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'Natural' Scotland in the Anthropocene

Prof Stuart Monro, scientific director of SCRR, on how human activity continues to shape a landscape that we think of as nature's work

GEOLOGISTS ARE INCREASINGLY recognising the need for a new geological epoch, the Anthropocene, which represents that period of time when human activity has had a profound effect on the landscape. For organisations within the Scottish Consortium for Rural Research, I believe this gives us something to think about, particularly in this year of Natural Scotland.

The landscape of Scotland is a highly managed one. A satellite image shows that very little of the countryside around us has not been modified in some way by human activity. We manage river courses to better control flooding, we improve soils and create field boundaries to generate more productive agriculture, we have managed forests to provide timber resources and places for leisure activity. This is our 'natural' Scotland in the 21st century and I am reminded of a quote from Bronowski's *Ascent of Man* where he states, "Man is no longer a figure in the landscape; he is a shaper of the landscape." Human activity is now one of the natural processes that are shaping our planet – something that can be easily recognised in Scotland.

Above: Scotland from space. How much of it is 'natural'?

This issue in species

Beaver, squirrels, mink and mussels are among 32 species that were part of Scotland's Species Action Framework – **page 2**

Grey seals might be able to tell us about the health of the marine environment they live in – **page 4**

Dunlin benefit greatly from restored peatlands in the Flow Country – **page 5**

Barley is Scotland's most important cereal crop, and a new DNA assay may improve yield and quality – **page 6**

Strandline amphipods are those little shrimp-like, insect-like creatures from the seashore, and they've been eating plastic – **page 7**

Lophelia pertusa is a coral used to assess the impact of environmental change – **page 10**

Eagles, dolphins, deer, wildcats and martens are some of Scotland's iconic animals, but which will be chosen for SNH's Scottish 'Big Five'? – **page 11**

About SCRR

THE SCOTTISH CONSORTIUM FOR RURAL RESEARCH – known until May 2012 as the Edinburgh Consortium – exists to promote sharing of ideas and techniques among a group of organisations active in research into land, freshwater, coastal and marine resources, and their uses.

Our member organisations have bases throughout Scotland and are at work all over the world: details on the back page.

Members' reports

Scottish Natural Heritage

PHOTOGRAPHS: RED SQUIRREL AND PINE HOVERFLY, LORNE GILL / SNH; GREAT CRESTED NEWT, SUE SCOTT / SNH

Scotland's Species Action Framework, 2007-12

Dr Martin Gaywood, SNH Policy and Advice Manager, on the effects and legacy of a unique programme

SCOTLAND'S FIVE-YEAR Species Action Framework (SAF) programme ran from 2007 to 2012. This unique programme started with the selection of 32 species for which new and focused effort and resources could make the most difference to biodiversity. Most had been targeted for conservation action. However, the SAF also included invasive non-native species, as well as species in conflict with people's interests, and others that could be both used sustainably and benefit biodiversity.

The SAF programme has been led by SNH. It contributed over £4m during the five years, as well as involving an enormous partnership to get the work done on the ground. Nearly 100 partner organisations have been involved with the various projects, as well as hundreds of individual volunteers, farmers, specialists and others. Some of Scotland's most high-profile species projects have come under the SAF umbrella; these include the East of Scotland Sea Eagle Project, the Scottish Beaver Trial, Saving Scotland's Red Squirrels, Cairngorms Wildcat Project and the Langholm Moor Demonstration Project. The Scottish Mink Initiative, one of the largest mink management projects in the world, was also initiated under SAF.

In addition, SAF also included work on some of our less well-known species, such as the woolly willow, the fresh-water whitefish called vendace, and the slender Scotch burnet moth. The scale of the projects ranged from 'international', with the development of flyway action plans for the Greenland white-fronted goose, to 'microhabitat', with habitat creation in the Cairngorms and translocation of the Pine hoverfly. SAF was made a priority under the Scottish Rural Development Programme (SRDP), and was also used to influence other initiatives.

Many individual projects will continue and new ones, such as the four-year LIFE project for freshwater pearl mussel, were initiated with the help of work pioneered during SAF

In all cases, the management work carried out was underpinned by the best scientific knowledge available. In some cases, additional research was needed – for example genetic studies to inform decisions on which donor populations of freshwater pearl mussel to use for reintroductions, and the surveillance of squirrelpox virus to help plan red squirrel conservation action.

