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A comparison of European freshwater nutrient boundaries: A report to ECOSTAT, October 2015

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Background and organisation of the work.

The Water Framework Directive requires Member States to follow an intercalibration process to ensure comparability of status class boundaries (specifically the Good/Moderate boundary) for biological quality elements. This process is well established, and has been successfully followed by many MS for a range of BQEs. However, concerns have been raised that an apparently wide range of nutrient boundary values have been established by MS to support good ecological status. ECOSTAT has initiated a project to investigate this issue. The work is being led by UK (Freshwaters), Germany (Saline waters) and JRC. The aim of the work is to investigate and establish the reasons for any differences between MS in the development and application of nutrient boundaries, leading to the production of best practice guidance.

This work is beng co-ordinated by the steering group members listed below:

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1 Summary and key observations

The purpose of this report is to provide a comparison of the nutrient boundary values used by Member States to support good ecological status for freshwaters (rivers and lakes) under the Water Framework Directive (WFD). Data, provided in 2014 by 28 countries on WFD boundary values for nitrogen and phosphorus, and methods used in deriving the values, were collated and analysed. The results presented here represent the authors' interpretation of the information provided by experts from the Member States updated following a previous draft circulated to member state experts.

There are a number of factors that make direct comparison of nutrient boundaries between Member States difficult – these include the distribution of different river and lake types, the use of different summary statistics, different laboratory analytical techniques and determinands, and different methodological approaches to establishing boundary values. In addition, some MS have set site-specific boundaries, some type-specific, and in some cases some have used generic boundary values for all types. It should also be noted that MS may not have provided information for all of their national types, as the questionnaire only asked for the most important types. We have taken a pragmatic approach to the data, and used a variety of comparison methods in order to try to minimise the influence of these factors and to provide possible explanations for observed differences.

It is very difficult to reliably allow for type-specific differences when comparing nutrient boundary values. However, the overall impression gained from the information provided for both nitrogen and phosphorus in rivers and lakes is that the boundary values in use for lakes are more comparable than for rivers, and the values for phosphorus are more comparable than those for nitrogen. Comparisons have been made using a combination of National, Intercalibration and European Broad types.

For lakes there is a strong scientific literature relating phosphorus concentrations to the eutrophication response, and it is not surprising that boundary values for phosphorus are less variable than for rivers. The understanding of the eutrophication response in rivers is less well developed, and it is suggested that this is reflected in the wider variation between Member States in the boundary values used.

The least comparable boundaries were for nitrogen, particularly in rivers. Several Member States reported values for nitrate nitrogen that appear to be linked to guideline values from the repealed Drinking Water Directive (80/778/EC) and Surface Water Abstraction Directive (75/440/EC), These are unlikely to be linked to supporting ecological status. Other Member States reported lower values for nitrate, or values for total nitrogen, although these still covered a relatively large range of concentrations.

In general, for both rivers and lakes, lower values were reported where modelling or regression methods were used to establish boundary values. The highest values were reported when statistical distributions of the nutrient concentrations from all water bodies were used to set the boundary values or they were set by expert judgement.

For lakes, the majority of Member States use a mean or median as a summary metric, but for rivers and particularly for nitrogen, upper percentile values are used. In most cases there is no clear explanation, although France report that a maximum is used to detect the most unvavourable situation. For soluble nutrients such as nitrate an upper percentile may reflect winter concentration when applied to annual data, and thus be a better indication of annual available nitrogen load. However, upper percentiles have much higher uncertainty and are thus likely to be less appropriate as a metric to support ecological status. To facilitate comparison between differing summary statistics we have halved values for upper percentiles, based on general relationships between means and these percentiles.

When considering the variation in reported boundary values, we have made direct comparison between Member States, but we have also made comparisons with calculated average values within types or across all types, with the aim of identifying whether Member States have tended to set tighter or lower boundaries than the average. Further refinement of this approach, to exclude outlying values, should be considered.

It is recommended that the reported boundary values should be compared with pressure-response relationships developed during the intercalibration process, taking into account the uncertainty of relationships

and thus deriving a range of boundary values that could support ecological status for specific water body types.

1.1 Lake total phosphorus boundaries

Almost all Member States have reported boundary values for lake total phosphorus (TP). Those that did not report values either had no lakes or were in the process of revising their approach. The results show that there is a large range of boundary values in use, with the majority in the range of 5-100 μgl^{-1}. Almost all countries use similar summary metrics (mean, median or geometric mean), with ES using only a 75th percentile value, and DE using a combination of a median and 75th percentile value. This simplifies comparisons of boundaries, as differences caused by the summary metric are likely to be small in comparison to differences due to other reasons.

Comparison of national boundary values using the intercalibration and European broad typology (Lyche-Solheim et al. 2015) demonstrates that differences in boundary values are partly a result of different lake types. Siliceous and upland lakes have lower boundaries than lowland and calcareous/mixed or organic lake types. This is a reflection of well-established differences in natural (reference) phosphorus loadings to these lake types. However, it is difficult to make robust comparisons of boundary values through the use of type specific comparisons as the types used are either narrowly defined (intercalibration types), and thus contain boundaries from few countries, or they are more widely defined (European broad types), contain more countries but a wider range of national lake types. However, the analysis suggests that while there are country specific differences these are, for most countries, on average less than ±20 μgl^{-1} differences in the good/moderate boundary. A few countries tend to set boundaries that are lower (-30 μgl^{-1}) and a few higher (+ 30 μgl^{-1}), only one country (HU) set much higher boundary values.

Member states use different methods to set boundaries and there is evidence that the use of expert judgement or the distribution of TP concentrations across a range of values within a Member State results in higher good/moderate boundary values than the values that result from regression relationships with biological quality elements.

With a few exceptions the good/moderate boundary values used by Member States for lakes are broadly comparable and reflect differences in the sensitivity of lake types and uncertainty in the relationships between TP and biological quality elements. Further work comparing pressure response relationships developed between phytoplankton and TP in lakes during the intercalibration process may provide a more confident assessment of the appropriate range of boundary values for different lake types.

1.2 River phosphorus boundaries

Although the majority (22) of Member States reported TP boundary values for rivers, four only reported soluble or total reactive phosphorus (AT,ES, IE, UK). More countries used upper percentile summary metrics, such as 90th percentiles, for rivers than were reported for lakes. This was perhaps a surprising result, as upper percentile values are likely to have greater uncertainty and are most often used as a water quality standard where there is evidence that short term higher concentrations have a significant impact on ecological status.

Most Member States have established fewer type specific phosphorus boundaries for rivers than for lakes, despite usually having more river types. Nine countries reported a single national good/moderate boundary value covering all of their river types, and a further five countries only reported two boundary values. Thus there was much less evidence of type specific discrimination for river phosphorus boundary values, and the majority fall within a range of 10-500 ugl^{-1}. This lack of type specific difference was clear when boundary values were compared using both the intercalibration and broad typologies. In both cases, for the majority of the types, ranges of boundaries within the type were relatively high and showed much smaller type specific differences than for lakes. For the high/good boundary there was slightly better evidence of a gradation between siliceous and calcareous river type boundary values, but again this was less clear than it was for lakes.

As for lakes, there was evidence that the use of the distribution of phosphorus concentration values from all river water bodies produced higher boundary values than those based on relationships between phosphorus and biological status, both regression and categorical techniques.

The overall impression gained from the comparison of river boundaries was of a greater range of values and much less widespread or effective use of type specific boundaries than was the case for lakes. This has resulted in greater country differences and in some Member States much higher phosphorus concentrations for boundaries. In some cases these values are upper percentiles, but even after making allowance for this (e.g by halving the value for comparison) the values remain higher than for other countries.

Rivers are more dynamic than lakes and this heterogeneity is likely to be reducing the ability to establish nutrient thresholds. However, it is suggested that these results reveal a less clearly developed view of the impact of phosphorus in rivers than in lakes, and that further work to produce pressure response relationships for a variety of biological quality elements or metrics is needed before realistic ranges of phosphorus boundaries can be established from European rivers.

1.3 Lake nitrogen boundaries

Only sixteen countries reported boundary values for nitrogen in lakes, fewer than for phosphorus. The majority use total nitrogen, with two using only nitrate, one a mean value the other a maximum summary statistic value. Total nitrogen good/moderate boundary values range from 0.3 – 4.0 mgl^{-1}, although in one country nitrate nitrogen standards are also set for reservoirs at a higher values than for total nitrogen (5.65 mgl^{-1}) linked to guideline standards for drinking water and thus not applicable to supporting ecological quality.

In comparison to boundaries for lake phosphorus most Member States have established fewer type specific boundary values, suggesting less understanding of the impact of nitrogen on lake. There is also a greater range of country specific differences for nitrogen boundaries, than there were for phosphorus, with most countries showing differences, after allowing for different lake types, of ±0.5 mgl^{-1}.

As for phosphorus, there is also evidence that Good/moderate boundary values for nitrogen are dependent on the method used to derive the boundary. The lowest values being used where regression techniques are applied, and the highest when distribution of all water bodies are used.

1.4 River nitrogen boundaries

Twenty two countries reported boundary values for nitrogen in rivers, although the majority of these are for nitrate rather than for total nitrogen. At least five of these report values which are likely to be taken from drinking water standards and may not be intended as a value supporting good ecological status. As for lakes, most countries have reported relatively few good/moderate boundary values for nitrogen in comparison to the number of river types, suggesting little evidence of type specific sensitivity or background nitrogen concentrations.

There are a wide range of good/moderate total nitrogen boundary values, ranging from 0.25 mgl^{-1} to 35 mgl^{-1}. The lowest values are found in countries from the Northern GIG and the highest from the Eastern Continental GIG. While there are differences in the range of boundary values used when rivers are grouped by the European broad types, several of these types contained substantial ranges of boundary values. Comparing boundary values after making allowance for type specific differences demonstrated that river nitrogen (total nitrogen, or where not used nitrate nitrogen) boundary values show substantial country variation, typically ± 1.5 mgl^{-1}, much higher than for lakes (±0.5mgl^{-1}).

