

## Air Pollution Bulletin Number 4 September 2007

News from the Air Pollution Lead Co-ordination Network (APLCN)

The APLCN was established in 2000 to assist JNCC and the UK statutory conservation agencies with their air pollution work. The APLCN brings together the air pollution work of JNCC and the conservation agencies; provides strategic advice on air pollution impacts on nature conservation to a wide constituency; develops air pollution policy and manages air pollution research projects.

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#### 1. Introduction

The Air Pollution Bulletin provides an overview of the APLCN's key work areas, with links to further information. It is usually produced annually, although this time there has been a two year gap. The Bulletin is principally an update for conservation agency staff, but we hope it is also of interest to other environmental organisations, the research community and the general public. We welcome feedback on its format and content. If you have any comments, or would like more details on any of the topics covered, email the network officer [clare.whitfield@jncc.gov.uk](mailto:clare.whitfield@jncc.gov.uk)

#### 2. Membership of the network and changes to the network remit

The APLCN involves specialist staff from the three GB country conservation agencies and JNCC. We are currently without a member from the Environment and Heritage Service Northern Ireland (EHS). There have been one or two other changes to membership over the last year. We are pleased to welcome Ian Strachan who replaces Noranne Ellis from Scottish Natural Heritage (SNH) and Khalid Aazem who joins us from Countryside Council for Wales (CCW). Also Caroline Chapman from Natural England has left for pastures new and Zoe Masters is currently covering her role. We wish Noranne and Caroline all the best in their new roles.

**Network Chair** - Simon Bareham - Countryside Council for Wales

**Network Officer** - Dr Clare Whitfield - Joint Nature Conservation Committee

**Other members** - Dr Ian Strachan - Scottish Natural Heritage; Dr Zoe Masters - Natural England; Khalid Aazem - Countryside Council for Wales

Recently there have been some changes to the remit of the APLCN. When the network was established part of its function, and the network officer's role, was to provide specialist technical and casework advice to the country conservation agencies. In part this was because of the new regulatory regime of Integrated



Pollution Prevention and Control being implemented whilst at the same time none of the agencies had dedicated air pollution specialists (except CCW). However, now much of the general technical framework has been agreed and there is greater capacity within the agencies for air pollution advice. As a result of this, and in order to align the APLCN's work more closely with JNCC's new strategy, casework and 'general function' advice is no longer within the APLCN work programme. However, we recognise that the network should continue to provide a forum for the country agencies to share experience and best practice on casework. Section 9 summarises the APLCN's current priority work areas.

### 3. News

- **New publications - all available at [www.jncc.gov.uk/page-1426](http://www.jncc.gov.uk/page-1426)**

#### **Biomonitoring methods for assessing the impacts of nitrogen pollution: refinement and testing - JNCC Report 386.**

Following a review and assessment of biological monitoring methods for nitrogen pollutants ([JNCC Report 356](#)), a second phase of the work has been published. This work included a refinement and further testing of the most appropriate methods identified in the first phase. Methods were tested at four 'intensive' sites and at 32 'extensive' sites across the UK, alongside measurements of atmospheric nitrogen concentration and/or deposition.

The project demonstrated that for the most robust assessment, a suite of measures should be used. It put forward the concept of a 'biomonitoring chain', which considers different nitrogen indicators from the source through emissions, concentrations, deposition, physiological response and ultimately species level response. It showed excellent potential for epiphytic lichen biomonitors. This will be further developed as part of a PhD studentship (see Section 8). It also demonstrated good potential for chemical methods, Ellenberg N index and standardised grass transplants at sites with a strong gradient of nitrogen deposition. However, these methods were much less effective at sites dominated by moderate levels of 'diffuse' inputs.

The project was funded by JNCC, the country conservation agencies and the Scottish and Northern Ireland Forum for Environmental Research (SNIFFER).

#### **Assessing the risks of air pollution impacts to the condition of Areas/Sites of Special Scientific Interest in the UK - JNCC Report 387**

The conservation agencies' Common Standards Monitoring for terrestrial sites is not designed to assess air pollution impacts. As a result, it is likely to fail to detect and attribute the effects of air pollution in a consistent and auditable manner. For example, the 2006 [CSM report](#) only identifies 30 records of air pollution being listed as an adverse factor affecting feature condition. By comparison, over 68% and 69% of SSSIs occur in 1km grid squares where the nutrient nitrogen and acidity critical loads are exceeded, respectively. Therefore, it is likely that we are under-reporting the impacts of air pollution. This is of major concern since it presents a very mixed message to stakeholders and ultimately could serve to undermine the policy drivers for action on emissions.