Clockwise from top left: red squirrel; pine hoverfly; great crested newt

The species, and the actions carried out, were carefully selected to benefit as wide a range of native biodiversity as possible. The hazel gloves fungus was used as a 'totemic' species to promote the sustainable management of our special Atlantic hazel woods. The management of 'keystone species' such as the great yellow bumblebee will have wide benefits. The habitat work for species such as great crested newts meant that 78 ponds were created or restored, to the benefit of a range of other pond wildlife.

SAF has also ensured that it has left a legacy. Many of the individual projects are set to continue. New ones, such as the new four-year LIFE project for freshwater pearl mussel, were initiated with the help of work pioneered during SAF.

For further information, please see www.snh.gov.uk/protecting-scotlands-nature/species-action-framework/ or the SAF 2012 conference mini-site, www.snhconferencesandevents.org

Contact Dr Martin Gaywood at martin.gaywood@snh.gov.uk

Healthy seals, healthy seas?

New research is exploring links between pathogens in grey seals and pollution of the marine environment

HIGH LEVELS OF the food poisoning species of bacteria campylobacter and salmonella have been found in grey seal pups by scientists at the Moredun Research Institute. Understanding what bacteria, viruses or parasites grey seals carry may help us determine how healthy our seas really are.

Forty-five percent of the world's population of grey seals live in Scottish coastal waters, coming ashore to breed in the autumn months. They are at the top of their food chain, live at the interface between the marine and terrestrial environments and, as such, may hold valuable information about the health of our coastal waters.

Scientists at Moredun Research Institute, in collaboration with the Sea Mammal Research Institute in St Andrews and the Wildlife Unit at the Scottish Rural College, Inverness, are looking at causes of disease and death in grey seal pups on the Isle of May breeding colony in the Firth of Forth. By screening for large numbers of different bacteria as well as specific viruses and parasites, they hope to work out which pathogens grey seals are carrying that may be shared with other species such as birds and land mammals.

PHOTOGRAPH: JOHANNA BAILY

Forty-five percent of the global population of grey seals live in Scottish coastal waters

Campylobacter and salmonella were found in the intestines of grey seal pups from the Isle of May during the pupping season in autumn 2011 (in 50% and 20% of pups respectively). These finding raise concerns that the bacteria indicate pollution of the marine environment through contamination from sources such as human sewerage or run-off from agricultural land. The next step is to fully identify these bacteria at the genetic level to try to determine their source and if they have been present in seal populations for many years or represent a new threat to this species.

For more information please contact johanna.baily@moredun.ac.uk or mark.dagleish@moredun.ac.uk

Lews Castle College UHI publishes wave energy findings

HEBRIDEAN MARINE ENERGY FUTURES, a project involving Lews Castle College UHI in partnership with the Universities of Edinburgh, Strathclyde and Heriot-Watt and several energy companies (Aquamarine Power, Pelamis, Voith, Scottish Power Renewables and E-ON), has been recording wave heights off the west coast of Lewis for more than two years.

The project uses devices called wave rider buoys, installed about five nautical miles off Bragar and Siader in Lewis, to gather data about wave height and strength. During winds gusting up to hurricane force in early February, the buoys detected waves averaging 14m (45ft) in height and reaching a maximum of more than 23m (75.5ft).

From October 2011 to Sept 2012, the average wave power measured off Lewis was 75.5 kilowatts per metre. Based on this, and a 200km coastline from Butt of Lewis to Barra, the total mean power would be 15GW - equivalent to 12 modern nuclear power plants, such as Torness. However, during storms such as those experienced this year, the wave power potential down the (200km) length of the Western Isles could match the output of 120 Torness-sized nuclear power stations. The challenge therefore would be for renewables companies to come up with technology able to stand up to the most extreme conditions.

For further information, please see www.hebmarine.com

Right: retrieving a waverider buoy which has spent a year in the sea off Lewis

Members' reports

National Museums Scotland

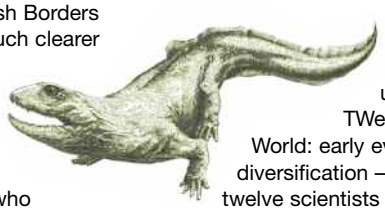
The TWeed project: evolution's missing chapter

Fossils found recently in the Scottish Borders are exciting evidence of early, lizard-like four-legged animals

THE EARLIEST TETRAPODS –– animals with backbones and four legs – evolved from a particular group of fish that possessed fleshy lobed fins. The earliest tetrapods in all probability used their limbs to scramble over the beds of lakes and river systems, but they would have lacked any capacity to move across dry land. However in time, and with fully-developed lungs, we believe that new forms evolved that lived and looked much more like amphibians do today.

