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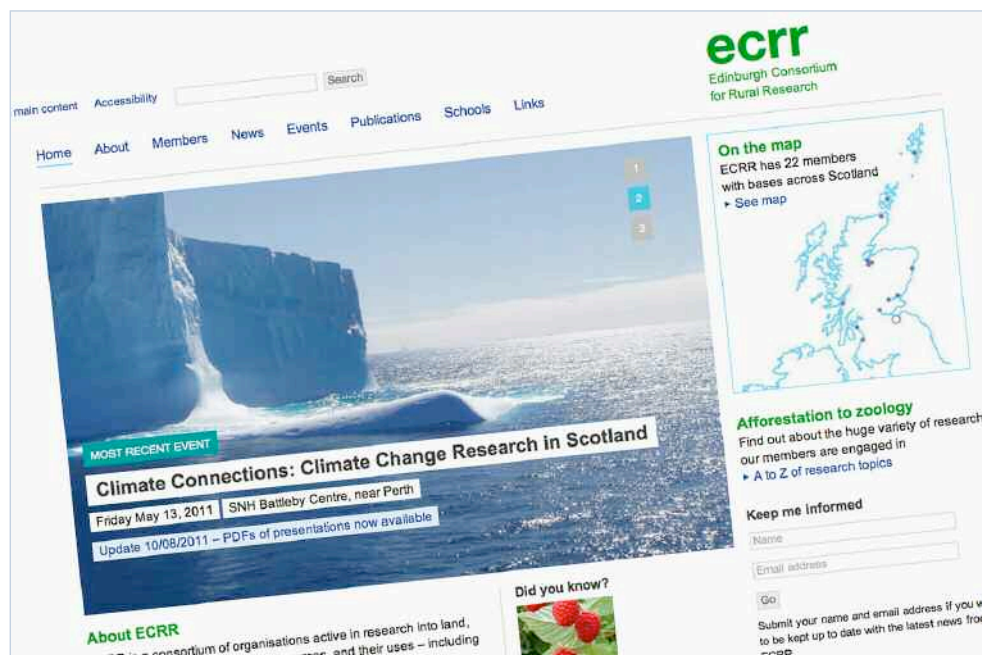
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Edinburgh Consortium
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This issue in numbers

60% of Scotland's land mass is covered in carbon-rich soils like peat, so carbon loss from peatlands is an important issue – **page 2**

1,365 horses and ponies were involved in the largest ever case-control study of equine grass sickness, looking at a geological connection – **page 3**

2,347 tonnes of Scottish salmon were exported to China in January to June 2011, increasing the value of exports to the far east from £2.1m in 2010 to £16m this year – **page 7**

159% of normal rainfall (based on 1970 to 2001 average) was experienced in the west of Scotland in September-October – **page 8**

16 years ago, all the fish in Loch Flemington were killed by algae; but now the loch is a model for restoration of water quality – **pages 8-9**

3,360 seedlings of Scots pine were studied to discover that there is genetic variation in different populations of the tree in Scotland – **page 10**

Communicating across the Consortium

Professor Stuart Monro, scientific director of ECRR, explains the significance of this new-look newsletter and the redesigned website

ECRR NOW HAS a reach across Scotland, bringing together diverse groups of researchers in universities, research establishments and other organisations concerned with rural issues. If ECRR is to be effective in stimulating collaboration, then we must also be effective in the ways we communicate. *The Bush Telegraph* served us well when the main focus was on communication in and around the Bush Estate, where the original core of ECRR organisations was based. Now there is an increasing requirement to engage with a wide variety of stakeholders extending well beyond our own membership.

When people are time-poor, they want to be able to scan through a document and be able to pick out the information that is of most relevance – hence the re-modelling of our

magazine and alongside that the updating of the website.

This has been done in response to feedback from both within and outwith ECRR. While many magazines are moving to on-line versions, there was significant feedback to suggest that there is still value in the paper version. It is important that however we communicate, the ECRR look and feel is preserved, and in developing a new website alongside revising the magazine means this can be achieved.

We are not there yet, but what is needed is feedback on the content and layout of both media. The magazine is with you now; it will take a little longer to fully populate the new web site. Feedback on both will be most welcome to ensure that we are communicating the right information in the best possible way.

Above: the new ECRR website at www.ecrr.org.uk

About ECRR

THE EDINBURGH CONSORTIUM FOR RURAL RESEARCH 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.

Further details on the back page.

Members' reports

SNIFFER



News

Princess Royal opens new Vet School building

THE NEW BUILDING at the University of Edinburgh's Royal (Dick) School of Veterinary Studies was opened in September by The Princess Royal, recently installed as the University's new Chancellor.

More than 1,000 staff and students can be accommodated in the new building. The facility is based next to the school's hospitals for small and large animals, and together with the Roslin Institute constitutes a £100 million development on the University of Edinburgh's Easter Bush campus.



IPCC visits Scotland to look at effects of peatland restoration

SCOTLAND WILL HOST a meeting of scientists from the Intergovernmental Panel on Climate Change (IPCC) on January 24-26, looking at wetland management and peatland restoration.

A change to international rules on reporting of greenhouse gas emissions is under consideration, to include the positive effect of restoration measures on damaged peatlands.

'In Scotland, we have some of the very best examples of peatland restoration in Europe,' says Professor Des Thompson, Principal Adviser for Biodiversity at Scottish Natural Heritage. 'By improving the state of peatlands we can make a significant contribution to reducing carbon dioxide levels in the atmosphere.'

www.scotland.gov.uk/News/Releases/2011/10/28175557



Photo (and bottom left): SNIFFER

Peat: how carbon is lost to water

PEATLANDS ARE IMPORTANT to Scotland, where carbon-rich soils cover around 60% of the land mass. By their nature, peaty and organic soils act as significant stores of carbon, and it is important to determine if they are behaving as net sinks or sources to understand how they might contribute to climate change.