One of our approaches to address this anomaly is to report 'risk' of air pollution impact alongside the condition assessment. This is synonymous with an assessment of the pressure on the future viability of the habitat and of future foreseeable risks from air pollution. Report 387 recommends methods for how that risk assessment could be done, focusing on critical loads and levels (see further discussion in sections 4 and 5)

The project was funded by English Nature and JNCC.

#### **The impacts of ozone on nature conservation: a review and recommendations for research and policy - JNCC Report 403**

Ozone is globally the most important gaseous pollutant causing effects on vegetation. However, while a number of reviews have evaluated the evidence of impacts of ozone on semi-natural ecosystems, none of these has specifically focused on the priorities of the nature conservation agencies.

This project provides a systematic risk assessment to identify BAP habitats at greatest risk of impacts of ozone and considers how this risk might change in the future. It identifies key gaps in knowledge, and priorities in terms of conservation objectives. It assesses how policy initiatives might mitigate the possible impacts of ozone on habitats of conservation value in the UK over the next 20-30 years. The project was funded by CCW, JNCC, Natural England and SNH.

Meanwhile the Royal Society has set up a major study to assess and synthesise existing information on ground-level ozone and its impacts, and their coupling to climate change. The focus of the report is on the period 2030-2100 see <http://www.royalsoc.ac.uk/page.asp?changes=0&latest=1&id=5836>



Ozone exposure experiments in solar domes at CEH Bangor. The site was visited during the Network meeting in June 2006. Photograph by Zoe Masters, Natural England. 2006.

- **Streamlining European Biodiversity Indicators (SEBI2010)**

As reported in our 2005 bulletin, Simon Bareham was appointed Chair of the expert group tasked with producing a nitrogen deposition indicator under the SEBI programme. This is a pan-European programme with the aim to develop a European set of biodiversity indicators to assess and inform about progress towards the European 2010 Biodiversity targets. Nutrient nitrogen critical loads exceedance has been selected as the indicator for nitrogen deposition. Full details can be found at <http://biodiversity-chm.eea.europa.eu/information/indicator/F1090245995> or for further information contact Simon Bareham ([S.Bareham@ccw.gov.uk](mailto:S.Bareham@ccw.gov.uk))

- **Biodiversity Indicators in Your Pocket**

[Biodiversity Indicators in Your Pocket 2007](#) describes a set of biodiversity indicators for the UK. Eighteen indicators have been selected which show changes in aspects of biodiversity, such as the population size of important species or the area of land managed for wildlife. These indicators are an essential first step towards measuring the UK's 2010 biodiversity targets. The APLCN were involved in advising on the air pollution indicator. The indicator selected for the Focal Area "Threats to Biodiversity" is the "[Area of sensitive UK habitats exceeding critical loads for acidification and eutrophication](#)"

- **Conservation status and Article 17**

The APLCN has undertaken an assessment of air pollution impacts on Annex I Habitats as part of JNCC's work on conservation status for the Article 17 reporting under the Habitats Directive. The assessment is based on critical loads exceedance data, drawing on both "Site Relevant Critical Loads" for SACs and national mapping of critical loads exceedance. JNCC is currently consulting on the assessments. For full details, including the air pollution assessment, results and methodology see [www.jncc.gov.uk/page-4060](http://www.jncc.gov.uk/page-4060)

- **New critical levels for ammonia**

Critical levels are thresholds, for gaseous air pollutants, above which there may be effects on ecological receptors. New critical levels for ammonia were recommended at an expert workshop held under the UNECE Convention on Long-Range Transboundary Air Pollution, in December 2006. These are substantially lower than the former critical levels for ammonia. Since then the critical levels were adopted by the International Co-operative Programme on Modelling and Mapping at the Task Force meeting in April 2007. It has been agreed between the conservation agencies and the UK environment agencies to use the new critical levels in impact assessments considering ammonia emissions. The new critical levels are:

- $1\mu\text{g NH}_3\text{ m}^{-3}$  (annual mean) for (a) sensitive lichen communities and bryophytes, and (b) ecosystems where sensitive lichens and bryophytes were an important part of the ecosystem integrity.
- $3\mu\text{g NH}_3\text{ m}^{-3}$  (annual mean) for higher plants in general, with an uncertainty range of 2 to  $4\mu\text{g m}^{-3}$  depending on the degree of precaution appropriate to different contexts.

