Norwegian Institute for Water Research

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Task 2a: Comparison of typologies

Bottom-up approach

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Compiled by:

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Contents

1. Introduction

1.1.Background

From the assessment of the River Basin Management Plans (RBMPs) and work undertaken in the intercalibration process it is clear that a range of methods have been used by Member States (MSs) to determine types of water bodies. The methods used to identify types range from statistical analysis to expert judgment , and types have not always been validated by biological data. In some cases there is no information on how types have been identified. There are a very large number of national types (2646), and the links between the national types and the common intercalibration types are often missing or is unclear, for example when one national type is reported to be linked to several of the common intercalibration types. The translation of intercalibration results for the common intercalibration types to the national types is therefore not straightforward. There are questions as to whether typologies are ecologically relevant and whether ecological status assessments are really comparable across Europe.

1.2.Objective

The objective of the bottom-up approach for typology assessment is to assess similarities between national types across MSs based on the type factors and ranges of the different factors used by MSs in their national typologies. The links to the common intercalibration (IC) types will also be assessed. A limited number of commonly shared types will be identified and described based on the analyses of similarities in type factors and ranges between the national types.

1.3.Content of report

The content of the report includes a description of the datasets and the analytical methodology adopted, followed by an overview of the national types and links to the IC types, and details of the typology factors and ranges used for the national types where data are available. The final part of the report presents the similarities among national types based on the most commonly used type factors and ranges, and presents a limited number of clusters of national types with high similarities for rivers and lakes. The report ends with some conclusions and suggestions on the way forward to improve comparability of national types.

2. Data sources and methodology

2.1.Data sources

2.1.1 WISE WFD data

The primary source of information was the WISE WFD master database, last updated 04.06.2012, containing the electronic RBMP data reported by MSs. An MS Access version of the WISE WFD database was prepared by the European Environment Agency's (EEA) European Topic Centre on Inland, Coastal and Marine Waters (ETC-ICM) (Data Manager Miroslav Fanta), dated 13.06.2012, named WFD_Access_2012_06_13.mdb.

Tables from two RBMP reporting schemas: SWB_SCHEMA (Surface water body) and SWMET_SCHEMA (Surface waters methodology) were used. For more details, see Table 1. Diagrams showing the database model for these schemas are given in Figure 1.

Table 1. Tables used from the WISE WFD database. In addition, associated code lists (LOV_tables) were used.

Schema	Table name	Fields used	Type of information used
SWB_ SCHEMA	SWB_SURFACEWATERBODY	EUSurfaceWaterBody_ID; **TypologyCode**; LOV_SWCategoryCode_ID	Count of WBs per MS WB type
SWMET_ SCHEMA	SWMET_SystemB_RW SWMET_SystemB_LW SWMET_SystemB_TW SWMET_SystemB_CW	All fields (typology factors; ALTITUDE etc.)	Yes/No for each typology factor for each MS and national type
SWMET_ SCHEMA	SWMET_Typology	SWMET_Schema_ID; **TYPE_CODE**; TYPE_NAME; LOV_SWCategoryCode_ID	TYPE_NAME contains detailed information on typology factors for some WB types (BG, EE, EL, HU, LT, SE, SK) .
SWMET_ SCHEMA	SWMET_EcologicalClassification	SWMET_Schema_ID; SWMET_EC_Unique_ID	Link to SWMET_EcoClassificationTypology
SWMET_ SCHEMA	SWMET_EcoClassificationTypology	SWMET_EC_Unique_ID; **TypologyCode**	TypologyCode can be linked to IC WB type codes
SWMET_ SCHEMA	SWMET_IntercalibrationTypes	SWMET_EC_Unique_ID; LOV_TypologyIntercalibrationCode_rltc_ID	IC WB type codes

Note that the three sets of typology codes (marked bold in Table 1) are not always consistent. [SWMET_SCHEMA].[TYPE_CODE] has a good match with [SWB_SURFACEWATERBODY].[TypologyCode], which allows combining count of water bodies (WBs) with typology information. However, [SWMET_EcoClassificationTypology].[TypologyCode] has a poor match with the two other sources, which impedes the linking of IC type codes with MS type codes.

2.1.2 Information from Member States

As the WISE WFD database has little information on numerical typology factors we searched for additional information on national typology directly from MSs via three approaches.

(1) Internet searches were made for documents such as national classification guidance documents; relevant information was found only for DE and DK within the time available to find additional information.

(2) Information from IE, PL and UK (all water categories) was compiled by WRc from documents assessed during the compliance assessment of the RBMPs.

(3) Information for rivers and lakes was obtained by e-mail upon request from AT, ES, FI, IT, and RO (and FR, but it was not provided in time for use in this project).

2.1.3 WISE SoE data (EEA Biology)

The WISE SoE databases Biology in Rivers and Biology in Lakes were published by EEA 01.10.2012 and can be downloaded from Waterbase (http://www.eea.europa.eu/data-and-maps/data/waterbase-rivers-8 and http://www.eea.europa.eu/data-and-maps/data/waterbase-lakes-8). These data sources will be referred to as "EEA Biology".

The EEA Biology databases contain information on water body (WB) types used for national classification systems ("WaterbodyTypeNCS") for most stations, as well as information on various typology factors for many stations (altitude, geology etc.) Typology data from EEA Biology has been used as supplementary information for water body types where information from MS was not available.

2.2.Project database

A project database was constructed in MS Access to contain all information obtained relating to the national WB types.

2.2.1. Database structure

A diagram of the database structure is given in Figure 1. The main table is t_TypeMS, which contains the full set of MS WB type codes (TypeMS_Code). This table has one-to-one relationships to the following tables:

- t_TypeMS_YN_WFD: Yes/No information for typology factors from the SWMET_SystemB tables
- t_TypeMS_Freq_WFD: Counts and proportions of WBs for each type from SWB_SURFACEWATERBODY
- t_TypeMS_Desc_MS: Description of typology factors from the various MS sources (and from SWMET_Typology).
- t_TypeMS_Desc_EEA: Description of typology factors from EEA Biology

The table t_TypeIC contains the full set of IC WB types with a description of typology factors, obtained from the reports "Water Framework Directive intercalibration technical reports" for Rivers, Lakes and Coastal & Transitional waters (JRC 2009 a, b, c). Information on links between MS types and IC types was obtained by WRc from the table SWMET_IntercalibrationTypes. The table link_TypeMS_TypeIC allows for many-to-many relationships between national types and IC types.

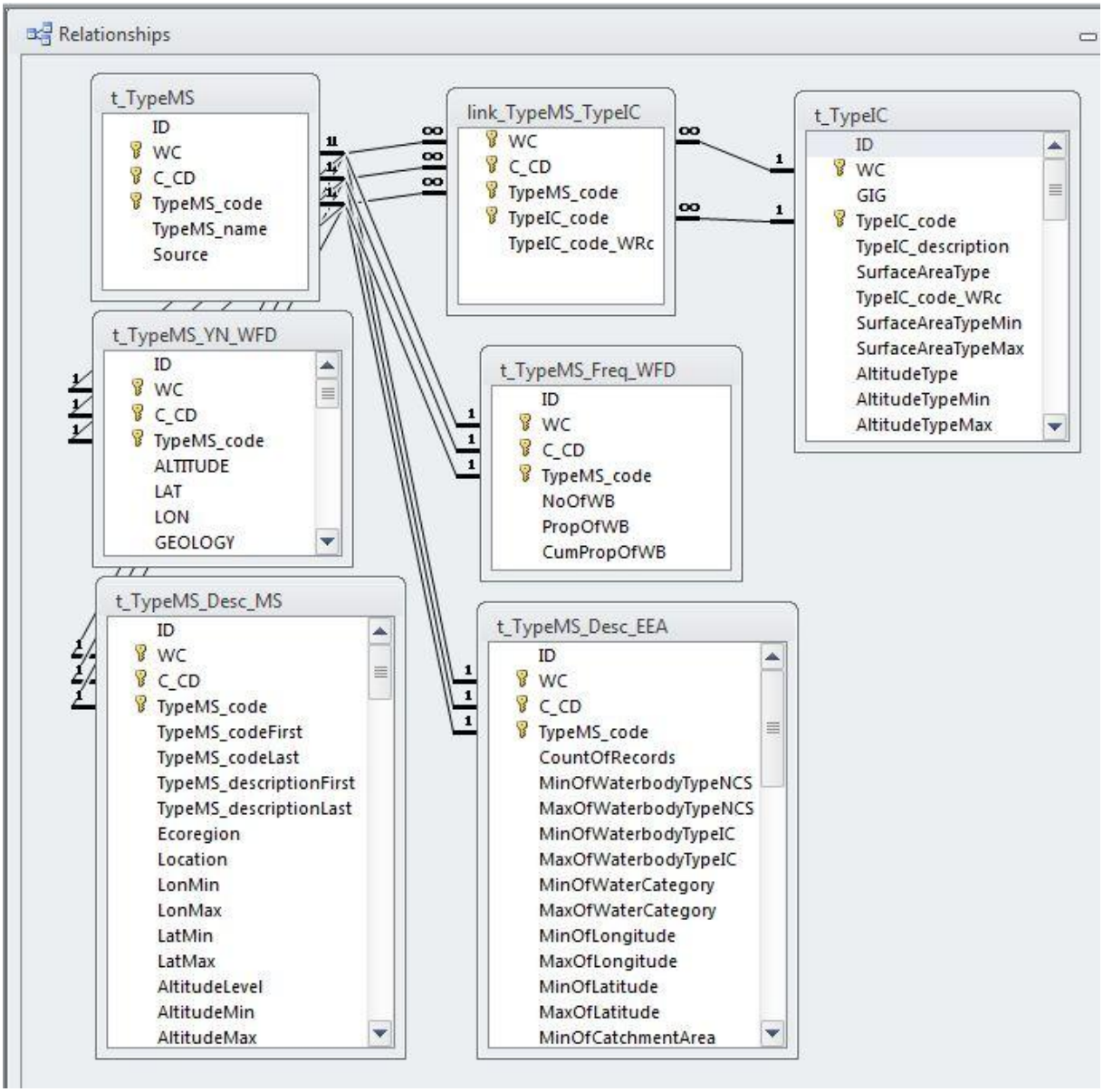


Figure 1. Table relationships in the project database.

2.2.2. Database compilation and extraction

The mismatch between national type codes from some of the sources (as described under 2.1) posed a problem for combining information from the different sources. As a consequence, a single national type may be represented by more than one type code in the database. The codes found in [SWB_SURFACEWATERBODY].[TypologyCode] were used as the primary source for [t_TypeMS].[TypeMS_Code].

Non-matching type codes found in other sources were first inspected and if possible harmonised with existing codes (e.g., "C1a" and "C1b" were combined to "C1" for AT). Remaining non-matching codes found in [SWB_SURFACEWATERBODY].[TypologyCode], in [SWMET_EcoClassificationTypology].[TypologyCode] and in MS sources were added. Non-matching

codes found in EEA Biology were not included. The field [t_TypeMS].[Source] shows the source of the type code.

For numeric typology factors (e.g. altitude), the description of the interval for each type was stored as minimum and maximum values in t_TypeMS_Desc_MS (AltitudeMin and AltitudeMax). For categoric typology factors (e.g. geology), the description of different categories was stored in a single field.

For data from the EEA, the minimum and maximum values of numeric variables were extracted from the set of stations assigned to each national type (e.g. MinOfAltitude, MaxOfAltitude). Note that these values do not necessarily cover the whole interval of the typology factor for the given type; these values only give an indication of the interval.

Data were extracted from the project database into MS Excel tables to produce the graphs and analyses presented in section 2.3. Information from the EEA was only included for types and typology factors where information from other sources was not available.

2.3.Data analyses

2.3.1. Overview of available typology information

For each water category, a cross-table for MS x Typology factor was constructed based on the Y/N information for individual typology factors (from t_TypeMS_YN_WFD). Within one MS the set of Y/N information can vary among types; if any of the types within a MS had "Y" for a given typology factor, then "Y" was inserted in this table. For each typology factor, an additional column "_info" indicates whether typology information from the MS is available for at least one type in each country, alternatively whether information from EEA Biology is available.

Countries with empty "_YN" columns have probably not reported this information to WISE. For countries and typology factors where the "_YN" column has "Y" but the "_info" column does not have "MS", it should be possible to obtain more description of the typology. For cases where the "_YN" column has "N" but the "_info" column does have "MS", the reporting of these two types of information is not consistent.

2.3.2. Selection and description of individual typology factors

For each water category and typology factor, the number of MSs having reported "Y" for at least one type was summarised (see Appendix, Table A.1). For each water category, the typology factors with at least 6 MSs with "Y" were selected for further analysis. Some of the typology factors used by ≥ 6 MSs were not selected because:

(i) they were not relevant for cross-country comparison (LON, LAT);
(ii) they were represented by other typology factors (DEPTH for lakes, which was already represented by MEAN DEPTH);
(iii) there was no other typology information available (e.g. RES_TIME for lakes, DEPTH and WAV_EXP for transitional waters).

The resulting selected typology factors were (number of MSs in parenthesis):

RW:

- CatchmentArea ("SIZE", 16)
- Geology (16)
- Altitude (14)
- Discharge (9)
- Substratum (8)
- Slope (8)

LW:

- SurfaceArea ("SIZE", 18)
- Geology (16)
- MeanDepth (16)
- Altitude (14)
- Mixing (9)
- Alkalinity ("ACID_NEUTR", 7)

TW:

- Salinity (11)
- TidalRange (9)
- Substratum (9)
- Mixing (8)

CW:

- Salinity (15)
- Exposure (14)
- Substratum (13)
- Mixing (11)
- TidalRange (9)

For the selected typology factors, intervals (or categories) were plotted as bar-charts for each national type. Likewise, bar-charts were made for each typology factor of all IC types. For more details, see Figures 3-9.

2.3.3. Clustering of national types based on selected typology factors

Dendrograms are a convenient way of depicting pair-wise dissimilarity between objects and orders observations in a tree shape with more dissimilar ones being separated by branches at higher height.

For LW the minimum and maximum levels of altitude, mean depth and surface area were used because for these type factors there were relatively many MSs and/or national types with numeric data for the selected typology factors (> 60%). For RW we included altitude and catchment area where relevant numeric data was available for > 75% of the national types. For both LW and RW the excluded typology factors had a high proportion of types and/or MSs with missing numerical values. TW and CW had too few MSs and /or national types with numerical values of the selected typology factors to be used in these analyses.

National types with missing numerical values for the selected typology factors from many MSs were removed, and the remaining types with numerical values were scaled before the pairwise Euclidian distances were calculated between each combination of national types. These Euclidian distances are displayed in dendrograms. All analyses were performed in the programming software R (version 2.15.1; R Development Core Team 2012).

3. Results and Discussion

3.1. Overview of national types

There are 2646 national types across all water categories and MSs, with 1599 river types, 673 lake types, 261 coastal water types and 116 transitional water types.

Figure 2 shows the number of national types per MS for each water category, based on information found mainly in the WISE WFD tables SWB and SWMET, but also supplemented with type information provided for this report from MSs.

For rivers, there are six MSs (CY, DK, EE, LT, LU, LV) that have less than 10 national river types. At the other end of the scale, Italy has 415 river types, while Austria, France and the Netherlands also have many river types (169, 148 and 121 types respectively). The remaining MSs have between 10 and 100 river types.

For lakes there are five MSs with less than 10 lake types: CY, LT, LV, PT, SI. The largest number of lake types is reported by the Netherlands with 131 lake types, while the remaining MSs have between 13 and 76 lake types.

For coastal waters, as many as 11 MSs have less than 10 national types of coastal waters, while France has the highest number of coastal water body types (41 types). The remaining MSs have between 10 and 25 national types of coastal waters.

For transitional waters, most MSs have less than 10 national types, while Italy has the highest number of national types (27), France and Spain have 16 national types each, and UK has 11 national types.

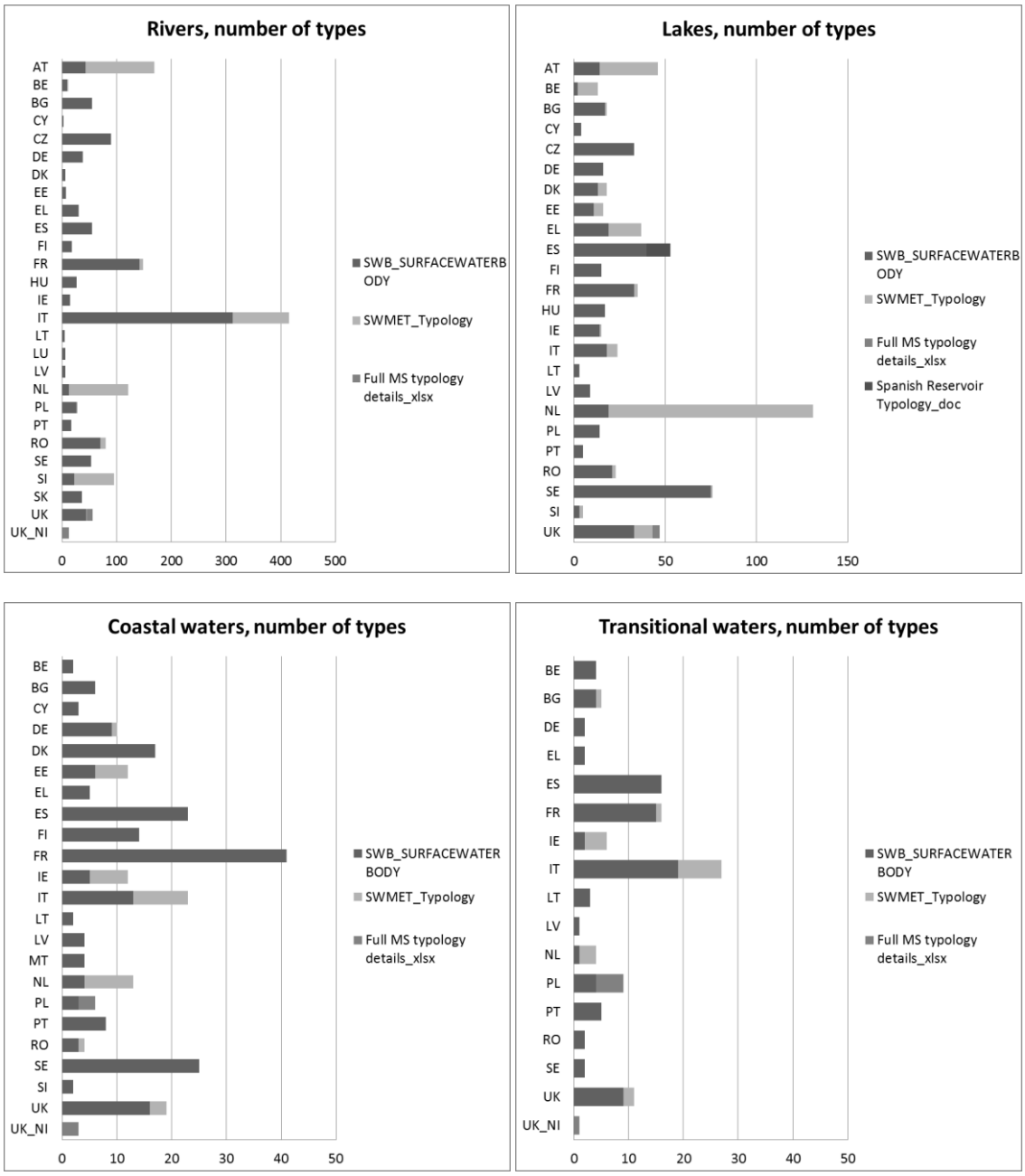


Figure 2. Number of national types of water bodies per country for different water categories. The legend shows the source of information. Only unique typecodes are used.

3.2.Links between national types and the Intercalibration common types

The links between the national types and the common types are unclear or missing for the large majority of national types at the end of the intercalibration phase 1. These are the typologies used for the first RBMPs. Only one third of the river types and lake types and only 12 % of coastal and transitional types were linked to the common IC types (Table 2). Many MSs (12-14 MSs in each water category) did not report any links at all to any of their national types, and some MSs reported several IC types for certain single national types. The latter is probably due to the use of larger ranges of certain type factors in the national types than in the IC types, or deviation of type factors used in the

national types relative to the IC types. The situation at the end of intercalibration phase 2 is likely to be much improved, but there is no data available at European level to analyse this yet.

Table 2. Number and proportion of national types linked to IC types in the first RBMPs (based on IC phase 1 results). Data from WISE WFD database SWB schema. For IC types not shown there are no links reported to any national type.

Rivers		Lakes		Coastal and trans waters	
IC type	# national types	IC type	# national types	IC type	# national types
R-A1	49	L-A1/2	4	CW-B12	14
R-A2	57	L-AL3	10	CW-B3a	5
R-C1	15	L-AL4	7	CW-B0	3
R-C2	5	L-CB1	35	CW-B2	3
R-C3	70	L-CB2	41	CW-NEA1/26e	3
R-C4	47	L-CB3	15	CW-B13	2
R-C5	29	L-M5/7	8	CW-B3b	2
R-C6	10	L-M8	12	CW-NEA1/26a	1
R-E1	4	L-N1	3	CW-NEA1/26b	1
R-E3	5	L-N2a	3	CW-NEA1/26c	1
R-E4	3	L-N2b	1	CW-NEA1/26d	1
R-M1	15	L-N3a	4	TW-B13	1
R-M2	15	L-N5a	1		
R-M3	2	L-N6a	1		
R-M4	15	L-N8a	4		
R-M5	7				
R-N1	1				
R-N3	3				
R-N4	2				
Sum	354	Sum	149	Sum	37
Total	1139	Total	448	Total	306
% linked	31 %	% linked	33 %	% linked	12 %

3.3.National types including 80% of all water bodies

Based on the reporting of national types and number of water bodies per type in the WISE WFD database SWB schema, we found that a small proportion of the national types include the large majority of the water bodies for rivers and lakes (Table 3). The proportion of national types including 80 % of the water bodies is 24 % for rivers and 37 % for lakes. In particular for rivers, the large majority of national types represent only a small minority of European river water bodies. Some of these types may however represent large water bodies that are difficult to compare with other water bodies. For coastal and transitional waters, roughly half of the national types include 80 % of the water bodies. Further details on specific types at MS level are provided in the Annex Table A2.

Table 3. Proportion of national types including 80 % of water bodies, based on information reported by MSs in the WISE WFD database SWB schema, update 21st June 2012.

Water category	Rivers	Lakes	Coastal waters	Transitional waters
Number of national types including 80% of all water bodies	275	164	114	51
Proportion of national types including 80% of all water bodies	24%	37%	53%	56%
Total number of national types*	1139	448	215	91

*Only types reported in the SWB schema are included. Additional types are reported in the SWMET schema.

3.4.Overview of typology factors used for national types

3.4.1. Most frequently used type factors

The table below shows that geology (or alkalinity for lakes), size (catchment area for rivers and surface area for lakes) and altitude are the most frequently used type factors for both rivers and lakes. Mean depth is also commonly used for lake typology. For coastal and transitional waters, the most frequently used type factors are salinity and substrate, while wave exposure is also important for coastal waters. Mixing regime and tidal range are also quite frequently used in both coastal and transitional types. For all water categories the latitude and longitude are frequently used, indicating region specific types in many countries.

Table 4. Type factors most commonly used in national typologies. All type factors used by more than 5 MSs are included. See Annex Table A1 for complete table of type factors. Green highlighted cells are type factors with sufficient information on numeric ranges from at least 6 MSs. These type factors are used as basis for bar-charts below.

RIVERS		LAKES		COASTAL WATERS		TRANSITIONAL WATERS	
Type factors Rivers	# MSs using type factor	Type factors Lakes	# MSs using type factor	Type factors Coastal waters	# MSs using type factor	Type factors Trans. waters	# MSs using type factor
GEOLOGY	16	SIZE	18	SALINITY	15	SALINITY	11
SIZE	16	GEOLOGY	16	WAV_EXPO	14	SUBSTRATE	9
ALTITUDE	14	MEAN DEPTH	16	SUBSTRATE	13	TIDAL	9
LAT	9	ALTITUDE	14	LAT	11	MIXING	8
LON	9	LAT	9	LON	11	LAT	7
DISCHARGE	9	LON	9	MIXING	11	LON	7
SLOPE	8	MIXING	9	TIDAL	9	DEPTH	7
SUBSTRATE	8	ACID_NEUT	7			WAV_EXPO	6
		RES_TIME	7				

3.4.2. Single typology factors: Ranges used for different national types

Rivers altitude: Many national types are lowland types with altitude less than 200 m, which corresponds to the lowland IC types (Figure 3). A few national types are mid-altitude or highland rivers (tributaries) that correspond more or less to the IC mid-altitude or highland IC types. However, there are also national types that overlap with several altitude categories used in the IC types.

Rivers catchment area: Most national types are small to medium sized rivers with catchments less than 1000 km^2. The ranges of catchment area applied by the national types often span a wide range of catchment areas below 1000 km^2. Most of the national large river types have quite similar catchment sizes (1000-10000 km^2). Most of the intercalibration types are rivers with small (10-100 km^2) or medium (100-1000 km^2) catchment sizes, meaning that the most of the national river types match the intercalibration types relatively well. Some national types include very small rivers with catchment size below 10 km^2. There are very few national types for very large rivers.

Rivers geology: Of the few national types with available information on geology most of them are specific in terms of the geological categories in WFD Annex II, being either siliceous or calcareous or organic. A minority apply less specific mixed geology, or two or even all three of the specific categories, so are not clearly related to the IC types.

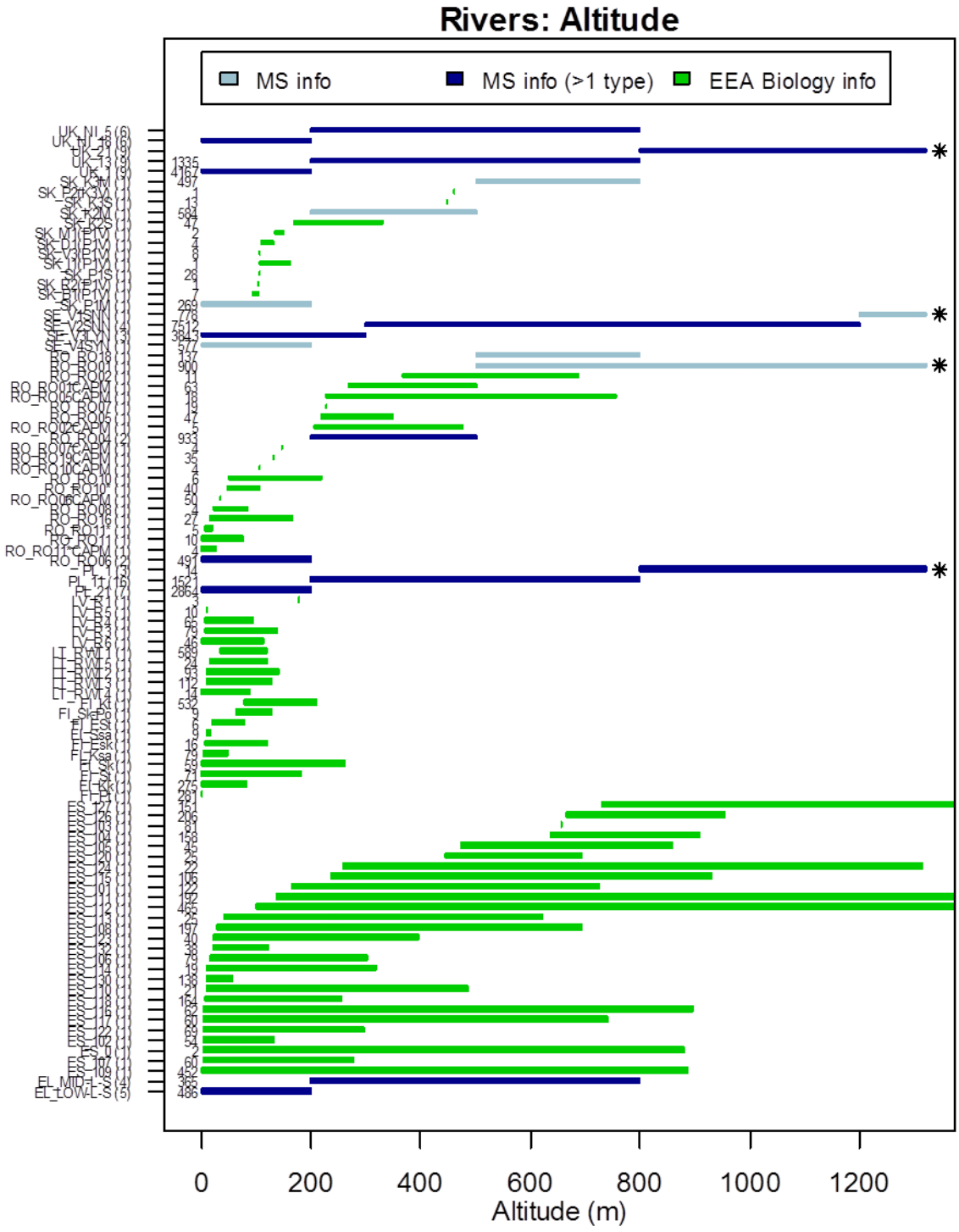
Lakes altitude: The majority of national lake types with available data are lowland types corresponding well with the lowland IC types. For the mid-altitude national types, the correspondence with the mid-altitude IC types is less clear.

Lakes surface area: Most of the national types have surface area > 0.5-10 km^2. Some national types have a narrower range of surface area. There are also some national types for large lakes > 10 km^2. All the IC types that apply surface area as a typology factor are for lakes with surface area > 0.5 km^2, except two merged Atlantic types that also include smaller lakes. Thus the national types mostly correspond to the IC types for this typology factor.

Lakes mean depth: Most of the national types with data on mean depth are for lakes with mean depth more than 3 m, corresponding roughly to the mean depth of many of the IC types. There are also quite a lot of national deep lake types (mean depth larger than 15 m) corresponding well with the mean depth of the deep lakes IC types. A few national types are for very shallow lakes, corresponding to the IC type L-CB2.

