RBGE Event Schedule

Scottish Biodiversity Science for Nature: novelty, ingenuity and solutions

18th November 2019, Royal Botanic Garden Edinburgh

Programme

09.30 *Registration and Coffee*

Introduction and Updates

Chair: Prof Rob Brooker, James Hutton Institute (JHI)

10.15 **Biodiversity Science for Nature: Welcome from RBGE** - Prof Pete Hollingsworth, RBGE
10.20 **Conference Introduction** - Dr John Kerr, SG
10.30 **State of Nature Summary** - Dr Mark Eaton, RSPB
10.40 **Global assessment of biodiversity and what that means for Scotland** - Dr Debbie Bassett, SNH
10.50 Questions

Data and Diagnostics

Chair: Prof Rob Brooker, JHI

10.55 **The Climate Emergency -** Dr Clive Mitchell, SNH
11.10 **Scottish Biodiversity Data - what do we need?** - Rachel Tierney, SBIF

11.25 *Comfort break*

11.35 **Biodiversity from Space -** Prof Mat Williams, University of Edinburgh
11.50 **The Darwin Tree of Life project: Genomes for biodiversity -** Prof Mark Blaxter, Wellcome Sanger Institute
12.05 **Putting the 'social' into socio-ecological systems -** Dr Kirsty Blackstock, JHI
12.20 **Some contemporary directions in landscape epidemiology -** Prof Dan Haydon, University of Glasgow
12:35 5x2min **Speed talks**:

- How to identify a beaver: Using genetics during the Scottish beaver reintroduction - Dr Jean-Marc Costanzi, RZSS
- Free Access to Earth Observation Sensors: NERC Field Spectroscopy Facility - Andrew Gray, NERC Field Spectroscopy Facility in Edinburgh
- Rethinking DNA barcoding: Are nuclear genome sequence data good in telling plant species apart? - Wu Huang, RBGE
- Engaging Communities with Decision-making and Nature - Dr Antonia Eastwood, JHI
- Niches for Species, a multi species model to guide woodland management - Dr Alice Broome, Forest Research

Scottish Natural Heritage Dualchas Nàdair na h-Alba nature.scot
SCOTTISH POLICY GROUP BRITISH ECOLOGICAL SOCIETY
SEFARI
Royal Botanic Garden Edinburgh
ECOS

RBGE Event Schedule

12.45 *Lunch and poster viewing (including poster competition)*

Biodiversity and Ecosystem Services – Science to Solution

Chair: Dr Jackie Hyland, SNH

13.45 **Understanding the value of and limits to nature-based solutions in a warming world -** Prof Nathalie Seddon, University of Oxford

14.00 **Underwater gardening: bringing biodiversity back to our oceans** - Dr Richard Lilley, Project Seagrass

14.15 **A blanket to keep us cool: Restoration stories from the Flow Country** - Dr Roxane Andersen, UHI, Thurso

14.30 **Interesting physics, interesting ecology: Designing marine ecosystems of the future -** Prof Beth Scott, University of Aberdeen

14.45 **Evidence and research priorities -** Sarah Hutcheon, SNH

14.55 *Comfort break*

15.05 5x2min **Speed talks:**

- Integrating species conservation and ecosystem restoration: Exmoor ponies - Deborah Davy, University of Glasgow
- Using species distribution modelling to further the understanding of maerl bed distribution around Scotland - Cornelia Simon Nutbrown, SNH / RBGE
- Moving species - How can conservation translocations work best for nature? - Dr Martin Gaywood, SNH
- B-Lines- enhancing habitat for pollinators along the John Muir Way - Suzanne Burgess, Buglife
- The appliance of science post-2020 - Dr Susan Campbell, SG

Outlook and Conclusion

Chair: Dr Jackie Hyland, SNH

15.15 **Where next? -** Prof Andrew Millar, SG

15.25 **Announcement of poster prize winner, and presentation of an Honorary Fellowship of the Royal Scottish Geographical Society**
Concluding remarks - Dr Chris Ellis, RBGE

