, for your excellent presentation. Thanks very much for that, and crisp too, keeping us on time. Lovely pictures, you are probably used to it, but when you are sitting here in a rather muggy and grey Kent, the views of the British Virgin Islands are really lovely.

Jodey Peyton: A really lovely talk, and really inspiring to see what a long-term collaboration can bring. Thank you for that. Some of the excellent work on BVI being discussed is at:

https://www.kew.org/science/our-science/projects/tropical-important-plant-areas-british-virgin-islands

Alison Copeland (from Bermuda): How did you identify your forest types for BVI?

Tom Heller: In an MSc project by Kew MSc student Gaia Caravella, those forest-types were determined directly from the rapid botanic-survey data. We did botanic surveys at 105 different sites across the main islands of BVI and she conducted a cluster-analysis on those and it really quite well identified a number of principal vegetation-types. There were three main clusters that represented coastal vegetation, dune-vegetation, the Caribbean dry forest, and moist or evergreen forest at higher elevations. The results were also able to pick out some sub-types, and reflects what we understood from the ground and previous vegetation mapping work. What we have identified is the next step in directly relating those clusters to the botanic survey-data and vegetation-mapping which has been done, a lot of it based on remote-sensing data.

Katie Medcalf (Environment Systems): Tom, do these amazing genetic techniques give any insight on what has been historically present, Thinking back through the huge land-use changes on the islands through the last 3-400 years?

Tom Heller: That is a really interesting question. There have definitely been some interesting insights from the population-genetic work. So, for example, Martin Hamilton's work on *Veronia rupicola* which, in the Virgin Islands, is found only on Anegada, but is also found in dry areas of Puerto Rico. At one time when sea-levels were much lower, Puerto Rico and the Virgin Islands were connected as one land-mass and the population genetics reflects that history. My own work on the St Thomas Prickly Ash, which I am in the middle of writing up at the moment, I think has been quite interesting in that it is a species that is very rare in the Virgin Islands, restricted to very small patches of good-quality forest and has much higher levels of genetic diversity than you might otherwise expect. My thinking is that a lot of those trees are quite long-lived and pre-date a lot of the habitat-change that has occurred in the Virgin Islands, so in some ways represent a genetic debt; they are the repository of really important genetic diversity. If we do not take action to conserve them, we will lose that genetic diversity quite quickly.

Katie Medcalf: That's really interesting; thanks Tom.

Graham Makepeace-Warne (Manx WT): Can genetic data give any clues to bio-abundance?

Tom Heller: If you mean in terms of abundance rarity, or abundantly particular species, I don't know; it is not something I have done myself. I know lots of people are working on eDNA, particularly in the marine environment; this is not something of which I have particular experience. The aim of the population-genetics work we are doing, the phylogenetic diversity, is to be able to identify which species contribute most to phylogenetic diversity, so whether particular species represent particularly distinct lineages. We do a lot of work to prioritise species on threat-status and their rarity and their function in the ecosystem phylogenetic diversity as an extra element of how evolutionary important or how evolutionary unique they are.

Jodey Peyton: It is a fascinating topic. Thinking around the neighbouring islands, and the links especially with the US Virgin Islands, do you get to work much with the US Virgin Islands, either of you?

Nancy Pascoe: Yes, we do have good connections with our colleagues in the US Virgin Islands and Puerto Rico. Through many of our projects over the years, we have tried to integrate more. As Tom just said, the Puerto Rico Bank includes the US and British Virgin Islands and Puerto Rico, so it is natural that we should all want to collaborate. Things that might be abundant on Anegada are quite rare in Puerto Rico. So understanding, particularly when you are doing Red-List assessments, you really need to understand that. In practice and field-work that is coming up, with Kew coming here in November, there is a plan to take a trip over to the US Virgin Islands. They have different geographical and political restrictions, especially if they are federal workers, so there are some complications of working but we plan ahead. US Fish and Wildlife are always keen and interested, and an amazing resource that are helping to build capacity in our organisation too. The one thing we want to say with all this work and our relationship with Kew, is it's always been very high priority to build capacity amongst our staff. I know Jodey met one of our staff at Kew when she was recently there, and we have just got another staff-member there. Through the *People and Skills* Darwin grant we just managed to get, we are going to be training a lot of our staff by sending them to Kew. The relationship is really important because it is not just Kew coming here doing work for us; it's with us, and that's really important, and that is why we have had such a great long-standing relationship.

Tom Heller: I don't think I have acknowledged Colin Clubbe's role in all of this. Obviously his work, right from the beginning of the relationship with Kew and the National Parks Trust, is really key to that. He is still there and working with the team and supporting us.

Jodey Peyton: I think lots of people owe lots of thanks to Colin, who does an amazing job and is an incredible advocate.

Roland Lines: Can image-analysis of site-photographs be used to complement rapid site-surveys?

Tom Heller (to Nancy Pascoe)**:** One of the really interesting ones is the example you were highlighting on Tobago; so you have got photos of visits you've made before Hurricane Irma. Over time, those have been really informative, haven't they?

Nancy Pascoe: Yes: time-sequences of images on that particular site where we are doing invasive-species removal, I have been at the Trust for 27 years, so I've got photos over a 27-year period. Also, Tom, from the rapid botanic surveys we are doing, we have hundreds if not thousands of photos. We took a picture of every single plant-species that was documented. And then what also helped was an inventory identification-guide. So we definitely have great photos. Being able to manage and identify the species, which is again where our colleagues in Puerto Rico have really helped us because they have a lot more experience with the moist tropical forest and they have been a great resource in helping with identification of species that we might not have known in the field.

Catherine Wensink: Do you use iNaturalist Nancy?

Nancy Pascoe: No, I don't tend to use iNaturalist. I don't need to because I have WhatsApp chat with Kew and my Puerto Rico colleagues. So, in real time, I could be out in the field and if I don't know what something is I can post the picture and literally within 5 minutes, once I have a good connection, either one of our botanists in Puerto Rico or somebody from Kew, depending on the time difference, has helped identify it. So I don't need iNaturalist. I've got iKew!

Tom Heller: We get very competitive, so there is usually a rush of who can come in with the answer first.

Jodey Peyton: Thank you very much, everbody, and thank you for the great questions in the chat as well.

Updated population estimates for the Endangered Northern Rockhopper Penguin *Eudyptes moseleyi* at Tristan da Cunha in the South Atlantic

Antje Steinfurth (RSPB) *et al.*

Antje Steinfurth

Steinfurth, A., Sherley, R.B., Glass, T., Bell, C., Dilley, B.J., Davies, D., Johaadien, R., Le Bouard, F., Nydegger, M., Ratcliffe, N., Bourgeouis, K., Bradley, J., Cleeland, J., Daling, R., Dromzee, S., Dyer, B., Ferreira, C., Fox, C., Glass, S., Green, I., Green, K,, Green, M., Jones, C.W., Kinchin-Smith, D., Kuntz, W., Lawrence, K., Louw, H., McClelland, G., Parker, G.C., Perold, V., Risi, M.M., Repetto, J., Repetto, R., Rexer-Huber, K., Schofield, A., Stevens, K.L., Swain, G., Taylor, C., Visser, P., Whitehead, O., Whittle, A., Witcutt, E., Cuthbert, R., Robson, B., Ryan, P.G. & Bond, A.L. 2025. Updated population estimates for the Endangered Northern Rockhopper Penguin *Eudyptes moseleyi* at Tristan da Cunha in the South Atlantic. pp 165-169 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

Tristan da Cunha, in the central South Atlantic, is a globally important breeding site for the Endangered Northern Rockhopper Penguin *Eudyptes moseleyi*, supporting most of the global population. However, the lack of recent breeding-pair estimates for the South Atlantic population has hindered reassessment of the species' conservation status.

Using hierarchical state-space modelling of counts from Gough Island (since 2008) and the Tristan da Cunha archipelago (since 2010), our initial analysis suggest 295,400 breeding pairs (95% CI: 293,830–296,970), representing ~96% of the global population, with Middle Island holding the largest population (97,000; 95% CI: 96,790–97,300), followed by Gough (88,400; 95% CI: 87,620–89,180), Inaccessible (73,400), Nightingale (28,600; 95% CI: 28,300–28,900), and Tristan (8,000). A reliable trend could be calculated only for Gough Island, where monitored colonies indicate an increase of ~6% per year between 2008 and 2020.

Previous counts may have underestimated true population sizes, and comparisons should be made cautiously given methodological differences. Nevertheless, major changes in population-size would probably have been detectable. While our preliminary results do not indicate strong evidence for substantial shifts in breeding-pair numbers, we recommend that these estimates are considered as an updated assessment of the current South Atlantic breeding population, rather than direct evidence of change from earlier counts.

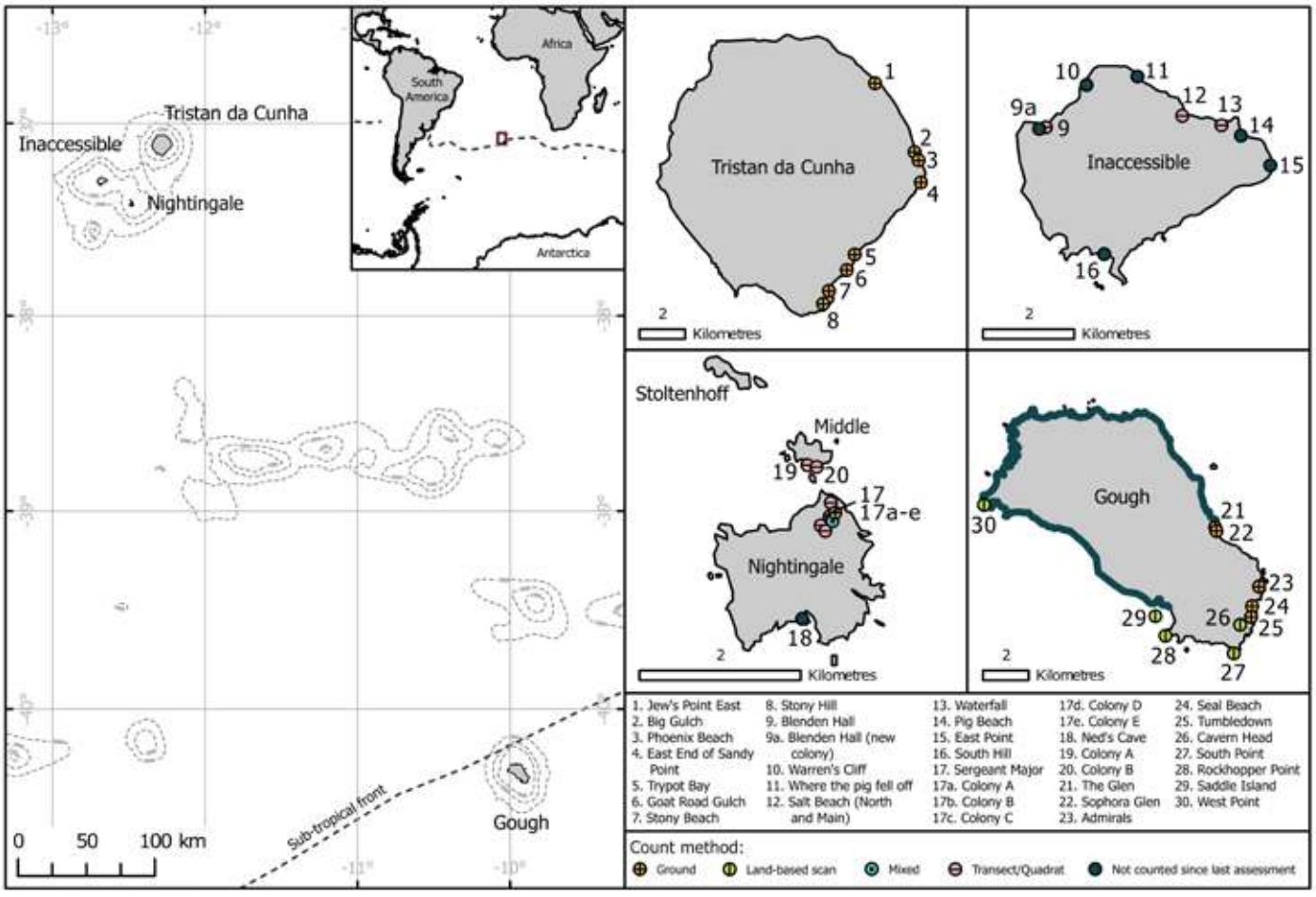
Our study emphasises the need for pragmatic monitoring protocols and highlights the importance of survey-timing for a highly synchronised breeding species. We recommend continuing monitoring through annual censuses of a subset of selected breeding colonies to track population trends, complemented by comprehensive island-wide censuses every ten years to ensure that changes observed at annually monitored colonies are representative of the regional population. This approach will provide a robust framework for future conservation assessments, including the IUCN Red List re-evaluation.

Antje Steinfurth[1,2], Richard B. Sherley[3,4], Trevor Glass[5], Chris Bell[1], Ben J Dilley[2], Delia Davies[2], Rukaya Johaadien[2], Fabrice Le Bouard[1], Mara Nydegger[1], Norman Ratcliffe[6], Karen Bourgeouis[1], Jan Bradley[1], Jaimie Cleeland[1,6], Roelf Daling[1], Sylvain Dromzee[1], Bruce Dyer[7], Carmen Ferreira[1], Derren Fox[1], Simon Glass[5], Ivan Green[5], Kirsty Green[5], Matthew Green[5], Christopher W. Jones[1], David Kinchin-Smith[1], Werner Kuntz[1], Kate Lawrence[1], Henk Louw[1], Greg McClelland[1], Graham C. Parker[1,8], Vonica Perold[1], Michelle M. Risi[1], Julian Repetto[5], Riaan Repetto[5], Kalinka Rexer-

Huber[1,8], Andy Schofield[1], Kim L. Stevens[1,2], George Swain[5], Chris Taylor[1], Paul Visser[1], Otto Whitehead[2], Alex Whittle[1], Emma Witcutt[1], Richard Cuthbert[1,9], Brad Robson[1], Peter G. Ryan[2], Alexander L. Bond[1,10] (1 RSPB Centre for Conservation Science, David Attenborough Building, Pembroke Street, Cambridge, CB2 3QZ, UK; 2 FitzPatrick Institute of African Ornithology, University of Cape Town, Rondebosch 7700, South Africa; 3 Environment and Sustainability Institute/Centre for Ecology and Conservation, University of Exeter, Penryn, TR10 9FE, UK; 4 Department of Biodiversity and Conservation Biology, University of the Western Cape, Bellville 7535, South Africa; 5 Tristan Conservation Department, Edinburgh of the Seven Seas, Tristan da Cunha, TDCU 1ZZ, South Atlantic; 6 British Antarctic Survey, High Cross, Madingley Road, Cambridge, CB3 0ET, UK; 7 Department of Environment, Forestry and Fisheries, PO Box 52126, Cape Town 8000, South Africa; 8 Parker Conservation, Karitane, New Zealand; 9 World Land Trust, Blyth House, Bridge Street, Halesworth, IP19 8AB, UK; 10 Bird Group, The Natural History Museum, Tring, HP23 6AP, UK)

The Northern Rockhopper Penguin *Eudyptes moseleyi* is the most northerly breeding species, restricted to just seven islands between 37°S and 40°S: five in the Tristan da Cunha group in the central South Atlantic, and Iles Saint-Paul and Amsterdam in the southern Indian Ocean (BirdLife International 2020). Despite the remoteness of these islands, numbers declined by over 90% between the late 19th and early 20th centuries, including a decline of over 50% in the Atlantic population between 1975 and 2005 (Cuthbert *et al*. 2009), prompting the species' IUCN Endangered status in 2008 (BirdLife International 2020).

Overall, the global population is thought to be in continued decline due to the species' restricted breeding range and vulnerability to multiple and ever-increasing threats, both terrestrial and marine (BirdLife International 2020). These include shifts in oceanographic conditions (Guinard *et al*. 1998; Green *et al*. 2023), as well as island-specific pressures such as disease outbreaks (Jaeger *et al*. 2018; Barbraud *et al*. 2021), habitat degradation (Lesage *et al*. 2024), chronic and catastrophic oil pollution (Ruoppolo *et al*. 2013), and competition or predation from the expanding Subantarctic Fur-seal *Arctocephalus tropicalis* population in the South Atlantic (Bester *et al*. 2019, 2020). The magnitude and mechanisms of these impacts, however, remain poorly quantified and uncertainty over current population numbers in the South



Northern Rockhopper Penguin breeding sites in the South Atlantic

Northern Rockhopper Penguins are rated as Endangered by IUCN.

Above: Rockhopper breeding site in the open
Below: Rockhoppers breeding in tussock

Atlantic hinders reassessment of the species' IUCN Red-List status and hampers evaluation of conservation-effectiveness.

To address this issue, our study aimed to update population estimates and, where possible, provide trends at the Northern Rockhopper Penguin's South Atlantic breeding sites. We compare our results with the most recent published estimates from the Tristan da Cunha group (Cuthbert *et al*. 2009; Robson *et al*. 2011) to evaluate potential changes in population-size, review the census-methods, and provide recommendations to strengthen future monitoring protocols, ensuring improved tracking of this globally threatened species.

The UK Overseas Territory of Tristan da Cunha comprises the Tristan da Cunha archipelago and Gough Island, approximately 380 km south-southeast. Northern Rockhopper Penguins breed at five islands: the three main islands of Tristan da Cunha, Inaccessible, and Nightingale, along with its satellite islet Middle, as well as at Gough Island, the only breeding site for this species south of the sub-Tropical front.

Like all *Eudyptes* penguins, Northern Rockhopper Penguins are highly synchronous breeders with defined parental shifts. In the northern islands, they return to their breeding sites in late July–early August; eggs are laid in September and incubated for 32–34 days. Chicks hatch from mid-October and fledge from the end of December. On Gough Island, breeding is later by 3-4 weeks, with eggs laid in October and chicks fledging in January-February (Cuthbert 2013).

How to count a penguin?

Survey methods are chosen for each site according to colony extent, habitat and topography. Regardless of count-method, the timing of surveys is of the essence and aims to coincide with peak egg-laying when breeding pairs can be counted at defined nest-sites, eggs have been laid and ideally only a minimum of nests has failed (i.e. at the end of September in the northern islands and in the second half of October on Gough Island; Cuthbert 2013).

Penguins on Gough and Tristan breed along the islands' rocky shores. Here, total ground-counts of breeding pairs are conducted on foot by walking slowly through or along the perimeter of the colony and recording all active nests, carefully checking around boulders, in crevices and among dense vegetation.

For colonies that are inaccessible from land, and with no suitable landing sites from the sea, for example Rockhopper Point on Gough Island, scan counts are conducted from a vantage point with two observers independently tallying breeding birds using binoculars and click-counters. Since 2014, the colony at Rockhopper Point on Gough has been photographed from the same vantage point to produce high-resolution images. Incubating birds are then counted using the software iTag (Viquerat 2015). In both methods, only "apparently-incubating" birds, those tightly sitting in a posture indicative of incubation, are included.

Penguins on Nightingale, Middle (or Alex) and Inaccessible breed in dense, 2 m-high *Spartina arundinacea* tussock grass, which dominates most of these islands and prevents colony ground-counts. The number of breeding pairs for each sub-colony is estimated from the colony-area and mean nest-density. Nest-density (nests m^{-2}) is derived from transect-counts, in which observers walk slowly along a rope and record all active nests with >50% of the nest-bowl within 1 m either side of the transect line.

To produce robust population-estimates, we summarised colony-counts since their last published assessments, i.e. post-2006 for Gough, and after 2009 for the northern islands (Cuthbert *et al.* 2009; Robson *et al*. 2011) and accounted for several factors that could influence the

availability and detectability of nests during surveys, including breeding phenology, daily nest-survival, survey-date, and count-method (accuracy and precision).

Once island-counts had been processed and yielded a single year of new population-estimates (Tristan and Inaccessible), the adjusted population count (N̂) was used to generate the estimate for the respective island. For islands with time-series of population-estimates (Nightingale, Middle and Gough), we applied hierarchical state-space models (SSM), following Velevski *et al*. (2015).

Despite standardised survey-protocols, the review of the database revealed that data for some colonies or entire years were often missing, or of poor quality, due to surveys being cancelled or conducted too late in the breeding season, sometimes as late as the crèche stage. For a highly synchronous breeder, such as the Northern Rockhopper Penguin, late surveys introduce substantial uncertainty, as the proportion of active nests declines as the season progresses (Williams & Stone 1981).

While there is still some fine tuning to the analysis to be done, our initial analysis suggest 295,400 breeding pairs (95% CI: 293,830–296,970) for the South Atlantic, representing ~96% of the global population, with Middle Island holding the largest population (97,000; 95% CI: 96,790–97,300), followed by Gough (88,400; 95% CI: 87,620–89,180), Inaccessible (73,400), Nightingale (28,600; 95% CI: 28,300–28,900), and Tristan (8,000). A reliable trend could be calculated only for Gough Island, where monitored colonies indicate an increase of about 6% per year between 2008 and 2020.

Although our preliminary results do not suggest a substantial change in breeding-pair numbers in the South Atlantic population, comparisons with previous estimates (Cuthbert *et al*. 2009; Robson *et al*. 2011) should be approached with caution due to key methodological differences. We therefore recommend that our population-estimates be interpreted as a reassessment of the current South Atlantic breeding population, rather than as direct evidence of changes relative to previous counts.

Conclusion

Our study emphasises the need for pragmatic monitoring protocols and the importance of survey-timing for accurate population-counts of a highly synchronised breeding species. To achieve this, surveys must be fit-for-purpose, i.e. appropriately designed and achievable with the resources and capacities available. Without consideration of purpose (what are we monitoring; why are we monitoring it; do we want population estimates and/or trends) and technical details (methods, sample-sizes, spatial distribution of monitoring points), monitoring is ineffective, and time and resources will be wasted. Incorrect conclusions could lead to misplaced priorities in the species' conservation, in the assessment of the species' conservation status, or in the effectiveness of actions, potentially leading to misallocation of resources and interventions.

As these are globally important breeding sites for the Northern Rockhopper Penguin, we recommend the continuation of a monitoring programme but, instead of aiming to achieve island-wide counts on an annual basis, annual efforts should focus on a subset of selected breeding colonies to track population-trends, complemented by comprehensive island-wide censuses every ten years to ensure that changes observed at annually monitored colonies are representative of the regional population.

This annual-plus-10-yearly approach will provide a robust framework that will contribute to the identification of regional and global conservation-priorities for this species and provides information necessary for its IUCN Red-List re-evaluation.

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Q&A (addressed by **Dr Harry Marshall**)

Andy Pearce: Thank you very much, Antje, I thought it was a fascinating presentation. Very encouraging to see those numbers, with all the caveats you rightly gave.

Jodey Peyton: Thank you from me for the pictures lovely baby penguins. I know it's not very scientific but very sweet.

Laure Cugnière: Have you noticed any shifts in breeding timing? Have you tried thermal drones for counts in inaccessible areas?

Harry Marshall: Antje is currently on the ship coming back from Gough, so unfortunately could not be with us. I will try to answer as best I can. As far as I am aware, we have not noticed any significant shift in breeding timing – with the caveat that I am not Antje. But, as she pointed out, the surveys are inevitably a little bit patchy and, when they are in very inaccessible places, getting there at the right time is always quite difficult. That is not something that has come out but I am not sure that would necessarily be picked up. I am not confident at the moment, given the differences in timing of these surveys. Thermal drones: a great idea. Getting to some of these places is hard, so that is definitely a technique to look into; it's a technique that our group in general is currently working on with the St Helena National Trust on seabirds. It is definitely something that we can potentially look at expanding to Tristan. But obviously particularly inaccessible areas take a long time to get to. So it is a question of making that work.

Dr Harry Marshall

Laure Cugnière: Thanks, Harry

Jodey Peyton: Thank you very much. A great talk. I think Laure has a talk later on which would be alluding to that kind of work; so that might be interesting for you Harry.

iRecord St Helena: a community-platform for biodiversity-knowledge empowering conservation-action and decision-making

Selene Gough & Rebecca Cairns-Wicks (St Helena Research Institute)

Selene Gough

Rebecca Cairns-Wicks

Gough, S. & Cairns-Wicks, R. 2025. iRecord St Helena: a community-platform for biodiversity-knowledge empowering conservation-action and decision-making. pp 170-176 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

As a free, locally-managed online platform, iRecord St Helena empowers citizens, researchers, and conservationists to contribute and access biological records that support evidence-based decision-making.
This presentation highlights the outcomes of Darwin Plus Local project DPL00090, which focused on strengthening bird conservation science by collating, validating, and mobilising historic seabird datasets. In partnership with the St Helena National Trust and the RSPB, the project delivered hands-on training in data management and monitoring, processed over 40,000 historical records; developed a governance framework, and applied FAIR data principles to support strategic conservation planning.
As the island prepares for fibre-optic broadband, iRecord St Helena is laying the digital foundation for national biological recording, enhancing local capacity, ecosystem monitoring, and cross-territory collaboration.
The talk will reflect on system-development, impact to date, community-engagement, and future directions.

Selene Gough & Rebecca Cairns-Wicks, St Helena Research Institute

Hello everyone. Firstly, I would like to introduce myself. I am Selene, the Data Manager at the St Helena Research Institute, I run the St Helena Biological Records System, known as iRecord St Helena.

iRecord St Helena is what's called a clonal system of iRecord UK. In simple terms, that means we have taken the existing iRecord platform and created a local copy, or clone, that runs independently for St Helena.

It uses the same open-source software and structure as the UK system, but we can customise it for our own needs: our species-lists, our data-governance rules, and our local forms.

iRecord UK is operated by the Biological Records Centre as part of the UK Centre for Ecology & Hydrology.

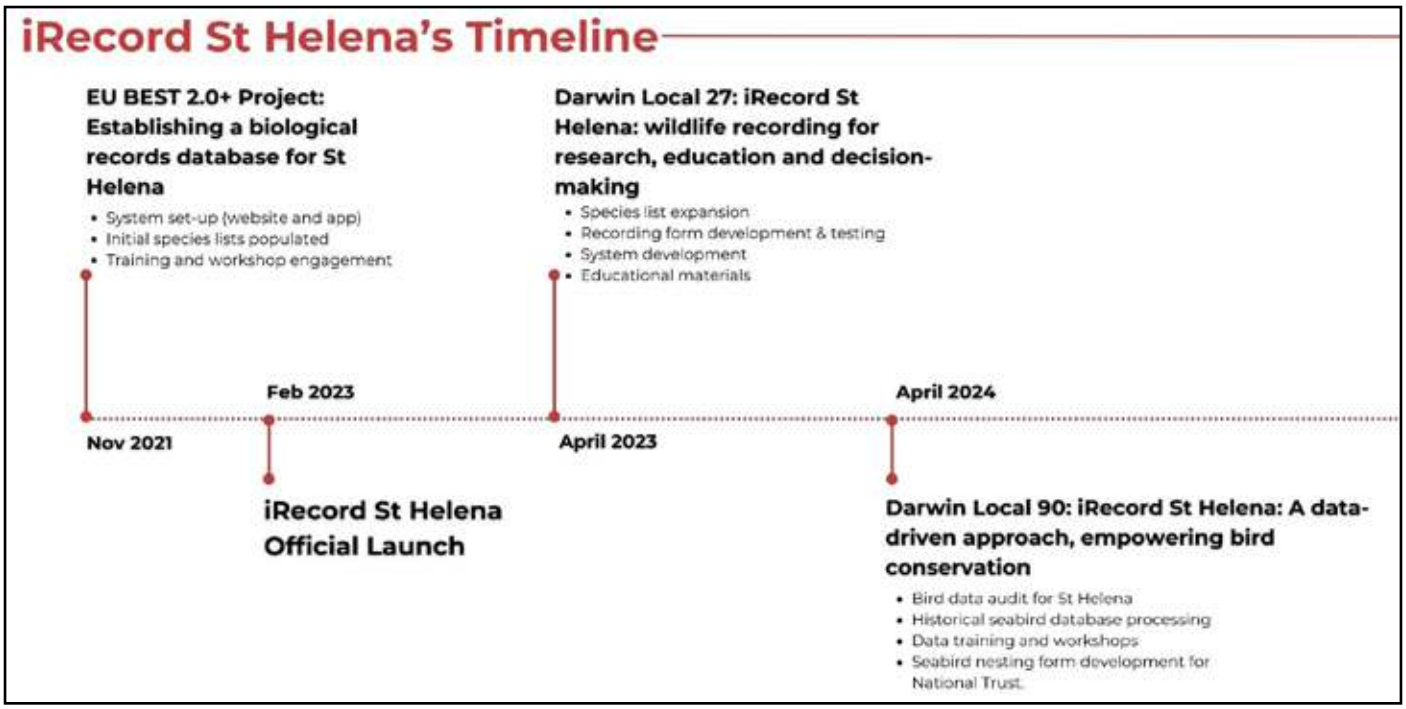
It is a digital platform designed to support the collection, management and sharing of biological records related to St Helena's unique wildlife.

Accessible via a website, mobile app, and customisable recording forms, iRecord St Helena enables a wide range of users, from scientists and conservationists to nature enthusiasts and the local community to log wildlife sightings in a structured, verifiable way.

