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JAMES HUTTON BY SIR HENRY RAEBURN, NATIONAL GALLERY OF SCOTLAND (WIKIMEDIA)



This issue in Latin species names

Nosema ceranae is a gut parasite of bees whose role in colony collapse is currently being researched by SASA – **page 4**

Acarapis woodi is a mite that causes tracheal damage and reduces the lifespan of honey bees – **page 4**

Dermanyssus gallinae is the red poultry mite, a tiny creature that causes enormous problems for poultry farmers – **page 5**

Homo sapiens seems to be responsible for a change to our climate that will last for centuries – **page 8**

Sterna hirundo is the common tern, currently bewildering researchers who are trying to keep track of its movements – **page 10**

Dolerus aeneus is a sawfly (order, Hymenoptera; suborder, Symphyta) whose decline in pristine fields might affect birds such as the grey partridge – **page 11**

A compass-bearing on the future

Prof Stuart Monro, scientific director of SCRR, offers some thoughts on the new report from the Intergovernmental Panel on Climate Change

THE PUBLICATION OF the latest report of the Intergovernmental Panel on Climate Change (IPCC) raises some challenging issues for those involved in environmental research. It emphasizes that with the benefit of 'big data', science now has the ability to examine aspects of environmental change on a variety of scales. Our predecessors looked at data on a scale appropriate to human thinking at the time: now, we can examine what might be

regarded as small changes and postulate their longer term impacts.

I am a big fan of James Hutton, a medic, a farmer, a chemist and the Father of Modern Geology. He changed the thinking about the scale of time of geological change, what he termed 'deep time', and laid the foundations for much of the modern thinking on Earth's processes. He

Pictured above:
James Hutton,
painted by Raeburn

Continued overleaf

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

Centre for Ecology and Hydrology, Scottish Natural Heritage

A compass-bearing on the future

From page one

introduced a scientific approach to agriculture with new techniques in ploughing brought in from East Anglia and a chemical approach to the understanding of the nature of soil. It was inspirational, when the Macaulay Land Use Research Institute and the Scottish Crop Research Institute merged, to call the new organisation the James Hutton Institute.

Hutton recognised that the Earth was naturally a dynamic system, continually in change but operating in cycles. His famous quote – ‘I see no vestige of a beginning, no prospect of an end’ – is one that today we need to take with a large pinch of salt. His



‘Hutton recognised that the Earth is a dynamic system, continually in change but operating in cycles’

conclusions were based on the scale of observations available to him at the time.

Today, the scale of observations in both quantity and quality is immense but extending the cross-disciplinary work of Hutton to gain more and better data on the Earth system will be the foundation on which we can plan for the mitigation of the effects identified in the IPCC report.

On a positive note, from a geological perspective, the Earth system is remarkably robust and applying the Huttonian maxim ‘the past is the key to the future’, perhaps we should be more confident. However, the fly in the ointment is this relatively new kid on the block, *homo sapiens*, and the ability of that species to dominate Earth systems.

Puffin population on the Isle of May National Nature Reserve

After severe storms in March 2013, puffin numbers should have plummeted – but didn't. Alistair Dawson of the Centre for Ecology and Hydrology explains



PHOTOGRAPH: BOAWORM UNDER CC BY 3.0 VIA WIKIPEDIA

IN MARCH OF THIS YEAR, severe weather resulted in the deaths of thousands of seabirds along the coasts of eastern Scotland and north-east England. This was at the time that birds were returning to their breeding colonies. The Atlantic puffin was one of the species affected. Examination of the bodies of some of the 3,500 dead puffins and ringing recoveries suggested that many of the birds involved were breeding adults from local colonies. Images of dead and dying puffins resulted in great concern about the future of the major puffin breeding colonies in the region, especially since there had been a 30% decline in the numbers of puffins on the Isle of May National Nature Reserve (NNR) off Scotland's east coast between 2003 and 2009.

The Isle of May NNR is home to the largest colony of puffins in the North Sea and has been the main centre of the UK science community's research into puffins for nearly four decades.

However, the results of a subsequent puffin survey by scientists from the Centre for Ecology and

Hydrology, led by Professor Mike Harris and funded by Scottish Natural Heritage (SNH), indicated that a total of 46,000 burrows showed signs of use by puffins in the spring, an almost identical total to the last count, which was completed in 2009.

Professor Harris said: ‘Our general impression over the last few years was that the population was increasing slowly and this may explain why there

‘Our general impression over the last few years was that the population was increasing slowly and this may explain why we did not see a decline’

was not seen a decline following the recent wreck this spring.’