Lakes geology/alkalinity: Of the few national types with available information on geology, most are specific in terms of the geological categories in WFD Annex II, being either siliceous or calcareous or organic. A minority apply a mixed geology spanning two of the specific categories. For alkalinity, the few national types with available information do not show any consistent pattern and so do not correspond so well to the alkalinity categories of the IC types, except the high alkalinity types that are quite similar to the IC types (alkalinity more than 1 meq/l).

a)


Rivers: Altitude
MS info
MS info (>1 type)
EEA Biology info
0
200
400
600
800
1000
1200
Altitude (m)

b)

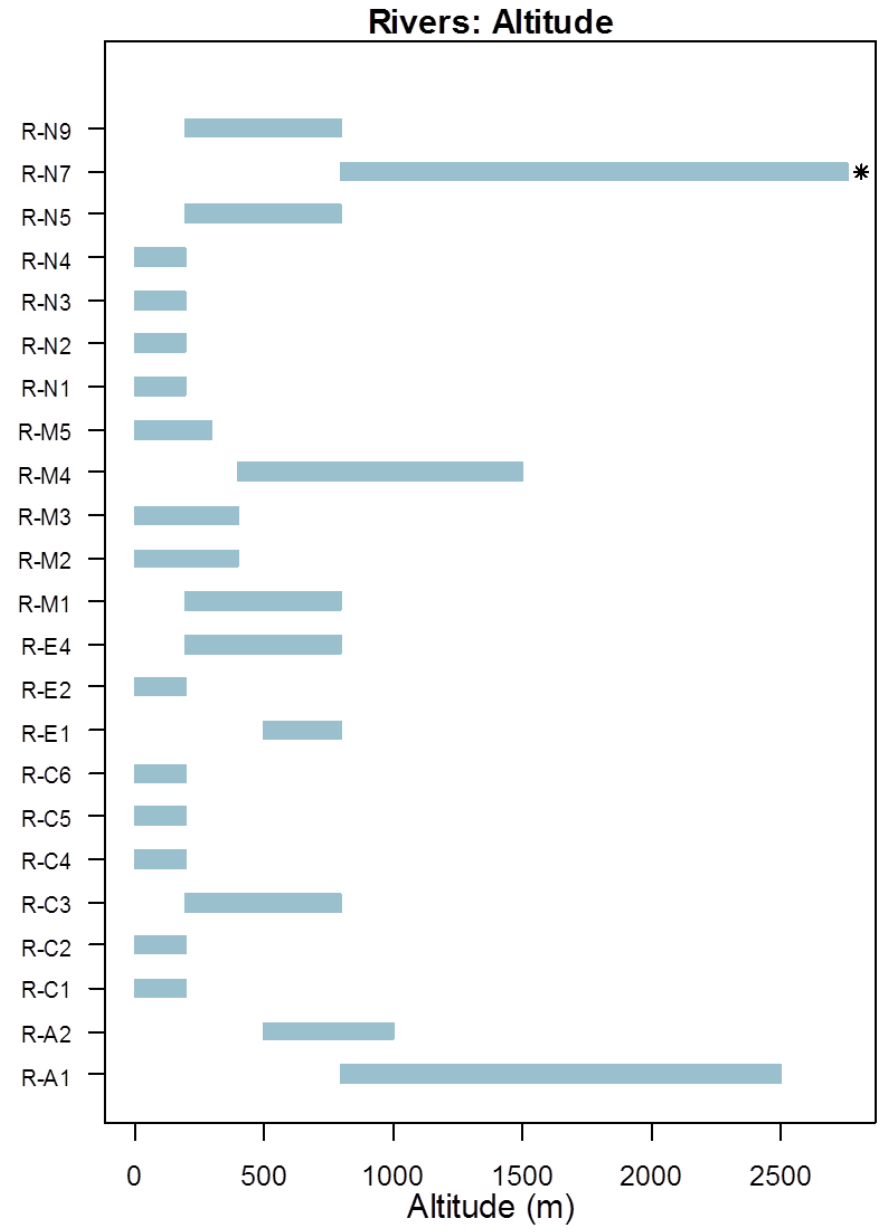
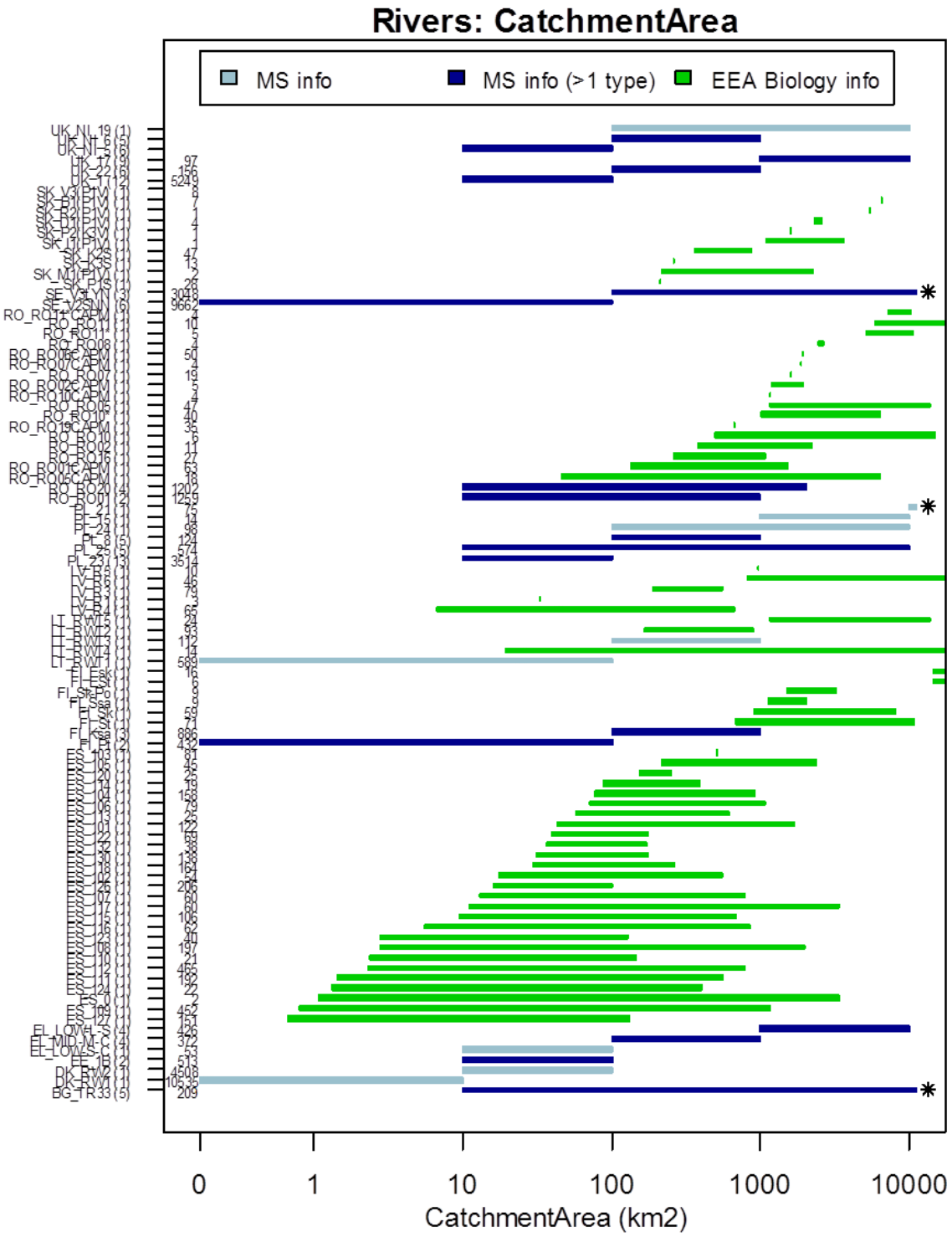


Figure 3. (**a**) Intervals of the typology factor 'Altitude for all national river types where information is available. MS codes are added as prefix to the national type codes (y-axis labels). Types are sorted by minimum value within each MS. An asterisk indicates that the interval does not have a maximum value. The number on the right-hand side of the y-axis shows the number of water bodies reported for the given WB type. Dark blue bars indicate groups of types with identical intervals or categories within a MS; the number in parenthesis following the type code shows the number of types represented by given type code. The list of type codes in each group is given in Appendix, Table A.4. Green bars represent information from the EEA Biological data flow.

(**b**) Intervals of the same typology factor for all relevant IC types.

a)


Rivers: CatchmentArea
MS info
MS info (>1 type)
EEA Biology info
0
1
10
100
1000
10000
CatchmentArea (km2)

b)

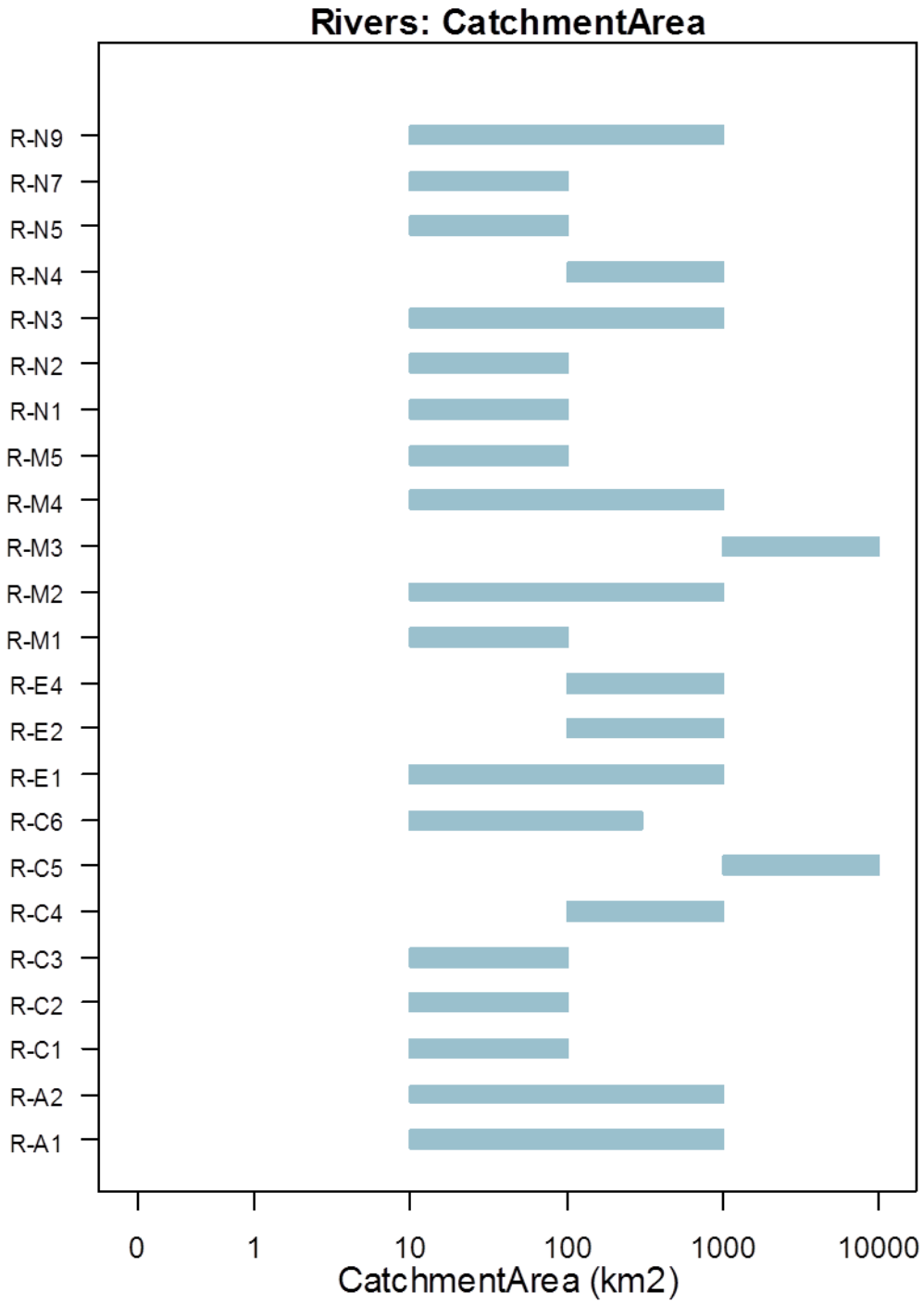
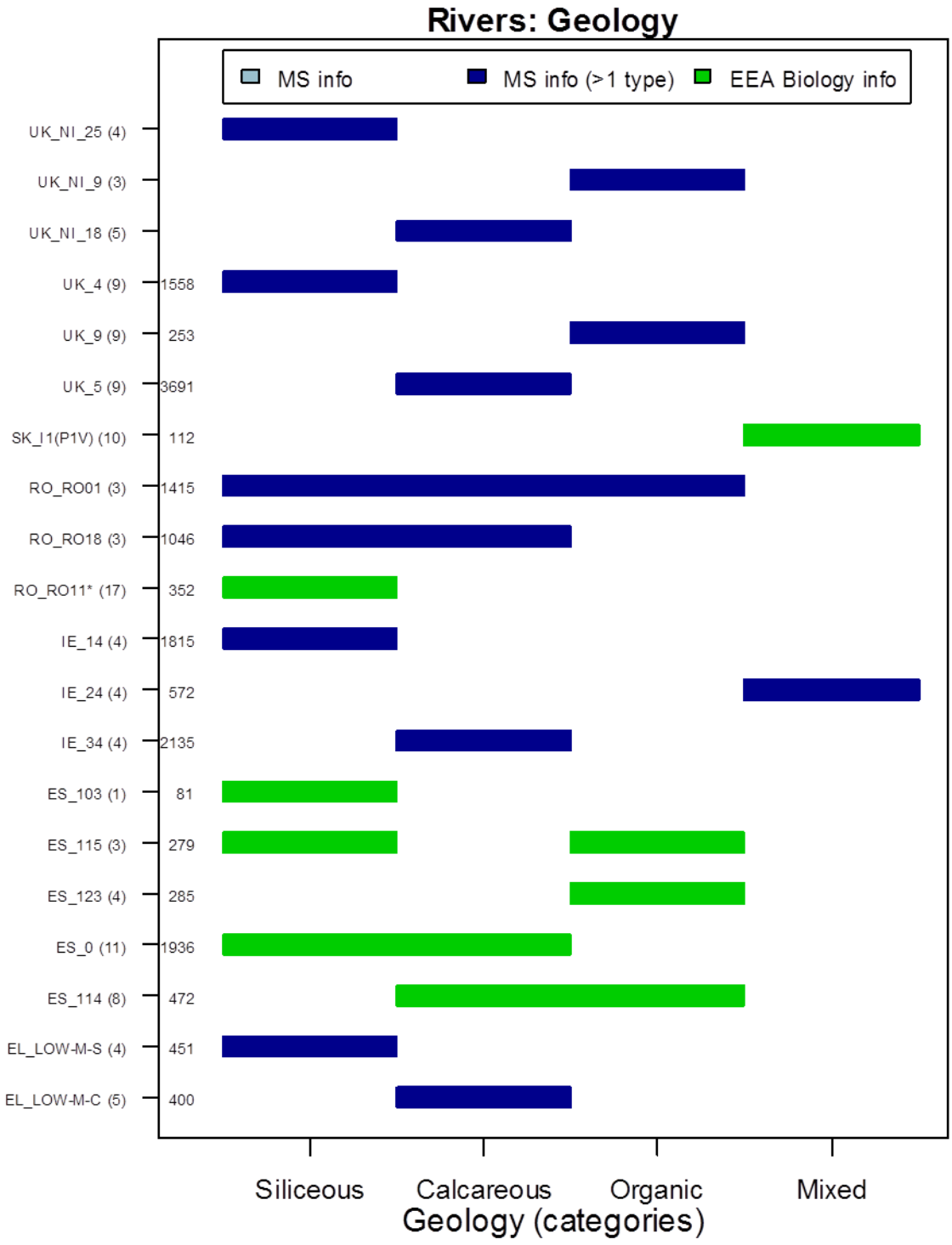


Figure 4. **(a)** Intervals of the typology factor CatchmentArea for each national river type (**a**) and IC type (**b**). For more details, see description of Figure 3.

a)


Rivers: Geology
MS info
MS info (>1 type)
EEA Biology info
UK_NI_25 (4)
UK_NI_9 (3)
UK_NI_18 (5)
UK_4 (9) 1558
UK_9 (9) 253
UK_5 (9) 3691
SK_I1(P1V) (10) 112
RO_RO01 (3) 1415
RO_RO18 (3) 1046
RO_RO11* (17) 352
IE_14 (4) 1815
IE_24 (4) 572
IE_34 (4) 2135
ES_103 (1) 81
ES_115 (3) 279
ES_123 (4) 285
ES_0 (11) 1936
ES_114 (8) 472
EL_LOW-M-S (4) 451
EL_LOW-M-C (5) 400
Siliceous
Calcareous
Organic
Mixed
Geology (categories)

b)

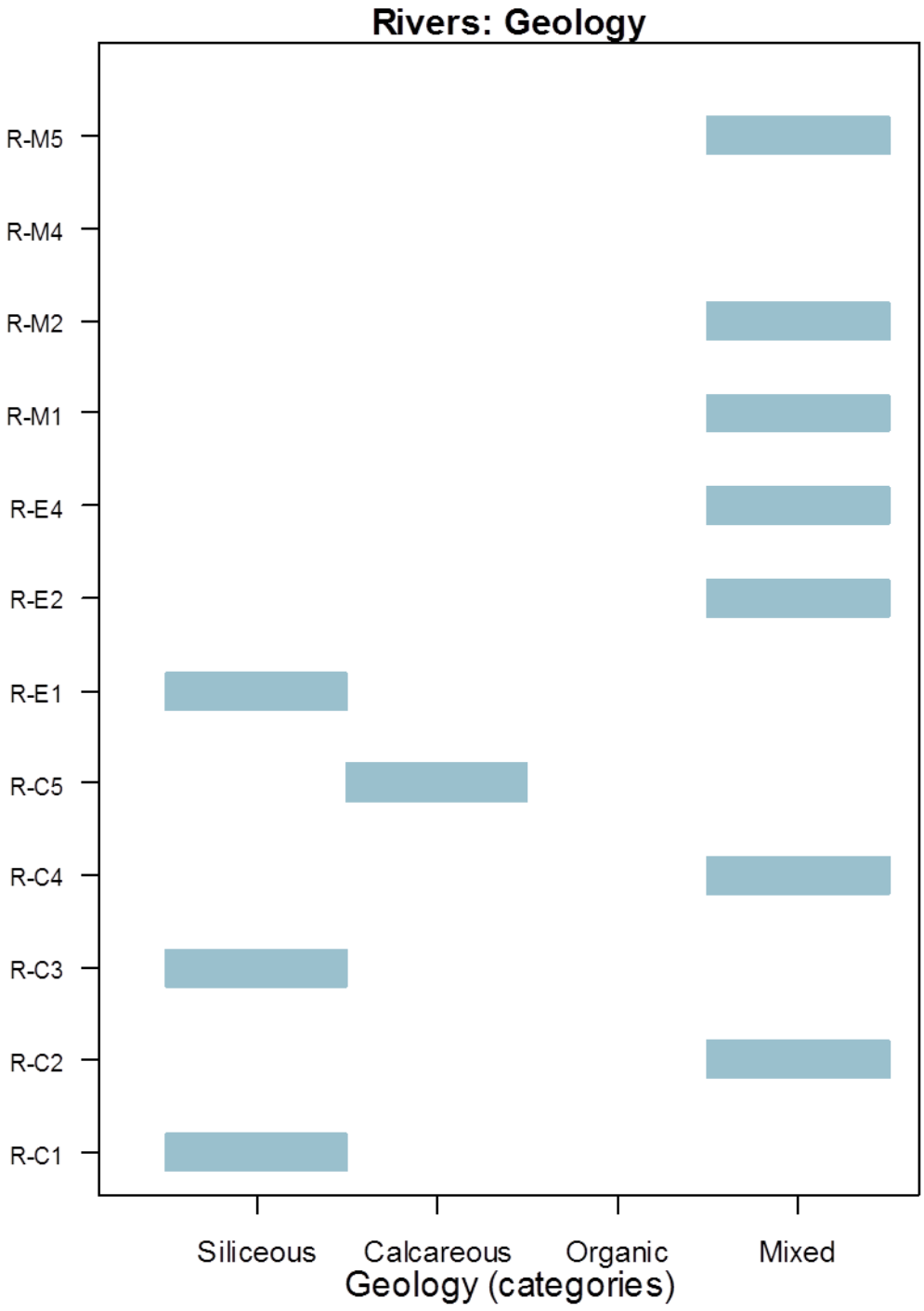
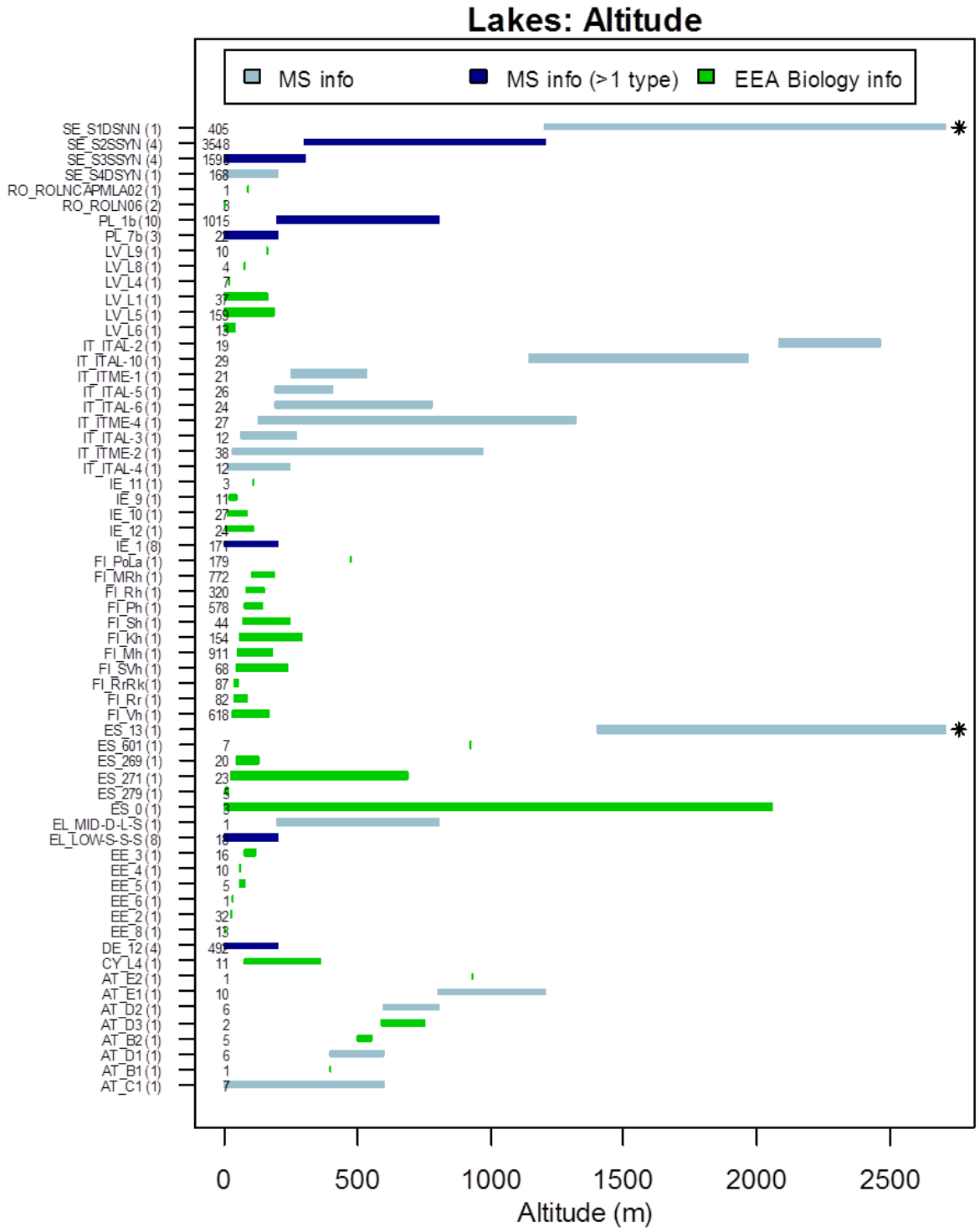


Figure 5. Categories of the typology factor Geology for each national river type (**a**) and IC type (**b**). MS codes are added as prefix to the national type codes (y-axis labels). For more details, see description of Figure 3.

a)


Lakes: Altitude
MS info
MS info (>1 type)
EEA Biology info
SE_S1DSNN (1) 405
SE_S2SSYN (4) 3548
SE_S3SSYN (4) 1598
SE_S4DSYN (1) 168
RO_ROLNCAPMLA02 (1) 1
RO_ROLN06 (2) 8
PL_1b (10) 1015
PL_7b (3) 22
LV_L9 (1) 10
LV_L8 (1) 4
LV_L4 (1) 7
LV_L1 (1) 37
LV_L5 (1) 159
LV_L6 (1) 13
IT_ITAL-2 (1) 19
IT_ITAL-10 (1) 29
IT_ITME-1 (1) 21
IT_ITAL-5 (1) 26
IT_ITAL-6 (1) 24
IT_ITME-4 (1) 27
IT_ITAL-3 (1) 12
IT_ITME-2 (1) 38
IT_ITAL-4 (1) 12
IE_11 (1) 3
IE_9 (1) 11
IE_10 (1) 27
IE_12 (1) 24
IE_1 (8) 17
FI_PoLa (1) 179
FI_MRh (1) 772
FI_Rh (1) 320
FI_Ph (1) 578
FI_Sh (1) 44
FI_Kh (1) 154
FI_Mh (1) 911
FI_SVh (1) 68
FI_RrRk (1) 87
FI_Rr (1) 82
FI_Vh (1) 618
ES_13 (1)
ES_601 (1) 7
ES_269 (1) 20
ES_271 (1) 23
ES_279 (1) 4
ES_0 (1) 3
EL_MID-D-L-S (1) 1
EL_LOW-S-S-S (8) 18
EE_3 (1) 16
EE_4 (1) 10
EE_5 (1) 5
EE_6 (1) 1
EE_2 (1) 32
EE_8 (1) 13
DE_12 (4) 492
CY_L4 (1) 11
AT_E2 (1) 1
AT_E1 (1) 10
AT_D2 (1) 6
AT_D3 (1) 2
AT_B2 (1) 5
AT_D1 (1) 6
AT_B1 (1) 1
AT_C1 (1) 7
0
500
1000
1500
2000
2500
Altitude (m)

b)

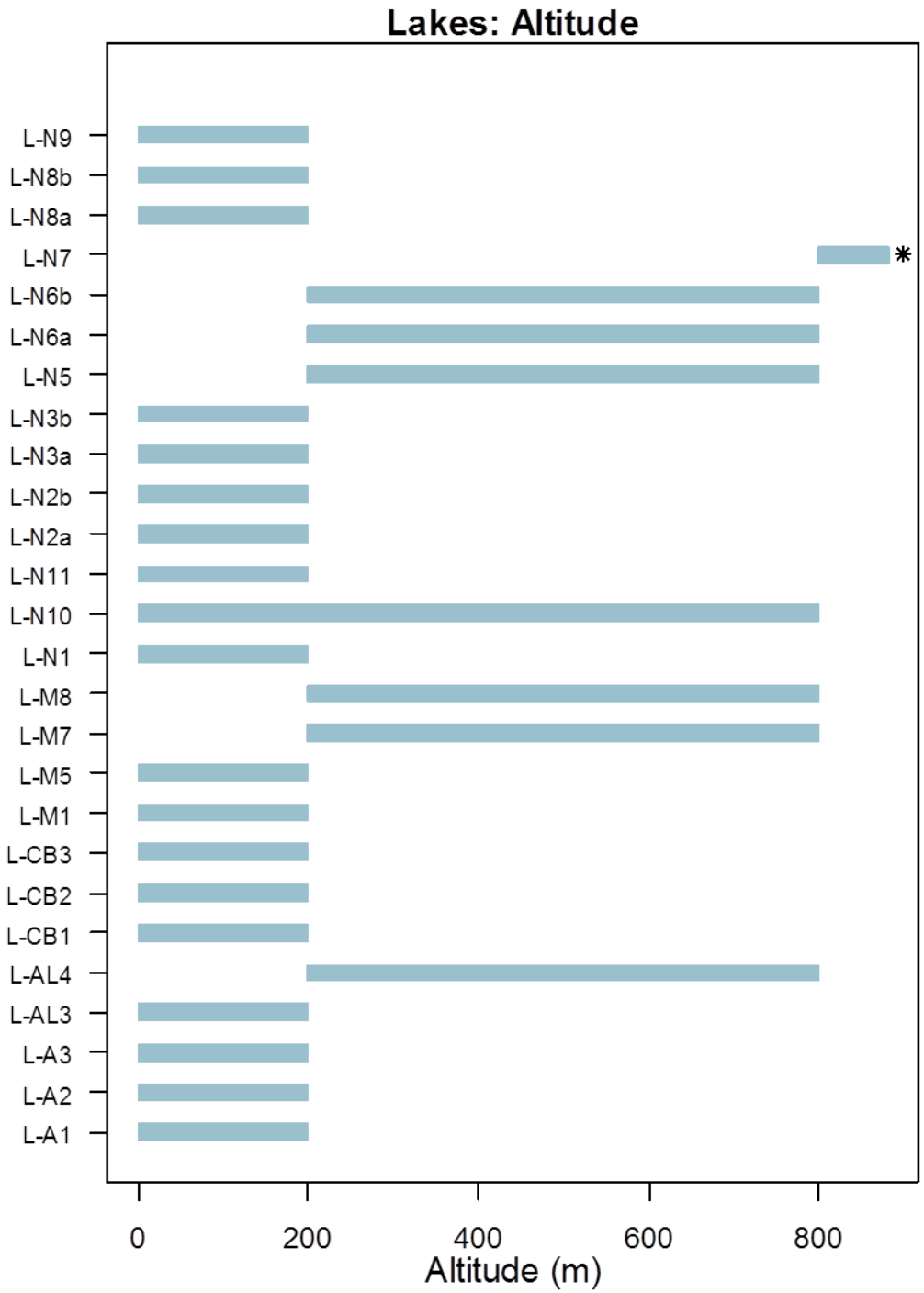
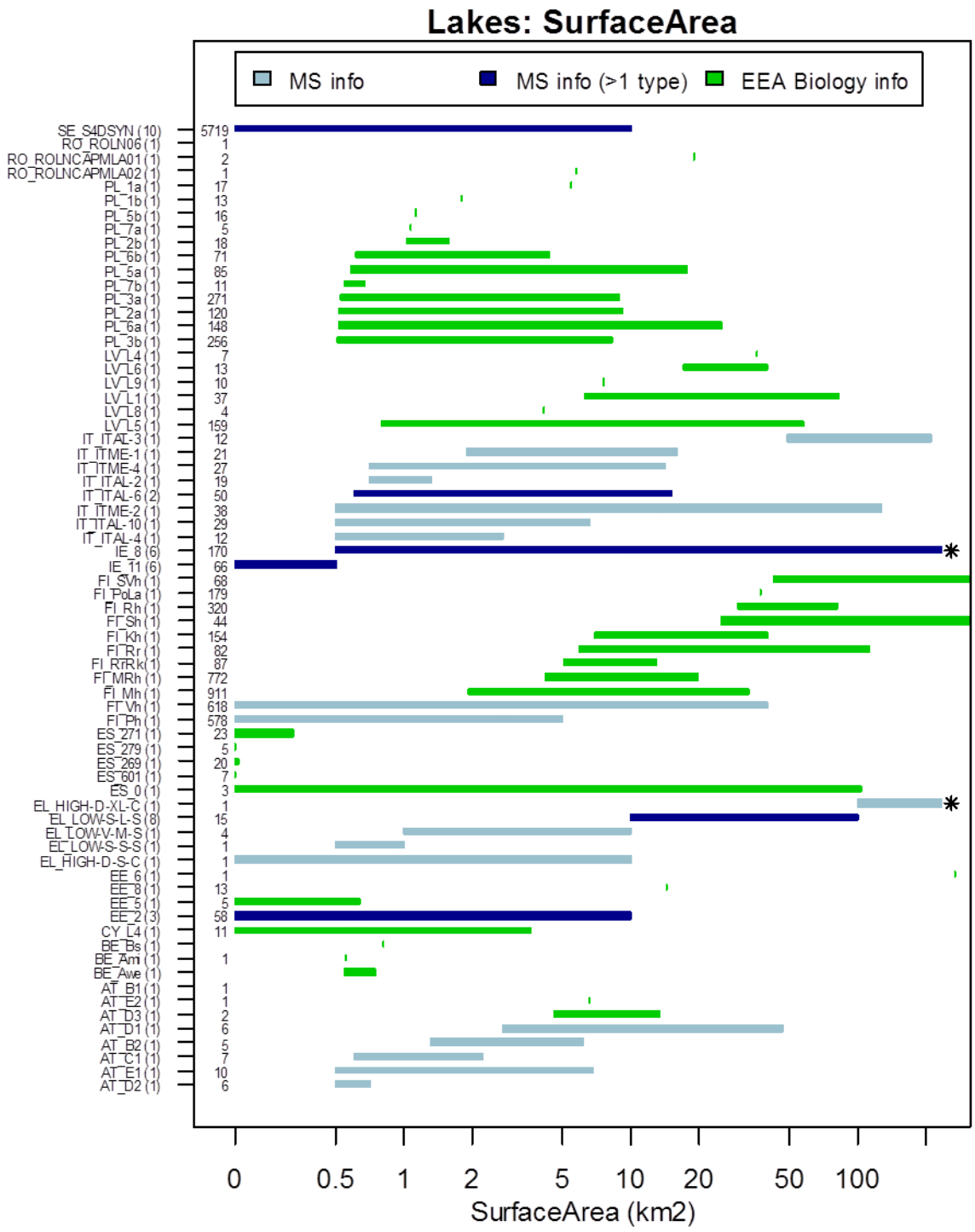


