Air Pollution Bulletin Number 6 - January 2012

JNCC and the country conservation bodies collaborate on air pollution work through the Inter-agency Air Pollution Group (IAPG). The IAPG has replaced the former Air Pollution Lead Co-ordination Network (APLCN). Through the group, we work together to provide joint responses to UK Government and EU consultations, to provide evidence and advice on air pollution impacts on biodiversity and ecosystems, and collaborate on research projects.

The country conservation bodies are statutory consultees under planning law and pollution regulation, which involves assessment of air pollution impacts on habitats and species. In addition to the IAPG, the country conservation bodies have formed an informal air pollution casework group to share experience and best practice and to provide a forum for collaboratively addressing key issues.

The Air Pollution Bulletin provides an overview of the IAPG's and casework group's key activities, with links to further information. It 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, please email <u>Clare Whitfield</u>.

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New Publications...

Nitrogen Impacts on Biodiversity - JNCC Reports 447 & 449

The Joint Nature Conservation Committee (JNCC) and the country conservation bodies, together with Defra, recently funded a major new analysis to assess the impact of nitrogen deposition. The analysis, the largest of its kind, covered four widespread habitats - calcareous and acid grasslands, heathlands, and bogs. Each was examined for evidence of vegetation change caused by nitrogen deposition after accounting for other factors that could have had an influence.

The results demonstrate effects of nitrogen deposition on habitats through reduced occurrence of a range of plant and lichen species and changes in ecosystem structure and function. These effects have been shown to occur below current critical loads. This, together with other evidence from surveys and experiments, provides clear evidence of impacts of nitrogen (more details are provided on page 7).

Proceedings of "Nitrogen Deposition and Natura 2000" Workshop

JNCC worked with Stockholm Environment Institute (SEI) and the Centre for Ecology & Hydrology (CEH) to organise this European workshop, in 2009. The workshop brought scientists, policymakers and conservation practitioners together to review new science of nitrogen deposition on biodiversity, and to compare approaches to assessing nitrogen impacts in relation to the requirements of the Habitats Directive.

A book of the proceedings is now available <u>online</u>, together with a summary leaflet. A limited number of hard copies are also available. The proceedings include a number of papers from conservation agency staff, for example reporting on the approach the UK takes for air pollution assessment under Article 17 and Article 6.3 of the Habitats Directive. Similarly, it documents the approaches other European countries have taken.



The publication warns of the risks to European wildlife from nitrogen pollution resulting from industry and agriculture. The issue presents a serious challenge for the conservation of natural habitats and species under the Habitats Directive. JNCC is now

working with the country conservation bodies to explore the implications of the evidence of nitrogen impacts for country biodiversity strategies and biodiversity policies.

Predicting nitrogen deposition impacts on plant species using a dynamic soil eutrophication indicator – contract report for CCW

The Countryside Council for Wales (CCW) commissioned this study to examine the effects of nitrogen pollution on dune grassland. A model chain, calibrated to data from an N-addition and grazing experiment at Newborough Warren, was used to predict how plant species might respond to changes in soil chemistry. The soil changes described were related to changes in the overall nutrient enrichment of the flora, as indicated by mean Ellenberg nitrogen score, and thereby to the habitat's suitability for particular species. Declines in Habitat Suitability were interpreted as increasing risk to the species. At rates above 30 kg nitrogen ha-1y⁻¹, the more sensitive species were placed at risk almost immediately, but at smaller rates species were placed at risk over the longer-term, with an increasing delay period with less nitrogen addition. At rates lower than the critical nitrogen load for calcareous fixed dunes, more mesotrophic species were placed at risk. Species viewed as positive indicators of habitat condition were placed at risk under both high and low rates of nitrogen addition.

The study will be used by CCW to support advice provided to regulators, planners and partner organisations. The final report is available at http://www.ccw.gov.uk/publications--research.aspx. For further details, contact <u>Khalid Aazem</u> or <u>Simon Bareham</u> at CCW.

News...

Update on roles and responsibilities within Scottish Natural Heritage

Scottish Natural Heritage (SNH) plays an important role in providing advice on air pollution issues in Scotland, especially in relation to impacts on designated sites, as well as impacts on semi-natural habitats in the wider environment. For example, SNH provides advice on the impacts of air pollutants on Special Areas of Conservation(SACs) which provide protection for Annex I habitats and Annex II species listed by the EC Habitats Directive. Mike Shepherd, Senior Casework Manager is the lead contact for this casework advice. He also sits on the air pollution casework group. Daniel Gotts, Policy and Advice Manager (Sustainable Development) provides input on any casework involving transport issues. Alison Lee, Policy and Advice Officer, is SNH's representative on the IAPG. Updates on many of the IAPG's current work areas are provided in other articles within this bulletin.