The count also revealed that the March wreck seriously delayed breeding on the Isle of May, with laying starting two to three weeks later than normal. Nevertheless, it subsequently turned out that puffin breeding success was higher than it had been in 2012 and was very close to the long-term average. Chicks also appeared to have grown normally and fledged at about average weight.

Roslin Institute, The University of Edinburgh, Moredun, Centre for Ecology and Hydrology

PHOTOGRAPH: NORRIE RUSSELL



National Avian Research Facility at Easter Bush takes shape

The conventional building is open, with the 'specified pathogen-free' facility to follow next autumn, reports Alan Hart of the Roslin Institute

THE NEW National Avian Research Facility (NARF), funded by the University of Edinburgh, BBSRC, Roslin Foundation and Wellcome Trust, will endow the UK with a national resource to study avian biology, genetics, infection and disease.

NARF infrastructure is currently being erected at the University of Edinburgh's Easter Bush Campus adjacent to the Roslin Institute, and will comprise a conventional biosecure facility and a unit capable of maintaining birds in what is known as a specified-pathogen-free (SPF) facility. The conventional unit was officially opened on September 9th, 2013 by the Rt Hon Mr David Willetts MP, Minister for Universities and Science. The SPF facility will be completed approximately one year later and will provide accommodation for several inbred chicken lines that are currently housed at The Pirbright Institute's (formerly the Institute for Animal Health) Compton Laboratories.

Both facilities will have capabilities to generate transgenic birds, using either the current lentiviral technology or taking advantage of new technologies being developed at

the Roslin Institute, to study genes of interest.

Scientists at the Roslin Institute and the Pirbright Institute are partners in the NARF and together offer a wealth of knowledge and expertise in avian biology and genetics. The research portfolio is wide ranging and encompasses both fundamental and applied bioscience. This includes host-pathogen interactions, genetics, transgenics, immunology, virology, proteomics, epidemiology and developmental biology. In addition to the two new buildings, NARF has challenge facilities available at the Pirbright Institute and Moredun Research Institute to enhance our understanding of disease resistance and susceptibility.

To disseminate this information and provide the community access to services, reagents and genetic resources developed through NARF, a web-based portal is also under construction. This knowledge base will provide interested parties with a one-stop shop for all things avian and in particular chicken.

NARF: www.narf.ac.uk

Minister of State for Universities and Science visits CEH in Edinburgh

THE RT HON DAVID WILLETTS MP, Minister of State for Universities and Science, visited the Centre for Ecology & Hydrology's Edinburgh site on Monday September 9th. The main focus of his visit was to discuss the latest research into pollinators with ecologists Dr Claire Carvell and Dr Adam Vanbergen (Science Co-ordinator of the UK Insect Pollinators Initiative).

Dr Vanbergen explained how the CEH researchers were combining ecology with molecular genetics, showing how environmental changes affected the organisation of pollinator community networks and how this in turn affected inbreeding in wild plant populations. The minister also discussed the various issues around the valuation and conservation of pollinators and the ecosystem service they provide. Finally he was shown details of the long-term biological recording networks co-ordinated by CEH that have helped in tracking changes in UK wildlife over the last century.

The minister also heard from Professor David Fowler FRS about the role played by CEH scientists in research into atmospheric pollution monitoring and the contribution of nitrogen management towards more efficient, sustainable agriculture. His visit concluded with a discussion on seabird ecology and sources of renewable energy with Dr Francis Daunt.

Above: stage one of the NARF receives finishing touches

Below: Claire Carvell and Adam Vanbergen of CEH meet with David Willetts MP



PHOTOGRAPH: DEENA MOBS, CEH

Members' reports

Science and Advice for Scottish Agriculture; Centre for Mountain Studies, UHI

PHOTOGRAPHS: SASA



The plight of the honey bee

Scientists at SASA are working hard to identify the causes of collapse in bee populations. Fiona Hight has the details

POLLINATOR LOSS has hit the headlines recently, and with a reported 30% of honey bee colonies lost during 2012-13, concerns are high. Scientists at SASA are working to identify reasons behind these losses in an effort to improve the health of Scottish honey bees.

In collaboration with Aberdeen University, SASA is studying the distribution and effects of the mite *Acarapis woodi*, which causes tracheal damage, reducing the lifespan of honey bees. Although almost extinct in warmer climates, this mite can cause colony loss over prolonged winters.

SASA is also working with Dundee University and the Scottish Beekeepers' Association (SBA) to develop an understanding of the recently introduced gut parasite *Nosema ceranae*, which is symptomless but has been linked to colony collapse. The ultimate goal of this project is to enable beekeepers to identify the disease themselves and make better-informed management decisions.



