Database Report

Report on technical changes in 2025

ICP Forests Database Report under the UNECE Convention on Long-range Transboundary Air Pollution (Air Convention)

United Nations Economic Commission for Europe (UNECE)
Convention on Long-range Transboundary Air Pollution (Air Convention)
International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests)

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CONTENTS

INTRODUCTORY REMARKS

This document is supposed to give a quick overview of relevant database changes in year 2025, as well as changes in the online documentation. Editorial changes (e.g. language improvements) are not mentioned here.

For content-related issues and decisions which require specialist knowledge, decisions were made in agreement between the PCC of ICP Forests and corresponding Expert Panel chairs.

Please take into consideration, that this report can represent just an intermediate status.
The current specifications are always documented under: https://icp-forests.org/documentation.

LITTERFALL (LEVEL II)

Form LFD (Dry weights)

https://icp-forests.org/documentation/Surveys/LF/LFD.html

New fraction in code_sample

- **Fraction 18.0**: Category for the mixed (and unsorted) rest of litterfall samples. This category should be used if some litter remains that cannot be sorted into any of the other available categories. This can be the case for example, if the required minimum quantity is not reached, or if it is not possible to separate the tree species.
  Together with the other submitted fractions of the respective collection period, this rest should sum up to total litterfall.
  dictionary: https://icp-forests.org/documentation/Dictionaries/d_litter_sample.html
  EI 212: https://icp-forests.org/documentation/Explanatory_Items/212.html

Form LFC (Chemical analysis)

https://icp-forests.org/documentation/Surveys/LF/LFC.html

New attribute

- **ref_temp**: New attribute for reporting concentrations based on divergent drying temperatures (in centigrade, C°).
  The use of other temperatures than 105°C is not recommended, however possible now.

DEPOSITION (LEVEL II)

Forms DEM (Deposition measurements)

https://icp-forests.org/documentation/Surveys/DP/DEM.html

New attribute

- **N_NO3_plus_N_NO2**: Sum of N-NO3 and N-NO2 (in mg/L).. It is recommended to report N-NO3 and N-NO2 separately. If, however for technical reasons, these values can be measured only together, use this attribute for the submission.

SOIL SOLUTION (LEVEL II)

Forms SSM (Soil solution measurements)

https://icp-forests.org/documentation/Surveys/SS/SSM.html

New attributes

- **N_NO2**: New attribute for N-NO2 (in mg/L)
- **N_NO3_plus_N_NO2**: Sum of N-NO3 and N-NO2 (in mg/L). It is recommended to report N-NO3 and N-NO2 separately. If, however for technical reasons, these values can be measured only together, use this attribute for the submission.

SOIL (LEVEL I AND II)

Integration of new WRB 2022 publication

Forms PRF (Soil profile description)

https://icp-forests.org/documentation/Surveys/SO/PRF.html | https://icp-forests.org/documentation/Surveys/S1/PRF.html

Changed dictionaries

- **d_wrb_pub**: The new WRB 2022 is available in different language versions in the dictionary d_wrb_pub. This dictionary is used in attribute code_wrb_publication. Following wrb versions have been added in regard to WRB 2022:

22ca	WRB 2022 Catalan version, Update 2024
22en	WRB 2022 English version, Update 2024
22es	WRB 2022 Spanish version, Update 2024
22fr	WRB 2022 French version, Update 2024
22it	WRB 2022 Italian version
22po	WRB 2022 Portugese version, Update 2024

https://icp-forests.org/documentation/Dictionaries/d_wrb_pub.html

- **d_soil_adjective**: The WRB 2022 publication is accompanied by a modified set of qualifiers (refers to attributes code_wrb_qualifier_[1-6]).
  Following qualifiers have been added:

at	Activic	**iy**	Inclinigleyic	**lh**	Litholinic	**qq**	Protogypsic
bc	Biocrustic	**jb**	Hypergarbic	**ln**	Limonic	**qy**	Protogleyic
cd	Cordic	**jj**	Hyperspolic	**mc**	Mochipic	**sh**	Saprolithic
cq	Claric	**jq**	Hypergeric	**mm**	Mulmic	**sv**	Solimovic
cs	Coarcic	**jx**	Hyperurbic	**nb**	Neobrunic	**th**	Thyric
ds	Dorsic	**ka**	Kalaic	**nr**	Naramic	**ts**	Tsitelic
ep	Epic	**kh**	Skeletohistic	**pb**	Panpaic	**wa**	Wapnic
ip	Isopteric	**ko**	Skeletofolic	**pq**	Pelocrustic		
iw	Inclinistagnic	**kt**	Skeletotransportic	**qk**	Protokalaic		

  Following qualifiers have changed their meaning in WRB 2022 ([old name]->[new name]):

ad	Aridic -> Arenicolic	**gf**	Gypsifractic -> Gypsofractic
at	Anthrotoxic -> Activic	**jk**	Hyperskeletic -> Ejectiskeletic
co	Colluvic -> Cohesic	**py**	Petrogleyic -> Pyric
ed	Epidystric -> Endic	**tt**	Technolithic -> Technotephric

  The complete list with all qualifier symbols and their validity in relation to the WRB version can be found here:
  https://icp-forests.org/documentation/Dictionaries/d_soil_adjective.html

- **d_soil_specifier**: This dictionary refers to attributes code_wrb_spezifier_[1-6].
  Following specifier has been added in regard to WRB 2022:

y	Poly-

  The complete list with all specifier symbols and their validity in relation to the WRB version can be found here:
  https://icp-forests.org/documentation/Dictionaries/d_soil_specifier.html

- **d_wrb_diagnostics**: This dictionary refers to the attributes diagnostic_[1-10].
  Following new diagnostic horizons, properties and materials have been added:

hco	Cohesic horizon	**may**	Aeolic material	**mth**	Organotechnic material
hln	Limonic horizon	**mcq**	Claric material	**ptg**	Protogypsic properties
hpb	Panpaic horizon	**mmm**	Mulmic material		
hts	Tsitelic horizon	**msv**	Solimovic material		

  Following diagnostic horizons and materials won't be available anymore from survey year 2025 onwards:

ham	Anthric horizon	**hvo**	Voronic or Chernic horizon
hfu	Fulvic horizon	**hye**	Yermic horizon
hml	Melanic horizon	**mco**	Colluvic material
hty	Takyric horizon		

  https://icp-forests.org/documentation/Dictionaries/d_wrb_diagnostics.html

- **d_humus**: This dictionary refers to the attribute code_humus.
  Following new humus codes have been added:

10	Tangel	**13**	Fibrimoor
11	Saprimoor	**14**	Amphimoor
12	Mesimoor		

  Following humus codes won't be available anymore from survey year 2025:

6	Histomull	**8**	Histomor
7	Histomoder	**9**	Histoamphi

  https://icp-forests.org/documentation/Dictionaries/d_humus.html

Mandatory attribute

- **code_humus**: The reporting of the humus system is mandatory (if unknown specify code 99).

Forms PFH (Soil profile horizons)

https://icp-forests.org/documentation/Surveys/SO/PFH.html | https://icp-forests.org/documentation/Surveys/S1/PFH.html

Changed dictionaries

- **d_soil_structure**: For the specification of attribute code_soil_structure there are new additional codes available:

11	Lenticular	**14**	Pseudosand / Pseudosilt
12	Polyhedral	**15**	Stratified
13	Flat-edged	**16**	Cloddy

  This soil structure code won't be available anymore from survey year 2025 onwards:

7	Crumbly

  https://icp-forests.org/documentation/Dictionaries/d_soil_structure.html

Changed test

- **horizon_subordinate**: With the new WRB 2022 even more characters can be used to specify the subordinate horizon. Almost all alphabetic characters have received a specific meaning; as well as a number of Greek letters and also some uppercase letters are part of the new set. Due to this large number of possible characters, a corresponding test to limit these characters is no longer useful. Nevertheless, the following still applies:
  - Remove blank spaces.
  - Duplicate characters will rise an error.