15.45 **Departure for those catching trains etc.**

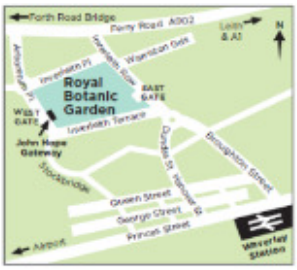
15.45-17.00 *Drinks reception*

RBGE Event Schedule

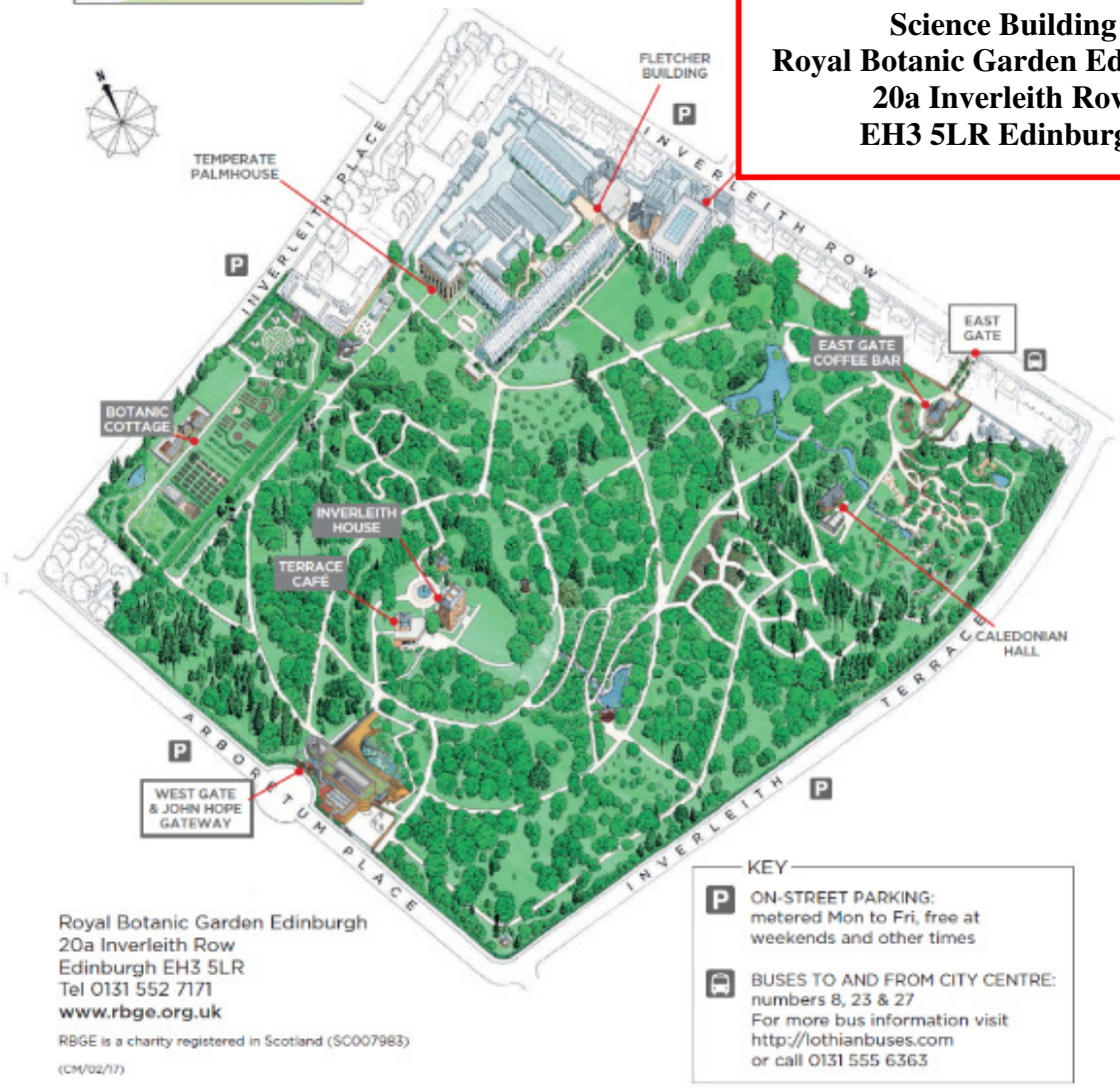
MAP AND DIRECTIONS TO RBGE

Royal Botanic Garden Edinbrugh, 20a Inverleith Row, Edinburgh, EH3 5LR

The Science Building is located along Inverleith Row and Lothian Buses 8, 23 and 27 stop outside the building (bus stop 'Warriston Drive'). Other entrances only open 10.00-16.00. Inverleith Row operates parking meters and cost £2.40 per hour with a maximum stay of 4hrs. For more information please visit:
https://en.parkopedia.co.uk/parking/meter/arboretum_place_inverleith_terrace/eh3/edinburgh/?arriving=201801231100&leaving=201801231300



SBS Conference
Science Building
Royal Botanic Garden Edinburgh
20a Inverleith Row
EH3 5LR Edinburgh



BACKGROUND INFORMATION FOR DELEGATES

First, welcome and thank you for attending. Have a great time!

REGISTRATION

Please collect your name badge and information pack, including the programme and conference information from the Registration Desk on arrival.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY – HONORARY FELLOWSHIP

We are delighted to announce that one of our conference delegates will be awarded the Honorary Fellowship of the RSGS. Recent recipients include Greta Thunberg and Gordon Buchanan. We look forward to announcing this towards the end of the Conference.

POSTER PRIZE

Posters are a key means of presenting your work. We shall award prizes for the best poster and runner(s)-up. We thank the NHSB and the RBGE for sponsoring this.

About NHBS: our bookstore covers everything from field guides, to monographs and good reads with a specialist catalogue dedicated to including all titles relating to the natural world. The equipment include everything for wildlife surveying as well as habitat management. We recently began manufacturing marine, freshwater and terrestrial survey tools, all carefully designed to meet the high demands of our customers. We also work with our customers to design and build custom-made equipment that is perfectly suited their needs.

EXHIBITORS

The exhibitors will have their stalls in the Fletcher Building so please pay them a visit. This years we'll have SEFARI, BES SPG (sponsors of the travel funds), NHSB (sponsors of the poster price) and CIEEM.

ACRONYMS

BES SPG	British Ecological Society – Scottish Policy Group
CEH	Centre for Ecology and Hydrology
CIEEM	Chartered Institute of Ecology and Environmental Management
ECOS	Edinburgh Conservation Science
NHBS	Natural History Book Service
RBGE	Royal Botanic Garden Edinburgh
RSPB	Royal Society for the Protection of Birds
SBIF	Scottish Biodiversity Information Forum
SEFARI	Scottish Environment, Food and Agriculture Research Institutes
SG	Scottish Government
RSGS	Royal Scottish Geographical Society
SNH	Scottish Natural Heritage
SRUC	Scotland's Rural College
SWT	Scottish Wildlife Trust
RZSS	The Royal Zoological Society of Scotland
UHI	University of the Highlands and Islands

SPEAKERS AND ABSTRACTS

Prof Pete Hollingsworth:

