

Für Mensch & Umwelt

Umwelt 
Bundesamt

36th ICP MODELLING & MAPPING MEETING

Review & Revision of Empirical Critical Loads for Nitrogen:

CCE introduction & Status of the Call for Data

Christin Loran, Thomas Scheuschner, Markus Geupel
Coordination Centre for Effects (CCE)
German Environment Agency

Web-Conference, 21 – 23 April 2020



Review & revision: Proposed schedule

Data collection	2019 / 2020
Drafting of the different sections (per class according to EUNIS)	2020 / 2021
Optimisation of first drafts after exchange between the contributing author	2021
Review of the second drafts by external expert team	2021
Finalisation of the background document on revised empirical Critical Loads	2021

Review & revision: Proposed schedule

Proposed schedule for the review & revision of empirical Critical Loads 2020/2021																									
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Month		01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12
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last update: 04.03.2020 / CCE																									
TF M&M Meeting / Workshop																									
UNECE / WGE																									

Review & Revision

- WHAT IS THE OBJECTIVE?

- WHAT HAS BEEN DONE SO FAR?
 - Preliminary literature review
 - First meeting in December 2019 in Dessau
 - Call for data

- WHAT ARE THE NEXT STEPS?

What is the objective?

Update of empirical Critical Loads for Nitrogen: Current empirical CLs are 10 years old

Bobbink & Hettelingh (2011):
Review and revision of
empirical critical loads and
dose-response relationships.

Table 1 Overview of empirical critical loads of nitrogen deposition ($\text{kg N ha}^{-1} \text{ yr}^{-1}$) to natural and semi-natural ecosystems (column 1), classified according to EUNIS (column 2), as originally established in 2003 (column 3), and as revised in 2010 (column 4). The reliability is qualitatively indicated by ## reliable; # quite reliable and (#) expert judgement (column 5). Column 6 provides a selection of effects that can occur when critical loads are exceeded. Finally, changes with respect to 2003 values are indicated in bold.

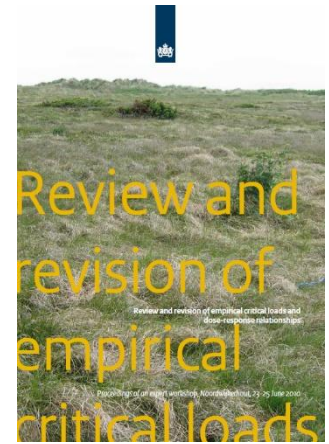
Ecosystem type	EUNIS code	2003 $\text{kg N ha}^{-1} \text{ yr}^{-1}$ and reliability	2010 $\text{kg N ha}^{-1} \text{ yr}^{-1}$	2010 reliability	Indication of exceedance
Marine habitats (A)					
Mid-upper salt marshes	A2.53		20-30	(#)	Increase in dominance of graminoids
Pioneer and low-mid salt marshes	A2.54 and A2.55	30-40 (#)	20-30	(#)	Increase in late-successional species, increase in productivity
Coastal habitats (B)					
Shifting coastal dunes	B1.3	10-20 (#)	10-20	(#)	Biomass increase, increased N leaching
Coastal stable dune grasslands (grey dunes)	B1.4 ^a	10-20 #	8-15	#	Increase in tall graminoids, decrease in prostrate plants, increased N leaching, soil acidification, loss of typical lichen species
Coastal dune heaths	B1.5	10-20 (#)	10-20	(#)	Increase in plant production, increased N leaching, accelerated succession
Moist to wet dune slacks	B1.8 ^b	10-25 (#)	10-20	(#)	Increased biomass of tall graminoids
Inland surface water habitats (C)^a					
Permanent oligotrophic lakes, ponds and pools (including soft-water lakes)	C1.1 ^c	5-10 ##	3-10	##	Change in the species composition of macrophyte communities, increased algal productivity and a shift in nutrient limitation of phytoplankton from N to P
Dune slack pools (permanent oligotrophic waters)	C1.16	10-20 (#)	10-20	(#)	Increased biomass and rate of succession
Permanent dystrophic lakes, ponds and pools	C1.4 ^d		3-10	(#)	Increased algal productivity and a shift in nutrient limitation of phytoplankton from N to P



What is the objective?