For full details see [http://www.ammonia-ws.ceh.ac.uk/documents/ece\\_eb\\_air\\_wg\\_5\\_2007\\_3\\_e.pdf](http://www.ammonia-ws.ceh.ac.uk/documents/ece_eb_air_wg_5_2007_3_e.pdf)



Outdoor pigs, Suffolk. Photograph by Clare Whitfield, JNCC. 2007.

- **Update on IPPC and Habitats Regulations**

The Integrated Pollution Prevention and Control (IPPC) Directive has been introduced in the UK over the past seven years, with a programme for bringing in different industrial sectors. This process will be completed by the end of October 2007. In previous Bulletins we have reported some of the assessments being undertaken under the requirements of the Pollution Prevention and Control (PPC) Regulations and the Habitats Regulations, for which the country conservation agencies are statutory consultees. Since the last edition, three very important sectors have been going through the PPC application process: the Electricity Supply Industry; Refineries and Intensive Livestock Farming (pigs and poultry). At the time of going to press, the regulators and country conservation agencies were at critical stages in the assessment and decision. Contact [Simon Bareham](#) (CCW); [Zoe Masters](#) (Natural England) or [Ian Strachan](#) (SNH) for further information.

- **New guidance**

In the last edition of the Bulletin we reported on interim guidance produced with the Highways Agency for undertaking environmental assessment of air quality for sensitive ecosystems in internationally designated nature conservation sites and SSSIs. At the time this guidance was issued as a supplement to the Design Manual for Roads and Bridges (DMRB). Towards the end of 2006, the guidance note was updated and incorporated fully into the DMRB (Volume 11 Section 3). See <http://www.standardsforhighways.co.uk/dmr/vol11/section3/ha20707.pdf>

#### **4. Condition assessment and evidence of air pollution effects**

In previous editions of the Bulletin we have outlined some of the challenges of assessing air pollution impacts at sites. We have drawn attention to the anomalous results which are arising from our reporting of site condition and air pollution assessment, which present a very mixed message to Government and the pollution regulators, and may undermine action of emissions. For example, large areas of the UK exceed the critical loads/levels set for protection of ecosystems. Countrywide surveys such as the Countryside Survey 2000 and the Plant Atlas have shown a widespread nitrogen eutrophication signal across terrestrial habitats. However, our own Common Standards Monitoring is not designed for air pollution assessment and hence rarely attributes air pollution as a cause of unfavourable condition and is probably greatly under-reporting the importance of air pollution.

The APLCN continues to pursue a three-tiered approach for addressing this issue, which was developed following consultation with habitat LCNs and the air pollution research community:-

- A risk assessment should be undertaken for all SSSIs, so that risk can be reported alongside site condition (see section 5)
- More intensive monitoring on a subset of sites (see Bulletin 3 - Targeted Monitoring Project section 6) and better use of surveillance.
- A project to recommend whether there is scope within the current CSM framework for providing guidance on the attribution of air pollution as causative of unfavourable condition (see section 8).

Research projects are currently active in each of these areas, with the aim to provide a better evidence base of air pollution impacts for informing policy development. However, in the short term there are no simple solutions. In the meantime the APLCN reinforces that CSM assessment is not a panacea for the monitoring and assessment of all environmental pressures. There is a strong evidence base of the role of air pollutants on ecosystems which should provide a sufficient driver for action. We are exploring how it can be used more effectively to inform site-level and more general biodiversity reporting.



## 5. Critical loads exceedance at protected sites

In our last Bulletin we reported on the development of Site Relevant Critical Loads and Source Attribution (apportionment) for Natura 2000 sites. This work had been funded by SNIFFER and the Environment Agency and contracted to the Centre for Ecology and Hydrology (CEH). The database assigns 'relevant' critical loads to each sensitive interest feature of each Natura 2000 site. This is then linked to modelling of deposition at each site, which is apportioned to different source sectors. Site information is publicly available on the Air Pollution Information System ([www.apis.ac.uk](http://www.apis.ac.uk)) and a report of the work can be downloaded at

[www.sniffer.org.uk/exe/download.asp?sniffer\\_outputs/AQ02.pdf](http://www.sniffer.org.uk/exe/download.asp?sniffer_outputs/AQ02.pdf). The approach represents a very powerful assessment tool: both in terms of site specific assessments (i.e. for casework advice) and also for national overviews (i.e. it has been used to inform the conservation status assessments).