The core aim is to build a comprehensive, accessible biodiversity-database that can inform and support targeted conservation-actions and support long-term environmental sustainability.

But beyond conservation, iRecord is also evolving into a tool for education and learning, providing opportunities for students, teachers, and the wider community to engage with nature, build data-literacy, and develop a deeper understanding of local biodiversity through hands-on involvement.

The journey of iRecord St Helena began with funding from the EU BEST 2.0+ project, which laid the groundwork for the platform and involved setting up the online database, the web-portal, and the mobile app.



By February 2023, iRecord St Helena was launched officially.

Following this, we moved into Darwin Local 27. This phase built upon the foundation set by the BEST 2.0+ project, enabling us to expand significantly our species-lists. In addition, we developed and trialled recording-form technology.

In April 2024, we started Darwin Local 90, a collaboration with the Royal Society for the Protection of Birds (RSPB) and the St Helena National Trust, which had a focus on seabird-data.

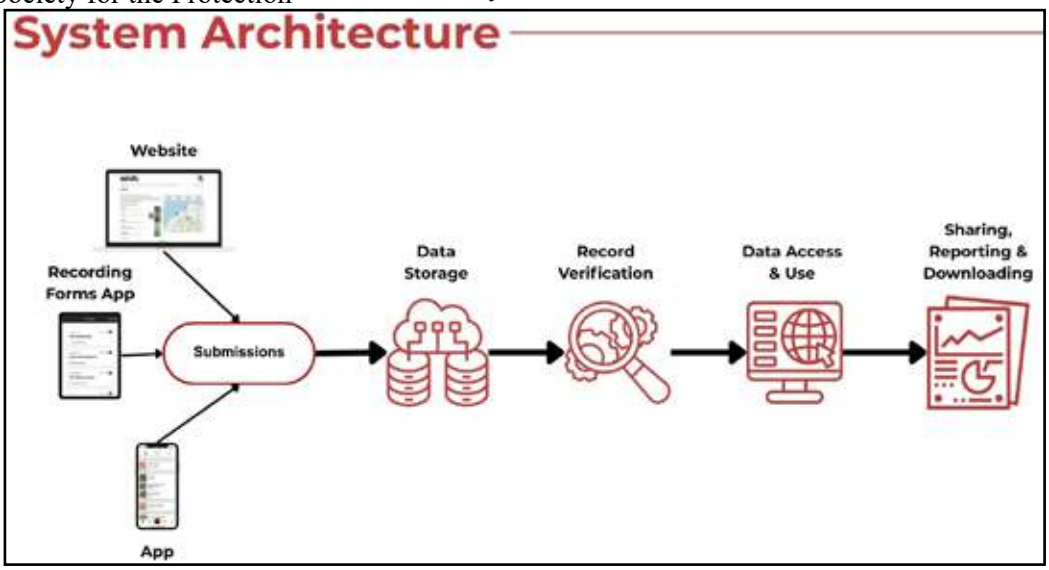
iRecord St Helena aims to address several barriers and challenges the island faces when managing biodiversity-data. One of the main ways it does this is by providing a centralised database, which reduces the number of fragmented datasets. By bringing data together into a larger, shared pool, the information becomes more useful, more reliable, and easier to manage.

The system is also highly accessible. It can be reached globally via the website, while the mobile app allows anyone, including members of the public, to submit their sightings. The recording form provides a streamlined way of capturing survey-data in the field, making it quicker and simpler to log records as they happen.

iRecord St Helena has been built using Indicia, an open-source toolkit designed for biological recording. At its heart is a spatially enabled, relational data-warehouse, which supports secure storage, standardisation, rapid data-entry, and -reporting. All iRecord data are held in an Indicia warehouse hosted by UKCEH, on behalf of the wider recording community.

The system offers also basic validation checks, ensuring that the records submitted form a reliable foundation for biodiversity-datasets.

Altogether, iRecord St Helena provides a trusted and effective tool to support evidence-based decision-making, helping to strengthen how we monitor and manage biodiversity-data on the island.



The diagram at the bottom of the previous page gives an overview of the flow of data through iRecord St Helena.

It all starts with data-entry, which can be done via the website, mobile app, or through specific recording forms. These entries can be made by individuals, community-groups, or organisations, depending on the platform.

Once submitted, the data are uploaded into the iRecord St Helena database and stored. From there, the data are then available for verification by expert volunteers.

Both verified and unverified records are accessible for use, but verified records carry more scientific reliability. Data can be accessed by organisations, the public, citizen-scientists, and the owners of the recording forms. The public has access to all open-license public records, while recorders can download, analyse, and publish all of their own data.

One of our goals is to connect iRecord St Helena with other international biodiversity platforms, such as iNaturalist and the Global Biodiversity Information Facility. By linking these systems, we can put St Helena's biodiversity more firmly 'on the map', ensuring our data are visible, discoverable, and part of the global biodiversity knowledge-base.

This means also that we can capture records that are submitted on other platforms, and share ours more widely.

Key features of iRecord St Helena

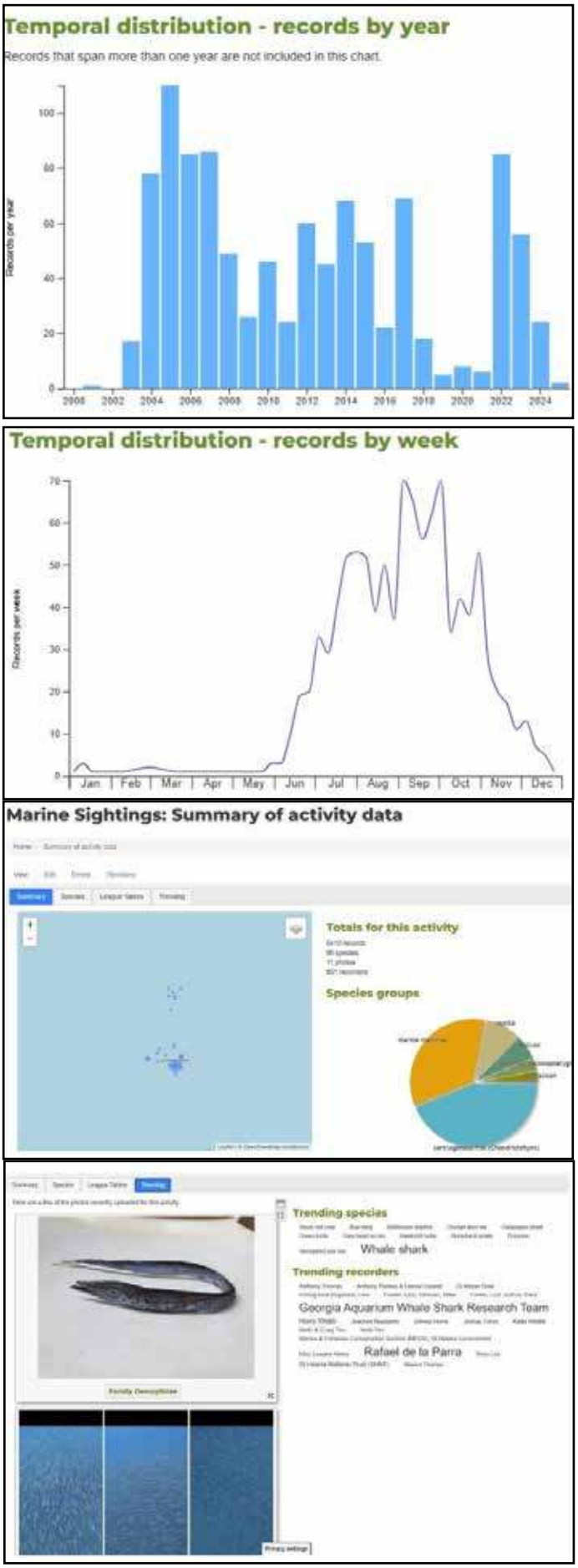
Now I would like to talk further about the key features of iRecord St Helena.

The iRecord St Helena website is a central hub for recording, managing and accessing biodiversity-data. It is designed to support everyone who uses the system.

Its flexibility caters to different recording needs and allows for more complex data-entry compared to the mobile app. Including the ability to import larger datasets from csv files or Excel sheets.

The website offers tools for custom made filters and mapping layers to allow users to get the most of their data and also explore other biodiversity data submitted to the database.

The website includes other interactive tools.



Examples of other website tools. The top two take Humpback Whale Megaptera novaeangliae *as an example.*

Firstly, integrated species insights, a tool that allow users to explore trends in the data. These tools provide the opportunity to gain insight quickly in species abundance and distribution over time, based on the data submitted into the system. In this particular example, one can see temporal distribution data for the Humpback Whale *(previous page)*. This summary shows the number of sightings over different periods, providing a snapshot of how frequently this species has been recorded.

Another feature includes the activities tab. These are custom-made groups which can be tailored to include records of interest such as: particular species, geographic regions, dates, record-quality and even source, such as records only submitted via the app.

These types of activities can be made by the public, but also private groups. They are great tools for seeing citizen-science insights, such as top recorders, top species recorded and temporal information of when species were first and most recently recorded.

The filters tool on the website offers a flexible and easy way to manage the type of information one is interested in viewing on iRecord St Helena.

Filters can be created depending on species, geographic areas, date, recorders, record verification status and even the source of the record.

Since setting up iRecord St Helena, our next focus has been verification, making sure that the records coming into the system are accurate and reliable.

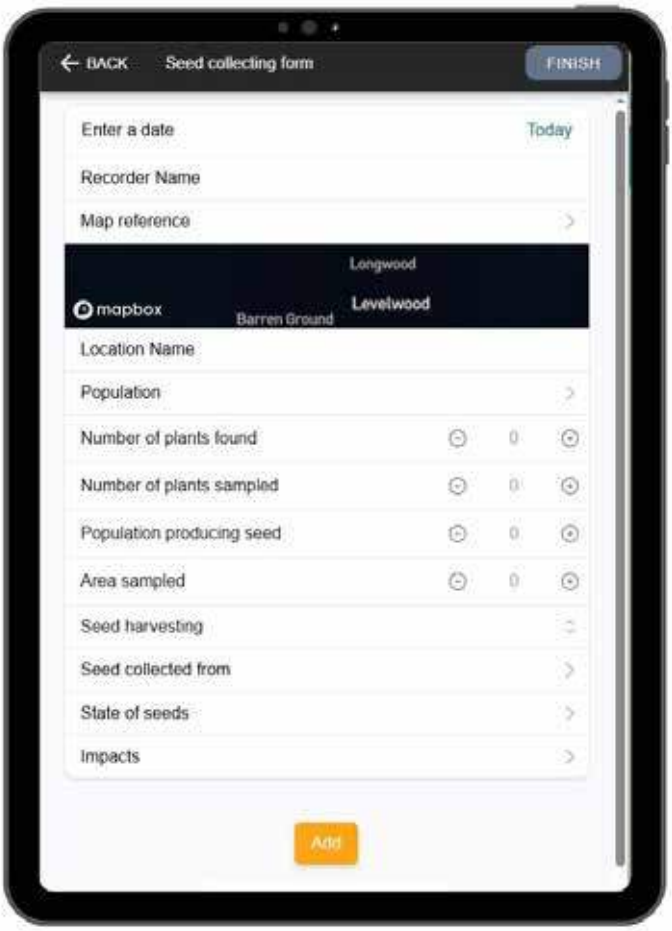
Verification is carried out by volunteer experts, who review records within their specialist groups. They assign each record a status from a standard set of terms, for example, whether it is accepted, needs more evidence, or is not accepted, and note the basis for that decision.

This process is vital, because high-quality, verified data are what makes our records truly useful for research, policy and conservation.

Recently we hosted our first demonstration session with local invertebrate experts from the St Helena National Trust, and we are excited to expand training opportunities to other volunteer verifiers very soon.

The mobile app is designed to be user-friendly and accessible.

The simplified recording process allows users to navigate easily through a simple form to log their sightings. The app prompts them to fill in essential details needed to capture a meaningful record, including features like capturing the location of each sighting using the device's GPS. Users can record sightings even when they do not have internet access and the photo-upload feature allows users to attach images to their records, which is a key part of the verification process and increases the likelihood that citizen-science records can be used for further analysis and research.



The recording form app is a relatively new and developing technology, which we are testing actively with organisations/data collectors.

The recording form provides data-collectors with the option to collect detailed and tailor-made data to meet their surveying needs.

Forms offer a flexible alternative to paper-based recording, allowing data to be collected offline in the field, as well as map-referencing using devices' built-in GPS, and the option for photographs to be collected. Survey-form administrators can then review and export the data submitted using their form on the iRecord St Helena website.

Empowering conservation

How does iRecord St Helena empower conservation?

The DPL00090 I mentioned earlier in this presentation was a collaborative effort with our project-partners, RSPB and St Helena National Trust.

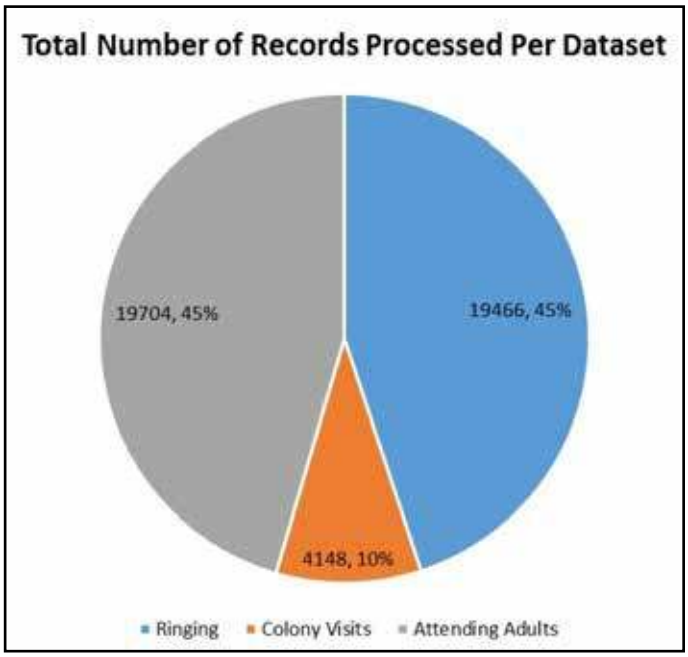
This project represents a vital component of the iRecord St Helena initiative, aiming to improve how bird-data on St Helena are collected, accessed, and utilised to support conservation efforts.

Some of the key project outputs and activities included:

- Developing a sensitive species-list to protect species being published online and ensuring appropriate data-sharing;
- Through governance and policy-development, we have a strengthened institutional understanding of

data-management best practices;

- Hosted a 2-week training and capacity-building workshop led by RSPB partners Luba Meshkova and Harry Marshall and which focused on scientific field-methods, data-analysis and management and upskilling both government and ngo staff;
- And, finally, a large part of the work focused on processing a historic legacy seabird access database from the Marine Department of SHG. The pie-chart on the screen shows the breakdown of the access database and how many records in total we processed during the project



One of the most exciting aspects of iRecord St Helena is its ability to engage a wide range of people in biological recording. The platform is designed to be user-friendly. By offering both mobile- and web-based tools, we have made it easy for anyone to contribute.

To support this, we run demonstration sessions with groups like tour-guides, conservationists and the wider community. These sessions not only teach people how to use the system but also show them how their contributions make a real difference.

What's more, we actively recognise and celebrate our recorders. Through newsletters and spotlights, we share their contributions, keeping the community connected.

Supporting data-providers and collaborating with local

experts are central to the success of iRecord St Helena. Since the inception of the BEST 2.0+ project, we have held numerous workshops to engage with researchers, conservation groups and experts. These sessions have been tailored to meet different needs, from small, focused groups to larger sessions, allowing us to share knowledge and gain user-feedback.

Supporting data-providers is a key part of our work, and we have been fortunate to collaborate with organisations like the Environmental Management Division and the St Helena National Trust. These groups are regularly out in the field collecting large volumes of data, and our role is to ensure they have the tools and knowledge to do this effectively when using iRecord St Helena.

An aspect of a continuously developing system requires feedback from these partners. For example, we are collaborating on the development of specialised recording forms, like the Seed Collection Form, which will be used to monitor and manage data from the Environmental Management Division's seed-collection efforts.

This kind of collaboration ensures that iRecord St Helena can evolve to meet the unique needs of conservation-work on St Helena while supporting long-term biodiversity-monitoring.

Since completing DPL00090, we have moved on to strengthen the foundation of iRecord St Helena: our metadata database.

Central to that work is standardisation, and supporting our commitment to making data Findable, Accessible, Interoperable and Reusable.

We have been working with data-experts to create a Darwin-Core-compliant metadata form that captures provenance, licensing and essential dataset descriptors. The form is web-based and designed for data-providers to fill out online; it includes online validation, so metadata are complete.

This makes our datasets easier to search, share and reuse, and ensures the datasets are working to meet international biodiversity-data standards.

iRecord St Helena, and the wider iRecord system, offers three key advantages that are especially powerful in the context of small islands and UK Overseas Territories:

First, it is open-source. This means the platform is cost-effective, customisable and adaptable to local priorities without reliance on commercial vendors. Importantly, because it is open-source, any investment made in developing the platform, such as new features or recording forms, can potentially benefit other UK Overseas Territories as well. This makes iRecord not just a local tool, but potentially a shared infrastructure across the UKOT's.

Secondly, it is centralised. Instead of biodiversity-data being scattered across spreadsheets, reports, and separate systems, iRecord brings it together, ensuring that

decision-makers, researchers and the community are all working from the same, high-quality information. As well as empowering data-owners to make the most out of their datasets.

And third, it is accessible. Whether you're a conservation-professional, a citizen-scientist, or a student, iRecord is designed to be easy to use, with mobile tools, offline support, and interfaces that encourage inclusive engagement.

Together, I believe these pillars make iRecord a powerful tool for supporting conservation and environmental resilience in the unique settings of the UKOTs.

As I conclude this presentation I would like to thank our funders, partners and collaborators.

If you are interested in subscribing to the iRecord St Helena quarterly newsletter, please scan the QR code.

And finally, if you are interested in supporting iRecord St Helena as a voluntary verifier, please contact us. Let us know your area of taxonomic expertise and we will explore whether we can accommodate you and whether there is a need in that group.

Q&A

Andy Pearce: Thank you very much, Selene: another very fascinating talk. iRecord St Helena is clearly a very powerful tool. I understand from Mike that Rebecca has moved on now from the Research Institute and has been promoted to Chief Minister. So warm congratulations to her. She is a former Council member of UKOTCF. So a powerful conservationist now has political powers. Excellent news.

Jodey Peyton: Congratulations. Selene, on a really excellent presentation. It fits in very well with other talks yesterday, with Quentin talking about GBIF and where data ends up, and how you can access historic data. iRecorder is a really excellent system. I used to work at CEH with iRecorder which is a really nice example of how you can take *ad hoc* records and disparate data-sets and combine them into really useful tools, in managing and accessing data.

Jasper Montana: Have you had much citizen-uptake of iRecorder so far? What strategies do you think work best to promote uptake of apps use by citizen-scientists.

Selene Gough: Well, to start off, the first few years of iRecorder's development has involved mainly the system itself, but also working with automisation of data collected. A lot of our focus has not been with the community but we are working on that now. What we have found works best is directly engaging with people who already know, or are very interested in, the natural environment, like tour-guides, people who are regularly out in the field. I found it is best to approach them and take them out and show them how the system works, and why you should record your sightings; then showing them that, once it has been uploaded, how it makes a difference: showing them the full life-cycle of the data and why it is important that they do that. In terms of younger people, we have found that youth in the communities are very interested in iconic species, like really attractive butterflies, so focussing on a specific species to get them interested in recording works really well as well.

Jodey Peyton: I was thinking as well that another great part of iRecorder is that linking to iNaturalist and the records from those two different platforms for collecting data. I know that iNaturalist is very popular in some parts of the world as a tool for collecting records. It does not have the capability of iRecorder but is another tool for data-collection. Do records that are verified on iNaturalist get re-verified in iRecorder St Helena or does the verification process change depending on where it has come from or how verified it is at its starting point?

Selene Gough: I don't know whether it was clear but I said that it is an aspirational goal for us to get there. So we haven't yet worked that process out, but ultimately I am thinking there will be some differences in the way the systems work. That is ultimately the goal to hook the systems up in a much larger network.

Jodey Peyton: I think working with your verifiers is a

really fantastic way to get engagement both on St Helena and wider. So thank you very much for an excellent talk, a really nice presentation.

Just a note from me: if people are interested in signing up for the iRecord St Helena quarterly newsletter, here's the link: https://forms.gle/iKUQ4pLEGHHFVBQy6.

Safeguarding Tristan da Cunha: Using Areas to be Avoided and Virtual Markers to Protect the World's Most Remote Marine Reserve

Katie McPherson (Head of Compliance and Enforcement, Marine Management Organisation)

Katie McPherson

McPherson, K. 2025. Safeguarding Tristan da Cunha: Using Areas to be Avoided and Virtual Markers to Protect the World's Most Remote Marine Reserve. pp 177-181 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

Tristan da Cunha, the world's most remote inhabited island, lies in the South Atlantic Ocean and is home to the Tristan da Cunha Marine Protection Zone (MPZ)—the largest marine reserve in the Atlantic, established in 2021. Despite its isolation, the island is near key trans-oceanic or transnational shipping routes, making it vulnerable to maritime incidents, including vessel groundings and pollution events such as the *MS Oliva* (2011) and *MFV Geosearcher* (2020).

In 2020, to mitigate these risks, the Tristan da Cunha Government (TdCG), with support from the Blue Belt Programme, designated two voluntary Areas to be Avoided (ATBAs) to improve navigational safety and protect the inshore marine environment by requesting vessels stay 25nm from the islands when on transit.

AIS-based surveillance by the Blue Belt Programme has shown a significant decline in vessel transits within the ATBAs since their designation. Data from 2016 to 2024 indicates a marked reduction in transits, despite stable overall traffic through the MPZ, suggesting deliberate avoidance by vessels. High-risk transits (those within 5nm of the island) trigger communications from TdCG to flag state authorities, promoting voluntary compliance.

To support the ATBAs, a Blue Belt study with the Northern Lighthouse Board recommended installing three physical beacons – two on Tristan da Cunha and one on Gough Island – to broadcast virtual markers. These beacons trigger alerts on the ships' navigation systems to the presence of the island, aiding collision-avoidance. Despite logistical challenges, including COVID-19 and limited transport, two beacons were installed in January 2025 with help from the Tristan community. The third is due for completion this year.

This presentation explores the successful implementation, monitoring, and impact of the ATBAs and virtual markers in safeguarding this ecologically significant maritime zone and protecting the local economy.

Katie McPherson (Head of Compliance and Enforcement, Marine Management Organisation)

The Blue Belt Programme is the UK Government's leading marine conservation initiative supporting its Overseas Territories.

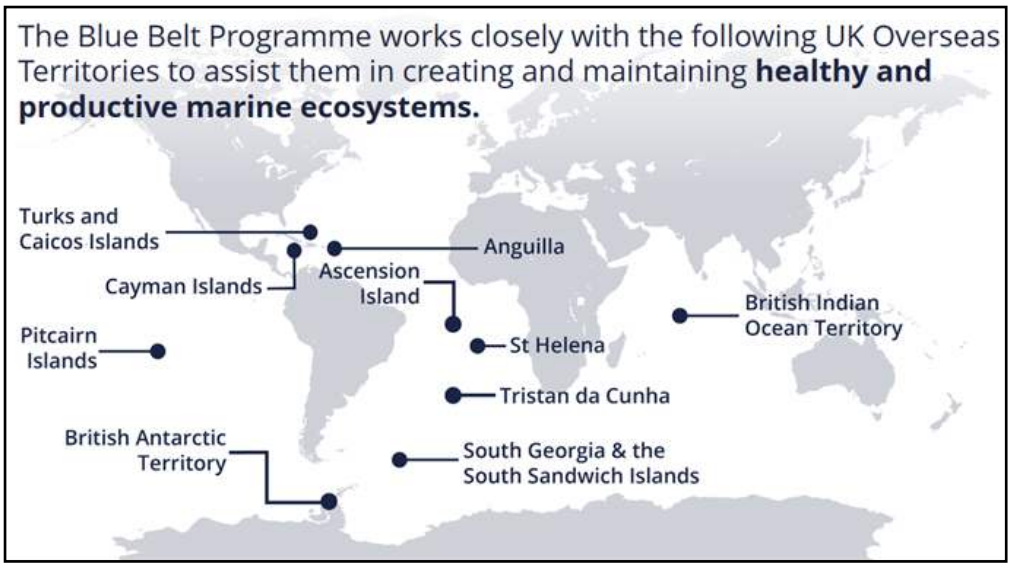
Initiated in 2016, the programme has worked with UK Overseas Territories to support them in protecting and sustainably managing their marine environments.

This underpins the UK Government's commitment to protecting 30% of the world's ocean by 2030, as agreed at the Convention on Biological Diversity.

The Blue Belt programme has been central to the UK Government's ambition of leading action to tackle the serious global problem of biodiversity loss. It provides UKOTs with access to the resources, support and information to protect their unique ecosystems.

90% of the UK's endemic marine biodiversity is found within the UK Overseas Territories.

Together, these Territories are protecting around 4 million square kilometres of marine environment, making it one



of the largest networks of Marine Protected Areas of its kind on the planet.

The Programme has been implemented in eight Territory jurisdictions, covering 10 biologically distinct regions.

The Blue Belt Programme provides a range of support and technical assistance to UKOTs, working across five themes:

- Strengthening governance and management-frameworks;
- Understanding and protecting biodiversity, and building resilience to climate-change;
- Managing human impacts;
- Supporting compliance and enforcement; and
- Capacity-building and ocean-literacy.

Tristan da Cunha is the world's most isolated, permanently inhabited place on earth. It is located in the South Atlantic Ocean and comprised of four main islands. Its Marine Protection Zone (MPZ) covers around 700,000 square kilometres and was designated in 2020 making it the largest marine reserve in the Atlantic. Many species in Tristan's productive waters are endemic and depend on its environment,

The Blue Belt programme has been working with Tristan da Cunha since 2016, providing advice and support in a variety of areas. This includes: improving knowledge of TdC ecosystem, identifying key habitats, species and threats; and then working with the Tristan da Cunha Island Council to inform their marine protection strategy.

We have also provided TdC with a new vessel for inshore biodiversity monitoring and refurbished Tristan da Cunha's exisiting fisheries patrol rib. Further to support this work the Blue Belt programme has provided extensive training to members of the Tristan da Cunha's fisheries department on vessel maintenance and at-sea survival techniques.

The programme has provided additional training in the UK for TdC fisheries department staff on compliance and enforcement, and provided and supported the training of additional scientific observers to monitor fishing operations.

TdC is accessible only via a seven-day sea-voyage from Cape Town, South Africa. Despite its isolation, the island lies near major shipping lanes connecting South America and Asia, with bulk-carriers transporting soya. The island's remoteness does not shield it from the risks posed by trans-oceanic vessel-traffic, which includes potential groundings and pollution events.

Tristan da Cunha has experienced these risks first-hand. In 2011, the *MS Oliva* ran aground, releasing over 800 tonnes of oil and affecting around 20,000 northern rockhopper penguins. These events highlighted the urgent need for protective measures to prevent future disasters. The island's economy and biodiversity are closely tied to the health of its marine environment, making proactive protection essential. These incidents served as a catalyst for the development of voluntary Areas to Be Avoided (ATBAs) to mitigate such risks.

What is an Area to be avoided?

Predetermined shipping routes are nothing new – the practice originated in 1898 for shipping companies operating passenger-ships across the north Atlantic.

Traffic-separation schemes and other ships' routing-systems have been established in most of the major congested, shipping areas of the world, and the number

of collisions and groundings has often been dramatically reduced.

The International Maritime Organisation's responsibility for ships' routing is enshrined in SOLAS chapter V, which recognizes the Organization as the only international body for establishing such systems.

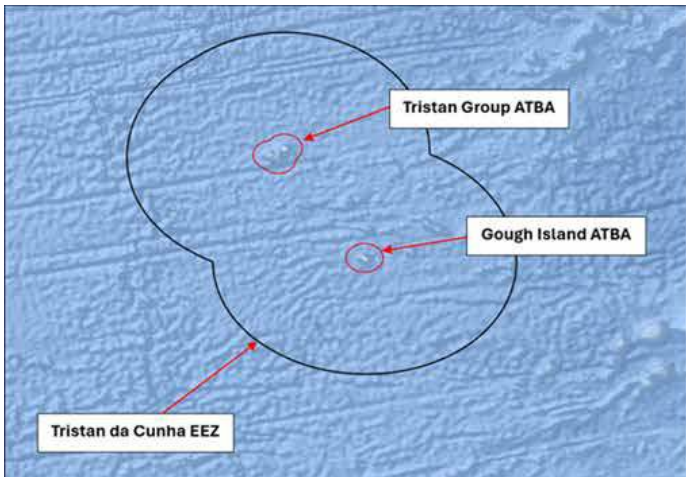
There are many routing measures that can be considered:

- traffic-separation schemes, 2-way routes, recommended tracks, deep-water routes (for the benefit primarily of ships whose ability to manoeuvre is constrained by their draught);
- precautionary areas (where ships should navigate with particular caution); and
- areas to be avoided (for reasons of exceptional danger or especially sensitive ecological and environmental factors).

