

Nitrogen Deposition and the Nature Directives

Impacts and Responses: Our shared experiences



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Theme 1: Working Group 2: Establishing conservation objectives and conservation measures for Natura 2000 sites and applying critical loads/level at sites

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To find out more about the workshop visit: <http://jncc.defra.gov.uk/page-5954>

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The workshop is being organised by JNCC on behalf of the UK Government, Devolved Administrations and country nature conservation bodies, in collaboration with the Dutch Ministry of Economic Affairs and in co-operation with the Task Force on Reactive Nitrogen.

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1. Summary

Atmospheric nitrogen deposition has caused widespread impacts on sensitive habitats and species across the Atlantic Biogeographic Region. Large areas exceed critical loads and will continue to do so for the foreseeable future, such that nitrogen deposition presents an ongoing threat.

Many Natura 2000 sites are likely to have already been impacted by nitrogen deposition, and this may have occurred before designation. Member States are required to set conservation objectives for Natura 2000 sites and to establish the necessary conservation measures. In doing so, they need to establish whether there is a requirement to restore (improve) the habitat at the site or to maintain it.

The working group will examine if and how Member States have taken into account nitrogen impacts when setting conservation objectives and conservation measures for sites. It will look at methods used to set critical loads (and critical levels, where relevant) for Natura 2000 sites. It will then examine whether and if and how Member States establish the maximum level of nitrogen deposition that will not prevent achievement of the relevant conservation objectives for a site.

2. Introduction

There is widespread evidence of the impacts of nitrogen deposition on terrestrial habitats across Europe and particularly the Atlantic Biogeographic Region (Hicks *et al*, 2011, Nordin *et al*, 2011). Whilst a decline in nitrogen deposition is predicted under current legislative commitments, deposition levels will still exceed critical loads over large areas of the region (Dise *et al*, 2011).

In the UK, nitrogen deposition-driven changes in habitats have been demonstrated in broad-scale national surveys from the 1970s and 1980s (ROTAP, 2012). Dise *et al*, 2011, concluded that it is likely that biodiversity has been in decline in Europe for many decades due to enhanced nitrogen deposition. There remains evidence for ongoing temporal impacts (Stevens *et al*, 2011, Emmett *et al*, 2011), but the current condition of habitats in areas historically exposed to high nitrogen deposition may reflect earlier impacts of deposition. In some cases, these impacts will have occurred before site designation. However, because historic records providing detailed information on vegetation composition and plant and soil chemistry are very rare, we frequently do not know how habitats at individual sites have already changed (Stevens *et al*, 2009).

The Habitats Directive aims to achieve Favourable Conservation Status (FCS) of habitats and species of community interest. Member States are required to establish Special Areas of Conservation which, together with Special Protection Areas classified under the Birds Directive, form a coherent network of sites known as Natura 2000. The main objective of the

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network is to safeguard biodiversity in Europe. Member States have to take necessary measures to ensure FCS of the habitats and species of European importance.

The directive obliges Member States to set conservation objectives for sites and to establish the necessary conservation measures. Thus, they need to establish a desired state, or condition, for the habitat and species features on a site so that they contribute to FCS of the habitat/species as a whole.

Therefore, in setting objectives and conservation measures for habitats in Natura 2000 sites, Member States need to decide whether there is a requirement to restore (improve) the habitat or to maintain it.

In relation to this, it is important to know how nitrogen impacts have been considered when setting objectives for sites. Theoretically, where sites are sensitive to nitrogen and deposition is above “critical loads”, at least three scenarios can be envisaged:

- a habitat (or species) at a site has been impacted by nitrogen deposition and current objectives are to restore the habitat;
- a habitat (or species) has not been impacted by nitrogen deposition; objectives are to maintain the habitat, but the high deposition (in excess of critical loads) presents a risk of “damage” in the future;
- a habitat at a site has historically been impacted by nitrogen deposition, but nevertheless is still thought to be adequately meeting its objectives in respect of habitat structure and function and contributing to FCS. The objective is to maintain the habitat.

The workshop will seek to determine whether this reflects the real situation and consequently to find out in these contrasting situations how and if countries have established an ‘acceptable’ level of nitrogen deposition to a site (i.e. a level that will enable the feature to be maintained at, or restored to, favourable condition both now and into the future).

Alongside this, Member States in the region produce national maps of critical loads¹ (e.g. via National Focal Centres for Critical Loads). National mapping of critical loads is used in analysis for policy, such as the Convention on Long-Range Transboundary Air Pollution and the EU Thematic Strategy on Air Pollution. Additionally, in some cases, critical loads have been assigned to Natura 2000 sites. Amongst other things, these may be used to inform assessments of plans and projects (Article 6.3) and of conservation status (Article 17).

This working group will look at how objectives and conservation measures are set for habitats at Natura sites, mainly focussing on Annex I habitats, and whether and how nitrogen impacts have been taken into account directly or indirectly in this process. It will examine how Member States have set critical loads (and levels, if applicable) for Natura sites and how this relates to conservation objectives and conservation measures which are focussed on habitat structure and function. It will consider how Member States establish restoration (improvement) or maintenance requirements for a habitat at a site, whether in terms of

¹ A critical load is a “quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge”.

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habitat structure and species attributes, or functional attributes including measures of environmental quality. Finally, it will then explore if and how these aspects are used to determine a level of nitrogen deposition that will allow the required maintenance or restoration of a habitat. Theme 2 will consider the question of how that level of deposition is to be achieved via various measures and approaches, and how impacts can be mitigated via habitat management.