Much research has focused on the interaction of peatlands with gaseous carbon, in the form of carbon dioxide or methane. Less well studied is the interaction with, and potential loss of, aqueous carbon – dissolved and particulate organic and mineral carbon – from our peatlands. Whilst this 'aqueous flux' of carbon from peatlands is believed to be relatively small compared with levels of carbon exchanged with the atmosphere, changes in parameters such as rainfall, and certain land management practices may mean carbon lost via aqueous flux could be increasing.

A better understanding of the carbon losses from peaty soils would be useful not only for assessing the state of these soils themselves, but also for informing the production of Greenhouse Gas (GHG) budgets and in turn the policies that relate to these.

A SNIFFER project undertaken by the James Hutton Institute is designed to feed in to the future modelling efforts for carbon flux and potentially influence the design of forthcoming monitoring programmes.

The primary objectives were to develop a meta-database holding existing data on the aquatic loss of carbon from peaty soils; and to use this existing data – together with

complementary data covering variables such as extent of peaty soils, land management, and changes in rainfall – to identify what might be driving any changes in peatland carbon losses.

One of the key findings from the development of the meta-database has been to identify that there is a very limited number of studies that have

A better understanding of carbon losses from peaty soils would be useful for informing greenhouse gas budgets

examined the multiple forms carbon can take in aquatic systems. Much of the data has focused on levels of dissolved organic carbon (DOC). Limited work appears to have been undertaken to examine aquatic carbon fluxes within the context of net carbon budgets for peatlands, and at a limited number of sites.

However the meta-database is an important tool for identifying the information that currently exists within the UK in relation to the aquatic loss of carbon from peatlands. This can be used to identify where improvements in the evidence base may be required to support decision making in relation to the carbon management of peatlands.

The meta-database from this project is at www.clad.ac.uk/aquatic_carbon_database.htm

The project partners were:
 Scottish Environment Protection Agency
 Scottish Natural Heritage
 Environment Agency
 Northern Ireland Environment Agency



Equine grass sickness – the geochemical connection

A new study uses the British Geological Survey's geochemical map to investigate whether minerals in the environment are a factor in this predominantly fatal neurodegenerative disease of horses

EQUINE GRASS SICKNESS was first recorded in army horses at Barry Camp, Angus, in the early 1900s after which outbreaks were described across northeast Scotland before spreading to England and Wales. Great Britain continues to have the highest reported prevalence worldwide, with a high proportion of cases in Scotland.

The common clinical signs relate to gastrointestinal paralysis and include abdominal pain, difficulty swallowing and weight loss. The precise cause remains unknown, but there is evidence to suggest that it may be a toxico-infectious form of botulism, with *Clostridium botulinum* producing neurotoxins locally within the gastrointestinal tract.

Certain 'trigger factors' may also be required to induce disease. These remain largely unidentified, but there is strong evidence implicating an environmental agent encountered while grazing, and low dietary intake of essential elements has been postulated as a risk factor.

The Royal (Dick) School of Veterinary Studies (RDSVS), the British Geological Survey (BGS) and the James Hutton Institute (JHI) have collaborated to investigate the potential association between geochemical parameters in the soil/environment and the distribution of EGS cases in eastern Scotland. This investigation was conducted as a retrospective case-control study using data collected between 01/01/1990

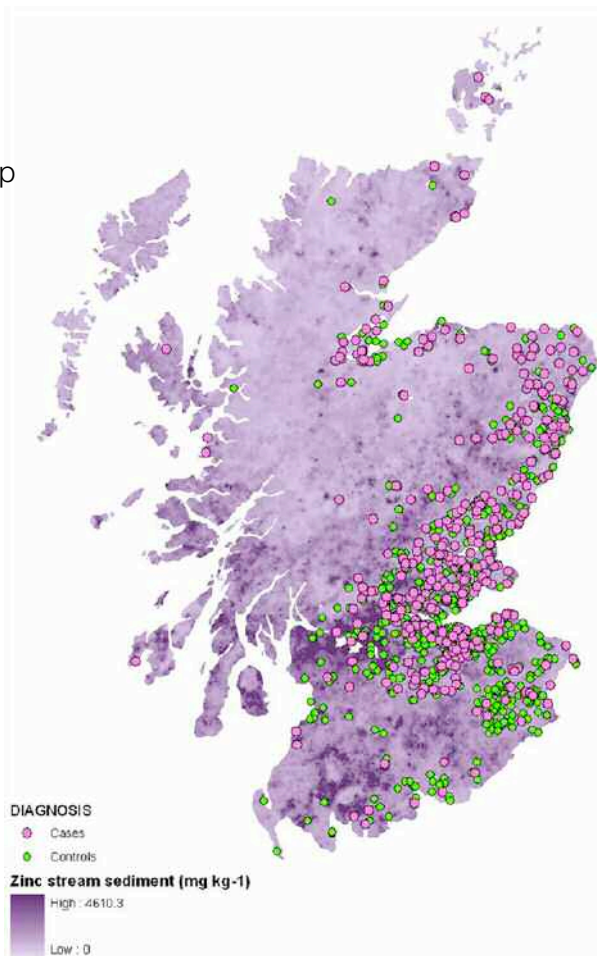
and 01/06/2006. A case was determined to be any horse or pony diagnosed with EGS by a clinician at the RDSVS. Two time-matched controls were obtained for each case, and a complete spatially referenced database of locations was produced for 455 cases. This involved 1365 animals in total – the largest case-control study of EGS undertaken to date (see map).