The Scottish Government and the SBA are now in the second year of a survey of honey bee health in Scotland. This project aims to identify factors affecting bee health and develop 'best practice' for beekeeping under Scottish conditions. First year

results confirmed 32% winter losses in 2012-13, and identified weather, husbandry and disease management as the main reasons for loss. The 2013 survey will also look at pesticide and virus levels within the colony.

Outcomes of these projects will be disseminated to beekeepers through the Scottish Honey Bee Health Strategy, launched in 2010 to develop closer links between beekeepers, scientists and policymakers.

2012 Scottish Honey Bee Health Survey report – www.scotland.gov.uk/Resource/0042/00423966.pdf

Scottish Honey Bee Health Strategy – www.scotland.gov.uk/Publications/2010/06/23102211/0

Sustainable estates: an evidence-based approach

Since 2007, the Centre for Mountain Studies has examined the future of upland estates, reports Martin Price

THE PROJECT 'Sustainable Estates for the 21st Century', funded by the Henry Angest Foundation, has now concluded, with the publication of 'Lairds, Land and Sustainability: Scottish Perspectives on Upland Management' by Edinburgh University Press.

This has been the main in-house project at the Centre for Mountain Studies since 2007, and was the first major project on estates since the 2003 Land Reform Act, comprising four studies (three PhDs and postdoctoral research) focusing on large estates – with community, NGO, and private owners – in Scotland's uplands.

In addition to contributing to the long-running debates about estates, the book is particularly timely, given

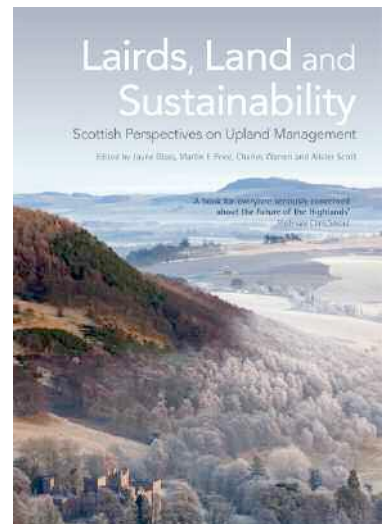
the current activity of the Land Reform Review Group. The book provides an objective and evidence-based perspective on the issues surrounding land ownership and management in upland Scotland, not least the differences between various landownership mechanisms and the benefits that each brings to Scotland's people and natural heritage.

An event to launch the book at the Scottish Parliament is being planned.

Book, Edinburgh University Press:
www.euppublishing.com/book/9780748645916

Land Reform Review Group:
www.scotland.gov.uk/About/Review/land-reform/ReviewGroup

The book of the 'Sustainable Estates' project is published by Edinburgh University Press



PHOTOGRAPHS: MOREDUN



Development of a vaccine to control poultry red mite

Infestation of hen houses causes serious problems for birds, workers and farmers, says Joanne Watts of Moredun

THE POULTRY RED MITE lives off-host in inaccessible areas of cages during daylight, emerging during darkness to feed on the hens, biting through the skin to feed on blood.

Infestation of production facilities with this parasite therefore has important animal welfare implications including anaemia, increased irritation and restlessness, feather pecking and an increased incidence of cannibalism. These behaviours also have a considerable negative impact on productivity.

In addition, poultry red mites (PRM) have been implicated as carriers for a number of important avian diseases, and it has recently been recommended that they should be listed as an occupational hazard for poultry workers on the basis of their allergenicity.



'Many of the currently effective pesticides have been withdrawn from use and the emergence of resistance to the remaining compounds has exacerbated these problems'

The mite is therefore a major health concern of the European poultry industry and is the cause of significant economic losses.

Until recently, PRM infestation has been controlled with the use of pesticide sprays in hen houses during the period that the houses are not populated (i.e. before the introduction of new birds at the start of a laying cycle). Controlling mite populations is now a major problem, with most pesticides affording only limited or short-lived reduction in the population of mites. Also, because of concerns over safety and environmental contamination, many of the currently effective pesticides have been withdrawn from use and the emergence of resistance to the remaining compounds has exacerbated these problems with mite

control. There is now an urgent need to develop alternative control strategies.

As a result Moredun scientists are working on a project supported by BBSRC, Zoetis (formerly Pfizer Animal Health) and Akita Co. Ltd to develop a vaccine to help protect hens against these blood-sucking mites.

Cairngorms National Park Research launch event

Launch and workshop •
MacDonald Aviemore Resort, Aviemore
• Thursday November 14, 2013

THE AIM OF THIS EVENT is not only to launch the Cairngorms National Park as the UK's first Long Term Social and Ecological Research (LTSER) network, joining up research from different disciplines to share results and improve its use and effectiveness, but also to help the Cairngorms National Park Authority develop a research strategy for the National Park, as well as to share recent research and future opportunities.