This process began about 360 million years ago. But under what circumstances did it take place and what was the Earth like at this time? Until now, we have had very little information to help with answers.

The early Carboniferous period (from 360 to 340 million years ago) is known not only for its extreme scarcity of tetrapod fossils, but also the rarity of terrestrial invertebrates. Just what went on in this interval has remained a mystery to palaeontologists, yet it was a pivotal step for the evolution of life on land. Now, for the first time, new fossils from the Scottish Borders promise to reveal a much clearer picture of terrestrial life at this time.



The fossils were discovered by Stan Wood, a renowned field palaeontologist, who sadly died earlier this year. They include fossil plants, scorpions, myriapods, fishes and several of the elusive tetrapods.

The scientific significance of the finds cannot be overestimated and an expert group of scientists has been assembled to research the fossils. Operating under the acronym TWeed – Tetrapod World: early evolution and diversification – the project involves twelve scientists from across the UK, funded by the Natural Environment Research Council. The consortium is led by Prof. Jenny Clack FRS and involves scientists from two SCRR members, National Museums Scotland and the British Geological Survey, together with the universities of Leicester, Cambridge and Southampton. During the next four years the TWeed team will be the first to have the opportunity to study the fossils and to search for others. Team members will investigate the environmental, depositional and climatic context in which this momentous episode took place.

Above: fossil of an early tetrapod affectionately known as 'Ribbo'. Left: reconstruction by Michel Coates.

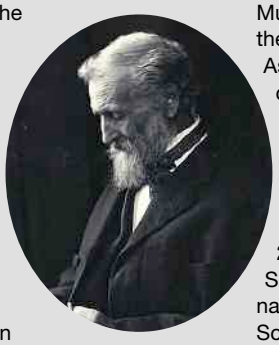
For further information please see www.tetrapods.org/

First John Muir Day will celebrate Scotland's conservation pioneer

JOIN THE CELEBRATIONS of the first ever John Muir Day in Scotland on April 21, 2013, the 175th anniversary of his birth.

Known in America as the father of the National Parks, the Dunbar-born conservationist has inspired people all over the world.

Run by Scottish Natural Heritage, this campaign aims to raise awareness of the fantastic achievements and legacy of John Muir and encourage Scots to get into the countryside.



As part the £3.4m VisitScotland campaign 'Big April Adventure', it features a new television advert and a major ticket giveaway from Scottish transport providers, which will see at least 15,000 people enjoying free travel during April. 2013 is also the Year of Natural Scotland. Look out for exclusive nature events and activities all over Scotland in April.

In April 2014, John Muir will be further honoured by the opening of the new John Muir coast-to-coast trail running from Dunbar in the east to Helensburgh in the west.

Year of Natural Scotland, Visit Scotland: www.visitscotland.com/about/nature-geography/year-of-natural-scotland/

Year of Natural Scotland, SNH: www.snh.gov.uk/enjoying-the-outdoors/year-of-natural-scotland-2013/

PHOTOGRAPH: CHRIS GOMERSALL / RSPB IMAGES

New methods in forest-to-bog restoration

A major new research partnership is investigating whether new approaches could speed up the process of turning plantations back to peatland

IN A GROWING PARTNERSHIP, scientists at the RSPB and Scottish universities are working together to better understand a major conservation land management practice: the restoration of blanket bog by the removal of forestry plantations on deep peat.

One of the most controversial issues in rural Scotland in recent decades was the extensive planting of non-native conifer trees on deep peat soils in the Flow Country of Sutherland and Caithness. These 1980s plantings were strongly challenged at the time by nature conservationists, arguing that the Flow Country blanket bogs were among the most distinctive and internationally important wildlife habitats in the UK. Since that era, increasing interest has also focussed on another critically important function of these peatlands: the preservation of enormous stores of soil carbon. Should this carbon be released as greenhouse gases, it would dramatically add to Scotland's contribution to climate change. Combined with the biological importance of the peatlands, this has led to an emerging consensus that, where possible, forestry plantations on deep peat should be restored as blanket bog.