To establish a new routing system for IMO's adoption, a proposal is submitted to the IMO's Sub-Committee on Navigation, Communications and Search and Rescue (NCSR), which will then evaluate the proposal and make a recommendation regarding its adoption by the Maritime Safety Committee.

To support TdC, the Blue Belt programme assisted in developing an evidence-base for the establishment of an ATBA and the MCA provided technical input. It is important to note that Tristan da Cunha has not signed the convention to implement legally binding measures – ATBAs are voluntary. Even though they are voluntary, it is likely that, if a vessel is involved in an accident and they have not followed this kind of voluntary measure, their insurance will not pay out – a major motivator to comply.

In April 2020, the Tristan da Cunha Government, with support from the Blue Belt Programme, designated two voluntary Areas to Be Avoided (ATBAs). These zones were established around the Tristan Group and Gough Island, each providing a 25 nautical mile buffer to reduce the risk of maritime incidents. The ATBAs apply to vessels over 400 gross tonnes that are transiting the area, excluding those engaged in permitted activities such as fishing or research. The primary goal is to enhance navigational safety and protect the inshore marine environment from pollution and collisions.

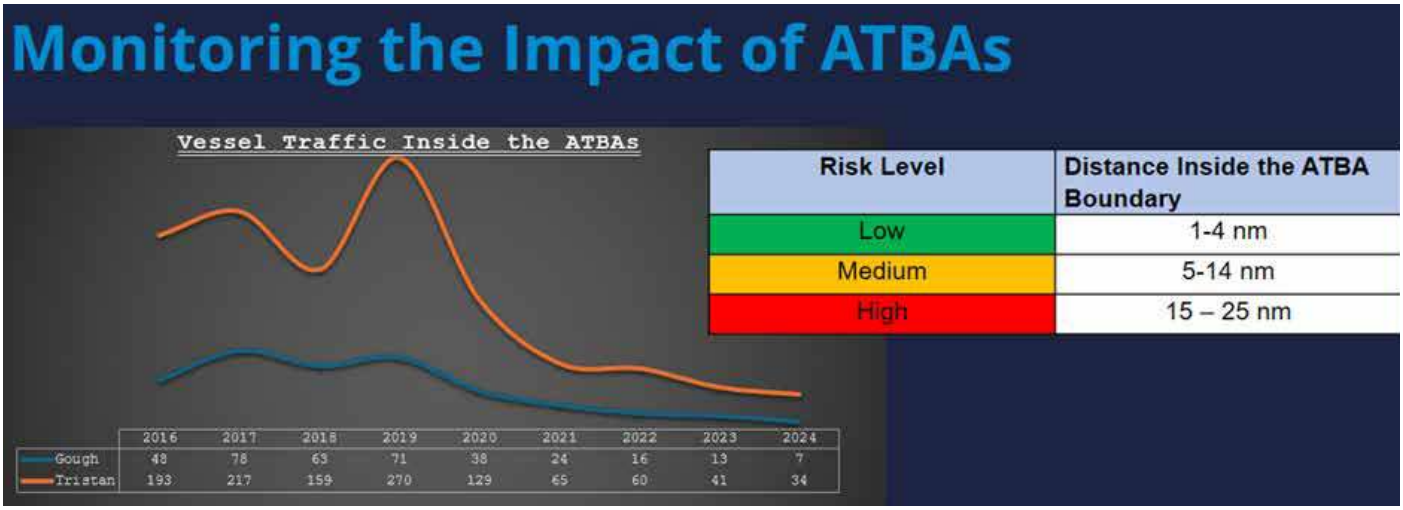


The Marine Management Organisation (MMO) started surveillance of the ATBAs on behalf of Tristan da Cunha Government on 1st April 2020. Surveillance is conducted by analysing Automatic Information System (AIS) data. AIS is a maritime safety and collision-avoidance system that broadcasts a vessel's identity, course, position, speed and generally its destination. Transmissions are received by surrounding vessels, shore-stations and satellites. .

Since the designation of the ATBAs, there has been a marked decline in vessel-transits through these zones. Data from 2016 to 2024 show that while overall traffic through the Marine Protection Zone (MPZ) has remained relatively stable, the percentage of vessels entering the ATBAs has decreased significantly.

The class of vessel, and their likely cargo, have also remained consistent. Bulk-carriers transporting dry goods such as soya from South America to Asia have dominated consistently from 2016 to 2024.

All the transits are categorised transits based on proximity to the islands: High-risk transits are those which are within 5 nm of the island. The ATBA is voluntary but it is essential that the TdC government respond to High-risk transits to continue to raise awareness and promote compliance. Where there is a high-risk transit, the Tristan da Cunha Government contact the relevant flag-state



authorities, encouraging voluntary compliance. This monitoring approach has proven effective in identifying and mitigating potential threats, and it has contributed to a significant reduction in ATBA incursions over time.

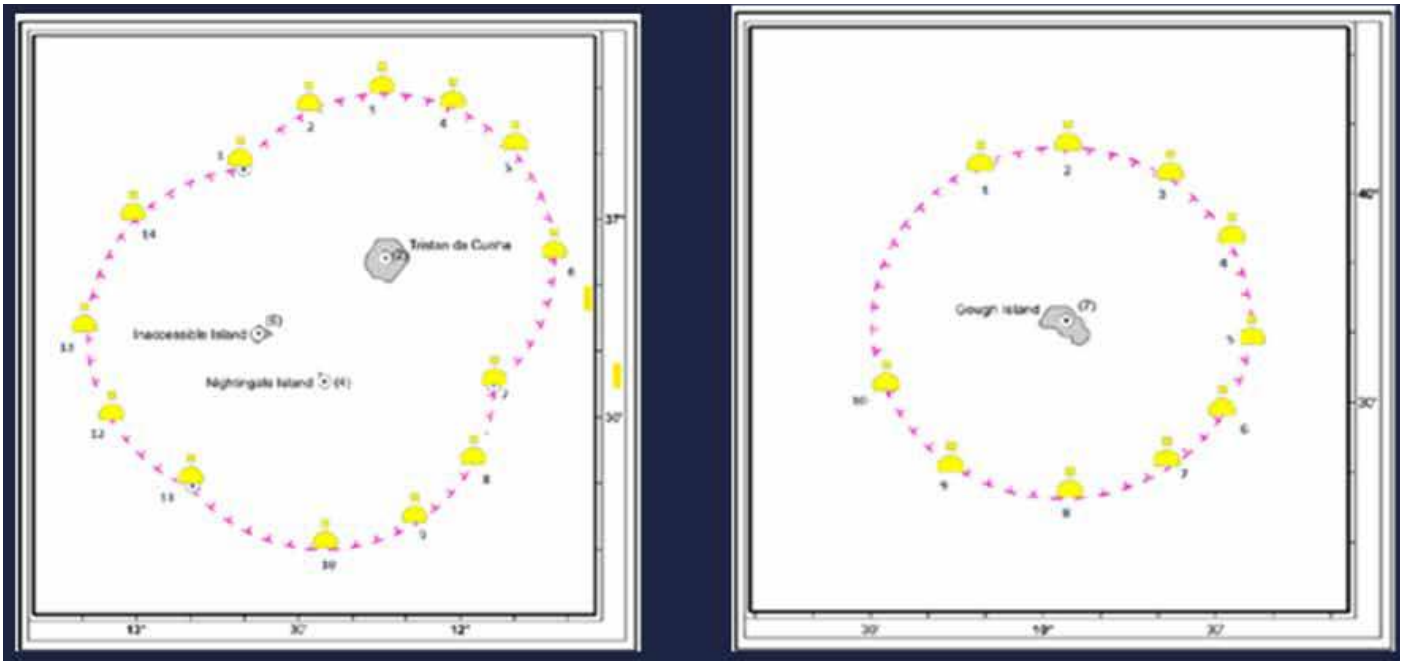
To support the ATBAs, a feasibility study conducted by the Blue Belt Programme and the Northern Lighthouse Board recommended the installation of three physical beacons – two on Tristan da Cunha and one on Gough Island. Several beacons are required as there is a volcano in the way and the multiple sites allow for all-round coverage.

These beacons emit virtual Aids to Navigation (AtoNs) via AIS, making the ATBAs visible on vessel navigation-systems. The images (above) show the physical beacons that have been, and will be, installed at Green Hill, Burntwood and Gough Island and which will each produce 10 virtual beacons.

Despite challenges such as COVID-19, legislative delays, and limited transport access, and a fire at the factory manufacturing beacons, two beacons were installed successfully in January 2025, with the help of the Tristan community. The third beacon is scheduled for a challenging installation this year, requiring helicopter access due to the remote terrain

The installation of virtual AtoNs has already shown positive results. As you can see (below and top of next page), AIS transmissions from the beacons are now visible to transiting vessels, enhancing awareness and promoting safer navigation.

Early monitoring indicates a continued decline in ATBA transits, suggesting that the beacons are contributing to improved compliance. This technological enhancement represents a significant achievement for both the MMO and the Tristan da Cunha Government, providing an additional layer of protection for one of the world's most ecologically significant maritime zones.



Thank you for your time today and please visit our website (https://www.gov.uk/government/organisations/marine-management-organisation) if you would like to learn more.

Chris Carnegy

Q&A

Andy Pearce: Thank you very much Katie for another fascinating talk. It was a really enjoyable presentation.

Jodey Peyton, noting that Katie coud not be on the call and her colleague had not yet joined, asked whether anyone of the attendees was able to answer a question asked about what additional benefits the ATBA technology had for the community.

Chris Carnegy (Tristan da Cunha's UK rep): Thank you for the opportunity. I just wanted to record the fact that I spoke to Chief Islander, Ian Lavarello, this morning. He was just back from Gough Island where he was doing some work to install the beacon on Gough. I believe that is mostly complete; there were just a few setting issues remaining. It is a great initiative and you have seen from the data already that it is known that the number of incursions has dramatically dropped so it's a very useful thing.

Jodey Peyton: Lovely to get a live update, very good. Has anyone reported any other benefits from the reduction in incursions?

Chris Carnegy: Well, in a sense, the absence of news is good news. The wreck of the *Oliva* is obviously seared into the memory of Tristan da Cunha. Delegates might recall that, when it happened, large numbers of the islanders turned out to try literally to sponge off the penguins in the swimming pool on the main island of Tristan. But it was an uphill struggle to try and save penguin lives then. So that is the last serious incident of this kind in the archipelago and with this protection in place for the future, hopefully there won't be another one.

Jodey Peyton: Yes, this is an excellent initiative. Thank you very much Chris for joining us.

Andy Pearce: Excellent, thank you again.

The Cyprus Database of Alien Species (CyDAS)

Jakovos Demetriou (Laboratory of Vector Ecology and Applied Entomology, Joint Services Health Unit Cyprus, Akrotiri, Cyprus; Enalia Physis Environmental Research Centre, Nicosia, Cyprus; Department of Ecology and Systematics, Faculty of Biology, National and Kapodistrian University of Athens, Greece)

Jakovos Demetriou

Demetriou, J. 2025. The Cyprus Database of Alien Species (CyDAS). pp 182-184 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

More than 37,000 species have been introduced outside their native range worldwide. Invasive non-native species (INNS) are a main driver of global biodiversity loss, also negatively affecting socioeconomic parameters and human health. Thus, regularly updated species inventories and databases on non-native and INNS are essential for informing policy and management decisions. The Cyprus Database of Alien Species (CyDAS), provides informational resources on non-native species on the island of Cyprus as a whole, through an openly accessible, free, online, and dynamic platform. To date (last updated to the end of December 2023) it presents information on 1,293 terrestrial, freshwater and marine taxa. The CyDAS aims to keep track and supplement our knowledge on non-native species of the island facilitating the development of early warning and rapid response systems, to raise public awareness of the risks posed by INNS, to strengthen and enhance engagement and public participation in surveys, as well as to inform INNS policy.

Jakovos Demetriou, Biologist, MSc, PhD candidate
(Laboratory of Vector Ecology and Applied Entomology, Joint Services Health Unit Cyprus, Akrotiri, Cyprus; Enalia Physis Environmental Research Centre, Nicosia, Cyprus; Department of Ecology and Systematics, Faculty of Biology, National and Kapodistrian University of Athens, Greece)
jakovosdemetriou@gmail.com

Introduction

There are >37,000 species introduced outside their native range worldwide. Only a subset may become invasive non-native species (INNS), *i.e.* affecting native biodiversity or ecosystem-functions, as well as society, economy and human health.

INNS are a main driver of global biodiversity loss. There is a need for regularly updated species-inventories and databases on non-native and INNS in order to:

- track changes/trends,
- inform public, policy and management decisions.

Island invasions

Islands are unique ecosystems, with unique evolutionary histories, and high endemism. Islands are particularly vulnerable to biological invasions. INNS are the main cause of extinction.

There are needs for action in respect of:

- risk assessment,
- horizon scanning,
- prevention,
- eradication,
- mitigation of impacts and spread.

The island of Cyprus

Cyprus is at a crossroad of three continents. It has a rich history since antiquity of trade, conquests and changing landscape. There has been movement of people, organisms and goods throughout the millennia. There is a complex geopolitical situation, with changing trade-routes and ever-growing trade. Despite the evident challenges, there are crucial needs for:

- up-to-date species inventories,
- early-warning and rapid-response systems,
- raising public awareness,

- engagement and stronger public participation.

Long story shortened

2014 – 2018: COST Action Alien Challenge (COST TD1209) → Cyprus Invasive Alien Species (CY.I.A.S) inventory (offline database).

2020: CY.I.A.S published as a checklist through the Global Register of Introduced and Invasive Species (GRIIS).

2017 – 2021: Supplemented, data standardised and renamed as the Cyprus Database of Alien Species (CyDAS) (DPLUS056, 088).

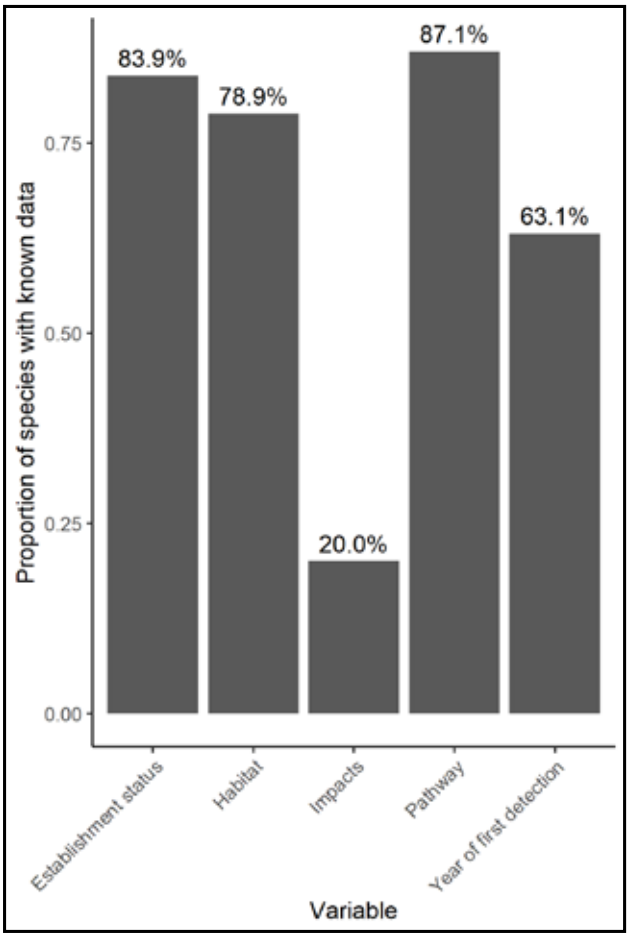
2022 – 2025: Further supplementing (DPLUS124, 200, 202), prototype system for other UKOTs (DPLUS175).

2025: Article in press (Scientific Data).

1,293 taxa and growing (https://ris-ky.info/cydas)

Deficiencies = opportunities

- Incomplete records and missing data.
- Lack of experts, boots on the ground, and monitoring.
- Inconsistencies in taxonomic placement in linked databases.
- Clarifying the status of cryptogenic and data-deficient taxa.
- Lack of documented habitat(s) and inconsistencies in classification schemes used between databases.
- Lack of impact studies and assessments of invasiveness.
- Lack of an island-wide, centralised biological record centre and an infrastructure to host and support biodiversity-data.
- Sensitive geopolitical situation setting boundaries and restrictions in collaborations, and a unified INNS policy.
- Need for stronger collaboration, transparency, pathway management, biosecurity protocols and active participation.



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Joanna Angelidou, Sara Boschi, Michael Hadjiconstantis, Charlotte Johns, Argyris Kallaniotis, Evangelos Koutsoukos, Christodoulos Makris, Shyama Pagad, Lian Jenna Wong and many many others…

Joint Services Health Unit (RAF Akrotiri), UK Centre of Ecology and Hydrology, University of Cyprus, Akrotiri Environmental Education Centre, Enalia Physis Environmental Research Centre, Hellenic Agricultural Organization Demeter, Hellenic Centre for Marine Research and many many others…

Biodiversity Challenge Funds – The Darwin Initiative (DPLUS056, 088, 124, 175, 200, 202).

Q&A

Andy Pearce: Thank you very much, Jakovos. That was fascinating. Quite a frightening dramatic insight into the scale of the challenge of these invasive species. Thank you also to John Randall for standing in as question-master this afternoon after a busy time this morning in Parliament: much appreciated.

John Randall: That was a very interesting presentation. I found it fascinating. I think one of the challenges for any island is obviously invasive species, but in Cyprus you have got the three political entities that makes it even more difficult. I would imagine that co-operation is not necessarily forthcoming from two of those entities.

Jodey Peyton: Do you think there are any more invasive species that you will find? And I suppose, added to that, not just will you find more, but will more invasive species arrive?

A: Thank you very much for being here and for your questions. We do expect a lot of species to arrive because trade is increasing and, of course, with all the geopolitical

situations globally, we see that these routes also change constantly. So, as the routes of trade change, so do our expectations of species that might arrive. If we anticipate further species to be found, that is something that is already happening, even in the last 5 years. I would say, when I have been more active in the field trying to locate non-native species, we have to go by plants. For example, we have these plants and we know that these plants are associated with these insects. So we just go to the plants and check for those species and we do find the insects there. So that tells us that many species might have been here already for decades but no-one has bothered to check if they are here. And that is understandable with the large amounts of species around. But something we do have to continue and, when we have a good consensus of what is already here, we can try to stop further arrivals.

John Randall: Another one is whether management is an option for the most pervasive of these alien invasive species. Should there be active projects effectively to eliminate them?

A: Well, eradication of non-native species would rely on timely detection and rapid action. We have this situation, for example, with the Common Mynah where, just when the species was reported, action was taken. People were out trying to locate these birds and eradicate them. And that has worked very well. But, at the same time, there are other species that were detected rather late and they are now widespread and any management would be very costly. At the same time, it is interesting to see how policy on a European level works. Because for example we have the golden wattle *Acacia saligna* and this species should be eradicated but has been here for centuries and can be found everywhere on the island. So, yes these should be eradicated but practically it's almost unmanageable. So it would all come down to finding these species and taking any measures just right when you detect them when they arrive.

John Randall: I would like to thank Jakovos for a great talk.

Andy Pearce: Yes, thank you Jakovos. Here in Kent the big problem we are facing is Asian Hornets, which are wiping out all our native bees

Jodey Peyton: Check out the CyDAS website here: https://ris-ky.info/cydas

and the data are available here: https://zenodo.org/records/17023319

In Search of the eDNA Bounty: Uncovering Marine Biodiversity in the Mutineers' Seas

Kirsten J. Harper, J. Murray Roberts, Jason Cleland, Simeon Archer-Rand, Georgia Holly & Rob Ogden (The Royal (Dick) School of Veterinary Studies and The Roslin Institute)

Kirsten J. Harper

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The Pitcairn Islands is the 12th largest Marine Protected Area (MPA) on Earth. Located in an isolated area of the Pacific, the MPA covers 841,910 square kilometres which includes an Exclusive Economic Zone as well as the territorial seas of Pitcairn, Henderson, Ducie, and Oeno Islands.

The MPA is one of the most pristine ecosystems on the plant with approximately 1,249 identified marine species, including five endemic fish species: Henderson squirrelfish *Sargocentron megalops*, Henderson triplefin *Enneapterygius ornatus*, Pitcairn sandlance *Ammodytoides leptus*, many-spined butterfly-fish *Hemitaurichthys multispinosus*, and an undescribed species of combtooth blenny *Alticus* sp. Given the MPA's isolated location, environmental DNA will enable baseline biodiversity data to be rapidly generated against which future changes can be measured.

In February 2023, a total of 58 1L water samples were collected from three sites (Adams Seamount, Henderson Island and Oeno Atoll) at five depths (2, 30, 60, 120 and 200m), while in February 2024 a total of 28 1L water samples were collected from three additional sites around Pitcairn Island (Bounty Bay, Down Rope, and Matt's Rocks) at three depths (30, 60, and 120 m). Six primer pairs covering four gene regions (12S, COI, 16S and 18S) were used to characterise biodiversity present. Results indicate communities differ between sites and depths due to species' life histories, while preliminary results indicate that there is high overlap in species detected by eDNA analysis and Baited Remote Underwater Vehicles (BRUVs).

Keywords: Environmental DNA, metabarcoding, Pitcairn Islands, marine protected area, biodiversity monitoring

Kirsten J. Harper, J. Murray Roberts, Jason Cleland, Simeon Archer-Rand, Georgia Holly & Rob Ogden (The Royal (Dick) School of Veterinary Studies and The Roslin Institute)

Introduction

Environmental DNA (eDNA) refers to genetic material shed into the environment by organisms via skin, mucous, gametes and waste products. This material can be collected from environmental samples such as water, and analysed through high-throughput sequencing to provide insight into community-compositions.

The Pitcairn Islands, a UK Overseas Territory in the South Pacific, encompass four volcanic islands and was designated a Marine Protected Area (MPA) in 2015. Covering 841,910 km², it is the third largest continuous MPA globally. Despite its near-pristine status and the presence of unique endemic fish-species, systematic biodiversity surveys have been limited due to its extreme remoteness. As such, eDNA metabarcoding represents an option to provide a cost-effective, non-invasive and highly sensitive means of establishing a biodiversity-baseline.

Methods

In February 2023, 58 water-samples, each of 300 mL, were collected from Adams Seamount, Henderson Island and Oeno Atoll at depths of 2, 30, 60, 120 and 200 m. In February 2024, a further 28 such samples were collected from Pitcairn Island sites (Bounty Bay, Down Rope, Matt's Rocks) at depths of 30, 60, and 120 m. Water was

University of Edinburgh staff and Pitcairn Islanders conducting environmental DNA field sampling during February 2023 in the Pitcairn Islands.

collected with a handheld Niskin bottle, filtered using Sterivex filter-units, and frozen until DNA-extraction could be performed. DNA was extracted in a clean laboratory and PCR performed prior to sending samples for sequencing.

Results

Results presented here are from one marker only that targeted fish; other markers are currently under analysis. Species-richness was highest at shallower depths. Oeno Atoll displayed the greatest species-richness at 2 m, while Bounty Bay consistently exhibited the lowest diversity across depths. Community-composition varied significantly between sites and depths, reflecting habitat-specific assemblages and species' life-histories. Preliminary comparative data indicate also there was overlap in taxa detected by eDNA and BRUV surveys, suggesting complementarity of the two methods.

Discussion

Our results demonstrate the ability of eDNA to resolve biodiversity-patterns across depths and sites in one of the world's most remote MPAs. High diversity in Oeno Atoll's shallow waters probably reflects habitat-complexity, while consistently low richness in Bounty Bay indicates less diverse communities. The overlap with BRUV surveys validates eDNA findings and suggests that both methods could be integrated to capture a fuller picture of marine biodiversity than by single methods. This complementarity is particularly valuable in remote MPAs where monitoring opportunities are limited.

Conclusion

This study provides the first eDNA-derived biodiversity-baseline for the Pitcairn Islands MPA. Future work will complete bioinformatic analyses across all gene-regions and compare further eDNA and BRUV datasets. Together, these efforts will contribute to a long-term monitoring framework for the Pitcairn Islands and demonstrate the utility of eDNA in managing remote MPAs.

Q&A

Andy Pearce: Thank you very much indeed Kirsten, a fascinating talk.

John Randall: Keith Bensusan asks: What makes elasmobranchs eDNA difficult to detect? (John: I had to check as a layman, but I guess it refers to sharks and rays.)

A: Some reasons can include the fact that sharks tend to shed less eDNA compared to bony fishes. They have tough denticles rather than scales. Other than that, they are often found offshore and in pelagic environments where eDNA disperses rapidly and degrades. They are also highly mobile, moving through large areas without remaining long enough to build up detectable eDNA concentrations.

John Randall: I found that absolutely fascinating, as somebody who didn't know anything about it. My question: is this able to be a good opportunity to sample it because of the pristine nature of the Pitcairn Islands? Would it work, say, in the English Channel which is pretty polluted? I am just wondering if it can work when only you've got a pretty good pristine marine environment.

A: No, it would work in numerous places. Obviously, when there are other factors involved, and depending on how quickly the eDNA degrades, that would obviously impact your results as well.

John Randall: And the other question: you mentioned sea-mammals. and I don't know whether birds would count, from their droppings or feathers that get in the water, but we are talking primarily about fish and other sorts of marine life.

A: Yes: for this study it was marine-focussed, marine mammals, marine invertebrates, marine fish etc. but you can use it for terrestrial eDNA. You can do eDNA captured from air samples. Often, when you are doing marine samples, you will actually get some local birds signals coming in there but, because we were not interested in that, I would probably filter those out.

John Randall: And a practical question, you said that

they were frozen and then sent off to Edinburgh. How long does that journey take from Pitcairn and how do you keep them frozen?

A: I think it takes several days to get back, and they just had to put it in whatever freezer was available to them along the route. Wherever they stopped, it went straight into a freezer. There are different ways that you can preserve the filtered units. Some people add preservation buffers to it so that might be something to look at, but ours were frozen along the route as best as possible.

Alison Copeland: Do you just get a presence/absence for species from eDNA, or can you get some sort of abundance/magnitude data – or is that what you use the BRUVs for?

A: So that's kind of a loaded question. It's quite complicated. Yes you get presence/absence. There is some thought that you can correlate counts, so the more there are, the more there are of that particular species, but that's not fully fleshed out yet. There is still a lot of modelling going on with that, so you do have to interpret that with caution. The BRUVs data does give you additional information, so sometimes you will use the two methods in tandem. I am not sure that eDNA is necessarily something that you would just use on its own in some places. Sometimes you need some other techniques there to complement it to get the full picture. That is where we are with the abundance.

Roland Lines: Do ocean currents have implications for marine eDNA evaluations?

A: They do, yes. There have been lots of studies actually modelling how far currents etc can move eDNA to give us an idea of whether we are getting a snapshot of what's actually here or we are detecting things from far away. So you have to interpret with caution.

John Randall: It sounds to me, as a layman, that this is an exciting new advance, but is it relatively new?

A: It's really increased in use in the last 10 years or so, but the first study was way back, I believe, in 2008, I would have to check, and that was on a type of bullfrog. So it's been around a while but it's usage is increasing by magnitudes year on year as we advance with the techniques and methodology, and the analysis, and what we can actually tell from that data.

John Randall: Thank you very much indeed, Kirsten.

Andy Pearce: Thank you very much, John. And thank you Kirsten, a fascinating topic. It leaves you with a burning desire to go and see Pitcairn: do so if you possibly can in your life, it is such a beautiful pristine place.

Beyond bases: modern remote monitoring of animal populations

Tom Hart & Laure Cugnière (Seabird Watch, Oxford Brooks University)

Tom Hart
Laure Cugnière

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From cliff-nesting seabirds to remote-island reptiles, colonial species across the UK Overseas Territories and Crown Dependencies often live in habitats that are difficult to access and monitor using traditional field methods. However rapid advancements in technology are transforming what is possible for conservation. Many more colonial species in UKOTs could be monitored in more sites if the need for human presence is relaxed. This session explores how cutting-edge tools such as drones, autonomous cameras and artificial intelligence are being deployed to revolutionise under-monitored species in these regions.

Vast datasets on species distribution and abundance are being collected throughout the UKOTs and CDs particularly for hard-to-reach or spatially dispersed species like seabirds. We report how DPLUS174 has been tackling these issues and how the lessons may be generalisable to many more UKOTs. The talk will delve into how the data collected can be analysed efficiently and accurately by "artificial intelligence", rapidly turning terabytes of images, video and audio into actionable insights. Real-world examples will be shared. Best practices will be highlighted, potentially feeding into the following general discussion, consideration of the challenges and opportunities of integrating these technologies into long-term conservation strategies.

This talk may be of interest to practitioners, policymakers, researchers and anyone keen to see how innovation is driving conservation impact in some of the UK's most biodiverse but remote territories.