Figure 6. Intervals of the typology factor Altitude for each national lake type (**a**) and IC type (**b**). For more details, see description of Figure 3.

a)


Lakes: SurfaceArea
MS info
MS info (>1 type)
EEA Biology info
SE_S4DSYN (10) 5719
RO_ROLN06 (1) 1
RO_ROLNCAPMLA01 (1) 2
RO_ROLNCAPMLA02 (1) 1
PL_1a (1) 17
PL_1b (1) 13
PL_5b (1) 16
PL_7a (1) 5
PL_2b (1) 18
PL_6b (1) 71
PL_5a (1) 85
PL_7b (1) 11
PL_3a (1) 271
PL_2a (1) 120
PL_6a (1) 148
PL_3b (1) 256
LV_L4 (1) 7
LV_L6 (1) 13
LV_L9 (1) 10
LV_L1 (1) 37
LV_L8 (1) 4
LV_L5 (1) 159
IT_ITAL-3 (1) 12
IT_ITME-1 (1) 21
IT_ITME-4 (1) 27
IT_ITAL-2 (1) 19
IT_ITAL-6 (2) 50
IT_ITME-2 (1) 38
IT_ITAL-10 (1) 29
IT_ITAL-4 (1) 12
IE_8 (6) 170
IE_11 (6) 66
FI_SVh (1) 68
FI_PoLa (1) 179
FI_Rh (1) 320
FI_Sh (1) 44
FI_Kh (1) 154
FI_Rr (1) 82
FI_RrRk (1) 87
FI_MRh (1) 772
FI_Mh (1) 911
FI_Vh (1) 618
FI_Ph (1) 578
ES_271 (1) 23
ES_279 (1) 5
ES_269 (1) 20
ES_601 (1) 7
ES_0 (1) 3
EL_HIGH-D-XL-C (1) 1
EL_LOW-S-L-S (8) 15
EL_LOW-V-M-S (1) 4
EL_LOW-S-S-S (1) 1
EL_HIGH-D-S-C (1) 1
EE_6 (1) 1
EE_8 (1) 13
EE_5 (1) 5
EE_2 (3) 58
CY_L4 (1) 11
BE_Bs (1)
BE_Ami (1) 1
BE_Awe (1)
AT_B1 (1) 1
AT_E2 (1) 1
AT_D3 (1) 2
AT_D1 (1) 6
AT_B2 (1) 5
AT_C1 (1) 7
AT_E1 (1) 10
AT_D2 (1) 6
0
0.5
1
2
5
10
20
50
100
SurfaceArea (km2)

b)

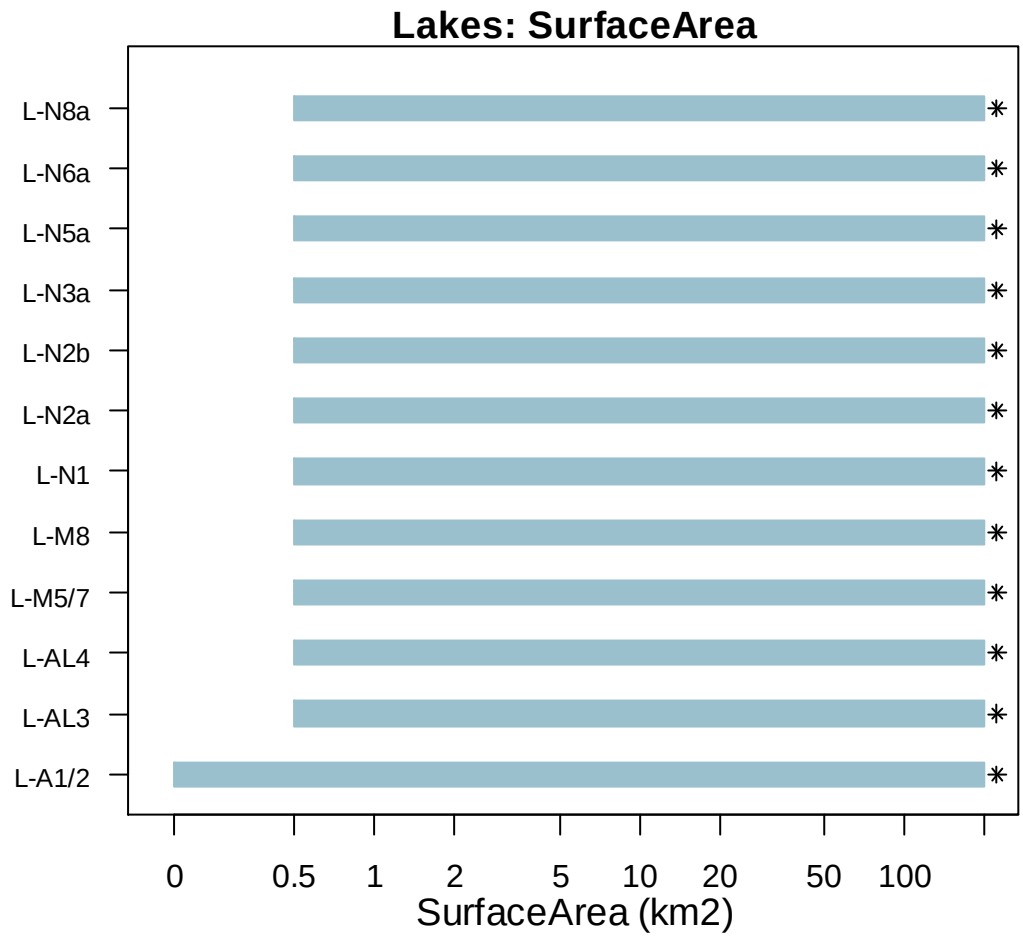
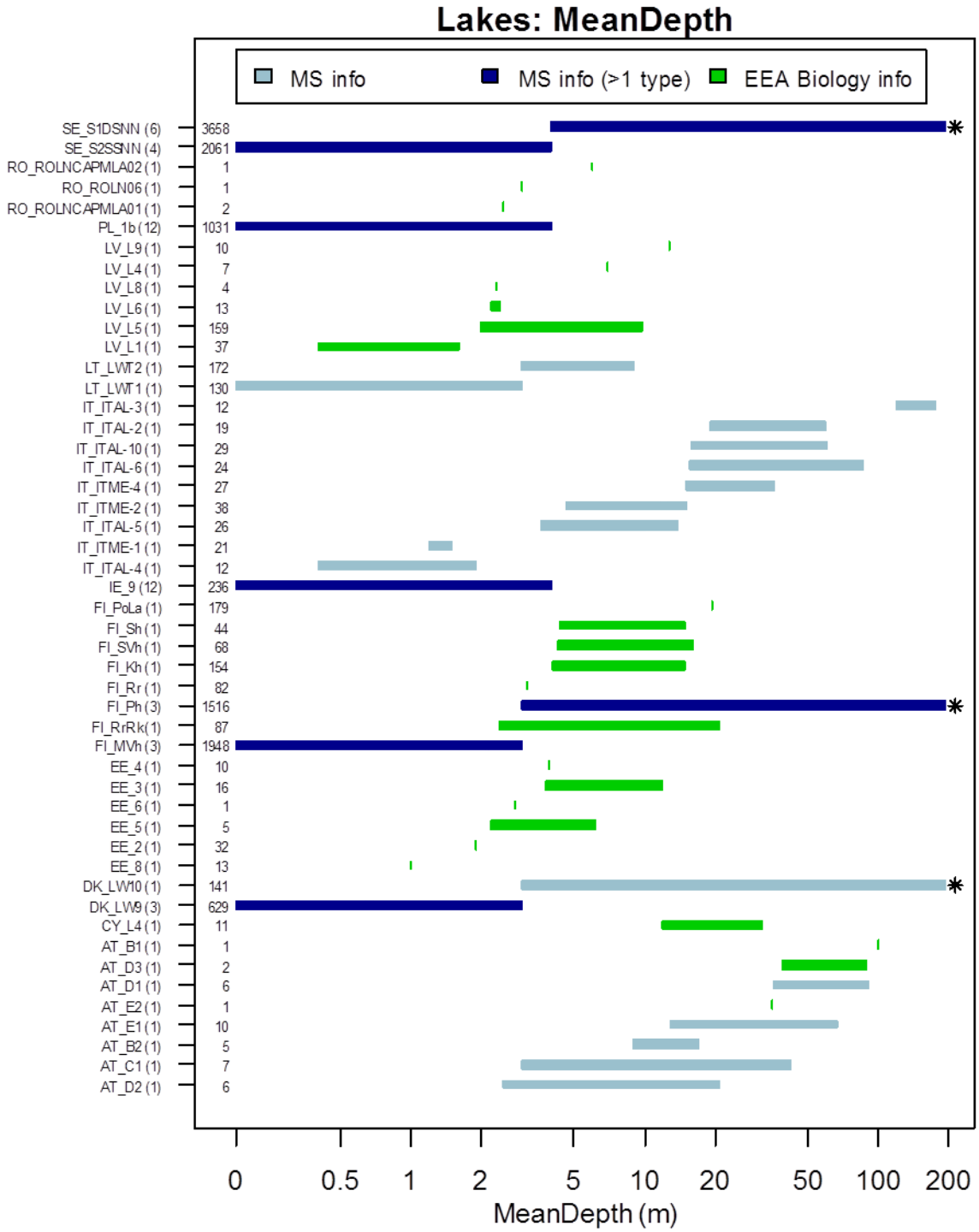


Figure 7. Intervals of the typology factor SurfaceArea for each national lake type (**a**) and IC type (**b**). For more details, see description of Figure 3.

a)


Lakes: MeanDepth
MS info
MS info (>1 type)
EEA Biology info
SE_S1DSNN (6) 3658
SE_S2SSNN (4) 2061
RO_ROLNCAPMLA02 (1) 1
RO_ROLN06 (1) 1
RO_ROLNCAPMLA01 (1) 2
PL_1b (12) 1031
LV_L9 (1) 10
LV_L4 (1) 7
LV_L8 (1) 4
LV_L6 (1) 13
LV_L5 (1) 159
LV_L1 (1) 37
LT_LWT2 (1) 172
LT_LWT1 (1) 130
IT_ITAL-3 (1) 12
IT_ITAL-2 (1) 19
IT_ITAL-10 (1) 29
IT_ITAL-6 (1) 24
IT_ITME-4 (1) 27
IT_ITME-2 (1) 38
IT_ITAL-5 (1) 26
IT_ITME-1 (1) 21
IT_ITAL-4 (1) 12
IE_9 (12) 236
FI_PoLa (1) 179
FI_Sh (1) 44
FI_SVh (1) 68
FI_Kh (1) 154
FI_Rr (1) 82
FI_Ph (3) 1516
FI_RrRk (1) 87
FI_MVh (3) 1948
EE_4 (1) 10
EE_3 (1) 16
EE_6 (1) 1
EE_5 (1) 5
EE_2 (1) 32
EE_8 (1) 13
DK_LW10 (1) 141
DK_LW9 (3) 629
CY_L4 (1) 11
AT_B1 (1) 1
AT_D3 (1) 2
AT_D1 (1) 6
AT_E2 (1) 1
AT_E1 (1) 10
AT_B2 (1) 5
AT_C1 (1) 7
AT_D2 (1) 6
0
0.5
1
2
5
10
20
50
100
200
MeanDepth (m)

b)

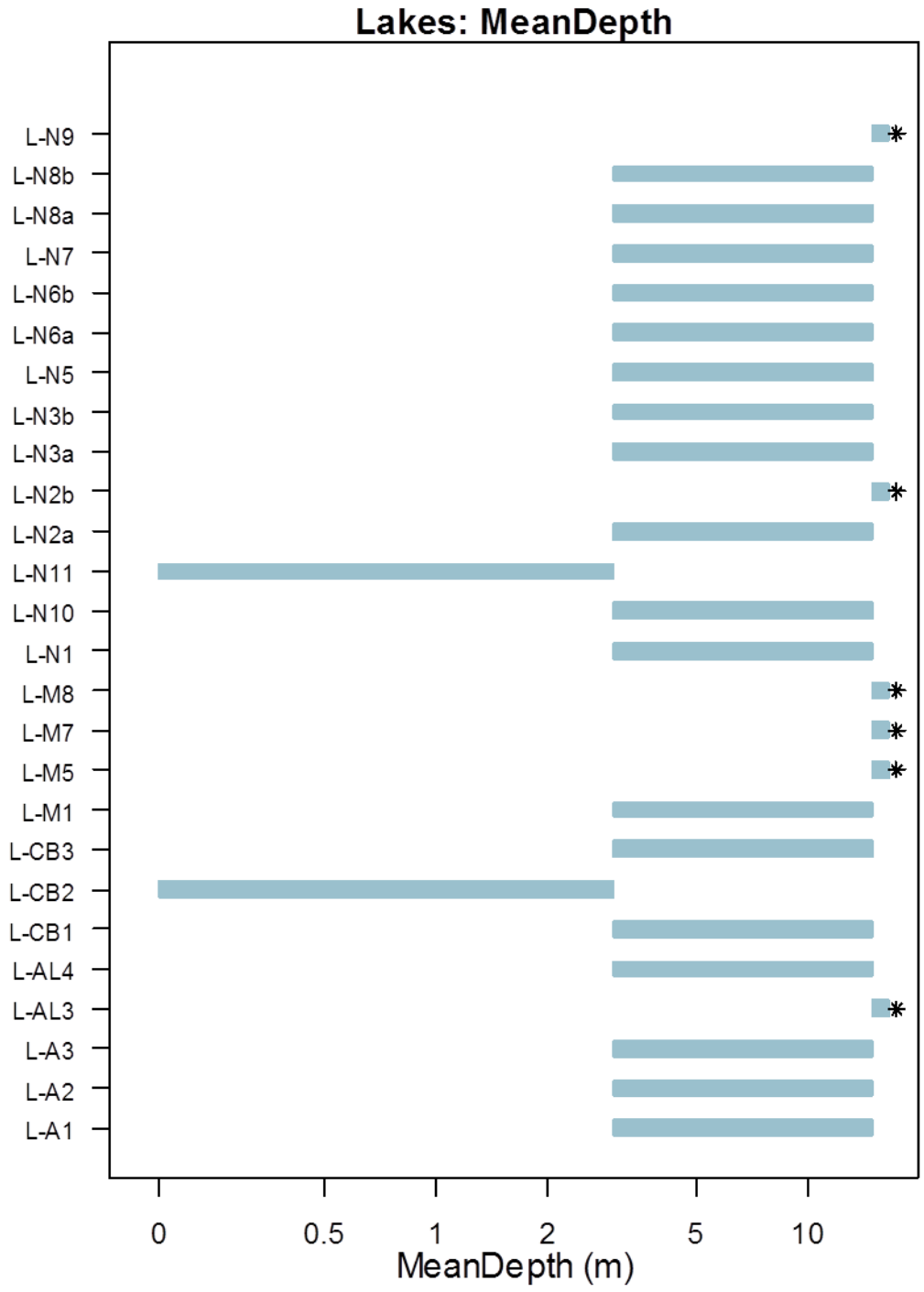
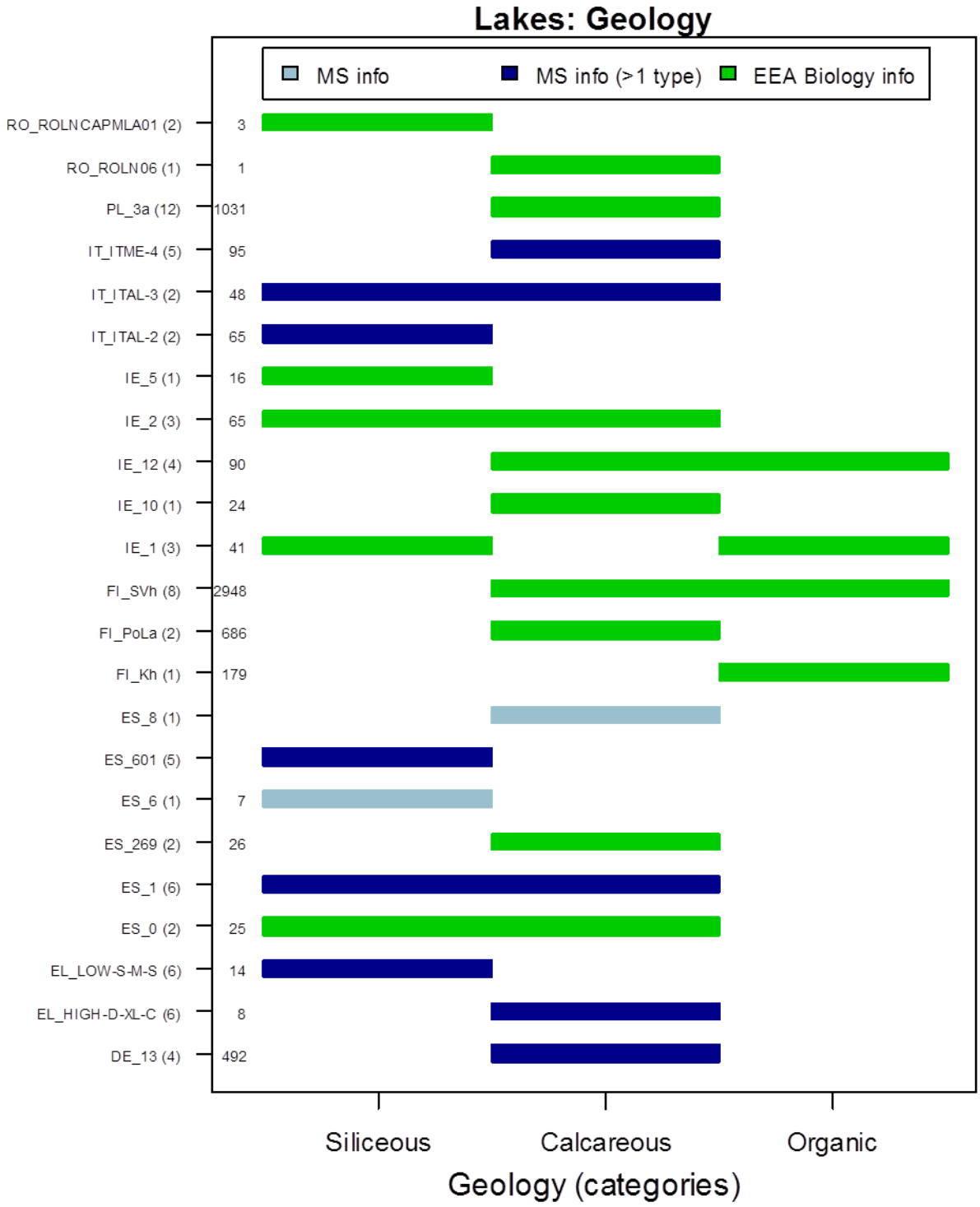
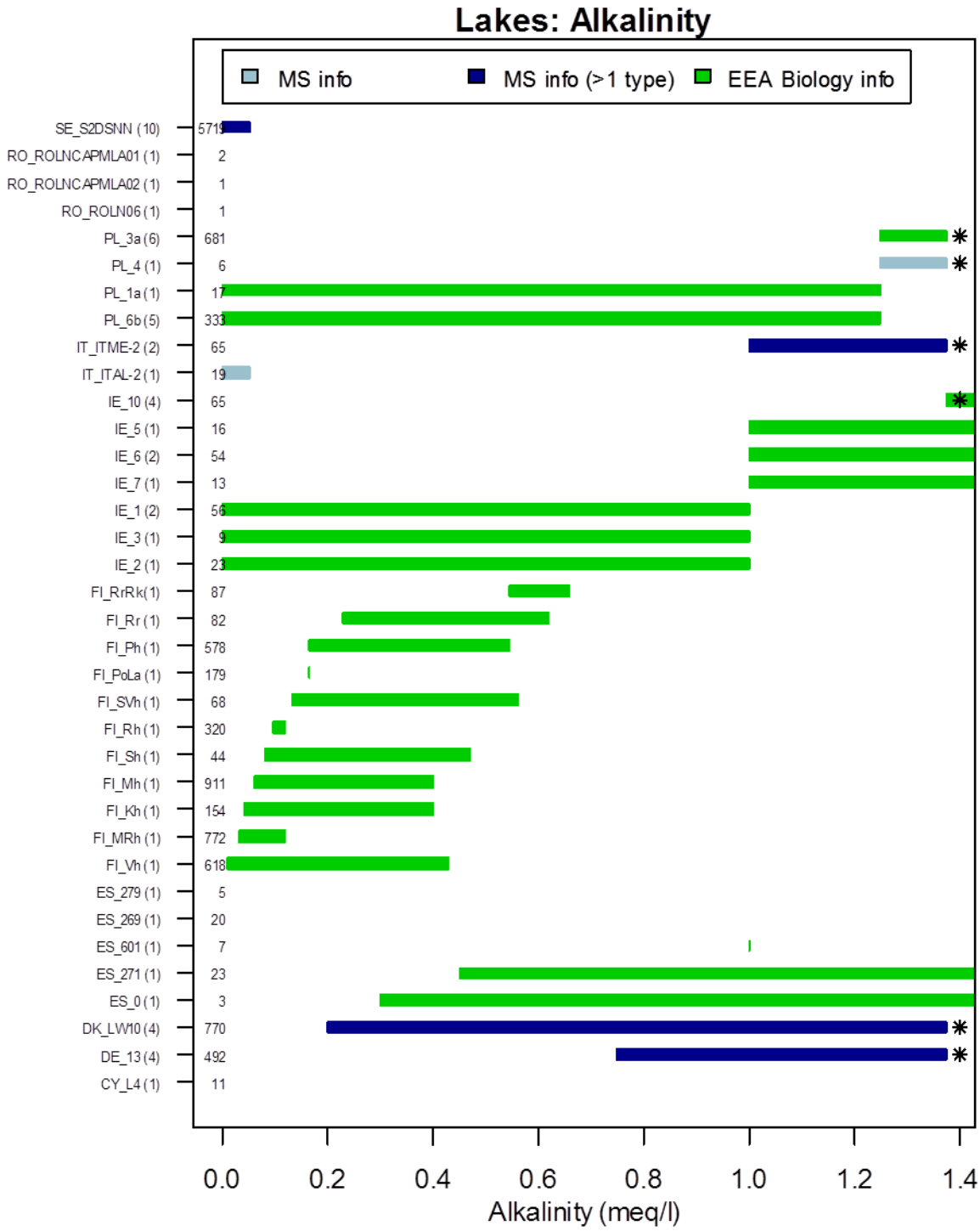


Figure 8. Intervals of the typology factor MeanDepth for each national lake type (**a**) and IC type (**b**). For more details, see description of Figure 3.

a)


Lakes: Geology
MS info
MS info (>1 type)
EEA Biology info
RO_ROLNCAPMLA01 (2) 3
RO_ROLN06 (1) 1
PL_3a (12) 1031
IT_ITME-4 (5) 95
IT_ITAL-3 (2) 48
IT_ITAL-2 (2) 65
IE_5 (1) 16
IE_2 (3) 65
IE_12 (4) 90
IE_10 (1) 24
IE_1 (3) 41
FI_SVh (8) 2948
FI_PoLa (2) 686
FI_Kh (1) 179
ES_8 (1)
ES_601 (5)
ES_6 (1) 7
ES_269 (2) 26
ES_1 (6)
ES_0 (2) 25
EL_LOW-S-M-S (6) 14
EL_HIGH-D-XL-C (6) 8
DE_13 (4) 492
Siliceous
Calcareous
Organic
Geology (categories)

b)


Lakes: Alkalinity
MS info
MS info (>1 type)
EEA Biology info
SE_S2DSNN (10)
RO_ROLNCAPMLA01 (1)
RO_ROLNCAPMLA02 (1)
RO_ROLN06 (1)
PL_3a (6)
PL_4 (1)
PL_1a (1)
PL_6b (5)
IT_ITME-2 (2)
IT_ITAL-2 (1)
IE_10 (4)
IE_5 (1)
IE_6 (2)
IE_7 (1)
IE_1 (2)
IE_3 (1)
IE_2 (1)
FI_RrRk (1)
FI_Rr (1)
FI_Ph (1)
FI_PoLa (1)
FI_SVh (1)
FI_Rh (1)
FI_Sh (1)
FI_Mh (1)
FI_Kh (1)
FI_MRh (1)
FI_Vh (1)
ES_279 (1)
ES_269 (1)
ES_601 (1)
ES_271 (1)
ES_0 (1)
DK_LW10 (4)
DE_13 (4)
CY_L4 (1)
5719
2
1
1
681
6
17
333
65
19
65
16
54
13
56
9
23
87
82
578
179
68
320
44
911
154
772
618
5
20
7
23
3
770
492
11
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Alkalinity (meq/l)

c)

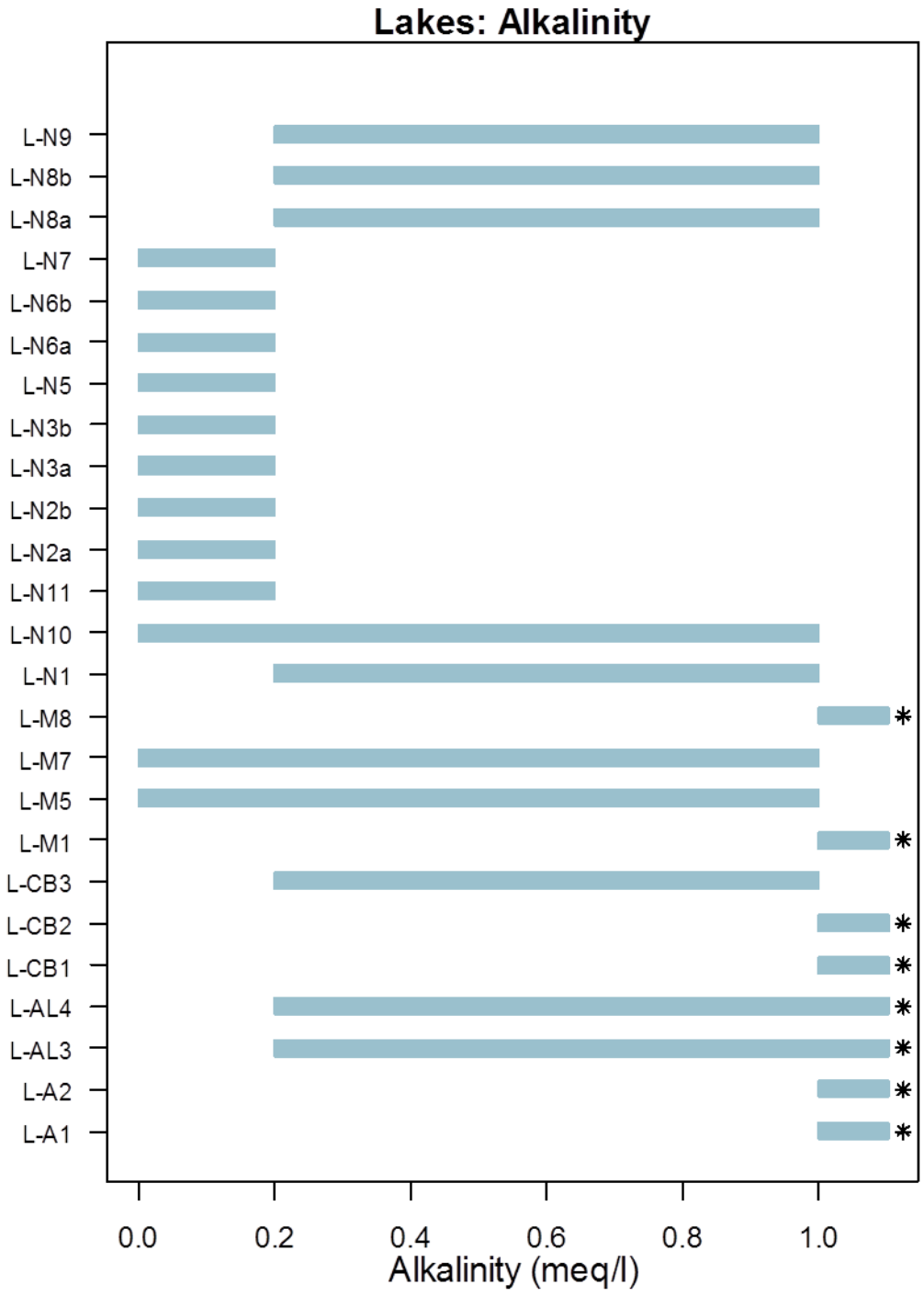


Figure 9. Intervals of the typology factor Geology for each national lake type (**a**) of the typology factor Alkalinity for each national type **(b)** and IC type for alkalinity (**c**). For more details, see description of Figure 3.

In the Annex Figure A2 there are bar-charts for other type factors relating to fewer MSs for rivers and lakes, and for coastal and transitional types.