Update of empirical Critical Loads for Nitrogen

- add new relevant information from studies on the impacts of N on semi-natural ecosystems published since 2009
- **Scientific Focus of this review and revision to be defined**, could include the following research gaps identified in the last update (Bobbink and Hettelingh 2011):
 - More research on steppe, Mediterranean vegetation types, swamp forests, mires, fens, coastal habitats, etc.
 - Additional effort in allocation of N effects to appropriate EUNIS forest habitat subtypes
 - More rigorous guidelines for evaluation of new studies (estimation of deposition, confounding factors, statistics)
 - Possible differential effects of oxidized and reduced nitrogen





What has been done so far?

Data collection	2019 / 2020
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What has been done so far?

Data collection

2019 / 2020

Project coordinated by CCE: **Preliminary literature review**

Contractor: Thünen Institute of Forest Ecosystems (Anne-Katrin Prescher)

Duration: September – December 2019

Results of preliminary literature review

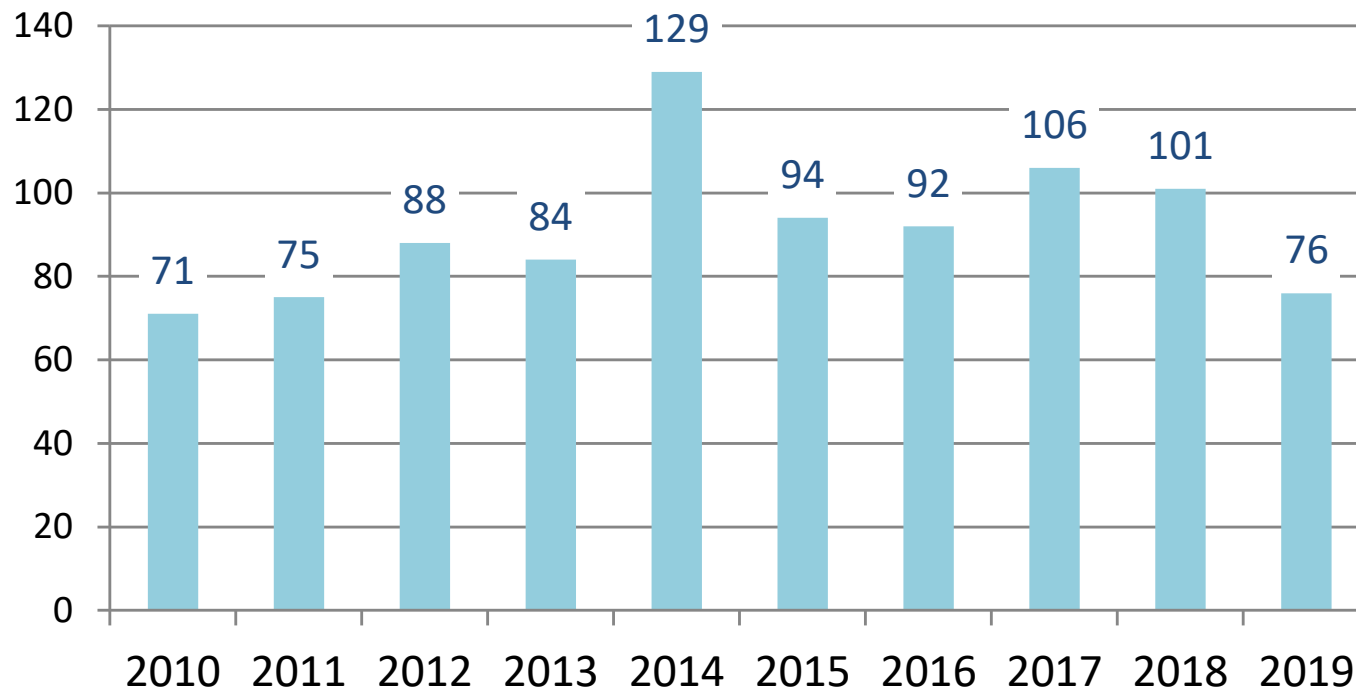
Conducted by Anne-Katrin Prescher (Thünen Institute)