It is now necessary to update the database to reflect changes to acidity critical loads; to include new sites and introduce new emission scenarios for deposition modelling. In addition, through the APLCN, the conservation agencies will be developing the approach for application to habitat features of SSSIs. This will allow 'risk' from air pollution to be reported alongside condition assessment, as well as national assessments of the area and number of features/sites at risk from atmospheric deposition. This updating and extension to the database will be funded by the Environment Agency, JNCC, Natural England and CCW and will take place during 2007/08. In theory, the database can also be extended to include critical level exceedance, however, funding is not available for this in the current year.

The development of Site Relevant Critical Loads has been an innovative and novel approach. Clare Whitfield and Simon Bareham, joined Jane Hall from CEH in presenting the approach to the annual [workshop of the Co-ordination Centre for Effects in April 2007](#). Principally our aim was to advocate the development of a consistent approach to the assessment of air pollution impacts on Natura 2000 sites/Annex 1 Habitats (such as for Article 17 reporting) across Europe, building on the established critical loads assessment procedures and scientific forum. Also to promote the integration of such assessment into air pollution policy development to ensure current commitments and objectives for nature conservation are better linked to action on emissions. Very encouragingly, similar approaches for applying critical loads to Natura 2000 sites have been adopted by a number of other northern European countries.

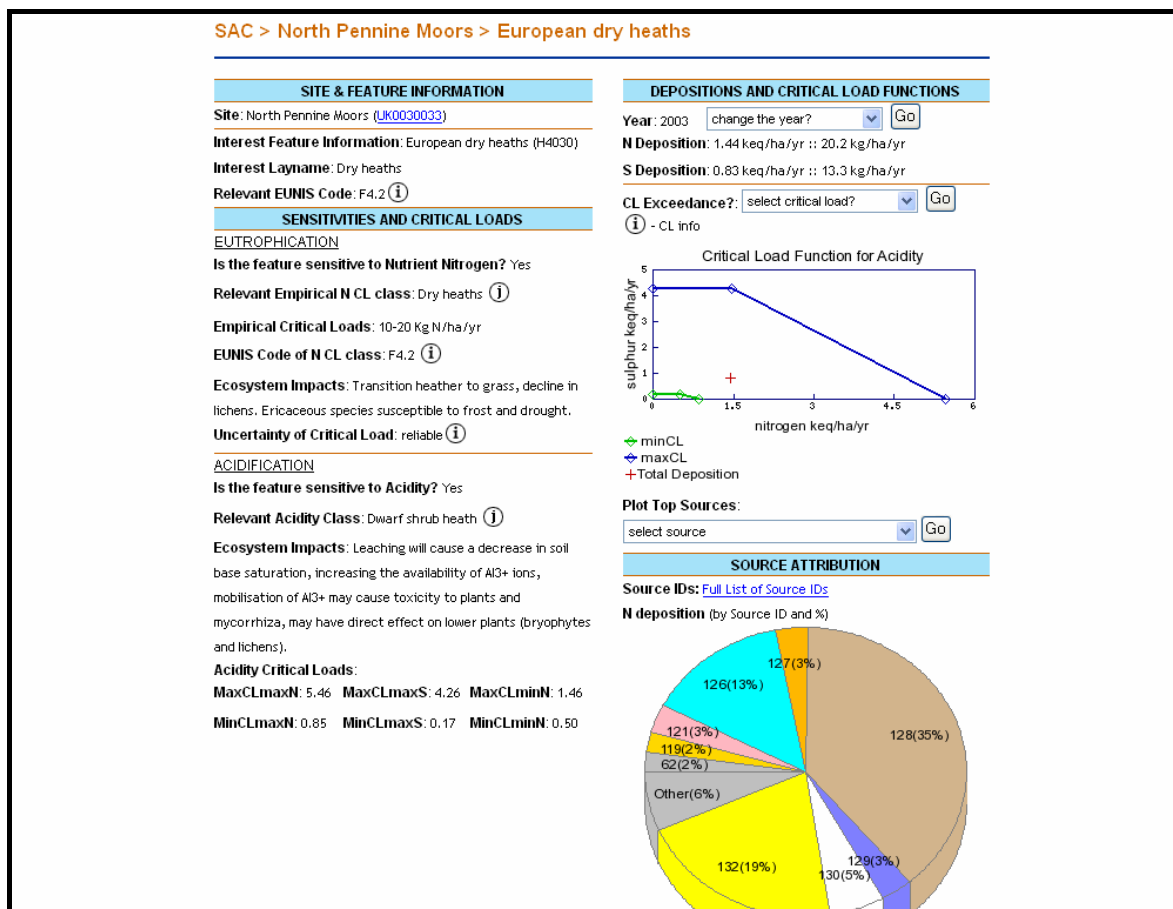


Illustration of the results from a SRCL search on APIS ([www.apis.ac.uk](http://www.apis.ac.uk) search by "SAC/SPA")

## 6. Emissions trading

The APLCN has responded recently, on behalf of JNCC and the country conservation agencies, to a number of consultations concerning, amongst other issues, emissions trading of sulphur dioxide and oxides of nitrogen. These include the operation of the National Emissions Reduction Plan under the UK's implementation of the revised Large Combustion Plant Directive (LCPD) and the European Commissions' consultation on IPPC.

Back in the mid-1990's the conservation agencies were engaged in discussions with Government and the then Her Majesty's Inspectorate of Pollution (HMIP) (now part of the Environment Agency), in relation to the introduction of tradable permits for sulphur dioxide. Our research at the time showed that the location of sources of SO<sub>2</sub> and NO<sub>x</sub> emissions is a key issue in evaluating the environmental effect they cause (this is also supported by the recent work on SRCLs and source attribution). For example, a unit of emission transferred to a Scottish power station, under a trade, could cause up to five times more damage than if it were released from the Thames Valley power station, brokering the transfer. The same is not true for carbon dioxide (CO<sub>2</sub>), where location is not important. Ultimately, at that time, the Government did not proceed with a tradable permit system for reducing sulphur emissions.