A new phase of research will extend our understanding of this 'forest-to-bog' restoration, measuring the rate of recovery of bog habitats and carbon balance, and comparing different restoration techniques. Current restoration techniques are effective, but new approaches and enhancements might speed up the restoration process – at a cost.

The research will evaluate whether these enhancements deliver significant improvements in the rate of recovery of bog conditions. The work is based around areas of forestry plantation undergoing restoration between 2013 and 2018, covering over 1,000 ha of RSPB Forsinard Flows Reserve and parts of the 1,900ha restoration fellings between 1998 and 2012. RSPB researchers will focus on the biodiversity effects of restoration, while scientists from the Universities of St Andrews, Stirling, the Highlands and Islands (Environmental Research Institute) and Edinburgh, with expertise in the science of greenhouse gases and water quality, will extend these studies to the wider ecological functions of the peatlands.

To support the work, four new PhD studentships have been established, supported by Scottish Government. These add to existing research activity in the area by (among others) CEH, JHI and Forest Research, and contribute to a developing peatlands research hub in the Flow Country.

For more information about research at RSPB, please see www.rspb.org.uk/ourwork/science/projects.aspx

Contact Mark Hancock at: mark.hancock@rspb.org.uk

Top: dunlin, one of the characteristic birds of the Flow Country peatlands.

Left: RSPB staff alongside staff and students from ERI/UHI, Stirling and St Andrews.

Below left: Graham Hambley, PhD student, measures gases entering and leaving peatland soils.

PHOTOGRAPHS: MARK HANCOCK, RSPB

Members' reports

James Hutton Institute

PHOTOGRAPH © STEWART MALECKI, THE JAMES HUTTON INSTITUTE

Barley is Scotland's most important cereal crop: the new techniques could help improve quality and environmental resilience as well as yield

New barley genotyping assay opens door for better crop yields

Same technique could be used in potatoes, currants and berries

THE JAMES HUTTON INSTITUTE and US company Eureka Genomics have launched a new custom assay for the genotyping of barley, enabling identification of over 400 SNPs (single-nucleotide polymorphisms) in a single test. The assay will offer a low-cost opportunity for researchers to identify and optimise traits such as yield, quality and environmental resilience for commercial crop production. It also opens the door for the development of new assays for other crops such as potato, blackcurrant and raspberry.

Barley is the world's fourth most important cereal crop and has significant worldwide economic value for the brewing and whisky distilling industries and animal feed. It is Scotland's most important cereal crop in terms of output, being estimated at £243 million for 2008, according to the 2009 Economic Report on Scottish Agriculture. Its contribution to Scottish agricultural output is only exceeded by cattle and dairy production.

Dr Pete Hedley of the James Hutton Institute said: "The collaboration with Eureka Genomics has not only enabled us to develop an efficient genotyping tool for barley, but opens the doors to apply the technology to the other main crop species of interest at the James Hutton Institute, notably potato, blackcurrant and raspberry.

"Translating these assays to our newly acquired MiSeq platform in the Genome Technology group will ensure affordable and flexible in-house genotyping over the next few years." Staff at the James Hutton Institute involved in developing the new assay were Dr Pete Hedley, Dr Joanne Russell, Dr Micha Bayer, Allan Booth and Professor Robbie Waugh.

The marker assay (LDMA) developed by the James Hutton Institute and Eureka Genomics provides an improved and economical alternative to traditional technologies for profiling hundreds of SNPs (or other genetic markers) in thousands of samples using Next Generation Sequencing (NGS). The assay can be broadly applied to the detection of SNPs, CNV, presence/absence and methylation and is compatible with DNA or RNA from virtually any organism, even when genome information may be incomplete.

For further information please see www.hutton.ac.uk/news

Calling all social scientists: SCRR 'Ruralities' event, Perth, March 20

TO DATE, SCRR has concentrated more on the biological than social-scientific aspects of rural research. Accordingly, the aim of this one-day meeting is to encourage social scientists (broadly interpreted) working in a rural context to come together to exchange information and insights. The intention is to help SCRR to develop a more fully cross-disciplinary approach to 'rural research'.

Entitled Researching Scotland's Ruralities: Social Science Perspectives on Current Issues in Rural Scotland, the meeting will have a number of substantive focus points, but is also intended to encourage researchers to network. It is supported by a group of SCRR member organisations including The University of Edinburgh (ESRC Genomics Forum and CHSS), the James Hutton Institute and SRUC (formerly SAC).