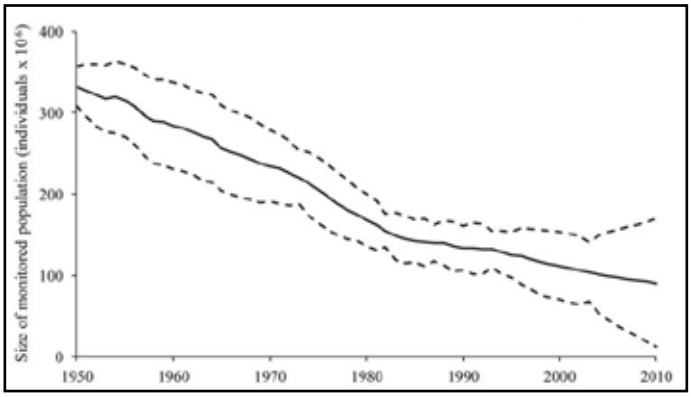
Tom Hart & Laure Cugnière (Seabird Watch, Oxford Brooks University)

Hello, everyone. My name is Tom, and I am speaking also on behalf of Laure Cugnière. We are from Oxford Brookes University and Seabird Watch. Most of what I will be talking about today is funded by Darwin Plus. I would like to talk about how we monitor remote populations; that should be of relevance to many of us in the room.

So, traditional monitoring can be quite hard because areas are hard to get to, or specific animals may be hard to see. It may be that you have populations that you cannot get to every day. It might just be a time-resource. So, we aim to fill those gaps. And particularly, that is a lack-of-resource issue in a lot of the UKOTs, for where we have colonial species that might be appropriate to this kind of technology.

So, what we have been developing over the last few years is population-surveys using drones. I do not think of it as a new technique anymore; it has just come of age. We need to spin it out for a lot more people to access. We have spent a lot of time on phenology, but also reproductive-success, using autonomous cameras. Our niche, or our added value to this, is that we can help people process this huge amount of data, using both citizen-science and artificial intelligence. And of course, the goal is to inform policy – which could be anything from localised protection to marine protected areas.

The world's seabirds are in decline, and of the monitored colonies around the world, we have lost over half. This



Population trend of the World's Monitored Seabirds, 1950-2010

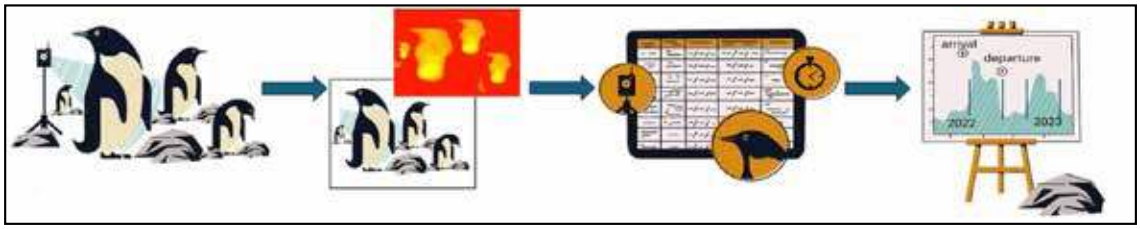
relates to monitored colonies. What about those that are not monitored? Also. do we have biases in these? Because it really does depend on where you look.

Historically, we have done this by field-visits and field-experiments, which usually involve counting. But there is also a lot of behaviour that we want to capture, like phenology and reproductive success. Ideally, we would have historic data that goes back over a time-series, and the longer that goes back, the better. But even if that does not exist, it is easy to start now. There are solutions that can help, such as remote sensing of populations. That has been done on everything from penguins and seals to albatrosses and turtles. That might be satellite-monitoring. It is very powerful, but it does presume that one can see the animals of interest; so that cannot be in places with a lot of cloud-cover, and it is not going to be regular.

On the ground, going around places, counting things, is robust in that we can all do it. However, it might be limited in: how often; when we can get there; and whether we can count some of the larger colonies of things. Also, whether there is an issue of disturbance. The coming-of-age techniques of drones and time-lapse cameras are what I want to focus on today, to make people think about whether these are appropriate for them. This challenge started in Antarctica. Every year, thousands of seabirds arrive, and start to breed. Because many penguin colonies are very hard to get to, we have big data-gaps. We have tended to get data only from near scientific-bases.

We have tried to fix that by hitchhiking on a load of different ships, leaving cameras, and seeing what very regular observations can do. So here *(top of page)* you see a load of king penguins on South Georgia, an unmonitored colony, but now we can do chick-counts, timing of breeding and even look for things of other interest. In the foreground, the little white bird is a sheathbill. It has turned out that it might be quite a powerful indicator of avian flu.

This project is quite mature in Antarctica. We have about 100 sites we monitor regularly. In the diagram *(below)* a camera, takes photos of penguins. Those are now converted through AI, but until recently, it was also citizen-science. A data-sheet gives a count of

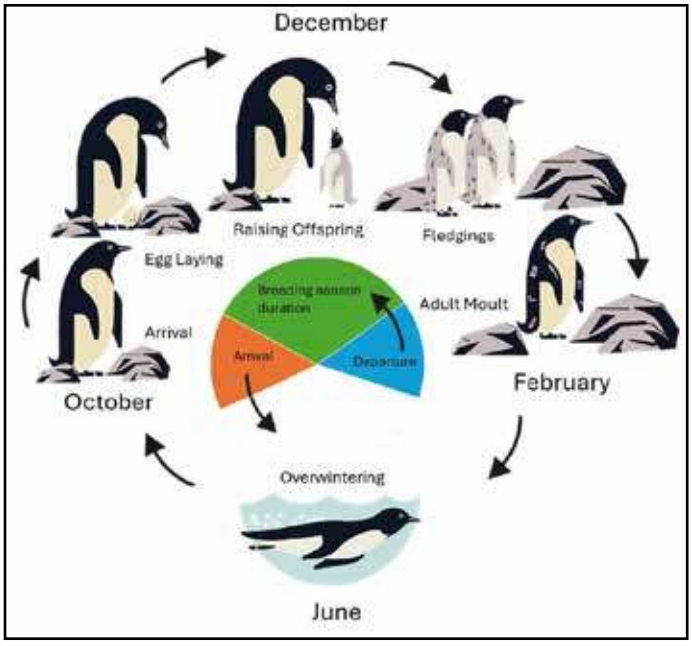


Camera Name	Pengbot Out Folder (.matlab)	Pengbot Density Maps (.jpg)	Pengbot Count Files (.csv)
AITCc	AITCc_pengbot_out	AITCc_density_maps	AITCc_pengbot_count
BAILa	BAILa_pengbot_out	BAILa_density_maps	BAILa_pengbot_count
BOOTa	BOOTa_pengbot_out	BOOTa_density_maps	BOOTa_pengbot_count
COPAg	COPAg_pengbot_out	COPAg_density_maps	COPAg_pengbot_count
CUVEb	CUVEb_pengbot_out	CUVEb_density_maps	CUVEb_pengbot_count
CUVEb	CUVEb_pengbot_out	CUVEb_density_maps	CUVEb_pengbot_count
DAMOa	DAMOa_pengbot_out	DAMOa_density_maps	DAMOa_pengbot_count
GEORd	GEORd_pengbot_out	GEORd_density_maps	GEORd_pengbot_count
GEORe	GEORe_pengbot_out	GEORe_density_maps	GEORe_pengbot_count
GODTa	GODTa_pengbot_out	GODTa_density_maps	GODTa_pengbot_count
HALFb	HALFb_pengbot_out	HALFb_density_maps	HALFb_pengbot_count
HEROa	HEROa_pengbot_out	HEROa_density_maps	HEROa_pengbot_count
LOCKb	LOCKb_pengbot_out	LOCKb_density_maps	LOCKb_pengbot_count
MADDa	MADDa_pengbot_out	MADDa_density_maps	MADDa_pengbot_count
NEKOc	NEKOc_pengbot_out	NEKOc_density_maps	NEKOc_pengbot_count
ORANa	ORANa_pengbot_out	ORANa_density_maps	ORANa_pengbot_count

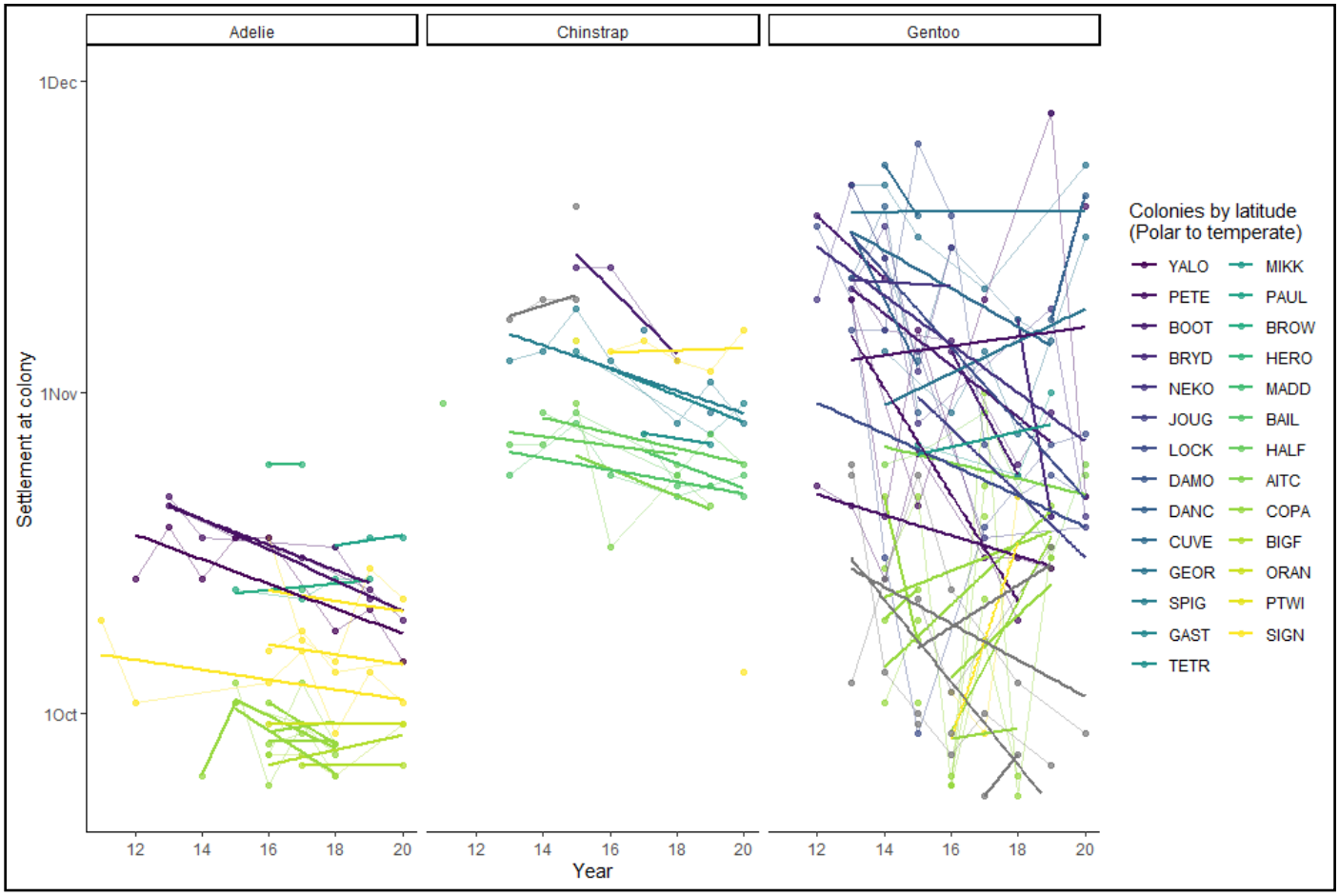
every image, the metadata, the time it was taken, the temperature, etc. We then convert that into parameters of interest, and this part is now all automated for penguins. We are just publishing the first paper, where every part of this process was automated. With a few tweaks, it may be applicable to your species and scenarios.

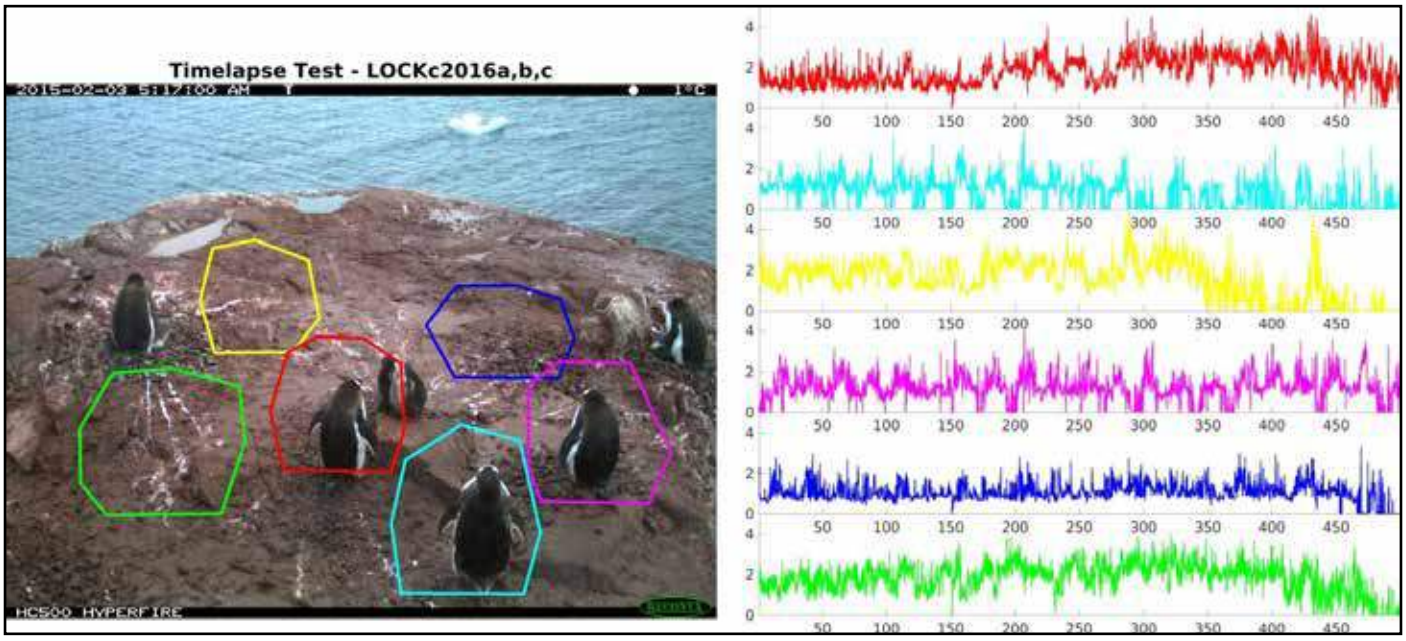
This *(below)* is what the last 15 years of monitoring in Antarctica has shown. We have shown that Adélies and chinstraps now breed 10 days earlier than they did about 10 years ago, and Gentoos are, on average, 2 weeks earlier, but you can see the huge variance. We show that these penguins are all adjusting their breeding season, so those that breed earlier, are also departing earlier, and seem to be shrinking the breeding season. This could be a good thing, other than we know that most of these populations are in decline.

Interestingly, we are now looking at a carryover effect, and we do see that those that depart earlier are also arriving earlier, so there is a knock-on dependency between years.



This *(above)* is the breeding cycle of penguins, and we're seeing both early arrival, early departure, shrinking of breeding season, and potentially a bit of a cascade across





seasons. Which, again, could be a good thing if they have more time to overwinter and feed up.

But, given these populations are in decline, it raises worrying questions about why that flexibility is not allowing them to adapt enough.

We do have some positives, though. With a collaborator in Argentina, Andrea Raya-Rey (at CADIC-CONICET), we found that, on her site, when penguins start earlier, they end earlier. And that is leading them away from hot days when the chicks have been shown to die in the heat. So it could be that this, whichever cue they are following, has advantageous impacts.

As we have got the AI working, we have got a lot bolder in what we do. I mean, it's really encouraged us, and it should encourage you to collect more data. And to do it now if you are in any doubt. So, this *(above)* is a one-minute interval camera from Lockroy, and we are using that to get foraging success.

This has been thanks to a huge, effort and collaboration with Andrew Zisserman and Carlos Artita.

And a new collaboration with the same group, with Nikki Armani, who has generalised this from penguins to all other seabirds. It does seem now that the new algorithm, CountGD, works on basically anything we can see in an image, and can tell it what to count *(below)*.

So that has huge implications for the camera data, but also for drones. For the last few years, we have been using drones all around Antarctica. The population trends depend where you look.

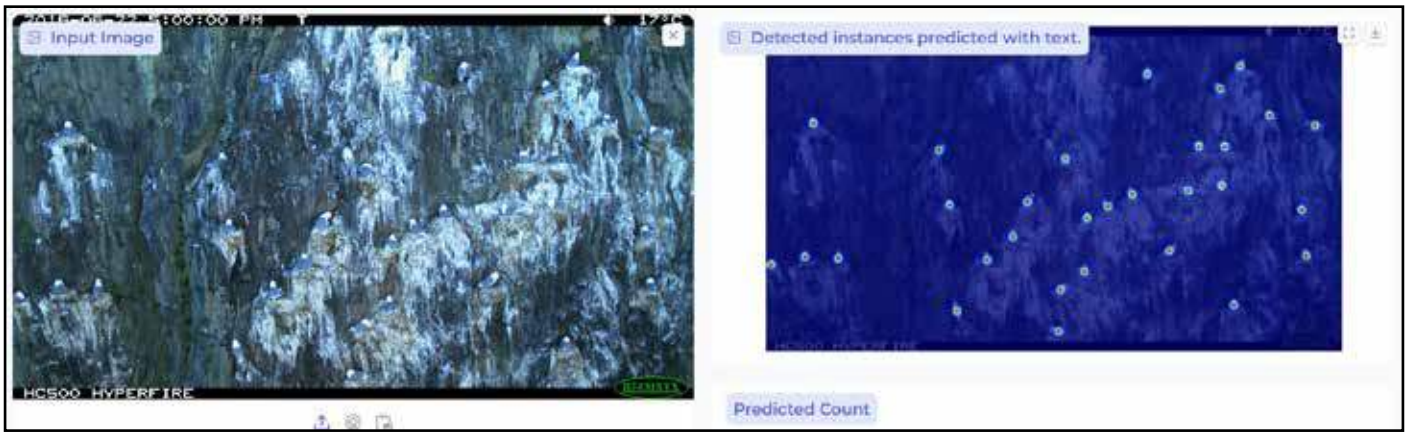
We see positive and negative trends. And our take-home from this is that, yes, we are seeing large-scale population-changes, and it depends where you look. Drones have allowed us to cover a lot more ground, and to get the nuance of what we need to, hopefully, mitigate some of these threats.

Considering these, what are the opportunities and limitations for monitoring across the UKOTs? Well, both cameras and drones work now; it is whether they work in your scenario.

There are also things we have not mentioned, such as invasive species and disturbance. Images from Montserrat show goats, donkeys and cats disturbing wildlife; this may help reprioritise what is needed to avoid disturbance.

The strengths and limitations: to set up a camera that will last at least 5 years costs probably about £500, and then a small annual monitoring cost.

But should you use that? If you can see your organisms, if they breed in groups, and if there is a good enough view, ideally looking down on them, and if you can get a suitable number of nests per view, or if you are happy



to spend on multiple cameras, so one per nest, then yes, this should work for you. It is worth checking whether the AI works for your species, and we can help you with that. We have a tool online. We are still working on productivity, and that does not automate yet. Phenology does, as does the detection of, invasive species or predators.

If you are interested in drones, then these cost a bit more, about £5,000. But we occasionally have spares or old drones that we can lend you, at least to get started. The big limitations are whether you can see your species.

If the targets of interest are burrow-nesters, this is a problem that we have not really fixed yet. I have mentioned this several times, in text, but you need to be able to recognise roughly what you're looking at within the image, and if you can, then AI should be able to do this. And you need to think about whether you can do that without disturbing wildlife. But we have lots more information on this we are more than willing to share. And we are also very happy to train you. We have a limited budget. We are very interested through this forum in holding a workshop for these techniques.. If you can get to us, we are more than happy to spend time training and help you set up for this in your scenario.

So, thank you very much.

Q&A

Andy Pearce: Thank you very much Tom for another fascinating presentation. Pretty arresting, particularly the figures at the start of your talk about the overall 50% reduction in seabirds – pretty shocking. Many thanks to you and your team for all the work you are doing.

John Randall: Thank you very much for a fascinating presentation. All of them have been so far but this one was particularly interesting for me as somebody who is very interested in bird-populations. What I was going to ask about is two things. First, as you said burrow-nesters are particularly difficult to monitor; presumably a lot of burrow-nesters are nocturnal species, so I was just wondering whether any of the technology yet has got night-vision involved. The other question, in regard particularly to penguins but I think elsewhere where their breeding season has been brought forward or whatever, is there any indication, apart from the fact that populations are declining, maybe their food sources are not adapting to the changes as well as perhaps the penguins breeding?

A: In response to the first question, are burrow-nesters a problem? Yes, they absolutely are. We have tried with thermals to look into burrows, and you need quite a big temperature-differential for that. So it works better towards the poles than it does in the tropics. It basically doesn't work in the tropics. The most close to success we've seen in this is Ellie Owen from National Trust for Scotland, and she has been looking at puffins and whether you can do very high resolved surveys of burrows. So that's the closest we've got to that. Otherwise we are still going to have to do play-back, be on the ground, put an audio playback device down a hole and see if it is occupied or not. It is definitely something that we are looking at but it is a big gap. There is a possibility with time-lapse cameras with thermal or night vision. We have looked at those in penguins and they work because they are a lot more expensive and power-hungry so we have not been able to do it at the same level yet.

Your second question, predators and prey. We haven't looked at this in penguins yet. The only places where people study food-metrics as well as monitor colonies is really at one or two sites. We are looking at proxies for that, such as where whales are year-on-year because they have more flexibility. It remains a big problem. So elsewhere, wherever it has been studied, we see increasing mis-match so the prey and predator don't always respond at the same rate to changes in the environment. So we think it is a problem.

John Randall: I've got lots of compliments, and also, I think you will be able to see them from people interested in taking up the training offer you made. So that's Keith Bensusan, Nancy Pascoe, the Bermuda National Trust, and the St Helena National Trust [see below].

Keith Bensusan: Yes to a workshop, please Tom! I know plenty about your work and I think it would be of enormous benefit for everyone.

Bermuda National Trust: Thank you! This is so interesting and I am very keen to take advantage of any training available.

Helena Bennett (St Helena National Trust): Tom, we would love to have a chat with you. We are starting our Coastal Management programme with Darwin, including monitoring seabirds – masked boobies and storm petrels – what is the smallest animal the remote cameras can pick up, and how long do you keep them out for (*i.e.* battery life).

A: The smallest animal the cameras can pick up: as long as you can see them then it's fine. And in response to everyone who is reaching out, then please take our contacts and obviously if you want us to come to you you've got to figure out a way to pay for it. If it is possible for you to come to us, then yes we can host you. It only takes a couple of days to be able to train you.

John Randall: Harry Marshall has asked: whether bioacoustics methods are a better bet for burrows.

A: Yes, it could work, bioacoustics have been showing a link to relative abundance, so you can get relative numbers over time but it's a lot less precise. It's certainly brilliant for rough reproductive success, number of chicks, and definitely phenology; so yes, timing of breeding for sure.

John Randall: Nancy Pascoe, BVI, has asked whether you do any online training.

A: Very interesting, so could we do any online training? I think we would need to think about that. We have been very practical and hands-on until now. We will think about how we could do that.

Jodey Peyton: From **Laure**: Interested in a workshop or training on remote species monitoring using drones or time-lapse cameras, sign up here:

https://docs.google.com/document/d/1R6fwAFw19bQDjH8miRTlELLjWGXl_lJE7M4r3osc-zo/edit?usp=sharing

or email lcugniere@brookes.ac.uk.

Ajhermae White: Nice presentation, Tom! In Montserrat, our biggest issue with seabirds that nest in burrows is being able to find them and access them. If we were able to access one, the other challenge would be how to position the camera if the entrance is small.

A: There are smaller cameras available. There are cameras specifically developed for nest-boxes so I think that nowadays that's possible

Catherine Wensink: Can you give a flavour of what AI can do?

A: That's an interesting one. I tried to put that on the screen. But what can it do now? The penguins that we have been working on for a while, we can follow every nest and tell us nest-rate survival. Everything we have run through so far, in principle, if you can look at it as an expert, and say "That's a fulmar, that's a booby" and there's enough pixels in it, so if it is recognisable within the image, then AI can automatically count it. And this, very shortly, we hope to be a public website. Nicky, our collaborator in Oxford in the engineering department, is building that into a website so that it will be available to everyone. We are talking months now: I am hoping availability within the next 3 months – and that means you will be able to go and try it out yourself, and see if it works for your situation.

John Randall: I think that's everything. I would like to thank you again for a really interesting presentation. A lot of food for thought. And I now hand back to the hard-working Jodey to carry on, as I have to get back to some voting, I think. Thank you all very much.

Mike Pienkowski: Thank you very much for breaking out of voting for more important matters.

John Randall: My thoughts entirely.

Andy Pearce: Thank you very much John.

Tracking Change: Phytoplankton Trend Analysis in British Gibraltar Territorial Waters (BGTW)

Marre Linthorst[1], Stephen J. Warr[2] & Awantha Dissanayake[1] (1. School of Marine and Environmental Science, University of Gibraltar; 2. Department of Environment, Sustainability, Climate Change and Heritage)

Marre Linthorst

Linthorst, M., Warr, S.J. & Dissanayake, A. 2025. Tracking Change: Phytoplankton Trend Analysis in British Gibraltar Territorial Waters (BGTW). pp 194-195 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

Phytoplankton play a central role in marine ecosystems as primary producers, forming the base of the food web and contributing significantly to global carbon cycling and oxygen generation. Because of their sensitivity to environmental change, phytoplankton communities are widely recognised as effective indicators of ecosystem health, water quality, and early warning signals for eutrophication, climate change, and other anthropogenic impacts. Despite their ecological significance, long-term, high-resolution studies of phytoplankton dynamics are lacking in British Gibraltar Territorial Waters (BGTW) and the wider region, leading to a critical knowledge gap in the assessment of the marine environment. To address this gap, a comprehensive twelve-year dataset (2013–2024) of phytoplankton abundance (cell counts per Litre) from four representative coastal sites (Sandy Bay, Camp Bay, Runway, and Mid-Harbour) was analysed. The analysis followed international guidelines established by the OSPAR Commission, with indicators selected to align with both the OSPAR Quality Status Report and the EU Water Framework Directive.

Results demonstrate considerable interannual and seasonal variability in total phytoplankton abundance and diversity across the four sites, with a significant increase observed in winter. At the species-specific level, several taxa exhibited significant trends (both increasing and decreasing) across all four sites. Diatoms consistently dominated the phytoplankton community, while dinoflagellates and cyanobacteria exhibited episodic increases during particular seasons. Analysis of harmful taxa revealed sporadic peaks in the abundance of certain dinoflagellate species as well as toxic cyanobacteria associated with harmful algal blooms (HABs), with some taxa showing significant trends at particular sites. Community analysis further identified significant changes in community state space at three of the four sites (Sandy Bay, Camp Bay and Runway) when comparing recent years to the historical baseline, indicating a degree of community change potentially linked to environmental pressures or climate-driven shifts. However, due to the absence of supporting evidence linking these changes to specific environmental pressures, Good Environmental Status (GES) is considered 'unknown' according to OSPAR criteria, as assessment requires a demonstrable link between biological changes and anthropogenic or manageable pressures.

The findings provide the first detailed baseline of phytoplankton dynamics in BGTW and inform ongoing and future marine monitoring. Evidence of community shifts highlights the urgent need for consistent, high-resolution monitoring and adaptive management, particularly as climate change, nutrient shifts, and human pressures are expected to further alter phytoplankton communities and increase the risk of HABs. To support more robust GES evaluations, future assessments should incorporate concurrent environmental data to better identify the drivers of phytoplankton variability. By aligning with international frameworks, this

research supports Gibraltar's Water Framework Directive obligations and offers a replicable model for future assessments, ultimately facilitating evidence-based policy, conservation, and sustainable management of this vital marine ecosystem.

Marre Linthorst[1], Stephen J. Warr[2] & Awantha Dissanayake[1] (1. School of Marine and Environmental Science, University of Gibraltar; 2. Department of Environment, Sustainability, Climate Change and Heritage)

I am Marre Linthorst, and I am with the University of Gibraltar. This poster is part of my dissertation and represents the research I conducted. The study provides the first long-term, high-resolution assessment of phytoplankton dynamics in British Gibraltar territorial waters from 2013 to 2024. Phytoplankton are very sensitive to environmental change and serve as early indicators of ecosystem-health, eutrophication, and climate-change.

Prior to this research, no long-term, species-level analysis had been carried out in Gibraltar waters because previous assessments relied solely on A-data, which do not reflect changes in species-composition or trends in biodiversity. To address this gap, I analyzed a 12-year dataset from four coastal sites in Gibraltar: Sandy Bay, Camp Bay, Runway, and Mid Harbor. I applied the OSPAR Quality Status Report framework to evaluate trends in abundance, diversity, and community-structure using cell-count data, rather than just chlorophyll-a measures, employing three indicators.