However, the trading of SO<sub>2</sub> and NO<sub>x</sub> emissions will now take place in the UK through the National Emissions Reduction Plan of the LCPD. The APLCN recognise that there are benefits to trading of these pollutants and it may offer a cost effective means of reducing emissions. However, although concerns over local hotspots of pollution can be managed through effective implementation of IPPC, we remain concerned as to whether this mechanism can adequately afford protection from long-range effects. Our position remains:

- Any emission trading scheme must not compromise protection of statutory nature conservation sites (such as Natura 2000 sites) or threaten the wider objectives of the Habitats Directive, or national biodiversity commitments, considering both short-range and long-range effects.
- The integrated assessment tools which provide the cornerstone of current air pollution policy evaluation and the effects-based approach upon which current negotiations on emissions of transboundary air pollutants are based, must not be compromised by emissions trading of NO<sub>x</sub> and SO<sub>2</sub>.



Power Station. Photograph by Cathy Gardener, JNCC 2007.

## 7. New air quality strategy published

The revised [UK Air Quality Strategy](#) (AQS) was published in July, following public consultation the previous year. The AQS sets objectives for nine key air pollutants and identifies local, national and international actions to improve air quality. The principal focus of the previous AQS (2000, amended in 2003) was on the protection of human health. It did not address the impact of air pollution on ecosystems to any significant extent.

Whilst air quality has improved significantly in the UK, it is still causing serious adverse effects on human health and the natural environment. Air pollution is currently estimated to reduce the life expectancy of every person in the UK by an average of 7-8 months. In addition, over 50% of the area of semi-natural ecosystems exceeds critical loads.

The review of the AQS was principally to focus on progress to meeting objectives and the policy measures needed to deliver them. Within this approach, individual objectives could be revised or new ones considered in light of policy, scientific and technological developments.

Since 2003, JNCC has maintained an active dialogue with Defra, identifying the shortfalls of the AQS 2000, in terms of ecosystems impacts, and advising on areas which needed to be addressed in the review. Throughout this past dialogue, JNCC has advocated that the AQS include a stronger element on ecosystem protection; in line with Government nature conservation policy objectives and legislation (see Bulletin 3).