  A list of all currently available symbols for subordinate horizons and their explanation is listed in the new Explanatory Item EI 134.

New attribute

- **code_hor_master_prefix**: This prefix allows you to specify certain biological properties important in the functioning of the master horizons of the humus profile. They are multiple-letter symbols as used by Zanella et al. (2018 or 2022) and can be added to the O, H and A horizons. All available codes are listed in the new dictionary d_hor_master_prefix.

New dictionary

- **d_hor_master_prefix**: A new dictionary that provides the available codes for the new attribute code_hor_master_prefix. This is the dictionary's content:

Code	Name	Description	For master horizon
n	new	new litter (age<1year), neither fragmented nor transformed/discoloured leaves and/or needles	OL
v	vetustus, verändert, verbleicht or viellie	old litter (age>3 months), slightly altered, discoloured, bleached, softened up, glued, matted, skeletonized, sometimes only slightly nibbled by fauna	OL
zo	zoogenic		OF, OH, HS, A
noz	non-zoogenic	To the naked eye, or with the help of a hand lens, this horizon does not show relevant signs of animal activity (absence of burrows; droppings, mucus coatings, animal remains, etc. < 5% of soil volume). Zoological agents are not involved in soil aggregation. Fungus- and root-derived aggregates can be visible.	OF, OH, HS, A
szo	slightly zoogenic		OH
l	limnic	HS horizon with a high percentage of mineral particles (clay, silt and sand). The mineral fraction is more than 50%. The mineral component may occur in the form of thin layers. The bioactivity is comparable to szoH	HS
ma	biomacrostructured	mixed biogenic organo-mineral peds dominate	A
me	biomesostructured	composed of coloured organic (dark) or/and organo-mineral biogenic peds	A
mi	biomicrostructured	composed of fine mineral grains mixed with fine organic particles and dark-coloured biogenic peds (holorganic or hemiorganic)	A
sg	single grain structure	entirely non-coherent (e.g., loose sand), biological aggregation absent or involving less than 5% of the soil volume	A
ms	massive structure	material is a coherent mass (but not necessarily cemented), biological aggregation absent or involving less than 5% of the soil volume	A
an	actinomycetes	Histic organo-mineral horizon, mostly formed by microorganisms (actinomycetes), dark coloured, with plastic and massive structure, both high and low base saturation is possible	A

https://icp-forests.org/documentation/Dictionaries/d_hor_master_prefix.html

CROWN CONDITION (LEVEL I AND II)

TRC/TRE (Crown condition), TRD/TRF (Damages)

https://icp-forests.org/documentation/Surveys/CC/TRD.html | https://icp-forests.org/documentation/Surveys/CC/TRD.html
https://icp-forests.org/documentation/Surveys/C1/TRE.html | https://icp-forests.org/documentation/Surveys/C1/TRF.html

The introduction of the attribute "tree damage status" was completed. The project started back in 2023 and involves much more than simply adding a new attribute. Main objective was to avoid double-coding of contradicting tree information (e.g. dead and alive, or damaged and undamaged). For this reason, a unique tree damage status was created in form TRC/TRE for each tree, applicable to both new and old data. The place to report dead trees shifted from the Damages table (TRD/TRF) to the main Crown Condition table (TRC/TRE).
The main challenge was to fill the tree damage status for the past data and to clarify data gaps and uncertainties as much as possible. Also, many tests have been revised to better reflect the Manual and to prevent the uploading of contradictory data as far as possible.

More details are listed in the attached specific change report, which was also sent to all Crown Expert partners. The report attached here is the updated version from 29.01.2026.