A range of trace elements, most with known biological function, was collated from two geochemical datasets. Interpolated maps (based on a 250 m grid) of fine fraction (< 150 µm) first and second order stream sediment total element concentrations were provided by the BGS Geochemical Baseline Survey of the Environment (G-BASE) project, which is the national geochemical survey of the UK. The James Hutton Institute (JHI), formerly, the Macaulay Land Use Research Institute, also provided maps of averaged values of a range of trace elements determined by Inductively Coupled Plasma – Atomic Emission Spectrometry or Graphite Furnace Atomic Absorption Spectrometry from a wide range of individual soil profiles collected from throughout Scotland.

Statistically significant univariate associations were found for a number of geochemical parameters in both datasets. For example, lower concentrations of chromium, lead and zinc in the BGS stream sediment dataset ($P < 0.003$) and the JHI soil dataset ($P < 0.001$), and higher concentrations of titanium in the BGS sediment dataset ($P < 0.003$) and JHI soil dataset ($P < 0.001$) were associated with an increased risk of EGS.

Further analysis is ongoing to establish a final multivariable model to determine which factors remain associated with EGS occurrence after accounting for other variables. It is hoped this study will identify geochemical parameters in soils that warrant further investigation at the level of the horse-grass-soil relationship.

Published by permission of the director of the British Geological Survey.



Map showing the location of the equine grass sickness cases (n=455) and controls (n=910) in eastern Scotland and concentrations of zinc in the environment based on the BGS G-BASE stream sediment dataset for Scotland.

Map source: 2001 Census Output Area Boundaries. Crown copyright 2003, reproduced with the permission of the Controller of HMSO. Geochemical data © BGS, NERC



A pony exhibiting the classical clinical signs of equine grass sickness with severe weight loss, a 'tucked-up' abdominal appearance, 'elephant-on-a-tub' stance and depression

The association between the distribution of cases of equine grass sickness in Eastern Scotland and environmental geochemical parameters

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Members' reports

Royal Botanic Garden, Edinburgh

Royal
Botanic Garden
Edinburgh

Lost plant species rediscovered in Sumatra

Almost 200 years ago, the Aberdonian botanist William Jack described plants – in particular, species of begonia – that have never been seen again since. Until, that is, two RBGE expeditions set out to find them. Dr Mark Hughes reports



Photos: RBGE

SCIENTISTS AT THE ROYAL BOTANIC GARDEN EDINBURGH (RBGE) have recently successfully rediscovered several plant species on the Indonesian island of Sumatra which have not been seen for more than 190 years.

The search for the missing species was spurred by a desire to clarify the identity of plants described by the Aberdonian botanist William Jack (1795-1822). Jack is widely regarded as one of the most brilliant botanists to have worked on the flora of the Malay

The loss of Jack's collections has meant a lack of type material, so his plant names are either prone to misapplication or remain a complete mystery

Archipelago and his achievements are further thrown into relief by the twin tragedies of his untimely death at the age of 27 from Malaria, and the destruction of the bulk of his biological collections during a ship fire in 1824.

The loss of Jack's collections has meant that most species described by him lack type material, so that his plant names are either prone to misapplication or remain a complete mystery. Both cases apply to the

begonia species described by Jack, a genus which is one of RBGE's core research interests.

Two expeditions were planned to cover localities in Sumatra visited by Jack in the hope of finding living plants of species named by him, but of which no other record remains. The expeditions to Bengkulu in 2010 and coastal Padang in 2011 by Dr Mark Hughes from the Tropical Group and Carmen Puglisi, a PhD student, covered specific island and mountain localities named by Jack in his manuscripts.

The vast majority of lowland Bengkulu, where Jack collected prolifically, was found to be completely deforested and it seems likely that a number of Jack's species have become extinct. However, several begonia species were found which match Jack's descriptions. One, *Begonia bracteata*, was found on the slopes of an isolated mountain, Gunung Bungkok, while another, *Begonia sublobata*, was spotted growing in abundance on one side of the tiny island Pulau Pagang.

This is the first time these plants have been collected since Jack discovered them nearly two centuries



Begonia bracteata, known only from the isolated peak of Gunung Bungkok in Bengkulu, Sumatra, and now in cultivation at RBGE

ago. The material collected of these species and others will allow taxonomists at RBGE to delimit and identify them correctly, and give up to date conservation assessments.

In addition to species already named by Jack, many species new to science were discovered. More than 30 new species of begonia alone have been described from Indonesia at RBGE since 2009; the ongoing collecting and taxonomic research of the Tropical Group in collaboration with staff at Bogor Botanic Garden and Herbarium Bogoriense in Java is fundamental to the understanding and conservation of the immensely botanically rich forests of Indonesia.

Dr Mark Hughes is a begonia systematist at Royal Botanic Garden Edinburgh



Sea louse vaccine to replace chemicals?

THIS PROJECT IS funded by the Technology Strategy Board, a joint initiative between the Scottish Government and the BBSRC. It is led by an Industrial partner, Pfizer inc., which has provided substantial match funding, and brings together expertise within Pfizer, the Institute of Aquaculture and the Moredun Research Institute.

UK salmon aquaculture produces 150,000 tonnes p.a., valued at more than £1bn, with key nutritional benefits for consumers. Sea lice, parasitic copepods infecting salmon in the sea, are a key constraint to sustainability, costing the industry more than £30m each year to control. Sea louse control relies on chemical treatment, but the development of resistance to control is a major threat to the sustainability of the UK and global industry.