Pete is Director of Science and Deputy Keeper at RBGE. His research focuses on understanding and conserving plant biodiversity. He has a particular interest in biodiversity genomics. Other interests include understanding pest and pathogen threats to the natural environment, wildlife forensics, the conservation of genetic diversity, reintroductions and restoration, and large-scale analyses of threats to biodiversity. He is an Honorary Professor of the Kunming Institute of Botany, a Visiting Professor of the Universities of Edinburgh, Herriot Watt and Johannesburg, Chair of Bumblebee Conservation Trust, and Fellow of the Royal Society of Edinburgh.
https://www.rbge.org.uk/about-us/organisational-structure/staff/science-management/prof-pete-hollingsworth/

Dr John Kerr:

John is a Scientist and Civil servant with a long standing interest in how we improve the way humans work with and impact on nature. John has recently moved from a science role supporting agriculture to a more policy focused role heading up Agriculture and Crofting policy. John is the chair of the Scottish Biodiversity Strategy Science Support Group. **https://www.linkedin.com/in/john-kerr-830054b0/**

Dr Mark Eaton:

Mark is Principal Conservation Scientist in the Monitoring section of the RSPB Centre for Conservation Science. He is responsible for overseeing much of the RSPB's involvement in monitoring of wildlife - through surveys, red-listing, indicators and 'state of' reporting - in the UK and internationally.
www.rspb.org.uk/our-work/conservation/centre-for-conservation-science/our-team/mark-eaton/

Talk Title: The State of Nature in Scotland
Abstract: The State of Nature 2019 report was published on the 4th October by a broad range of conservation, monitoring and research organisations including, for the first time, SNH. Mark will give a brief overview of the science behind the report, and what it tells us about the state of Scotland's wildlife over recent decades.

Dr Debbie Basset:

Debbie is Biodiversity Strategy Manager for SNH and was an editor of T*he 2020 Challenge for Scotland's Biodiversity*. She has a background in woodland and freshwater ecology and in recent years has been heavily involved with policy development and implementation to improve biodiversity in Scotland.

Talk Title: Global assessment of biodiversity and what that means for Scotland

Abstract: On 6th May 2019 IPBES (Intergovernmental Platform for Biodiversity and Ecosystem Services) published a Global assessment of biodiversity ecosystem services. Compiled by 145 expert authors from 50 countries over three years, with inputs from another 310 contributing authors, the Report assesses changes over the past five decades, providing a comprehensive picture of the relationship between economic development pathways and their impacts on nature. It also offers a range of possible scenarios for the coming decades. But how can we interpret this global assessment for Scotland and what does it tell us about priorities for action?

Dr Clive Mitchell:

Clive has over 20 years of expertise in environmental policy and sustainable development. In SNH, Clive is an Outcome Manager, allocating resources to priorities for people and nature in rural, urban, coastal and marine settings, including protected areas. Clive bridges the social and natural sciences, climate change and nature and the geological and biological worlds. As an associate lecturer with the Open University for over 23 years, Clive's viewpoint is global, using a range of frameworks to evaluate policy and practice on the environment and sustainable development from different viewpoints and to understand how the Earth works as a system. Clive has worked for the UK Sustainable Development Commission as team leader for climate change, energy, transport and buildings, acting as a critical friend to Government, exercising the newly acquired scrutiny role and working with civil servants to develop policy.

Talk title: The Climate Emergency

Abstract: A brief outline of the Climate Emergency, and why it is an emergency. Brief comment on climate change over the last 100 years, and looking ahead to the next 100, Paris targets, global carbon budgets and the state of nature, past, present and future. A nature-rich future is key to addressing the Climate Emergency, and presents a triple opportunity: transitioning to net zero while adapting to climate change that is already locked in while addressing the state of nature. We need to do this using the same areas of the land and sea, over the same period. The key to a nature-rich future is diversity - but at what scale? The whole country, catchments, farms, fields and commercial forests: what place for monocultures? Clive concludes with a summary of SNH's Climate Change Commitments.

Rachel Tierney:

Rachel is the Scottish Biodiversity Information Forum (SBIF) Development Officer and is hosted by the Scottish Wildlife Trust. Rachel has worked as a Data Manager for the RSPB, the Data & Liaison Officer for the NBN Trust and for a period was the NBN Trust Interim CEO.

Title: Scottish Biodiversity Data - what do we need? - Rachel Tierney, SBIF

Talk Title: Scottish Biodiversity Data - what do we need?

Abstract: More urgently than ever before, in tackling the biodiversity crisis and climate emergency, we need relevant and up-to-date information to guide timely and effective action for a nature rich future. The SBIF explored problems, opportunities and investment needs of Scotland's biological recording community, publishing the findings in *A Review of the Biological Recording Infrastructure in Scotland.* The SBIF Vision is for a robust biodiversity data infrastructure that is fit-for purpose and capable of supporting all of the demands we place upon it – hear an update on progress towards this.

Prof Mat Williams:

Mathew is Professor of Global Change Ecology at the School of GeoSciences, University of Edinburgh. He is an ecosystem ecologist, studying the effect of climate change on natural and managed landscapes across the globe.
https://www.geos.ed.ac.uk/homes/mwilliam

Talk Title: Biodiversity from Space

Abstract: Biodiversity is under threat across the globe, so we urgently need to be able to track the status of life on Earth. Earth observation, using satellites, planes and drones, provides a means to monitor our land surface rapidly and repeatedly. Here we review the potential of methods to detect biodiversity remotely. Optical sensors have been in space for 50 years are generating images more often, at increasing quality and finer resolution. Linked to ground data optical images characterise and categorise plant canopies, classify the earth's land-cover and track changes over time, at ecologically relevant scales. Lidar and Radar sensors are newer technologies in space. These are active sensors, that allow determination of vegetation structure by interacting with tree stems. As such these instruments are highly complementary to optical data, providing estimates of biomass in three dimensions. We discuss the potential to map habitat structure using satellites and for hyperspectral imagery to identify canopy species differences from space.
https://www.geos.ed.ac.uk/homes/mwilliam