2 Introduction

2.1 Background

This report provides an initial comparison of the nutrient boundary values used by EU Member States as supporting quality elements for the Water Framework Directive (WFD). National experts in each country were asked to provide data concerning the metrics and summary statistics used to define supporting element nutrient (phosphorus and nitrogen) boundary values. This information was supplemented by a questionnaire requesting descriptions of the approaches used and how the boundary values were applied. Data provided by each member state for the metrics and type specific boundary values used to define WFD supporting element

status for nutrients were compiled into a single data set. The data set contained 2772 records with one or more good/moderate boundary values for the parameters shown in Table 2.1-1. 26 Member States reported values for Lakes and 25 for rivers. To compare boundary values it is important to compare similar lake and river types, so the reported national typologies were matched to the recently developed Broad typology[1]. For lakes 73% of records were matched, for rivers 78%. An alternative approach would be to use the intercalibration types: the data set had 64% of lake and 44% of river national types allocated to one or more intercalibration types.

Comparisons are reported here for the nutrient parameters where sufficient numbers of boundary values were reported: total phosphorus and total nitrogen for lakes, and total phosphorus, total nitrogen and nitrate nitrogen for rivers. Comparisons were not made for ammonium or nitrite nitrogen as they were not considered to be substances which contribute significantly to eutrophication, their mode of action being via toxicity to fish and invertebrates.

Category	NH_3-N	NH_4-N	NO_2-N	NO_3-N	Org N	SRP	TN	TP	TRP
Lake		6	2	6		3	14	26	
River	1	17	7	19	2	14	13	24	2

Table 2.1-1 Number of countries (BE W and BE Fl counted separately) reporting different nutrient related supporting elements for rivers and lakes (NH3-N free ammonia, NH_4-N total ammonium as nitrogen, NO_2-N nitrite as nitrogen, NO_3 nitrate as nitrogen, Org N organic nitrogen, SRP soluble reactive phosphorus, TN total nitrogen, TP total phosphorus, TRP total reactive P)

2.2 Boundary setting methods

Each country was asked to summarise information about the way that the good/moderate boundary was set and where appropriate to provide similar information relating to reference conditions. Few countries provided information about reference conditions, as the WFD does not require reference conditions to be established for supporting elements. However, several countries interpreted this question as the method used to establish the high/good boundary, which provided useful additional information and a view of supporting element concentrations which were close to reference conditions. The responses have been summarised (Table 2.2-2) and can be grouped into five main approaches and an additional category of “insufficient information” (Table 2.2-1).

For rivers the most commonly stated method could be categorised as “expert judgement” and included values taken from the literature. For lakes the most common approach is the use of regression modelling where nutrient concentration is related to a BQE or part of a BQE such as chlorophyll a concentration. This approach is less common for rivers, probably due to weaker relationships between river BQEs and nutrients (Davies 2012).

For rivers, and to a lesser extent lakes, another common method was based on the distribution of nutrient concentrations in water bodies assigned a WFD status, typically from biological classifications. Various approaches were described, for example the 90th percentile of water bodies classified as Good. This approach is relatively objective, although as for all methods there is an element of expert judgement in the selection of the percentile used (see below).

Another approach, was to define boundaries from a percentile of the distribution of supporting element concentrations from all water bodies. This approach introduces a high degree of expert judgement, as there is no explicit link between ecological status and the chosen percentile of the supporting element and the boundaries are likely to be influenced by the range of current conditions present in any particular country.

[1] Following comments from ES no matches to the Broad Typology were made for ES rivers or lakes and thus boundaries from ES do not contribute to comparisons using this typology.

For lake phosphorus two countries predicted reference TP values from models of alkalinity and depth, from which high/good and good/moderate boundaries were then derived using expert views on the relative degree of change from reference (an EQR approach).

For nitrate, the common use of the value 5.65 mgl^{-1} as N is likely to be derived from the guideline value of 25 mgl^{-1} as NO_3 in the Drinking Water Directive (80/778/EC) although this has now been repealed. However the standards used for protection of drinking water supplies do not have any relationship with ecological reponse, so it is difficult to understand how they might be perceived to support good ecological status.

Method used to determine GM boundary	Lakes	Rivers
Insufficient information	DE[2], GR, IE, LV, Sl	BE(W), DE[2], GR, LU, LV, PL
Expert Judgement	BE(Fl), BG, CZ, HU	BE(FL), BG, ES, FR, IT, PT, SK, CZ (Nitrate)
Distribution of all water bodies	CY, RO, FR (NO_3)	EE, HU, RO
Distribution of High/Good/Moderate water bodies	AT, HR, LT, PL, ES	AT, CY, CZ, FI, HR, IE, LT
Regression with biology	DK, FI, FR(TP), IT, NL, NO, PT	CZ(3rd cycle), NL, NO, UK
Modelling and expert judgement	EE, SE, UK	SE

Table 2.2-1 Categories of methods used to set lake and river boundaries

[2] As information only available in German

		Summary of method used to derive boundary values for lakes		
Country	**Ref. provided**	**Reference**	**High/Good**	**Good / Moderate**
AT	Y	mean of reference lakes or expert judgement	Mean concentration-range at boundary H/G of BQE Phytoplankton assessment	Mean concentration-range at boundary G/M of BQE Phytoplankton
BE_FL			Expert Judgement	Expert judgement
BE_WL	no lakes			
BG		75th percentile of Good	Expert Judgement	Expert judgement
CY	Y	25th percentile of all sites		EQR 0.8
CZ				Derived from river boundary
DK				Empirical Models
DE				insufficient detail (reports in Gernan)
EE	Y	Model using Morpho Edaphic Index		EQR 0.3-0.6
ES			Expert judgement	75th percentile of reference sites
FI	Y	Mean of Reference	75th percentile Reference	95th percentile of Reference +0.5xReference
FR		Maximum of Reference (Defined by phytoplankton)	Regression with Phytoplankton metric. For NO_3 90th percentile of reference	Regression with Phytoplankton metric. For NO_3 geometric method 10^(1/4*max(log10(NO3_N))-P90(log10(NO3_N))))
GR				
HR			25th percentile of Good	90th percentile of Good
HU		unspecified stat of Ref sites	Expert judgement, statistical analysis	Expert judgement, statistical analysis
IE				insufficient detail
IT	Y	From GIG		Regression from literature
LT	Y	25th percentile of Reference	Average of 75th & 25th percentiles of High & Good	Average of 75th & 25th percentiles of Good & Moderate
LU	no lakes			
LV		Median of Reference	90th percentile of Reference	No information provided
NL		Alkalinity/Depth model		90th percentile of upper residuals of regression with Biology
NO	Y	Predicted from regression with Chlorophyll, using value of Reference sites		Clear low alkalinity lakes, 25th percentile of residuals of regression with chlorophyll, Moderate alkalinity lakes, regression with whole phytoplankton EQR
PL				90th percentile of High & Good
PT				Regression with Chlorophyll
RO			90th percentile Reference or Best Available	Double HG boundary
SE	Y	Modelling & Expert Judgement	Modelling and Expert Judgement	Modelling and Expert Judgement
SI			Use AT boundary values	Use AT boundary values
SK	no lakes			
UK	Y	Model using Morpho Edaphic Index	0.80 EQR	0.5 EQR

Table 2.2-2 Summary of methods used to set lake boundary values

Country	Ref. provided	Method used to derive value		
		Reference	High/Good	Good / Moderate
AT			Mean concentration at boundary H/G of BQE Phytobenthos-assessment (for PO4-P) and Macroinvertebrate (for NO3-N)	Mean concentration-range at boundary G/M of BQE Phytobenthos (for PO4-P)
BE_FL			Expert Judgement	Expert Judgement
BE_WL			Expert Judgement	Expert Judgement
			based on SEQ-eau Method (V.2 –alterations and biological potentialities) and Directive 78/659/EEC for fishes	
BG		75th percentile Good	Expert Judgement	Expert judgement
HR			10th or 25th percentile of Good	75th or 90th percentile ofGood
CY			25th percentile of all, 75th percentile of Reference	50th percentile of Good + Moderate
CZ		Mean of Reference water bodies	90th percentile of Reference water bodies (Nitrate with reference to Nitrates Directive)	90th percentile of Good water bodies (moderate anthropogenic pressure)
DK				
DE		Under revision	under revision	Unspecified statistic
EE	Y	Mean of Reference		75th percentile of all
ES			90th percentile of Reference	Expert judgement
FI		No reference value defined.	75th-90th percentile Reference or best available	Combination of statistics and review panel work/expert judgement
FR		Expert Judgement	Expert Judgement	Expert Judgement
GR				
HU		modelled using altitude	10-30th percentile of all + regression with Phytobenthos	30-50th percentile of all + regression with Phytobenthos
IE		Mean of Reference	95th percentile of High	Compare interquartile ranges of Good & Moderate
IT		90th percentile Reference (TP) 75th percentile (NO3)	Expert judgement	Expert Judgement
LT		25th percentile Reference	Average of 75th & 25th percentiles of High & Good	Average of 75th & 25th percentiles of Good & Moderate
LU				German method
LV		50th percentile Reference	90th percentile of Reference	
NL				regression with Biology
NO		Lake Reference x 1.5 confirmed by river BQE ref.values and regressions against TP, For turbid rivers: regression model for TP vs. catchment clay-cover in ref.sites	Lake Ref x 1.5, confirmed by river BQE HG values and regressions against TP: Clear riv EQR: 0,5-0,6	Lake Ref x 1.5, confirmed by river BQE GM values and regressions against TP: Clear riv EQR 0.3-0,4, Turb riv 0.5
PL				
PT				Historic value

Country	Ref. provided	Method used to derive value		
		Reference	High/Good	Good / Moderate
RO			90th percentile best available	Double High/Good
SE	Y			Expert Judgement
SK		Expert Judgement		Expert Judgement
UK	Y	Modelled using alkalinity and altitude	Regression with EQR for Macrophytes and Phytobenthos	Regression with EQR for Macrophytes and Phytobenthos

Table 2.2-3 Summary of methods used to set river boundary values

3 Comparison of Phosphorus boundary values

3.1 Range of metrics and boundary values used

A variety of statistical summary metrics are used to specify phosphorus boundary values, the most common was a mean, usually calculated for the growing season for lakes and annually for rivers (Table 3.1-1). Five countries (AT, BE (W), FR, RO, SK) use 90th percentile values in rivers and ES uses a 75th percentile for lakes. Two countries use a combination of mean and percentile values: DE use a mean and 75th percentile in lakes and IE a mean and 95th percentile for rivers.