3.5.Commonly shared types based on national types with high similarity in type factors and ranges

The clustering based on similarities in the most frequently used type factors for national river types (catchment area and altitude) revealed 5 basic clusters of national types (Figure 10). The differences in ranges for the two type factors along with a narrative description of these type clusters are given in Table 5 below. Although the national types included in this analysis only constitute a small proportion of all national types reported, the clusters may indicate some commonalities and the major differences among national river types. For lowland rivers, the national types included in this analysis (the types with numeric type factor ranges available) can be broadly divided into three major common types based on size of catchment area: small (cluster RW 4), medium-large (cluster RW 5) and very large rivers (cluster RW 3). The two other type clusters represent small-medium mid-altitude (cluster RW 1) and high-altitude (cluster RW 2) river types, respectively. Geology is also a frequently used type factor for national river types, but when combining this factor with catchment area and altitude, very few national river types remained so results would not be representative. Thus, there are no results including geology on top of the other two type factors.

For lakes, three type factors, altitude, mean depth and surface area, were combined to assess similarities among the national types with available data on numeric ranges. This analysis gave 8 different clusters of national types (Figure 11). The type cluster LW1 is small, very shallow lowland lakes showing high similarity for national types from IE, PL, IT (one type only) and SE, while the cluster LW2 consists of medium sized, shallow lowland lakes from FI, LV, EE, RO, IE. The cluster LW4 represents very large, shallow lowland lakes in FI, EE, RO. The other lake clusters are mid-altitude or highland lakes, either very large and deep Alpine lakes from AT and IT (LW3), medium sized, shallow-deep highland lakes from the same countries (LW 8), medium sized, shallow mid-altitude or mid-high altitude lakes (LW 5 and LW 7), comprising lake types from Northern (SE, FI) and Alpine (AT, IT) countries, as well as a lake type from Cyprus (CY LW 4). Finally small, shallow, mid-altitude lake types from Poland characterise the type cluster LW 6.

If alkalinity is included as a type factor in addition to altitude, mean depth and surface area, the number of MSs and national types, as well as the number of type clusters decrease (Figure 12). The LWa 1 are small, very shallow lowland lakes with high alkalinity from IE only, while the LWa 6 are medium sized, deep highland lakes with moderate alkalinity mainly from IT. The other four type clusters are all very shallow lakes with different combinations of low or moderate alkalinity, small or medium size and lowland or mid-altitude from PL, IE and SE.

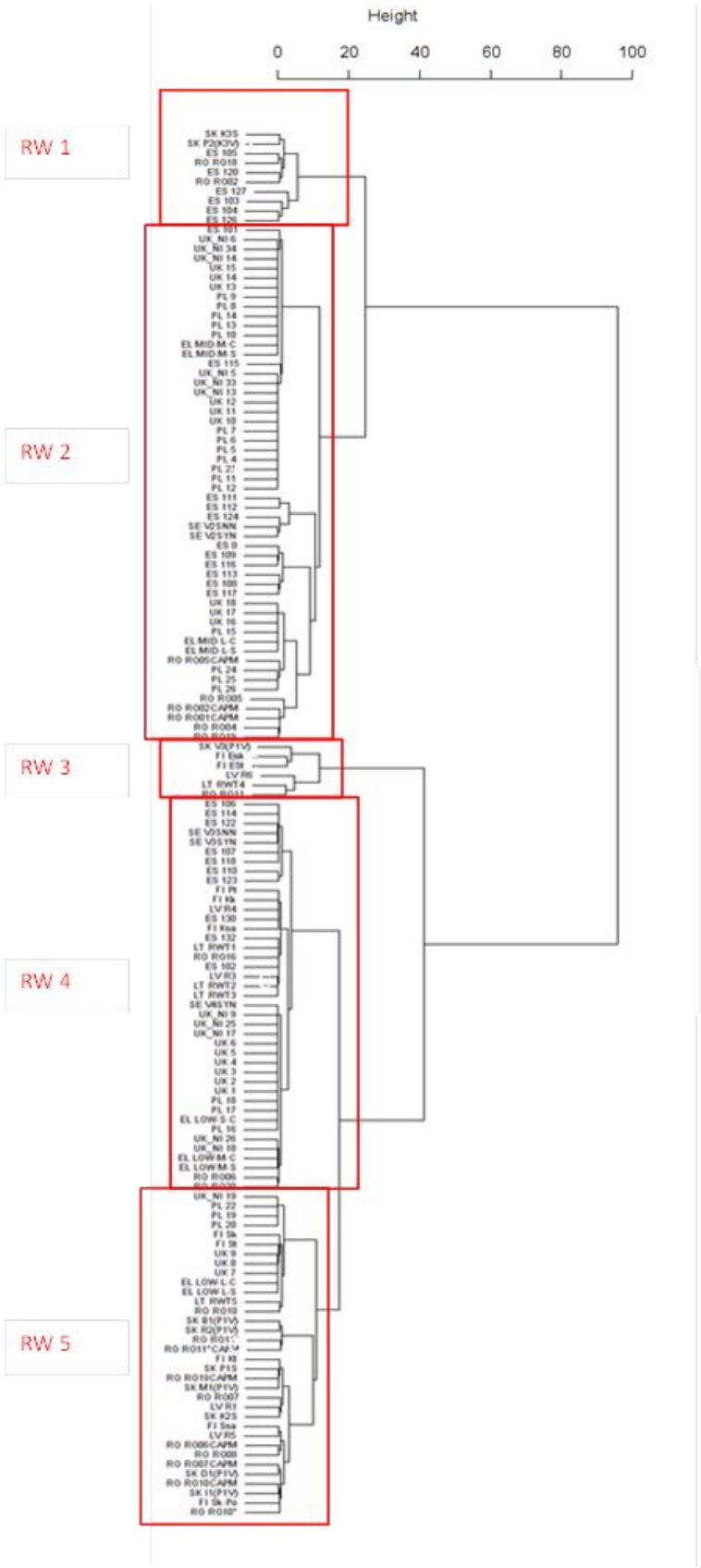


Figure 10. Dendrogram of national rivers types (n=145) (RW) based on minimum and maximum range of altitude and catchment area. RW 1 – 5 identify clusters with internal high similarity of ranges of the type factors altitude and catchment area.

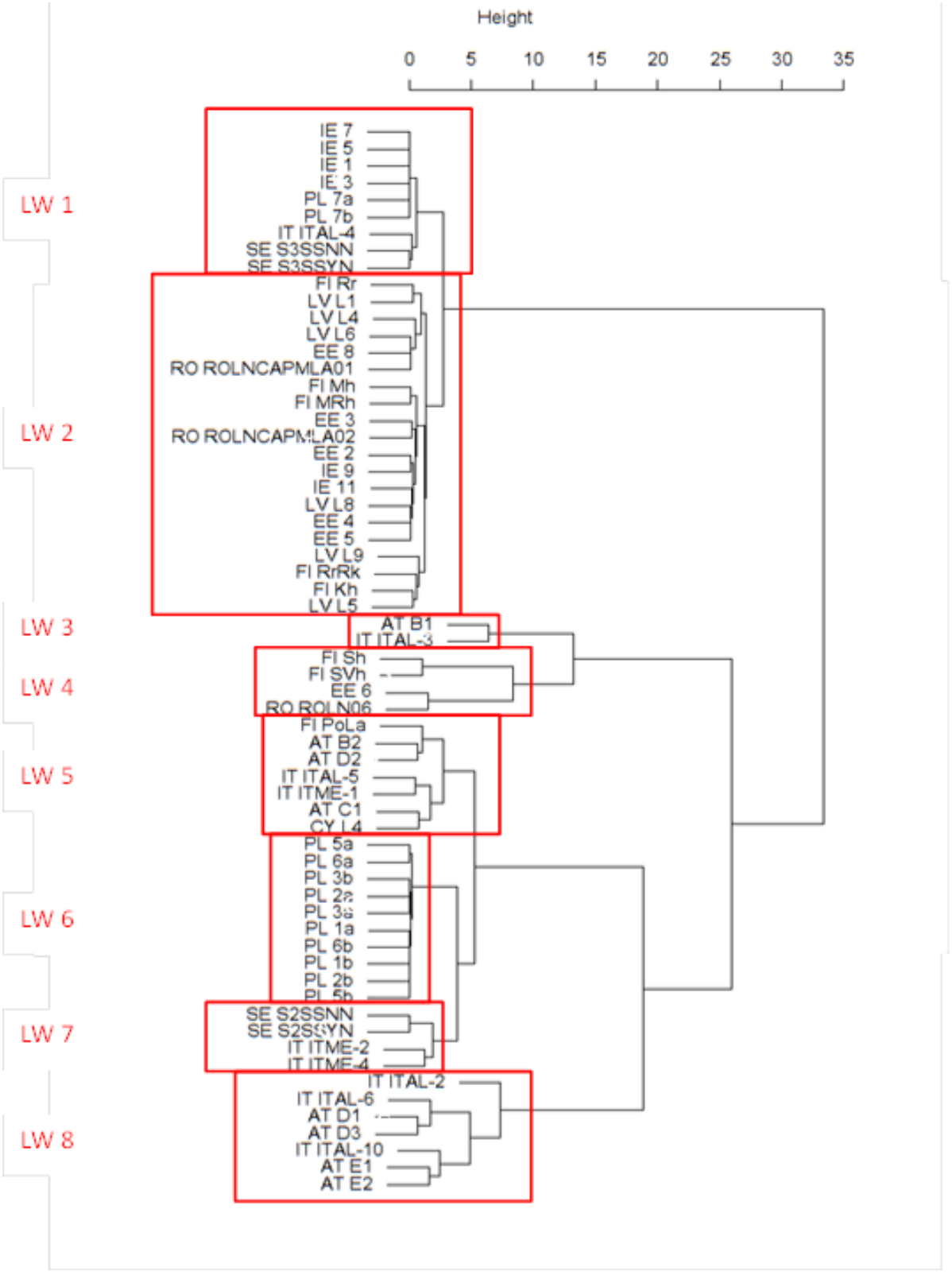


Figure 11. Dendrogram of national lakes types (n=63) (LW) based on minimum and maximum range of altitude, mean depth and surface area. LW 1 – 8 identify clusters with internal high similarity of ranges of the type factors altitude, mean depth and surface area.

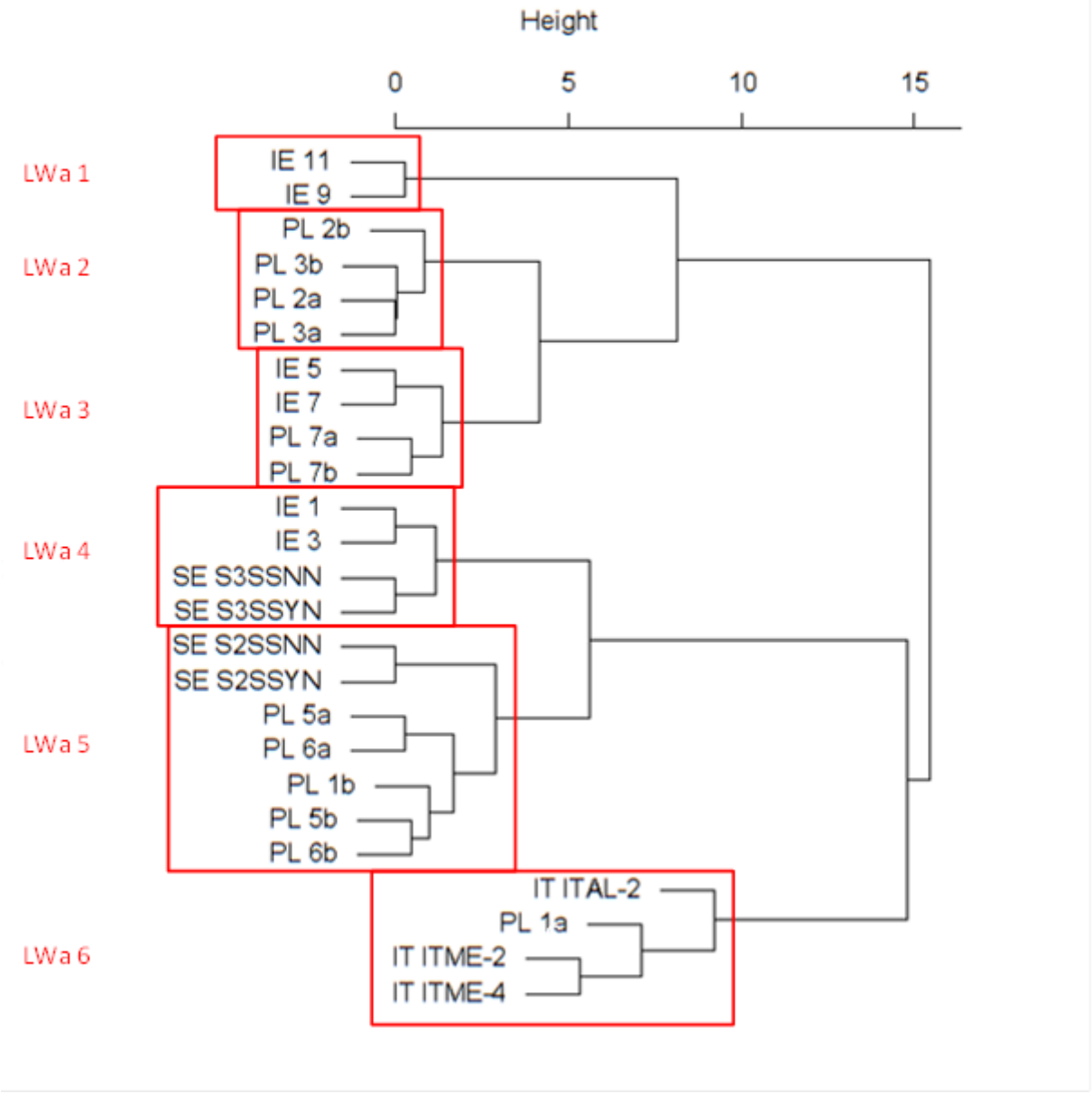


Figure 12. Dendrogram of national lake types (LW) (n=25) based on minimum and maximum range of alkalinity, altitude, mean depth and surface area. LWa 1 – 6 identify clusters with internal high similarity of ranges of the type factors alkalinity, altitude, mean depth and surface area.

Table 5. Characteristics of type clusters for rivers and lakes identified in the dendrograms.

River types excluding alkalinity						
Type clusters	**Alkalinity**	**Altitude**	**Mean depth**	**Surface area**	**Catchment area**	**Description**
RW 1	-	Mid	-	-	Small - medium	Small-medium, mid-altitude rivers
RW 2	-	Mid - high	-	-	Small - medium	Small-medium, mid-high altitude rivers
RW 3	-	Low	-	-	Very large	Very large lowland rivers
RW 4	-	Low	-	-	Small	Small lowland rivers
RW 5	-	Low	-	-	Medium - large	Medium-large lowland rivers
Lake types excluding alkalinity						
Type clusters	**Alkalinity**	**Altitude**	**Mean depth**	**Surface area**	**Catchment area**	**Description**
LW 1	-	Low	very shallow	Small	-	Small, very shallow lowland lakes
LW 2	-	Low	shallow	Medium	-	Medium, shallow lowland lakes
LW 3	-	Mid	deep	Very large	-	Very large, deep, mid-altitude lakes
LW 4	-	Low	shallow	Very large	-	Very large, shallow lowland lakes
LW 5	-	Mid	shallow	Medium	-	Medium, shallow mid-altitude lakes
LW 6	-	Mid	shallow	Small	-	Small, shallow, mid-altitude lakes
LW 7	-	Mid - high	shallow	Medium	-	Medium, shallow, mid-high altitude lakes
LW 8	-	High	shallow-deep	Medium	-	Medium, shallow-deep highland lakes
Lake types including alkalinity						
Type clusters	**Alkalinity**	**Altitude**	**Mean depth**	**Surface area**	**Catchment area**	**Description**
LWa 1	High	Low	very shallow	Small	-	Small, very shallow lowland lakes with high alkalinity
LWa 2	Moderate	Mid	very shallow	Medium	-	Medium, very shallow mid-altitude lakes with moderate alkalinity
LWa 3	Moderate	Low	very shallow	Small	-	Small, very shallow lowland lakes with moderate alkalinity
LWa 4	Low	Low	very shallow	Small - medium	-	Small, very shallow lowland lakes with low alkalinity
LWa 5	Low	Mid	very shallow	Medium	-	Medium, very shallow mid-altitude lakes with low alkalinity
LWa 6	Moderate	High	deep	Medium - large	-	Medium-large, deep highland lakes with moderate alkalinity

4. Conclusions and way forward

- Only a small proportion of national types can be compared due to no or very limited information on numerical type factors ranges in the WISE WFD database, as well as in the GIG reports. Furthermore, mismatch in type coding makes it difficult to link to IC types.
- The most commonly used typology factors are:
    - Rivers: Altitude, Catchment area, and Geology.
    - Lakes: Altitude, Surface Area, Mean Depth, Geology/Alkalinity.
    - Coastal waters: Salinity, Substrate, Wave exposure, Mixing regime, Tidal range.
    - Transitional waters: Salinity, Substrate, Mixing regime, Tidal range.
    - For all water categories also the latitude and longitude are frequently used, indicating region specific types in many MSs.
- Type factor ranges or categories applied for each of the most commonly used type factors (bar-charts) are generally more variable among national types than among the IC types. For some type factors the majority of national types with numeric type factor data show good correspondence with IC types, e.g. rivers altitude, lake depth. Many national types are also quite similar for a single type factor, although the correspondence with the IC types from intercalibration phase 1 may be less good.
- The outcome of the similarity analyses of national types of rivers and lakes across the most frequently used type factors suggests that many national types have high similarity and may be grouped to a limited number of common types. These common types are given in Table 5 above and may be quite useful for European assessments if updated with more MSs, also taking typology revisions done during intercalibration phase 2 into account. For coastal and

transitional waters the data on numeric ranges of type factors were too limited to allow further analysis in this study.

- Recommendations on the way forward:
    - More information is needed from MSs on the numerical ranges applied for all their national types, including coastal and transitional waters, updated after intercalibration phase 2.
    - Once the information becomes available, a new assessment of similarities and comparabilities between national types should be assessed and evaluated relative to the outcome of the results given in this report.
    - The consequences of the large number of national types and in many cases weak links to the IC types should be assessed, especially concerning the implications for the translation of IC results to national types and for the comparability of assessments of ecological status.
    - Pan-European comparisons can be improved using type clusters with high internal similarities of national types (important for EEA and for EC).
    - Some of the national types may not be needed, although this topic must be discussed with MSs in terms of the potential for further harmonisation or reduction of the number of national types based on their similarity of type factors and on the number of water bodies they represent.

References

R Development Core Team (2012). R: A Language and Environment for Statistical Computing. *R Foundation for Statistical Computing* Vienna, Austria. http://www.R-project.org/.

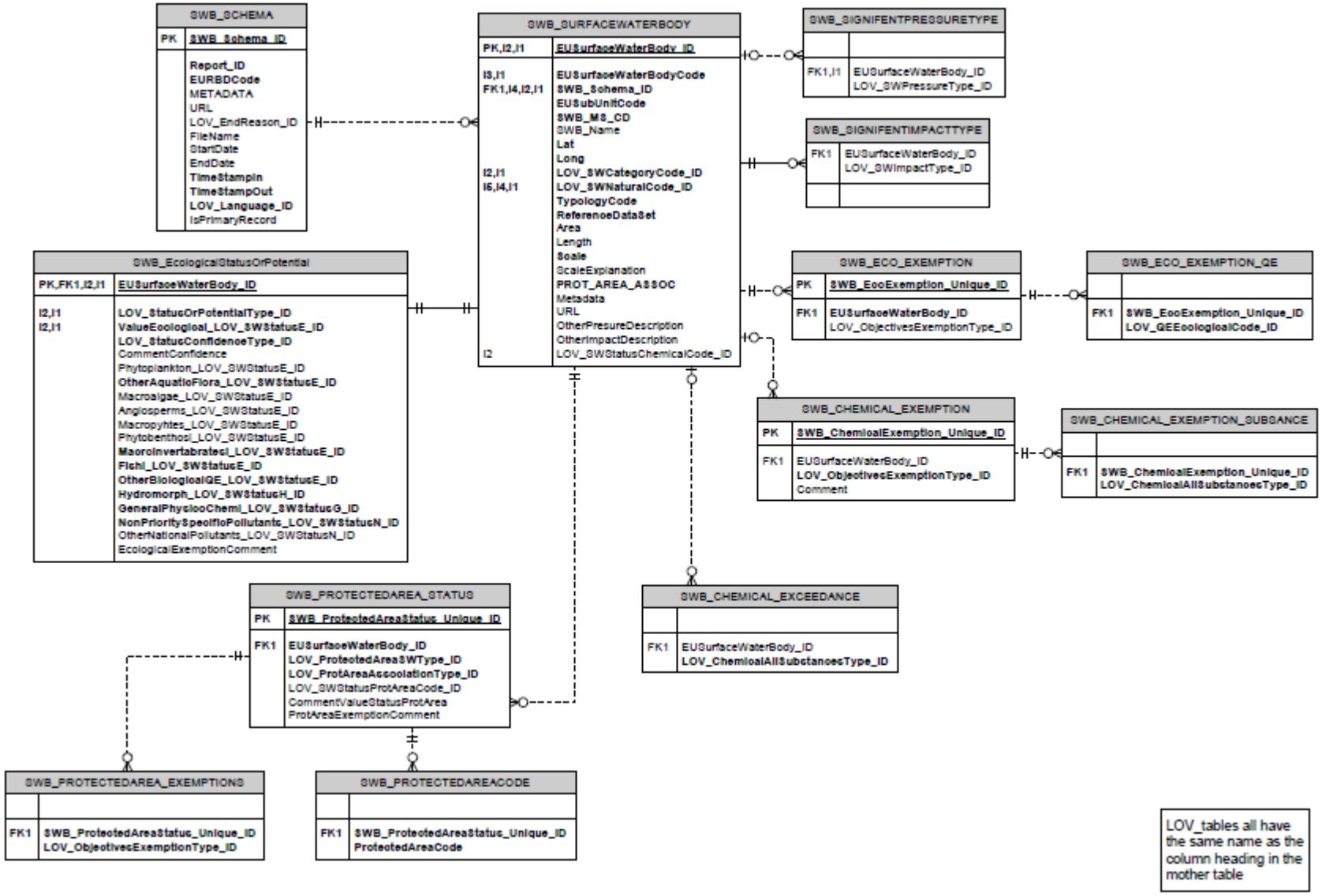
JRCa 2009. Water Framework Directive Intercalibration Technical Report. Part 1. Rivers. EUR report 23838 EN/1. 136 pp.

JRCb 2009. Water Framework Directive Intercalibration Technical Report. Part 2. Lakes. EUR report 23838 EN/2. 176 pp.

JRCc 2009. Water Framework Directive Intercalibration Technical Report. Part 2. Coastal and Transitional Waters. EUR report 23838 EN/3. 240 pp.

Annex

(a)


SWB_SCHEMA
PK SWB_Schema_ID
Report_ID
EURBDCode
METADATA
URL
LOV_EndReason_ID
FileName
StartDate
EndDate
TimeStampIn
TimeStampOut
LOV_Language_ID
IsPrimaryRecord
SWB_SURFACEWATERBODY
PK,I2,I1 EUSurfaceWaterBody_ID
I3,I1 EUSurfaceWaterBodyCode
FK1,I4,I2,I1 SWB_Schema_ID
EUSubUnitCode
SWB_MS_CD
SWB_Name
Lat
Long
I2,I1 LOV_SWCategoryCode_ID
I5,I4,I1 LOV_SWNaturalCode_ID
TypologyCode
ReferenceDataSet
Area
Length
Scale
ScaleExplanation
PROT_AREA_ASSOC
Metadata
URL
OtherPresureDescription
OtherImpactDescription
I2 LOV_SWStatusChemicalCode_ID
SWB_SIGNIFENTPRESSURETYPE
FK1,I1 EUSurfaceWaterBody_ID
LOV_SWPressureType_ID
SWB_SIGNIFENTIMPACTTYPE
FK1 EUSurfaceWaterBody_ID
LOV_SWImpactType_ID
SWB_EcologicalStatusOrPotential
PK,FK1,I2,I1 EUSurfaceWaterBody_ID
I2,I1 LOV_StatusOrPotentialType_ID
I2,I1 ValueEcological_LOV_SWStatusE_ID
LOV_StatusConfidenceType_ID
CommentConfidence
Phytoplankton_LOV_SWStatusE_ID
OtherAquaticFlora_LOV_SWStatusE_ID
Macroalgae_LOV_SWStatusE_ID
Angiosperms_LOV_SWStatusE_ID
Macrophytes_LOV_SWStatusE_ID
Phytobenthos_LOV_SWStatusE_ID
MacroInvertabrates_LOV_SWStatusE_ID
Fish_LOV_SWStatusE_ID
OtherBiologicalGE_LOV_SWStatusE_ID
Hydromorph_LOV_SWStatusH_ID
GeneralPhysicoChem_LOV_SWStatusG_ID
NonPrioritySpecificPollutants_LOV_SWStatusN_ID
OtherNationalPollutants_LOV_SWStatusN_ID
EcologicalExemptionComment
SWB_ECO_EXEMPTION
PK SWB_EcoExemption_Unique_ID
FK1 EUSurfaceWaterBody_ID
LOV_ObjectivesExemptionType_ID
SWB_ECO_EXEMPTION_QE
FK1 SWB_EcoExemption_Unique_ID
LOV_QEEcologicalCode_ID
SWB_CHEMICAL_EXEMPTION
PK SWB_ChemicalExemption_Unique_ID
FK1 EUSurfaceWaterBody_ID
LOV_ObjectivesExemptionType_ID
Comment
SWB_CHEMICAL_EXEMPTION_SUBSANCE
FK1 SWB_ChemicalExemption_Unique_ID
LOV_ChemicalAllSubstancesType_ID
SWB_PROTECTEDAREA_STATUS
PK SWB_ProtectedAreaStatus_Unique_ID
FK1 EUSurfaceWaterBody_ID
LOV_ProtectedAreaSWType_ID
LOV_ProtAreaAssociationType_ID
LOV_SWStatusProtAreaCode_ID
CommentValueStatusProtArea
ProtAreaExemptionComment
SWB_CHEMICAL_EXCEEDANCE
FK1 EUSurfaceWaterBody_ID
LOV_ChemicalAllSubstancesType_ID
SWB_PROTECTEDAREA_EXEMPTIONS
FK1 SWB_ProtectedAreaStatus_Unique_ID
LOV_ObjectivesExemptionType_ID
SWB_PROTECTEDAREACODE
FK1 SWB_ProtectedAreaStatus_Unique_ID
ProtectedAreaCode
LOV_tables all have the same name as the column heading in the mother table

(b)

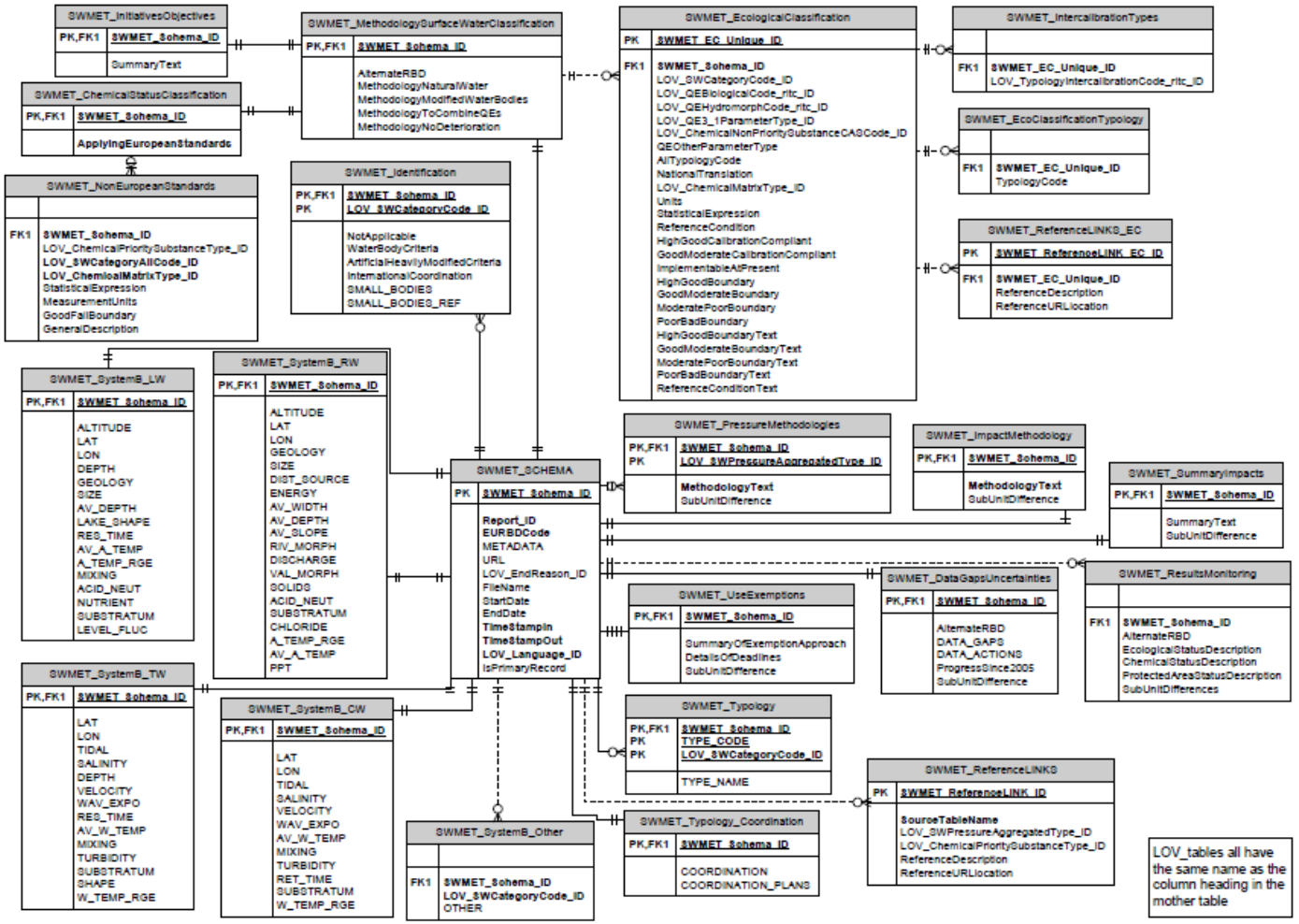


Figure A.1. Diagram of WFD Master database model, for schema used in this project: **(a)** Schema SWB (Surface Water Body); (**b**) Schema SWMET (Surface Water Methodology). The diagram was provided by Jon Maidens at Atkins (version 06.05.2011). Fields which reference a look-up table (code list) are named with the LOV table name suffixed with "_ID"; the look-up tables are not shown in the diagram.