The results establish the first baseline of Gibraltar's phytoplankton community across four sites. There has been a significant increase in total abundance and structural changes at three of the four sites, indicating emerging ecological shifts, potentially driven by climate-change or local pressures. Interestingly, the site where no changes were observed was also found to have a trend in one of the indices, showing that it is moving toward a more typical community for that particular site.

Despite these changes, good environmental status remains unknown under the OSPAR criteria due to insufficient supporting data linking these biological trends to specific human pressures. To strengthen future monitoring, I recommend including concurrent environmental data and standardising the sampling scheme to reduce sampling-bias.

Overall, this research fills a critical knowledge-gap in Gibraltar's marine environment, provides a policy-framework for future assessments, and supports evidence-based management to safeguard the region's pelagic habitat under a changing climate.

The Dietary Dynamics of Red Foxes *Vulpes vulpes* Amidst Changing Rabbit Availability

Jemila Mellin (University of Gibraltar), Bethany Maxwell (Gibraltar Botanic Gardens / University of Gibraltar) & Dr Awantha Dissanayake (University of Gibraltar)

Mellin, J., Maxwell, B. & Dissanayake, A. 2025. The Dietary Dynamics of Red Foxes *Vulpes vulpes* Amidst Changing Rabbit Availability. pp 196-197 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

European rabbits *Oryctolagus cuniculus* are a keystone species in Mediterranean ecosystems, crucial as a primary food source for predators like the Red Fox *Vulpes vulpes*. Recently, Gibraltar experienced a significant decline in local rabbit populations, which could threaten the Red Fox's survival due to its reliance on rabbits as a primary food source. Such a decline in prey could potentially disrupt food webs as foxes may switch to alternative available prey such as the Barbary Partridge or nesting gulls, affecting the overall biodiversity in the region. This study provides baseline data on red fox feeding habits and estimates the abundance of both species within the Gibraltar Nature Reserve. Over five weeks, camera traps at three sites within the Gibraltar Nature Reserve and its fringes recorded the abundance (observations as a proxy) and activity patterns of rabbits and foxes, with significant site-specific differences identified, stemming from minimal human exposure (fox: $p=0.004$; rabbit: $p=0.001$, ANOVA).

Scat analysis further explored fox dietary habits, revealing site-specific variations (PERMANOVA $p=0.03$). At Site 1: Mediterranean Steps, fox scat yielded mostly bone and fur (43.3 %), while fruit and vegetables dominated at Site 2: Green's Lodge Road, (21.4 %). Site 3: Sandy Bay, diets were more diverse, consisting of bones, quills, feathers, and invertebrates (54.1 %). The varied composition of prey items (indicative from fox scat) demonstrates the behavioural flexibility of red fox diet and composition.

This research is the first in Gibraltar to focus on these species, highlighting the Red Fox's dietary adaptability and its reliance on declining rabbit populations. Findings emphasise the need for conservation efforts to mitigate ecosystem impacts.

Jemila Mellin (University of Gibraltar), Bethany Maxwell (Gibraltar Botanic Gardens / University of Gibraltar) & Dr Awantha Dissanayake (University of Gibraltar)

Hello everyone, my name is Jamila, and I am a Master's student from the University of Gibraltar. This poster presents research conducted on the predator-prey relationship between red foxes and European rabbits in Gibraltar. It was prompted by a significant rabbit-decline in April of 2024 and aimed to assess the potential impacts on the red fox population. Although the study was limited to a five-week period, which restricted the potential for long-term conclusions, some interesting patterns did emerge.

Studying species-behaviour reveals important details about habitat-use, foraging, abundance, and activity, both individually and between interacting species. Considering the rabbit-decline in Gibraltar, it was essential to understand the role of the red fox and assess how this shift might affect other species found on the Rock. The study was conducted from May to June 2024 at three sites within the Gibraltar Nature Reserve.

This research employed the analysis of camera-trap footage and scat-analysis. Camera-traps were used to determine the relative abundance of rabbits and foxes within the nature reserve, with two cameras placed at strategic locations within each study-site. Footage was collected and analysed daily. Scat-analysis was

conducted to investigate potential dietary changes in the local fox population. Scat-samples were collected opportunistically on a weekly basis across all sites, with macro-components extracted, examined, and categorised for further analysis.

The study revealed three key results. The dietary analysis suggests that red foxes on the Rock are adaptable to changes in food-availability. While bones and fur were present in the majority of scat-samples, they were not always the most frequent components. Scat from Greens Lodge Road contained a higher proportion of fruit and vegetable-matter, pobably due to the site's proximity to a macaque-feeding station. In contrast, scats from Sandy Bay showed a greater frequency of feathers, possibly due to a higher abundance of bird-species in the area.

Activity-patterns indicated that rabbit peak-activity in Gibraltar differs from patterns in the existing literature. Typically, rabbits are most active just before sunrise and shortly after sunset. This shift in activity could represent a behavioural adaptation to avoid fox-predation. Data from the camera-traps showed the highest rabbit and fox detections, as well as greater species-diversity, at Greens Lodge Road. The increased number of species in this area could probably be due to limited human disturbance.

Currently, there is no research on fox-populations within the Gibraltar Nature Reserve. The findings from this study provide valuable baseline-data on both rabbit and fox populations in Gibraltar, offering insights into their abundance, behaviour and dietary patterns. Such functional knowledge is essential for monitoring population-trends, detecting ecological changes, and guiding future conservation-efforts.

In summary, understanding fox-feeding habits and behavioural ecology can inform targeted management-strategies that protect both predator and prey species. Given the foxes' opportunistic nature and adaptability, the loss or reduction of a primary food-source such as rabbits could drive behavioural changes, potentially affecting other vulnerable species or leading to human-wildlife conflict. Thus, effective management will require the integration of ecological data, ongoing field-research, and adaptive conservation-planning.

Thank you for your attention.

Ecological insights and conservation challenges for the Orange Cup Coral *Astroides calycularis* in the Western Mediterranean

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Awantha Dissanayake

Dissanayake, A. 2025. Ecological insights and conservation challenges for the Orange Cup Coral *Astroides calycularis* in the Western Mediterranean. p 198 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

Astroides calycularis, commonly known as the orange cup coral, is a scleractinian coral species endemic to the Mediterranean Sea, primarily distributed along the southern and western coasts. It thrives in dimly lit environments such as underwater caves, overhangs, and vertical walls, typically at depths ranging from 5 to 40 metres. As a non- zooxanthellate species, *A. calycularis* relies exclusively on heterotrophic feeding, making it well-adapted to low-light conditions. Its life history includes slow growth rates, limited larval dispersal, and episodic recruitment, all which contribute to its vulnerability.

In recent decades, *A. calycularis* has faced several anthropogenic and climate-related threats. Habitat degradation due to coastal development, marine pollution, and physical damage from diving and fishing activities pose significant risks. Additionally, rising sea temperatures and ocean acidification have raised concerns about its physiological resilience and future survival.

Despite these challenges, recent studies highlight the species' potential for restoration. Successful transplantation experiments using Corals of Opportunity in Gibraltar's waters demonstrate some capacity for recovery with high success transplantation rates (93 %) observed > 1 month post-transplantation. Some coral colonies were lost/died due to various factors including glue failure, diver impact (dislodged colonies) and longer term due to the impact of Marine HeatWaves (MHWs) over summer months with impacts to polyps and overall colony health.

Active restoration efforts are a necessary step to abate the biodiversity crisis, as the Orange Cup Coral is an important ecosystem engineer, that not only increases habitat complexity but supports a diverse benthic community and associated fish species in the Western Mediterranean. To conserve the vulnerable coral, effective conservation strategies in combination with monitoring efforts and effective policy measures are paramount for survival of the species.

Awantha Dissanayake (School of Marine and Environmental Science, University of Gibraltar, Europa Point Campus, GX11 1AA, Gibraltar)

Establishing a Baseline Characterisation of Marine Benthic Taxa and Trophic Structure in Guernsey: Evaluating the Ecological Impact of Local Fisheries

Eve Torode, Jamie Selina Davies & Awantha Dissanayke (University of Gibraltar)

Eve Torode

Torode, E., Davies, J.S. & Dissanayke, A. 2025. Establishing a Baseline Characterisation of Marine Benthic Taxa and Trophic Structure in Guernsey: Evaluating the Ecological Impact of Local Fisheries. pp 199-200 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

The present study provides the first baseline assessment of marine biodiversity and trophic structure in Guernsey's waters, investigating the ecological impacts of varying fishing pressures using mono-Baited Remote Underwater Video systems (mono-BRUVs). Deployments were conducted across three spatially distinct sites representing varying relative fishing pressure: Herm (low), Boue Blondel (moderate), and Great Bank (high), to evaluate community composition, population dynamics, and trophic structure. A total of fifteen species, including twelve commercially and three ecologically important taxa, were detected during the study. Results reveal a gradient of community complexity and community simplification plausibly linked to higher fishing pressure and the dominance of lower trophic level taxa, likely resulting from the reduced predator abundance at heavily fished sites, as exhibited by the Great Bank. Seasonal closures and management measures at Boue Blondel appear to foster more balanced trophic structures, while low pressure at Herm appears to support stable and even communities despite lower species richness. Herm's minimal detection rate is reasonably assumed to be a result of confounding limitations in the experimental design, technical difficulties and habitat complexity that, while not unsuitable, is less preferable compared to the other clear biotypic habitats. Consistent with this, the study would have been better positioned by locating the Herm site to within the Humps Ramsar site more effectively to capture species presence, while maintaining low-fishing effort requirements. Methodologically, mono-BRUVs proved effective for non-destructive benthic trophic level assessments, though limitations such as bait bias and video quality were noted. Effective use of mono-BRUVs requires comparable experimental designs and deployment strategies that align with specific research goals and environmental conditions to ensure accurate and robust data-sets. The study recommends implementing enhanced matrices for video analysis and integrated monitoring programmes that combine complementary survey methods. Given Guernsey's unique ecological and socio-economic context, adaptive, locally informed management-approaches are essential to address island-specific vulnerabilities and to support the long-term resilience of both biodiversity and the fishing sector. For this reason, the study encourages adaptive ecosystem-based fisheries-management as an essential strategy to sustain biodiversity and sector resilience, especially considering increasingly variable marine conditions.

Eve Torode, Jamie Selina Davies & Awantha Dissanayke (University of Gibraltar)

I am Eve Torode, and I am doing this as part of the partial fulfillment of my MSc at the University of Gibraltar in Marine Science, along with Marre, who spoke earlier. My study was based in Guernsey.

I wanted to establish a baseline characterisation of marine taxa in Guernsey, especially in relation to trophic structure. A short-term study was never going to address the full question, but the goal was to see if the fishing industry, both commercial and recreational, is having an effect on our local waters and the community-

composition of benthic taxa.

I conducted this study by deploying mono-BRUVs in three areas of varying fishing pressure. The lowest-pressure site was Herm, identified by Sea Fisheries as having lower fishing pressure, predominantly potting, which made it an ideal control-area. The middle-pressure site was Boue Blondel, a reef to the west of the island, quite far out and deep. The highest-pressure site was the Great Bank.

Each deployment-day consisted of six deployments of 50 minutes each, yielding a large amount of video for analysis. Regarding mono-BRUVs, there is a lot of discussion around single-camera versus stereo setups and the best way to analyze the footage. I tested different analysis-techniques. I used a method called N-Max, which involves five minutes on, five minutes off, and I used also OPUE, which aggregates all observations and divides them at the end. However, I found these methods tended to under-represent species-richness; so I enhanced the dataset by including species not captured in those standard parameters.

The results largely aligned with my projections: fishing impacts biodiversity, particularly the benthic communities in Guernsey. One site showed slightly different parameters, which I attribute to a less ideal deployment-location. Unlike the other sites, this was a transition habitat just in front of a bay, relatively shallow, rather than a full reef system. Despite this, we still observed notable catches and were able to conduct size-analyses across all sites.

One challenge is communicating findings such as trophic-simplification or predator-loss to policymakers and fishery-managers in a way that leads to constructive management-change. I have been using confidence-matrices for this purpose. Each box contains a single statement highlighting the study's outcome and the level of confidence in that conclusion. While scientists can interpret nuances in the data, this approach expresses confidence in terms like "highly likely" or "definitely," which helps decision-makers understand the implications clearly.

Q&A

Myles Darrell: How do you go about communicating these findings, like trophic-simplification or predator-loss, to policymakers and fishers in a way that leads to some kind of constructive management-change, because that's something we are struggling with here in Bermuda?

A: That's definitely a big issue. I have been using something called confidence-matrices, putting one statement in each box, and indicating how confident I am in all the data, so they know that. Whereas in science, we can all understand if the data seem to show this, but it could also mean, putting it in terms of maybe, highly likely, and definitely, I think, really helps.

Invasive Species dominate tree canopies in Bermuda's protected areas

Alison Copeland[1], Adrian Brennan[1] & Wayne Dawson[2] (1 Department of Biosciences, Durham University; 2 Department of Evolution, Ecology and Behaviour, University of Liverpool)

Alison Copeland

Copeland, A., Brennan, A. & Dawson, W. 2025. Invasive Species dominate tree canopies in Bermuda's protected areas. pp 201-202 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

Bermuda is a subtropical, oceanic archipelago of 54 km^2 in the western North Atlantic. Its 400 years of human habitation resulted in over 1400 plant-species introductions for ornamental purposes, agriculture, or wind-breaks. Our recent inventory shows Bermuda has a vascular plant flora of 1587 species from 162 families, with 89.8% non-native species. Of the 52 invasive species, 48% are trees and shrubs. To investigate the prevalence of woody invasives, we surveyed canopy-forming species in 16 Bermudian protected areas.

In upland woodlands, we identified 54 species of trees, palms and shrubs; 20 species were invasive, 13 naturalised and 13 native. The uplands were invasive-dominated, with the 11 most abundant trees being invasive species. The most numerous upland tree was Allspice *Pimenta dioica*, followed by Surinam Cherry *Eugenia uniflora* and Spiny Fiddlewood *Citharexylum spinosum*.
We found 47 species in coastal habitats, including 19 invasive, 10 naturalized and 13 native species. The most numerous coastal tree was the native Bay Grape *Coccoloba uvifera*, followed by the invasive Casuarina *Casuarina equisetifolia*, invasive Brazil Pepper *Schinus terebinthifolia* and the invasive Madagascar Olive *Noronhia emarginata*. Coastal canopies were formed of 51% invasive or naturalised trees, 48% native trees and 1% others, compared to upland habitats where 98% of trees were invasive or naturalised and only 2% native. These results demonstrate the necessity of protecting the vegetation of coastal protected areas from damaging developments, recreational activities and erosion, so that native-species populations and resistance of native communities to further invasion are maintained.

Alison Copeland[1], Adrian Brennan[1] and Wayne Dawson[2] (1 Department of Biosciences, Durham University; 2 Department of Evolution, Ecology and Behaviour, University of Liverpool)

The subject of my PhD is Bermuda's flora in general. As Myles Darrell alluded to last night in his Ground Lecture, Bermuda's flora is largely invasive and naturalised; so, by default, this is also an invasive-plant project.

I'll run through my poster. The first box is an introduction to Bermuda's flora. We published a paper in March (Copeland & Dawson), and there is a QR code *(right)* linking to it. The main finding: from a literature search, we compiled a database of 1,587 vascular plant species. Of these, 89% were not native to Bermuda. Using a classification scheme described in the paper, 52 species were classified as invasive. This forms chapter one of my thesis.

Chapter three of my thesis looks at how this translates to the landscape. Over two winters, I surveyed 16 of Bermuda's national parks and nature reserves. We established 246 canopy-plots, each 20 metres by 20 metres, and counted all trees, palms and shrubs. We recorded 30,873 trees across 65 species. Only 14% of these were from 18 native species, while the remaining 86% were from 47 non-native species.

In an analysis of proportions of native versus non-native trees, the main takeaway was that parks along the south shore, the windward shore, had more native-tree canopies, while most others were dominated by non-natives. Of the 16 parks, 10 had more than 95% non-native trees; four had 99%; and one had 100%. At Warwick Pond, for example, only four plots were surveyed, and not a single native tree was found. At

Seymour's Pond, managed by the Audubon Society, we found just one Bermuda cedar out of 436 trees counted.

Within the non-native trees, we also identified invasive species – defined here as non-native trees forming self-sustaining populations that are actively spreading across the island. We recorded 20 invasive species out of 65 (31%), which made up about 85% of all trees recorded island-wide.

We also compared coastal versus upland plots. Coastal plots were less invaded: 48% native and 51% invasive or naturalised. Upland plots were much more dominated by invasives (98% of the canopy) with only about 2% native species. The main contributors in upland areas were species like Surinam cherry and Allspice. Along the coast, *Casuarina* and Brazil pepper *Schinus terebinthifolia* were dominant.

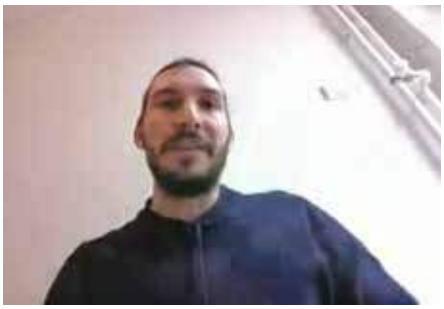
The good news is that Bermuda's three endemic trees – the Bermuda cedar, Bermuda palmetto, and Bermuda olivewood – still have a visible presence in the canopy, reflecting historic tree-planting efforts in national parks. Protecting native vegetation in coastal areas is important, especially against development or damaging recreational activities.

Looking forward, I am comparing the standing canopy with the seedling layer underneath. In some native-dominated canopies, the seedling layer is invasive-dominated, indicating future changes.

I would like to thank Durham University and the Bermuda Botanical Society for funding the work.

Ants of the Akrotiri UK Sovereign Base Areas (Cyprus)

Jakovos Demetriou, Christos Georgiadis, Evangelos Koutsoukos, Lech Borowiec, Helen E Roy, Angeliki F Martinou & Sebastian Salata



Jakovos Demetriou

Demetriou, J., Georgiadis, C., Koutsoukos, E., Borowiec, L., Roy, H.E., Martinou, A.F. & Salata, S. 2025. Ants of the Akrotiri UK Sovereign Base Areas (Cyprus). p 203 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

Located at the southernmost point of the island of Cyprus, the Akrotiri UK Sovereign Base Area is a biodiversity hotspot for migrating birds, including a designated Ramsar Site, Special Protection Area and Special Area of Conservation. Throughout DPLUS200, a Darwin Plus project funded by the UK government, we surveyed the ant-biodiversity of the Akrotiri SBA. We identified 52 taxa, including twelve endemic and nine non-native species, which collectively amount to 59% of the 88 ant species known from Cyprus. Amongst these, four taxa were first recorded for Cyprus, the non-native *Monomorium exiguum* was first reported from natural habitats in the Mediterranean and the little fire ant *Wasmannia auropunctata* was detected in the Cyprus UK SBAs. Structured seasonal samplings in 10 habitat-types showed higher percentages of non-native taxa in man-made habitats and higher percentages of endemic taxa in natural habitats. Despite its small size (123 km^2), the Akrotiri SBA is an important biodiversity hotspot for Cypriot ants. However, urbanisation and land-use regimes seem to affect endemism-maintenance and biological invasions. Nevertheless, further research is necessary, especially regarding the management of invasive non-native species, *i.e. W. auropunctata*, as well as the conservation of endemic species *i.e. Oxyopomyrmex pygmalioni* and *Temnothorax akrotiriensis*.

Jakovos Demetriou[1,2,3], Christos Georgiadis[4,5], Evangelos Koutsoukos[1,2,4], Lech Borowiec[6], Helen E Roy[7,8], Angeliki F Martinou[1,2,9], Sebastian Salata[6]

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Persistence, Accuracy and Timeliness: Finding, Mapping and Managing Non-Native Plant Species on the island of South Georgia

Bradley Myer (Indigena Biosecurity International)

Bradley Myer

Myer, B. 2025. Persistence, Accuracy and Timeliness: Finding, Mapping and Managing Non-Native Plant Species on the island of South Georgia. p 204 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

South Georgia Island, a remote sub-Antarctic ecosystem, is recovering from the long-term impacts of introduced mammals such as reindeer and rodents. With these pressures removed, the focus has shifted to restoring native biodiversity by managing invasive non-native plant-species. Indigena Biosecurity International is supporting this effort through a strategic and spatially driven programme, targeting 35 of the 42 known non-native species on the island for control to zero-density. Using rapid, multi-season surveys and detailed spatial-data analysis, the team has developed and implemented a robust, adaptive control strategy. Since 2016, seven species have been eradicated successfully and ten new introductions have been prevented from establishing. This poster outlines the programme's methodology, key results, and lessons learned from one of the world's most challenging conservation environments.

Bradley Myer (Indigena Biosecurity International)

Bailiwick Eelgrass Project

Mel Broadhurst-Allen (Alderney Wildlife Trust)

Mel Broadhurst-Allen

Broadhurst-Allen, M. 2025. Bailiwick Eelgrass Project. pp 205-206 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

The Bailiwick Eelgrass Exploration Project (BBEP) aims to record and raise awareness of eelgrass (also known as seagrass) across the Bailiwick of Guernsey, through citizen-science. This includes common eelgass *Zostera marina* and dwarf eelgrass *Z. noltii* species. BEEP is a volunteer-led initiative, set-up in 2019 by the Alderney Wildlife Trust, La Société Guernesiaise, Biodiversity Partnership and Guernsey Biological Records Centre, supported by Seasearch. From 2024-2027, BEEP volunteers are undertaking field-based surveys with local communities. Some of the initial results are presented; they will be used to provide appropriate evidence-led conservation recommendations.

Mel Broadhurst-Allen (Alderney Wildlife Trust)

My name is Mel Broadhurst-Allen, and I am with the Alderney Wildlife Trust as their Living Seas Coordinator. I am presenting this poster on behalf of several organisations across the Bailiwick of Guernsey. These include the Alderney Wildlife Trust, La Société Guernesiaise, the Biodiversity Partnership, and the Guernsey Biological Records Centre, and we are supported by Guernsey SeaSearch.

All of those organisations, back in 2019, set up an initiative called the *Bailiwick Eelgrass Exploration Project* – or BEEP, which is a bit easier to say. We created this project because there was a significant lack of data regarding seagrass, or eelgrass as it is known locally. The aim was to work with our community to record and raise awareness of eelgrass across the islands.

For context, there are two different species of eelgrass within our waters: common eelgrass *Zostera marina* and dwarf eelgrass *Zostera noltei*. Over the last four or five years, we have been taking out different members of the public and stakeholder-groups – marine users and volunteers – to record eelgrass across our shores. We now have a good sense of where those beds are located, but we still do not know how healthy they are. As you can imagine, without that information, it is difficult to recommend the most appropriate conservation techniques or measures for those eelgrass-beds.

Last year, alongside our volunteers and partner organisations, we set up a small assessment that will run until 2027. We are taking our community out during low tides to study eelgrass and, using a range of survey-techniques, we are examining how healthy those beds are. This includes plant-morphometrics, using quadrats, showing the community how to use them, recording the number of shoots, measuring blade-length, and checking for blackened tips that may indicate health-issues.

We are also initiating carbon-stock analyses. As part of our link to SeaSearch, we record everything within and around the eelgrass-beds, including the surrounding habitat. Recently, we have been gifted some seawater-testing equipment, allowing our volunteers to collect data on parameters such as temperature and dissolved oxygen. They are getting nicely wet while doing so!

By the end of 2027-2028, we aim to provide and publicise a range of conservation-measures based on these findings.

Our early results suggest that the beds are quite similar between 2024 and 2025, though they differ slightly between specific sites. We hope to develop a variety of conservation-measures. These could include promoting awareness for different eelgrass-beds, initiating restoration-efforts such as planting new seeds or translocating adult leaves, or focusing on recovery where simple actions like regular beach-cleans might be sufficient.

We have also identified that freshwater and land-use runoff are major pressures on these habitats. So, part of our next step is to work with local government agencies to find ways to divert runoff away from eelgrass-beds.

So that's it – that's our little BEEP project.

Q&A

Myles Darrell: Are you seeing differences in how each

species responds to the local pressures?

A: Yes, certainly. Dwarf eelgrass is found in a very sheltered location further up the shore. Some of the pressures there are associated with moorings that have been left over time. We are quite pleased that our local government agencies have actually spoken to some of those mooring-owners, and they have moved them out of the way; this has been brilliant, and we can now monitor those differences. We can we actually see a difference in the blade-growth, and how dense that bed will get. And tractors as well: there is certainly some signs of tractor-use on the lower-shore eelgrass, which is common eelgrass that is more impacted by freshwater runoff. Unfortunately, some of the boat-operators might not see where the eelgrass is, when putting their anchors down, or dropping moorings. So, different impacts, which are important because, in 2028, we have to give different conservation recommendations based on where they are.

Bugs in our drawers

Laura McCoy (Manx National Heritage)

Laura McCoy
Photo: Dave Kneale

McCoy, L. 2025. Bugs in our drawers. p 207 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

The Manx Museum holds over 78,000 entomological specimens, forming the largest component of its natural-science collection. These pinned insects, some dating back to the late 19th century, represent an invaluable resource for understanding biodiversity, ecological change, and climate-impacts over time. This poster presents the early stages of a long-term conservation and collections-care project designed to rehouse, re-catalogue, and improve access to this extensive archive. Through volunteer-led efforts, outdated cabinets are being replaced with conservation-grade storage, specimens are being reorganised taxonomically, and obsolete or non-local material is being responsibly deaccessioned. With support from generous donors and a growing network of collaborators, this initiative is not only safeguarding the collection but also preparing it for future digitisation and use in research, education and environmental policy.

Laura McCoy (Manx National Heritage)

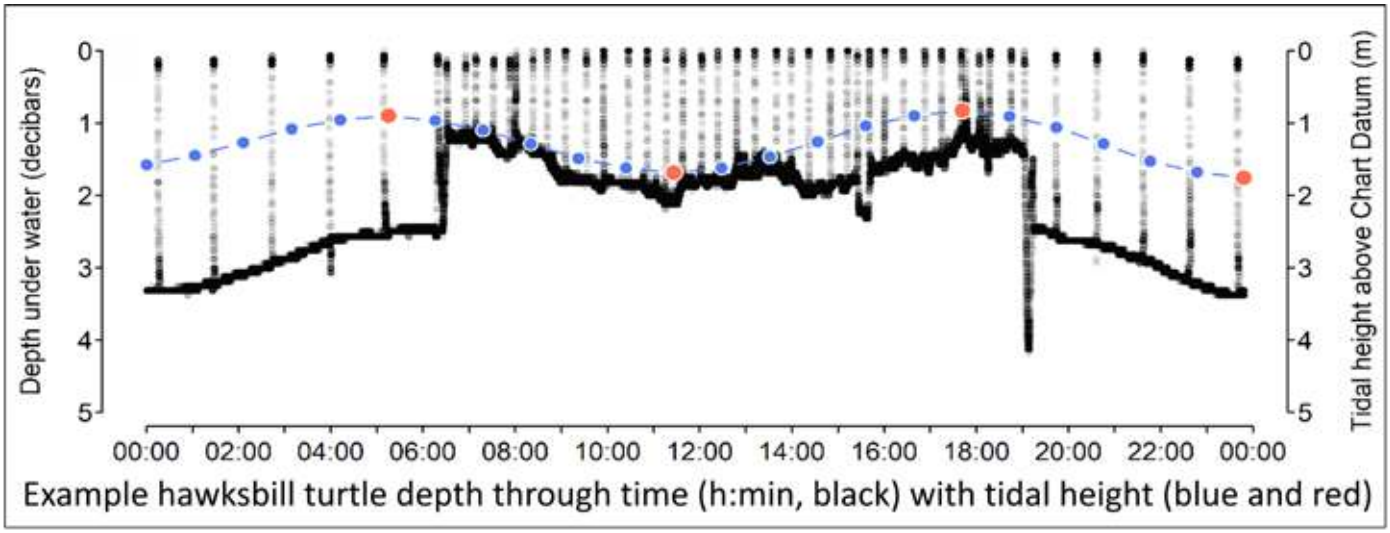
Sea turtles at shallow depths: from foraging in a shallow lagoon to crossing an ocean basin

Kimberley L Stokes, Nicole Esteban, Holly J Stokes, Paolo Casale, Andre Chiaradia, Yakup Kaska, Akiko Kato, Paolo Luschi, Yan Ropert-Coudert & Graeme C Hays (Swansea University)

Stokes, K.L.,Esteban, N.,Stokes, H.J.,Casale, P., Chiaradia, A., Kaska, Y., Kato, A., Luschi, P., Ropert-Coudert , Y. & Hays, G.C. 2025. Sea turtles at shallow depths: from foraging in a shallow lagoon to crossing an ocean basin. pp 208-209 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

Large marine animals are difficult to observe and are therefore often assumed to spend most of their time at great depths. Two tracking studies in the Chagos Archipelago show examples of sea turtles remaining within 2 m of the sea surface for the great majority of time. Knowledge of the three-dimensional space use of marine megafauna is important for conservation planning.