The use of upper percentiles as the summary metric needs to be taken into account when comparing the boundary values as they would typically have higher numeric values than a mean or median value. To allow for this upper 90th and 95th percentile values have been halved for comparisons (see 3.3.1 for details). The growing season is defined in various ways, but typically covered the period from March to October, (May to October in Scandinavian countries). In comparison to differences in the use of percentiles and means it is assumed that differences between annual and growing season means would be negligible in the context of comparing national values.

For lakes, all countries that reported boundaries use total phosphorus (TP) and three (BG, HU, RO) additionally report soluble phosphorus (SRP) (Table 3.1-2). For rivers the majority report TP, although two only reported SRP (AT, ES) and two only total reactive phosphorus (TRP) (IE, UK) (Table 3.1-3).

Phosphorus concentrations for the good/moderate boundary varied substantially between countries with values in rivers generally higher than those in lakes (Figure 3.1-1) which would be expected as phosphorus is retained in lake sediments and average concentration should thus be lower than that found in inflowing rivers. Some of the variation in boundary values is likely to be due to differences in typology and thus the following sections will compare phosphorus boundary values for similar lake and river types using the intercalibration and recently developed European broad typology (see 3.2.2 & 3.3.2).

When comparing boundary values it would be instructive to compare Member States views of reference phosphorus concentration, as although Annex V makes it clear that the good/moderate boundary for nutrients should be at a level “so as to ensure the functioning of the ecosystem ..”, at the high/good nutrient boundary “concentrations remain within the range normally associated with undisturbed conditions”. Only 9 Member States (AT, CY, EE, FI, IT, LT, NO, SE, UK) reported reference values for phosphorus, although the majority reported values for the high/good boundary. The exceptions were DK, GR, IE, PL for lakes and DE, GR, IT, PT, SK for rivers.

If it is assumed that the high/good boundary value reflects a member state’s view of reference, then the ratio of the high/good to good/moderate boundary can be used to measure the relative degree of change of phosphorus that each member state assumes will still support good ecological status. The difference can also be expressed as an absolute change in TP, by subtracting the good/moderate boundary value from the high/good value, to provide the TP good class width. Both are potentially useful measures, although the ratio approach is very similar to that used to define chlorophyll boundary values for lakes and represents a relative change from reference rather than an absolute value, both are shown in Figure 3.1-3.

For both lakes and rivers there was a substantial range in this ratio. For lakes the majority of countries had values above 0.5, a doubling of phosphorus concentration across the good status class. However, for rivers the range of values was greater, with approximately as many countries with values below 0.5 as above 0.5. These results suggests that there is a more uniform view of the impact of phosphorus in lakes than in rivers, and implies that rivers are less sensitive to phosphorus as greater changes will still support good status in rivers. This difference in apparent sensitivity between rivers and lakes also illustrates that while the ratio may reflect different national approaches to boundary setting it may also reflect the sensitivities of different lake or river types and emphasises the importance of comparing boundary values in common types.

Category	Parameter Code	Period	Not specified	Percentiles			geometric mean	mean	median
				75th	90th	95th			
Lakes	SRP	Annual						2	
		Growth Season						1	
	TP	Annual		1			2	8	
		Growth Season		1				13	2
Rivers	SRP	Annual	1		4			6	1
		Growth Season						2	
	TP	Annual			4			14	3
		Growth Season						3	
	TRP	Annual				1		2	

Table 3.1-1 Summary metrics used to specify lake and river phosphorus boundary values

Category	Country	Period	SRP	TP
Lakes	AT	Annual		mean
	BE (Fl)	Growth Season		mean
	BG	Annual	mean	mean
	CY	Annual		mean
	CZ	Growth Season		mean
	DE	Growth Season		median
				75th percentile
	EE	Growth Season		mean
	ES	Annual		75th percentile
	FI	Growth Season		mean
	FR	Growth Season		median
	GR	Annual		mean
	HR	Growth Season		mean
	HU	Annual	mean	mean
	IE	Annual		mean
	IT	Annual		geometric mean
	LT	Growth Season		mean
	LV	Annual		mean
	NL	Growth Season		mean
	NO	Growth Season		mean
	PL	Growth Season		mean
	PT	Annual		mean
	RO	Growth Season	mean	mean
	SE	Growth Season		mean
	SI	Growth Season		mean
	UK	Annual		geometric mean

Table 3.1-2 Parameters used to specify phosphorus boundaries for lakes (SRP soluble reactive phosphorus, TP total phosphorus, TRP total reactive phosphorus)

Category	Country	Period	SRP	TP	TRP
Rivers	AT	Annual	90th percentile		
	BE (Fl)	Growth Season	mean	mean	
	BE (W)	Annual		90th percentile	
	BG	Annual	mean	mean	
	CY	Annual	mean	mean	
	CZ	Annual		median	
	CZ_3rd	Annual	median	median	
	DE	Annual	mean	mean	
	EE	Annual		mean	
	ES	Annual	metric not reported		
	FI	Annual		mean	
	FR	Annual	90th percentile	90th percentile	
	GR	Annual		mean	
	HR	Annual		median	
	HU	Annual	mean	mean	
	IE	Annual			mean
					95th percentile
	IT	Annual		mean	
	LT	Annual	mean	mean	
	LU	Annual	mean	mean	
	LV	Annual		mean	
	NL	Growth Season		mean	
	NO	Annual		mean	
	PL	Growth Season	mean	mean	
	PT	Annual		mean	
	RO	Annual	90th percentile	90th percentile	
	SE	Annual		mean	
	SK	Annual	90th percentile	90th percentile	
	UK	Annual			mean

Table 3.1-3 Parameters used to specify phosphorus boundaries for rivers (SRP soluble reactive phosphorus, TP total phosphorus, TRP total reactive phosphorus)

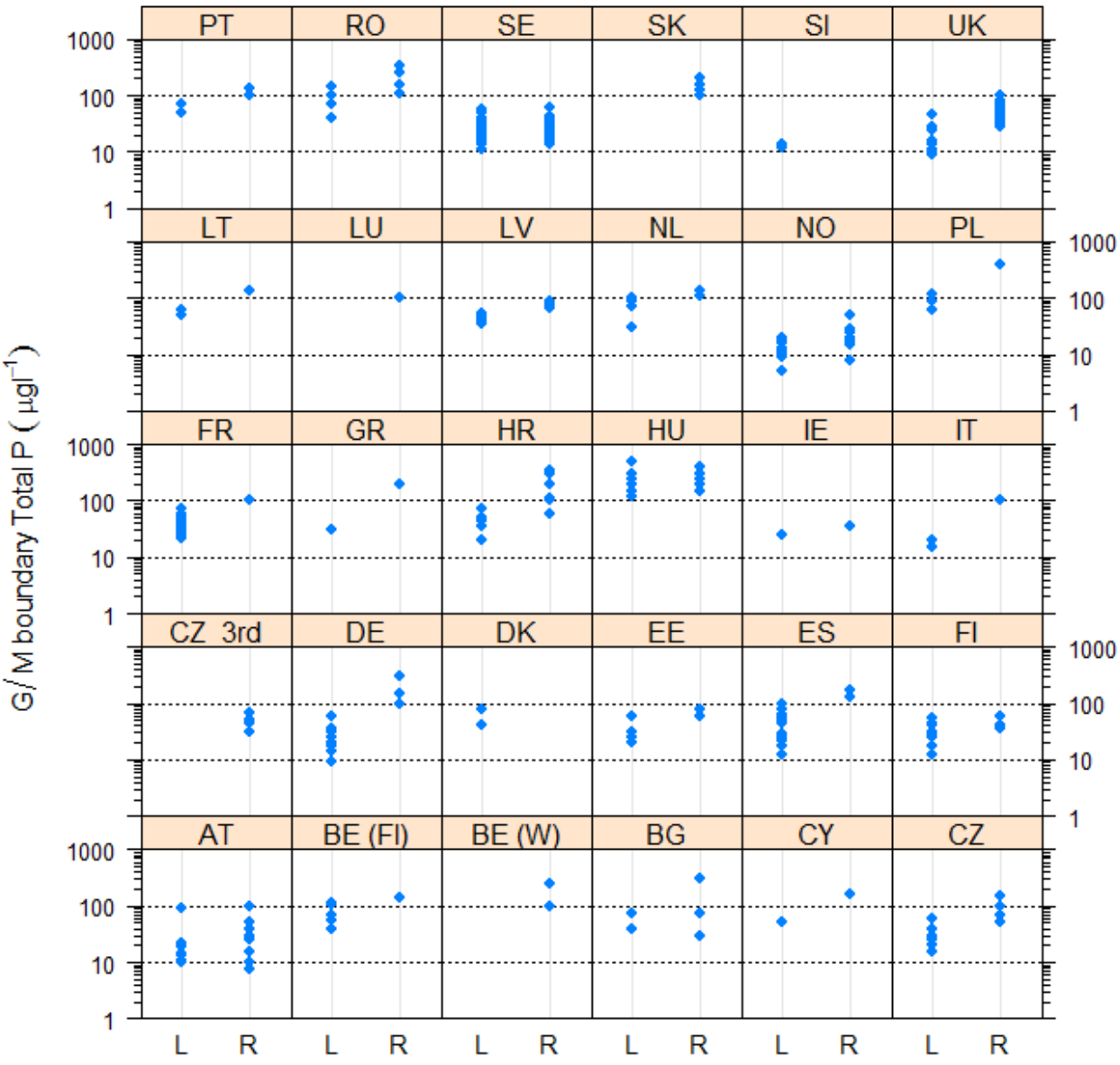

Figure 3.1-1 Comparison of Total P boundaries in lakes (L) and rivers (R) by country (UK and IE river P boundaries are Total Reactive P rather than Total P. River values for ES and AT are Soluble Reactive P, values for AT rivers and ES lakes are halved as they are 90th percentiles, river values for IE exclude 95th percentile, lake values for DE exclude 75th percentile values)

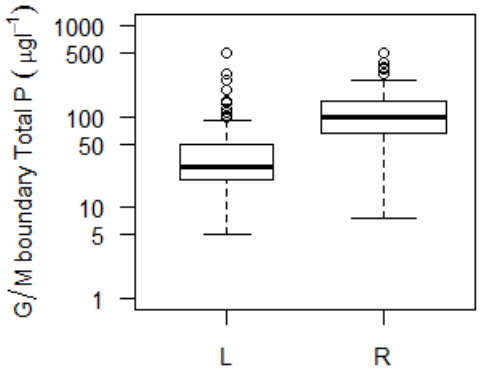

Figure 3.1-2 Range of good/moderate phosphorus boundary values in lakes (L) and rivers (R). Width of bar proportional to number of countries with boundary values (75th and 90th percentile values are halved).