Table A.1. Overview of available information for frequently used typology factors for each MS for rivers (**a**), lakes (**b**), transitional waters (**c**) and coastal waters (**d**). The most frequently used typology factors were selected as described in Section 2.3.2. Explanation to columns "YN": "Y" means that the MS has reported use of the factor for at least one type; "N" means that the MS has reported "N" for all types; blank means that the MS has not reported this kind of information. Explanation to columns "Info": "MS" means that more information on the type factor (interval or categories) is available for at least one type, from one or more of the sources listed in sections 2.1.1.-2.; "EEA" means that information on the type factor is not available from sources listed in section 2.1.1.-2. but from EEA Biology; blank means that no information on the type factor is available. WC = water category; C_CD = country code.

a)		**Geology**		**CatchmentArea**		**Altitude**		**Discharge**		**Substratum**		**Slope**	
WC	**C_CD**	**YN**	**Info**	**YN**	**Info**	**YN**	**Info**	**YN**	**Info**	**YN**	**Info**	**YN**	**Info**
RW	**AT**	Y		Y		Y		Y		N		N	
RW	**BE**	Y		Y		Y		N		Y		N	
RW	**BG**	Y		Y	MS	Y		Y		Y		N	
RW	**CY**	N		N		N		Y		N		N	
RW	**CZ**	Y		Y		Y		N		N		N	
RW	**DE**	Y		Y		Y		N		Y		N	
RW	**DK**				MS								
RW	**EE**	Y		Y	MS	N		N		Y		N	
RW	**EL**		MS		MS		MS						
RW	**ES**	Y	EEA	Y	EEA	Y	EEA	Y		Y		Y	
RW	**FI**	Y		Y	MS	Y	EEA	N	EEA	N		N	
RW	**FR**	Y		Y		Y		Y		N		Y	
RW	**HU**	Y		N	MS	Y	MS	N		N		Y	
RW	**IE**		MS										
RW	**IT**	Y		Y		Y		Y		Y		Y	
RW	**LT**	Y		Y	MS	Y	EEA	N	EEA	N		Y	
RW	**LU**	Y		Y		N		Y		Y		N	
RW	**LV**				EEA		EEA		EEA				
RW	**NL**	Y		Y		N		N		N		Y	
RW	**PL**		MS		MS		MS						
RW	**PT**	Y		Y		Y		Y		N		Y	
RW	**RO**	Y	MS	Y	MS	Y	MS	Y	MS	Y	MS	Y	MS
RW	**SE**	N		Y	MS	N	MS	N		N		N	
RW	**SI**												
RW	**SK**		EEA		EEA		MS						
RW	**UK**	N	MS	N	MS	Y	MS	N		N		N	
RW	**UK_NI**		MS		MS		MS						

b)		SurfaceArea		MeanDepth		Geology		Altitude		Mixing		Alkalinity	
WC	**C_CD**	**YN**	**Info**	**YN**	**Info**	**YN**	**Info**	**YN**	**Info**	**YN**	**Info**	**YN**	**Info**
LW	**AT**	Y	MS	Y	MS	Y		Y	MS	Y		N	
LW	**BE**	Y	EEA	Y		Y		Y		N		Y	
LW	**BG**	Y	MS	Y		Y		Y		Y		N	
LW	**CY**	N		N		N		N	EEA	N		N	EEA
LW	**CZ**	Y		Y		Y		Y		N		N	
LW	**DE**	Y		Y		Y	MS	Y	MS	Y		Y	
LW	**DK**	Y		Y	MS	N		N		Y		Y	MS
LW	**EE**	Y	MS	N	EEA	Y		N	EEA	Y		N	
LW	**EL**		MS				MS		MS				MS
LW	**ES**	Y	EEA	Y		Y	MS	Y	MS	Y		Y	EEA
LW	**FI**	Y	MS	Y	MS	Y	EEA	Y	EEA	N		Y	EEA
LW	**FR**	Y		N		Y		Y		Y		N	
LW	**HU**	Y	MS	Y		Y		Y		N		N	
LW	**IE**		MS		MS		EEA		MS				MS
LW	**IT**	Y	MS	Y	MS	Y	MS	Y	MS	Y		Y	MS
LW	**LT**	Y		Y	MS	Y		Y		N		N	
LW	**LV**		EEA		EEA				EEA				
LW	**NL**	Y		Y		Y		N		N		Y	
LW	**PL**		EEA		MS		EEA		MS				EEA
LW	**PT**	Y		Y		Y		Y		Y		N	
LW	**RO**	Y	EEA	Y	EEA	Y	EEA	Y	EEA	N		N	EEA
LW	**SE**	Y	MS	Y	MS	N		N	MS	N		N	MS
LW	**SI**												
LW	**UK**	Y		Y		Y		Y		N		N	

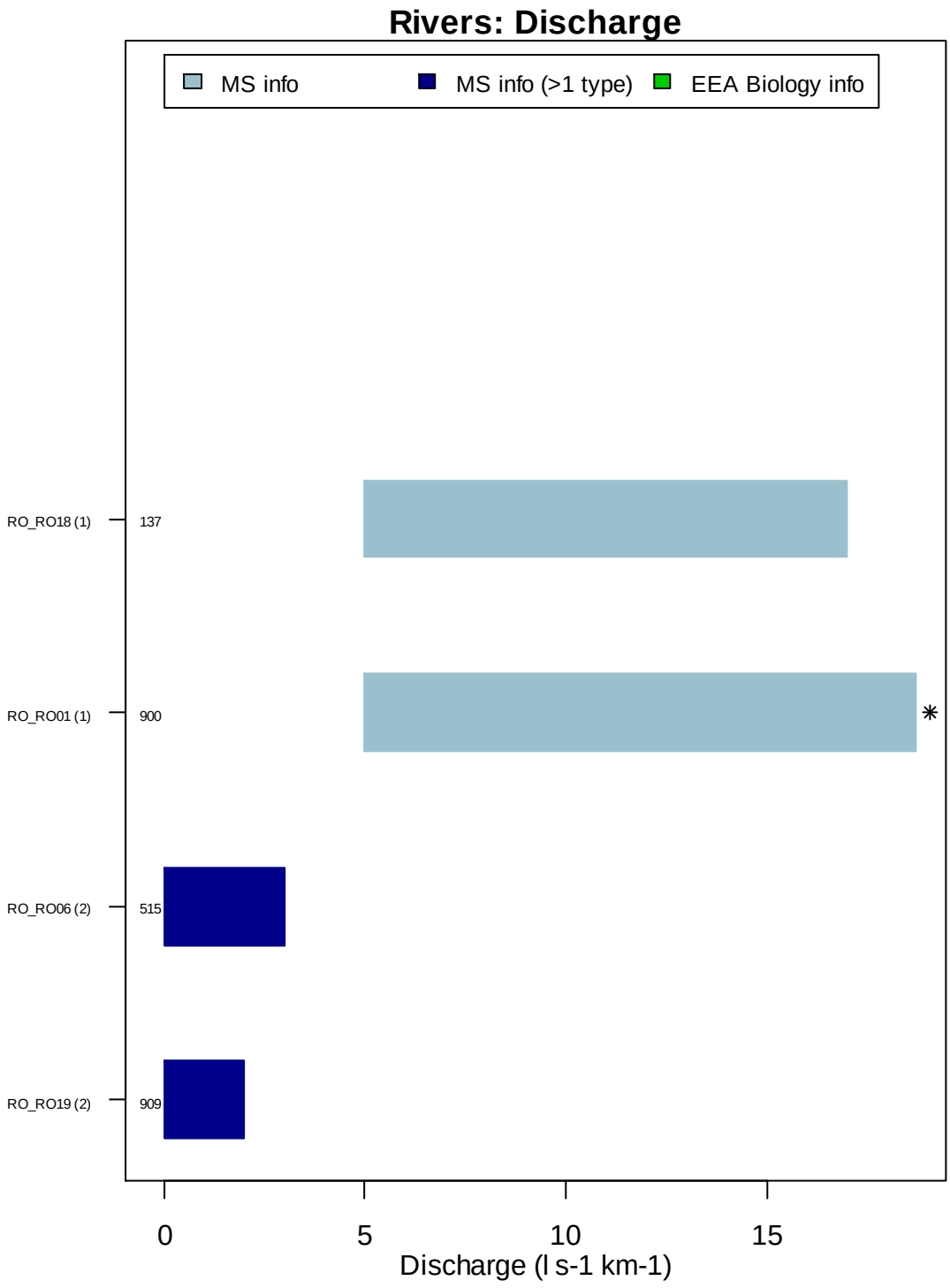
c)		Salinity		TidalRange		Substratum		Mixing	
WC	**C_CD**	**YN**	**Info**	**YN**	**Info**	**YN**	**Info**	**YN**	**Info**
TW	**BE**	Y		Y		N		Y	
TW	**BG**								
TW	**DE**	Y		Y		Y		N	
TW	**EL**	Y		Y		Y		Y	
TW	**ES**	Y		Y		Y		Y	
TW	**FR**	Y		Y		Y		Y	
TW	**IE**		MS		MS		MS		
TW	**IT**	Y		Y		Y		Y	
TW	**LT**	Y		N		Y		N	
TW	**LV**								
TW	**NL**	N		Y		N		N	
TW	**PL**		MS		MS		MS		
TW	**PT**	Y		Y		N		Y	
TW	**RO**	Y		N		Y		N	
TW	**SE**	Y		N		Y		Y	
TW	**UK**	Y	MS	Y	MS	Y	MS	Y	
TW	**UK_NI**		MS		MS		MS		

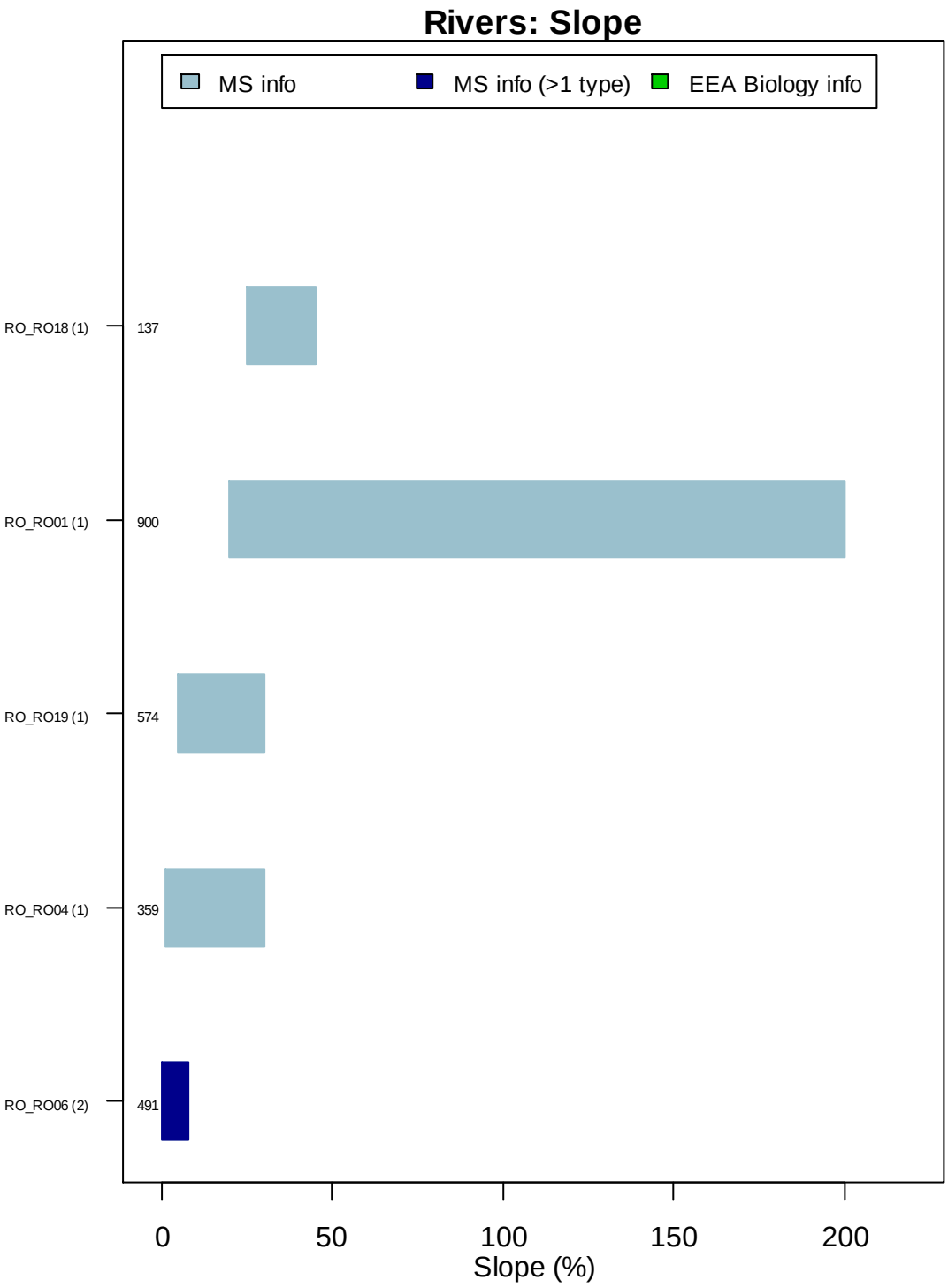
d)		Salinity		Exposure		TidalRange		Substratum		Mixing	
WC	**C_CD**	YN	**Info**	**YN**	**Info**	**YN**	**Info**	**YN**	**Info**	**YN**	**Info**
CW	**BE**	Y		Y		Y		Y		Y	
CW	**BG**	N		Y		N		Y		N	
CW	**CY**	N		Y		N		Y		N	
CW	**DE**	Y		Y		Y		Y		Y	
CW	**DK**										
CW	**EE**	Y		Y		N		Y		Y	
CW	**EL**	Y		Y		Y		Y		Y	
CW	**ES**	Y		Y		Y		Y		Y	
CW	**FI**	Y		Y		N		N		Y	
CW	**FR**	Y		Y		Y		Y		Y	
CW	**IE**		MS		MS		MS				
CW	**IT**	Y		N		N		Y		Y	
CW	**LT**	Y		N		N		Y		N	
CW	**LV**										
CW	**MT**	Y		Y		Y		N		Y	
CW	**NL**	Y		N		N		Y		N	
CW	**PL**		MS		MS		MS				
CW	**PT**	Y		Y		Y		N		N	
CW	**RO**	Y		Y		Y		Y		Y	
CW	**SE**	Y		Y		N		Y		Y	
CW	**SI**										
CW	**UK**	Y	MS	Y	MS	Y	MS	N		N	
CW	**UK_NI**		MS		MS		MS				

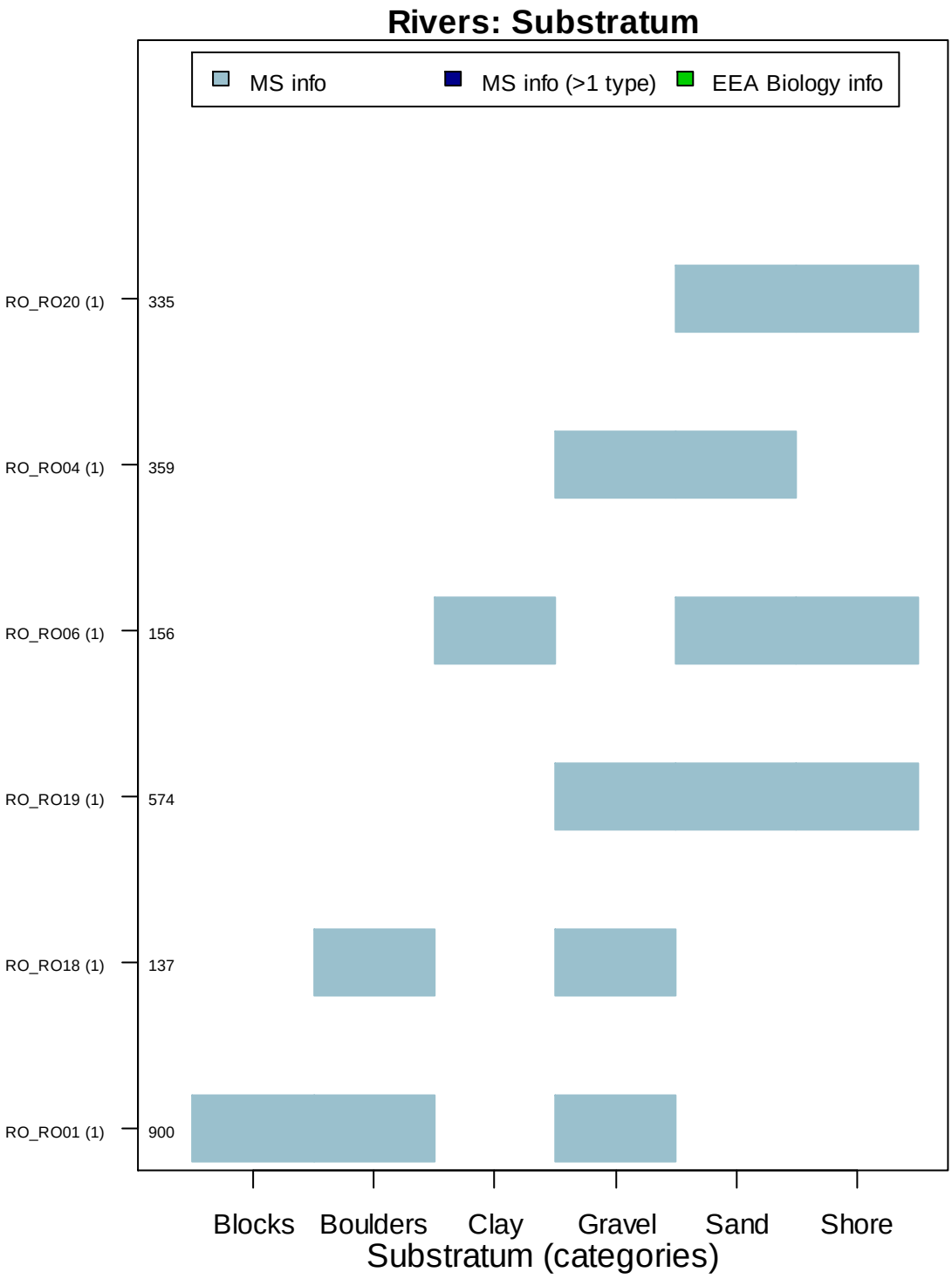
Table A.2. Xls-File with most common types provided by WRc on 21st June 2012, RW, LW, TW and CW summary sheets.

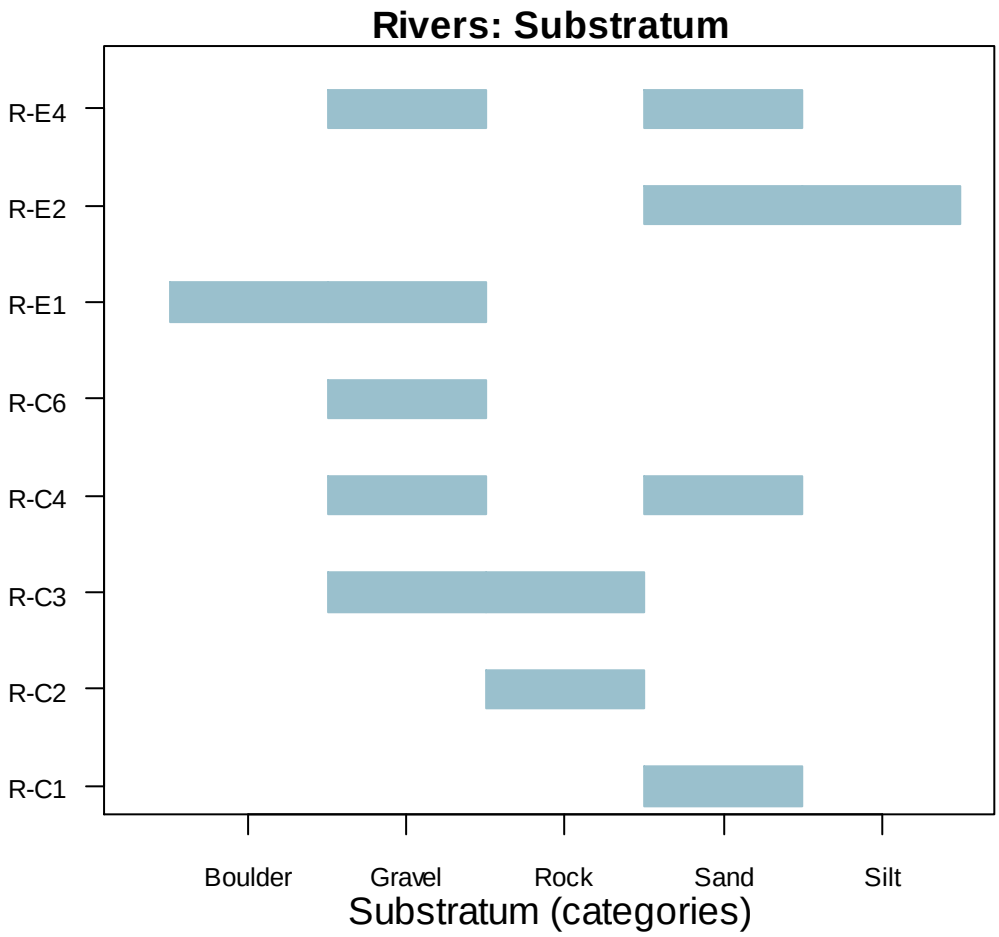
Due to the large number of sheets and size of each sheet in this file, it is attached as a separate file.

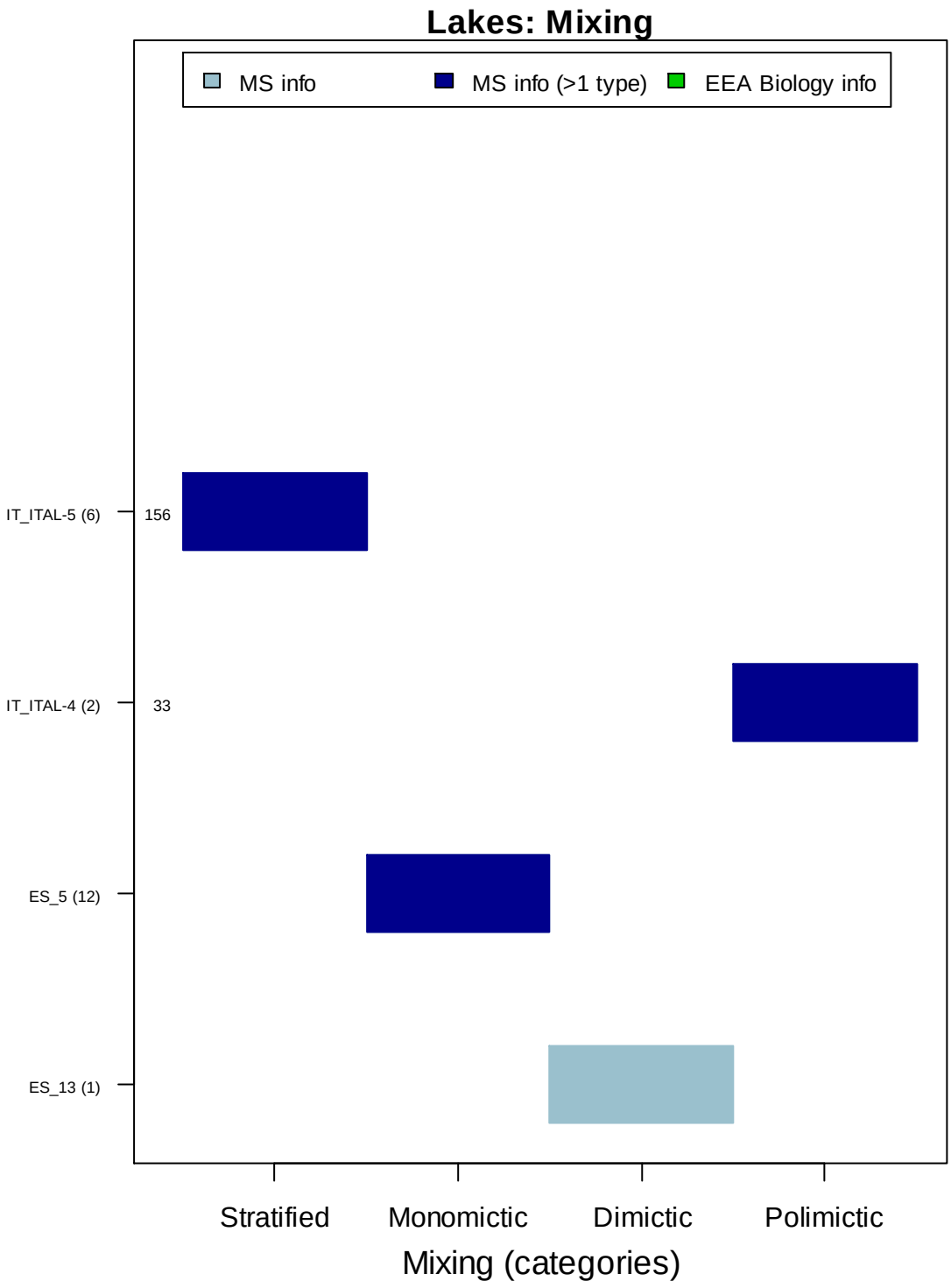
Figure A.2. Bar-charts with typology factors available for less than 6 MSs: national types and IC types, respectively. (For national types, the y-axis label starts with the country code). For more details, see description of Figure 3.

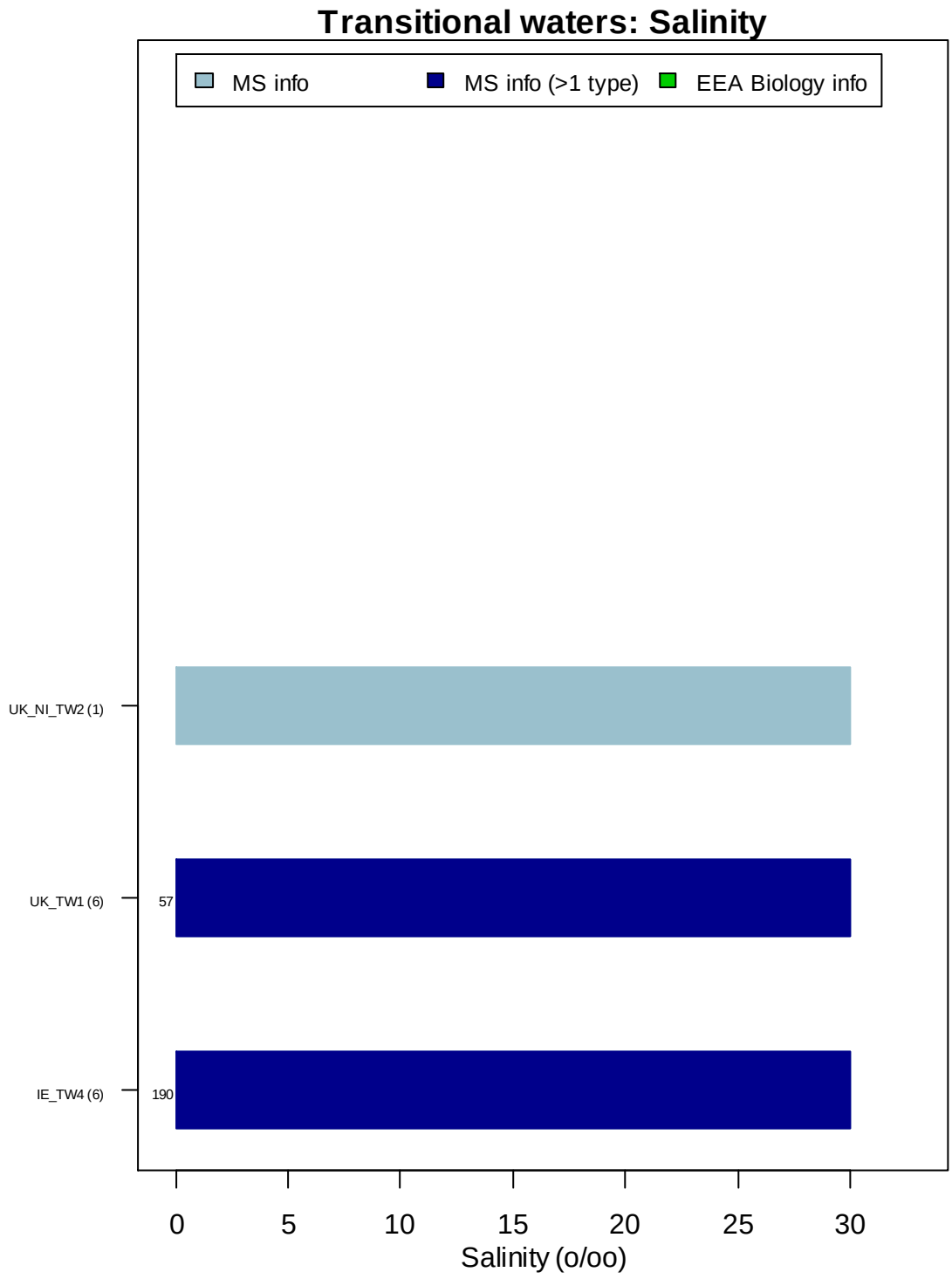


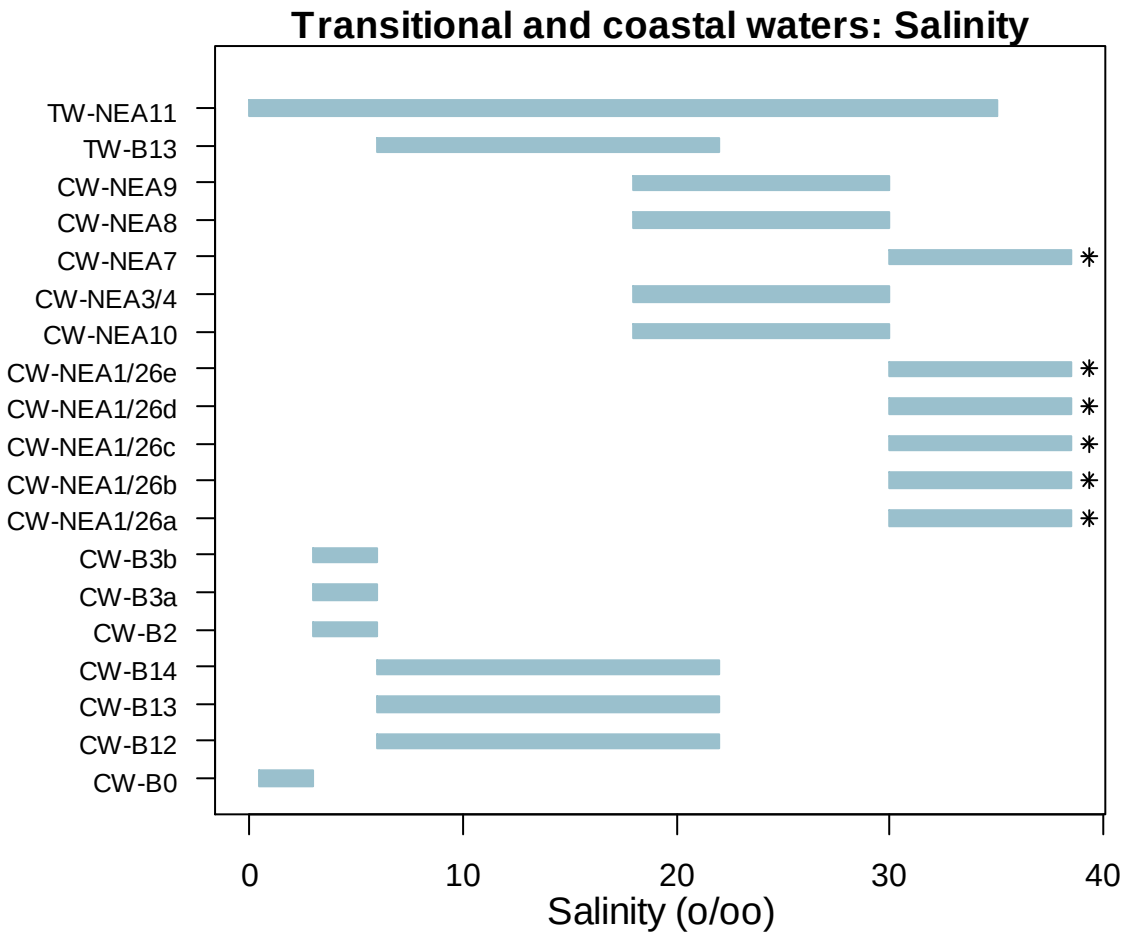

Rivers: Slope
MS info
MS info (>1 type)
EEA Biology info
RO_RO18 (1)
137
RO_RO01 (1)
900
RO_RO19 (1)
574
RO_RO04 (1)
359
RO_RO06 (2)
491
0
50
100
150
200
Slope (%)