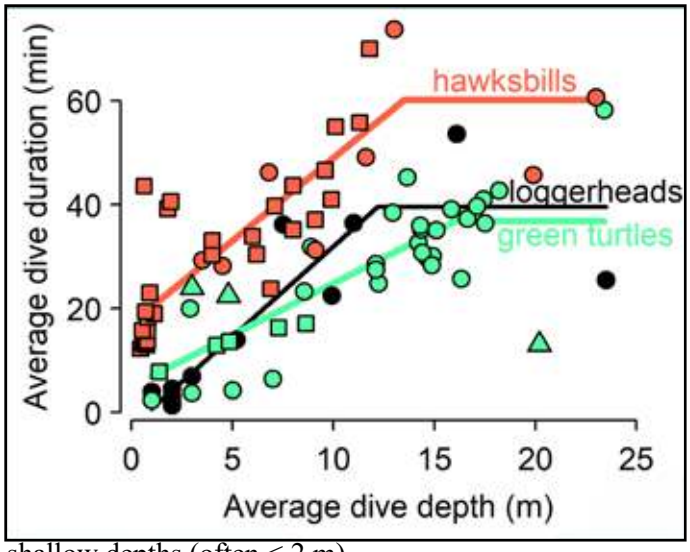
Kimberley L Stokes, Nicole Esteban, Holly J Stokes, Paolo Casale, Andre Chiaradia, Yakup Kaska, Akiko Kato, Paolo Luschi, Yan Ropert-Coudert & Graeme C Hays (Swansea University)



Example hawksbill turtle depth through time (h:min, black) with tidal height (blue and red)

Study one: hawksbill turtles may be shallow water specialists

Hawksbill turtles foraging in Turtle Cove, Diego Garcia were recorded remaining submerged for up to an hour at shallow depths (often < 2 m).



Lung-diving animals limit the size of breath taken before shallow dives to avoid excess buoyancy from air in the

lungs, meaning that shallow dives are much shorter than deeper dives where a full breath can be taken.

Green and loggerhead turtles dive for < 5 min at shallow depths (2–5 m).

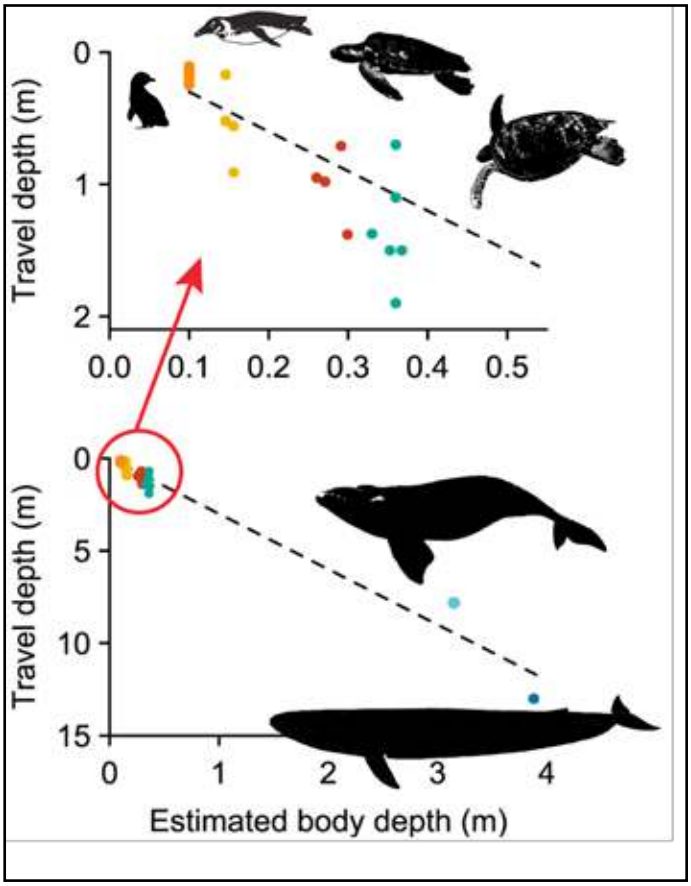
When comparing dive-data from other sea turtle populations, we discovered that hawksbill turtles consistently dive for longer per depth in shallow water (< 25 m) than other species of sea turtle.

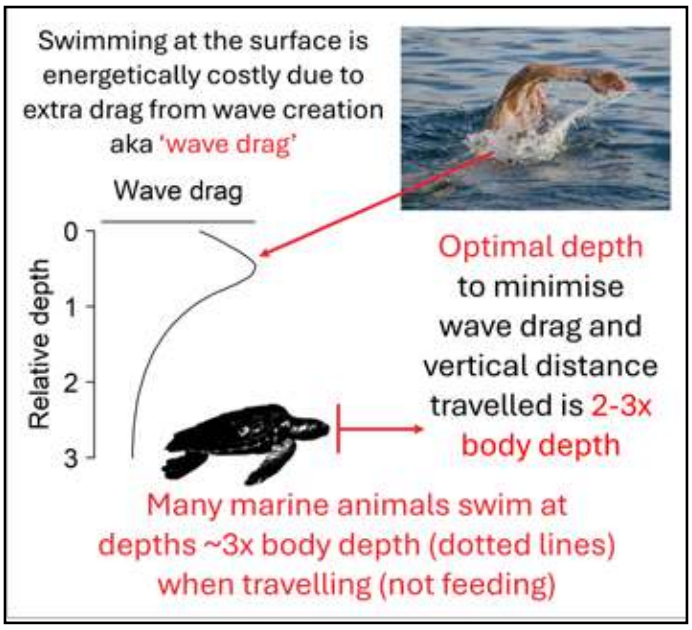
Our study highlights variation in foraging depth strategies between these turtle species for the first time. Depth of foraging habitat is assisting with conservation planning in the Indian Ocean. We found that hawksbill turtles on Diego Garcia in the Chagos Archipelago were choosing to forage in very shallow, spatially confined parts of the lagoon to avoid predators in the deeper areas – where large sharks, such as bull sharks, are found. This kind of extremely localised behaviour leaves them very vulnerable to human interference, although it also presents opportunities for targeted protection, such as on Diego Garcia, where they are well protected.

Stokes *et al.* (2023) High dive efficiency in shallow water. *Marine Biology* 170: 45

Study two: green turtles optimise travel efficiency by remaining within 2 m of the surface during oceanic crossings

Green turtles were tracked with depth-loggers during their post-breeding migration from Diego Garcia. We tracked female green turtles on their return migration away from the Chagos Archipelago, which lies in the middle of the Indian Ocean. These turtles were crossing





open ocean on massive journeys of thousands of kilometres, returning to places such as the Seychelles and East Africa.

Depth-tracking studies during migration are rare because of logistical difficulties and a focus on foraging depths. We found that during the daytime, they swam at shallow depths. We also compared this with published data from other species – such as penguins and whales – and discovered a consistent relationship between the depth at which the animals travelled (when they were migrating and not feeding) and their body-size. Across these various species, they were all travelling at depths of around three times their body depth. By "body-depth," I mean the diameter of the body from the dorsal to the ventral surface – the back to the belly. Travelling at these relatively shallow depths probably allows them to conserve energy by reducing the distance they must travel to the surface each time they need to breathe.

This finding was exciting because it suggests that many migrating animals are present at predictable depths when crossing the ocean. We hope that this knowledge of their three-dimensional space-use can inform conservation-policy around boat-strikes and fisheries-management in known hotspots and migratory corridors, particularly during the seasons when many animals are migrating.

Stokes *et al.* (2024) Optimisation of swim depth across diverse taxa during horizontal travel. *PNAS* 121: e2413768121

Q&A

Paul Edgar, ARC: Did the lower temperatures of deeper water have an effect?

A: For ocean temperatures, I think the temperature-drop would be quite a lot deeper than that,. There are animals that actually go to the depths to cool down sometimes when they need to. But, in this case, when we are talking about within the upper 50 metres, you would expect the temperature to be not that different.

General Discussion on Topic 5

After confirming the recommendations referrng to this topic:

Jodey Peyton: Does anyone have any outstanding questions for any of the speakers? We have had a really fantastic range of presentations this afternoon. I think there was a lot of interest in the work that Tom and Laure were talking about in terms of remote sensing and training opportunities. Borrowing drones sounds interesting. And do any of the speakers want to add anything to the talks they gave earlier?

Andy Pearce: I have a general question, as very much a non-expert I found it fascinating listening to all the intricate measuring work that has been going on. And I just wondered whether people have a feel for how that level of knowledge and measurement across the Overseas Territories compares with what we have in the UK itself. Whether it might actually, in some respects, be more advanced in the UK. I am genuinely unaware of it, but I am just really intrigued whether people have a feel about that. For example, seabird population measurement.

Mike Pienkowski: I was just going to say that it might be the case that what we have in mainland Britain or the British Isles or whatever, in particular is the historical record. We have got a long series of information. My background is birds, although I did spend a lot of time lying on mud watching worms. For the birds, we have got a long history of amateur co-ordinated work giving bird-counts. Thinking of the seabirds particularly, there have been seabird censuses every 20 years since somewhere in the 1960s and there are other monitoring techniques too. It used to be my job, but that was 40 years ago, so I have forgotten it all. My feeling is that some of the novel techniques we have been hearing about are being pioneered in the Territories and elsewhere and may be transferable back. But I am almost a layman too, like John Randall, so others may have better ideas.

Jodey Peyton: Tom Heller has put something in the chat around recommendations.

Andy Pearce: Concerning conservation genetics.

Mike Pienkowski: I think that is something we should pick up, but not now, given that, if people want to add new recommendations at this stage, that would need wide consultation. Some of these issues are covered by generic aspects of the existing draft recommendations. There is no limit on when we put recommendations together; we tend to do it at a conference, but there are other possibilities too, especially if we are having workshops. The big challenge with recommendations is getting nobody to disagree with them too much. We don't really want to start another round, it would tire me out I think. It's a good point to note for the future, and possibly to include in less formal outputs of the conference.

Jodey Peyton: a question from **Catherine Wensink** for Jasper Montana about shifting baselines but I think he might have gone now because he is in Australia.

Catherine Wensink: Something that came up during Jasper's talk reminded me about shifting base-lines across age-generations and how that is factored in to social-science projects?

Jodey Peyton: This is really important and links back to Antje's talk about Tristan and the penguin surveys that were undertaken. Potentially a lot of reasons why those numbers were different.

Andy, has anything stood out for you?

Andy Pearce: The main one, as I said, was that I was struck by the skill and ingenuity and the range of it. It is more than I expected from the relatively thin slice I saw in a place like Montserrat. The other thing that strikes me, a bit of a hobby horse of mine, is the extent of British Government engagement in it. We have a lot of people here, a big resource actually, committed to measuring and conserving, across the Overseas Territories. But, with due respect to Minister Mary Creagh who addressed us earlier, I am not sure I am seeing an equivalent interface on the part of the British Government, in digesting this and supporting it cohesively overall. I don't know whether others have a similar view; I might be being unduly negative there.

Mike Pienkowski: I don't know whether we have anybody from JNCC in the session at present – or, indeed, whether they would be prepared to say anything. But, as a former Director there, I will say something because I am no longer bound by some of the problems. One of the difficulties there is that the Government tends to delegate its technical knowledge to agencies, which actually I think is quite a good thing. It kept me in a job for a long time! But it no longer delegates the ability to develop policy. And the people developing policy do not have the technical knowledge to develop it. I think actually that has got worse with time. Thinking back to when I was representing Britain at various things – we are going back now to the early 1990s at least – then there was a much greater readiness for departmental officials and agency staff to work together. I remember, on one occasion, I found myself as the lead delegate to an EU meeting, simply because I was the technical person but I happened to outrank the official. He seemed to deem me therefore the leader. The point I am making is it wasn't a problem then. There was a degree of trust, and I think there has been a bit of a breakdown, not so much in trust but in confidence, self-confidence and mutual confidence. If any official wants to say I have got this wrong then I am quite prepared to be corrected. But they are probably not allowed to!

Andy Pearce: I recognise a lot of that from my own relatively recent experience, a lack of confidence on the

part of the public service particularly. When I first joined the public service, a lot of people felt these things were in their interests, collective interests, a sense of collective responsibility. That seems to have dissipated, there is now a lot of defensive reaction and protective reaction. I do not know whether it is due to financial pressures or resource pressures, but it is a cultural shift, which is always the hardest thing to make. I think if we could, one of the oucomes of the conference should be to encourage a greater sense of engagement with these things, and not to be afraid of them – to work together with them and this extends particularly into this monitoring and technical side of things. I think that would be a great outcome, if we can give it a push. Very challenging.

Eleonora Manca (JNCC): Thanks Mike and Andrew for the question. I cannot comment myself, as Mike said!

Mike Pienkowski: Thanks, Eleonora. I would not expect you to comment! Also, you are too young to have the long-term view I was commenting on!

Jodey Peyton: If you have any questions for our speakers, please put them in the chat or let me know.

Laure Cugnière (Seabird Watch): Talking about our work with monitoring and using technology, following a Darwin Plus grant on capacity-building in some of the UKOTs, we felt there was the need for a channel to share lessons that we have learnt in monitoring and the existing tools that we have developed. So we have been discussing with Jodey and others in the Forum, and we are looking to create a short-term working group to try to share all these tools and raise capacity for standardisation for monitoring of seabirds and other species. So we have created a site which is in the chat. Please sign up and we will be in touch with some more information, and hopefully that will take off in the next few months. Thank you. I am sorry we could not stay any longer, we double-booked on meetings today.

This is Laure's Chat message: We are interested in assessing interest for a short-term working group nested within UKOTCF on remote monitoring strategy in UKOTs. The knowledge is there to boost monitoring capacity and having a working group as a channel to share lessons learned and existing tools would facilitate rapid take up. Please accept our apologies as Tom Hart and I cannot stay to discuss this further here but you can express your interest as this would be the leading idea for a workshop: https://docs.google.com/document/d/1R6fwAFw19bQDjH8miRTlELLjWGXl_lJE7M4r3osc-zo/edit?usp=sharing

Jodey Peyton: There is quite a lot of interest in your work. We do encourage people to sign up with the link Laure put in the chat.

We have had lots of conversations yesterday around the collection of field-data and recording and taxonomy and taxonomics, from those presenting their work, and a lot about the technology side. I wonder, with limits on budgets, do any of the speakers have any thoughts around how you keep promoting the importance of skilled recording and the value of taxonomy alongside these amazing technologies. Do any of our speakers have any thoughts on that, Jakovos Demetrious, Tom Heller or Nancy Pascoe?

Tom Heller: I have a quick comment on that. I think one of the things, particularly with the recent projects we have been doing with the National Parks Trust of the Virgin Islands, it has been interesting and really helpful certainly within the Kew team having experts on genomic approaches come in and combining that with our field-experience. Between the National Parks Trust and myself and Sara [Barrios], we know the flora and habitats fairly well. Having that genomic expertise in adds that power to it. We can spot things in the data that the genomic specialists don't necessarily pick up on, but they understand the limitations. Combining those different disciplines has been powerful.

Jodey Peyton: Yes, I think it is always making clear in the funding application and to the funders that it is essential for everything to have this kind of the field side, and the taxonomy side. It takes a long time to develop and it's expensive to get it to the level where we can do these incredible species-identifications. I was also wondering about the work in BVI. Could those genomics be used for conservation for the surrounding islands? Could you be distributing, growing seeds and giving to the next door island if they have a species that is rarer, or if there is enough known about genetics to know that they are individual species compared to subspecies, in BVI or other islands?

Tom Heller: So I guess, on the distribution of genetic resources, that's obviously a decision by the owner of those genetic resources, the country they come from. And I think it does need to be informed by a decent understanding of genetic diversities. So you don't want to be inadvertently promoting outbreeding depression and things like that. But there is work that's been done on being able to make more robust assumptions based on the life-history traits. You might not directly know the genetic patterns in that particular population but, if you know things about it's life-history traits, you can begin to make somewhat more robust assumptions.

Jakovos Demetriou: Regarding taxonomy, taxonomy is a dying field of study, classical taxonomy at least, because things are moving forward into more integrated studies and molecular tools. We have also tried experimenting with these molecular tools to find out more about them, but what I would like to stress is there needs to be a combination of the classical taxonomy and more modern tools because what we have been seeing, at least with the insects, is that there are not many sequences available for different genetic markers of species. So, even if you find them, you won't be able to track them down with reference mitochondrial DNA and nuclear

DNA. And the other thing: there have been lots of mistakes from assigning a sequence to a species which was identified morphologically, and then the specimen is lost or totally destroyed. So, what I would like to stress is, since the UK has institutions such as Museums, like the Natural History Museum, it would also be nice to have specimens deposited in various collections so that specialists can look at them and then we would be able to have the specimen and the sequences. For example, we need non-destructive DNA protocols, so at least as we move on we know that we have the species identified correctly. This has been the source of many mistakes, even for very common agricultural species. I would ask colleagues to have this in mind in different projects and conservation in general.

Jodey Peyton: Did you mean having specimens deposited locally in the territories; is that what you mean by having the resources?

Jakovos Demetriou: I would say make them as available as possible. It would be lovely to have, at the local level in each Overseas Territory, a place where specimens are deposited – and, if that is not available, because I know that needs resources and a dedicated staff and there is not always the capacity to do so, at least to have specimens deposited somewhere where most people in the UKOTs will have them available for examination or loan.

Jodey Peyton: I do know that some natural history museums do have the facility to loan specimens but we can certainly ask if not.

There is a massive project going on in the UK to digitise specimens. It is a multi-million pound project, a really good step in that direction. In the sessions yesterday we were talking about the repatriation of some specimens from St Helena being put back on island after leaving the island. It is also very important for people to have that connection to specimens even if it is not for scientific purposes, but for cultural or other reasons. It is a really good point to make. Thank you Jakovos, that was great.

There is a question for Kirsten. **Catherine Wensink** asks: "On eDNA, where do you see this in 10 years' time? Identifying how many insects pollinate a flower?"

Kirsten Harper: There's actually pollinator eDNA work going on right now. I am not particularly familiar with it; so I can't answer too much on it. I think for sure we will be able to dig in more abundance aspects of eDNA. Like I said, it's come a long way but you know you still do have to interpret results with caution. And we are expanding into air eDNA, that seems to be the next big thing: extracting eDNA from air samples. So yes, I think it is just going to keep on evolving, especially as the reference data-bases get better, so with people putting in more reference-data, especially endemic species. One thing I think I might be missing for particular island endemic species are any publicly available reference data-bases. So I am not seeing them in my data even though they may be there. So the more reference data-bases there are, and the more comprehensive they are, the better our results will be.

Jodey Peyton: As you say, linking the database specimens to the eDNA is needed. The Bold database developed for the project that we have for invertebrates in Diego Garcia is an example. Those specimens are put in alongside the identification of the species. It is important to get those rarer species in there too.

Jodey Peyton: https://boldsystems.org is a repository that has been used

Thank you again for the great questions and the comments in the chat.

Mike Pienkowski: Thank you everybody. There were some very interesting discussions in that session, both after the talks and at the end, as there have been in previous sessions too. Thank you to the team of Andrew, Jodey and John, and Keith who has been rapporteuring again.

Main topic 6: Identifying and preparing for future challenges and opportunities

Chairing: Dr Mike Pienkowski (standing in for Sarita Francis (Montserrat)); Question-master: Jodey Peyton; Rapporteur: John Pinel (Jersey)

Introduction

Dr Mike Pienkowski, UKOTCF Chairman (standing in for Mrs Sarita Francis, Executive Director, Montserrat National Trust)

Good day, everyone, and welcome to Session 6, titled "Identifying and Preparing for Future Challenges and Opportunities."

I must start by noting that I am not Sarita Francis, who was due to chair this session. Sarita sends her sincere apologies and best wishes. There is, unfortunately, a major meeting taking place today in Montserrat related to the Organisation of Eastern Caribbean States, of which Montserrat has recently taken over the presidency. Due to logistical issues – including Montserrat's main meeting room being out of action – the Montserrat National Trust offices have been taken over, rather than just their main meeting room which had been booked – and Sarita's office is now serving as as an emergency facility. We extend our sympathies and support to the team in Montserrat as they navigate these challenges.

As a small gesture, I am wearing a Montserrat tartan tie today and recall my many collaborations on the island, including work as lead editor of the booklet on Montserrat's natural heritage.

There are further changes to our session line-up. Lord John Randall, originally scheduled to moderate the Q&A, has been called back to Parliamentary duties in the House of Lords. He and Jodey Peyton kindly coordinated a partial swap during the earlier session, and Jodey is now back once more to facilitate today's questions – thank you, Jodey, for your adaptability.

The one fixed point in our session team today is John Pinel from Jersey, who continues in his role as rapporteur – thank you, John, for your steady support.

We have a strong panel lined up for this shorter session; so without further delay, let's move into the first presentation.

Dr Mike Pienkowski

Dr Jodey Peyton

John Pinel

Roots of Resilience: How Nature Fights Climate Change in the BVI

Katie Medcalf, Nancy Pascoe, Samuel Pike (Environment Systems & National Parks Trust of the Virgin Islands)

From top: Katie Medcalf, Nancy Pascoe, Samuel Pike

Medcalf, K., Pascoe, N. & Pike, S. 2025. Roots of Resilience: How Nature Fights Climate Change in the BVI. pp 214-218 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

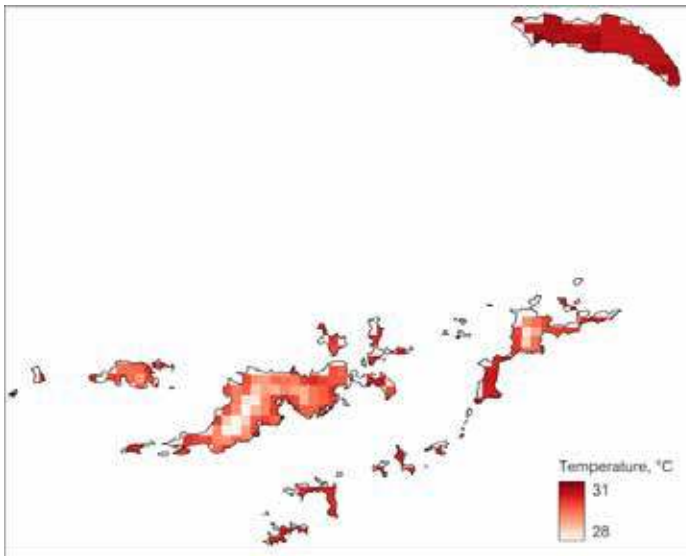
This project assessed the impacts of climate change on the British Virgin Islands' flora and fauna, using the latest high-resolution climate predictions modelled at a locally relevant scale. Rising temperatures, prolonged droughts, and more frequent storms are increasing risks such as flooding and erosion. The study highlighted the vital role of protected areas in mitigating these effects and demonstrated how these natural ecosystems benefit the islands as a whole. It also explored opportunities to strengthen climate resilience by expanding and strategically managing these areas. By safeguarding ecosystems, protected areas buffer environmental shocks and support long-term sustainability—positioning the BVI to adapt to future climate uncertainties.

Katie Medcalf[1], Nancy Pascoe[2], Samuel Pike[1] (1. Environment Systems & 2. National Parks Trust of the Virgin Islands)

Introduction

The British Virgin Islands (BVI) are experiencing the present-day realities of a warming climate, evident in the increased intensity of storms, as seen during the 2017 hurricane-season, and more frequent localised flooding and prolonged droughts. While these challenges are significant for small island states, the BVI possess a powerful ally in their natural ecosystems. These biodiverse habitats act as a critical life-support system, providing essential services such as clean air and water, and mitigating the effects of climate-change through storm-surge protection and soil-stabilisation.

This work was part of a Darwin Plus Project DPLUS180, *Integrating climate change resilience into protected area design and management*. It was a collaborative initiative between the National Parks Trust of the Virgin Islands (NPTVI) and Environment Systems. The project's stated aims were to create BVI-specific climate-change modelling data and deliver it via a web-dashboard to facilitate targeted NPTVI fieldwork, inform national-level decision-making, and raise public awareness.



WorldClim predicted temperatures for 2041-2060 (Celsius) for the BVI

August 2022 workshop: 22 people from 8 Departments and agencies

Furthermore, the project sought to build resilience into the BVI protected-area network by identifying sites that provide essential ecosystem-services and contain significant biodiversity-value in the face of a changing climate. By integrating scientific evidence, advanced technology, and a co-creation methodology, the project quantified successfully the role of natural ecosystems in building climate-resilience and translated complex data into actionable knowledge for local stakeholders. This paper outlines some of the project's methodology, key findings, and final outputs, providing a model for evidence-based conservation that is both scientifically robust and practically useful.

Methodology: A Data-Driven and Collaborative Approach

The project was founded on the principle that conservation must be informed by strong, credible evidence. The methodology combined a broad range of data with a co-creation process to ensure that the project's outputs were both scientifically sound and relevant to local needs. The overall approach was to identify biodiversity-rich and resilient areas by modeling the likely impacts of climate-change and creating scenarios of potential outcomes for protected areas and the services they provide.

The baseline for this analysis was an extensive body of existing marine and terrestrial biodiversity-data collected over two decades of previous Darwin Plus projects, including information on plants, coastal habitats, iguanas, turtles and birds. This project utilised this legacy-data to identify the most biodiversity-rich areas and combined them with historical, current and future climate-data to identify sites with greater resilience to climate-change. Altogether, over 500 datasets were used in this project.

A critical first step involved the acquisition and processing of climate-data. Environment Systems Ltd. (ESL) obtained and processed high-resolution WorldClim climate-data for several time-periods (1970-2000, 2021-2040, 2041-2060, 2061-2080, and 2081-2100). The future climate-predictions were based on two shared socio-economic pathways: SSP245, which assumes climate-protection measures are implemented, and SSP370, which represents policies focused on national security over environmental concerns. The use of these climate-data, along with local weather-data from the Department of Disaster Management for ground-truthing, marked the first time this type of analysis had been undertaken in the BVI.

The biodiversity-data supplied by NPTVI and other local and international partners were utilised for a new type of analysis, as ecosystem-services had never before been mapped on a Territory-wide scale. Through a workshop held in August 2022, which included 22 participants from various BVI government agencies and departments, a common direction and goal were established.

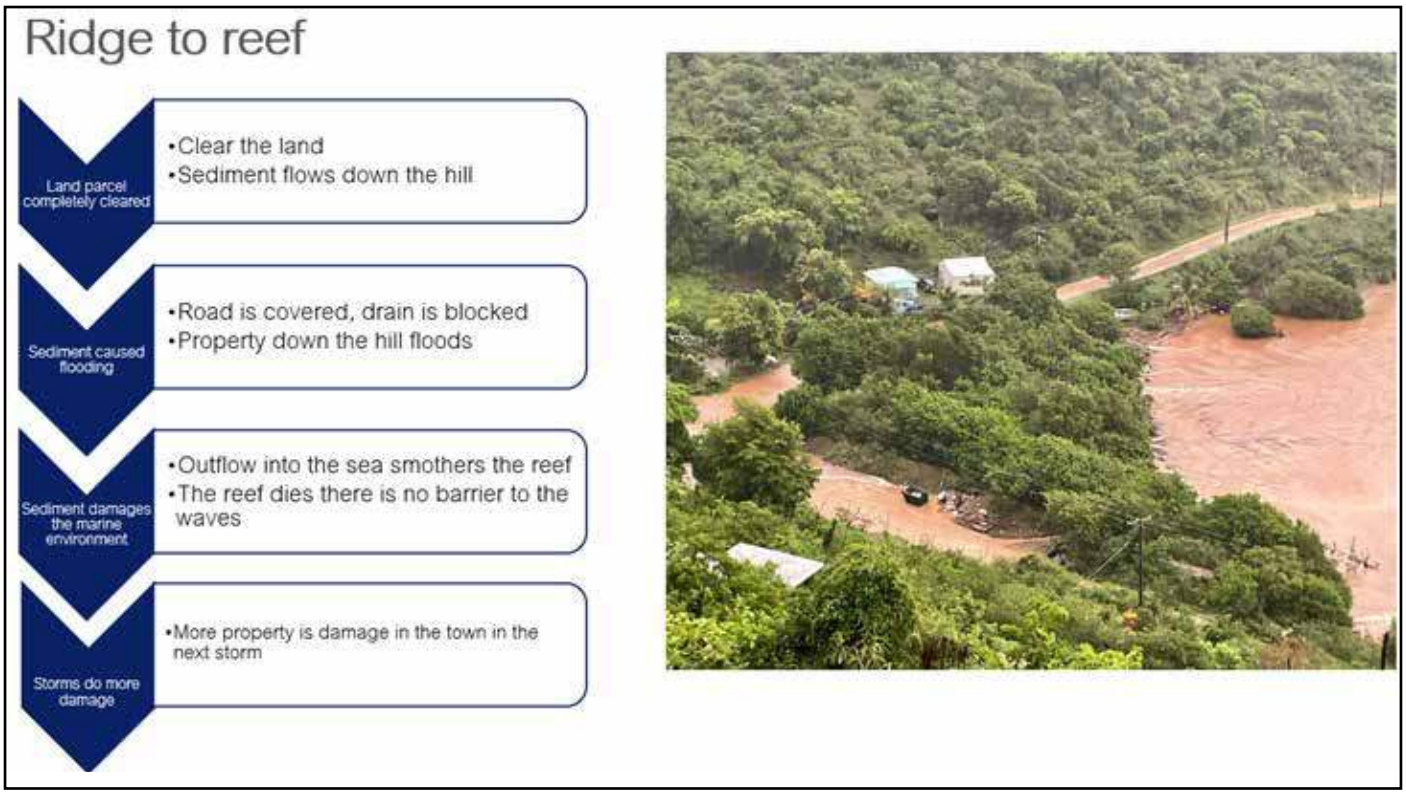
The SENCE tool, Environment Systems' internal natural-capital evaluation-tool, was used to create maps and future-scenario models following climate-change, to be used in the evaluation of the BVI's protected areas. This process of creating scenario models showing the impact of climate-change on ecosystem-service provision was a critical component of the project. This was made possible by peer-reviewed input gathered during an online technical symposium on 23 August 2023. The symposium comprised nine key international experts from organizations such as the Royal Society for the Protection of Birds (DPLUS 196), Royal Botanic Gardens Kew (DPLUS 183), the UK National Oceanography Centre (DPLUS 152 & 150), Portsmouth University (DPLUS 160) and the Marine Conservation Society (DPLUS 111). A second expert meeting was held with four scientists from The Nature Conservancy, who provided additional data and expertise on Caribbean regional ecosystem-mapping. In total, over 70 models were created, representing the first time this type of integrated climate and habitat analysis was conducted for the BVI.