This innovative proposal leverages recent developments in sequencing, mucosal immunity, protein mass spectrometry and vaccine technology to develop a novel vaccine capable of providing substantive, eco-friendly control of sea lice infections in farmed salmon. Vaccines provide a means to tackle a major constraint to the sustainability of protein production, as well as helping to protect rural jobs, the marine environment and wild salmon stocks.



Scanning electron micrograph of a sea louse, pseudo-coloured

Photos: Institute of Aquaculture



Wrasse as a 'green' control for sea lice in salmon farms

LEADING SALMON PRODUCERS and scientists have been awarded co-funding of £2.1m from the Technology Strategy Board to develop the technologies to breed and grow commercially viable numbers of wrasse in tanks and deploy these successfully and sustainably in Atlantic salmon farms across Scotland.

Wrasse are 'cleaner' fish that naturally predate ectoparasites such as sea lice and remove them from the skin of other fish. Sea lice present a major challenge to the Scottish salmon industry, costing an estimated £30 million each year. They can hamper growth and leave farmed salmon vulnerable to diseases. The industry is licensed to use a number of sea lice medicines but wrasse will provide an additional tool to combat sea lice and reduce the use of medicines.

This project will address a series of key research priorities that currently limit wrasse production including

Wrasse are 'cleaner' fish that naturally predate ectoparasites such as sea lice and remove them from the skin of other fish

broodstock origin and conditioning, gender control, spawning, larvae and juvenile performances, disease control and deployment strategies.

The four-year project is led by Marine Harvest Scotland Ltd and Scottish Sea Farms Ltd, in partnership with the Reproduction and Genetics group of the Institute of Aquaculture, who will bring their expertise in marine finfish broodstock management, population genetics and fish husbandry to the project as well as their marine facilities at Machrihanish.

The Scottish Salmon Producers' Organisation (SSPO) has agreed to disseminate the practical findings of the project to the wider Scottish salmon farming industry.

Project to investigate how fish think

THE COPEWELL PROJECT is a major international collaboration that aims to understand what matters to fish.

COPEWELL will study Atlantic salmon (*Salmo salar*), European sea bass (*Dicentrarchus labrax*) and sea bream (*Sparus aurata*) to try to reach a better understanding of how fish experience their world. Rather than

simply describing fish behaviour or stress responses, it will try to gain insights into how fish think and what is important to them. It will provide an understanding of the mechanisms involved in individual coping styles (or personalities),



through the combination of behavioural, molecular and endocrinological studies.

The theory of allostatic stress regulation has replaced homeostasis in many species and this project will determine if the concept is relevant to fish and how it can be used to

identify states of positive welfare.
www.imr.no/copewell

Members' reports

Society, Religion and Technology Project



Photos: SRT



Drumness Farm,
Auchterarder,
Perthshire

What does sustainable agriculture have to do with the church?

Dr Murdo Macdonald explains the aims of the Society, Religion and Technology Project

1969: HAVING ASSURED US that they were bigger than Jesus and “All you need is love”, The Beatles were in the process of an acrimonious break-up. Man had recently set foot on the moon for the first time and the first commercial “Jumbo jet” flights had yet to take place. Things we now take almost for granted – the ATM, mobile phones, the internet, *in vitro* fertilisation – either didn’t exist or were in very early stages of development.

In December 1969, Phillips Petroleum and Amoco announced the discovery of oil in the North Sea. The economy of much of Scotland was about to be transformed, with the arrival of heavy industry in places such as Stornoway, Easter Ross and Shetland.

The (then) Industrial Mission department of the Church of Scotland realised that the technological innovation that had been gathering pace in the 1960s would have a profound effect on many aspects of Scottish society – and so what was to become the Society, Religion and Technology Project (usually known as the SRT) was born.

The SRT Project was officially inaugurated on May 1st 1970, to help the church to engage constructively with the scientific community in Scotland and beyond. For over 40 years now, the SRT Project has been involved in informed debate with many



interested parties: government, regulators, industry, scientists, the church, the general public. The variety of publications that have resulted from the work of the SRT Project stands as eloquent testimony to the dedicated work of many people over the years, and many individuals have been stimulated to think – and to act – through the work of the project.

Science and technology have had enormous impacts on all aspects of human life, in many cases changing the way we think of ourselves and society. Most of these impacts have been positive; some have had unforeseen consequences. Many have raised ethical and moral questions as to how and where technology can and should be applied to benefit the largest number of people.

Many might argue that the church should not interfere with issues that lie outwith its remit. Yet the church in Scotland comprises many people with

professional expertise relevant to all kinds of areas – including areas that may be considered controversial. The SRT Project seeks to assist the church in being faithful to Jesus’ call to his followers to be “salt and light” in the world.

As the national church, the Church of Scotland can call on a wide range of expertise and experience from within the “ranks” of the Church: to be able to harness even a fraction of this strength in depth, and to apply the resulting wisdom, would be of great benefit to all.

The church comprises many people with professional expertise relevant to all kinds of areas – including areas that may be considered controversial

Current areas of interest for the SRT Project include economic matters, brain imaging and sustainable agriculture. A number of other issues remain on the horizon, for future consideration: areas such as nanotechnology, water and energy are likely to be among these.

If you would like more information about the work of the SRT, please contact Dr Murdo Macdonald by email at mmacdonald@cofscotland.org.uk

Please also see www.srtp.org.uk.