Prof Mark Blaxter:

https://www.sanger.ac.uk/science/programmes/tree-of-life

Talk Title: The Darwin Tree of Life project: Genomes for biodiversity

Authors: Mark Blaxter, Wellcome Sanger Institute, *for* The Darwin Tree of Life Consortium

Abstract: In the face of the looming sixth great extinction, continuing threats to the biosphere, and the understanding that human societal health depends on ecosystem health, it has been proposed that high quality reference genomes should be generated for all species on Earth - the Earth Biogenome Project. These genomes will be the fulcrum against which scientists, governments, NGOs and businesses can lever transformative change in how we interact with, comprehend and preserve biodiversity. The Darwin Tree of Life project is a collaboration between UK biodiversity organisations (NHM, RGBKew, RBGE, and Oxford University / Wytham Woods) and genomics organisations (Wellcome Sanger Institute, Cambridge University, Edinburgh University, Earlham Institute and the EBI) which has the aim of generating chromosomally-complete reference genomes for all of the 60000 eukaryotic species described from the British Isles. Though the project is (formally) only weeks old, I will present our goals, the success already achieved in assembling genomes of individual specimens of wild species, and describe how the many stakeholder communities can access and exploit these data.

Dr Kirsty Blackstock:

https://www.hutton.ac.uk/staff/kirsty-blackstock

Talk Title: Putting the social into socio-ecological systems

Abstract: It is well recognised that in order to address both the climate and biodiversity emergencies, as well as delivering the interconnected UN sustainable development goals, we must understand the role of humans as part of, not separate from, our environment. Moreover, it is increasingly clear that we need to take a holistic, systemic, long-term and participatory approach to working with nature. However, it is daunting to know how to bridge the natural-social science divide - building effective bridges between the sciences is still novel for many of us and requires ingenuity. This talk outlines different forms of social science (realist or interpretivist, qualitative or quantitative, mode 1 or mode 2) as these have important implications for what social researchers consider as data, and how they go about diagnosing problems and/or seeking solutions. I will illustrate this with a social science led project on monitoring and evaluation that considered current arrangements for Natura 2000, Water Framework Directive and CAP pillar 2 agri-environment schemes in nine European regions (Waylen *et al.,* 2019). The research questions, data sources and methodology are quite different to biological monitoring and evaluation procedures. They required the social and natural scientists to think carefully not only about knowledge production but also use and practices. I present this project as an example of a complementary approach to more

technological approaches in this session, so that together we can pursue our common goal of a healthier planet and nature for all.

Publication: **Waylen, K.A.; Blackstock, K.L; van Hulst, F.; Damian, C.; Horváth, F.; Johnson, R.K.; Kanka, R.; Külvik, M.; Macleod, C.J.A.; Meissner, K.; Oprina-Pavelescu, M.M.; Pino, J.; Primmer, E.; Rîsnoveanu, G.; Satalová, B.; Silander, J.; Spulerová, J.; Suskevics, M.; van Uytvanck, J.** (2019) Policy-driven monitoring and evaluation: does it support adaptive management of socio-ecological systems?, Science of the Total Environment, 662, 373-384.

Prof Dan Haydon:

Dan is Professor of Population Ecology and Epidemiology at the University of Glasgow. Dan undertook his PhD at the University of Texas, and post-docs at the Universities of Oxford, British Columbia, Edinburgh, and Guelph before moving to Glasgow in 2004. He was the founding Director of the Boyd Orr Centre for Population and Ecosystem Health (winner of the Queen's Anniversary Prize in 2014), and since 2010 has been Director of the Institute of Biodiversity, Animal Health and Comparative Medicine at the University of Glasgow. He is a Fellow of the Royal Society of Edinburgh, and was appointed Director of the Glasgow Centre for International Development in 2017.

https://www.gla.ac.uk/researchinstitutes/bahcm/staff/danielhaydon/

Talk Title: Some contemporary directions in landscape epidemiology

Abstract: I review how new types of data and analysis are generating new opportunities to understand the dynamics and control of infectious diseases at landscape levels. Specifically, I talk about the impacts of pathogen whole genome sequencing on our understanding of disease transmission, how we can now track individual animals moving across landscapes, and how numerically intensive modelling approaches (such as state space and individual-based models) are changing the way we can use data, and in principle predict future changes.

Prof Nathalie Seddon:

Nathalie is Professor of Biodiversity at the University of Oxford with broad interests in understanding the origins and maintenance of biodiversity and its relationship with global change. An ecologist by training, her research now focusses on determining the ecological and socioeconomic effectiveness of nature-based solutions to climate change, and how best to increase the influence of robust biodiversity and ecosystem science on the design and implementation of climate and development policy. In 2017, she founded the Nature-based Solutions Initiative (www.naturebasedsolutionsinitiative.org), a programme of interdisciplinary research, policy advice, and education aimed at bringing the equitable protection of nature to the centre of the sustainable development agenda. She is Senior Associate of the International Institute for Environment and Development, and a Senior Fellow of the Oxford Martin School.

Talk Title: Understanding the value of and limits to nature-based solutions in a warming world
Abstract: There is growing awareness that "Nature-based Solutions" (NbS) can help to protect us from climate change impacts whilst slowing further warming, supporting biodiversity and securing ecosystem services. Here I will discuss the potential of NbS to provide the intended benefits, highlighting issues around reliability and cost-effectiveness compared to engineered alternatives, and their resilience to climate change. I will highlight the rise of NbS in climate policy—focussing on their potential for climate change adaptation as well as mitigation—and discuss barriers to their evidence-based implementation. As climate policy turns increasingly towards greenhouse gas removal approaches such as afforestation, there is an urgent need for natural and social scientists to engage with policymakers. They must ensure that NbS can achieve their potential to tackle both the climate and biodiversity crisis while also contributing to sustainable development.