Critical Loads based nitrogen deposition assessment for Habitats Directive Article 17 reporting

<u>This document</u> provides information on using critical loads for nutrient nitrogen to assess the threat from nitrogen deposition to achieving favourable "conservation status" for habitats listed in the Habitats Directive. JNCC developed this guidance in collaboration with the Co-ordination Centre for Effects of the UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP) and the UK Critical Loads National Focal Centre (NFC).

The document sets out the background to the reporting obligations under the Directive and recommends a methodology for assessing nitrogen as a pressure/threat to Annex I habitats based on (empirical) critical loads of nutrient nitrogen. It was produced following agreement at the 2010 Task Force meeting of the CLRTAP International Co-operative Programme on Modelling and Mapping. The document is aimed at both EU NFCs and authors of Article 17 reports. It aims to promote the use of established impact assessment methods developed under CLRTAP to assess the threat to conservation status.

Environment Audit Committee: Air Quality – a follow on report

In 2010 the Environmental Audit Committee reported on Air Quality. It found that poor air quality is shortening the life expectancy of people in the UK by an average of seven to eight months and is costing society up to £20 billion per year. It called for an urgent step change in policy to reduce pollution from transport. The Committee has recently undertaken a follow-up inquiry and <u>published its report</u> in December 2011. The report found that the evidence of the damage caused by air pollution has grown stronger, since its 2010 report. But the UK is still failing to meet European targets for nitrogen dioxide and particulates across many parts of the country. The step change called for has not happened.

JNCC made a written <u>response</u> to the Committee, on behalf of the GB conservation agencies, concerning evidence of nitrogen deposition impacts on habitats. While the thrust of the report focussed on human health impacts, it cites the evidence JNCC provided.

"Air pollution also causes significant damage to the environment. Sixty percent of sensitive habitats exceed the critical load for nitrogen, of which atmospheric pollution is a major cause. The Joint Nature Conservation Committee, Countryside Council for Wales, Natural England and Scottish Natural Heritage told us that oxides of nitrogen (NOX) harms UK biodiversity and is compromising our ability to deliver current conservation commitments such as the objective to achieve favourable conservation status under the Habitats Directive."

News...

The Committee was highly critical of the Government for failing to get to grips with this issue. Poor air quality in the UK is now found to be shortening the lives of up to 200,000 people by an average of two years. The Committee put forward a series of recommendations to the Government. It concluded with the statement that four thousand people died as a result of the Great Smog of London in 1952 and this led to the introduction of the Clean Air Act in 1956. In 2008, 4,000 people died in London from air pollution and 30,000 died across the whole of the UK.

New and Revised Critical Loads for Nutrient Nitrogen

Empirical critical loads for nutrient nitrogen were reviewed at a <u>workshop</u> in June 2010, held under the auspices of the Convention on Long-Range Transboundary Pollution (CLRTAP). JNCC and SNH were represented at the workshop. New values were set for some habitats not previously assigned a critical load and other values revised.

The UK critical load focal centre has since <u>revised</u> the national maps of nutrient nitrogen critical loads. JNCC and the country conservation bodies were consulted on this work and the result of the "Nitrogen Impacts of Biodiversity" (page 7) study formed part of the evidence base used to set 'mapping values'.

Critical load values in APIS have been updated to reflect the revisions. JNCC and the country conservation bodies are currently considering the UK mapping values and the modifying factors with a view to making recommendations on how to apply nitrogen critical load ranges in casework advice.

 Improvements to screening models for agricultural ammonia sources and combustion sources (Simple Calculation of Atmospheric Impacts Limits - <u>www.scail.ceh.ac.uk</u>)

Simple Calculation of Atmospheric Impacts Limits (SCAIL) is a suite of screening tools, currently for combustion and agricultural sources, for assessing potential impacts on semi-natural areas and protected sites. Below we report recent and ongoing improvements.



Simple Calculation of Atmospheric Impact Limits is a suite of <u>screening tools</u> for assessing the impact from agricultural and combustion sources on semi-natural areas like SSSIs and SACs. SCALL is now available as two models -SCALL Agriculture and SCALL Combustion. Both models provide an estimate of the amount of addity, nitrogen or subplur deposited on to a habitat or sensitive ecosystem. Output from the models can then be used to assess whether impact limits for the habitat are exceeded or not. The models are useful as an initial screening of sources for IPPC applications or Appropriate Assessments under the Habitats Directive.