Keynote speaker will be Michael Mirtl, Environment Agency Austria and Chair of Long Term Ecosystem Research - Europe (LETR).

Contact: Gavin Miles, Cairngorms National Park Authority, 01479 870535.

More details from cairngorms.co.uk



PHOTOGRAPH: 2020 VISION / MARK HAWBLIN

How to stimulate the growth of nature tourism in Scotland

Seminar • Our Dynamic Earth, Edinburgh
• December 16, 2013

The aim of this seminar is to bring together researchers, consultants, NGOs, public sector employees and businesses to discuss policy, practical methodology and on-going support for the nature tourism sector in Scotland. Invited presenters will offer their views on how to expand the sector linked to key points such as identifying the support needed (e.g. training, funding, marketing, business development), how to develop closer links between organisations and individuals involved in tourism, the role of research and consultancy, setting targets and how to identify and measure success.

For details please contact Dr. Kathy Velander (k.velander@napier.ac.uk), School of Life Sport and Social Sciences, Edinburgh Napier University, Edinburgh.

Members' reports

James Hutton Institute; Science, Religion and Technology Project

James Hutton Institute secures share of £3m to research world's most important crops

Funding from BBSRC under the 'HAPI' programme will result in research into potatoes, onions and other edible horticulture crops

THE JAMES HUTTON INSTITUTE has secured more than £850,000 in new funding from the Biotechnology and Biological Sciences Research Council who, in conjunction with the Scottish Government, has awarded £3 million to four projects to improve food security for some of the world's most valuable crops.

The £2.99 million funding is the first round of awards from BBSRC's Horticulture and Potato Initiative (HAPI) which supports high-quality, industrially relevant research projects on potato and edible horticulture crops. The Scottish Government has contributed £627,097 towards the research.

Dr Glenn Bryan, James Hutton Institute is Principal Investigator on the £1 million project 'Controlling dormancy and sprouting in potato and onion', which involves Imperial College London, University of Greenwich and Cranfield University, PepsiCo, Albert Bartlett, Potato Council and Mylnefield Research Services, one of the Institute's commercial affiliates.

The new project will seek to tackle problems during long term storage of onion and potato that can lead to losses when these crops sprout.



Pictured above: potato harvesting

Storage techniques to prevent sprouting are often expensive and environmentally unsustainable.

The research will use advances in biochemistry, genetics and molecular biology to identify the genetic basis of dormancy and sprouting in onion and potato and seek to understand the physiological and molecular control steps, with a view to improving storage and reducing losses.

Researchers from JHI are also partners on two of the other projects receiving HAPI funding: 'Establishing

biofumigation as a sustainable pesticide replacement for control of soil-borne pests and pathogens in potato and horticultural crops', led by Professor Peter Urwin, University of Leeds, and 'Strategies for integrated deployment of host resistance and fungicides to sustain effective crop protection', led by Dr Frank Van den Bosch, Rothamsted Research.

The four projects focus on potato and onion, but the findings could have applications for a wide range of crops and agriculture.

The gift of food

Wouldn't it be good if we knew more about our food and where it comes from? Murdo Macdonald of SRTP discusses a recent Church of Scotland report

ALL OF US NEED to eat; here in the developed world, many of us eat too much, and often the wrong kinds of things. This has had all kinds of consequences for health.

One of the things that has been becoming clearer to us over the past few years is the need not only to be

careful about what we eat, but also to reconnect with where our food comes from. In past generations, most of our food was supplied very locally; so many of us would have had a much clearer connection with somebody who worked the land. Whether that was an uncle who was a farm hand, or simply



‘Running out of land - a new global challenge’

SCRR Annual Peter Wilson Lecture • February 10, 2014 • Given by Dr Alan Bedward of the European Commission’s Institute for Environment and Sustainability

ON MONDAY, FEBRUARY 10, 2014, the annual SCRR Peter Wilson Lecture will be given by Dr Alan Bedward, the Unit Head for Land Resource Management at the JRC’s Institute for Environment and Sustainability in Ispra. The title of his lecture is ‘Running out of Land – a new Global Challenge’.