Dr Richard Lilley:

Richard is a Founding Director of Project Seagrass, and is principally responsible for operations in Scotland. He is also a Teacher of Biology at a secondary school in Edinburgh. He is passionate about education, particularly marine science communication and outdoor learning. His academic research focuses on the sustainable supply chain management of small-scale capture fisheries. Richard is particularly interested in the role of seagrass meadows in providing local/regional food security.
He has over a decade's experience of working in marine ecosystems. He has worked in the Caribbean and Mediterranean seas, the Andaman Sea and in the North Atlantic Ocean. He is a qualified PADI and BSAC scuba-diving instructor and recreational free diver.

Talk Title: Underwater gardening: bringing biodiversity back to our oceans
Abstract: Seagrasses are flowering plants (angiosperms) that have adapted over millions of years to life in the sea. The meadows that seagrasses form play an important role in keeping our oceans healthy and stocked with food. Seagrass provides a home for all kinds of marine life, including food fishes, like cod and plaice, but also endangered species such as seahorse. Additionally, seagrasses absorb large amounts of carbon dioxide from the surrounding seawater, and so have a role in climate mitigation. But seagrasses globally are being lost at a rate of about two football fields every hour, and in the UK over the last century we've lost at least half of our seagrass coverage. Their reintroduction into previous known seagrass sites, in which current environmental conditions are favourable, provides significant opportunity to enhance recovery and support biodiversity. In the 1990's, the UK Government under their Biodiversity Action Plan for *Zostera marina* proposed the restoration of up to 1000 hectares. We are not aware that any effort was ever made to achieve this target. Indeed, to date, there have been no successful full-scale seagrass restoration projects in the UK. However, since 2013 Swansea University and Project Seagrass have been conducting a range of novel methodological seagrass restoration trials. This work has built on methods and evidence from the world's most successful restoration projects situated in Chesapeake Bay, USA. Our project

will build upon the knowledge developed to conduct three major restoration initiatives, with one of these proposed for Scotland.

Dr Roxane Andersen:

Roxane is a Senior Research Fellow based at the Environmental Research Institute, part of the University of the Highlands and Islands (UJI), where she leads the 'Carbon, Water and Climate' research theme. She coordinates the Flow Country Research Hub (recently short-listed for a Nature of Scotland Award), a network of >60 researchers and stakeholders with an interest in the research undertaken in the Flow Country peatlands of Caithness and Sutherland, and she is a member of the Flow Country World Heritage Site Working Group, and the Flow Country Rivers Trust. Roxane also chairs Scotland's National Peatland Research and Monitoring Group, which supports the delivery of Scotland's National Peatland Plan. Roxane's own research for the last 15 years has focussed on peatland responses to disturbance, restoration and climate change. As a "jack of all trades", she has worked across a range of topics, from mixotrophic microbes to remote-sensing. https://eri.ac.uk/members/roxane-andersen/

Talk Title: A blanket to keep us cool: Restoration stories from the Flow Country
Abstract: In good condition, peatlands are the most efficient terrestrial carbon store on the planet, holding more C than in any other habitat in just 3% of the land area. They also support unique assemblages of highly specialised species across a range of taxa, from microbes to birds, and supply clean freshwater to pools, lochs, rivers and people. Degradation through human intervention jeopardises all these functions and by turning peatlands from C sinks to C sources, can fuel climate change. Peatland restoration aims to halt degradation and bring back key processes, and is globally considered as one of the most urgently required carbon abatement strategies to limit and reverse land-based emissions.

This presentation will give an overview of the current evidence base underpinning restoration efforts for the Flow Country of Caithness and Sutherland, where a particular focus has been the large scale removal of non-native conifer plantations, termed "forest-to-bog" restoration. This will include our current state of knowledge on the recovery of biodiversity, carbon and water quality in forest-to-bog restoration sites. The presentation will also highlight some of the challenges of documenting recovery over such large scales, and some of the innovative solutions being developed to address them.

Prof Beth Scott:

Beth is a Professor in Marine Ecology. She has a multi-disciplinary background in marine ecology, oceanography and fisheries. Her focus has been the spatial and temporal identification of critical marine habitats where mobile predator and prey species interact. Her approach has been to focus on the functional linkages between fine scale bio-physical oceanographic processes and population dynamics of a range of fish, seabird and mammal species through both empirical data collection and modelling approaches. Recently she has been appointed Co-Director for the Offshore Renewable Energy (ORE) SuperGen Hub (2018-22). She was a member of the Ministerial DEFRA Marine Protected Areas Science Advisory Panel and of SNH's Scientific Advisory Committee. She is a Forum Coordinator for Marine Renewable Energy Forum, Marine Alliance for Science and Technology, Scotland (MASTS). **https://www.abdn.ac.uk/people/b.e.scott**

Talk Title: Interesting physics, interesting ecology: Designing marine ecosystems of the future.
Abstract: What will the marine ecosystems of our future look like? The use of our marine environment is changing rapidly due to large increases in anthropogenic activities and climate change. It is imperative that current marine spatial planning approaches appreciate which regions will continue to contain critical marine habitat for our wildlife and what types of regions are best used for co-location/multi-use of activities. Planning is underway now for very large-scale offshore renewable energy extraction to potentially use a significant proportion of the North Sea and aquaculture is also set to move offshore. These changes, along with rapid climate change, will have bring about a corresponding displacement of fisheries, the potential for de-facto MPAs and changes to physical aspects of marine ecosystems. This talk explores if we can plan now with our current knowledge of marine ecosystems for possible win/win scenarios in the future.