Pigs at Whitmuir
Organic Farm,
Lamancha, Borders



Research on stranded sea mammals sheds new light on disease

LONG-TERM RESEARCH BY SAC is shedding more light on disease in sea mammals, including whales, dolphins and seals. SAC microbiologist Dr Geoff Foster has identified several previously unreported infections in sea mammals – including brucellosis, which in its land-based form can cause abortion in farm livestock and affect their breeding cycles.

Inverness-based Dr Foster works closely with SAC colleagues taking part in the Scottish Marine Animals Stranding Scheme, who advise on live strandings and carry out postmortems on casualty animals to discover why they died. Dr Foster isolated bacteria from cetaceans and seals landing on the Scottish coastline and was sent samples from elsewhere in Europe, the Caspian Sea and Antarctica.

Following Dr Foster's original discovery, brucellosis is now recognised as endemic amongst animals in the world's oceans and seas. However, while the marine brucella may have been identified, Geoff Foster says more needs to be understood.

"We do know that brucella is responsible for neurobrucellosis, which can cause meningitis and has resulted in the live stranding and death of some cetaceans. However, our knowledge on the extent these bacteria impact in other ways on cetaceans, seals and otters is limited.

"For example, it is well known that brucellosis has major effects on the reproductive success of farm livestock due to spontaneous abortion and male

infertility. While we have found evidence of brucella infection in male reproductive tissue of cetaceans, it will be a major challenge to find evidence of abortion in the vast oceans. But the most important question we need to answer is the potential impact on the breeding success of discrete groups, especially for species with low population numbers, such as the dolphins in the Moray Firth."

British livestock have been declared free of brucellosis (commonly called contagious abortion) for the past 25 years. However, WHO/FAO regards the disease as the most important

The important question is the impact on the breeding success of discrete groups – especially ones with low populations such as the dolphins in the Moray Firth

bacterial zoonosis in the world (zoonoses are diseases that can spread from one species to another).

Dr Foster's research has been invaluable in understanding more about why marine animals like whales and dolphins get sick or die. Not only has brucella in marine mammals proved to be a distinct species from that infecting land animals, there are also different species in cetaceans (*Brucella ceti*) and seals or otters (*Brucella pinnipedialis*).

SAC acknowledges the support of the DEFRA and Scottish Government Marine Directorate, which this year has provided more than £160,000, or 80% of the Stranding Scheme budget.



A stranded baleen whale

Photo: SAC Wildlife Unit

© SAC Wildlife

News

Leap in salmon exports after China opens up

SIX MONTHS AFTER the first direct exports were agreed, China has become the largest export destination for Scottish salmon in the Far East.

Data from HM Revenue & Customs show that in January to June 2011, 2,347 tonnes of Scottish salmon were exported to China. The value of all salmon exports to Far East markets – which include China, Thailand, Malaysia, Singapore, Vietnam, Japan, Taiwan and Hong Kong – increased from £2.1 million in January to June 2010, to more than £16 million.

Scottish producers make up almost a quarter of the Atlantic salmon market in China.

The Scottish Government is supporting industry targets to increase the value of the food and drink sector to £12.5 billion by 2017.

www.bbc.co.uk/news/uk-scotland-scotland-business-15310089



Photo: Hans-Peter Field CC BY-SA

Offshore energy locations identified by Marine Scotland Science

LOCATIONS SUITABLE FOR offshore wind farms in shallow water, along with areas suited to deep-water energy generation, have been identified in a report by the Scottish Government agency Marine Scotland Science.

The locations include areas off Shetland and Orkney, the Solway Firth, the North and South Minch, the Firth of Tay and the Firth of Forth.

The Scottish Government aims to have 100% of electricity generated by renewables by 2020.

scotland.gov.uk/Publications/2011/11/28104658/0

BBC Scotland news story at www.bbc.co.uk/news/uk-scotland-scotland-business-15949320

Members' reports

Centre for Ecology and Hydrology



Centre for
Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

Rainfall above average in highland areas

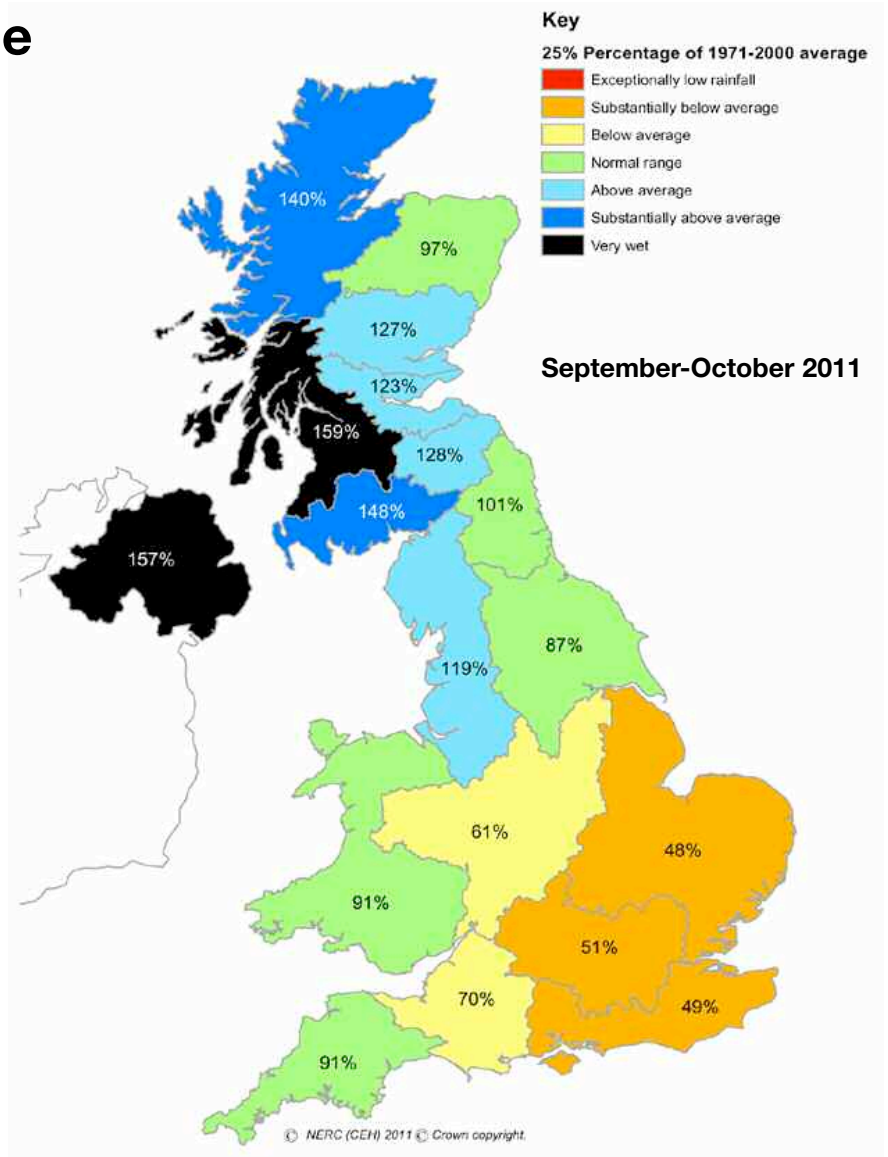
Maps just published by the Centre for Ecology and Hydrology show that Scotland has been wetter than usual in September-October