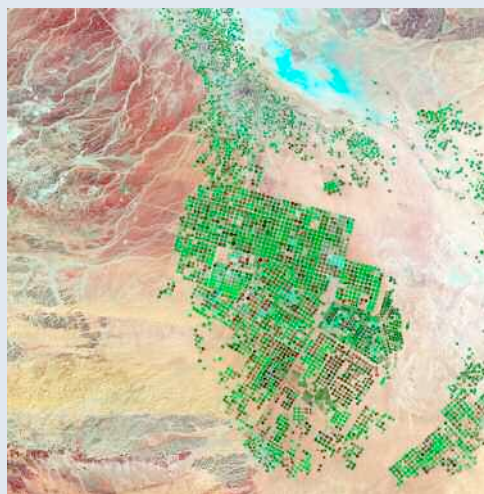
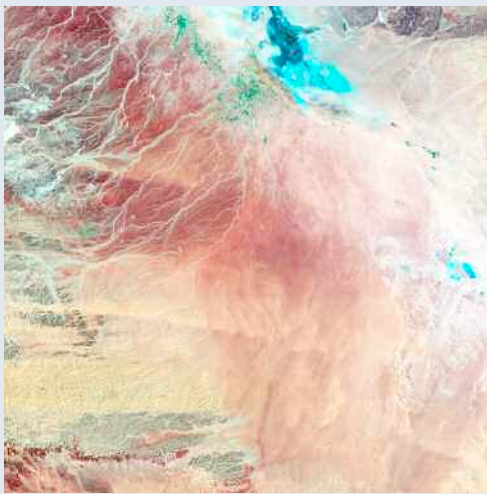
Land is not often considered a non-renewable resource, but it should be. The land meets most food, fuel and fibre needs of our rapidly growing human population and shapes Earth’s climate too. Competition for this finite

resource is fierce. Satellites provide a unique vantage point from which to determine how, when and where land resources change. This talk introduces some of the policies that impact global land-use and highlights the role of Earth-imaging satellites in responding to these.

The lecture will be delivered at the Royal Society of Edinburgh, George Street, Edinburgh. Further details will be available shortly on the events section of the RSE website – www.royalsoced.org.uk/events/.



‘A unique vantage point’: employing earth-imaging satellites to highlight land use issues



This pair of satellite images shows the expansion of irrigated agriculture in Al Jawf province Saudi Arabia between February 5, 1987 and January 17, 2012

Images: Landsat, courtesy USGS and NASA



PHOTOGRAPH: ADRIAN SHAW

Pictured left: the farm shop at Whitmuir, to the south of Edinburgh

the local market gardener, we knew that milk came from cows, and that vegetables usually came with the dirt still on them. It’s sometimes suggested that many children now think that milk comes from Tesco, and that all carrots are the same shape.

The Church of Scotland report ‘Food is a gift from God’ looked at many of the issues that arise from the disconnect between us and where our food comes from. As a society, we have come to view food as another commodity, rather than what it really is – a gift, brought to us via the work of others, which we need to value.

A lot of local churches have food projects, and encourage their members to get involved, perhaps by giving part of the glebe over to community allotments, for example. Initiatives such as the Fife diet, and other similar local projects try to get us to think a bit more deeply about where our food comes from. Let’s not be satisfied with simply eating more healthily – let’s resolve to know about more about the gift of food – and the people who work hard to bring that gift to us.

www.srtp.org.uk/assets/uploads/Food_Is_a_Gift_leaflet.pdf

News

IPCC climate change report

PHOTOGRAPH: NASA



IPCC Fifth Assessment Report (AR5)

The first part of the IPCC's AR5 report was published in September 2013, with more to follow in 2014

THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC) is the leading body for the assessment of climate change, established by the World Meteorological Organization and the United Nations Environment Programme. The first of the 5th Assessment reports, Climate Change 2013 – the Physical Science Basis was published last month.

The summary for policymakers reports that the atmospheric concentrations of carbon dioxide (CO₂), methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years. CO₂ concentrations have increased by 40% since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions. The ocean has absorbed about 30% of the emitted anthropogenic carbon dioxide, causing ocean acidification. Cumulative emissions of CO₂ largely determine global mean surface warming by the late 21st century and beyond. Most aspects of climate change will persist for many centuries even if emissions of CO₂ are stopped. This

represents a substantial multi-century climate change commitment created by past, present and future emissions of CO₂. Extreme precipitation events are anticipated over most of the mid-latitude land masses and are very likely to become more intense and more frequent by the end of this century as global mean surface temperature increases. It is virtually certain that there will be more frequent hot and fewer cold temperature extremes over most land areas on daily and seasonal timescales as global mean temperatures increase. It is very likely that heat waves will occur with a higher frequency and duration. Occasional cold winter extremes will continue to occur. Limiting climate change will need substantial and sustained reductions of greenhouse gas emissions.