Choose a SCAIL model:



SCALL ACRICULTURE is a simple online screening tool that can be used in IPPC applications, EIAs or Appropriate Assessments to estimate the effect of an agricultural emission (e.g. poultry shed) on a habitat (e.g. SSSI). This estimate can then be used to determine the exceedance or non-exceedance or on-exceedance of the habitat's impact limit and will help users in deciding whether more detailed modeling or site specific investigation is required. The model takes into account regional wind statistics for 15 UK regions and users input details of their source (e.g. livestock numbers), the habitat in question and distance from source to the habitat.



SCALL COMBUSTION is a screening tool that uses the atmospheric dispersion model AERMOD to model S02 and NOX emissions from small to medium sized combustion sources. The model estimates the impacts of nitrogen oxides (NOX: NO and NO2) and sulphur dioxide (SO2) emissions on sensitive habitat sites. User can enter details of their habitat, source and stack parameters to calculate an estimate of NOX and SO2, acid and nitrogen deposition at the habitat. The model uses wind data free nearest meteorological station data, of which there are around 30 meteorological stations in the system.



The SCAIL projects are led by SNIFFER on behalf of the UK environment agencies. The country conservation bodies are represented on the steering group, currently by JNCC.

SCAIL - Combustion

Environmental permitting regulations apply to all combustion processes in the UK (mainly power stations) with a rated thermal capacity exceeding 20 Mega Watts. Applications for permits to build and operate such a process require an assessment of potential impacts of atmospheric emissions on protected sites. SCAIL-Combustion provides a simple freely available model that allows "screening" of an application, to assess whether a more complex model will be required for a fuller assessment, or whether the application can be screened out initially. It is available at <u>www.scail.ceh.ac.uk</u>.

News...

SCAIL- Combustion was initially developed to assess the impact of small-medium sized combustion processes. However, the model has been calibrated with emission data from much larger power stations which means it can now be used for a screening assessment of any size of power station. For more information go to <u>UKPIR15 SCAIL-Combustion Final Report (23Jun10).pdf</u> or contact <u>Simon Bareham</u>.

The critical loads data on SCAIL-Combustion have recently been updated to ensure consistency with APIS.

SCAIL-Agriculture

In a new project (SNIFFER project ER26) the SCAIL-Agriculture tool is being improved. It will cover the UK and Republic of Ireland. The new version of the tool will be able to provide an estimate of the deposition and air concentrations of ammonia, particulate matter (PM) and odour from intensive pig and poultry units. The output from the freely available tool will assist environmental regulators make a decision on whether further complex dispersion and deposition modelling is required. The project commenced in April 2011 and is due to be completed by May 2013. Click <u>here</u> for more information.

England Biodiversity Strategy

"<u>Biodiversity 2020</u>: A strategy for England's wildlife and ecosystem services" was published in August 2011. It is a national framework to guide conservation efforts in England over the next decade. It sets out the Government's ambition to halt overall loss of England's

biodiversity by 2020 (and move from a position of net biodiversity loss to net gain), in response to the historic Convention of Biological Diversity (CBD) Nagoya agreement, where over 190 countries agreed to take urgent action to halt biodiversity loss. This agreement, the CBD Strategic Plan adopted in October 2010, includes a target that "by 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity".

The England Biodiversity Strategy identifies air pollution as a "direct pressure" on biodiversity and includes a priority action to "reduce air pollution impacts on biodiversity through approaches at national, UK, EU and international levels targeted at the sectors which are the source of the relevant pollutants (nitrogen oxides, ozone, sulphur dioxide, ammonia)". It says that Defra will: implement existing and planned policies to reduce UK emissions, to help to reduce critical load exceedance and risk of impacts on biodiversity; will work with the Department of Transport to further address emission from transport sources; and work collaboratively with the agricultural sector to increase nitrogen use efficiency and encourage emissions reductions (for both air pollutants and greenhouse gas emissions). Work is ongoing in the country conservation bodies looking at how to take nitrogen deposition effects into account in site condition assessment and reporting (see page 7). This could impact on the Strategy outcomes and is being discussed with Defra.

The England Biodiversity Strategy links to the <u>National Ecosystem Assessment</u>, the <u>Natural Environment</u> <u>White paper</u> and the <u>Lawton Review</u>.