3. Objective of the working group

The objectives of this group are:

- **Objective 1:** To share experience of how countries have taken direct or indirect account of nitrogen deposition impacts when setting conservation objectives and conservation measures for interest features of Natura 2000 sites;
- **Objective 2:** To present, in brief, approaches to setting critical loads/levels for Natura sites and to explore the relationship with site conservation objectives based on habitat structure and function attributes;
- **Objective 3:** Finally, taking into account the previous two objectives, the group will look at if and how Member States have established what level of nitrogen deposition input is 'acceptable' given the conservation objectives.

From these objectives the group will establish examples of 'good practice' and recommend the issues to be taken into account in setting of, or evaluation of, objectives and critical loads.

Note that Working Group 1 will discuss how nitrogen deposition impacts have been taken into account in assessments of conservation status for Habitats Directive Article 17 reporting in 2013.

4. Discussion points and question

The objectives outlined above will be discussed in succession. The approach of the group will be to ask Member State representatives to outline their approach in the context of objectives 1 and 2 and addressing the discussion points below. Then the working group will explore the relationship between these two objectives and hear approaches from Member States in relation to objective 3 and the challenges this presents.

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4.1 Key discussion points for each objective

The key discussion points for each objective are as follows:

Objective 1

- Gather examples of Member States' approaches to setting conservation objectives.
- Consider whether realised, or potential, nitrogen deposition impacts affected the setting of conservation objectives, either directly or indirectly. This will include, for example, the question of whether they are influenced by what is realistically achievable.
- Establish if and how the objectives help determine whether nitrogen deposition should be reduced at a site, either to maintain the feature or restore it (improvement).
- Gather examples of Member States' approaches to establishing conservation measures.

Objective 2

- Briefly present how critical loads (and levels if applicable) have been applied to habitats at sites and how this relates to objectives for habitat structure/function attributes (see list of questions below).

Objective 3

- Based on these approaches which will be outlined by representatives of Member States, the group will look at how Member States have established what level of nitrogen deposition input is "acceptable" given the conservation objectives and what scientific and practical challenges this presents (including what is realistically achievable).

4.2 Questions about the application of critical loads and levels

There are a number of questions concerning the application of critical loads and levels which are relevant to this discussion and to objective 2. These are set out below, and Member State representatives are asked to address the questions, as far as they are able, when presenting their information to the working group.

4.2.1 Setting Critical Loads

- i) Have critical loads been established for Natura 2000 sites?
- ii) How are critical loads assigned to Annex I habitats at each site?
 - a) For example, are these based on the UNECE empirical nutrient nitrogen critical loads (Hettelingh & Bobbink 2011), a mass balance method or developed based on dynamic modelling?
 - b) Where empirical nutrient nitrogen critical loads are used:
 - how have they been assigned to Annex I habitats?
 - how have they dealt with the ranges (e.g. do they use the lowest because of the precautionary principle, or the average or something else)?
 - how is a critical load set for sensitive Annex I habitats for which there is no UNECE empirical critical load set for a EUNIS class which corresponds with the Annex I type?

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- c) For mass balance approaches:
 - how are these set and what critical threshold is used (and how is it related to habitat structure and function)?
- d) For dynamic modelling approaches:
 - provide brief details of the method used to establish critical loads based on dynamic models. In particular how have Member States defined what the desired objective is for a habitat, and how are these related to measures of conservation status (e.g. measures of habitat structure and function including species composition)? Do abiotic conditions at sites affect the critical load?
 - How do the resulting critical loads compare with empirical critical loads?
- iii) Have critical loads been set for species (e.g. Annex 2 and SPA bird species)? If so, what method is used?
- iv) How are critical loads for Natura 2000 sites (and Annex I habitats in the wider countryside, if applicable) mapped (e.g. how are they applied spatially within sites to reflect interest feature distribution in sites)?
- v) Are critical loads for Natura 2000 sites integrated with Member State's national maps of critical loads? Are they used in submission of maps for Natura 2000 areas to CCE for example?
- vi) For habitats which receive nutrients from water sources, e.g. fen habitats, how are these other sources of nitrogen inputs taken into account when assessing risk to the habitat and establishing the critical load itself?
- vii) Do Member States set separate critical loads for acidification or are acidification impacts considered in, for example, dynamic modelling approaches?

4.2.2 Setting Critical Levels

- i) Are ammonia and/or NO_x critical levels established for sites?
- ii) If ammonia critical levels are established for sites, when is the lower critical level used (1 μgm⁻³: for lichens and bryophytes or habitats in which they integral)?

4.2.3 Applying Critical Loads (and Levels)

- i) What are site based critical loads/levels used for (e.g. Article 6.3 assessments, Article 17 assessments, other)? (please note Article 6.3 and Article 17 will be discussed in detail by other working groups, in this group we just need an overview of when critical loads/levels are applied, not details of the method).
- ii) Does critical load exceedance at a site trigger an action/response or does this require "visual" impacts at a site, and if so, how is that attributed specifically to nitrogen deposition?

5. How the group will operate

Members of the group are invited to provide a short presentation on questions raised above on the linkages between nitrogen and nature policy. We request that Member States agree a representative for the working group who will provide such a presentation.

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A digital projector and power point will be provided. Presenters are encouraged to bring printed handouts of their presentation, so these can be circulated amongst the group. However, delegates may wish to make a more informal presentation for example, a short report, without the use of slides.

A representative of each Member State participating in the group will be asked to bring a short presentation addressing the points set out in Section 4.1 for each objective (and the specific questions on critical loads 4.2). Following the information gathering from presentations, the group will discuss the approaches in more detail. The group will draw out examples of good practice, discuss the scientific and technical challenges and approaches to overcome these, and establish critical outstanding research and policy questions.

6. References

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