We are very encouraged that the revised AQS states that the UK Government and devolved administrations consider that the scope of the strategy should be “progressively extended to address key ecosystem impacts”. However, the revised strategy has failed to provide adequate new policy/objectives for protection of ecosystems from air pollution, over and above actions and commitments already in place.

- Significantly, the new AQS retains the previous ecosystem objectives for SO<sub>2</sub> and NO<sub>x</sub> (and the ‘exclusion zones concept’) and states that it is “inappropriate to implement the further options proposed during the consultation at the present time”. Instead, the AQS states that Defra will “take forward additional analysis and consider how best to ensure protection of ecosystems against air pollution in the medium to long term”
- Ammonia is not covered in the AQS, although there is a description of the current controls, policies and measures in place.
- The AQS reiterates the Government’s (and European Union’s) continued commitment to the attainment of no critical load exceedance over the long-term. It is a step forward to have this explicitly contained within the AQS. However, no additional specific measures are put in place (although critical load exceedance is contained within the benefits analysis of the suite of measures assessed for the review).
- The AQS has also added a new objective for protection of ecosystems from ozone, reflecting the obligations under the Third Air Quality Daughter Directive, albeit an objective which is three times higher than the equivalent United Nations Economic Commission for Europe recommended critical level.

We look forward to supporting Defra in their further analysis and policy development of ecosystem protection within the AQS.

## 8. Research update

A list of the projects the network is currently involved in is provided below:-

- **Update and extension of “Site Relevant Critical Loads and Source Attribution”.** This project will update the acidity critical loads; extend the database to SSSIs and include new emissions scenarios. APLCN/JNCC is managing the project on behalf of a consortium of Environment Agency, Natural England and CCW. See section 5 for more details.
- **Detecting and attributing air pollution impacts during SSSI condition assessment.** This project will explore the potential, within the existing framework of CSM (for sensitive terrestrial habitats), to attribute air pollution as a cause of unfavourable condition, focusing on the use of indicator species.
- **Air Pollution Information System (APIS).** Supporting and co-ordinating the ongoing maintenance of this web-based database of air pollution information in collaboration with SNIFFER on behalf of the project funders CCW, Natural England, SNIFFER, SNH, JNCC, Environment Agency, SEPA, EHS and CEH. See [www.apis.ac.uk](http://www.apis.ac.uk)
- **PhD Studentship: Epiphyte biomonitoring for atmospheric nitrogen effects on terrestrial habitats-** JNCC is proposing to contribute the funding of this PhD studentship in collaboration with CEH and SNIFFER. The aims of the project are: i) Develop robust methods to quantify the impact of atmospheric nitrogen concentrations and deposition on sensitive epiphyte species of macrolichens and bryophytes to improve the understanding of how pollutant exposure affects these communities. ii) Apply the methodology in relation to different sources of atmospheric nitrogen over the regional scale and

especially focusing on the role of ammonia in rural areas in relation to impacts on designated conservation habitats. iii) Extend the substrate relevance of the methodology to substrates, such as walls/stones and fences. It will commence in late 2007 or early 2008 and is currently being advertised.

## 9. Looking ahead - priority work areas

The main focus of the network over the following year will be:-

- Improving the evidence base of air pollution impact to support policy advice:
  - ⇒ Manage a research project to update and extend SRCLs to include SSSI (habitat features).
  - ⇒ Manage a research project entitled “Detecting and Attributing Air Pollution Impacts during SSSI Condition Assessment”.
  - ⇒ Continue to work with Defra and country agencies on the business case/plan for a targeted monitoring network (for climate change and air pollution).
  - ⇒ Explore opportunities for using data from surveillance programmes to provide better evidence of the impacts of air pollution.
- Following the update and extension of SRCLs, publish a report to summarise the key results and policy messages.
- Exploring opportunities for, and subsequently developing, JNCC’s role in influencing and informing development of air pollution policies and legislation in the EU and internationally.
- Responding to Government consultations and requests.
- Communicating air pollution information through APIS; JNCC publications; JNCC website and presentations.

Further details of the APLCN’s work programme can be obtained from [clare.whitfield@jncc.gov.uk](mailto:clare.whitfield@jncc.gov.uk)