In addition, we would like to draw your attention to the new Explanatory Item EI 320, which clearly lists all available combinations of removal code, damage status and defoliation. It that can be very helpful for submissions and answer one or two questions.

Crown database changes (Level I and II) – Introduction of tree damage status as of 12.12.2025

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Why (rationale)

- Avoid double-coding of contradicting tree information (e.g. dead and alive, or damaged and undamaged)
- Create a unique tree damage status for each tree, applicable to both new and old data
- Make future analyses of the data easier

What were the database changes?

- New mandatory attribute "code_tree_damage_status" in the crown condition form (C1.TRE / CC.TRC) (introduced already in 2023)
- Initial filling of the tree damage status for all previous years on behalf of a decision tree, see Annex a)
- Recoding of affected_part 4, see Annex b)
- Update and amend plausibility tests to prevent the submission of contradictory data (C1 Tests, CC Tests)
- Clean up contradictory data and gapfilling, see Annex c)

You need to know for your submissions:

- From 12.12.2025 on, you can use only the new variable/attribute "code_tree_damage_status" in C1.TRE / CC.TRC to determine the damage status of the tree. This replaces the former way via "affected_part" (in C1.TRF / CC.TRD). Code_affectpart 0, 4 and 9 are no longer valid codes in affected_part, and have been shifted to code_tree_damage_status, see Figure 1.

Fig 1: Code_affectpart 0,4 and 9 are no more available after 12.12.2025

CODE	DESCRIPTION
-9	No information provided
0	No symptoms on any part of tree
4	Dead tree
9	No assessment
11	Current needle year
12	Older needles

- Please note that affected part code -9 ("No information provided") is a relic and can no longer be used since survey year 2009.
- In contrast to before, only trees for which damage has been observed need to be present in the damage assessment form (C1.TRF / CC.TRD). So this concerns all trees with Tree damage status 1 ("damage or symptoms observed") and Tree damage status 4 ("dead tree"). However, cut and removed trees (RM codes 11-19) must not be reported in the damage files C1.TRF / CC.TRD.
  It is still possible to report several symptoms/causes of damage for the same tree in C1.TRF / CC.TRD.
  For Tree damage status 0 ("Alive tree, no symptoms") and 9 ("no damage assessment") no damage report can be submitted. The following table gives an overview of the new situation:

Tab 1: Codes of tree damage status and their relation to damage assessment (active since 12.12.2025)

Code	Description of tree damage status	Damage assessment (C1.TRF / CC.TRD)
0	Alive tree, no symptoms on any part of the tree	No damage symptoms or causes should be submitted
1	Alive tree, damage symptoms observed	It is mandatory to submit the observed symptoms and/or causes
4	Dead tree	It is mandatory to submit cause of death and/or symptoms* – except for cut and removed trees (RM codes 11-19)
9	No damage assessment	No damage symptoms or causes should be submitted

* For standing dead trees without any particular symptom we recommend to report this: affected_part 34, symptom 14 and cause 999

- You do not need to resubmit old data in connection with this implementation. The Tree damage status was filled in by PCC in agreement with the EP chairs (see Annex a). However, you may be asked to resubmit your past data if there are data conflicts that cannot be resolved by us.

ANNEX

a) Decision tree for the determination of tree damage status in the past data:

The decision tree as shown below was used to systematically determine the tree damage status of trees in the past data. The decision tree is based on the attributes code_affectpart, code_removal and code_defoliation, and for a few cases also symptoms/causes were included.

It can happen, that the damage status remains unclear (dead or alive? | damaged or undamaged?) and therefore will be stated with -9 ("No consistent information" – please note that this code only is applicable for old data). Cases with clearly contradictory data (see "!" in column data conflict) still need to be cleaned in the database – this is not implemented yet.