Sarah Hutcheon:

Sarah has worked in conservation for over 25 years. During her time at SNH she has worked as an Area Officer in the Highlands, and in the Central Belt. She has managed the Site Condition Monitoring programme, led on freshwater policy, managed organisational change projects, and currently manages the Director Support team for Sally Thomas (Director – People and Nature).

Talk Title: Evidence and research priorities
Abstract: SNH has developed a Strategic Evidence Needs document. The purpose of the document is to inform the development of research projects developed internally in SNH and externally with partners. We are now looking to raise awareness of this document externally and open up conversations with partners over work that can be undertaken to fill evidence gaps.

Prof Andrew Millar, Outlook:
https://www.gov.scot/about/how-government-is-run/directorates/environment-and-forestry/chief-scientific-adviser-environment-nat-resources-agriculture/

Dr Chris Ellis, Conclusion:

Chris co-ordinates RBGE's Scottish Conservation Programme, with personal research interests in the species response to environmental change. This includes the climate change response of Scotland's globally important lichen diversity, such as our temperate rainforest epiphytes. His research has contributed to major assessments such as the UK National Ecosystem Assessment, the Biodiversity Climate Change Impact Report Card, and the State of Nature Report. Chris works at the interface of science and policy, and among other activities he is the Chair of the SBS Habitats and Species Group, and serves on the Directorate of ClimateXChange:
https://www.rbge.org.uk/about-us/organisational-structure/staff/cryptogamic-plants-and-fungi/dr-christopher-ellis/

Prof Rob Brooker, Chair (morning session):

https://www.hutton.ac.uk/staff/rob-brooker

Dr Jackie Hyland, Chair (afternoon session):

Dr Jackie Hyland is a medical doctor specialising in public health medicine with a special interest in health equity and environmental health. Jackie advises on health aspects of environmental protection including contamination of air, land and water. She also champions the promotion of biodiversity within health and wider public sectors. She has published on:

- environmental health management
- engagement with stakeholders
- socioeconomic impact of air pollution and health

Jackie qualified in Medicine at the University of Edinburgh and has worked extensively in the NHS as a clinical practitioner and latterly as an Associate Director of Public Health. With an MBA from Heriot Watt and a Medical Doctorate from St Andrews University, Jackie joins us as a Board member of SNH.

SPEED TALK ABSTRACTS

Morning

Speaker: Dr Jean-Marc Costanzi, Royal Zoological Society of Scotland
Title: How to identify a beaver: Using genetics during the Scottish beaver reintroduction.
Abstract: The Scottish Beavers partnership has reintroduced beavers to Scotland, heralding the vital restoration of lost biodiversity. This project involves translocating beavers from Norwegian genetic stock and Bavarian genetic stock into Knapdale Forest on the West coast of Scotland. Genetics continues to play a key role in this project, from assessing the genetic provenance and diversity of the individuals involved to establishing identity. We will give a general overview of how genetic data continues to inform the Scottish Beavers project, with a particular focus on establishing the origin of a juvenile beaver skull found by our field team.

Speaker: Andrew Gray, NERC Field Spectroscopy Facility in Edinburgh (Mat Williams director)
Title: Free Access to Earth Observation Sensors: NERC Field Spectroscopy Facility.
Abstract: As part of the Natural Environment Research Council's (NERC) National Capability, the Field Spectroscopy Facility loans field spectrometers, sunphotometers and underwater bio-optical instrumentation to researchers, for free, to support research in topics such as biodiversity surveys. As of 2020, we will also be offering UAV mounted sensors, including cameras matching Sentinel 2, the European Space Agency's multispectral satellite constellation, as well as a full range hyperspectral imager with LiDAR. My speed talk will go over these new platforms, give some example uses, and let you know how you can get access to them for your own research.

Speaker: Wu Huang, a PhD student, Royal Botanical Garden Edinburgh
Title: Rethinking DNA barcoding: Are nuclear genome sequence data good in telling plant species apart?
Abstract: DNA barcoding has been proved successful for telling animal species apart. In plants, however, it's more challenging since many species can share organelle genomic sequences. To address the limitations of DNA barcodes for plants, accessing multiple independent loci from the nuclear genome will be required. The new wave of sequencing platforms has led to a significant increase in studying complex plant genomes. However, to date there has been no general evaluation of nuclear genome sequence variation patterns between plant species. This study aims to undertake a synthetic evaluation of the genetic differences of plant species, thus to facilitate the design of optimised new barcodes, and ultimately, to better support biodiversity monitoring.

Speaker: Antonia Eastwood, James Hutton Institute
Title: Engaging Communities with Decision-making and Nature
Abstract: The James Hutton Institute with Cumbernauld Living Landscapes is piloting the use of participatory video (PV) as a tool to monitor and evaluate the impact of nature engagement programmes. Through the medium of film, PV offers a way to empower and 'give voice' to

people who would not normally have the opportunity to communicate their needs and ideas to decisions makers. The talk will show a film created by school pupils on their experience of greenspace. It will end by showing how creative approaches can open opportunities for transformative change in how people view nature and how they use it to co-produce health and well-being benefits.

Speaker: Dr Alice Broome, Forest Research
Title: Niches for Species, a multi species model to guide woodland management
Authors: A. Broome, C. Bellamy, A. Rattey and D. Ray.