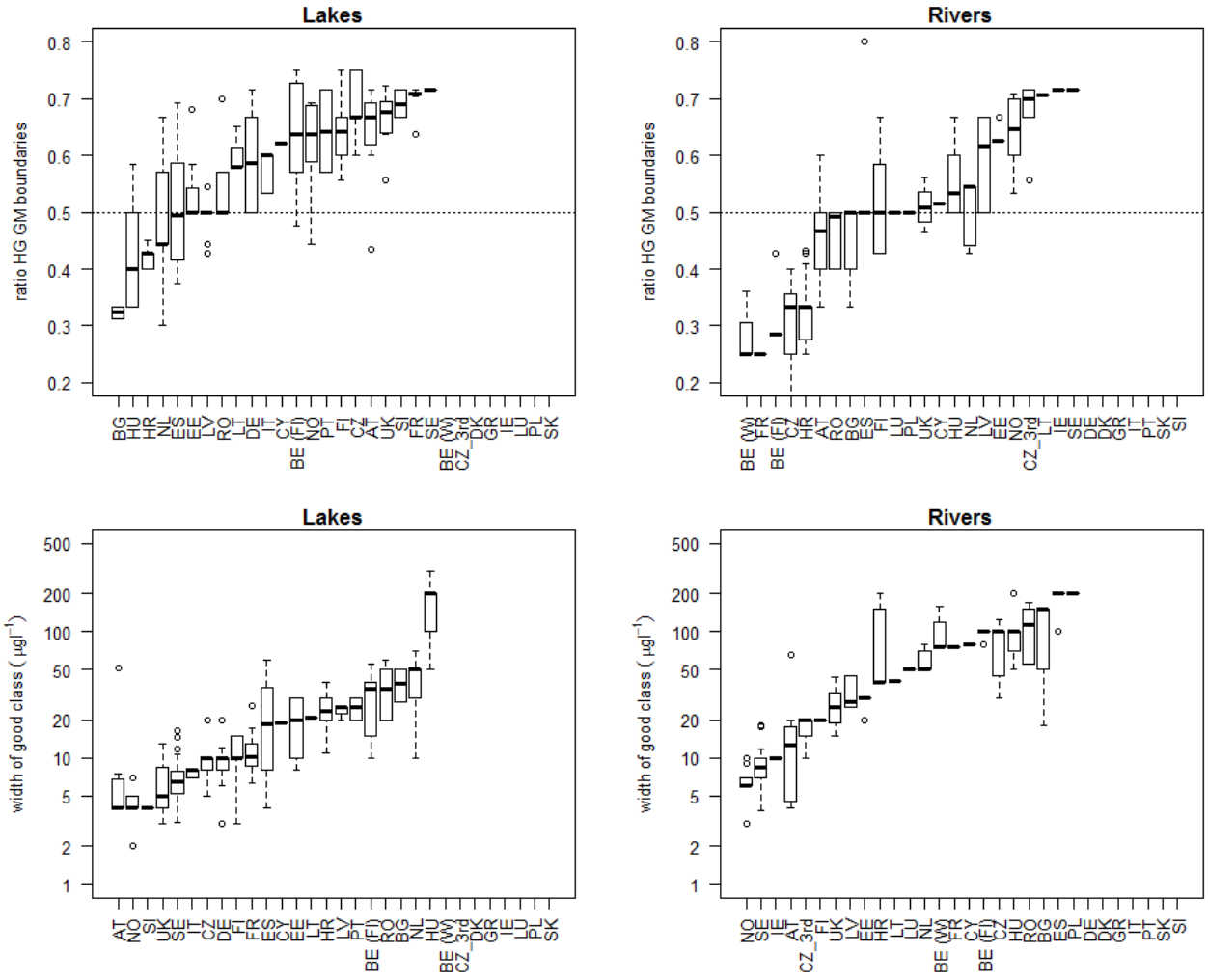

Figure 3.1-3 Range of a) ratio between high/good and good/moderate type specific phosphorus boundary values and b) the resulting width of the good class for lakes (TP) and rivers (TP and TRP/SRP if TP not measured). Arranged by country in ascending order of median value for all types reported by country. The ratio of 0.5 represents a doubling of phosphorus concentration from the high/good boundary.

3.2 Comparison of total phosphorus boundaries for lakes

3.2.1 Introduction

For lakes the comparison of TP boundaries is straightforward as only one country (ES) uses an upper percentile standard. There was a relatively wide range of national type specific good/moderate boundary TP values (Figure 3.2-1 & Table 3.2-1). The lowest good/moderate boundary values were reported by AT, IT, NO, Sl and UK (all with a median value less than the 25th percentile of all countries boundaries) and the highest by BE(FL), BG, DK, HU, NL, PL, PT and RO, all with a median value greater than the 75th percentile of all countries boundaries (Figure 3.2-1). Thus across Europe good/moderate phosphorus boundary values vary from <10 µgl^{-1} to > 200 ugl^{-1}.

Within each country the range of total phosphorus boundary values is smaller than it is across Europe. This is to be expected as no single country is likely to have lakes exhibiting the full range of European conditions. The majority of Member States reported fewer good/moderate boundary values than national lake types, as often a boundary value was applied to several lake types. However typically at least 5 different values were used. Notable exceptions were BG, DK and IT, with 12, 11 and 18 national lake types respectively, but only two boundary values. It is assumed that within each Member State the range of values used reflects the different sensitivities to phosphorus of their lake types. The lowest range of good/moderate boundary values was reported by IT (15-20 µgl^{-1}), despite having 18 different lake types, and the highest by HU (120-500 µgl^{-1}), although the majority typically have boundary values spanning a range of <100 µgl^{-1} with a median value for all countries of 46 µgl^{-1}.

There is a similar range of high/good boundary values across Europe (Figure 3.2-1). The lowest values are below 10 µgl^{-1} and the highest above 50 µgl^{-1}(with some above 100 µgl^{-1}) which must at least partly be a reflection of different natural TP concentrations in different European lake types. It is thus important to make comparisons of boundary values within similar types of lake, using either the intercalibration (IC) typology or the recently developed European broad typology. The IC typology has the advantage that the lake types were relatively narrowly defined and thus contain the most similar lakes, although few countries are then represented in each type. In addition the intercalibration process was carried out within geographic regions and thus cannot be used for a pan-European comparison. The broad typology was designed to overcome these problems, but potentially compares lakes that are less similar, as the types are relatively widely defined. In particular alkalinity, a factor likely to reflect background phosphorus concentrations (Cardoso et al. 2007) is not explicity included, although it is reflected by broad categories of geology. Both approaches have been used, see section 3.2.2.

Country	Number of				Range good/moderate boundary values ($\mu g l^{-1}$)		
	National types	National types with boundary	Unique good/moderate boundary values	Broad types	Min	Max	Range
AT	8	8	7	4	10	92	82
BE (Fl)	6	6	5	2	40	110	70
BE (W)	No lakes						
BG	13	12	2	5	40	75	35
CY	1	1	1	1	50	50	0
CZ	9	9	6	0	15	60	45
DE	16	14	8	3	9	60	51
DK	11	11	2	2	42	80	38
EE	8	8	4	4	20	60	40
ES	39	28	12		12	100	88
FI	13	13	8	3	12	55	43
FR	33	29	29	11	21	71	49
GR	1	1	1	0	30	30	0
HR	6	6	5	2	20	70	50
HU	16	14	6	4	120	500	380
IE	13	13	1	4	25	25	0
IT	18	20	2	9	15	20	5
LT	3	3	2	2	50	60	10
LU	No lakes						
LV	9	9	5	4	35	55	20
NL	19	6	4	3	30	100	70
NO	21	21	8	5	5	20	15
PL	13	4	3	2	60	120	60
PT	5	4	2	2	50	70	20
RO	17	13	4	6	40	140	100
SE	64	64	63	10	11	58	47
SK	No lakes						
Sl	2	2	2	1	12	14	2
UK	8	8	8	3	9	47	38

Table 3.2-1 Number of national lake types, good/moderate boundary values and broad types with boundaries reported by each Member State. (FR SE & UK have site specific boundary values, mean for national types used in above table, values for ES are 75th percentiles)