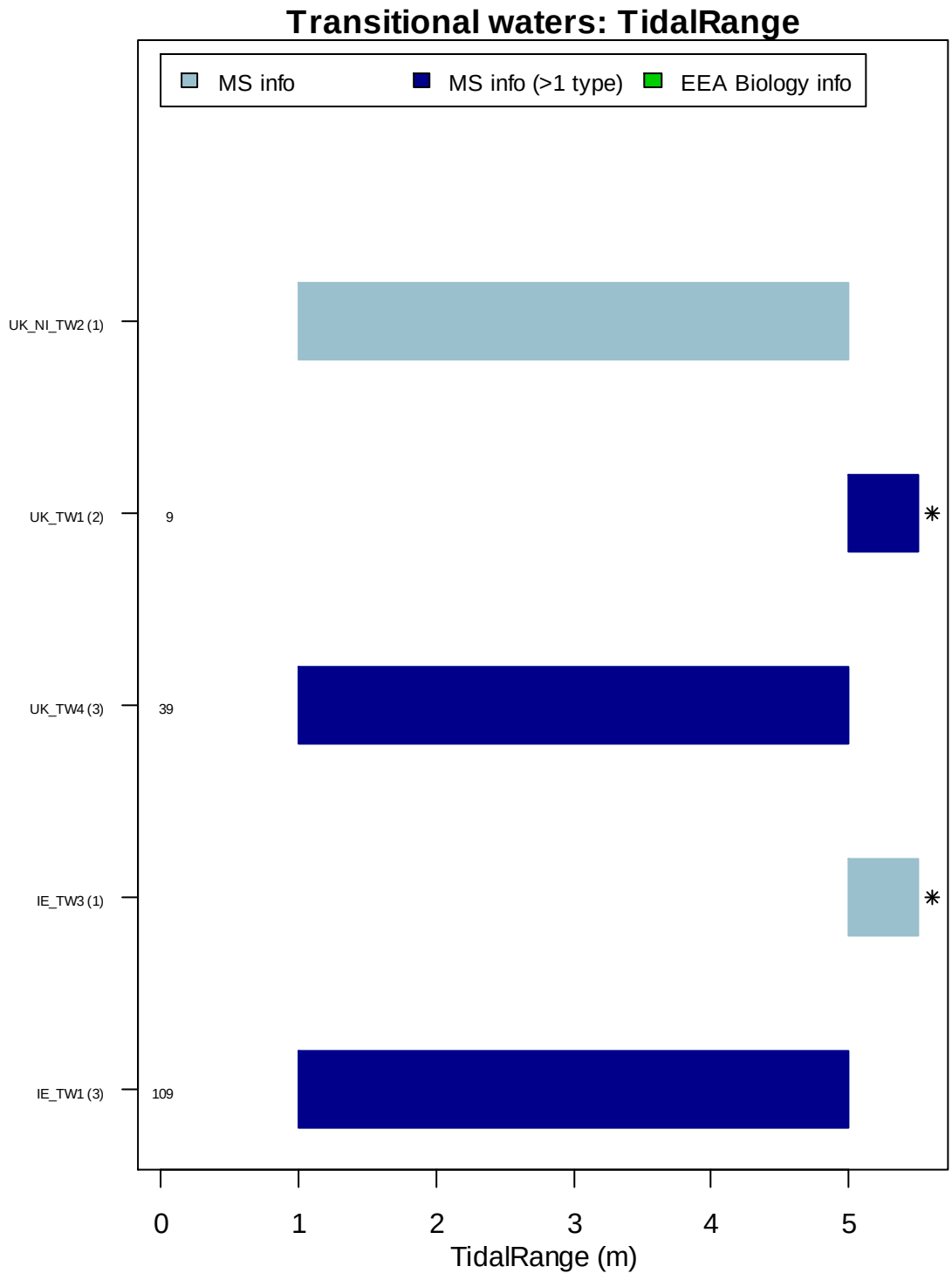

Rivers: Substratum
MS info
MS info (>1 type)
EEA Biology info
RO_RO20 (1)
335
RO_RO04 (1)
359
RO_RO06 (1)
156
RO_RO19 (1)
574
RO_RO18 (1)
137
RO_RO01 (1)
900
Blocks
Boulders
Clay
Gravel
Sand
Shore
Substratum (categories)

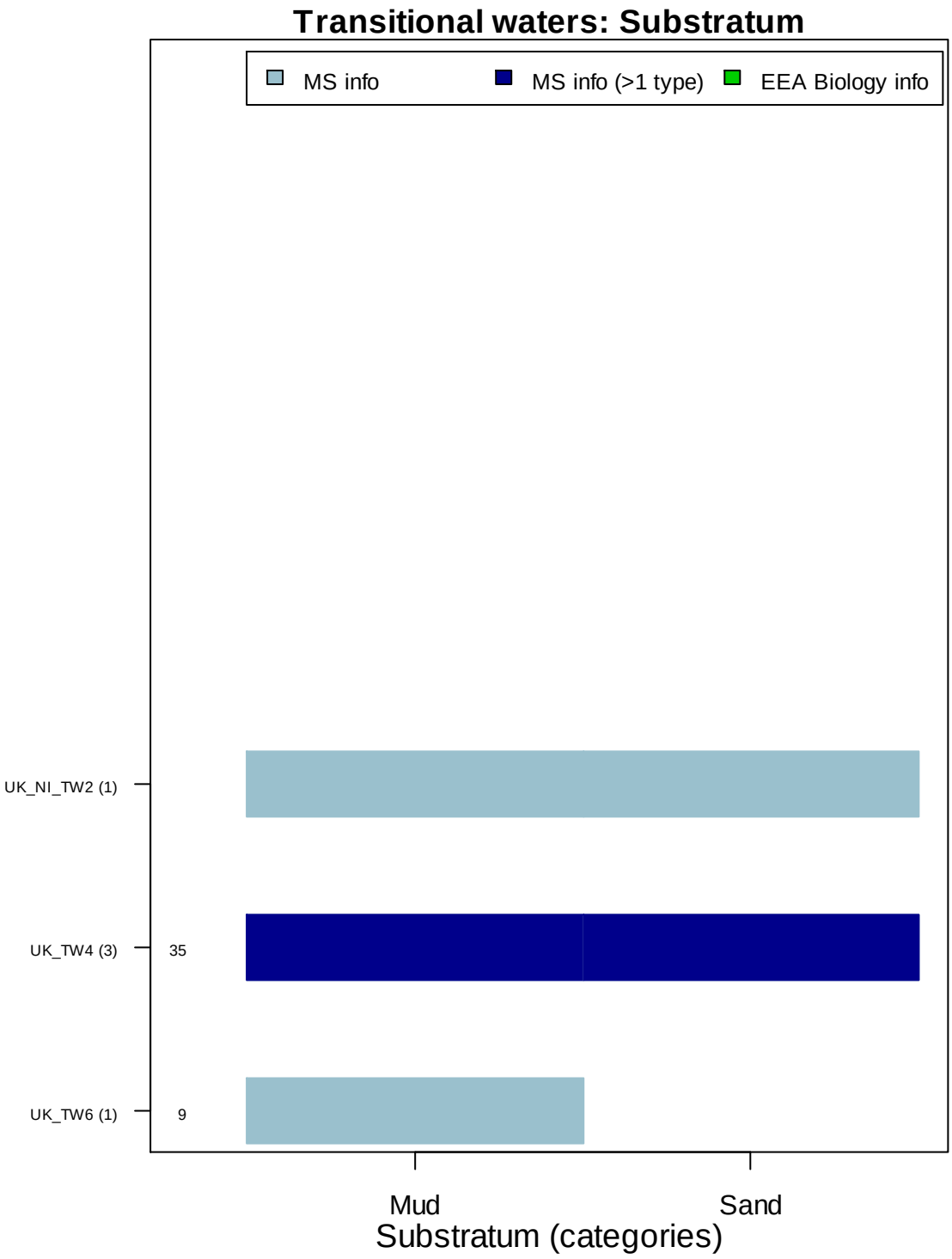

Rivers: Substratum
R-E4
R-E2
R-E1
R-C6
R-C4
R-C3
R-C2
R-C1
Boulder
Gravel
Rock
Sand
Silt
Substratum (categories)

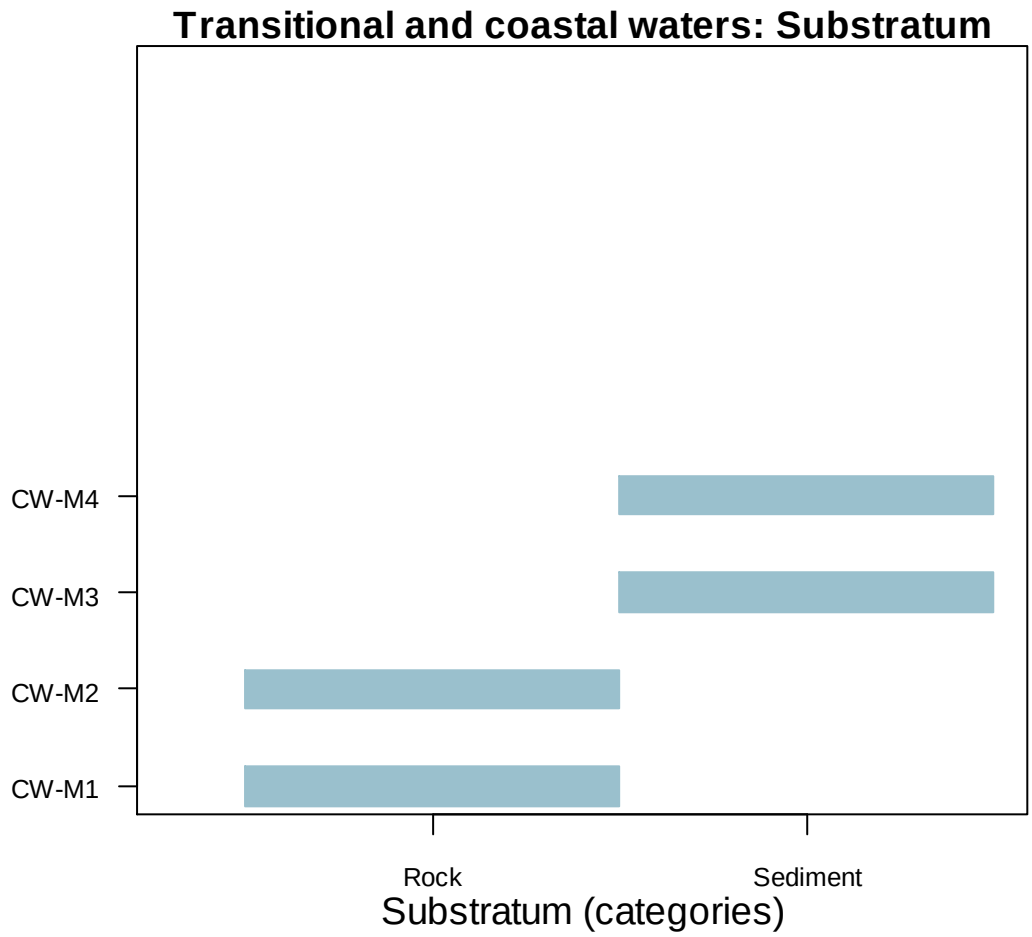

Lakes: Mixing
MS info
MS info (>1 type)
EEA Biology info
IT_ITAL-5 (6)
156
IT_ITAL-4 (2)
33
ES_5 (12)
ES_13 (1)
Stratified
Monomictic
Dimictic
Polimictic
Mixing (categories)

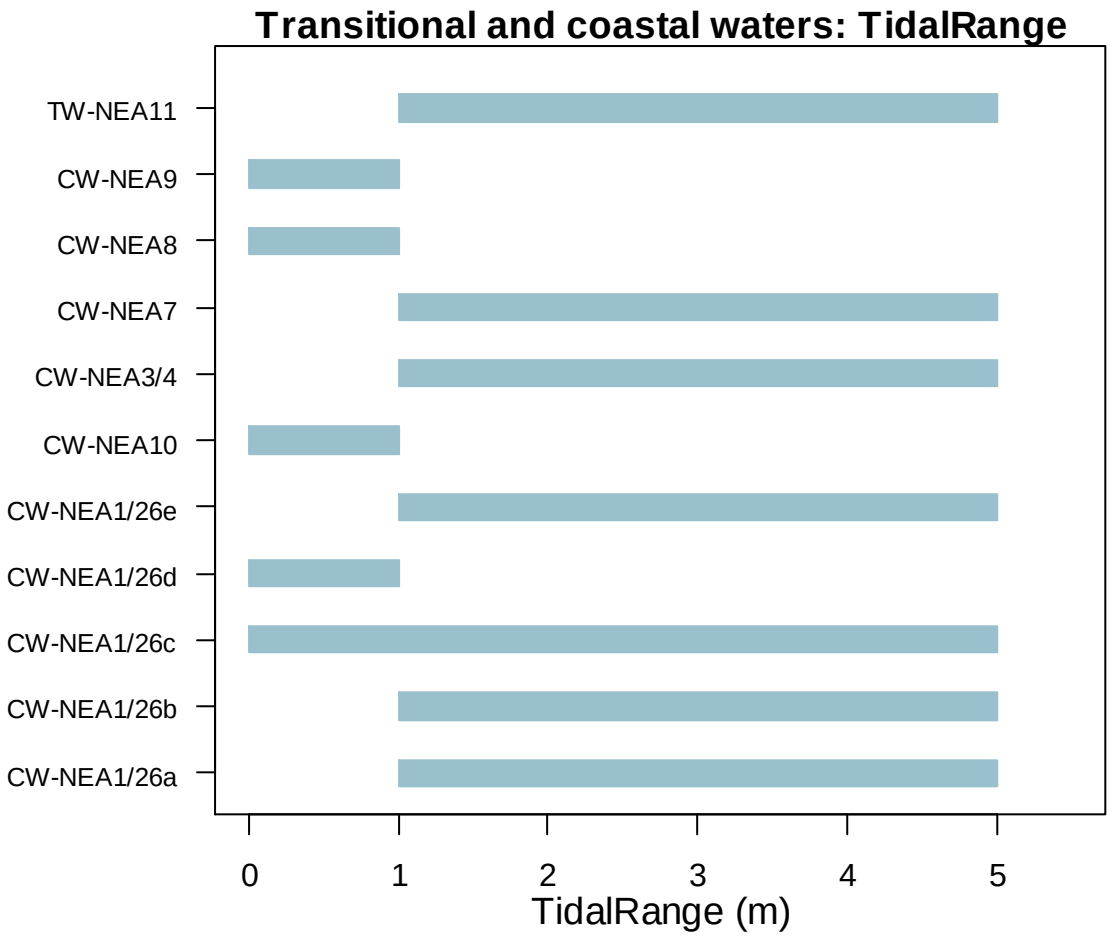

Transitional waters: Salinity
MS info
MS info (>1 type)
EEA Biology info
UK_NI_TW2 (1)
UK_TW1 (6)
57
IE_TW4 (6)
190
0
5
10
15
20
25
30
Salinity (o/oo)

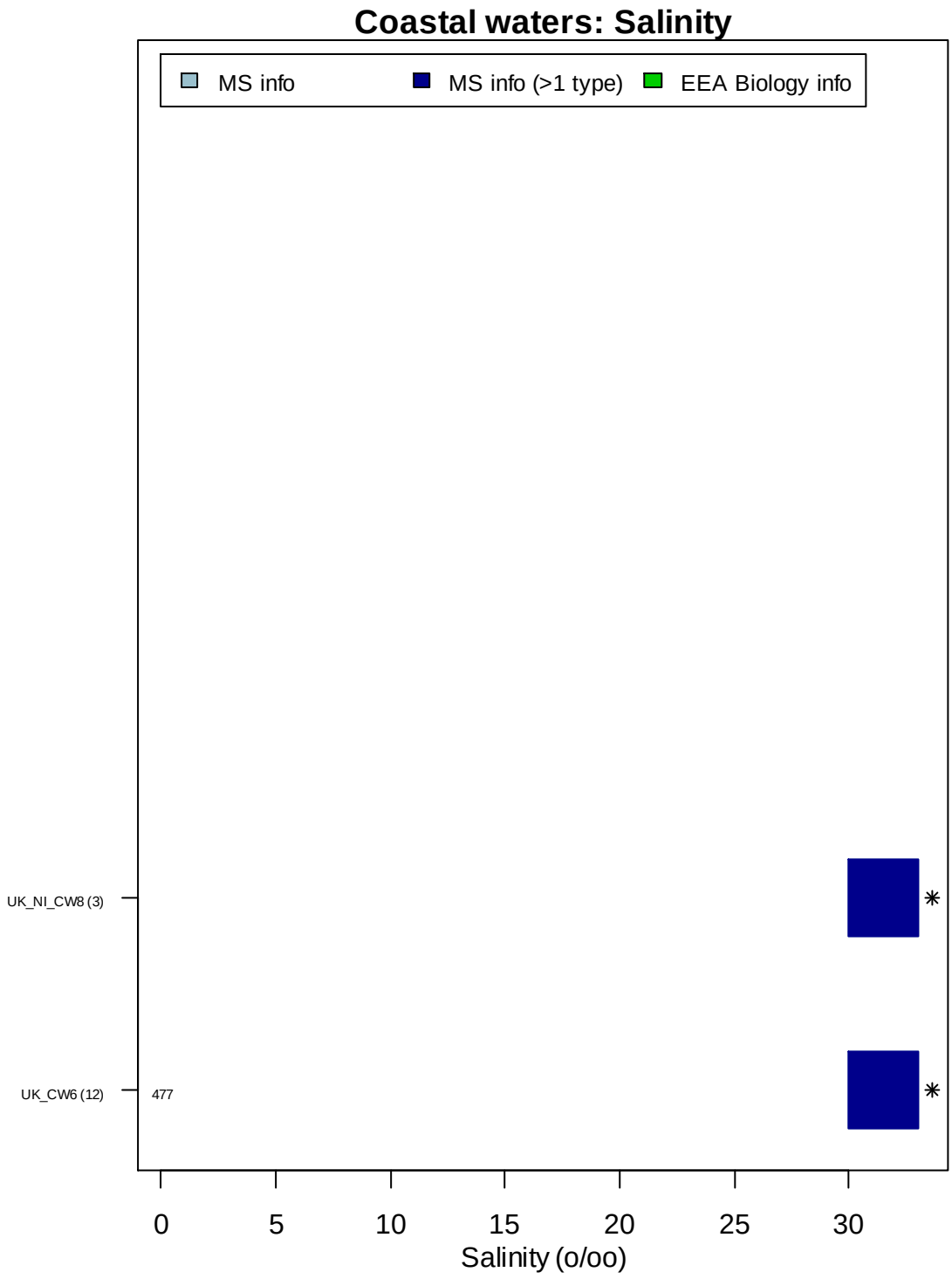

Transitional and coastal waters: Salinity
TW-NEA11
TW-B13
CW-NEA9
CW-NEA8
CW-NEA7
CW-NEA3/4
CW-NEA10
CW-NEA1/26e
CW-NEA1/26d
CW-NEA1/26c
CW-NEA1/26b
CW-NEA1/26a
CW-B3b
CW-B3a
CW-B2
CW-B14
CW-B13
CW-B12
CW-B0
0
10
20
30
40
Salinity (o/oo)

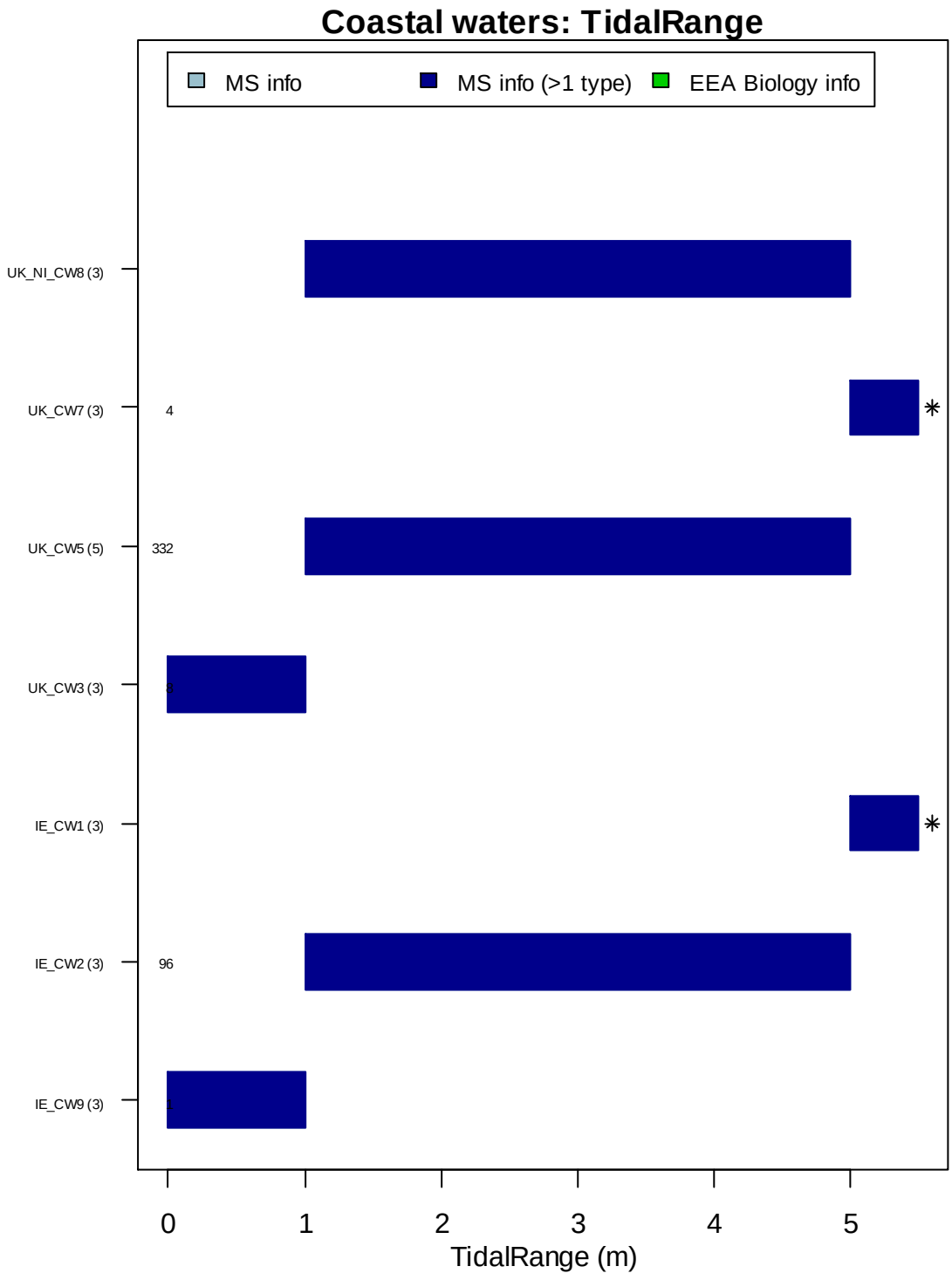

Transitional waters: TidalRange
MS info
MS info (>1 type)
EEA Biology info
UK_NI_TW2 (1)
UK_TW1 (2)
9
UK_TW4 (3)
39
IE_TW3 (1)
IE_TW1 (3)
109
0
1
2
3
4
5
TidalRange (m)

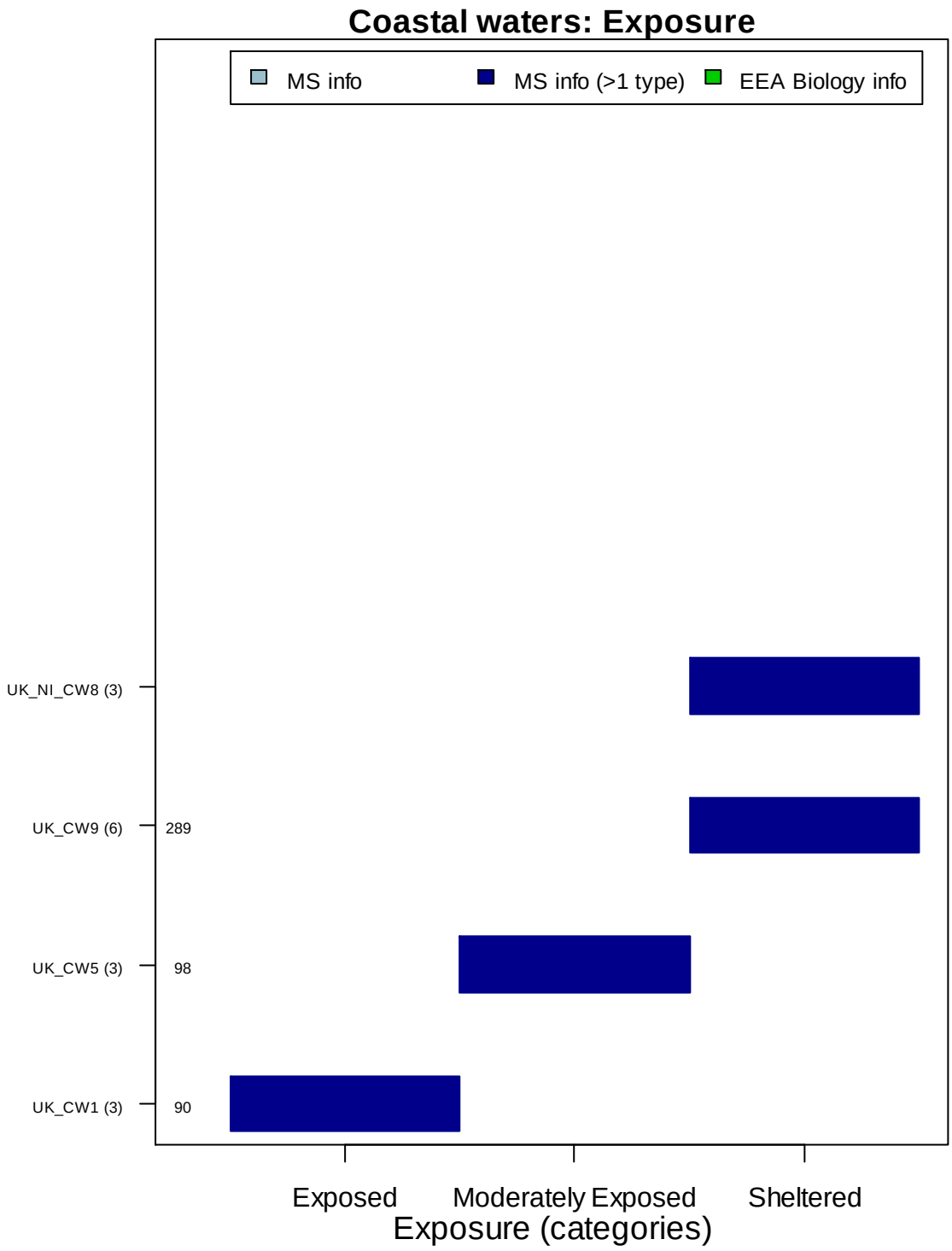

Transitional waters: Substratum
MS info
MS info (>1 type)
EEA Biology info
UK_NI_TW2 (1)
UK_TW4 (3)
35
UK_TW6 (1)
9
Mud
Sand
Substratum (categories)

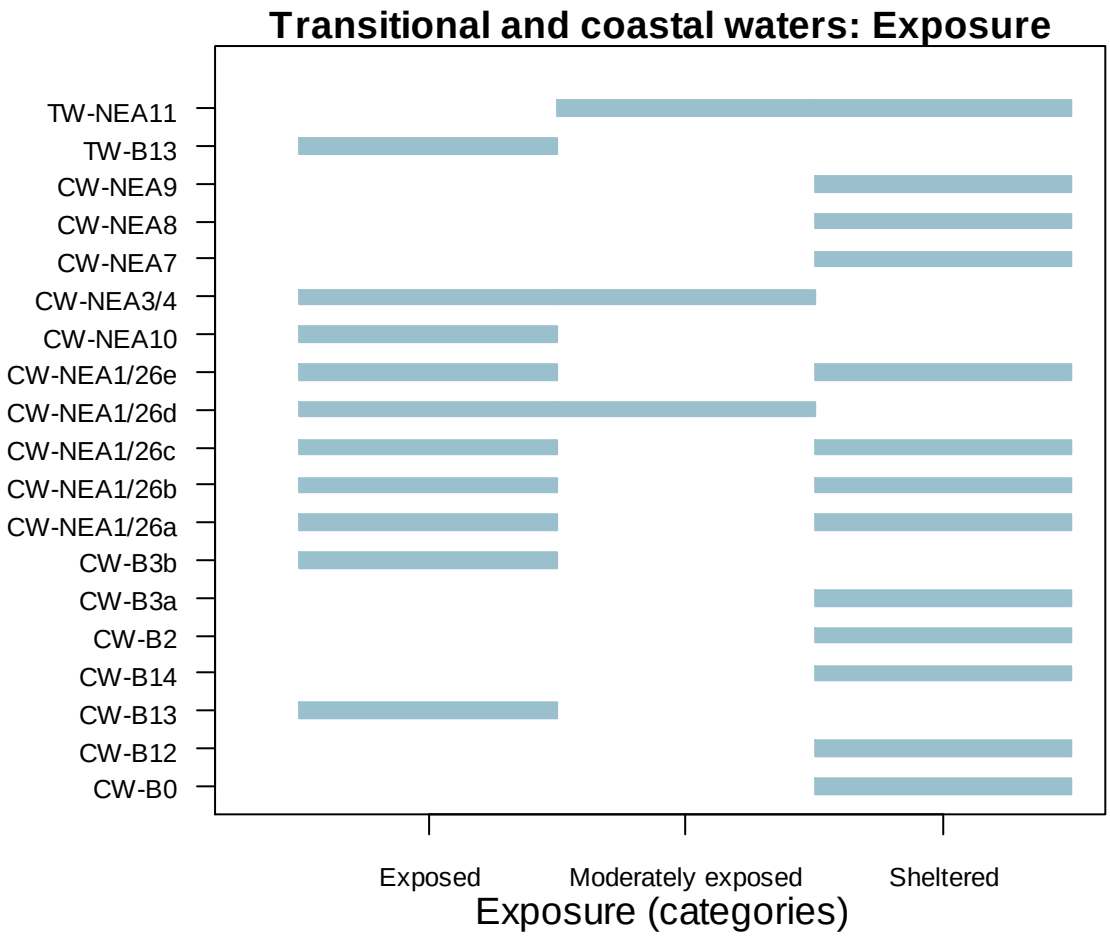

Transitional and coastal waters: Substratum
CW-M4
CW-M3
CW-M2
CW-M1
Rock
Sediment
Substratum (categories)