Key Findings: Ecosystems as Climate Mitigation Tools

The project's analysis confirmed that the BVI's natural habitats provide critical climate mitigation and resilience benefits. The findings were distilled into a series of key maps that illustrated the role of nature in four critical areas: biodiversity, climate-regulation, storm-surge vulnerability, and slope-stability/erosion-risk.

The data collected and modeled for this project underscored the immense value of intact natural systems in providing essential ecosystem-services, which are fundamental to the islands' resilience.

- Climate Regulation: The research confirmed that a healthy and diverse ecosystem is essential for climate-mitigation. Natural ecosystems, especially native forests, provide clean air and water, help attract rainfall, and thus mitigate drought, while also playing an important role in cooling the air.
- Mitigation of Storm Impacts: The analysis showed how nature helps by slowing rainfall, allowing it to be absorbed into the soil and aquifers. The roots of



The ridge to reef implications of soil erosion

native trees hold soil together, preventing erosion and runoff, which in turn protects fragile coral reefs from sediment-smothering.

- Erosion Control and the "Ridge to Reef" Connection: The data clearly demonstrated that clearing land, particularly near ghuts (natural drainage channels), leads to sediment running into the sea. In the absence of healthy ponds and mangroves, this sediment can smother and degrade coral-reef ecosystems. Without reefs to absorb wave energy, coastal areas become highly vulnerable to storm-surge.
- Biodiversity: The project mapped how essential native habitats on the land and seas around the BVI are in supporting and providing biodiversity. Analysis was undertaken to understand which areas on the island would be enhanced by increasing the area of protected sites.

Outputs and Legacy

The Darwin Plus Project DPLUS180, *Integrating climate change resilience into protected area design and management*, has produced several key outputs to ensure its lasting legacy and continued use by the BVI community.

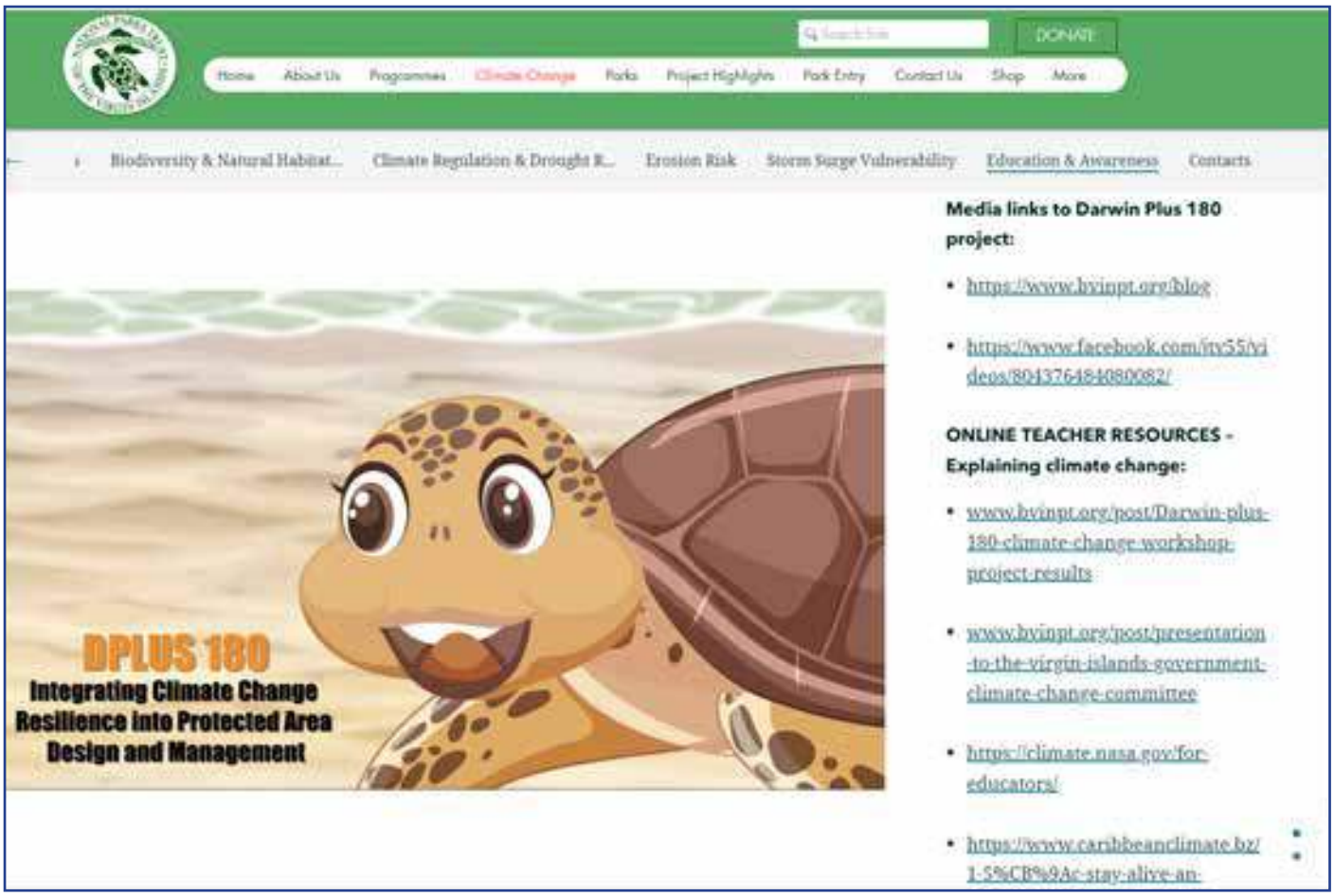
- Monitoring System: A monitoring system was established using satellite remote sensing to identify areas of cleared land or bare ground in near real-time. In addition the productivity of the national parks are monitored continually. These data provide the NPTVI with vital information for targeted investigation and management-actions.
- Public Communication Tools: To communicate the findings widely, a web-based story-map was developed to provide a straightforward, visual explanation of the project. The project-data are accessible publicly on the VI Government Mapping Portal and are usable by the government and the wider community. Additionally, creative communication materials, such as cartoons featuring "Crabby" and "Turtle," were used to explain effectively complex topics to schoolchildren.

Conclusion

The project demonstrated that robust scientific evidence can be a powerful tool for driving conservation-action. By integrating advanced technology with a collaborative approach, the project not only provided a clearer understanding of how climate-change is affecting the BVI but also quantified the immense value of its

Communication material: The storymap web portal: https://storymaps.arcgis.com/stories/0e69167ff8a64d53b373a9162ebc3a4b

On next page: cartoon



natural ecosystems in mitigating these impacts. The project has shown that nature is not merely a victim of climate-change but one of the strongest and most cost-effective solutions. The outputs of this project, including the comprehensive data, monitoring tools, and public resources, will continue to empower the National Parks Trust and the BVI community to build a more resilient future.

Q&A

Mike Pienkowski: Thank you very much for that presentation. I see that you, and I think colleagues, may be here to answer questions. So, I'm going to hand over to Jodey as question-master of this session to take us through those.

Jodey Peyton: We don't have any questions in the chat, but thank you: it's a really fascinating talk. I was wondering, there are the story maps, were they hard to make? I think they're a really beautiful resource. Was it quite easy to do them, or was it more complicated than it looked?

Katie Metcalf: I am going to leave Sam to answer that one, because he was the genius behind it.

Samuel Pike: Not quite. It was Nancy's, and the BVI government built it, really. It was a co-design between myself and Nancy – lots of the words from Nancy, and then me just putting the data in. It needs to be very collaborative and make sure that the target audience was there in terms of the language, and that everything was set up for that. But there are issues with licensing; it is very specific in terms of needing a whole ArcGIS system to be able to do these sorts of things. In terms of the back-end, actually creating it, it's very much like a sophisticated PowerPoint – you drag and drop bits where you want. But it all links into GIS software, so you can bring your maps in and allow people to play interactively with the data. In theory, it sounds simple – but not necessarily simple actually to implement, and it needs someone with a particular skill set. We were able to utilise Nancy's contacts in the government to be able to build that for us.

Jodey Peyton: And I guess you also need a good storyteller to create the content in the first place. Nancy, did you have anything you wanted to share about those or any other part of the project?

Nancy Pascoe: Just to thank Sam and Katie; it was a real joy working with them, and we have worked on previous projects. I encourage any of the other territories. We have used GIS for a long time here in the BVI, in the government as well as within the National Parks Trust. It is such a powerful tool; it really is. This project was something we took on because, as Katie showed in the pictures, Hurricane Irma in 2017 was so devastating. It was a way of not feeling so vulnerable and trying to be more proactive, not just acting like we are always going to be victims of something, and asking how we can plan ahead. There is also the question of how to make youth not be afraid of the future, and say what is their hope. On our website, you can see all the things we can do. We

cannot control what is happening globally, but we can act locally – tree-planting for shade, for example. We have had days of extreme heat in the past few years; it is not just the hurricanes. Extreme heat affects people's lives too, including when you can actually go outside and work. All of us talk about fieldwork – trust me, doing fieldwork in August is a nightmare in the Caribbean these past few years. So, just the act of tree-planting helps. I listened to Stuart Mailer's talk, and I did chuckle when he mentioned the highest point on Cayman being 72 feet – that cracks me up, because our highest point is 1,780 feet at Sage Mountain, which is still not as high as some places. But when it rains, erosion is serious, and flooding that can happen instantly. It does not have to be a hurricane; our town can flood quickly. So it was a great project. I loved working with them and totally encourage anybody else to as well.

Jodey Peyton: That's fantastic, thank you. I think that's the thing, isn't it? That's what these conferences are great for – sharing ideas, context and thoughts, and adapting. It's a really nice example of success again from BVI, so thank you very much. Thank you all. And Mike, I'll hand over to you. There are no more questions in the chat.

Mike Pienkowski: Thank you very much. I've always been impressed by the work of this team and what they can achieve by integrating remote sensing with work on the ground; so thank you very much indeed.

What the future could be – Changes in breeding success of Gough Island's seabird populations in response to the house mouse eradication attempt in 2021

Antje Steinfurth[1], Roelf Daling[1], Lucy Dorman[1], Rebekah Goodwill[1], Hannah Greetham[1], Christopher Jones[1], Vonica Perold[1], Michelle Risi[1], Kim Stevens[1], Trevor Glass[2], Steffen Oppel[1] (1. RSPB Centre for Conservation Science, David Attenborough Building, Pembroke Street, Cambridge, CB2 3QZ, UK; 2. Tristan Conservation Department, Edinburgh of the Seven Seas, Tristan da Cunha, TDCU 1ZZ, South Atlantic)

Antje Steinfurth

Steinfurth, A., Daling, R., Dorman, L., Goodwill, R., Greetham, H., Jones, C., Perold, V., Risi, M., Stevens, K., Glass, T. & Oppel, S. 2025. What the future could be – Changes in breeding success of Gough Island's seabird populations in response to the house mouse eradication attempt in 2021. pp 219-222 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

Gough Island (40°03′S, 9°09′W) in the South Atlantic is part of the British Overseas Territory of Tristan da Cunha. The island is a UNESCO Natural World Heritage Site, Ramsar Wetland of International Importance, Tristan da Cunha Nature Reserve, Important Bird and Biodiversity Area, and an Endemic Bird Area—making it one of the world's most significant seabird breeding sites.

Despite its small size (~65 km²), Gough Island hosts an estimated 8 million birds across 22 breeding seabird species. These include nearly the entire global populations (>99%) of the Critically Endangered Tristan Albatross *Diomedea dabbenena*, MacGillivray's Prion *Pachyptila macgillivrayi*, and the Endangered Atlantic Petrel *Pterodroma incerta*. Other notable species include the Endangered Sooty Albatross *Phoebetria fusca* (~35% of the global population), Atlantic Yellow-nosed Albatross *Thalassarche chlororhynchos* (~20%) and Northern Rockhopper Penguin *Eudyptes moseleyi* (~30%), alongside significant populations of other burrowing petrels and the Tristan Skua *Stercorarius antarcticus hamiltoni*.

The primary threat to the island's seabird populations is invasive House Mice *Mus musculus*, which prey on their eggs, chicks, and even adults. In 2021, the Gough Island Restoration Programme undertook a logistically complex eradication attempt. Although not successful, the baiting operation temporarily reduced the mouse population and improved seabird breeding success significantly. For example, the breeding success for the Tristan Albatross increased from a 17-year average of 29.9% (2004–2020) to 73% (2022-2024), while MacGillivray's Prion success jumped from 6% (2014–2020) to 76% (2021–2023). By 2024, however, breeding success for the prions dropped to 26% due to resumed predation.

These results highlight both the potential benefits of removing mice from Gough Island and the need for their eradication to remain a key conservation priority.

Antje Steinfurth[1], Roelf Daling[1], Lucy Dorman[1], Rebekah Goodwill[1], Hannah Greetham[1], Christopher Jones[1], Vonica Perold[1], Michelle Risi[1], Kim Stevens[1], Trevor Glass[2], Steffen Oppel[1] (1. RSPB Centre for Conservation Science, David Attenborough Building, Pembroke Street, Cambridge, CB2 3QZ, UK; 2. Tristan Conservation Department, Edinburgh of the Seven Seas, Tristan da Cunha, TDCU 1ZZ, South Atlantic)

Gough Island in the central South Atlantic Ocean is situated approximately 380 km southeast of the Tristan da Cunha archipelago. The island is a Ramsar Wetland of International Importance, a designated nature reserve and in 1995, was declared, together with Inaccessible, a UNESCO Natural World Heritage Site.

Despite its small size (~65 km²), it is a globally significant seabird breeding site, supporting an estimated eight million birds of at least 24 species. These include almost the entire global populations of the critically endangered Tristan albatross *Diomedea dabbenena* (Oppel *et al*. 2022), MacGillivray's prion *Pachyptila macgillivrayi* (Jones *et al*. 2021), and the endangered Atlantic petrel *Pterodroma incerta* (Cuthbert 2004). The island holds also significant populations of the endangered sooty albatross *Phoebetria fusca (*~36% of the global population, BirdLife International 2018), Atlantic yellow-nosed albatross *T. chlororhynchos* (~7-15%, BirdLife International 2018), and northern rockhopper penguin *Eudyptes moseleyi* (~30%, BirdLife International 2020). It supports the largest population of Tristan skuas (~1,000 breeding pairs; Ryan 2007) and is home to two endemic landbirds – the critically endangered Gough finch *Rowettia goughensis* and the vulnerable Gough moorhen *Gallinula comeri* (BirdLife International 2021, 2024) – as well as ~80% of the global population of sub-Antarctic fur-seals *Arctocephalus tropicalis* (Bester *et al*. 2019).

The main threat to Gough's wildlife is invasive non-native house mice *Mus musculus* that cause the loss of well over 2 million seabird chicks and eggs on Gough Island each and every year (Caravaggi *et al*. 2019). First evidence of mortality in adult seabirds due to mouse attacks was reported for a Tristan Albatross on Gough in 2021 (Connan *et al*. 2024). Critically, in long-lived seabird species with delayed breeding and low reproductive output, even modest increases in adult mortality may have severe population-level consequences, directly affecting their conservation-status (Oppel *et al*. 2022).

To remove this threat, in 2021, the Gough Island Restoration Programme attempted to eradicate mice from the island in one of the most challenging and logistically complex island-eradications ever ventured, by distributing cereal-bait pellets containing the rodenticide brodifacoum between 13th June and 2nd August using helicopters. Signs of mice rapidly diminished after baiting commenced, and none were detected after 27 days after the first bait application (Samaniego *et al*. 2022).

Therefore, the camera-footage we received in December 2021, with the evidence of mice remaining on the island, could not have hit harder. By April 2022, mice populations had increased exponentially around Base and, by August 2022, there was evidence of mice across the island.

However, while we did not succeed in removing every single mouse on the island, the mouse population did get substantially reduced for a limited time-window, and therefore provided the species breeding on Gough with a scenario of what the island could be like in the absence of mice.

Of the 7 species we monitored for breeding success in the breeding season following the bait-drop, 6 of these species (Tristan Albatross, Atlantic Yellow-nosed Albatross, Sooty Albatross, Atlantic Petrel, Grey Petrel, MacGillivray's Prion) had increased breeding success, providing the evidence that the eradication of mice will deliver the outcome that we always hoped for!

Probably the most pronounced difference in breeding success was observed for the critically endangered MacGillivray Prion. While the breeding success in our monitoring colony had been on average 6% across 7 years (2014 – 2020), breeding success in the three

breeding seasons following the eradication-attempt (2021 – 2023) increased to an average of 76%.

Not surprisingly, however, with the mouse population on the rise, mouse-predation for the MacGillivray's Prion was first observed again, although in low numbers, in the species' 2023 breeding season. In 2024, however, mouse predation intensified, and the breeding success decreased to 26%.

On the bright side, the breeding success for the Tristan Albatross continues to be high even in their fourth breeding season following the operation. This demonstrates also nicely that, while the surface-breeders such as albatrosses are often getting the attention and limelight in eradication operations, it is the small burrowing petrels that are particularly threatened.

Thus, doing nothing is still not an option, and the RSPB stays dedicated and committed to removing the mice from the island in a future second attempt.

Ultimately, the removal of mice from Gough Island should result in 2 million more chicks to fledge each year from the island. That is 2 million more birds each year to help reverse the trends of population-declines across several threatened species.

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Q&A

Mike Pienkowski: Thank you very much for that. I'm really impressed by the commitment and dedication of these teams attempting this. It's one of the few cases where you have to be 100% successful to be successful. And they're sticking with it, and I'm very pleased to say that.

When Antje recorded that, she thought her colleague Harry would be available to answer questions. He is not, actually, for a very good reason: childcare. And I'm delighted by that, because, you know, as an old fogie like me, I'm so pleased that there are continuing generations, young people taking over and continuing the work. But do continue to put any questions in the chat, and we'll send them to Antje so they're waiting for her when she gets back to somewhere within email range. Jodey, have you anything to say?

Jodey Peyton: I know, but Louise has very kindly said if there are any questions, she can pass them on to her colleagues, Antje, so that's fantastic. Thank you, Louise.

Jodey Peyton: I don't know if Louise could answer. Wth regard to the invasive-species management of predators, it is such a nice example of where, very quickly, positive hope can come from a decline to a really positive increase. I was wondering if we know what can happen next. I wonder if we know the next steps for conservation in Gough, but I'll put it in the chat, Louise, and you can maybe pass it on. Thank you.

Louise Soames (in chat box): We are still fund-raising!

Mike Pienkowski: I hadn't realized that Louise wasn't actually on the panel. So I'm belatedly promoting her, but she probably hasn't got anything more to say to that. We did undertake to Antje to get the messages to her.

Now, moving on then, I'm very pleased about the next talk, because I know that Alan Gray's been struggling to connect with us and has succeeded. Because we don't have a recording of his talk, he's going to give it live from the UKCEH. And it's actually a joint talk with Rebecca Cairns-Wicks, formerly of the St. Helena Research Institute – effectively the head of that. But she's been somewhat distracted, as I mentioned earlier, by being elected Chief Minister of St. Helena a couple of weeks ago. So we can understand that she's not here with us today, but she did send good wishes. So, I am now going to hand it over to Alan to give us this presentation.

Ecosystem Integrity Assessments, GBIF

Alan Gray (UKCEH) and Rebecca Cairns-Wickes (St Helena)

Alan Gray

Rebecca Cairns-Wicks

Alan Gray, A. & Cairns-Wickes, R. 2025. Ecosystem Integrity Assessments, GBIF. pp 223-227 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

This paper introduces the concept of ecosystem-integrity as a framework for monitoring and assessing ecosystem condition, structure, and function. The presentation outlines its relationship to international ecosystem-restoration principles, its alignment with the IUCN Red List of Ecosystems, and its potential role in long-term biodiversity monitoring and reporting. The application of ecosystem-integrity assessments is discussed in the context of UK Overseas Territories, with a case-study from the St Helena Cloud Forest Restoration Project. The role of the Global Biodiversity Information Facility (GBIF) as a data-platform for hosting and sharing relevant biodiversity and ecosystem data is also highlighted.

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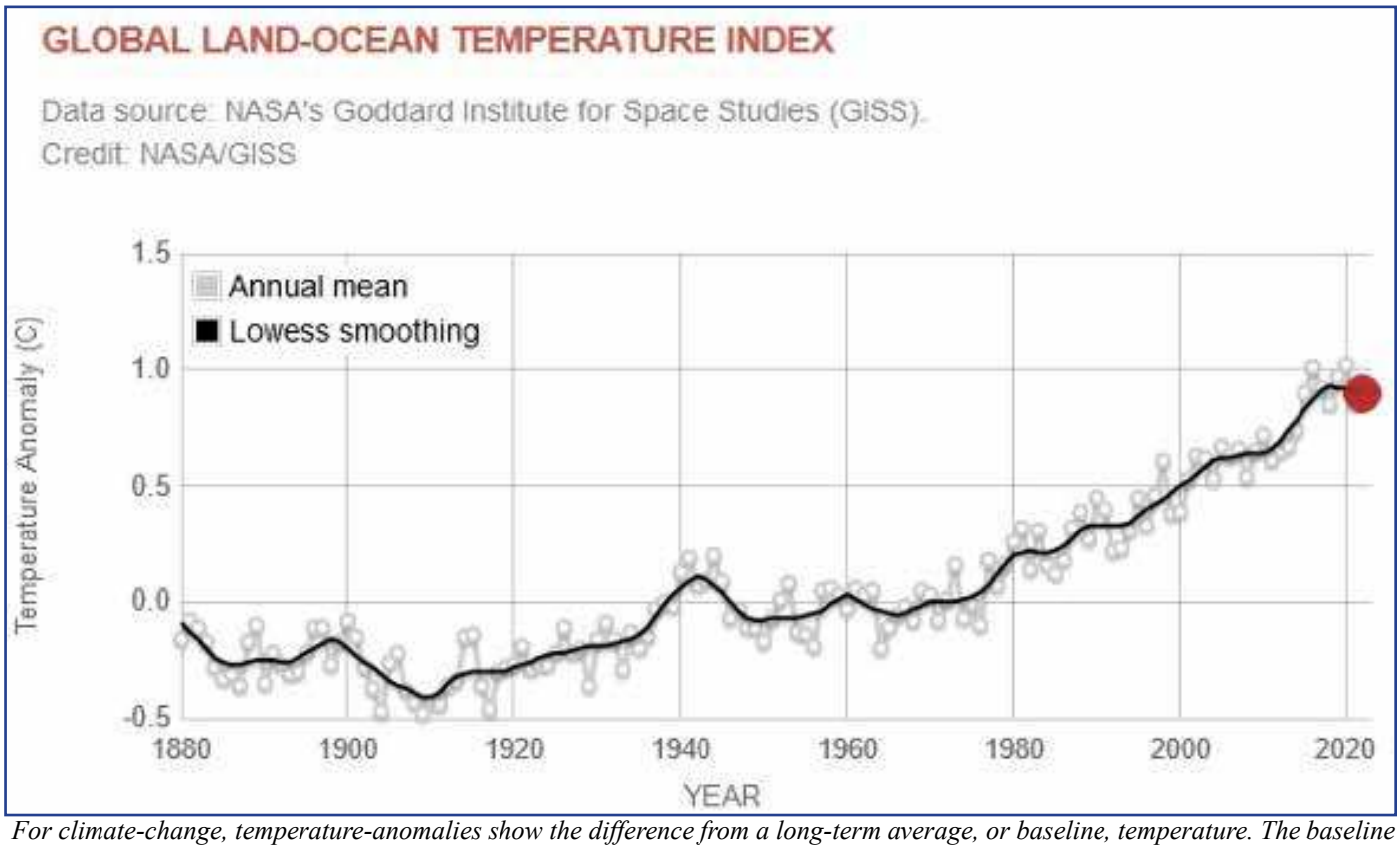
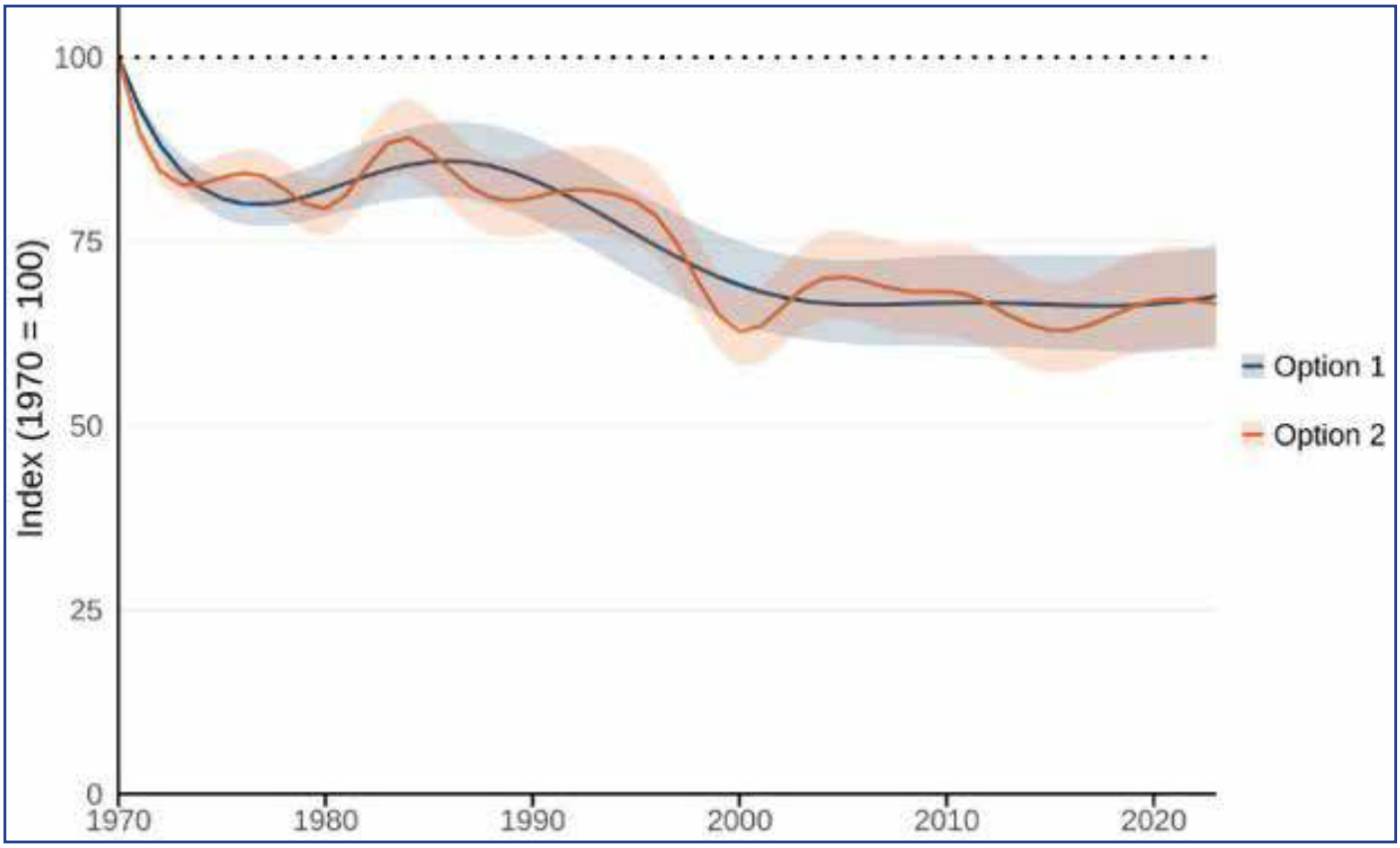
Introduction

Ecosystem-integrity refers to the intactness of ecosystems and their ecological properties, measured through a suite of indicators that capture the extent, quality and function of both biotic and abiotic components. These indicators can also incorporate anthropogenic pressures as proxies for ecosystem-degradation.