THE LATEST MONTHLY HYDROLOGICAL SUMMARY for the UK was recently published by the Centre for Hydrology and Ecology, covering the month of October 2011. Although October was an exceptionally mild month, the spatial distribution of the rainfall was again remarkable – triggering flooding in many western and northern regions, but showing increasing deficiencies in long-term rainfall across much of the English lowlands where drought conditions are severe in some areas.

High runoff rates in the gathering grounds of most upland reservoirs helped maintain healthy stocks in upland areas and, despite drawdowns to provide additional flood storage, estimated overall stocks for Scotland, Wales and Northern Ireland remain well above average.

In Scotland the previous maximum March-October rainfall was exceeded by a very wide margin this year.

A pdf copy of the full 12-page summary is at www.ceh.ac.uk/data/nrfa/nhmp/hs/pdf/HS_201110.pdf



Loch Flemington's algae problem and restoration of water quality

Sixteen years ago, all the fish in a small Highland loch known for its trout were killed by a bloom of toxic blue-green algae. Its recovery since, thanks in part to a novel treatment, may be a model for contaminated water elsewhere

THE CENTRE FOR ECOLOGY AND HYDROLOGY conducts multi-disciplinary research on water resources at local, national and international scales. Recently, attention has been drawn to a small Highland loch near Nairn in Inverness-shire.

Loch Flemington is about 35 acres (14 hectares) in size and sits in the Kildrummie Kames site of special scientific interest (SSSI). It was well known for its trout and records for the loch go back 40 years. One day, sixteen years ago, all of its fish were killed by a

toxic, blue-green algae bloom. Various sources of contaminated water were found, among them being raw sewage from the village of Croy. Although a sewage treatment plant has subsequently been built, the damage was already done.

Three years ago, CEH approached the local community about allowing a scientist called Sebastian Meis to carry out research at Loch Flemington for a PhD. CEH is now working with the local community to restore the loch's water quality.

As well as leading detailed monitoring and reporting of the water quality, a treatment called phoslock was applied to Loch Flemington in 2009. CEH believes it was the first time

Moredun honours 'outstanding veterinary scientist of his generation'

Dr Hugh Reid is made honorary fellow after years of groundbreaking research in virology

THE MOREDUN FOUNDATION, the governing body of Moredun Research Institute, was delighted to award an honorary fellowship to Dr Hugh Reid at its AGM in September.

Hugh Reid worked at Moredun Research Institute just outside Edinburgh for more than 33 years. He retired as Head of Virology in 2002 but remained at Moredun working as a Research Fellow overseeing the TSE research programme until retiring from this post earlier this year. He was awarded an MBE in 2002 in recognition for his services to animal health.



contribution to our understanding of orf virus of sheep and in the last ten years Dr Reid won funding to assemble a first class team at Moredun to tackle urgent issues concerning BSE. This important project has enhanced Moredun's reputation internationally as well as answering vital scientific questions needed by the farming and industry and government.

At the ceremony John Ross, Chairman of the Moredun Foundation, praised Dr Reid for his contribution, not just to the work of Moredun, but to the global livestock industry; "Hugh Reid is one of the most outstanding veterinary scientists of his generation. While his career has been spent unravelling the complexities of viruses of veterinary importance, he has made a much wider contribution in terms of ecology, land use and animal welfare."

Professor Julie Fitzpatrick, Director of Moredun Research Institute added, "Always generous with new ideas and always a constant source of worthwhile approaches to research and diagnostic problems, Dr Reid's scientific career has been exceptional. His contribution to the development of Moredun has been immense and he



has fostered collaboration in veterinary virology and made exceptional contributions to the health and welfare of farmed livestock."

The Moredun Foundation awards an honorary fellowship each year at its AGM to individuals who have made a significant contribution to the livestock industry. Previous recipients include Professor Ian Aitken, the late Dr Bill Martin, Dr Peter Nettleton, Dr David Buxton, Professor Agnes Winter, Professor Quintin McKellar, Professor Sir Jimmy Armour, Dr Bob Coop, Dr Mike Sharp, David Henderson, Dr Neville Suttle and John Scott MSP.