Compared to previous Assessment Reports, the subsequent AR5 reports will place greater emphasis on the socio-economic aspects of climate change Working Group II will be completed by March 29, 2014; Working Group III will be completed by April 11, 2014; and the Synthesis Report will be

Above: satellite picture of the Atafu atoll in Tokelau

completed by October 31, 2014. They will include much greater regional detail on climate change impacts, adaptation and mitigation interactions; inter- and intra-regional impacts; and a multi-sector synthesis. Risk management will be addressed and a response will be framed (both adaptation and mitigation) including scientific information relevant to Article 2 of the UNFCCC ('stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'). Key AR5 cross-cutting themes will be: Water and the Earth System: Changes, Impacts and Responses; Carbon Cycle including Ocean Acidification; Ice Sheets and Sea-Level Rise; Mitigation, Adaptation and Sustainable Development.



IPCC report: www.ipcc.ch/report/ar5/#.UIJkQSTHTQw

Summary for policymakers: www.climatechange2013.org/images/uploads/WGIAR5-SPM_Approved27Sep2013.pdf

Scotland's Adaptation Conference looks at adaptation and the natural environment

A consensus has emerged: the challenge is to put policy into practice, reports Anne Marte Bergsens of Sniffer

THE NATURAL ENVIRONMENT in Scotland plays a key role in adapting to the impacts of climate change. This is a key component of the Scottish Climate Change Adaptation Programme, the consultation on which concluded on September 27th, 2013. Natural environment was also one of four key themes at Scotland's Adaptation Conference 2013, which took place in Edinburgh earlier this month. The conference was organized by Sniffer as part of its delivery of the Adaptation Scotland support service.

How can nature help us and be helped to respond to the impacts of climate change? That was the question asked in two workshop sessions at the conference. Presentations from SNH and Scottish Environment LINK looked at the impact of climate change on the natural environment, while two case studies on adaptation were designed to inspire the participants in their own work.

In the ensuing discussion it was suggested that greater understanding



Scottish Government Minister for Environment and Climate Change, Paul Wheelhouse MSP, opened the conference with news about the Climate Challenge Fund taking a more integrated approach

'It was suggested that there are benefits in moving away from conservation efforts focused on individual species, to look at natural systems as a whole'

of the ownership of natural assets would help efforts to protect the natural environment and to realise benefits. It was also suggested that there are benefits of moving away from conservation efforts focused on individual species, but rather to look at the value of natural systems as a whole – for example the climate services provided by forests or mitigation of flood risks provided by coastal habitats.

The general consensus in the two workshop sessions was that we have significant policy frameworks. It was agreed the challenge now is to put policy into action.

It was intended that a full write-up of the conference would be available by the end of September 2013. Presentations can be downloaded from The Adaptation Scotland website at the address below.

www.adaptationscotland.org.uk/10/16/402/Scotlands-Adaptation-Conference.aspx

PHOTOGRAPH: MICHAEL SNOW, SNIFFER

SRUC study describes benefits of family-owned estates

A NEW STUDY by Scotland's Rural College (SRUC) has concluded that 'strong family-owned estates can contribute to the vibrancy of the wider rural communities in which they operate'. SRUC's Rural Society Research Team studied 23 family estates in Scotland and the report describes their characteristics and how they interact with local communities.

The SRUC team says that the estates' dominant activities are farming, forestry, sporting and let housing but activities such as quarrying, tourist accommodation, equine and renewables are growing in importance as they seek to diversify income streams.

According to the report, most of the estates recognise that the needs of their businesses and those of their wider communities are interdependent. The majority feel they have a duty to support local rural development, although the researchers also found a

minority who feel this should not be their responsibility.

The report also states that there is evidence of family estates supporting local communities through activities such as affordable housing provision, support for employment opportunities and local services, investment in their local areas, and working with multiple partners to input to local development plans. Some estates reported targeted letting of their properties to families with children or gifting of land for recreational use.

The study is the second part of a three-phase project researching how different types of land management and decision-making contribute to rural development and resilience. Phase one, in 2011, explored estates owned and managed by communities. In 2014/2015, SRUC will consider estates owned and managed by charities. An overview will be published when phase three is complete.



Pictured above: family-owned and run farming estate

New report (phase two), 2013: www.sruc.ac.uk/downloads/file/1669/family_estates_and_rural_resilience

Phase one report, 2011: www.sruc.ac.uk/downloads/download/9/2011_community_land_ownership_and_community_resilience

IAN WHITE WWW.SCOTLANDRURALCOLLEGE.CO.UK

Members' reports

BioSS, CEH, RSPB and SNH

PHOTOGRAPH: TONY HISGETT UNDER CC BY 2.0 VIA WIKIPEDIA

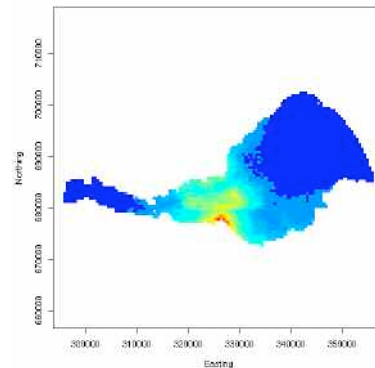


Fig 1. Map of predicted usage of the Firth of Forth by common terns from the colony at Leith: shading represents relative usage, ranging from high (red) to low (blue).