The concept aligns closely with global biodiversity and



For climate-change, temperature-anomalies show the difference from a long-term average, or baseline, temperature. The baseline temperature is typically computed by averaging 30 or more years of temperature data. A positive anomaly indicates the observed temperature was warmer than the baseline, a negative cooler.



The graph shows change in relative abundance of species in England 1970 to 2023, (1970 = 100) (DEFRA); Positive scores would indicate that the indicator is above its baseline, negative scores mean it is below, cf climate change.

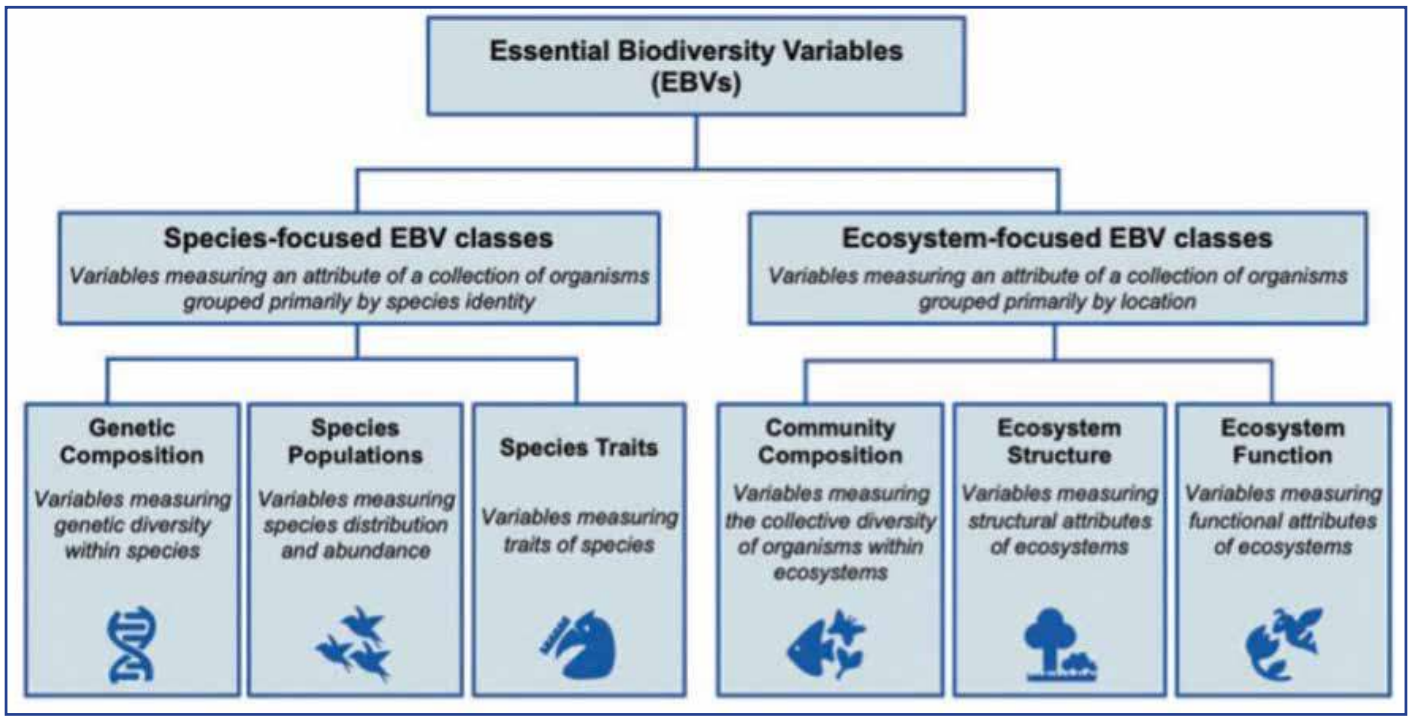
ecosystem-restoration frameworks, offering a means to evaluate change over time against defined reference conditions. Such assessments are essential for meeting targets set within the Kunming-Montreal Global Biodiversity Framework for 2030.

Understanding Ecosystem Integrity

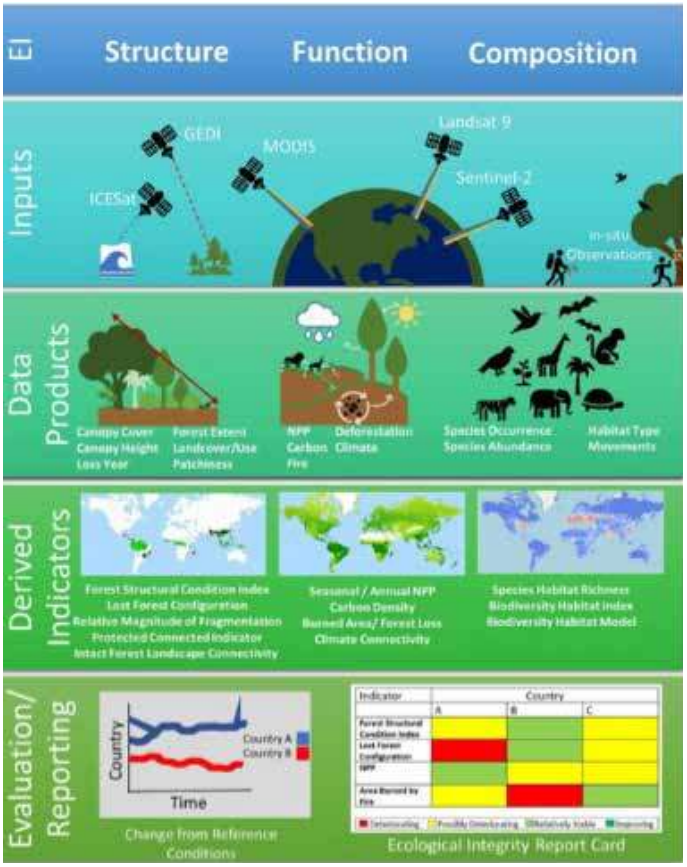
Ecosystem-integrity can be compared conceptually to climate-anomaly assessments – just as temperature anomalies measure deviations from a long-term baseline, ecosystem-integrity indicators measure changes in ecosystem-properties relative to a reference state.

Indicators are derived from essential biodiversity variables (EBVs), which can be:

- Species-focused (e.g. genetic diversity, population-trends, functional traits); or
- Ecosystem-focused (e.g. community-composition, structural complexity or ecosystem-functions such as carbon and hydrological cycles).



Ecosystem-Integrity Essential Biodiversity Variables



Ecosystem Integrity Assessments process

Data may be collected through *in situ* observations or remote sensing, and transformed into indicators (e.g. carbon-density or species-abundance) to assess change through time. These indicators can then inform international reporting mechanisms, including the Convention on Biological Diversity and the IUCN Red List of Ecosystems.

Application to the UK Overseas Territories

Ecosystem integrity assessments are particularly relevant to the UK Overseas Territories (UKOTs), where biodiversity-monitoring is often project-based and short-term. By adopting this framework, territories can begin developing coordinated, long-term monitoring approaches.

Such assessments encourage system-level thinking – moving beyond species-level metrics to include whole-ecosystem processes – and help identify whether current data-collection efforts are being undertaken at appropriate temporal and spatial scales.

They can also promote data-continuity between projects, reduce information-silos, and support adaptive management. As global biodiversity-targets approach, ecosystem-integrity provides a means of demonstrating progress and identifying areas needing further intervention.

Links with International Frameworks

Ecosystem-integrity aligns with IUCN's Red List of Ecosystems, particularly criteria C and D, which assess abiotic and biotic changes over a 50-year timeframe. It also supports the principles of ecological restoration, which emphasise measurable indicators, clear objectives, and an ambition to achieve the highest possible recovery.

Data-Management and GBIF

The Global Biodiversity Information Facility (GBIF) offers a secure, open-access platform for biodiversity-data, suitable not only for global and regional datasets but also for localised portals (e.g. for Montserrat which is currently under development). GBIF can serve as a repository for data underpinning ecosystem-integrity assessments, particularly for EBVs such as species-distributions, population-data, and trait-information.

By linking integrity-assessments with GBIF-hosted data, researchers and practitioners can ensure transparency, accessibility,and interoperability across regions and projects.

Case Study: The St Helena Cloud Forest Project

The St Helena Cloud Forest Restoration Project, funded by the UK Foreign, Commonwealth & Development

Next column: Top Central Peaks cloud-forest area
Middle: Black Cabbage tree Melanodendron integrifolium *threatened by plant pathogens, includmg* Phytophthora
Bottom: Restored tree fern forest Dicksonia arborescens

Office (FCDO) and the UK's Biodiversity Challenge Funds (or Darwin Plus as it is known) exemplifies how ecosystem-integrity concepts can be embedded within restoration-programmes.

The project adopts a whole-systems approach, integrating three pillars:

- Biodiversity,
- Hydrology, and
- Society and Economy.

The hydrological component is particularly significant for St Helena's water-security. Through comprehensive measurement of the hydrological cycle, including rainfall interception, storage and evapotranspiration, the project is able to quantify how native vegetation contributes to maintaining water-balance and ecosystem-function.

Indicators developed through this work can demonstrate how restoration-activities enhance ecosystem integrity and resilience in the face of climate-change.

Conclusions

Ecosystem-integrity provides a robust, holistic framework for assessing ecosystem-condition and guiding biodiversity-conservation. It encourages systems thinking, supports long-term monitoring and enables reporting of both progress and shortcomings.

When coupled with platforms like GBIF, ecosystem-integrity assessments can help establish consistent, transparent mechanisms for biodiversity-data management and reporting across the UK Overseas Territories and beyond.

While formal training opportunities are currently limited, informal collaboration and shared learning can play an important role in advancing the practical application of ecosystem-integrity assessments in restoration and conservation programmes.

Acknowledgements

The authors thank colleagues at UKCEH and the St Helena Research Institute for their collaboration and discussions on ecosystem integrity and monitoring approaches.

Contact

For further discussion or collaboration, contact Alan Gray at UK Centre for Ecology & Hydrology (UKCEH).

Q&A

Mike Pienkowski: Thank you very much, Alan. Thank you for overcoming the technology to join us as well. I am going to hand over to Jodey as question-master, with a warning to her that I see she may have to put questions to herself on some aspects, as I see that she is a co-author of the paper.

Jodey Peyton: Oh, I wouldn't get a sensible response! Thank you. We don't have any questions in the chat yet. Thank you, Alan. It s really interesting and really lovely to see it mapped out for St Helena. I was just wondering about what is the kind of minimum data that you can have for these assessments? Is it possible for every territory, or do you have to have a lot of data to make these things possible?

A: Well, that's whether you take it as ideal or practical. If you want to go for the ideal, then you would try to measure as much as possible. But, obviously, that is not always possible because resources are limiting, not just in terms of money but in terms of staff too. But there are simple things: looking at the species side of things, even just plotting distributions over time, and seeing how they change, is one way to look at an ecosystem-integrity assessment. So it can be quite simple; it does not have to be a huge, complex thing. But obviously, if you're doing something like a hydrological cycle, you really need to get all the aspects of it. And if something like the carbon-cycle is important, you would probably have to do quite a few different aspects of it. That does not have to be technologically challenging; that can be as simple as doing forest mensuration techniques and just measuring the trees – things like that. So there are practical and simple ways of doing this sort of thing, and a lot of it can be done by remote sensing as well, so that can be incorporated into it. We can pull a lot of drone-data into this type of thing, too.

Jodey Peyton: Thank you. There are now a couple of questions in the chat as well.

Katie Metcalf: Great talk, Alan. You mentioned that native vegetation was better for water-cycling in St Helena, that's such an important finding. Can you tell us a bit more?

A: So, actually, this goes back in time a little bit with UKCEH's history with St Helena. Back in the 1990s, CEH did a little study, and it suggested that this was the case. So they had done some comparisons between the native vegetation and the flats that we get in that cloud-forest habitat as well. And it suggested that the native vegetation was much better at capturing water in the form of mist on to leaves, but also because you get a much better formation of soil under the native vegetation, and there is a storage-capacity there. So there is storage in the natural canopy that is better than in the introduced species, and there is storage in the soil because it has much more organic matter in it underneath the native vegetation. Fast forward to, probably about five years ago now, we had a Darwin project, and we repeated that, and we got the same results. So it was good evidence that this is the case, that if we restore our endemic and native forests, we are going to have a much better way of capturing water, a way of storing water, and a way of

releasing it slowly so that we do not have a sort of flash kind of approach to water when it arrives and disappears quickly through the soils, so that we are much better guarded against drought in the future. Thank you very much.

Richard Selman: What geographic scale is this likely to be workable?

A: It can be scaled to whatever scale you really want it. The Convention on Biological Diversity were thinking that one appoach would be species-richness at a one-kilometre scale. So that can be applied, but it can be applied at a site-scale. at a national scale, and at a geographic scale – it can go from one small place to the globe.

Caroline Moss-Gibbons: Do you have any thoughts about how long-term funding might be achieved, given how short-term most funders operate under, especially public-sector funding?

A: I think that might be a question for tomorrow. I don't know, and I think we need a bigger commitment from government. I think we need to think about the place that the Overseas Territories are in, and how important they are for global biodiversity, and then tell people about it. We need the funding to do this – and it has got to be long-term. I think the other thing that is probably more important at this point in time, until long-term funding becomes available, is to think strategically about the short-term project-funding and how that can be linked together and provide data over the longer term. I mean, it often means we have to turn things around and be a bit clever about how we do our proposals, but if you can build-up data using short-term projects, then you get a longer time series of data.

Mike Pienkowski: Could I chip in? I think that's a very good point, and what we have been trying to push is the idea that projects should not have to be totally novel; they could build on other ones, but there's great resistance to that in the funding bodies. I think the other point I should mention is the reports over many years from the House of Commons Environmental Audit Select Committee, and indeed sometimes from the Foreign Affairs Select Committee too, saying that the UK government should not be leaving all this to the relatively small economies of the Overseas Territories to fund; they should share responsibility for it. But it does seem to fall on somewhat deaf ears, whichever government is in power. So, I don't know, perhaps we need to get more conservationists into politics, like Rebecca, and before that, John Cortés.

A: I think the other thing is that they do not really recognise that, actually, if they funded long-term projects in the Overseas Territories, what the UK would then be is a leader in global conservation, because that would put it on the map, and we would be achieving global outcomes, not just things in mainland UK or in each territory.

Mike Pienkowski: Especially because their physical size is small, a relatively small investment in UK terms can have a major effect and be a model to copy elsewhere. I have been saying that to politicians for 30 years; others need to take over and say it too.

Jodey Peyton: Here is a lovely video: *The Journey of a Raindrop on St Helena in the South Atlantic* https://www.youtube.com/watch?v=eWXZwBv8H9Q

Mike Pienkowski: I think that was a very stimulating discussion. Thank you, Alan. We're going to move on to the last talk in this session.

Although, in the past, we have had whole sessions on environmental education, how could we possibly have a session on identifying and preparing for future challenges without thinking about education? So we are very pleased that Catherine Childs from the National Trust for the Cayman Islands is going to address some of this. Here we go.

Education and Youth Participation in the National Trust for the Cayman Islands

Catherine Childs (Environmental Programmes Manager, National Trust for the Cayman Islands)

Catherine Childs, with educational assistants

Childs, C. 2025. Education and Youth Participation in the National Trust for the Cayman Islands. pp 228-231 in *UKOTCF's 7th conference on conservation and sustainability in UK Overseas Territories, Crown Dependencies and other small island states, 13th-16th October 2025 Proceedings* (ed. by M. Pienkowski, C. Wensink, A. Pienkowski, K. Bensusan, J. Peyton & B.N. Manco) UK Overseas Territories Conservation Forum, www.ukotcf.org.uk

The National Trust for the Cayman Islands is committed to engaging young people in the protection of our natural and historic heritage, ensuring that conservation is embedded across all generations. Through a wide range of programmes, we introduce youth of all ages to the importance of preserving Cayman's unique biodiversity and heritage, while also equipping them with the tools and opportunities to become advocates and future leaders.

In both primary and secondary schools, our Heritage Heroes membership programme connects students directly with conservation initiatives, encouraging even our youngest participants to get involved in preserving what makes Cayman special. Building on this foundation, we recently established a Youth Advisory Committee to the National Trust Council, giving younger demographics a voice in decision-making while nurturing the next generation of environmental and heritage leaders.

At the national level, we have developed a Climate Education Toolkit for teachers, supported by grant funding, to ensure every Caymanian student has access to current scientific knowledge and insights into how climate-change will impact our islands specifically. Additionally, in partnership with the International National Trusts Organisation (INTO), we facilitate opportunities for college-aged Caymanians to attend the climate COPs (conferences of the parties), international climate conferences, exposing them to critical global dialogues that have direct implications for our island nation. By combining education, participation, and leadership opportunities, the National Trust empowers Cayman's youth to be champions for conservation.

Catherine Childs (Environmental Programmes Manager, National Trust for the Cayman Islands)

The National Trust for the Cayman Islands (NTCI) is dedicated to preserving the historic and natural heritage of the islands. A core part of this mission is education and outreach, ensuring that the next generation understands the value of their cultural and environmental heritage and feels empowered to protect it.

Classroom Engagement: Heritage Heroes

One of the Trust's most successful programmes is the Heritage Heroes Classroom Club. For just $30 per class per year, every student receives a membership-card, giving them a sense of belonging to a movement that cares for Cayman's home. Classrooms also receive an Explore Passport, a map highlighting unique natural, cultural and historic sites across the islands. Students collect stickers when they visit these places, encouraging exploration and learning outside school-walls.

In addition to Heritage Heroes, teachers can draw on a wide range of resources developed by the Trust, including:

- "True Blue" - an educator's guide to Blue Iguana conservation.
- Classroom posters, including one highlighting Cayman's only native mammals — bats.
- Videos created during COVID to support remote learning, such as lessons on the difference between blue and green iguanas.

Above: Blue Iguana release
Below: Mangrove walk
Bottom: Nature walk

Learning Beyond the Classroom

The Trust provides field trips to immerse students in Cayman's ecosystems and historic sites. Children participate in Blue Iguana releases, mangrove-tours, and guided nature-walks, experiencing first-hand why these places are worth protecting. They engage also with local heritage experts to learn traditional skills like thatching, catboat-sailing, herbal medicine and rope-making.

Another project paired students with elders in the community to record oral histories, which were then donated to the National Archives. This not only preserved valuable stories but also affirmed for older generations that their experiences and wisdom are valued.

Building Youth Leadership

The Trust works also to amplify youth voices. Students have been supported to participate in protests and demonstrations, and older youth have received sponsorships to attend international conferences like Climate-change COP26, COP27, COP28, and the Global Sustainable Islands Summit. These experiences are often transformative, showing young Caymanians that their voices matter on the global stage. Funders are directly connected to youth-delegates, creating meaningful partnerships that make sponsorships highly rewarding.

To strengthen youth-involvement in decision-making, the Trust recently established a Youth Advisory Committee. This group ensures that young people influence the direction of the Trust, keeping it relevant to new generations while building the next leaders in heritage and conservation.

Climate Conference of the Parties 26

Innovative Tools

The Trust has created a climate-education toolkit tailored for Cayman teachers, with local impacts clearly explained and illustrated through videos featuring "Bella the Climate Ranger." This toolkit is designed to be adapted by other island-nations, making it a model for international use.

The Trust developed also a mobile app, offering information about sites across all three islands, plus an in-app George Town walking-tour. The tour integrates historic photos and audio stories from local voices. Families have even used the app at home, with grandparents sharing stories sparked by the images, helping preserve generational knowledge.

NTCI app

Inspiring the Next Generation

At the heart of all these efforts is empowerment. Whether through classroom-clubs, field-trips, heritage-workshops, or international conferences, the goal is to help young people feel that their voices and actions matter. By connecting them to their natural and cultural heritage, the National Trust is nurturing a generation of Caymanians who understand that protecting the environment is inseparable from protecting their identity and future.

Q&A

Mike Pienkowski: Thank you very much, Cathy. I think you're still here with us. Great. I thought that was really practical stuff, but also inspirational. It is a very nice combination to get together. And it is also, by the way, quite a good link for many aspects into tomorrow's session as well. But, before tomorrow we've got today.

Jodey Peyton: Yes, thank you, Cathy, it is so nice to see you. The session, I feel, is about hope; there are so many stories of hope, and your talk was full of them, so thank you very much. I'll just go through the comments and questions:

St Helena National Trust: Where did you find the funding for young people to attend the international conferences? I know you said they have some specific donors, but would you share any more about that, if you can?

A: Sure, absolutely. First of all, thank you for sharing all the details in the chats. I was watching you share everything as it was coming up; so I appreciate that support.

As far as the supporters and donors are concerned, we usually get big businesses in the islands to do that. We all share some of those, like banks or the energy provider. They are usually wanting to support community-organisations and projects in some way.

We are luckier than many in the Cayman Islands because we also have some offshore banking opportunities here, but every island has some big businesses that could do this. The reason why it has become such a popular programme is because we have gone out of our way to really make a connection between the business and the student; each student is assigned to one of the funders, who keeps them involved the entire time. They meet with them before we go, send messages every day with photographs, and feel involved. When they come home, they connect with a lunch-and-learn opportunity for the whole staff and, even without fundraising, funders come back asking, "When's it happening this year?" We've been really lucky with that.

Jodey Peyton: Luck and skill and storytelling on your part as well. It's really hopeful and very cool for sharing, thank you. Our Catherine [Wensink] mentioned the video before our break, with Bella and Stuart going to the Mastic Trail. Thank you very much; we really enjoyed that. There were a few comments during that about how nice the storyteller Stuart was, so thank you.

Caroline Moss-Gibbons: She just downloaded the app via the QR code on the slide; great app, thank you.

Montserrat National Trust: very impressive

Nancy Pascoe: Excellent education work; so that's all really doubly good.

Hayley Rawson: how did the idea for the app come up?

Cathy Childs: Hi, Haley! Haley's one of our old COP kids, so it's great to see you here today. The idea came up because cruise-ship passengers get off right in Georgetown, in the centre of town, and when they wander

around, they are not picking up anything about the history and culture or unique aspects of the place; they don't have anything to help them do that.

Previously, the National Trust had a written Georgetown Walking Tour, but it was difficult to share with cruise-passengers, stay-over visitors, or even local people who wanted to learn more about our history. So we thought an app would move it to the next generation. It's technical and accessible, and everyone carries their phone. You can walk around and listen to it while getting your steps in. It's also preserving the stories of the islands beyond what had been written in our guidebook. For example, you learn about the history of mahogany trees and other historical events, so we can preserve informal stories that might otherwise be lost. We got this app going with the Darwin Plus grant.

Jodey Peyton: Thank you, and I think your point about oral histories is another really lovely way of keeping history alive. There's something powerful about hearing someone tell a story; it feels really ancient in us to want to be told a story. Montserrat National Trust are interested in this.

A: Absolutely. And for anyone listening, you can contact us via the National Trust of the Cayman Islands website. We are happy to share resources. For example, the climate-resource we developed was made so that it is easy to adapt Cayman content to Montserrat, Anguilla, or other islands. We used a local app creator who can tweak it for other islands at a reduced cost. I am looking forward to working with everybody here.

Jodey Peyton: That's so lovely, thank you very much, Cathy.

A: Thank you.

Mike Pienkowski: Okay, thank you very much, Catherine, and thank you, Jodey.

General Discussion on Topic 6

Mike Pienkowski: I want you all to think if there are things you want to discuss in the general discussion. After the boring bit, which I'm going to do in a minute, Jodey can pick this up and help.

Those who joined earlier know what's going to happen now, but I need to repeat something for those who aren't. Sorry about that. We need to check the draft recommendations relating to this section of the conference. You'll find those on page 13 of the conference booklet.

Previous experience shows you cannot start with a blank sheet and come out with clear recommendations. Over 26 years of conferences, we have evolved a way of doing this. This year we started with a cross-territory group of people who looked at previous conferences, working-group discussions, abstracts from speakers and posters to come up with a draft. We circulated that draft several months ago, revised it based on comments, and by the third consultation, we were only changing a couple of words. We circulated the revised version over a week ago and have not received any new comments; so we are near consensus.

Of course, only a small proportion of people consulted are here. If anybody has serious problems with the recommendations, please put a note in the chat and we'll try and do something about it. I haven't seen any comments yet, so I'll take a few minutes to check. Very soon, I'll hand over to Jodey to see if she's picked up any points for discussion. There's nothing in the chat so we'll move on Jodey.

Jodey Peyton: We haven't had any more questions in the chat. I have to say this has been a really hopeful session. The next generation, as Nancy mentioned, needs engagement and training to understand what's happening in the world. Alan, do you have a question?

Alan Gray: I don't know if this is included elsewhere, but long-term monitoring should be considered, and how we fund that.

Mike Pienkowski: There is some reference to funding and long-term monitoring. We tried to limit recommendations to around 20, slightly over, but later we'll also divide them into shorter extracts for specific target audiences. There will be a session on funding tomorrow. There is a reference in there.

Jodey Peyton: Thanks, Alan. Does anyone have any other questions or reflections? Mike, what stood out for you this afternoon?

Mike Pienkowski: It's been fun chairing more than just the recommendations sections! I regret Sarita wasn't here, but overall it's been interesting. I missed some talks because I was busy behind the scenes, trying to keep things moving, but look forward to viewing the recordings.

Jodey Peyton: Does anyone else have anything? I think Katie and Nancy's work on storytelling, linking to Cathy and Cayman's work, is crucial. It helps people understand climate-change and empowers action. Cathy's work with kids is adorable; they're the next generation of blue iguana conservationists.

Mike Pienkowski: Perhaps people want a break maybe a drink. Tomorrow we'll start at noon with strong sessions from environment and corporate sectors, chaired by Leigh Morris from the Manx Wildlife Trust and now The Wildlife Trusts overall – very go-ahead and he led most of the work with Aviva, as mentioned by Joan Walley earlier. Alison Neil, from South Georgia Heritage Trust, will present on rodent removal success and how it was funded.

Jodey Peyton: Should we give John Pinel a chance to comment as rapporteur?

John Pinel: I just want to thank everyone for contributing. It's been excellent. I have lots of notes here to write up. This includes the important bit on education, not just for young people but for all of us. A lot of these things we've discussed have been quite complex and you have to be a practitioner to follow on and I love the idea for perhaps looking for ways to summarise outcomes of conferences for non-practitioners and young people. This is a great idea, to give hope and show solutions are possible. We don't all have to be working in conservation to achieve these things, but if you learn about conservation, you can and take it into any profession. Thanks for interesting and engaging talks.

Mike Pienkowski: We will publish first outputs in the next *Forum News*, divide recommendations for target audiences, and work on a proceedings volume. Contributors should submit written content and illustrations. People can also use other media for popular writing, but not reproduce presentations without permission of authors of presentations.

Jodey Peyton: No more questions, but I think it's lovely that everyone contributes their small parts.

Mike Pienkowski: Your comment about general training was very apt. Back when I took my degree in 1969–72, there were very few ecology or conservation jobs. Local authorities had none. We chose biology generally, then specialised after two terms. More than half of our year-class of 100 opted for ecology – rather disturbing the university, as they had no ecologists on staff. Many of us took it as a good general training for whatever we eventually did. By graduation, jobs started to appear, so it's always worth living in hope.

One of our plant-ecology lecturers later won a Nobel Prize. We had teased him because he was teaching a

subject (plant ecology) which wasn't his, as he was really a plant-physiologist..

One day I found something in the British Ecological Society newsletter saying people should stick with their specialisms. So I made the mistake of photocopying it and pinning it on the board in our general room. So, when a year or so later we came to finals, our plant-lecturer reproduced it as a question, adding "discuss". So I felt morally committed to doing so, and I did a very bad job – which was the end of my possibility for a First! These things can come back to haunt you. I think, in this case, the reflection of this consist of the benefits of a well-based training, whether it be degree or experience, in nature and conservation have all sorts of wide applications.

And I do feel I'm beginning to ramble. Jodey is supposed to have stopped me by now!

There is a reminder from Catherine. Thank you, Catherine. If you don't receive *Forum News*, our twice-yearly newsletter already, all you have to do is go to our website (www.ukotcf.org.uk). At the bottom of any page, there is one of the simplest form you've ever met to sign up to it. And that puts you on the circulation, and also covers us under the GDPR regulations, so that we are not sending out unsolicited mail.

Jodey Peyton: You can submit articles as well. I'm always looking for articles to put into it; there's plenty of choice from these last few days, which are fantastic. But feel free to get in touch with me if you do want to add something for *Forum News* as well. .

Mike Pienkowski: I also add thanks to Jodey, because she has just taken over the editor responsibility for the Forum from me.

OK, everybody, I think we are going to close down now for the day. You can have a little bit of time off! Good night, everyone, or good afternoon – or good early morning for our Australian colleague. And I wish you well, and look forward to seeing you tomorrow.