Transitional and coastal waters: TidalRange
TW-NEA11
CW-NEA9
CW-NEA8
CW-NEA7
CW-NEA3/4
CW-NEA10
CW-NEA1/26e
CW-NEA1/26d
CW-NEA1/26c
CW-NEA1/26b
CW-NEA1/26a
0
1
2
3
4
5
TidalRange (m)


Coastal waters: Salinity
MS info
MS info (>1 type)
EEA Biology info
UK_NI_CW8 (3)
UK_CW6 (12)
477
0
5
10
15
20
25
30
Salinity (o/oo)


Coastal waters: TidalRange
MS info
MS info (>1 type)
EEA Biology info
UK_NI_CW8 (3)
UK_CW7 (3)
4
UK_CW5 (5)
332
UK_CW3 (3)
3
IE_CW1 (3)
IE_CW2 (3)
96
IE_CW9 (3)
1
0
1
2
3
4
5
TidalRange (m)


Coastal waters: Exposure
MS info
MS info (>1 type)
EEA Biology info
UK_NI_CW8 (3)
UK_CW9 (6)
289
UK_CW5 (3)
98
UK_CW1 (3)
90
Exposed
Moderately Exposed
Sheltered
Exposure (categories)


Transitional and coastal waters: Exposure
TW-NEA11
TW-B13
CW-NEA9
CW-NEA8
CW-NEA7
CW-NEA3/4
CW-NEA10
CW-NEA1/26e
CW-NEA1/26d
CW-NEA1/26c
CW-NEA1/26b
CW-NEA1/26a
CW-B3b
CW-B3a
CW-B2
CW-B14
CW-B13
CW-B12
CW-B0
Exposed
Moderately exposed
Sheltered
Exposure (categories)

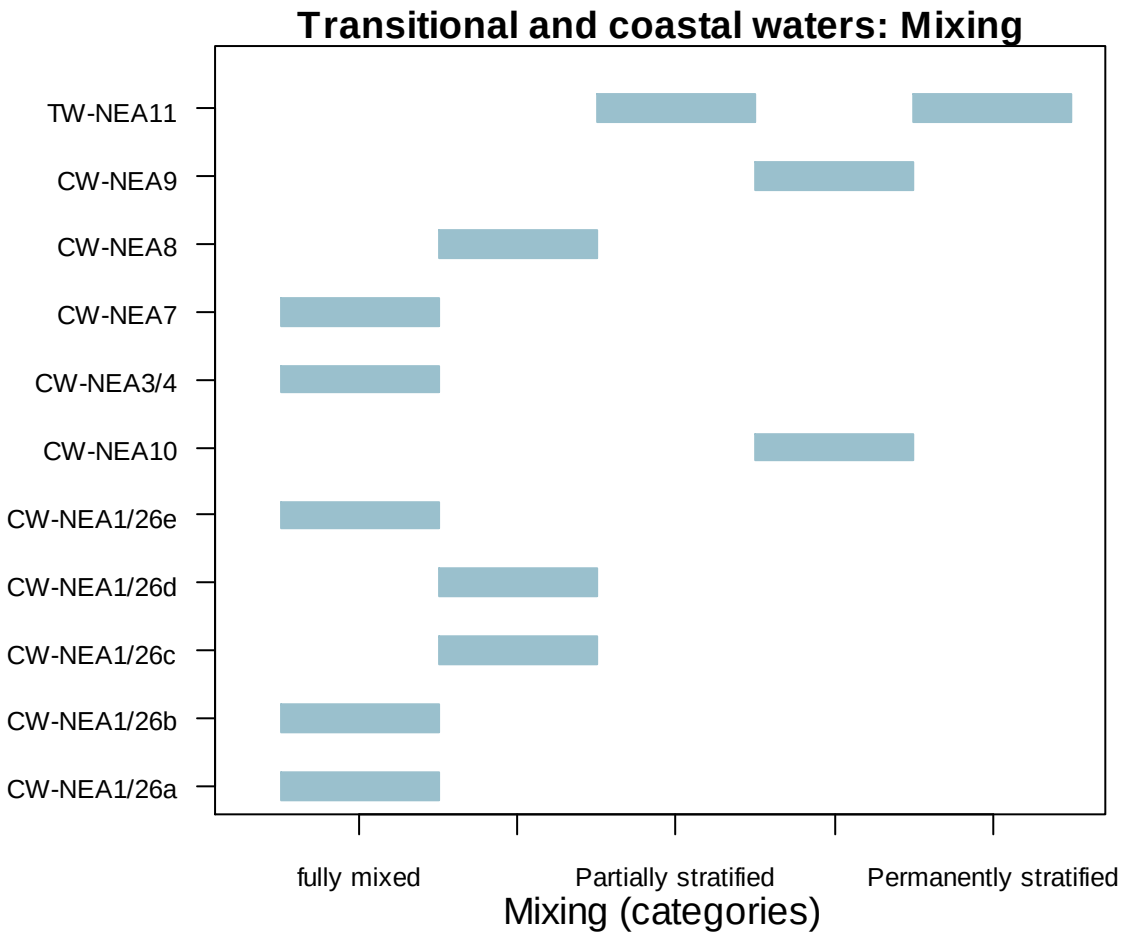

Transitional and coastal waters: Mixing
TW-NEA11
CW-NEA9
CW-NEA8
CW-NEA7
CW-NEA3/4
CW-NEA10
CW-NEA1/26e
CW-NEA1/26d
CW-NEA1/26c
CW-NEA1/26b
CW-NEA1/26a
fully mixed
Partially stratified
Permanently stratified
Mixing (categories)

Table A.3. Number of MSs using the different typology factors for at least one national type. For more details see section 2.3.2.

RIVERS		LAKES		TRANSITIONAL		COASTAL	
Factor	**MS**	**Factor**	**MS**	**Factor**	**MS**	**Factor**	**MS**
GEOLOGY	16	SIZE	18	SALINITY	11	SALINITY	15
SIZE	16	GEOLOGY	16	SUBSTRATUM	9	WAV_EXPO	14
ALTITUDE	14	AV_DEPTH	16	TIDAL	9	SUBSTRATUM	13
LAT	9	ALTITUDE	14	MIXING	8	LAT	11
LON	9	DEPTH	13	LAT	7	LON	11
DISCHARGE	9	LAT	9	LON	7	MIXING	11
AV_SLOPE	8	LON	9	DEPTH	7	TIDAL	9
SUBSTRATUM	8	MIXING	9	WAV_EXPO	6	RET_TIME	5
DIST_SOURCE	6	ACID_NEUT	7	RES_TIME	5	VELOCITY	4
PPT	5	RES_TIME	7	W_TEMP_RGE	4	W_TEMP_RGE	4
AV_WIDTH	4	NUTRIENT	6	TURBIDITY	3	AV_W_TEMP	3
CHLORIDE	4	SUBSTRATUM	5	VELOCITY	2	TURBIDITY	3
A_TEMP_RGE	4	LAKE_SHAPE	5	AV_W_TEMP	2	ALTITUDE	0
AV_A_TEMP	4	AV_A_TEMP	4	SHAPE	2	GEOLOGY	0
ENERGY	3	LEVEL_FLUC	4	ALTITUDE	0	SIZE	0
RIV_MORPH	3	A_TEMP_RGE	3	GEOLOGY	0	DIST_SOURCE	0
VAL_MORPH	3	DIST_SOURCE	0	SIZE	0	ENERGY	0
ACID_NEUT	3	ENERGY	0	DIST_SOURCE	0	AV_WIDTH	0
AV_DEPTH	2	AV_WIDTH	0	ENERGY	0	AV_DEPTH	0
SOLIDS	2	AV_SLOPE	0	AV_WIDTH	0	AV_SLOPE	0
DEPTH	0	RIV_MORPH	0	AV_DEPTH	0	RIV_MORPH	0
LAKE_SHAPE	0	DISCHARGE	0	AV_SLOPE	0	DISCHARGE	0
RES_TIME	0	VAL_MORPH	0	RIV_MORPH	0	VAL_MORPH	0
MIXING	0	SOLIDS	0	DISCHARGE	0	SOLIDS	0
NUTRIENT	0	CHLORIDE	0	VAL_MORPH	0	ACID_NEUT	0
LEVEL_FLUC	0	PPT	0	SOLIDS	0	CHLORIDE	0
TIDAL	0	TIDAL	0	ACID_NEUT	0	A_TEMP_RGE	0
SALINITY	0	SALINITY	0	CHLORIDE	0	AV_A_TEMP	0
VELOCITY	0	VELOCITY	0	A_TEMP_RGE	0	PPT	0
WAV_EXPO	0	WAV_EXPO	0	AV_A_TEMP	0	DEPTH	0
AV_W_TEMP	0	AV_W_TEMP	0	PPT	0	LAKE_SHAPE	0
TURBIDITY	0	TURBIDITY	0	LAKE_SHAPE	0	RES_TIME	0
SHAPE	0	SHAPE	0	NUTRIENT	0	NUTRIENT	0
W_TEMP_RGE	0	W_TEMP_RGE	0	LEVEL_FLUC	0	LEVEL_FLUC	0
RET_TIME	0	RET_TIME	0	RET_TIME	0	SHAPE	0

Table A.4. Overview of national types grouped according to identical intervals/categories for individual type factors, in the bar-chart Figures 3-9. The column "Label" shows the national type used as y-axis label (with country code as prefix) in Figures 3-9, to represent a group of national types with identical intervals/categories. The column "National type" shows all national types belonging to the same group (represented by the same "Label").

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
RW	Alkalinity	ES	108	2	109	.3	4.8	meq/l			
RW	Alkalinity	ES	108	2	108	.3	4.8	meq/l			
RW	Alkalinity	SE	V3LYN	9	V1SNN	0	.05	meq/l			
RW	Alkalinity	SE	V3LYN	9	V3SYN	0	.05	meq/l			
RW	Alkalinity	SE	V3LYN	9	V2LNN	0	.05	meq/l			
RW	Alkalinity	SE	V3LYN	9	V2LYN	0	.05	meq/l			
RW	Alkalinity	SE	V3LYN	9	V3SNN	0	.05	meq/l			
RW	Alkalinity	SE	V3LYN	9	V4SYN	0	.05	meq/l			
RW	Alkalinity	SE	V3LYN	9	V2SYN	0	.05	meq/l			
RW	Alkalinity	SE	V3LYN	9	V3LYN	0	.05	meq/l			
RW	Alkalinity	SE	V3LYN	9	V2SNN	0	.05	meq/l			
RW	Altitude	EL	LOW-L-S	5	LOW-M-S	0	200	m			
RW	Altitude	EL	LOW-L-S	5	LOW-M-C	0	200	m			
RW	Altitude	EL	LOW-L-S	5	LOW-L-S	0	200	m			
RW	Altitude	EL	LOW-L-S	5	LOW-L-C	0	200	m			
RW	Altitude	EL	LOW-L-S	5	LOW-S-C	0	200	m			
RW	Altitude	EL	MID-L-S	4	MID-M-C	200	800	m			
RW	Altitude	EL	MID-L-S	4	MID-L-S	200	800	m			
RW	Altitude	EL	MID-L-S	4	MID-L-C	200	800	m			
RW	Altitude	EL	MID-L-S	4	MID-M-S	200	800	m			
RW	Altitude	PL	1	3	2	800		m			
RW	Altitude	PL	1	3	1	800		m			
RW	Altitude	PL	1	3	3	800		m			
RW	Altitude	PL	11	16	14	200	800	m			
RW	Altitude	PL	11	16	11	200	800	m			
RW	Altitude	PL	11	16	13	200	800	m			
RW	Altitude	PL	11	16	10	200	800	m			
RW	Altitude	PL	11	16	8	200	800	m			
RW	Altitude	PL	11	16	5	200	800	m			
RW	Altitude	PL	11	16	15	200	800	m			
RW	Altitude	PL	11	16	9	200	800	m			
RW	Altitude	PL	11	16	25	200	800	m			
RW	Altitude	PL	11	16	12	200	800	m			
RW	Altitude	PL	11	16	4	200	800	m			
RW	Altitude	PL	11	16	24	200	800	m			
RW	Altitude	PL	11	16	23	200	800	m			

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
RW	Altitude	PL	11	16	6	200	800	m			
RW	Altitude	PL	11	16	7	200	800	m			
RW	Altitude	PL	11	16	26	200	800	m			
RW	Altitude	PL	21	7	20	0	200	m			
RW	Altitude	PL	21	7	22	0	200	m			
RW	Altitude	PL	21	7	21	0	200	m			
RW	Altitude	PL	21	7	16	0	200	m			
RW	Altitude	PL	21	7	17	0	200	m			
RW	Altitude	PL	21	7	18	0	200	m			
RW	Altitude	PL	21	7	19	0	200	m			
RW	Altitude	RO	RO04	2	RO04	200	500	m			
RW	Altitude	RO	RO04	2	RO19	200	500	m			
RW	Altitude	RO	RO06	2	RO20	0	200	m			
RW	Altitude	RO	RO06	2	RO06	0	200	m			
RW	Altitude	SE	V2SNN	4	V2LYN	300	1200	m			
RW	Altitude	SE	V2SNN	4	V2LNN	300	1200	m			
RW	Altitude	SE	V2SNN	4	V2SNN	300	1200	m			
RW	Altitude	SE	V2SNN	4	V2SYN	300	1200	m			
RW	Altitude	SE	V3LYN	3	V3LYN	0	300	m			
RW	Altitude	SE	V3LYN	3	V3SYN	0	300	m			
RW	Altitude	SE	V3LYN	3	V3SNN	0	300	m			
RW	Altitude	UK	1	9	4	0	200	m			
RW	Altitude	UK	1	9	5	0	200	m			
RW	Altitude	UK	1	9	2	0	200	m			
RW	Altitude	UK	1	9	8	0	200	m			
RW	Altitude	UK	1	9	6	0	200	m			
RW	Altitude	UK	1	9	7	0	200	m			
RW	Altitude	UK	1	9	9	0	200	m			
RW	Altitude	UK	1	9	1	0	200	m			
RW	Altitude	UK	1	9	3	0	200	m			
RW	Altitude	UK	13	9	16	200	800	m			
RW	Altitude	UK	13	9	14	200	800	m			
RW	Altitude	UK	13	9	12	200	800	m			
RW	Altitude	UK	13	9	17	200	800	m			
RW	Altitude	UK	13	9	18	200	800	m			
RW	Altitude	UK	13	9	13	200	800	m			
RW	Altitude	UK	13	9	15	200	800	m			
RW	Altitude	UK	13	9	10	200	800	m			
RW	Altitude	UK	13	9	11	200	800	m			
RW	Altitude	UK	21	9	23	800		m			
RW	Altitude	UK	21	9	22	800		m			
RW	Altitude	UK	21	9	25	800		m			

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
RW	Altitude	UK	21	9	27	800		m			
RW	Altitude	UK	21	9	26	800		m			
RW	Altitude	UK	21	9	19	800		m			
RW	Altitude	UK	21	9	24	800		m			
RW	Altitude	UK	21	9	20	800		m			
RW	Altitude	UK	21	9	21	800		m			
RW	Altitude	UK_NI	18	6	17	0	200	m			
RW	Altitude	UK_NI	18	6	26	0	200	m			
RW	Altitude	UK_NI	18	6	18	0	200	m			
RW	Altitude	UK_NI	18	6	19	0	200	m			
RW	Altitude	UK_NI	18	6	25	0	200	m			
RW	Altitude	UK_NI	18	6	9	0	200	m			
RW	Altitude	UK_NI	5	6	6	200	800	m			
RW	Altitude	UK_NI	5	6	34	200	800	m			
RW	Altitude	UK_NI	5	6	14	200	800	m			
RW	Altitude	UK_NI	5	6	5	200	800	m			
RW	Altitude	UK_NI	5	6	33	200	800	m			
RW	Altitude	UK_NI	5	6	13	200	800	m			
RW	CatchmentArea	BG	TR33	5	TR33	10		km2			
RW	CatchmentArea	BG	TR33	5	TR30	10		km2			
RW	CatchmentArea	BG	TR33	5	TR25	10		km2			
RW	CatchmentArea	BG	TR33	5	TR28	10		km2			
RW	CatchmentArea	BG	TR33	5	TR29	10		km2			
RW	CatchmentArea	EE	1B	2	1A	10	100	km2			
RW	CatchmentArea	EE	1B	2	1B	10	100	km2			
RW	CatchmentArea	EL	LOW-L-S	4	MID-L-S	1000	10000	km2			
RW	CatchmentArea	EL	LOW-L-S	4	LOW-L-S	1000	10000	km2			
RW	CatchmentArea	EL	LOW-L-S	4	MID-L-C	1000	10000	km2			
RW	CatchmentArea	EL	LOW-L-S	4	LOW-L-C	1000	10000	km2			
RW	CatchmentArea	EL	MID-M-C	4	LOW-M-S	100	1000	km2			
RW	CatchmentArea	EL	MID-M-C	4	MID-M-S	100	1000	km2			

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
RW	CatchmentArea	EL	MID-M-C	4	MID-M-C	100	1000	km2			
RW	CatchmentArea	EL	MID-M-C	4	LOW-M-C	100	1000	km2			
RW	CatchmentArea	FI	Ksa	3	Kt	100	1000	km2			
RW	CatchmentArea	FI	Ksa	3	Ksa	100	1000	km2			
RW	CatchmentArea	FI	Ksa	3	Kk	100	1000	km2			
RW	CatchmentArea	FI	Pt	2	Pt	0	100	km2			
RW	CatchmentArea	FI	Pt	2	Pk	0	100	km2			
RW	CatchmentArea	PL	23	13	5	10	100	km2			
RW	CatchmentArea	PL	23	13	2	10	100	km2			
RW	CatchmentArea	PL	23	13	16	10	100	km2			
RW	CatchmentArea	PL	23	13	6	10	100	km2			
RW	CatchmentArea	PL	23	13	4	10	100	km2			
RW	CatchmentArea	PL	23	13	18	10	100	km2			
RW	CatchmentArea	PL	23	13	23	10	100	km2			
RW	CatchmentArea	PL	23	13	12	10	100	km2			
RW	CatchmentArea	PL	23	13	3	10	100	km2			
RW	CatchmentArea	PL	23	13	17	10	100	km2			
RW	CatchmentArea	PL	23	13	1	10	100	km2			
RW	CatchmentArea	PL	23	13	11	10	100	km2			
RW	CatchmentArea	PL	23	13	7	10	100	km2			
RW	CatchmentArea	PL	25	5	25	10	10000	km2			
RW	CatchmentArea	PL	25	5	26	10	10000	km2			
RW	CatchmentArea	PL	25	5	19	10	10000	km2			
RW	CatchmentArea	PL	25	5	22	10	10000	km2			
RW	CatchmentArea	PL	25	5	20	10	10000	km2			
RW	CatchmentArea	PL	8	5	9	100	1000	km2			
RW	CatchmentArea	PL	8	5	8	100	1000	km2			
RW	CatchmentArea	PL	8	5	10	100	1000	km2			
RW	CatchmentArea	PL	8	5	14	100	1000	km2			

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
RW	CatchmentArea	PL	8	5	13	100	1000	km2			
RW	CatchmentArea	RO	RO01	2	RO01	10	1000	km2			
RW	CatchmentArea	RO	RO01	2	RO04	10	1000	km2			
RW	CatchmentArea	RO	RO20	4	RO20	10	2000	km2			
RW	CatchmentArea	RO	RO20	4	RO19	10	2000	km2			
RW	CatchmentArea	RO	RO20	4	RO18	10	2000	km2			
RW	CatchmentArea	RO	RO20	4	RO06	10	2000	km2			
RW	CatchmentArea	SE	V2SNN	6	V1SNN	0	100	km2			
RW	CatchmentArea	SE	V2SNN	6	V2SNN	0	100	km2			
RW	CatchmentArea	SE	V2SNN	6	V4SYN	0	100	km2			
RW	CatchmentArea	SE	V2SNN	6	V3SYN	0	100	km2			
RW	CatchmentArea	SE	V2SNN	6	V3SNN	0	100	km2			
RW	CatchmentArea	SE	V2SNN	6	V2SYN	0	100	km2			
RW	CatchmentArea	SE	V3LYN	3	V3LYN	100		km2			
RW	CatchmentArea	SE	V3LYN	3	V2LYN	100		km2			
RW	CatchmentArea	SE	V3LYN	3	V2LNN	100		km2			
RW	CatchmentArea	UK	1	12	3	10	100	km2			
RW	CatchmentArea	UK	1	12	19	10	100	km2			
RW	CatchmentArea	UK	1	12	10	10	100	km2			
RW	CatchmentArea	UK	1	12	21	10	100	km2			
RW	CatchmentArea	UK	1	12	2	10	100	km2			
RW	CatchmentArea	UK	1	12	5	10	100	km2			
RW	CatchmentArea	UK	1	12	12	10	100	km2			
RW	CatchmentArea	UK	1	12	6	10	100	km2			
RW	CatchmentArea	UK	1	12	1	10	100	km2			
RW	CatchmentArea	UK	1	12	4	10	100	km2			
RW	CatchmentArea	UK	1	12	11	10	100	km2			
RW	CatchmentArea	UK	1	12	20	10	100	km2			
RW	CatchmentArea	UK	17	9	26	1000	10000	km2			

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
RW	CatchmentArea	UK	17	9	25	1000	10000	km2			
RW	CatchmentArea	UK	17	9	7	1000	10000	km2			
RW	CatchmentArea	UK	17	9	9	1000	10000	km2			
RW	CatchmentArea	UK	17	9	27	1000	10000	km2			
RW	CatchmentArea	UK	17	9	17	1000	10000	km2			
RW	CatchmentArea	UK	17	9	18	1000	10000	km2			
RW	CatchmentArea	UK	17	9	16	1000	10000	km2			
RW	CatchmentArea	UK	17	9	8	1000	10000	km2			
RW	CatchmentArea	UK	22	6	23	100	1000	km2			
RW	CatchmentArea	UK	22	6	22	100	1000	km2			
RW	CatchmentArea	UK	22	6	13	100	1000	km2			
RW	CatchmentArea	UK	22	6	14	100	1000	km2			
RW	CatchmentArea	UK	22	6	15	100	1000	km2			
RW	CatchmentArea	UK	22	6	24	100	1000	km2			
RW	CatchmentArea	UK_NI	5	6	13	10	100	km2			
RW	CatchmentArea	UK_NI	5	6	25	10	100	km2			
RW	CatchmentArea	UK_NI	5	6	33	10	100	km2			
RW	CatchmentArea	UK_NI	5	6	5	10	100	km2			
RW	CatchmentArea	UK_NI	5	6	17	10	100	km2			
RW	CatchmentArea	UK_NI	5	6	9	10	100	km2			
RW	CatchmentArea	UK_NI	6	5	34	100	1000	km2			
RW	CatchmentArea	UK_NI	6	5	6	100	1000	km2			
RW	CatchmentArea	UK_NI	6	5	18	100	1000	km2			
RW	CatchmentArea	UK_NI	6	5	14	100	1000	km2			
RW	CatchmentArea	UK_NI	6	5	26	100	1000	km2			
RW	Discharge	RO	RO06	2	RO06	0	3	l s-1 km-1			
RW	Discharge	RO	RO06	2	RO04	0	3	l s-1 km-1			
RW	Discharge	RO	RO19	2	RO19	0	2	l s-1 km-1			
RW	Discharge	RO	RO19	2	RO20	0	2	l s-1 km-1			

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
RW	Geology	EL	LOW-M-C	5	MID-M-C	0	0		Calcareous		
RW	Geology	EL	LOW-M-C	5	LOW-M-C	0	0		Calcareous		
RW	Geology	EL	LOW-M-C	5	MID-L-C	0	0		Calcareous		
RW	Geology	EL	LOW-M-C	5	LOW-L-C	0	0		Calcareous		
RW	Geology	EL	LOW-M-C	5	LOW-S-C	0	0		Calcareous		
RW	Geology	EL	LOW-M-S	4	LOW-M-S	0	0		Siliceous		
RW	Geology	EL	LOW-M-S	4	LOW-L-S	0	0		Siliceous		
RW	Geology	EL	LOW-M-S	4	MID-L-S	0	0		Siliceous		
RW	Geology	EL	LOW-M-S	4	MID-M-S	0	0		Siliceous		
RW	Geology	ES	0	11	106	0	0		Calcareous	Siliceous	
RW	Geology	ES	0	11	117	0	0		Calcareous	Siliceous	
RW	Geology	ES	0	11	112	0	0		Calcareous	Siliceous	
RW	Geology	ES	0	11	111	0	0		Calcareous	Siliceous	
RW	Geology	ES	0	11	109	0	0		Calcareous	Siliceous	
RW	Geology	ES	0	11	108	0	0		Calcareous	Siliceous	
RW	Geology	ES	0	11	104	0	0		Calcareous	Siliceous	
RW	Geology	ES	0	11	118	0	0		Calcareous	Siliceous	
RW	Geology	ES	0	11	101	0	0		Calcareous	Siliceous	
RW	Geology	ES	0	11	105	0	0		Calcareous	Siliceous	
RW	Geology	ES	0	11	0	0	0		Calcareous	Siliceous	
RW	Geology	ES	114	8	107	0	0		Calcareous	Organic	
RW	Geology	ES	114	8	102	0	0		Calcareous	Organic	
RW	Geology	ES	114	8	113	0	0		Calcareous	Organic	
RW	Geology	ES	114	8	116	0	0		Calcareous	Organic	
RW	Geology	ES	114	8	110	0	0		Calcareous	Organic	
RW	Geology	ES	114	8	114	0	0		Calcareous	Organic	
RW	Geology	ES	114	8	120	0	0		Calcareous	Organic	
RW	Geology	ES	114	8	126	0	0		Calcareous	Organic	
RW	Geology	ES	115	3	115	0	0		Organic	Siliceous	

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
RW	Geology	ES	115	3	124	0	0		Organic	Siliceous	
RW	Geology	ES	115	3	127	0	0		Organic	Siliceous	
RW	Geology	ES	123	4	122	0	0		Organic		
RW	Geology	ES	123	4	130	0	0		Organic		
RW	Geology	ES	123	4	132	0	0		Organic		
RW	Geology	ES	123	4	123	0	0		Organic		
RW	Geology	IE	14	4	13	0	0		Siliceous		
RW	Geology	IE	14	4	12	0	0		Siliceous		
RW	Geology	IE	14	4	11	0	0		Siliceous		
RW	Geology	IE	14	4	14	0	0		Siliceous		
RW	Geology	IE	24	4	22	0	0		Mixed		
RW	Geology	IE	24	4	23	0	0		Mixed		
RW	Geology	IE	24	4	21	0	0		Mixed		
RW	Geology	IE	24	4	24	0	0		Mixed		
RW	Geology	IE	34	4	32	0	0		Calcareous		
RW	Geology	IE	34	4	33	0	0		Calcareous		
RW	Geology	IE	34	4	34	0	0		Calcareous		
RW	Geology	IE	34	4	31	0	0		Calcareous		
RW	Geology	PL	14	24	5	0	0				
RW	Geology	PL	14	24	9	0	0				
RW	Geology	PL	14	24	12	0	0				
RW	Geology	PL	14	24	17	0	0				
RW	Geology	PL	14	24	20	0	0				
RW	Geology	PL	14	24	10	0	0				
RW	Geology	PL	14	24	14	0	0				
RW	Geology	PL	14	24	6	0	0				
RW	Geology	PL	14	24	11	0	0				
RW	Geology	PL	14	24	13	0	0				
RW	Geology	PL	14	24	7	0	0				
RW	Geology	PL	14	24	23	0	0				
RW	Geology	PL	14	24	21	0	0				
RW	Geology	PL	14	24	1	0	0				
RW	Geology	PL	14	24	8	0	0				
RW	Geology	PL	14	24	4	0	0				
RW	Geology	PL	14	24	18	0	0				
RW	Geology	PL	14	24	16	0	0				
RW	Geology	PL	14	24	24	0	0				
RW	Geology	PL	14	24	25	0	0				
RW	Geology	PL	14	24	19	0	0				
RW	Geology	PL	14	24	2	0	0				
RW	Geology	PL	14	24	15	0	0				
RW	Geology	PL	14	24	3	0	0				

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
RW	Geology	RO	RO01	3	RO04	0	0		Siliceous	Calcareous	Organic
RW	Geology	RO	RO01	3	RO01	0	0		Siliceous	Calcareous	Organic
RW	Geology	RO	RO01	3	RO06	0	0		Siliceous	Calcareous	Organic
RW	Geology	RO	RO11*	17	RO05CAPM	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO06CAPM	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO05	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO08	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO01CAPM	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO02CAPM	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO07CAPM	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO19CAPM	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO10	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO02	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO16	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO10*	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO11	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO10CAPM	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO11*CAPM	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO11*	0	0		Siliceous		
RW	Geology	RO	RO11*	17	RO07	0	0		Siliceous		
RW	Geology	RO	RO18	3	RO20	0	0		Siliceous	Calcareous	
RW	Geology	RO	RO18	3	RO18	0	0		Siliceous	Calcareous	
RW	Geology	RO	RO18	3	RO19	0	0		Siliceous	Calcareous	
RW	Geology	SK	I1(P1V)	10	P1S	0	0		Mixed		
RW	Geology	SK	I1(P1V)	10	V3(P1V)	0	0		Mixed		
RW	Geology	SK	I1(P1V)	10	M1(P1V)	0	0		Mixed		
RW	Geology	SK	I1(P1V)	10	K2S	0	0		Mixed		
RW	Geology	SK	I1(P1V)	10	I1(P1V)	0	0		Mixed		
RW	Geology	SK	I1(P1V)	10	D1(P1V)	0	0		Mixed		
RW	Geology	SK	I1(P1V)	10	B1(P1V)	0	0		Mixed		
RW	Geology	SK	I1(P1V)	10	P2(K3V)	0	0		Mixed		
RW	Geology	SK	I1(P1V)	10	K3S	0	0		Mixed		
RW	Geology	SK	I1(P1V)	10	R2(P1V)	0	0		Mixed		
RW	Geology	UK	4	9	25	0	0		Siliceous		
RW	Geology	UK	4	9	4	0	0		Siliceous		
RW	Geology	UK	4	9	7	0	0		Siliceous		