Read the table like this:

1st line: If in the past data the affected_part is 4 ("dead tree") AND the removal code is in category "standing dead" or "cut and removed" AND also code_defoliation is 100%, then the tree is clearly dead and will receive tree damage status 4 ("dead").

2nd line: If the affected_part is 4 ("dead tree") AND the removal code is in category "standing dead" or "cut and removed", but code_defoliation is 0-99 ("living"), then there is a data conflict between living and dead. The tree damage status will be -9 ("No consistent information") in order to prevent uncertainties, and we will check later on if it is possible to solve the data conflict.

Tab 2: Decision tree to determine the tree_damage_status of past data (Level I and II)

AFFECTED_PART	CODE_REMOVAL	CODE_DEFOLIATION	TREE_DAMAGE_STATUS	DATA CONFLICT
Dead tree (code 4)	**dead** (11-19, 31-39)	**dead** (100)	4	
		living (0-99)	-9	!
		no info (-1, NULL)	4	
	living (0-8, 21-29)	**dead** (100)	-9	!
		living (0-99)	-9	!
		no info (-1, NULL)	-9	!
	living or dead (41-49)	**dead** (100)	4	
		living (0-99)	no cases found	
		no info (-1, NULL)	4	
	no info (-99)	**dead** (100)	4	
		living (0-99)	-9	!
		no info (-1, NULL)	4	
	missing value (NULL)	**dead** (100)	4	
		living (0-99)	no cases found	
		no info (-1, NULL)	no cases found	
Specific affected parts (code >9)	**dead** (11-19, 31-39)	**dead** (100)	4	
		living (0-99)	-9	!
		no info (NULL)	4	
	living (0-8, 21-29)	**dead** (100)	-9	!
		living (0-99)	1	
		no info (-1, NULL)	1	
	living or dead (41-49)	**dead** (100)	4	
		living (0-99)	1	
		no info (-1, NULL)	-9	
	no info (-99)	**dead** (100)	4	
		living (0-99)	1	
		no info (-1, NULL)	-9	
	dead (11-19, 31-39)	**dead** (100)	4	
		living (0-99)	-9	!

AFFECTED_PART	CODE_REMOVAL	CODE_DEFOLIATION	TREE_DAMAGE_STATUS	DATA CONFLICT
No symptoms on any part the tree (code 0)		**no info** (-1, NULL)	4	
	living (0-6)	**dead** (100)	-9	!
		living (0-99)	0	
		no info (-1, NULL)	0	
	living, not assessed (7-8,21-29)	**dead** (100)	-9	!
		living (0-99)	9	
		no info (-1, NULL)	9	
	living or dead (41-49)	**dead** (100)	4	
		living (0-99)	-9	
		no info (-1, NULL)	-9	
	no info (-99)	**dead** (100)	4	
		living (0-99)	0	
		no info NULL	-9	
No assessment (code 9)	**dead** (11-19, 31-39)	**dead** (100)	4	
		living (0-99)	4	
		no info (-1, NULL)	4	
	living (0-8, 21-29)	**dead** (100)	-9	!
		living (0-99)	9	
		no info (-1, NULL)	9	
	living or dead (41-49)	**dead** (100)	4	
		living (0-99)	9	
		no info (-1, NULL)	-9	
	no info (-99)	**dead** (100)	4	
		living (0-99)	9	
		no info (-1, NULL)	9	
No information provided (code -9)	**dead** (11-19, 31-39)	**dead** (100)	4	
		living (0-99)	-9	!
		no info (-1, NULL)	4	
	living (0-8, 21-29)	**dead** (100)	-9	!
		living (0-99) - no symptoms/causes	-9	
		living (0-99) - with symptoms/causes	1	
		no info (-1, NULL) - no symptoms/causes	-9	
		no info (-1, NULL) - with symptoms/causes	1	
	living or dead (41-49)	**dead** (100)	4	
		living (0-99)	-9	
		no info (-1, NULL)	-9	
	no info (-99)	**dead** (100)	4	
		living (0-99) - no symptoms/causes	-9	
		living (0-99) - with symptoms/causes	1	
		no info (-1, NULL)	-9	
No damage assessment for this tree	**dead** (11-19, 31-39)	**dead** (100)	4	
		living (0-99)	-9	!
		no info (NULL)	4	
	living (0-8, 21-29)	**dead** (100)	-9	!
		living (0-99)	9	
		no info (-1, NULL)	9	
	living or dead (41-49)	**dead** (100)	4	
		living (0-99)	-9	
		no info (-1, NULL)	-9	
	no info (-99)	**dead** (100)	no cases found	
		living (0-99)	-9	
		no info (-1, NULL)	-9	

