

Sweden

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Summary

A Call for Data 2014-2015 on critical loads and biodiversity indicators was adopted by the Working Group on Effects at its 33rd session in Geneva in September 2014 and later issued by the Coordination Centre for Effects under ICP Modelling and Mapping with a delivery deadline of March 2015.

The aims of the Call for Data were: (1) to adapt the critical load database to the new longitude-latitude grid to ensure compatibility with EMEP depositions; (2) a possibility for the NFCs to update their national critical load data on acidity and eutrophication; (3) to apply novel approaches to calculate nitrogen and sulphur critical load functions taking into account their impact on biodiversity.

The Swedish NFC response answers to points 1 and 2 above. Our response consists of a re-gridding of the previously (2014) reported critical loads for acidity and re-gridding empirical critical loads established in 2014 by Swedish habitat experts at 3798 Swedish Natura 2000 sites. For acidity the calculations are based on lakes and apply for both lakes and their catchments, in the same way as in data submissions in 2012 and 2014. A database with the results of the new calculations is submitted simultaneously.

After the data submission in 2012, the Swedish and Norwegian NFCs realized a shift in exceedance of critical loads for acidity running along the Swedish-Norwegian border (Posch et al., 2012). The Swedish ecosystems appeared generally more sensitive than Norwegian ecosystems in the same geographical region. The two NFCs teamed up to compare the methodologies applied in respective country to explain the difference. Three key differences in the critical loads calculations were identified. The Swedish calculations considered more intense forestry practices than the Norwegian, making the Swedish forest ecosystems more sensitive. This has been re-evaluated already in the 2014 data submission and both 2014 and 2015 data submissions take

into account future forest harvesting on a lower level than the 2012 submission. The second main difference lays in the choice of target lake water alkalinity expressed as ANClimit. In Norway ANClimit is set to protect fish population while in Sweden it is set to protect also littoral invertebrates. Both the Swedish and Norwegian ANC criteria relates target ANC to estimated pre-historical ANC, however the Norwegian target ANC is never set higher than 50µeq/l while the Swedish target ANC could be much higher than that for lakes with historically high ANC. The third difference is in the application of the precautionary principle with regards to future nitrate leaching where Norway considers smaller long term immobilisation of nitrogen than Sweden. Several aspects of the different approaches are discussed in the joint Swedish-Norwegian report (see the annex to this national report).

Introduction

In Sweden the impact of air pollution on ecosystems is of major concern, both with respect to acidification and eutrophication of soils and waters. In response to the Call for data Swedish NFC re-gridded critical loads for acidity on lakes and empirical critical loads at Natura 2000 areas the 0.10°x0.05° degrees longitude and latitude grid. The submitted critical loads reflect our view on acceptable level of air pollution which – if not exceeded – provides sufficient level of protection of Swedish ecosystems from harmful effects of acidification and eutrophication due to N deposition. Due to that and due to limited availability of resources, the response does not also answer the part of the Call concerned with establishing critical loads based on biodiversity change.

Critical loads for acidity

In 2014 Sweden revised the calculations of critical loads for acidity in surface waters (Slootweg et al., 2014). In the current submission the same calculations are re-submitted in the new geographical grid. Relative to the 2014 submission, ecosystem area of each grid was re-assessed. Hereby submitted ecosystem area (ECOarea) is reduced by excluding of nine largest Swedish lakes (same as in 2014) along with densely populated areas and agricultural land. Thus the area assessed for critical loads of acidification (395 226 km²) is ca 88% of the total area of Sweden (449 964 km²).

Critical loads for acidity are based on calculations at 5084 lakes as described in CCE Status Report 2014 (Slootweg et al., 2014). For the grid cells with no assessed lakes in it we have used inverse distance weighting interpolation (IDW). IDW determines cell values using a linearly weighted combination of a set of sample points. The weight is a function of inverse distance. This method assumes that the variable being mapped decreases in influence with distance from its sampled location. Between 3 and 10 lakes within 30 km radius were considered for interpolation for each grid. For the grid cells with assessed lakes in it we have used the critical loads at these lakes. Geographical distribution of the areas most sensitive to acidification follow the same pattern as observed in previous CL submissions.

Re-gridding and slight adjustment of the ECOarea (see above) did not have a major impact on exceedance of critical loads. Preliminary calculation showed exceedance at about 8% of the considered ECOarea

compared to 9% based on 2014 critical loads submission (Slootweg et al., 2014).

Empirical critical loads

Empirical critical loads established at 82 habitats represented in 3798 Natura 2000 areas covering 58 688 km² (Figure SE.1) were re-gridded to the new coordinates without any other adjustments compared to the 2014 submission (Slootweg et al., 2014). Remaining 273 Natura 2000 areas of the total 4071 were not relevant in this context (caves, large lakes, marine ecosystems etc.).

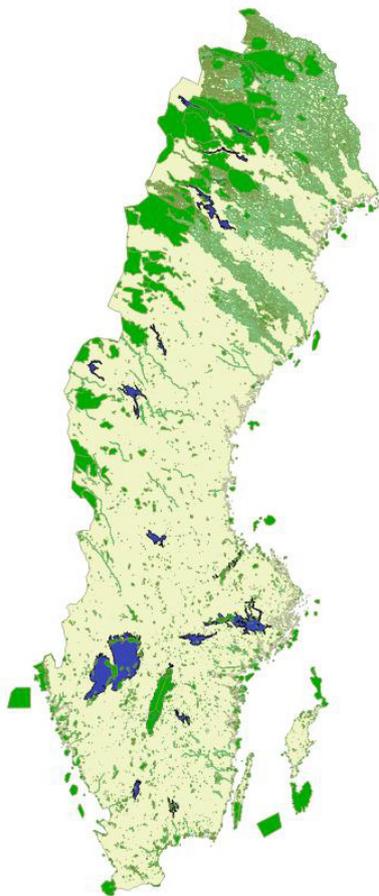


Figure SE.1. Map of Sweden showing geographical location of Natura 2000 areas in green.