It is at Perth Concert Hall, Mill Street, Perth, PH1 5HZ, starting at 10am on Wednesday March 20, 2013.

Full details of the programme and how to book are on the SCRR website at www.scrr.ac.uk/events.php

PHOTOGRAPH: ISTOCKPHOTO.COM

Pervasive plastics in the marine environment

Dr Phillip Cowie of the University Marine Biological Station, Isle of Cumbrae, explains his latest findings

PHOTOGRAPHS: PHILLIP COWIE

MANY OF US are aware of the heart-rending images of dead seabirds and marine mammals with stomachs full of macro-plastics which have potentially caused their deaths. However, for the past five years, Dr Phillip Cowie and his students have been studying the distribution of micro-plastics in different vertebrate and invertebrate groups in the Clyde Sea.

Initial research focussed on *Nephrops norvegicus* (langoustine) and discovered that a high percentage of those sampled in the Clyde contained plastic filaments in their guts (84%) – from synthetic clothing fibres, degraded fishing gear and other land and marine-based sources. Subsequent studies have shown that hermit crabs and different species of flatfish also contain varying levels of plastic filaments. Plastic may be mistaken for food and ingested directly or it may be acquired indirectly from burrowing activities and the secondary consumption of plastics in prey species.

The research indicates that organisms associated with muddy benthic habitats tend to be the most at risk. These are depositional environments and plastic materials of all sizes tend to aggregate in these areas. Organisms with 'messy', non-selective, opportunistic feeding behaviours may be more at risk of plastic ingestion than more discriminating species.

Plastics also accumulate and degrade in coastal strandlines, and our research has shown that amphipods in strandlines can also contain plastic filaments. This is surprising because they are very small and feed on dead and decaying seaweed on the shoreline.

This ground-breaking research indicates that many different groups of organisms will ingest plastic particles from the environment, and highlights the insidious nature of this pollutant. This is worrying, because it indicates that plastics could be passed through food webs from lower invertebrates to top predators such as large fish, seabirds and marine mammals. The actual impacts of these microplastics on the organisms concerned are currently unknown.

The Clyde Sea area is an ideal location to study this subject; it is a semi-enclosed basin with comparatively poor 'flushing times' and can be used to develop models of plastic abundance, distribution and behaviour for other national and international estuaries.

To find out more about Dr Cowie's rsearch at UMBS Millport please see http://www.gla.ac.uk/centres/marinestation/index.php?url=prc.php

Above: the effect of ingested plastics on predators such as shags are unknown. Left: a strandline amphipod. Below: anenome using a bin bag as an attachment surface

Members' reports

Scotland's Rural College (SRUC)

PHOTOGRAPHS: SRUC

You can take a cow to water, but...

Cattle aren't allowed to trample the ground beside a watercourse, so how are farmers to ensure they get a drink? SRUC is trialling alternatives

PICTURE IT: in the shade of a riverside tree, cattle are standing, some knee-deep in water, and drinking. It is an image generations of artists have used to evoke a particular rural mood. Now, though, it seems time is up for that timeless image.

Researchers from SRUC, Scotland's Rural College are working with SEPA to find better ways of watering stock. Diffuse Pollution, General Binding Rules (DP GBRs) specify there should be no significant poaching, that is trampling, of the ground within 5m of a watercourse.

Scottish Government has funded SRUC to trial and demonstrate a range of alternative livestock watering systems within two Priority Catchments on the west and east sides of Scotland. These working demonstrations will help farmers identify which option is most suitable for their farm.

Livestock kept close to any steading can get a drink from troughs filled by mains or borehole water. It is at remote sites, where piping water long distances is neither cost-effective nor practical, that alternatives must be found, especially if access to watercourses leads to a poaching problem.

The project is considering five options supported where appropriate by 'hotspot fencing'. This is a new concept that aims to take the pressure off badly poached sites, with the majority of the watercourse remaining unfenced. It allows for vegetation regrowth and, even if some stock still choose to go into the water and ignore the new drinking options, the overall poaching pressure is reduced and compliance with DP GBR 19 maintained. Full fencing is expensive and can be impractical at sites prone to flooding.

Installation work is in progress. In the west, on Orchardton farm, near Mauchline in Ayrshire, three trial sites have been chosen exhibiting different pieces of equipment.