Setting thresholds for "no adverse effect"

Industrial installations over a certain size are required to apply to the Environment Agency or SEPA for an Environment Permit or PPC permit respectively. Natural England, CCW and SNH are statutory consultees in this process.

Permitting decisions need to be made along with the understanding that around two thirds of all protected sites are already predicted to exceed their critical loads as a result of existing levels of air pollution.

This raises a key question for us, as statutory nature conservation advisors, as well as the pollution regulators: if there is already an identified risk of harmful effects from air pollution (i.e. current predicted critical level or critical load exceedance), what (if any) additional air pollution arising from a new installation is acceptable? The Environment Agency, Natural England and CCW have set up a working group to address this question by making use of the 'best available' scientific information, alongside legal advice.

A workshop held by the country conservation bodies in September, 2009 identified the potential for further analysis of available dose response data, to better predict the effects of small additions of pollutants above the critical load. Initial work for Natural England by Hicks and Ashmore (2010) concluded that existing dose-response relationships for nitrogen deposition and acid grasslands could be useful in this context but that a 'one size fits all' approach is unlikely to be appropriate for all habitat types. Last year, Natural England commissioned a study to collate and examine newly available dose-response data for a range of habitat types (including bogs, heaths, sand dunes etc); to identify the nature of the relationship (i.e. the shape of the curve, see figure below); and to quantify the effect of incremental additions of atmospheric nitrogen deposition (above the critical load) on different semi-natural habitat types. The report is currently being quality assured and prepared for publication on Natural England's website. The project findings are being discussed with the Environment Agency and other partners.



Using nitrogen impacts evidence to inform habitat and site assessment



As reported on page 2, JNCC recently published new evidence of nitrogen deposition impacts on grassland, heathland and bog habitats. The results, together with other published evidence, confirms that nitrogen deposition remains a significant and ongoing pressure, with implications for UK and country biodiversity commitments. The study concluded:

Impacts and Implications

• Changes in both species and ecosystem function indices occur at low levels of nitrogen deposition, some below current critical loads

• Changes in species and ecosystem function indices continue above the current critical load values indicating that ongoing damage may occur above the critical load threshold and there may be some benefits from reductions in deposition even if the threshold is not reached.

• Nitrogen deposition is compromising our ability to deliver current conservation commitments and future risks from nitrogen deposition remain high.

Nitrogen deposition reduced the probability of presence of *Campanula glomerata* in calcareous grassland.

Site assessment

- At a site level, nitrogen deposition impacts are very unlikely to be detected using Common Standards Monitoring.
- Case studies demonstrate that there are sites assessed as in favourable condition where evidence of nutrient enrichment attributed to nitrogen deposition can be seen.
- It is recommended that monitoring of changes in vegetation species composition, species richness and Ellenberg nitrogen scores at permanent locations over time is more likely to detect changes at individual sites.

Nitrogen deposition reduced the probability of presence of

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Broader vegetation surveillance

- The study demonstrated it is possible to get good evidence of nitrogen impacts on species occurrence in the wider countryside and summary variables describing ecosystem structure and function, from broad-scale vegetation survey data.
- This is possible even though the schemes are not designed specifically for assessing nitrogen deposition impacts.
- The study has made some recommendations for improvement to schemes that would enhance analysis in the future.

The IAPG presented the new evidence to the conservation bodies' Chief Scientists Group in August 2011 and the implications were discussed. It was agreed that the evidence should be reflected in reporting of conservation status (under the Habitats Directive) and further consideration should be given as to how it can be accounted for in site condition assessments (through Common Standards Monitoring). Whilst acknowledging that further change in some habitats is inevitable, under current deposition scenarios, it was recognised that the conservation bodies should mitigate impacts where possible through on-site or off-site management/landscape measures. This requires further work to consider the effectiveness of measures.

The Chief Scientist Group agreed to establish a Task and Finish group to agree the method for, and to undertake the assessment of, nitrogen deposition impacts for Article 17 reporting and to develop the approach for assessing the impact of nitrogen deposition within Common Standards Monitoring. The Task and Finish group will focus on a pilot habitat which will be calcareous grassland.

Updates to the Air Pollution Information System

The <u>APIS website</u> provides a comprehensive source of information on air pollution and the effects on ecosystems. It is an essential tool for air pollution impact assessment for casework, as well as a source of more general information on air pollution impacts and pollutant concentrations and deposition. It is funded by JNCC and the country conservation bodies together with the UK environment agencies, in partnership with CEH.