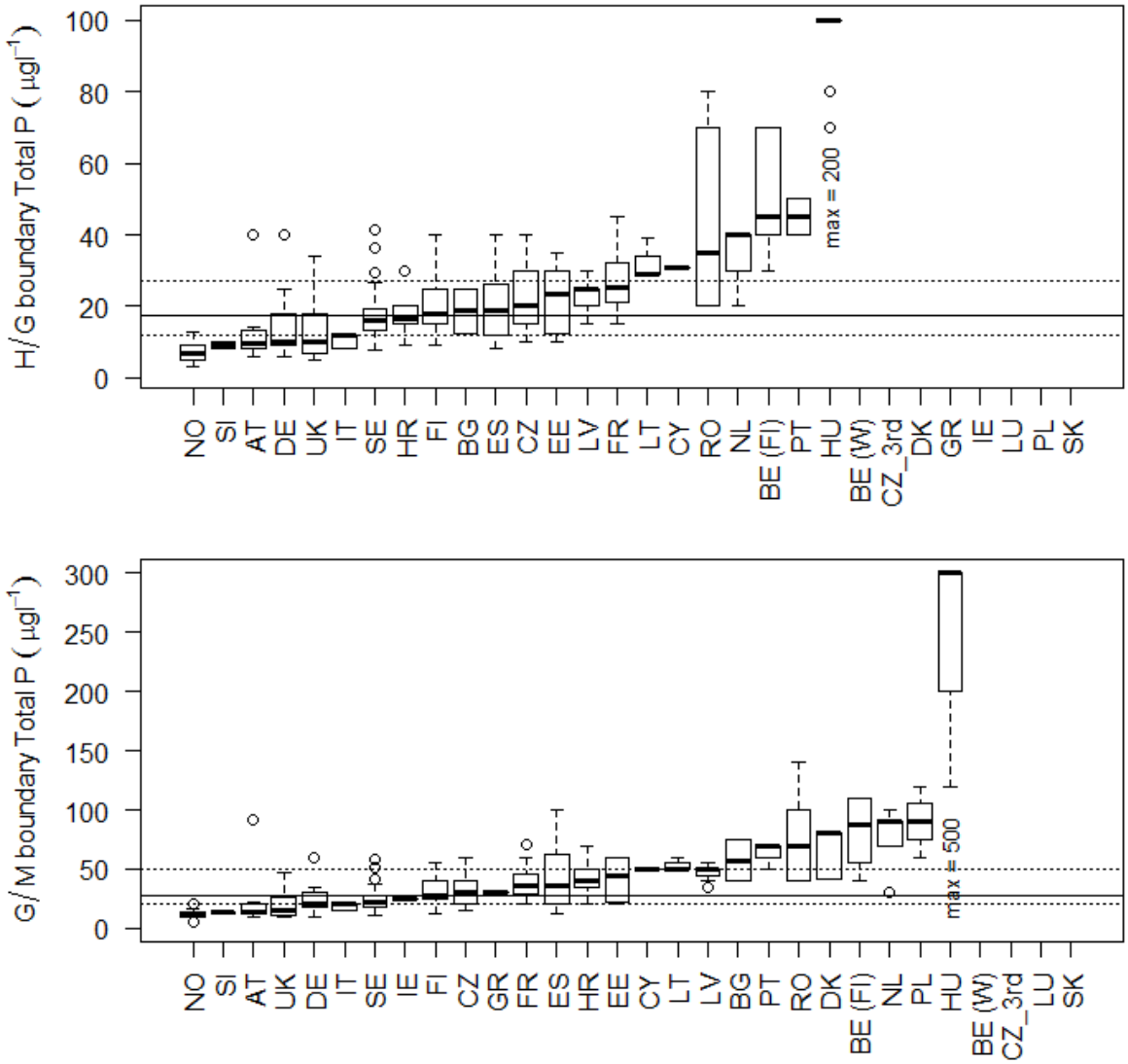

Figure 3.2-1 Range of a) high/good and b) good/moderate boundaries for lakes, arranged by median value of boundaries for each country. Lines mark 25th, 50th and 75th percentile values for all countries. (Range for DE includes only median, range for ES is for 75th percentile values)

3.2.2 Comparison of boundaries by lake type

3.2.2.1 Comparison of boundaries by intercalibration type

Five Member States did not report links to the intercalibration typology and are thus not represented in this comparison. The number of reported good moderate boundary values for total phosphorus in each intercalibration type is shown in Table 3.2-2. Only five types have more than 3 countries represented in the type. National boundaries for these types are shown in Appendix section 6.1.1 and all values are based on a mean or median summary statistic.

There is a clear transition in both good/moderate and high/good boundary values across the intercalibration typology (Figure 3.2-2). The lowest values were found in the low alkalinity lakes intercalibrated by the Northern GIG (NGIG). Slightly higher values were reported from moderate alkalinity and humic NGIG lakes (L-N1 L-N6a, L-N8a & L-N3a), Mediterranean reservoirs (L-M5/7, L-M8) and high alkalinity Alpine lakes (L-AL3 & L-AL4). The highest values were reported for the Eastern Continental GIG (L-EC1), the next highest in the Central Baltic GIG (CBGIG) high alkalinity lakes (L-CB1 & L-CB2), with moderate alkalinity types in the CBGIG (L-CB3) having slightly lower values, but still higher than those for what might be a similar lake type in NGIG (L-N1).

As expected the range of good/moderate boundary values within each of these intercalibration types was smaller than the range for each country, clearly demonstrating the importance of lake type when making boundary comparisons. The smallest ranges (10-20 μgl^{-1}) were reported for the NGIG and ALGIG lake types, perhaps reflecting that these types were represented by only four or less countries, but probably also reflecting the smaller range of actual TP concentrations in these lakes. In contrast the CBGIG lake types had from 6-7 countries reporting boundary values for the type with ranges of 70-80 μgl^{-1} (Figure 3.2-2). For example the lowest values in the high alkalinity CBGIG lakes were reported by IE (25μgl^{-1}) and the highest by PL (L-CB1 90 μgl^{-1}) and BE(Fl) (L-CB2 105 μgl^{-1}) (see Figure 6.1-3 & Figure 6.1-4). The highest range of good moderate values were found in the Eastern Continental GIG (L-EC1), although only two MS (BG, HU) were represented.

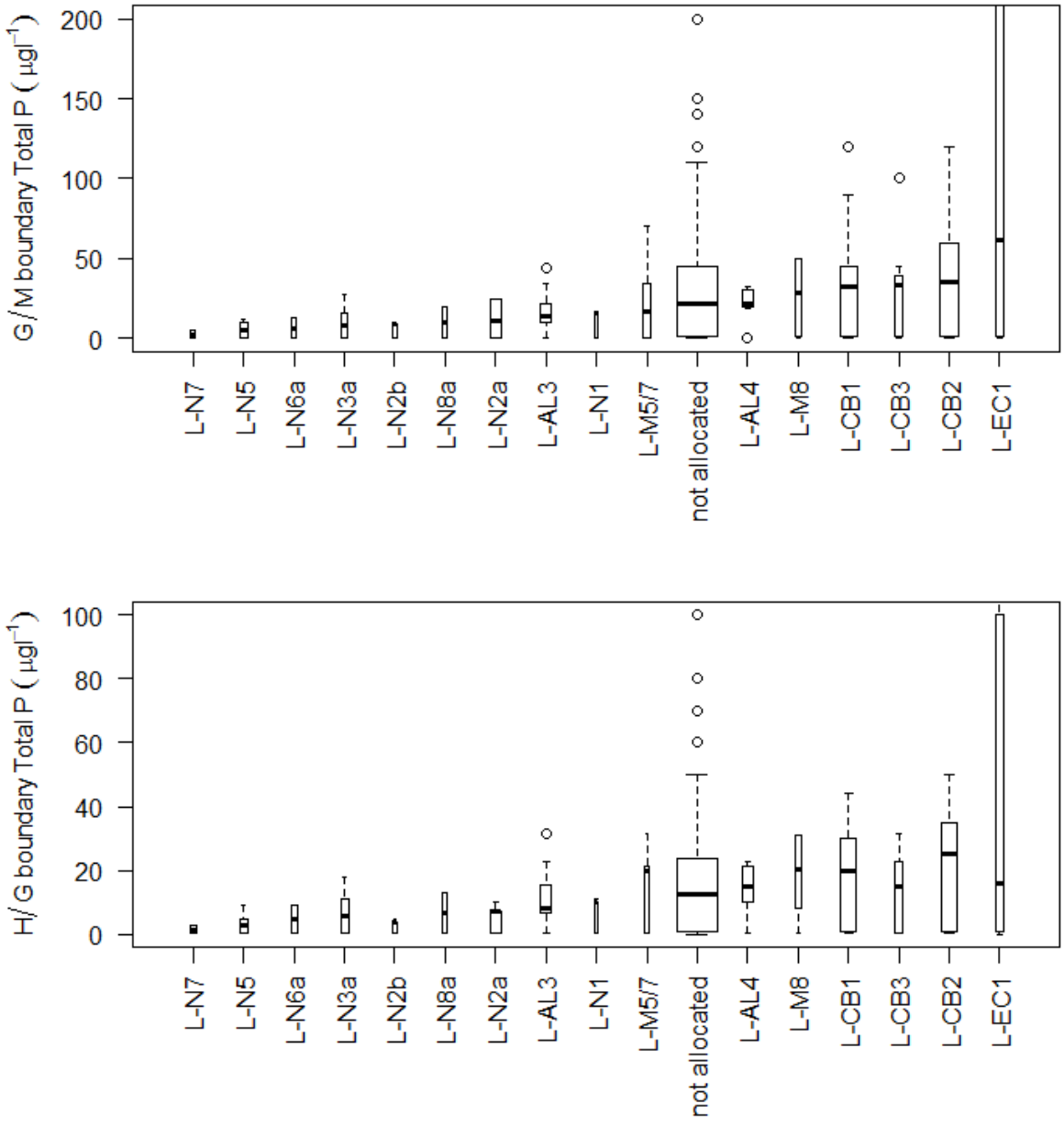

Figure 3.2-2 Range of a) good/moderate and b) high/good total phosphorus boundaries for lake intercalibration types

Intercalibration type	Number of countries	Total National Types	AT	BE (FI)	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HR	HU	IE	IT	LT	LV	NL	NO	PL	PT	RO	SE	SI	UK
not allocated		201	1	2	12		9	8	9	6	28	7	4	1	6	9	5	11		2				2	13	64		3
L-AL3	5	20	5					1					8					4									2	
L-AL4	4	15	2					2					8					3										
L-CB1	11	32		2				3	1	1			11				2		2	3	2		4					1
L-CB2	11	36		2				3	1	1			16				2		1	2	3		4					
L-CB3	3	8											5							2	1							1
L-EC1	1	5														5												
L-M5/7	3	7											4	1										2				
L-M8	4	6				1							2	1				2										
L-N1	2	2																				1						1
L-N2a	4	11										2					4					4						1
L-N2b	2	2																				1						1
L-N3a	2	5										3										2						
L-N5	2	5										1										4						
L-N6a	2	5										1										4						
L-N7	1	4																				4						
L-N8a	1	1																				1						

Table 3.2-2 Number of national type specific good/moderate boundary values for TP reported for each lake intercalibration type

3.2.2.2 Comparison of boundaries by broad type

The European broad typology combines lakes into 15 different broad types and the reported national types were linked to broad types using information in Lyche-Solheim et al. (2015). A comparison between the national types allocated to each of these broad types and to the intercalibration type, as defined by each Member State in their questionnaire responses was made. In general there was a good correspondence between the intercalibration types included within each broad type and those identified by Lyche-Solheim et al. (2015), but several revisions were made where lake types and TP boundaries suggested inappropriate type matches,and the resulting correspondence is shown in Table 3.2-4. Some IC types are still split between broad types, which may reflect further inappropriate matches but the current data set contains the best currently available match between national and broad types (see tables in Appendix section 6.1.2 for details).