Orf virus, pseudo-coloured. Orf is an infectious disease of sheep and goats that causes sores in soft tissue

that this procedure had been used on a natural water feature.

The treatment, and studies of how effective it is, form part of a £100,000 project running until 2012.

Results of tests carried out in 2010 and again this year have shown that water quality at the loch has improved significantly since 2009.

This work provides process-based understanding of lake restoration. These results help with the planning, assessment and implementation of whole-lake restoration programmes elsewhere within the UK and beyond.

This small loch's recovery from severe pollution may help to guide efforts to tackle contaminated water across the world.



Photo: CEH

Applying the Phoslock treatment at Loch Flemington

Members' reports

Forest Research



Forest Research

Adaptive genetic variation of Scots pine in Scotland

Studies of pine trees from populations in different parts of Scotland have found evidence of considerable variation – which has significant implications for replanting programmes

GENETIC DIFFERENTIATION OF FOREST TREES taken from different environments has frequently been observed in common-or-garden studies. However, this adaptive variation had not previously been studied in detail in the different populations of Scots pine (*Pinus sylvestris* L.) in Scotland. As a result, current seed transfer guidelines do not consider environmental or adaptive genetic variation.

Together, the data suggest that despite historic decreases in population size, environmental gradients have resulted in differentiation among native pinewoods

To investigate whether genetic variation has occurred in response to environmental variation across Scotland, a glasshouse-based common garden trial of ~3,360 seedlings from 21 populations and 84 open-pollinated families was established in 2007.

Various traits were examined. Timing of bud flush showed evidence of differentiation between populations, with those from cooler origins generally flushing earlier. Variation was also found among families taken from the same populations, suggesting that the trait is genetically controlled.

Chlorophyll fluorescence was used to examine drought response in three-year-old seedlings. The response was not related to rainfall, but possibly to more complex moisture variables that also take into account additional factors such as evaporation.

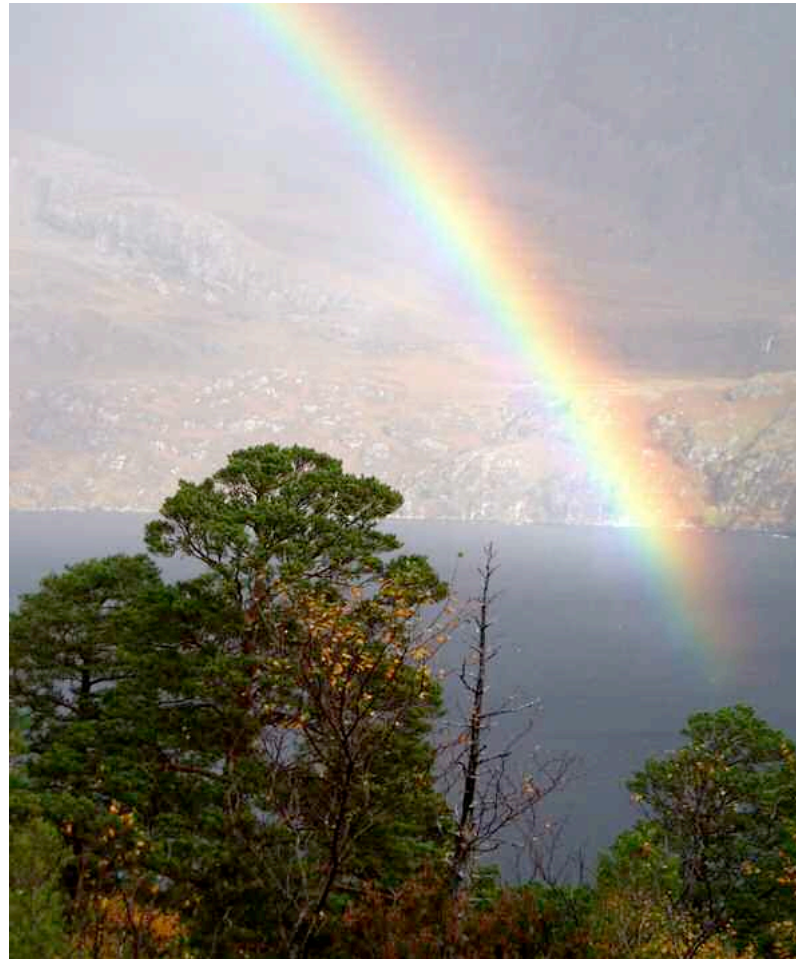


Photo: Forestry Commission

Scots pine, *Pinus Sylvestris*

Photosynthetic capacity in response to cold winter temperatures also varied significantly among eight populations that were kept outdoors, and the largest reduction occurred in seedlings from the mildest, most maritime coastal site.

The following spring, growth in height and needle flush started earlier in seedlings from cooler locations.

Together, these data suggest that, despite significant historic decreases in population size, environmental gradients have resulted in genetic differentiation among native pinewoods. To minimise the risk of planting poorly adapted stock and maximise the success of replanting programmes, it is important that the origins of planting stock are carefully considered in management guidelines for the species.

This work was carried out by Matti Salmela, a PhD student jointly supervised by staff at the Centre for Ecology and Hydrology, Forest Research, the James Hutton Institute and The University of Edinburgh.

<http://nora.nerc.ac.uk/14420/>

New plant tissue culture laboratory

THE NEW LAB at the Northern Research Station aims to establish efficient and reliable protocols for the propagation of improved sitka spruce tree material by somatic embryogenesis – that is, by proliferating tissues removed from seed-derived embryos.