- Literature for the time span 2010 – 2019
- Geographical boundaries: UNECE region
- Key words for searching literature
 - nitrogen/ ammonium/ nitrate/ nutrient
 - critical load/ limit/ level/ threshold
 - deposition/ air pollution/ immission
 - experiment/ observation/ simulation/ trial
 - fertilization/ addition/ treatment/ application
 - ecosystem/ habitat

Results of preliminary literature review

Conducted by Anne-Katrin Prescher (Thünen Institute)

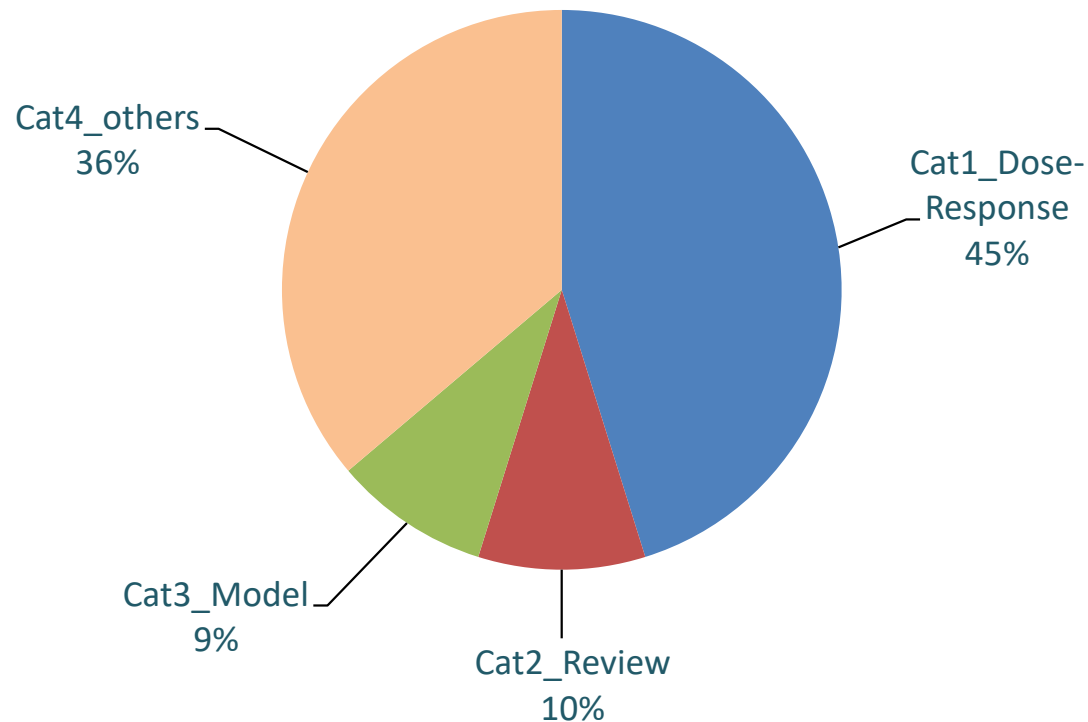
Number of Publications per Year



Results of preliminary literature review

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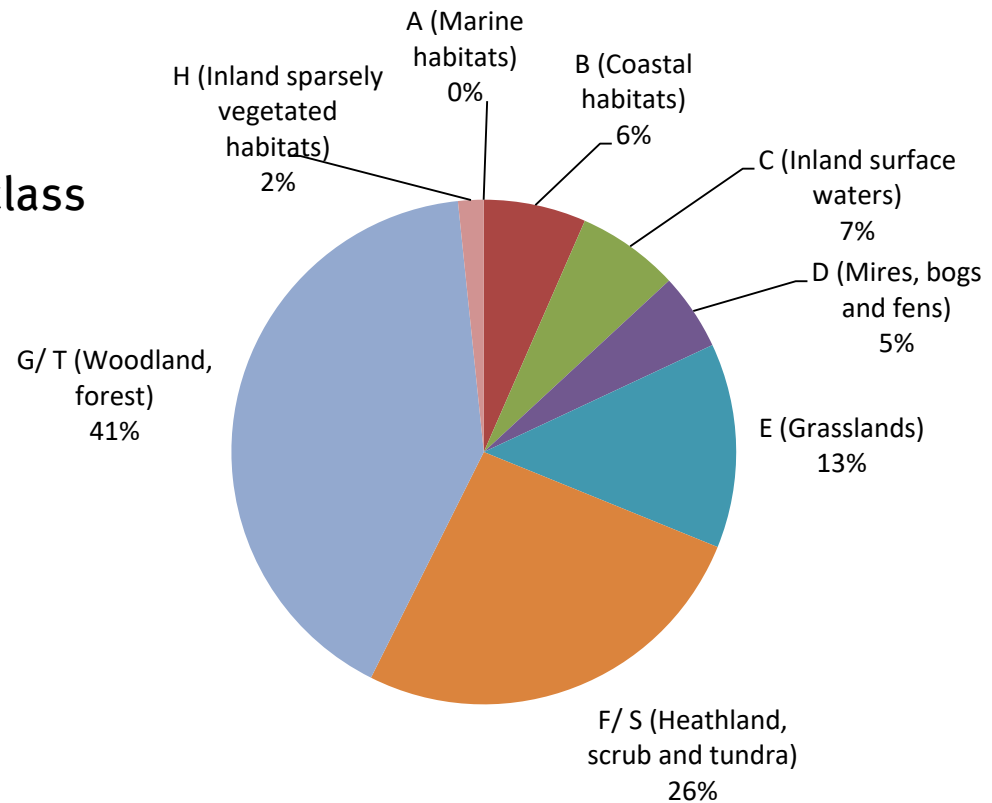
Publications per sorting category



Results of preliminary literature review

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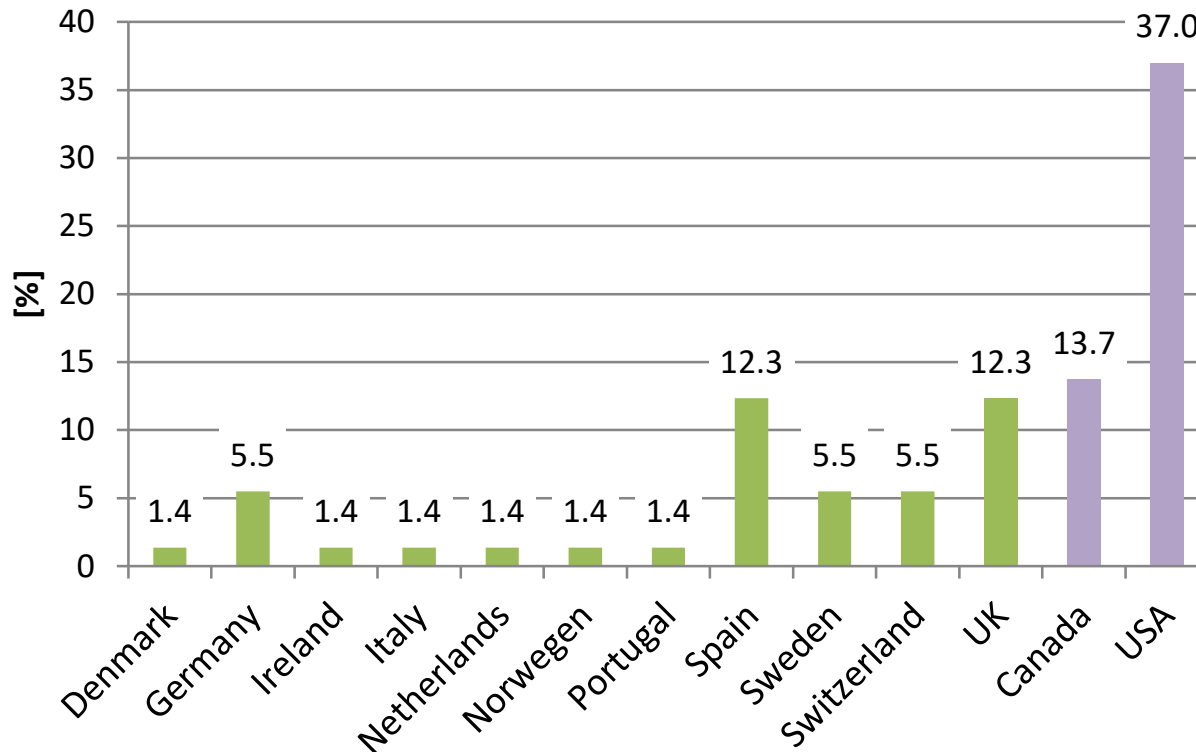
Publications per EUNIS class