Above: cattle at a 'poached' site. Right: pasture pump. Below: SRUC's Adrian Jones explains the RAM pump concept to visiting funders

• A single Pasture Pump sourced from a local farm supplies company. These normally cater for 10 to 15 stock – so a herd would require a drinking cluster. Also installed was an abstraction chamber to remove the abstraction point from the bed of the burn.

• A Drinking Trough filled via a battery operated pump, charged by solar power. This system, which can also support an electric fence, is a prototype so not available off the shelf.

• A ram pump powered by energy from the flow of water in the watercourse. It can feed a number of troughs and link into a gravity-fed system where appropriate, but the system does require ground works.

On other sites more options can be added to the list, including a gravity fed drinking trough and a full cluster of Pasture Pumps.

The work is in its early stages with information on installation and running costs or management issues still being collected. However already it has highlighted issues concerning the authorisation for abstraction (eg higher abstraction volumes are required by the ram pump operation). Another concern is keeping on the right side of the Engineering Controlled Activities regulations when taking water directly from the watercourse to supply troughs.

These are bureaucratic issues Constable and his contemporaries never had to consider. Likewise in comparison with the technology of centuries past, today's pumps may lack a certain aesthetic quality. However projects like this are another step back to a cleaner countryside where much of the wildlife and nature those artists observed become part of our everyday rural experience as well.

For further information please contact Rebecca Audsley, Climate Change Manager, SAC Consulting: Environment & Design rebecca.audsley@sac.co.uk

Seminar: Ecotourism in Scotland – Opportunities, Challenges and EU Standards

All are welcome to this seminar where consultants, academics and businesspeople will discuss the role of ecotourism in Scotland.

The programme will include presentations on the European Ecotourism Labelling Standard, the value of nature-based tourism, the sustainability of outdoor tourism, and land management standards and their application to ecotourism.

It takes place on February 28, 2013 from 1200 - 1630, at the Edinburgh Centre for Carbon Innovation, 15 South College Street, Edinburgh EH8 9AA. There is no cost, but places are limited, so please book early.

For more information contact Kathy Velander k.velander@napier.ac.uk or book directly with Angela Paterson angela.paterson@perth.uhi.ac.uk

PHOTOGRAPH: SNH

SCRR event: Research in the Cairngorms

An event is to be held in late April in Aviemore bringing together researchers with an interest in the Cairngorms National Park to share information, explore opportunities for collaboration and link into management practice. The event will mark the launch of the National Park as a Long-Term Socio-Ecological Research Site and will contribute towards a future research strategy.

For confirmation of the date, please see http://www.cairngorms.co.uk/

PHOTOGRAPH: VIA WIKIPEDIA

SCRR workshop: Environmental and agricultural metagenomics

Thursday May 9, 2013, Battleby Conference Centre, Redgorton, Perth

SCRR IS ORGANISING a workshop to present an overview of metagenomics as applied to the environment and agriculture.

Metagenomics is a powerful tool that can be used to analyze microbial communities regardless whether member organisms can be cultured in the laboratory. It is based on the genomic analysis of microbial DNA that is extracted directly from communities in environmental samples.

Presentations and discussions will examine its application with respect to soils and water, conservation, livestock and crops, while additional presentations will examine questions around metagenomics and lead discussion of its promise with regard to unlocking the massive uncultured microbial diversity present in these areas.

For further details, please see www.scrr.ac.uk

Oot n Aboot, ootdoors

Mountains, lochs, northern lights... climbing, skiing and whale watching... Scotland is jam-packed full of adventure, beauty and biodiversity and that's why it's worth celebrating. 2013 is the Year of Natural Scotland.

Working together with Young Scot, SNH have just launched a Young Scot App encouraging young people to complete an exciting 'Scotland's Outdoor Challenge'. Grab your boots and your binoculars and get oot n aboot in the great Scottish outdoors this spring! Young people can tick off activities as they do them, and compare their score with friends, and beat them! The App is available at the reception if you feel brave enough to face this challenge!

Enter at www.snh.gov.uk/oot-n-aboot (only young people can apply!)