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
RW	Geology	UK	4	9	10	0	0		Siliceous		
RW	Geology	UK	4	9	1	0	0		Siliceous		
RW	Geology	UK	4	9	16	0	0		Siliceous		
RW	Geology	UK	4	9	13	0	0		Siliceous		
RW	Geology	UK	4	9	19	0	0		Siliceous		
RW	Geology	UK	4	9	22	0	0		Siliceous		
RW	Geology	UK	5	9	11	0	0		Calcareous		
RW	Geology	UK	5	9	23	0	0		Calcareous		
RW	Geology	UK	5	9	8	0	0		Calcareous		
RW	Geology	UK	5	9	26	0	0		Calcareous		
RW	Geology	UK	5	9	20	0	0		Calcareous		
RW	Geology	UK	5	9	2	0	0		Calcareous		
RW	Geology	UK	5	9	17	0	0		Calcareous		
RW	Geology	UK	5	9	5	0	0		Calcareous		
RW	Geology	UK	5	9	14	0	0		Calcareous		
RW	Geology	UK	9	9	18	0	0		Organic		
RW	Geology	UK	9	9	15	0	0		Organic		
RW	Geology	UK	9	9	21	0	0		Organic		
RW	Geology	UK	9	9	6	0	0		Organic		
RW	Geology	UK	9	9	9	0	0		Organic		
RW	Geology	UK	9	9	3	0	0		Organic		
RW	Geology	UK	9	9	27	0	0		Organic		
RW	Geology	UK	9	9	24	0	0		Organic		
RW	Geology	UK	9	9	12	0	0		Organic		
RW	Geology	UK_NI	18	5	18	0	0		Calcareous		
RW	Geology	UK_NI	18	5	14	0	0		Calcareous		
RW	Geology	UK_NI	18	5	13	0	0		Calcareous		
RW	Geology	UK_NI	18	5	17	0	0		Calcareous		
RW	Geology	UK_NI	18	5	19	0	0		Calcareous		
RW	Geology	UK_NI	25	4	26	0	0		Siliceous		
RW	Geology	UK_NI	25	4	25	0	0		Siliceous		
RW	Geology	UK_NI	25	4	6	0	0		Siliceous		
RW	Geology	UK_NI	25	4	5	0	0		Siliceous		
RW	Geology	UK_NI	9	3	34	0	0		Organic		
RW	Geology	UK_NI	9	3	9	0	0		Organic		
RW	Geology	UK_NI	9	3	33	0	0		Organic		
RW	Slope	RO	RO06	2	RO20	0	8	%			

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
RW	Slope	RO	RO06	2	RO06	0	8	%			
LW	Alkalinity	DE	13	4	12	.75		meq/l			
LW	Alkalinity	DE	13	4	13	.75		meq/l			
LW	Alkalinity	DE	13	4	11	.75		meq/l			
LW	Alkalinity	DE	13	4	10	.75		meq/l			
LW	Alkalinity	DK	LW10	4	LW10	.2		meq/l			
LW	Alkalinity	DK	LW10	4	LW11	.2		meq/l			
LW	Alkalinity	DK	LW10	4	LW9	.2		meq/l			
LW	Alkalinity	DK	LW10	4	LW13	.2		meq/l			
LW	Alkalinity	IE	1	2	1	0	1	meq/l	Low	Moderate	
LW	Alkalinity	IE	1	2	4	0	1	meq/l	Low	Moderate	
LW	Alkalinity	IE	10	4	9	5		meq/l	High		
LW	Alkalinity	IE	10	4	11	5		meq/l	High		
LW	Alkalinity	IE	10	4	10	5		meq/l	High		
LW	Alkalinity	IE	10	4	12	5		meq/l	High		
LW	Alkalinity	IE	6	2	8	1	5	meq/l	High	Moderate	
LW	Alkalinity	IE	6	2	6	1	5	meq/l	High	Moderate	
LW	Alkalinity	IT	ITME-2	2	ITME-4	1		meq/l			
LW	Alkalinity	IT	ITME-2	2	ITME-2	1		meq/l			
LW	Alkalinity	PL	3a	6	3a	1.25		meq/l	high		
LW	Alkalinity	PL	3a	6	7b	1.25		meq/l	high		
LW	Alkalinity	PL	3a	6	7a	1.25		meq/l	high		
LW	Alkalinity	PL	3a	6	2b	1.25		meq/l	high		
LW	Alkalinity	PL	3a	6	2a	1.25		meq/l	high		
LW	Alkalinity	PL	3a	6	3b	1.25		meq/l	high		
LW	Alkalinity	PL	6b	5	1b	0	1.25	meq/l	high		
LW	Alkalinity	PL	6b	5	5a	0	1.25	meq/l	high		
LW	Alkalinity	PL	6b	5	6b	0	1.25	meq/l	high		
LW	Alkalinity	PL	6b	5	6a	0	1.25	meq/l	high		
LW	Alkalinity	PL	6b	5	5b	0	1.25	meq/l	high		
LW	Alkalinity	SE	S2DSNN	10	S3SSNN	0	.05	meq/l			
LW	Alkalinity	SE	S2DSNN	10	S3DSNN	0	.05	meq/l			
LW	Alkalinity	SE	S2DSNN	10	S2DSNN	0	.05	meq/l			
LW	Alkalinity	SE	S2DSNN	10	S2DSYN	0	.05	meq/l			
LW	Alkalinity	SE	S2DSNN	10	S2SSNN	0	.05	meq/l			
LW	Alkalinity	SE	S2DSNN	10	S3DSYN	0	.05	meq/l			
LW	Alkalinity	SE	S2DSNN	10	S3SSYN	0	.05	meq/l			
LW	Alkalinity	SE	S2DSNN	10	S4DSYN	0	.05	meq/l			
LW	Alkalinity	SE	S2DSNN	10	S1DSNN	0	.05	meq/l			
LW	Alkalinity	SE	S2DSNN	10	S2SSYN	0	.05	meq/l			
LW	Altitude	DE	12	4	12	0	200	m			
LW	Altitude	DE	12	4	13	0	200	m			

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
LW	Altitude	DE	12	4	11	0	200	m			
LW	Altitude	DE	12	4	10	0	200	m			
LW	Altitude	EL	LOW-S-S-S	8	LOW-S-L-C	0	200	m			
LW	Altitude	EL	LOW-S-S-S	8	LOW-D-M-C	0	200	m			
LW	Altitude	EL	LOW-S-S-S	8	LOW-D-L-S	0	200	m			
LW	Altitude	EL	LOW-S-S-S	8	LOW-S-M-S	0	200	m			
LW	Altitude	EL	LOW-S-S-S	8	LOW-S-L-S	0	200	m			
LW	Altitude	EL	LOW-S-S-S	8	LOW-S-S-S	0	200	m			
LW	Altitude	EL	LOW-S-S-S	8	LOW-D-L-C	0	200	m			
LW	Altitude	EL	LOW-S-S-S	8	LOW-V-M-S	0	200	m			
LW	Altitude	IE	1	8	4	0	200	m			
LW	Altitude	IE	1	8	2	0	200	m			
LW	Altitude	IE	1	8	8	0	200	m			
LW	Altitude	IE	1	8	6	0	200	m			
LW	Altitude	IE	1	8	5	0	200	m			
LW	Altitude	IE	1	8	1	0	200	m			
LW	Altitude	IE	1	8	7	0	200	m			
LW	Altitude	IE	1	8	3	0	200	m			
LW	Altitude	PL	1b	10	5a	200	800	m			
LW	Altitude	PL	1b	10	6a	200	800	m			
LW	Altitude	PL	1b	10	2a	200	800	m			
LW	Altitude	PL	1b	10	1a	200	800	m			
LW	Altitude	PL	1b	10	3b	200	800	m			
LW	Altitude	PL	1b	10	3a	200	800	m			
LW	Altitude	PL	1b	10	1b	200	800	m			
LW	Altitude	PL	1b	10	5b	200	800	m			
LW	Altitude	PL	1b	10	2b	200	800	m			
LW	Altitude	PL	1b	10	6b	200	800	m			
LW	Altitude	PL	7b	3	7a	0	200	m			
LW	Altitude	PL	7b	3	7b	0	200	m			
LW	Altitude	PL	7b	3	4	0	200	m			
LW	Altitude	RO	ROLN06	2	ROLNCAPMLA01	1.5	1.5	m			
LW	Altitude	RO	ROLN06	2	ROLN06	1.5	1.5	m			
LW	Altitude	SE	S2SSYN	4	S2DSNN	300	1200	m			
LW	Altitude	SE	S2SSYN	4	S2SSYN	300	1200	m			
LW	Altitude	SE	S2SSYN	4	S2DSYN	300	1200	m			
LW	Altitude	SE	S2SSYN	4	S2SSNN	300	1200	m			

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
LW	Altitude	SE	S3SSYN	4	S3DSNN	0	300	m			
LW	Altitude	SE	S3SSYN	4	S3DSYN	0	300	m			
LW	Altitude	SE	S3SSYN	4	S3SSNN	0	300	m			
LW	Altitude	SE	S3SSYN	4	S3SSYN	0	300	m			
LW	CatchmentArea	DE	11	3	12	1.5		volume ratio			
LW	CatchmentArea	DE	11	3	10	1.5		volume ratio			
LW	CatchmentArea	DE	11	3	11	1.5		volume ratio			
LW	CatchmentArea	ES	12	2	6	20000		km2			
LW	CatchmentArea	ES	12	2	12	20000		km2			
LW	CatchmentArea	ES	3	2	9	1000		km2			
LW	CatchmentArea	ES	3	2	3	1000		km2			
LW	CatchmentArea	ES	5	2	5	1000	20000	km2			
LW	CatchmentArea	ES	5	2	11	1000	20000	km2			
LW	CatchmentArea	ES	7	6	1	0	1000	km2			
LW	CatchmentArea	ES	7	6	10	0	1000	km2			
LW	CatchmentArea	ES	7	6	4	0	1000	km2			
LW	CatchmentArea	ES	7	6	7	0	1000	km2			
LW	CatchmentArea	ES	7	6	2	0	1000	km2			
LW	CatchmentArea	ES	7	6	8	0	1000	km2			
LW	Geology	DE	13	4	12	0	0		Calcareous		
LW	Geology	DE	13	4	11	0	0		Calcareous		
LW	Geology	DE	13	4	10	0	0		Calcareous		
LW	Geology	DE	13	4	13	0	0		Calcareous		
LW	Geology	EL	HIGH-D-XL-C	6	HIGH-D-S-C	0	0		calcareous		
LW	Geology	EL	HIGH-D-XL-C	6	LOW-D-L-C	0	0		calcareous		
LW	Geology	EL	HIGH-D-XL-C	6	HIGH-D-L-C	0	0		calcareous		
LW	Geology	EL	HIGH-D-XL-C	6	LOW-D-M-C	0	0		calcareous		
LW	Geology	EL	HIGH-D-XL-C	6	LOW-S-L-C	0	0		calcareous		
LW	Geology	EL	HIGH-D-XL-C	6	HIGH-D-XL-C	0	0		calcareous		
LW	Geology	EL	LOW-S-M-S	6	LOW-S-L-S	0	0		siliceous		
LW	Geology	EL	LOW-S-M-S	6	MID-D-L-S	0	0		siliceous		

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
LW	Geology	EL	LOW-S-M-S	6	LOW-V-M-S	0	0		siliceous		
LW	Geology	EL	LOW-S-M-S	6	LOW-S-M-S	0	0		siliceous		
LW	Geology	EL	LOW-S-M-S	6	LOW-D-L-S	0	0		siliceous		
LW	Geology	EL	LOW-S-M-S	6	LOW-S-S-S	0	0		siliceous		
LW	Geology	ES	0	2	0	0	0		Calcareous	Siliceous	
LW	Geology	ES	0	2	271	0	0		Calcareous	Siliceous	
LW	Geology	ES	601	6	2	0	0		Siliceous		
LW	Geology	ES	601	6	4	0	0		Siliceous		
LW	Geology	ES	601	6	601	0	0		Siliceous		
LW	Geology	ES	601	6	6	0	0		Siliceous		
LW	Geology	ES	601	6	5	0	0		Siliceous		
LW	Geology	ES	601	6	3	0	0		Siliceous		
LW	Geology	ES	8	8	10	0	0		Calcareous		
LW	Geology	ES	8	8	12	0	0		Calcareous		
LW	Geology	ES	8	8	269	0	0		Calcareous		
LW	Geology	ES	8	8	9	0	0		Calcareous		
LW	Geology	ES	8	8	7	0	0		Calcareous		
LW	Geology	ES	8	8	11	0	0		Calcareous		
LW	Geology	ES	8	8	279	0	0		Calcareous		
LW	Geology	ES	8	8	8	0	0		Calcareous		
LW	Geology	FI	Kh	8	Rr	0	0		Organic		
LW	Geology	FI	Kh	8	RrRk	0	0		Organic		
LW	Geology	FI	Kh	8	Rh	0	0		Organic		
LW	Geology	FI	Kh	8	Ph	0	0		Organic		
LW	Geology	FI	Kh	8	Mh	0	0		Organic		
LW	Geology	FI	Kh	8	Kh	0	0		Organic		
LW	Geology	FI	Kh	8	MRh	0	0		Organic		
LW	Geology	FI	Kh	8	Sh	0	0		Organic		
LW	Geology	FI	SVh	2	Vh	0	0		Calcareous	Organic	
LW	Geology	FI	SVh	2	SVh	0	0		Calcareous	Organic	
LW	Geology	IE	1	3	1	0	0		Organic	Siliceous	
LW	Geology	IE	1	3	4	0	0		Organic	Siliceous	
LW	Geology	IE	1	3	3	0	0		Organic	Siliceous	
LW	Geology	IE	10	3	9	0	0		Calcareous		
LW	Geology	IE	10	3	10	0	0		Calcareous		
LW	Geology	IE	10	3	11	0	0		Calcareous		
LW	Geology	IE	2	4	7	0	0		Calcareous	Siliceous	

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
LW	Geology	IE	2	4	8	0	0		Calcareous	Siliceous	
LW	Geology	IE	2	4	6	0	0		Calcareous	Siliceous	
LW	Geology	IE	2	4	2	0	0		Calcareous	Siliceous	
LW	Geology	IT	ITAL-2	2	ITAL-2	0	0		Siliceous		
LW	Geology	IT	ITAL-2	2	ITAL-10	0	0		Siliceous		
LW	Geology	IT	ITAL-3	5	ITAL-3	0	0		Siliceous	Calcareous	
LW	Geology	IT	ITAL-3	5	ITME-1	0	0		Siliceous	Calcareous	
LW	Geology	IT	ITAL-3	5	ITAL-6	0	0		Siliceous	Calcareous	
LW	Geology	IT	ITAL-3	5	ITAL-4	0	0		Siliceous	Calcareous	
LW	Geology	IT	ITAL-3	5	ITAL-5	0	0		Siliceous	Calcareous	
LW	Geology	IT	ITME-4	2	ITME-2	0	0		Calcareous		
LW	Geology	IT	ITME-4	2	ITME-4	0	0		Calcareous		
LW	Geology	PL	3a	12	1a	0	0		Calcareous		
LW	Geology	PL	3a	12	6a	0	0		Calcareous		
LW	Geology	PL	3a	12	5a	0	0		Calcareous		
LW	Geology	PL	3a	12	3b	0	0		Calcareous		
LW	Geology	PL	3a	12	2b	0	0		Calcareous		
LW	Geology	PL	3a	12	1b	0	0		Calcareous		
LW	Geology	PL	3a	12	2a	0	0		Calcareous		
LW	Geology	PL	3a	12	5b	0	0		Calcareous		
LW	Geology	PL	3a	12	7a	0	0		Calcareous		
LW	Geology	PL	3a	12	7b	0	0		Calcareous		
LW	Geology	PL	3a	12	3a	0	0		Calcareous		
LW	Geology	PL	3a	12	6b	0	0		Calcareous		
LW	Geology	RO	ROLNCAPMLA01	2	ROLNCAPMLA02	0	0		Siliceous		
LW	Geology	RO	ROLNCAPMLA01	2	ROLNCAPMLA01	0	0		Siliceous		
LW	MeanDepth	DK	LW9	3	LW11	0	3	m			
LW	MeanDepth	DK	LW9	3	LW13	0	3	m			
LW	MeanDepth	DK	LW9	3	LW9	0	3	m			
LW	MeanDepth	FI	MVh	3	Mh	0	3	m			
LW	MeanDepth	FI	MVh	3	MRh	0	3	m			
LW	MeanDepth	FI	MVh	3	MVh	0	3	m			
LW	MeanDepth	FI	Ph	3	Ph	3		m			
LW	MeanDepth	FI	Ph	3	Rh	3		m			
LW	MeanDepth	FI	Ph	3	Vh	3		m			
LW	MeanDepth	IE	9	12	4	0	4	m			
LW	MeanDepth	IE	9	12	3	0	4	m			
LW	MeanDepth	IE	9	12	6	0	4	m			
LW	MeanDepth	IE	9	12	9	0	4	m			
LW	MeanDepth	IE	9	12	7	0	4	m			

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
LW	MeanDepth	IE	9	12	2	0	4	m			
LW	MeanDepth	IE	9	12	12	0	4	m			
LW	MeanDepth	IE	9	12	5	0	4	m			
LW	MeanDepth	IE	9	12	11	0	4	m			
LW	MeanDepth	IE	9	12	10	0	4	m			
LW	MeanDepth	IE	9	12	1	0	4	m			
LW	MeanDepth	IE	9	12	8	0	4	m			
LW	MeanDepth	PL	1b	12	5b	0	4	m			
LW	MeanDepth	PL	1b	12	2a	0	4	m			
LW	MeanDepth	PL	1b	12	7b	0	4	m			
LW	MeanDepth	PL	1b	12	7a	0	4	m			
LW	MeanDepth	PL	1b	12	6a	0	4	m			
LW	MeanDepth	PL	1b	12	5a	0	4	m			
LW	MeanDepth	PL	1b	12	3b	0	4	m			
LW	MeanDepth	PL	1b	12	2b	0	4	m			
LW	MeanDepth	PL	1b	12	1b	0	4	m			
LW	MeanDepth	PL	1b	12	1a	0	4	m			
LW	MeanDepth	PL	1b	12	3a	0	4	m			
LW	MeanDepth	PL	1b	12	6b	0	4	m			
LW	MeanDepth	SE	S1DSNN	6	S4DSYN	4		m			
LW	MeanDepth	SE	S1DSNN	6	S2DSNN	4		m			
LW	MeanDepth	SE	S1DSNN	6	S2DSYN	4		m			
LW	MeanDepth	SE	S1DSNN	6	S3DSNN	4		m			
LW	MeanDepth	SE	S1DSNN	6	S1DSNN	4		m			
LW	MeanDepth	SE	S1DSNN	6	S3DSYN	4		m			
LW	MeanDepth	SE	S2SSNN	4	S3SSNN	0	4	m			
LW	MeanDepth	SE	S2SSNN	4	S2SSYN	0	4	m			
LW	MeanDepth	SE	S2SSNN	4	S2SSNN	0	4	m			
LW	MeanDepth	SE	S2SSNN	4	S3SSYN	0	4	m			
LW	Mixing	DE	11	4	10	0	0				
LW	Mixing	DE	11	4	13	0	0				
LW	Mixing	DE	11	4	11	0	0				
LW	Mixing	DE	11	4	12	0	0				
LW	Mixing	ES	5	12	2	0	0		Monomictic		
LW	Mixing	ES	5	12	12	0	0		Monomictic		
LW	Mixing	ES	5	12	1	0	0		Monomictic		
LW	Mixing	ES	5	12	11	0	0		Monomictic		
LW	Mixing	ES	5	12	5	0	0		Monomictic		
LW	Mixing	ES	5	12	6	0	0		Monomictic		
LW	Mixing	ES	5	12	10	0	0		Monomictic		
LW	Mixing	ES	5	12	8	0	0		Monomictic		
LW	Mixing	ES	5	12	9	0	0		Monomictic		

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
LW	Mixing	ES	5	12	4	0	0		Monomictic		
LW	Mixing	ES	5	12	3	0	0		Monomictic		
LW	Mixing	ES	5	12	7	0	0		Monomictic		
LW	Mixing	IT	ITAL-4	2	ITME-1	0	0		Polimictic		
LW	Mixing	IT	ITAL-4	2	ITAL-4	0	0		Polimictic		
LW	Mixing	IT	ITAL-5	6	ITAL-6	0	0		Stratified		
LW	Mixing	IT	ITAL-5	6	ITAL-5	0	0		Stratified		
LW	Mixing	IT	ITAL-5	6	ITME-2	0	0		Stratified		
LW	Mixing	IT	ITAL-5	6	ITME-4	0	0		Stratified		
LW	Mixing	IT	ITAL-5	6	ITAL-3	0	0		Stratified		
LW	Mixing	IT	ITAL-5	6	ITAL-10	0	0		Stratified		
LW	Salinity	DK	LW9	3	LW10	0	.5	o/oo			
LW	Salinity	DK	LW9	3	LW9	0	.5	o/oo			
LW	Salinity	DK	LW9	3	LW13	0	.5	o/oo			
LW	SurfaceArea	EE	2	3	3	0	10	km2			
LW	SurfaceArea	EE	2	3	4	0	10	km2			
LW	SurfaceArea	EE	2	3	2	0	10	km2			
LW	SurfaceArea	EL	LOW-S-L-S	8	LOW-S-L-S	10	100	km2			
LW	SurfaceArea	EL	LOW-S-L-S	8	LOW-S-M-S	10	100	km2			
LW	SurfaceArea	EL	LOW-S-L-S	8	LOW-S-L-C	10	100	km2			
LW	SurfaceArea	EL	LOW-S-L-S	8	LOW-D-M-C	10	100	km2			
LW	SurfaceArea	EL	LOW-S-L-S	8	LOW-D-L-S	10	100	km2			
LW	SurfaceArea	EL	LOW-S-L-S	8	LOW-D-L-C	10	100	km2			
LW	SurfaceArea	EL	LOW-S-L-S	8	MID-D-L-S	10	100	km2			
LW	SurfaceArea	EL	LOW-S-L-S	8	HIGH-D-L-C	10	100	km2			
LW	SurfaceArea	IE	11	6	3	0	.5	km2			
LW	SurfaceArea	IE	11	6	1	0	.5	km2			
LW	SurfaceArea	IE	11	6	9	0	.5	km2			
LW	SurfaceArea	IE	11	6	11	0	.5	km2			
LW	SurfaceArea	IE	11	6	7	0	.5	km2			
LW	SurfaceArea	IE	11	6	5	0	.5	km2			
LW	SurfaceArea	IE	8	6	8	.5		km2			
LW	SurfaceArea	IE	8	6	10	.5		km2			
LW	SurfaceArea	IE	8	6	2	.5		km2			
LW	SurfaceArea	IE	8	6	6	.5		km2			
LW	SurfaceArea	IE	8	6	12	.5		km2			
LW	SurfaceArea	IE	8	6	4	.5		km2			
LW	SurfaceArea	IT	ITAL-6	2	ITAL-5	.6	15	km2			
LW	SurfaceArea	IT	ITAL-6	2	ITAL-6	.6	15	km2			
LW	SurfaceArea	SE	S4DSYN	10	S3SSNN	0	10	km2			
LW	SurfaceArea	SE	S4DSYN	10	S3DSYN	0	10	km2			
LW	SurfaceArea	SE	S4DSYN	10	S3SSYN	0	10	km2			
LW	SurfaceArea	SE	S4DSYN	10	S3DSNN	0	10	km2			
LW	SurfaceArea	SE	S4DSYN	10	S2SSNN	0	10	km2			

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
LW	SurfaceArea	SE	S4DSYN	10	S2DSYN	0	10	km2			
LW	SurfaceArea	SE	S4DSYN	10	S2DSNN	0	10	km2			
LW	SurfaceArea	SE	S4DSYN	10	S1DSNN	0	10	km2			
LW	SurfaceArea	SE	S4DSYN	10	S2SSYN	0	10	km2			
LW	SurfaceArea	SE	S4DSYN	10	S4DSYN	0	10	km2			
TW	Exposure	UK	TW1	6	TW5	0	0		Sheltered		
TW	Exposure	UK	TW1	6	TW4	0	0		Sheltered		
TW	Exposure	UK	TW1	6	TW1	0	0		Sheltered		
TW	Exposure	UK	TW1	6	TW2	0	0		Sheltered		
TW	Exposure	UK	TW1	6	TW3	0	0		Sheltered		
TW	Exposure	UK	TW1	6	TW6	0	0		Sheltered		
TW	Salinity	IE	TW4	6	TW2	0	30	o/oo			
TW	Salinity	IE	TW4	6	TW3	0	30	o/oo			
TW	Salinity	IE	TW4	6	TW4	0	30	o/oo			
TW	Salinity	IE	TW4	6	TW5	0	30	o/oo			
TW	Salinity	IE	TW4	6	TW1	0	30	o/oo			
TW	Salinity	IE	TW4	6	TW6	0	30	o/oo			
TW	Salinity	UK	TW1	6	TW6	0	30	o/oo			
TW	Salinity	UK	TW1	6	TW5	0	30	o/oo			
TW	Salinity	UK	TW1	6	TW4	0	30	o/oo			
TW	Salinity	UK	TW1	6	TW1	0	30	o/oo			
TW	Salinity	UK	TW1	6	TW3	0	30	o/oo			
TW	Salinity	UK	TW1	6	TW2	0	30	o/oo			
TW	Substratum	UK	TW4	3	TW2	0	0		Sand	Mud	
TW	Substratum	UK	TW4	3	TW4	0	0		Sand	Mud	
TW	Substratum	UK	TW4	3	TW1	0	0		Sand	Mud	
TW	TidalRange	IE	TW1	3	TW2	1	5	m			
TW	TidalRange	IE	TW1	3	TW4	1	5	m			
TW	TidalRange	IE	TW1	3	TW1	1	5	m			
TW	TidalRange	UK	TW1	2	TW3	5		m			
TW	TidalRange	UK	TW1	2	TW1	5		m			
TW	TidalRange	UK	TW4	3	TW2	1	5	m			
TW	TidalRange	UK	TW4	3	TW5	1	5	m			
TW	TidalRange	UK	TW4	3	TW4	1	5	m			
CW	Exposure	UK	CW1	3	CW3	0	0		Exposed		
CW	Exposure	UK	CW1	3	CW2	0	0		Exposed		
CW	Exposure	UK	CW1	3	CW1	0	0		Exposed		
CW	Exposure	UK	CW5	3	CW6	0	0		Moderately Exposed		
CW	Exposure	UK	CW5	3	CW5	0	0		Moderately Exposed		

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
CW	Exposure	UK	CW5	3	CW4	0	0		Moderately Exposed		
CW	Exposure	UK	CW9	6	CW10	0	0		Sheltered		
CW	Exposure	UK	CW9	6	CW9	0	0		Sheltered		
CW	Exposure	UK	CW9	6	CW8	0	0		Sheltered		
CW	Exposure	UK	CW9	6	CW7	0	0		Sheltered		
CW	Exposure	UK	CW9	6	CW11	0	0		Sheltered		
CW	Exposure	UK	CW9	6	CW12	0	0		Sheltered		
CW	Exposure	UK_NI	CW8	3	CW8	0	0		Sheltered		
CW	Exposure	UK_NI	CW8	3	CW2	0	0		Sheltered		
CW	Exposure	UK_NI	CW8	3	CW5	0	0		Sheltered		
CW	Salinity	UK	CW6	12	CW5	30		o/oo			
CW	Salinity	UK	CW6	12	CW4	30		o/oo			
CW	Salinity	UK	CW6	12	CW3	30		o/oo			
CW	Salinity	UK	CW6	12	CW2	30		o/oo			
CW	Salinity	UK	CW6	12	CW12	30		o/oo			
CW	Salinity	UK	CW6	12	CW11	30		o/oo			
CW	Salinity	UK	CW6	12	CW10	30		o/oo			
CW	Salinity	UK	CW6	12	CW6	30		o/oo			
CW	Salinity	UK	CW6	12	CW9	30		o/oo			
CW	Salinity	UK	CW6	12	CW7	30		o/oo			
CW	Salinity	UK	CW6	12	CW8	30		o/oo			
CW	Salinity	UK	CW6	12	CW1	30		o/oo			
CW	Salinity	UK_NI	CW8	3	CW8	30		o/oo			
CW	Salinity	UK_NI	CW8	3	CW5	30		o/oo			
CW	Salinity	UK_NI	CW8	3	CW2	30		o/oo			
CW	TidalRange	IE	CW1	3	CW7	5		m			
CW	TidalRange	IE	CW1	3	CW4	5		m			
CW	TidalRange	IE	CW1	3	CW1	5		m			
CW	TidalRange	IE	CW2	3	CW8	1	5	m			
CW	TidalRange	IE	CW2	3	CW5	1	5	m			
CW	TidalRange	IE	CW2	3	CW2	1	5	m			
CW	TidalRange	IE	CW9	3	CW3	0	1	m			
CW	TidalRange	IE	CW9	3	CW6	0	1	m			
CW	TidalRange	IE	CW9	3	CW9	0	1	m			
CW	TidalRange	UK	CW3	3	CW9	0	1	m			
CW	TidalRange	UK	CW3	3	CW3	0	1	m			
CW	TidalRange	UK	CW3	3	CW6	0	1	m			
CW	TidalRange	UK	CW5	5	CW12	1	5	m			

WC	Factor	C_CD	Label	No. of nat. types	National type	Min	Max	Unit	Cat. 1	Cat. 2	Cat. 3
CW	TidalRange	UK	CW5	5	CW2	1	5	m			
CW	TidalRange	UK	CW5	5	CW5	1	5	m			
CW	TidalRange	UK	CW5	5	CW8	1	5	m			
CW	TidalRange	UK	CW5	5	CW11	1	5	m			
CW	TidalRange	UK	CW7	3	CW4	5		m			
CW	TidalRange	UK	CW7	3	CW1	5		m			
CW	TidalRange	UK	CW7	3	CW7	5		m			
CW	TidalRange	UK_NI	CW8	3	CW5	1	5	m			
CW	TidalRange	UK_NI	CW8	3	CW8	1	5	m			
CW	TidalRange	UK_NI	CW8	3	CW2	1	5	m			