Results of preliminary literature review

Conducted by Anne-Katrin Prescher (Thünen Institute)

Geographic coverage of study sites



Results of preliminary literature review

Deliverables / Results

- Findings of the preliminary literature review are summarized in a document which is / will be available on the [CCE HOMEPAGE](#) (ACTIVITIES › PROJECTS › EMPIRICAL CRITICAL LOADS: LITERATURE REVIEW)
- Endnote database containing the publications

Final project meeting = preparatory meeting

- in Dessau on 2nd December 2019
- Participants: Markus Geupel, Christin Loran, Thomas Scheuschner (all CCE / UBA), Anne-Katrin Prescher (Thünen Institute), Kai Schwärzel (ICP Forests), Roland Bobbink
- Participants via phone: Alice James (Chair ICP M&M), Harry Harmens (ICP Vegetation), Reto Meier (BAFU/ NFC ICP M&M Schweiz)
- Objective: Discussion on the approach for the process

Results of preliminary literature review

EUNIS – European Nature Information System

7 categories of interest

- A. **Marine habitats** [includes saltmarshes]
- B. **Coastal habitats** [dunes, shingle, rock/cliffs]
- C. **Inland surface waters** [standing waters; running waters including springs; swamps]
- D. **Mires, bogs and fens** [bogs, fens/flushes]
- E. **Grasslands and lands dominated by forbs, mosses or lichens** [dry and wet grasslands; montane grass/sedge heaths and snowbeds; various tall-herb vegetation types; parkland]
- S. F. **Heathland, scrub and tundra** [dwarf-shrub and *Dryas* heaths; hazel, juniper and most willow (including *S. herbacea*) scrub/woodland; hedgerows]
- T. G. **Woodland, forest and other wooded land** [broad-leaved and conifer woodland and plantations; excludes parkland (E) and some scrub types (F)]
- H. Inland unvegetated or sparsely vegetated habitats [rock/cliffs, scree, caves]
- I. Regularly or recently cultivated agricultural, horticultural and domestic habitats
- J. Constructed, industrial and other artificial habitats
- X. Habitat complexes

Results of preliminary literature review

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Outcome of the meeting:

- The whole process will be structured regarding the identified / relevant EUNIS classes
- To broaden the literature review and data base for the determination of empirical CL it can be useful including **gradient studies, survey studies and studies from non-European study sites** if respective EUNIS class is covered (these type of studies were not included in the former literature review)
- ICP Vegetation and ICP Forests intend to contribute with their expertise
- Cost for the last revision in 2010 was approx. 130.000 € and was financed by Netherlands, Switzerland and Germany

Call for Data (CfD): Empirical Critical Loads

1st April 2020:

- short report answering the questions from the CfD in order to prepare the review of the process of empirical CLs
 - **Thank you very much for the concise reports from Austria, Belgium (Flanders), Ireland/Canada, Norway, Switzerland, UK**

1st March 2021:

- report shall contain national findings – originated from experiments or research work – on dose-response relationships which are likely to be included within the review of on empirical CLs
- literature review should summarize the national, scientific state of the art, available data and a recommendation for revision depending on the results of the assessment

What are the next steps?