Members' reports

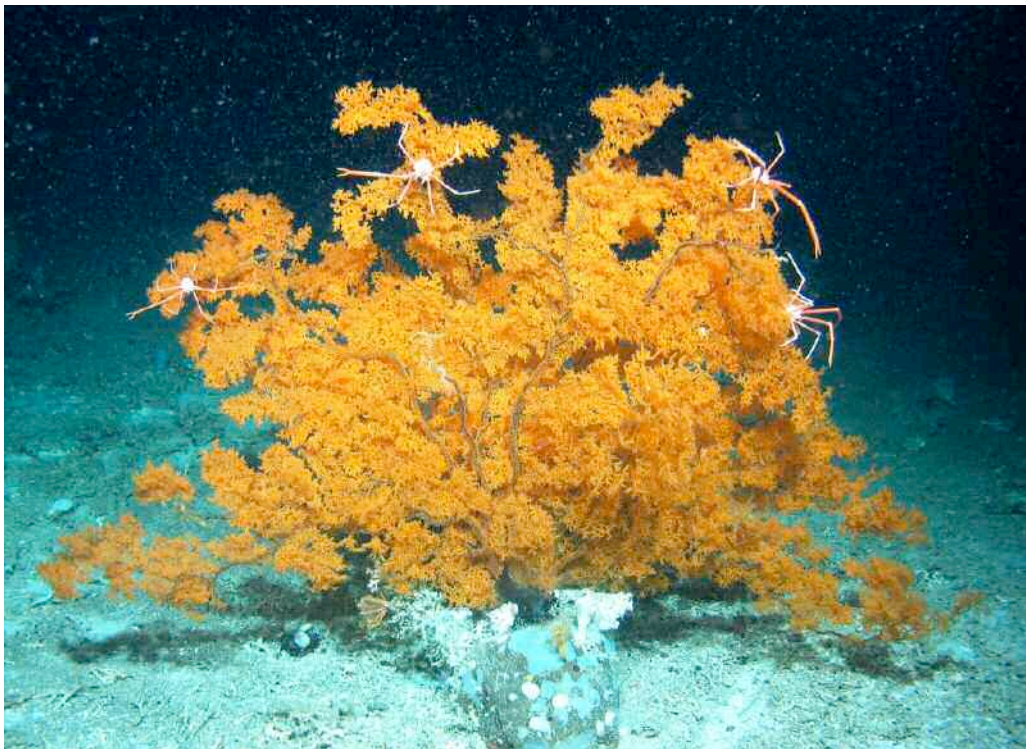
Heriot-Watt University

The 'Changing Oceans' expedition

Dr Laura Wicks of the Centre for Marine Biodiversity and Biotechnology on exploring beneath the waves

RESEARCHERS FROM ACROSS the UK and the world recently returned to shore following a highly successful, month-long research expedition aboard the RRS James Cook. The Changing Oceans Expedition, led by Professor Murray Roberts from Heriot-Watt University, was part of the UK Ocean Acidification Research Programme, with a remit to examine the potential impact of ocean temperature and chemistry changes upon cold-water coral reefs and the associated reef-creatures.

Research activities on board the James Cook centred on the Holland I Remotely Operated vehicle (ROV), which descended more than 1800 m into the North Atlantic in search of coral reefs. Thanks to the expertise of its pilots, we collected a myriad of creatures from bacteria to giant crabs, as well as dazzling high-definition footage of the reefs. One highlight was the use of a specially-designed microbial sampler which allowed the ROV to carefully collect corals and preserve them in the water from their natural environment; this allowed the scientists on board to analyse the microbial fauna of the corals – a first for the North Atlantic reefs.



PHOTOGRAPH: CHANGING OCEANS EXPEDITION

One highlight was the use of a specially designed microbial sampler which allowed the ROV to carefully collect corals and preserve them in the water from their natural environment

Above: 'squatties' (squat lobsters) on black coral. Below: celebrating the Diamond Jubilee.

PHOTOGRAPH: ROSANNA MILLIGAN

To examine the effects of the changing climate on cold-water corals, we collected *Lophelia pertusa* from both the shallow Mingulay Reef complex and the deeper sites of the Rockall mound. These corals were then incubated in treatment tanks, where the temperature and CO2 levels were manipulated to represent ocean conditions now and projected for the end of the century. Now we are back on dry land, sample processing and data analysis is underway to determine how the animals responded to their changed environment.

The Changing Oceans Expedition is one of the most ambitious attempts yet to understand the functional ecology of cold-water coral systems. Without this understanding we cannot predict how these ecosystems will respond to global climate change.