The majority of broad types are represented by four or more countries and some (the lowland calcareous lake types) by 14-16 countries, (Table 3.2-3). Typically the variation in high/good boundary values in each broad lake type is < 20 μgl^{-1}, although larger values do occur in some of the types (Figure 3.2-2). The greatest variation occurred in type 6 (lowland, organic & calcareous/mixed) and was the result of very high values reported by one member state (HU), see Figure 6.1-21, other countries having relatively similar values. The lowest values were found in highland lakes (broad type 12), large deep lakes and siliceous lakes (broad types 13,1, 7, 11, 2, 9), slightly higher values in the Mediterranean and lowland organic siliceous lakes (broad types 9,10,5,14). The highest values, mostly < 40 μgl^{-1}, were found in the lowland calcareous lake types (broad types 3, 4, 6). This is a pattern that would be expected from our current understanding of lake ecology and reflects the greater natural fertility of lakes found in soft rock systems. It also suggests that for the majority of countries there is a relatively uniform view of reference phosphorus conditions that matches current understanding of lake ecology.

Good moderate boundary values show a similar trend, with higher values associated with the calcareous/mixed lakes and the lowest with the siliceous lakes (Figure 3.2-4). The majority of siliceous lakes had values below 50 μgl^{-1} and the calcareous lakes below 100 μgl^{-1}. However, there was generally a wider range of values within each of the broad types than was reported for the high/good boundary. This is either a reflection of the wider range of conditions in what is by definition a “broad” typology or it reveals differences in Member States perception of the relative sensitivity of ecology to phosphorus. In general the range of values was greater when more countries and national type boundaries were included in the broad type. As an example the highland siliceous lakes (broad type 11) had a particularly high range of national good/moderate boundaries with two countries (BG, RO) having similar higher boundary values, three countries (NO, IT, SE) with similar lower values, while on country (FR) has an intermediate value (Figure 6.1-29). This may reflect different lake types or different views of the TP concentrations required to support good status.

The range of the ratio of high/good to good/moderate boundaries shows few differences between the broad types, with the majority having ratios less than 0.5, i.e. less than a doubling of TP concentration from high/good to good/moderate (Figure 3.2-5)..

A more detailed comparison of TP lake boundary values within intercalibration and broad typologies are given in sections (6.1.1 & 6.1.2). However, from these comparisons it is suggested that while typology is a major factor accounting for differences in TP lake boundary values, country specific differences are also likely to be significant. It is very difficult to separate the effect of country and typology due to the limitations of the use of a sufficiently broad typology in the comparison across Member States. One approach to achieving this comparison is to compare the average difference between Member State boundaries and the average boundary value (of all countries contributing to the type) for each broad type (see 3.2.3)

Broad Type		Number countries	Total national types	AT	BE (Fl)	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HR	HU	IE	IT	LT	LV	NL	NO	PL	PT	RO	SE	SI	UK
	Not allocated		129		2	2		9	7	7	1	39	8	17	1		7		1		1	13		9	1	2			2
1	Very large & deep (stratified) (all Europe)	4	5			1							2	1					1										
2	Lowland, siliceous	7	32								1		1					4					6			1	15		4
3	Lowland, stratified, calcareous/mixed	16	44		2	4			2	1	4			2			4	4	2	2	3	3		3		3	5		1
4	Lowland, calcareous/mixed, very shallow (unstratified)	14	33	1	2	1				3	1						2	4	1	1	2	2		1		3	10		1
5	Lowland, organic & siliceous	5	25										2								2		3				15		
6	Lowland, organic & calcareous/mixed	6	13								1						3				1	1				4	3		
7	Mid altitude, siliceous	9	21	1					2					1				1	2				4		2	2	6		
8	Mid altitude, calcareous/mixed	8	26	5		2			5					6		2			2								2	2	
9	Mid altitude, organic & siliceous	22	8																				2				6		
10	Mid altitude, organic & calcareous/mixed	1	1																								1		
11	Highland, siliceous (all Europe)	6	15			3								2					1				6			2	1		
12	Higland, calcareous/mixed (all Europe)	2	2	1															1										
13	Mediterranean, small-large, siliceous (including reservoirs)	3	6											2					2						2				
14	Mediterranean, small-large, calcareous/mixed (including reservoirs	4	11				1							1		4			5										
15	Mediterranean, very small	1	1											1															

Table 3.2-3 Number of national lake types allocated to each broad type by country

Broad Type		National Types	L-AL3	L-AL4	L-CB1	L-CB2	L-CB3	L-EC1	L-M5/7	L-M8	L-N1	L-N2a	L-N2b	L-N3a	L-N5	L-N6a	L-N7	L-N8a	not allocated
Not allocated		145	2	3	10	11	5	1	5	5					1	1			101
1	Very large & deep (stratified) (all Europe)	5	1									1		1					2
2	Lowland, siliceous	35	1				1		1		2	10	2						18
3	Lowland, stratified, calcareous/mixed	57	1	1	22	8	4	2											19
4	Lowland, calcareous/mixed, very shallow (unstratif	44		1	3	18		1											21
5	Lowland, organic & siliceous	26					1							4				1	18
6	Lowland, organic & calcareous/mixed	13			1	1		2											9
7	Mid altitude, siliceous	28	3	1	2	2	1		1						4				14
8	Mid altitude, calcareous/mixed	35	9	9	2	3	2		1										9
9	Mid altitude, organic & siliceous	8														2			6
10	Mid altitude, organic & calcareous/mixed	1																	1
11	Highland, siliceous (all Europe)	20	1						1							2	4		12
12	Higland, calcareous/mixed (all Europe)	2	1																1
13	Mediterranean, small-large, siliceous (including r	6							2	1									3
14	Mediterranean, small-large, calcareous/mixed (incl	16	1	1					1	4									9
15	Mediterranean, very small	1																	1

Table 3.2-4 Number of national lake types that could be linked to intercalibration and broad types.

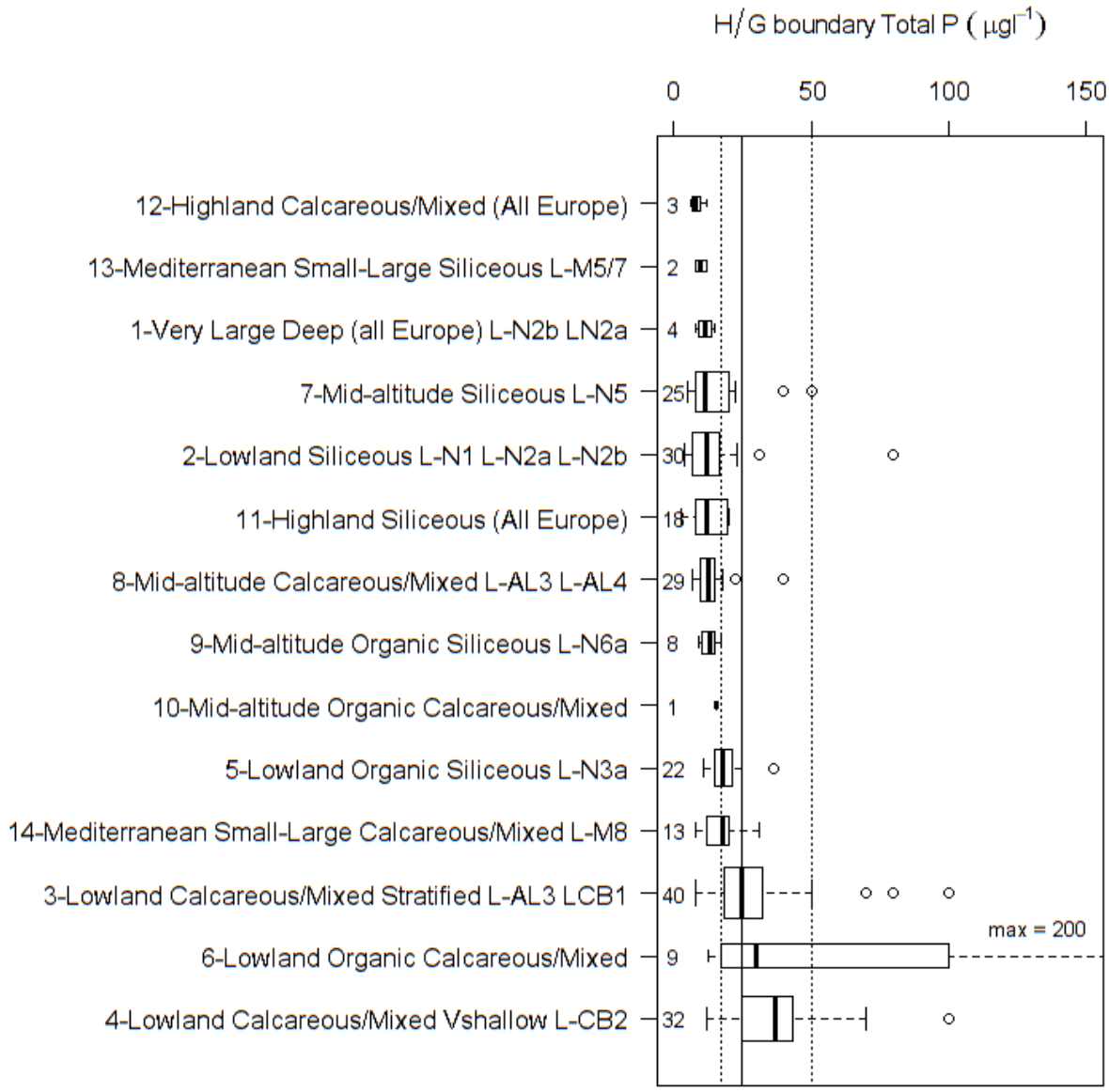

Figure 3.2-3 Range of reported high/good boundary values for lakes grouped by broad types. Numbers show the number of national types allocated to each broad type. Types ordered by median value of reported boundary.