We have recently undertaken a major update of the Site Relevant Critical Loads tool, with revised modelled deposition data (2005 and 2020), apportioned to 156 sources/source groups, and new critical loads for nutrient nitrogen and acidity. It has also been extended to include Areas/Sites of Special Scientific Interest. The user can assess nitrogen and sulphur deposition to a site, examine the major source inputs and find out the relevant critical loads for the site's interest features. The user guide has been updated and four online tutorials help guide you through the tool. The new SRCL tool was made publicly available during the summer 2011.



We've also been transferring APIS to a new Contents Management System. In the process, CEH has updated and improved the look of the website. The new version was released in February 2012. It includes:

- A new look and wider page to allow for bigger screens (see illustration below).
- Simpler search tool for pollutant-habitat records.
- Revised query by location tool to allow for multiple pollutant look-ups.
- A news section on the homepage.
- A comprehensive list of other web-based sources of information pollutants, guidance, habitats/sites.

Policy Reviews

Action to manage and improve air quality in the UK is largely driven through European legislation and the UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP). There are three main approaches:

- Setting limits for national emissions (ceilings) to address long-range transport of air pollution
- Setting environmental limit values/standards
- Addressing emissions from sources (e.g. industrial emissions).

There are various ongoing or recent reviews of the principle air pollution legislation/policies. The most relevant of these, to the conservation agencies, are briefly explained below.

The European Commission commenced a review of its air quality policy in 2011. It will complete in 2013 with proposals for changes to air quality policy, including a revision of the National Emission Ceilings **Directive**. As part of this, there was a consultation over the summer on air guality legislation to which JNCC submitted a response.

The Gothenburg Protocol of the CLRTAP is also under revision, with agreement expected in 2012. In response to the "acid rain" issues that emerged in the 1970's there was an international realisation that much



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closer cooperation was needed by nations to tackle air pollution that crossed large parts of the globe. In 1979 many European countries, including the UK, the US, Canada and Russia signed the United Nations Economic Commission for Europe (UNECE) Convention on Long Range Transboundary Air Pollution. The 1999 Gothenburg Protocol sets emissions ceilings for ammonia, sulphur dioxide, nitrogen oxides and volatile organic compounds (VOCs), with the aim to reduce impacts on the environment and health. It also contains Annexes which stipulate mandatory and non-mandatory technical measures for different industry types, e.g. combustion and agriculture, and monitoring requirements. JNCC and Natural England were asked by Defra for advice on nitrogen deposition impacts on Annex I habitats and Sites of Special Scientific Interest (SSSIs) in England respectively, to inform their position on the level of ambition required for the revised protocol.

The Industrial Emissions Directive (IED) (2010/75/EU) came into being January 2011, bringing together seven existing Directives, notably the Large Combustion Plant Directive (LCPD), The Integrated Pollution Prevention and Control Directive (IPPC) and the Waste Incineration Directive (WID). The Directive will be transposed during 2012. The aim is to consolidate and in some cases strengthen existing provisions within one Directive. An area where the Directive aims to strengthen existing requirements includes consideration of power stations. Emission limits for the sulphur dioxide (SO₂) and oxides of nitrogen (NOx) will be tightened to ensure that all existing power stations will be required to fit new abatement, if they want to continue operating beyond 2016. There will also be a review covering poultry thresholds; thresholds for the rearing of mixed species; and the control of emissions from the intensive rearing of cattle. This is of particular interest given the recent proposals for a number of "super dairies" across the UK. Although such developments require an assessment under the Environmental Impacts Directive there is currently no regulatory framework in place to control emissions to air, notably ammonia.

Looking ahead - priority work areas

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

- Responding to requests for advice and formal consultations.
- Agreeing the method for incorporating nitrogen evidence into Article 17 assessment and CSM.
- Working with partners on research and evidence requirements and project work. Including land use/ management measures for reducing nitrogen impacts.
- Overseeing APIS and ensuring it is updated and enhanced as necessary.

• Communicating air pollution information through APIS; JNCC publications and JNCC website Further details of the IAPG work programme can be obtained from Clare Whitfield.

Membership of the IAPG

The IAPG involves specialist staff from the three GB country conservation bodies and JNCC. The IAPG is chaired by CCW and managed by JNCC. We are currently without a member from the Northern Ireland Environment Agency.

- JNCC Dr Clare Whitfield
- Countryside Council for Wales Simon Bareham and Khalid Aazem
- Natural England Dr Zoe Russell
- Scottish Natural Heritage Alison Lee IAPG/Mike Shepherd casework group.