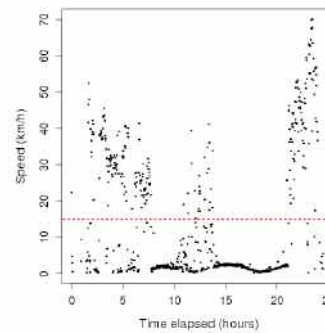
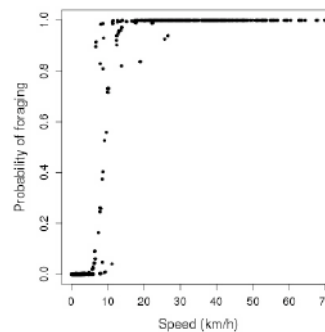
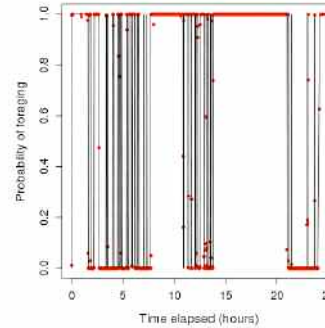


Fig 2. A speed-time graph for a single bird (left), for which the probability of foraging at any time has been estimated in a hidden Markov model to be a function of flight speed and the modelled activity states at consecutive times.



These data sets and their analyses have much in common with each other, and much in common with data sets collected by other types of digital recording equipment. Consequently, we have established an informal working group to pool experiences on data from automatic monitoring of organisms and environments, thereby ensuring we are tackling these emerging issues in a co-ordinated manner.

Statistical challenges for the digital age

A project to track the movements of terns in the Firth of Forth highlights the difficulties of making sense of the many new varieties of data being collected. This report from BioSS

THE DIGITAL AGE is presenting us with an unending stream of new statistical challenges, both to ensure efficiency in the collection of emerging data types and to ensure validity of subsequent analysis and interpretation. One kind of data we are encountering increasingly often is animal movement data, a type of record-only-presence data from which our scientific collaborators and regulatory agencies wish to infer habitat preferences and to identify highly used locations.

One project we are currently undertaking for the Joint Nature Conservation Committee is an analysis of flight paths of individual terns, with location and behaviour during trips of varying length collected by following birds in a boat.

We have found it better to account for trip length through a weighted regression analysis rather than a random effects model, whilst the INLA (Integrated Nested Laplace Approximation) software makes computationally efficient allowance for spatial correlation in the large data sets available. Our analyses identify the relative importance of spatial units for foraging (Fig 1) based on explanatory

variables such as chlorophyll level and seabed depth, but that importance of these variables varies between colony location and tern species.

A second project, being carried out in collaboration with CEH, includes analysis of locational data from automated GPS tags attached to a sample of birds from colonies in the Forth-Tay area to study the potential impacts of offshore wind farms on seabird survival and productivity. The analysis of the GPS data is solely concerned with describing, rather than explaining, spatial variations in bird densities, and therefore makes use of a semi-parametric modelling approach (GAMs - generalized additive models).

A third project with RSPB as our principal collaborator has involved analysis of the foraging behaviour of five seabird species – guillemot, razorbill, shag, kittiwake and fulmar – at colonies located throughout the British Isles. This study also used automated data from GPS tags, hence an important part of the analysis has been to classify bird behaviour on the basis of observed flight speeds which we have done using hidden Markov models (Fig 2).



Sawfly decline could have an impact on bird numbers

If intensive agriculture means fewer flies, farmland birds might be affected. Bernardo Rodriguez-Salcedo of the James Hutton Institute explains

THE INTENSIFICATION of agriculture could have an impact on threatened populations of farmland birds due to its effect on one of their most important food sources, the sawfly. In the first genetic study of farmland sawflies in the UK, scientists at the James Hutton Institute in Dundee examined the genetic diversity and population structure of sawfly larvae at a number of sites in Scotland in order to gain a better insight into agriculture's impact on sawfly abundance.

Their study provided the first evidence for the presence of diploid males in UK farmland sawfly populations. Diploid males are usually sterile and are typically produced when an unusual form of sex determination, called complementary sex determination, operates in inbreeding populations. Their study suggests that farmland sawflies might be vulnerable to population decline due to low levels of genetic diversity and inbreeding.