Further information on the research can be found on the expedition blog: changingoceans2012.blogspot.co.uk

Dr Laura Wicks is Post-Doctoral Research Associate within the Centre for Marine Biodiversity and Biotechnology: www.sls.hw.ac.uk/staff-directory/laura-wicks.htm

PHOTOGRAPH: © ESRC GENOMICS FORUM.

Children act like animals to learn about conservation

Innovative collaboration is a Bright Idea for pantomime season

A UNIQUE COLLABORATION between the ESRC Genomics Policy & Research Forum at the University of Edinburgh, The Durrell Wildlife Conservation Trust, The North Edinburgh Arts Centre, The Lyceum Youth Theatre Discover initiative and the Royal Zoological Society of Scotland took place at the end of January 2013.

This public engagement activity was initiated by Naomi Webster from Durrell as part of her Bright Ideas Fellowship visit to Edinburgh's ESRC Genomics Forum. Working with a group of thirteen young people, aged 9-12, from the Lyceum Youth Theatre Discover groups in North Edinburgh and Craigmillar, the project aimed to teach conservation themes through the medium of a scratch pantomime.

Using the case of the Mauritius Kestrel, she used the innovative medium of pantomime to explain the importance of saving endangered species from extinction and also the dilemmas faced with regards to the preservation of genetic diversity within populations. In just seven hours, spread over a Friday afternoon and Saturday morning, the group put together a story based on Snow White and the Seven Dwarves in which the heroes had to stop the Wicked Queen from destroying the rainforest with DDT and save the Mauritius Kestrel. Based on the real-life efforts of the Durrell Wildlife Conservation Trust, the case of Mauritius Kestrel perfectly illustrated a species brought back from the brink of extinction by joint conservation efforts.

Children from North Edinburgh and Craigmillar in costume (top) and during rehearsals

The young people's hard work culminated in a 20 minute pantomime performance on the Saturday afternoon complete with audience member participation with timely shouts of "Oh no you shouldn't!" and "He's behind you!" The project ended with a group trip to Edinburgh Zoo to see conservation in action.

Did they learn about saving the Mauritius Kestrel and the rainforest?

Oh yes they did!

For further information, please see www.genomicsnetwork.ac.uk

Vote for your favourite animal from Scotland's 'Big Five'

FROM PUFFINS to seals, eagles to deer, Scotland has an amazing variety of wildlife found in magical places. Spring is one of the best times to get out and about and spot many of these animals – whether on your doorstep or further afield. From March, you can vote for your favourite creature from SNH's Big Five. The five species are top secret for now, but you can always take a guess…

Vote at www.snh.gov.uk/natural

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- Royal Zoological Society of Scotland . . . . . www.rzss.org.uk
- Science & Advice for Scottish Agriculture . . . . . www.sasa.gov.uk
- Scotland's Rural College (formerly Scottish Agricultural College) . . . . . www.sruc.ac.uk
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  - Scottish Association for Marine Science, Oban. . . . . www.sams.ac.uk
  - West Highland College, Fort William . . . . . www.whc.uhi.ac.uk

Members' meetings

THURSDAY FEBRUARY 28, 2013
SCRR Seminar
Ecotourism in Scotland
15 South College Street, Edinburgh
www.scrr.ac.uk/events.php

MONDAY MARCH 11, 2013
Executive Committee meeting
Scottish Natural Heritage
Directors' Research Lunch, 12.30
Host, Dr Ian Bainbridge

WEDNESDAY MARCH 20, 2013
SCRR Workshop
Researching Scotland's Ruralities
Perth Concert Hall, Perth
www.scrr.ac.uk/events.php

APRIL, 2013 (DATE TBA)
SCRR event
Research in the Cairngorms
http://www.cairngorms.co.uk/

THURSDAY MAY 9, 2013
SCRR Workshop
Environmental and Agricultural Metagenomics
Battleby Conference Centre, Perth
www.scrr.ac.uk/events.php

MONDAY AUGUST 19, 2013
Executive Committee meeting
The James Hutton Institute
Invergowrie, Dundee
Directors' Research Lunch, 12.30
Host Prof. Ian Gordon

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FUTURE ISSUES

Contributions to the SCRR newsletter (formerly the ECRR newsletter, and before that The Bush Telegraph) are welcomed. All contributions, comments and suggestions should be emailed to the Secretary/Treasurer as above.

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