Abstract: Challenged with the complex task of conserving multiple protected species, each with its own, narrow niche requirements, forestry decision-makers require species distribution and habitat association information in an easily digestible format. We developed Niches for Species (N4S), a model that uses expert knowledge to predict the potential occurrence of 179 Scottish woodland protected species. We collated knowledge to define each species' suitable habitat in a hierarchical habitat classification, and analysed/classified spatial environmental datasets allowing each species' potential niche to be mapped, even in the absence of reliable occurrence records. The N4S model framework is transferable to other habitats and species.

Afternoon

Speaker: Deborah Davy, first year PhD student at the University of Glasgow
Title: Integrating species conservation and ecosystem restoration: Exmoor ponies

Abstract: Exmoor ponies are an endangered breed adapted to independent survival in harsh environments. The population requires management to conserve its genetic diversity. However, species specific conservation is self-limiting without suitable habitats to sustain the regenerated populations.
Exmoor ponies drive habitat creation by selectively grazing dominant plant species.
This process led ecological restoration, where grazing drives habitat creation, creates functioning ecosystems and improves biodiversity. Restoration of grassland ecosystems improves carbon capture and sequestration, a climate change mitigation.
Using Exmoors for grassland restoration, whilst simultaneously managing their population genetics, integrates species conservation and ecological restoration, an effective and sustainable management solution.

Speaker: Cornelia Simon Nutbrown, NERC iCASE PhD student with SNH and RBGE
Title: Using Species Distribution Modelling to Further the Understanding of Maerl Bed Distribution Around Scotland

Authors: Cornelia Simon-Nutbrown[1], Peter Hollingsworth[2], Teresa Fernandes[3], Lisa Kamphausen[4], John Baxter[3, 5], & Heidi L. Burdett[1]
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Abstract: Maerl, free-living, red coralline algae, can form reef-like ecosystems (maerl beds) that support high biodiversity- including rare, endemic and commercially important species- through three-dimensional habitat creation. Maerl beds have a global distribution, but western Scotland and they are a stronghold, and they are listed as 'Vulnerable' or 'Endangered' on the IUCN Habitat Red List. Current understanding of Scottish maerl bed distribution relies on ad-hoc records and there is little understanding of factors that control apparent distribution patterns. Here we present the first species distribution models of Scottish maerl beds (using known occurrences and environmental data) with the aim of informing targeted conservation management.

Speaker: Dr Martin Gaywood, Species Projects Manager, SNH
Title: Moving species – How can conservation translocations work best for nature?
Abstract: Scotland is good at conservation translocations. We have a code and guidelines to help practitioners with their decision-making, we have the National Species Reintroduction Forum to provide strategic guidance, and we have a lot of expertise and experience with reintroductions, reinforcements and conservation introductions of different species, ranging from sea eagles to vendace to small cow-wheat. But how can we use this sometimes controversial tool in a better, more targeted way that benefits not just individual threatened species, but wider habitats and ecosystems, and can contribute to addressing the threats arising from climate change and other factors?

Speaker: Suzanne Burgess, Scotland Manager, Buglife
Title: B-Lines- enhancing habitat for pollinators along the John Muir Way.
Abstract: B-Lines are Buglife's landscape-scale solution to the decline in pollinating insects. B-Lines are a series of 'insect pathways' running through our countryside and towns. They link existing wildlife areas together, creating a network that weaves across the British landscape. Scotland's first B-Line was the John Muir Way. After an initial mapping exercise to identify opportunities (e.g. at schools or parks), habitat has now been enhanced for pollinators at over 40 sites along the entire 134 mile route. B-Lines have now been mapped across the entire CSGN area which is further benefiting pollinators via our projects.

Speaker: Dr Susan Campbell, Biodiversity Policy & International Engagement Manager, Scottish Government
Title: The appliance of science post-2020
Abstract: It has never been more important for scientific and policy communities to come together, to tackle the global climate and biodiversity crisis. Scottish research is generating a wealth of scientific data and information – but how relevant is your science to policy-makers? Policy makers must be able to understand the applicability of your evidence to their policy area - but do you speak the same language? I will explain - as a scientist turned policy-maker - how your research helps the Scottish Government to reach out across national and international policy boundaries, to influence the Post 2020 Biodiversity Framework.

POSTER ABSTRACTS

Presenter: Gwenda Diack, Project Officer; Plantlife Scotland
Title: Cairngorms Wild Plants
Abstract: Species such as twinflower (Linnaea borealis) and one-flowered wintergreen (Moneses uniflora) exist in small isolated populations, vulnerable to extinction, genetic isolation, disease and changing environmental conditions. The Cairngorms Wild Plants project, covering the Cairngorms Important Plant Area, trains volunteers, land managers, outdoor industry professionals and students to monitor populations of key species, provides bespoke land management advice, and assesses the feasibility of future translocations and other interventions.
The project has engaged with over 700 individuals, as well as major private landowners, and demonstrates the positive ecological impact of working on a small range of priority target species within a defined geographical area.

Presenter: Sarah Watts, Stirling University
Title: Population dynamics and life history of Sagina nivalis on Ben Lawers.
Abstract: *Sagina nivalis* is one of the rarest and least known arctic-alpine plants in Scotland, where it occurs at the extreme southern margin of its range. Such rear edge populations deserve high priority for investigation in order to maintain biodiversity through anticipated global change. This poster presents results from a 38-year study of the species at Ben Lawers NNR, providing information on population fluctuations, long-term trends, lifespan, survival and flowering rates. Overall numbers have declined since the 1990s, and so threats to the conservation of *Sagina nivalis* are identified, including natural processes, sheep activity and climate change.