An accelerated decline in farmland sawfly numbers arising from low diversity and inbreeding would have a significant impact on farmland bird species, such as the grey partridge.

Pictured above: grey partridge are useful indicators of local diversity



The grey partridge is important as it is seen as a useful indicator of biodiversity in the agricultural landscape and its decline can indicate wider changes in the diversity and abundance of plants, insects and other animals. Long-term studies of grey partridge have shown that when its population declines, it directly correlates with reductions in invertebrates which are an important food source for chick survival.

Dr Nicola Cook, who led the study said: 'This is the first time such genetic research has been carried out on any farmland sawfly population as most previous studies were limited to census-based counting.

'This genetic study has helped us identify populations which may be vulnerable due to low genetic diversity and potentially sterile males. These populations have come under threat due to intensification of agriculture and modern practices.

'It is therefore important that we farm in such a way that biodiversity is encouraged by providing field margins and wildlife corridors and using agri-chemicals responsibly.'

Food security explained

THE GLOBAL FOOD SECURITY (GFS) programme has launched a new 'Insight' series of publications to unlock the world of food security research for policy-makers and practitioners. GFS Insight provides a balanced analysis of food related research and represents the current state of knowledge in areas relevant to food security.

The publication aims to help inform policy and practice, which is based on a wide variety of factors, by highlighting evidence from research. The first issue focuses on soil and details the latest evidence on issues such as soil fertility, regulation and management. There's also information on protecting soils for agriculture and why soil is a vital resource.

To download a copy visit: www.foodsecurity.ac.uk/assets/pdfs/1309-gfs-insight-importance-of-soils.pdf



World Forum on Natural Capital

Conference • Edinburgh
• November 21-22, 2013

THIS UN-BACKED EVENT will help business and sustainability leaders to identify the economic value of natural capital – the world's natural resources such as water, forests and biodiversity. It will build on significant private sector interest in the fast-emerging concept of accounting for natural capital that came out of the United Nations Rio+20 Earth Summit in June 2012.

The event will bring together business leaders, environmental experts and government representatives to help businesses identify the value of natural capital and the costs of depleting that capital.

www.naturalcapitalforum.com/blog/blog/155/Programme-Announcement

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Science & Advice for Scottish Agriculture	www.sasa.gov.uk
Scotland's Rural College (formerly Scottish Agricultural College)	www.sruc.ac.uk
Scottish Natural Heritage	www.snh.gov.uk
SNIFFER	www.sniffer.org.uk
Society, Religion and Technology Project	www.srtp.org.uk
University Marine Biological Station Millport	www.gla.ac.uk/marinestation
University of the Highlands and Islands (UHI)	www.uhi.ac.uk
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Centre for Mountain Studies, Perth College	www.perth.uhi.ac.uk/specialistcentres/cms
Centre for Remote and Rural Studies, Inverness College	www.crrs.uhi.ac.uk
Environmental Research Institute, North Highland College	www.eri.ac.uk
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NAFC Marine Centre, Shetland	www.nafc.ac.uk
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ON THE WEB

Back issues at www.scrr.ac.uk

COPY DEADLINE

The deadline for copy in the next issue is January 13, 2014.

DISTRIBUTION

For all queries about the distribution of this newsletter, please contact the Secretary/Treasurer by email as above.

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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Members' meetings

MONDAY OCTOBER 28, 2013
Centre for Ecology & Hydrology,
Bush Estate, Midlothian EH26 0QB
11:00 Executive Committee meeting
12:30 Directors' Research Lunch
Host: Dr Alistair Dawson

MONDAY DECEMBER 2, 2013
Sniffer, Greenside House,
Edinburgh EH1 3AA
11:00 Executive Committee meeting

MONDAY JANUARY 13, 2014
Royal (Dick) School of Veterinary Studies,
The University of Edinburgh, Easter Bush,
Midlothian EH25 9RG
11:00 SCRR Board Meeting
12:30 Directors' Research Lunch
Host: Prof David Argyle

Events

www.scrr.ac.uk/events.php

THURSDAY NOVEMBER 14, 2013
Launch, Cairngorms National Park
Research
MacDonald Aviemore Resort, Aviemore

MONDAY DECEMBER 16, 2013
Seminar, How to stimulate the growth
of nature tourism in Scotland?
Our Dynamic Earth, Edinburgh

MONDAY FEBRUARY 10, 2014
SCRR annual Peter Wilson Lecture:
Dr Alan Belward 'Running out of Land
– a new Global Challenge'
Royal Society of Edinburgh

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www.scrr.ac.uk/about.php

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