b) Recoding of affected part for dead trees (in TRF/TRD)

In damage assessment files (TRF/TRD) code 4 was formerly used in the affected_part for the dead trees, and other attributes (such as symptom, description etc.) were added to describe the cause of death for this tree. Since affected part code 4 has been moved to the new parameter Tree damage status, code 4 is no more available now in TRF/TRD. Therefore we needed to define another affected part code for these dead trees, based on the information available from other attributes. However, there is lack of information, and we cannot tell for sure which part of the tree is exactly affected by the death cause or symptom. As a result, for the majority of dead trees, the affected part is recoded as -9 (No information provided). Please note that affected part -9 cannot be submitted by the data providers, it is merely a technical database code that fills a gap here.

However, for some organisms, such as *Heterobasidion*, the affected part could be clearly assigned: *Armarilla* and *Heterobasidion* species affect the roots, *Cronartium /Endocronartium* species affect the top of the crown/stem and some *Ips*, *Phellinus* and *Fomes* species affect the bole.

c) Minor data clean ups

1. TRF/TRD: Resolve contradictions within one line (undamaged/unassessed vs symptoms/causes)

Description: Some trees were submitted with contradicting information: the affected part had either the code 0 ("No symptoms on any part of tree") or 9 ("No assessment"), standing for an undamaged or unassessed tree, while some symptoms or causes were submitted for the same tree in the same line.

Solution: Set code_affectpart to -9 (No consistent information) in these cases (1257 records affected in C1, 4385 in CC)

2. TRF/TRD: Resolve contradictions across several lines referring to the same tree and date

Description: There is an “empty” line with affected part 0 ("No symptoms on any part of tree") or 9 ("No assessment") and there is also another line for the same tree and same day reporting a symptom or cause.

Solution: Remove the "empty"-lines from TRF (affects 1471 records in C1, 1222 in CC)

There are few more cases with contradictory data in the database left (see “!” in Tab. 2). They still need to be cleaned and we may ask for your support if they cannot be resolved by us alone.

3. Gapfilling of code_removal in CC:

Description: In 308.465 lines of TRC the removal code (RM) was missing.

Solution: The gaps were filled according to following rules (only applied if code_removal is empty):

- RM code 2 (ingrowth trees): If the first report year of a tree (e.g. 2004) occured after the first report year of the plot as a whole (e.g. 1996), then it counts as an ingrowth tree (only for the first year) (applied to 8941 trees)
- RM code 1: alive trees with defoliation of 0-99% (applied to 290838 trees)
- RM code 38: dead trees with defoliation 100% (applied to 2390 trees)
- RM code -99: trees with unknown defoliation - RM unclear (applied to 6296 trees)

4. Removal of empty lines in C1_TRF and CC_TRD:

In damage assessment files (TRF/TRD) code 0 and 9 was formerly used in the affected_part for undamaged and unassessed trees. These lines were practically empty except for the information of code 0 and 9 itself. Since affected_part code 0 and 9 has been moved to the new parameter Tree damage status, the lines are not needed anymore in TRF/TRD. Therefore, all rows with affected part 0 and 9 have been removed: 1.197.371 records in TRF and 342.856 records in TRD.