This procedure has not previously been used commercially in the UK for conifers, but will aid the roll-out of the best-performing 'varietal' material to the UK's foresters. The embryogenic tissues can also be cryo-preserved in liquid nitrogen so as to be available indefinitely: an approach that could also be applied to other tree species, either for commercial or conservation needs, or for research into disease resistance.

www.forestry.gov.uk/fr/INFD-8MMBTU



Members' reports

Science and Advice for Scottish Agriculture

Photo: BadgerHero via Wikipedia CC BY-SA 3.0



The unit's first case has come to court and resulted in a guilty plea

European badger, *Meles meles*

Wildlife DNA forensic unit at SASA to help combat wildlife crime

THE TERM 'WILDLIFE CRIME' covers a wide range of criminal activity involving the theft or destruction of wild animals and plants, or even the destruction of habitats. Many such crimes occur in remote locations where there are no witnesses, but the police may find forensic evidence that can aid their investigation. This 'Wildlife CSI' (Crime Scene Investigation) often gleans non-human DNA evidence requiring specialist forensic analysis.

In January 2011, the Wildlife DNA Forensics unit opened at SASA, working in collaboration with the Royal Zoological Society of Scotland and TRACE wildlife forensics network. With funding from PAW Scotland, the unit carries out forensic analysis of DNA evidence free of charge for Scottish Police forces and the SSPCA.

Casework is not limited to Scotland, with submissions from other UK police forces, the RSPCA and two European CITES agencies.

This work complements and extends SASA's longstanding efforts in the prosecution of wildlife crime through the Wildlife Incident Investigation Scheme, which investigates the abuse of pesticides in poisoning wildlife.

The range of evidence types that the unit receives is vast, from blood, hairs and feathers, to equipment such as a kit used for egg-blowing or the walls of a cock-fighting ring. Often, investigators are interested in species identification from the evidence. If blood on a knife belongs to a rabbit, the suspect may simply have been hunting; if it is from



a badger, they may have been involved in badger persecution.

It is also possible to carry out animal DNA profiling – matching a specific animal to evidence linked with a suspect. This could mean matching dog saliva found on the carcass of a coursed hare to a suspect's pet dog.

Animal profiling methodology is currently only validated for forensic purposes for a small number of species, but the unit hopes to extend it to other species that are high on the UK wildlife crime priority list and is collaborating with the University of Edinburgh to validate profiling for red deer. This will help link evidence from poachers (tools for butchery) to specific incidents (a gralloch found on the hill).

Although the unit has only been open for a short period of time, our first case has come to court and resulted in a guilty plea. Found by Wildlife Crime Officer Craig Borthwick at a badger sett on the Clyde Walkway

in February, the men initially insisted they had only been hunting rabbits. However, DNA analysis of mouth-swabs taken from their dogs revealed fox DNA in the mouths of two dogs. This evidence, in combination with their unlikely rabbit-hunting equipment of spades and dogs with radio collars, led to the accused pleading guilty to hunting foxes with dogs in August. The men have now been banned from owning dogs for two years, and sentencing has been deferred for 12 months.

For further information on Scotland's fight against wildlife crime, see www.scotland.gov.uk/Topics/Environment/Wildlife-Habitats/paw-scotland/

Details of SASA's wildlife forensic analyses are at www.sasa.gov.uk/wildlife-environment/wildlife-crime

ECRR Peter Wilson Lecture 2012 • Monday February 13th, 6pm, Royal Society of Edinburgh

'Appliance of Science in the Rural Sector of Scotland'

Professor Iain J Gordon, chief executive, the James Hutton Institute

MANAGING LAND RESOURCES sustainably is essential to ensure the continuing availability of Ecosystems Services. Climate change, market fluctuations and Common Agricultural Policy reforms influence land management decisions and thus shape how land is used.

Professor Iain J Gordon, chief executive of the James Hutton Institute,

will outline how working in close partnership with the rural sector, scientists can help inform how land is used.

Through effective engagement, the development of new innovations and collaborative learning, scientists and the rural sector can ensure the future environmental quality and economic prosperity of our land.



Photo: JHI

Book via the Royal Society of Edinburgh website, www.rse.org.uk/events/event.php?id=259

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Roslin Institute, University of Edinburgh	www.roslin.ed.ac.uk
Royal Botanic Garden Edinburgh	www.rbge.org.uk
Royal Society for the Protection of Birds - Scotland	www.rspb.org.uk/scotland
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Society, Religion and Technology Project	www.srtp.org.uk
University Marine Biological Station Millport	www.gla.ac.uk/marinestation
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ON THE WEB

Back issues at
www.ecrr.org.uk

Members' meetings

Monday January 30, 2012

National Museums of Scotland, Edinburgh
Executive Committee meeting
Directors' lunch, 12.30
Host, Prof Nick Fraser

Monday March 12, 2012

Edinburgh Napier University
Directors' lunch
Host, Kathy Velander

Monday April 16, 2012

Royal Botanical Garden Edinburgh
Executive Committee meeting
Directors' lunch, 12.30
Host, Prof Steven Blackmore

Monday May 21 (or June 4) 2012

Venue TBA
Board Meeting
Details to be confirmed.
Directors' lunch, 12.30

Monday August 20, 2012

Scottish Agricultural College, Edinburgh
Directors' lunch
Host, Prof Geoff Simm

Monday October 8, 2012

Perth College, University of the Highlands
and Islands
Executive Committee meeting
Directors' lunch, 12.30
Host, Prof Martin Price

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FUTURE ISSUES

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

COPY DEADLINE

Deadline for copy in the next issue is
January 30th 2011

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