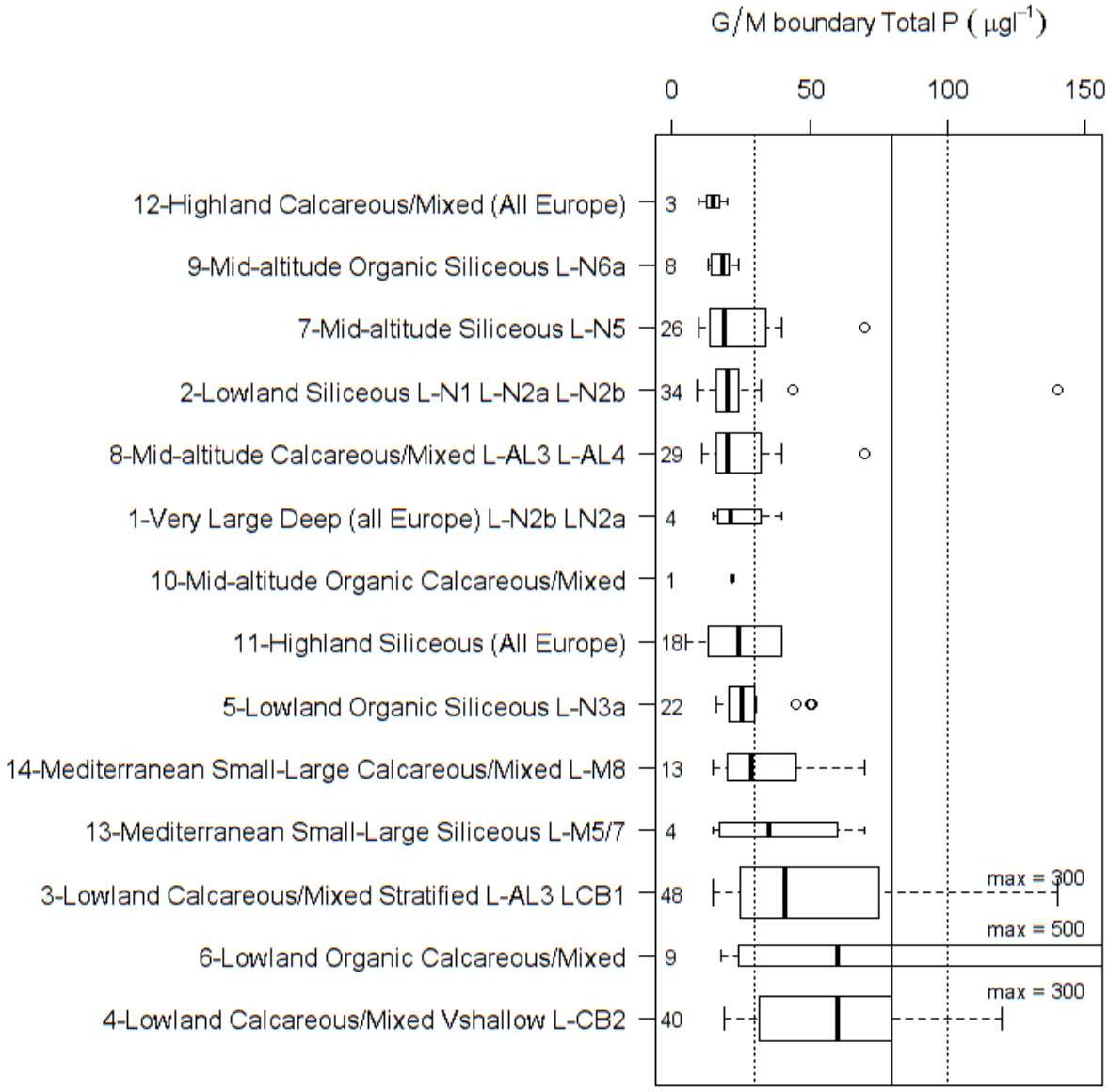

Figure 3.2-4 Range of reported good/moderate boundary values for lakes grouped by broad types. Numbers show the number of national types allocated to each broad type. Types ordered by median value of reported boundary

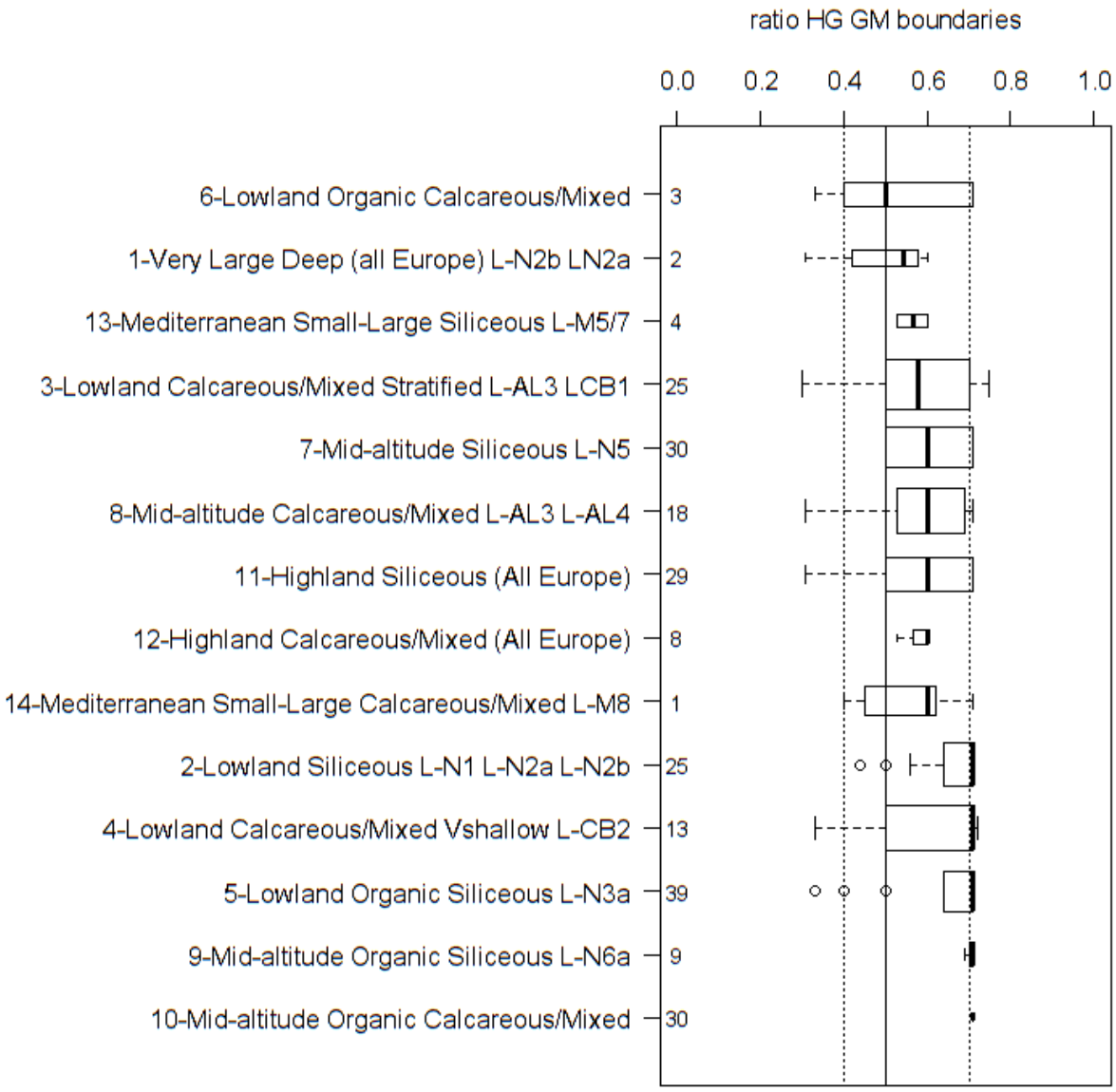

Figure 3.2-5 Range of ratio between high/good and good/moderate type specific phosphorus boundary values for each broad lake type. Numbers show the number of national types allocated to each broad type. Types ordered by median value of reported boundary

3.2.3 Comparison by country

The nutrient boundary values that are used to support WFD ecological status are likely to result not only from differences in background nutrient concentration and sensitivity caused by different lake morphological features such as depth and water retention, but also to the interpretation of these differences by Member States. It is very difficult to separate out these differences, but one approach is to compare the national boundary value of each country that contributes a value to a broad type with the average of all national boundary values for the type. This provides a value for each Member State that is the relative difference in concentration from the average, and thus minimises the influence of typological differences. This approach is similar to the process of comparing biological EQR values during intercalibration, with the average of all Member States boundary values forming the common view of a boundary value. By averaging the results by Member State across all broad types a value is obtained that will show on average if Member States tend to set tighter or lower boundaries.

In summary the following approach was used. After allocating national lake types to each broad type, the average national type boundary value was calculated for each broad lake type, providing a view of the boundary each country applies within a common European type. Then for each broad lake type the average boundary value for all countries included in the type was calculated, to give a type boundary, in effect a common view of all countries with lakes in the common type. The discrepancy between this common type boundary value and the national value for the type was then determined by subtracting the type average from each national value. Finally the average of these broad type specific differences was determined for each country, across all of the broad types. These values will reflect the average relative boundary value allocated by each country with respect to other countries, having removed type specific differences.

It is important to remember that this approach averages across types and thus identifies relative levels of precaution for different countries (i.e. does country A always set values that are lower/higher than country B?). A country with some very high and some very low boundary values would average out to show a low level of average difference. It should also be remembered that the averages are influenced by outlier boundary values. However, given the difficulty of making comparisons it is suggested that this is a useful approach.

The results show that on average the majority of Member States have set high/good boundary values which have differences of less than ±15µgl^{-1} once type differences are removed (Figure 3.2-7). The exceptions are PT, RO and HU which have much higher high/good boundary values. This suggests that the majority of Member States have similar views of reference conditions for lakes.

For the good/moderate boundary the differences are higher, but the majority of Member States have a difference of less than ±30µgl^{-1} (Figure 3.2-6). Three (PT, PL, RO) are slightly higher (< +30µgl^{-1}), while one (HU) has a much greater discrepancy (+200 µgl^{-1}).