Work Package	Objective of WP	Duration	Main Responsible Body / Person	Suggested authors
WP 1	Coordination of the process to review and revise empirical critical loads		CCE	
WP 2	Data Collection	09/2019 - 12/2019	Thünen Institute / CCE	
WP 3	Drafting the section chapters	09/2020 - 11/2020		
WP 3.1	Chapter - Introduction	09/2020 - 11/2020	BAFU, B-Ware, CCE	Experts CH, NL, D (CCE)
WP 3.2	Chapter - Updating procedure for empirical nitrogen critical loads	asap (before kick-off)	B-Ware, CCE	Experts NL, D (CCE)
WP 3.3	Chapter - Effects of nitrogen deposition on marine habitats (EUNIS class A)	09/2020 - 11/2020	B-Ware	Experts NL, UK
WP 3.4	Chapter - Effects of nitrogen deposition on coastal habitats (EUNIS class B)	09/2020 - 11/2020	B-Ware	Experts NL, UK
WP 3.5	Chapter - Effects of nitrogen deposition on inland surface waters (EUNIS class C)	09/2020 - 11/2020	???	Experts NL, UK
WP 3.6	Chapter - Effects of nitrogen deposition on mires, bogs and fens (EUNIS class D)	09/2020 - 11/2020	BAFU	Experts CH, NL, UK
WP 3.7	Chapter - Effects of nitrogen deposition on grasslands and lands dominated by forbs, mosse or lichens (EUNIS class E)	09/2020 - 11/2020	BAFU	Experts CH, N, NL, UK
WP 3.8	Chapter - Effects of nitrogen deposition on heathland, scrub and tundra (EUNIS class S)	09/2020 - 11/2020	BAFU	Experts CH, NL, UK
WP 3.9	Chapter - Effects of nitrogen deposition on woodland, forest and other wooded land (EUNIS class T)	09/2020 - 11/2020	BAFU	Experts A, CH, N, NL, SE, UK
WP 3.10	Chapter - Synthesis, conclusions and gaps in knowledge	12/2020 - 01/2021	B-Ware, CCE	All experts

What are the next steps?

WP 4	Internal review round	12/2020 - 01/2021	B-Ware	Experts
WP 5	External review round	02/2021 - 04/2021	B-Ware	Experts
WP 6	Progress report for WGE (for the 7th joint Session)	05/2021	CCE	CCE
WP 7	Finalization of the background document	06/2021 - 07/2021	B-Ware, CCE	Experts
WP 8	Scientific Publication	08/2021 - 10/2021	B-Ware, CCE	Experts
WP 9	Further Publications (CCE Report, Mapping Manual)	08/2021 - 10/2021	CCE	CCE
WP 10	TF Meeting Modelling & Mapping in Stockholm (21-23.4.2020) - Discuss detailed project approach, expert groups, discuss to publish special issue in scientific journal	04/2020	CCE	CCE
WP 11	TF Meeting M&M / Expert workshop - Determination of the revised critical loads	04/2021	CCE	CCE
WP 12	Expert workshop - Kickoff Meeting Project	08/2020	CCE, B-Ware	
WP 13	Expert workshop - Determination of the revised critical loads	05/2021		
WP 14	Adoption by W G E	12/2021	CCE	CCE

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WP 3.5	Chapter - Effects of nitrogen deposition on inland surface waters (EUNIS class C)	09/2020 - 11/2020	???	Experts NL, UK
WP 3.6	Chapter - Effects of nitrogen deposition on mires, bogs and fens (EUNIS class D)	09/2020 - 11/2020	BAFU	Experts CH, NL, UK
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Questions?

- Are there more NFCs / Experts who would like to contribute to the process (with expertise or funding)?
 - NFC Belgium (Flanders), NFC Ireland which submitted a response to the CfD?
 - NFCs which have not submitted a response but would still like to contribute?
- Proposed time schedule: is it feasible for the NFCs/Experts?
- Funding: Estimated minimum cost 130.000 €
 - Funds available from CCE: in 2019 approx. 45.000 €, in 2020 not yet known
 - Which NFC can contribute to the funding?
- Do we want to publish the results as a Special Issue in a scientific journal?
- Further questions???