Presenter: Grant Walker, Bradley Fairclough, Erik Paterson
Title: Winter presence of adult male palmate newts (Lissotriton helveticus) in a pond in Scotland
Abstract: Newts in Britain typically migrate from terrestrial over-wintering refugia to spring breeding ponds; and, post-breeding, to over-wintering refugia. There are also reports of adult newts remaining in ponds during non-breeding months although records of this behaviour and of winter surveys are rare. We undertook n=14 torchlight surveys, July-April inclusive. We present strong evidence indicating likely winter residence in aquatic habitat by n=56 adult male palmate newts. During winter, conservation activities, for example removal of pond vegetation and substrate, are undertaken to improve breeding habitat for newts. Our finding indicates that newts may be seriously disturbed or killed during such activities.

Presenter: Dr Ruth Mitchell, James Hutton Institute
Title: Tree diseases: biodiversity and ecosystem impacts.
Abstract: Tree diseases are increasing due to non-native pests and pathogens and climate change. The ecological impacts of tree diseases are rarely assessed. Here we present results assessing the ecological impacts on biodiversity and ecosystem function of a decline in ash

trees (due to ash dieback) and oak trees (due to acute oak decline). We assess the suitability of other tree species to replace ash and oak both in terms of their ability to support a similar suite of species and in terms of providing similar ecosystem functioning. The results can be used to adapt woodland management to increase resilience.

Presenter: Abi Gardner, SNH
Title: Ecoacoustics in biodiversity monitoring and assessment: is it a viable option for conservation practitioners in the UK?
Abstract: With the decline in biodiversity due to climate and environmental change, the monitoring and assessment of biodiversity is an increasingly central task. While the use of ecoacoustics has taken off in academia, its potential has not yet been fully realised in practice. The performance, time and cost expenditure, and ease of use of Automated Recording Units and point counts for avian monitoring were compared. Six different habitats in Scotland were surveyed. Overall, the results indicate that using ecoacoustics can be an effective method for conservation practitioners to perform user-friendly, cost and time efficient, rapid biodiversity assessments in multiple habitat types.

Presenter: Antonia Eastwood, James Hutton Institute
Title: Engaging Communities with Decision-making and Nature
Abstract: The James Hutton Institute with Cumbernauld Living Landscapes is piloting the use of participatory video (PV) as a tool to monitor and evaluate the impact of nature engagement programmes. Through the medium of film, PV offers a way to empower and 'give voice' to people who would not normally have the opportunity to communicate their needs and ideas to decisions makers. This 'poster' session will show two short films created by a group of school pupils on their experience of greenspace, and a film created by a group of adults with support needs on their participation in a nature engagement programme. We will discuss PV as a way of engaging different communities, as well as a tool for monitoring and evaluation.

Presenter: Tom Ovenden, PhD student, University of Stirling
Title: Scenarios for lynx in Scotland
Abstract: The reintroduction of the Eurasian lynx (*Lynx lynx*) has become the focus of recent debate. Reintroductions, especially of large carnivores, are often long, complex and costly, making advances in modelling approaches disproportionately valuable. We effectively assess the relative suitability of alternative reintroduction scenarios using a novel, spatially explicit and stochastic individual based model that incorporates advances in ecological theory. In doing so, we demonstrate how and where Scotland could support a lynx reintroduction, and demonstrate how our modelling approach can be used to quickly, safely and inexpensively explore management scenarios for a range of species and target limited conservation funds.

SOCIAL MEDIA POLICY

We love social media – this is a great way to connect with people across the world to share ideas and create collaborations. We heartily encourage delegates to tweet, post and share their experiences – our meeting is all about building relationships.
However, **speakers reserve the right to ask delegates not to disseminate their research via social media, so please respect this request if made.**
All attendees are encouraged to join the discussion via social media, so please use the hashtag **#ScotBiodivSci** and follow @RBGE_Science and @nature_scot on Twitter to ensure you are part of the conversation.

PHOTOGRAPHY

There will be a photographer present at the event. Photographs taken may be used for promotional purposes; if you have any concerns or queries regarding this, please come and see us at the Registration Desk.

INTERNET

There is complimentary WiFi for all delegates. Please connect to the RBGE Visitor WiFi and use the login provided to you at the help desk.

FOOD & REFRESHMENTS

Your registration includes tea/coffee, lunch and drinks. This will be served in the Fletcher Building. The Fletcher Building is a 50 m walk from the Main Science building and you may like to bring an umbrella or light waterproof in case of rain.

BADGES

For security and regulation purposes, please ensure you wear your registration badge at all times throughout the venue.

MOBILE PHONES

As a courtesy to speakers and other delegates, we ask that all mobile phones and electronic **devices be changed to silent mode before entering into any session.**

CODE OF CONDUCT

We ask everyone to help us maintain an inclusive, safe meeting for all attendees by:

- being courteous, respectful and professional towards others
- valuing the diversity of all participants, their views and opinions.

We want this meeting to be enjoyable for all participants. **If you have any concerns or need help at any time, please contact one of the named organisers at the foot of this schedule or anyone wearing a blue lanyard.**

CLOAKROOM

The Boardroom, just off the reception foyer, will be available for leaving coats, jackets and luggage. Whilst items are left at your own risk, the RBGE Steward will nearby all day. This is free of charge.

FEEDBACK

As ever we are keen to hear about your thoughts on the conference. To help us gather your suggestions and comments we will again be using an online feedback form which can be found here.

NEXT STEPS

All sessions will have note takers who will be keeping notes of the main points raised during discussions throughout the conference. After the conference these notes will be summarised into a brief report which will be available on the Scottish Biodiversity Strategy Science Conference web pages: https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy-conferences/biodiversity-science-conference

Thank you and we wish you a thoroughly enjoyable conference.

Aline Finger, Brigid Primrose, Pete Hollingsworth and Des Thompson
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