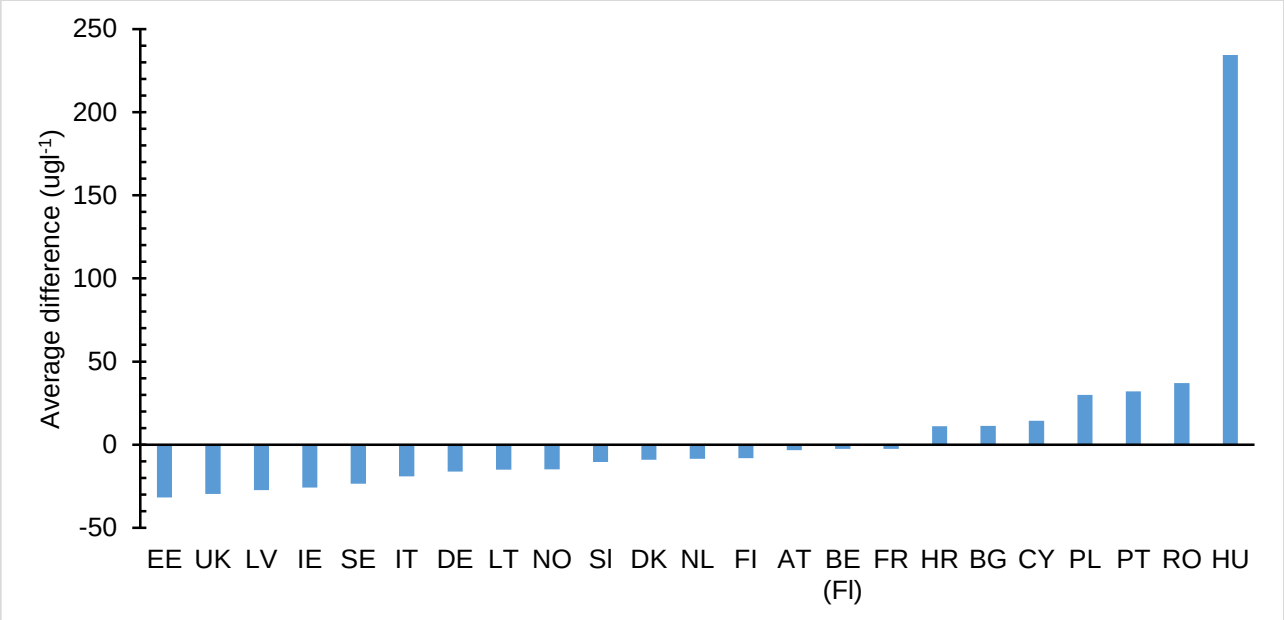

Figure 3.2-6 Average of the discrepancies (µgl^{-1}) between the national and average broad lake type total phosphorus good/moderate boundary value, for all types by country.

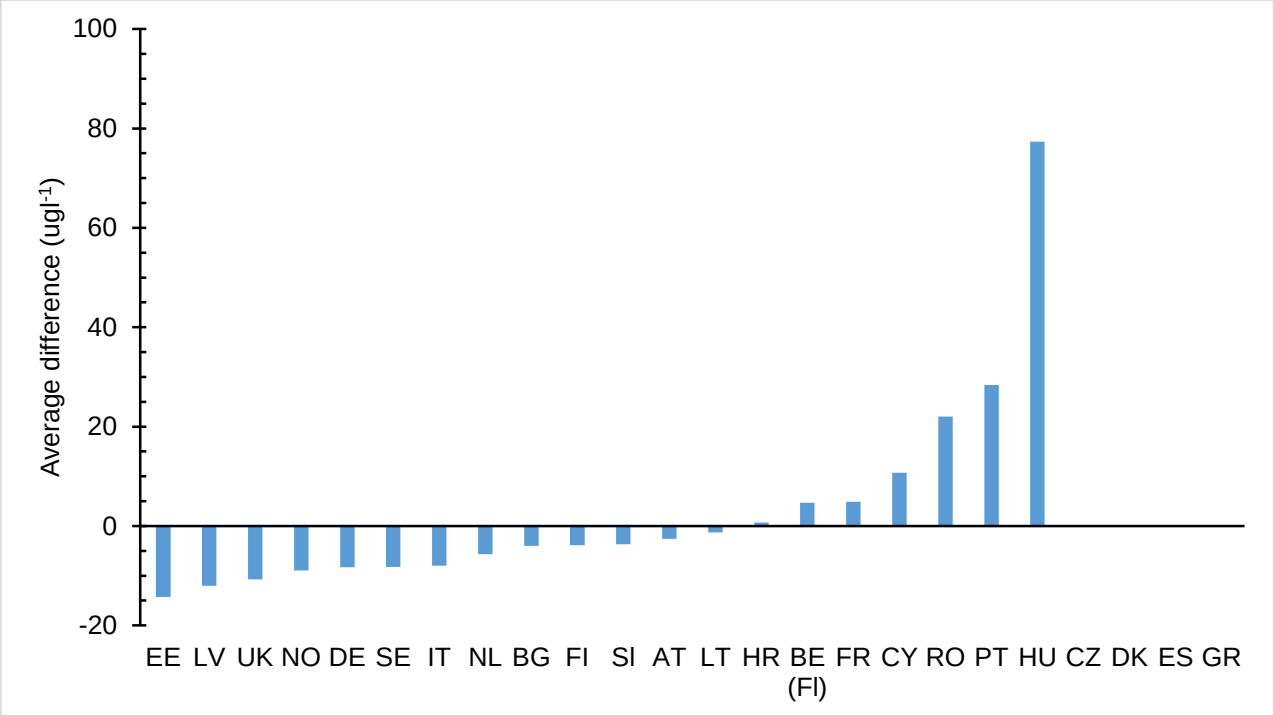

Figure 3.2-7 Average of the discrepancies (µgl^{-1}) between the national and average broad lake type total phosphorus high/good boundary value, for all types by country.

3.2.4 Comparison by method used to set boundaries

Countries used a wide variety of methods to establish boundary values (see 2.2) and it is likely that this may influence the resulting boundary values. There is evidence that this is the case, as boundary values set using statistical distributions of all water bodies and expert judgement tend to result in higher values (Figure 3.2-8). The highest values are associated with “expert judgement”, the next highest where Member States use statistical distributions of all water bodies with data, followed by statistical distributions based on classified water bodies. Approaches using modelling and regression tend to have lower values, although note that the results for modelling are only taken from three countries. There is also a difference in the ratio of good/moderate to high/good boundaries, with larger multiples of high/good resulting from boundaries set using expert judgement and the distribution of all water bodies (Figure 3.2-9).

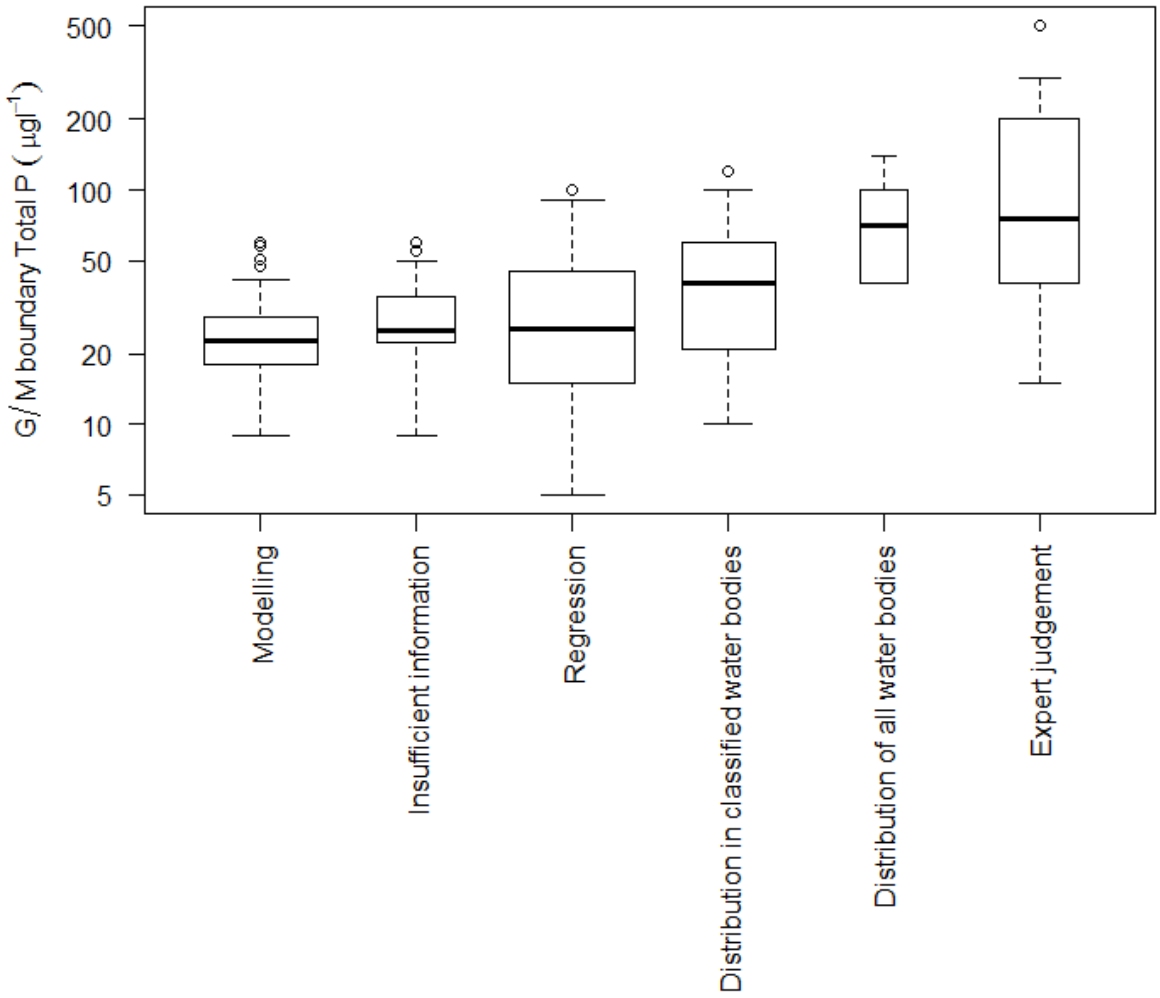

Figure 3.2-8 Range of good/moderate TP boundary values for lakes by category of method used to establish boundaries by different Member States

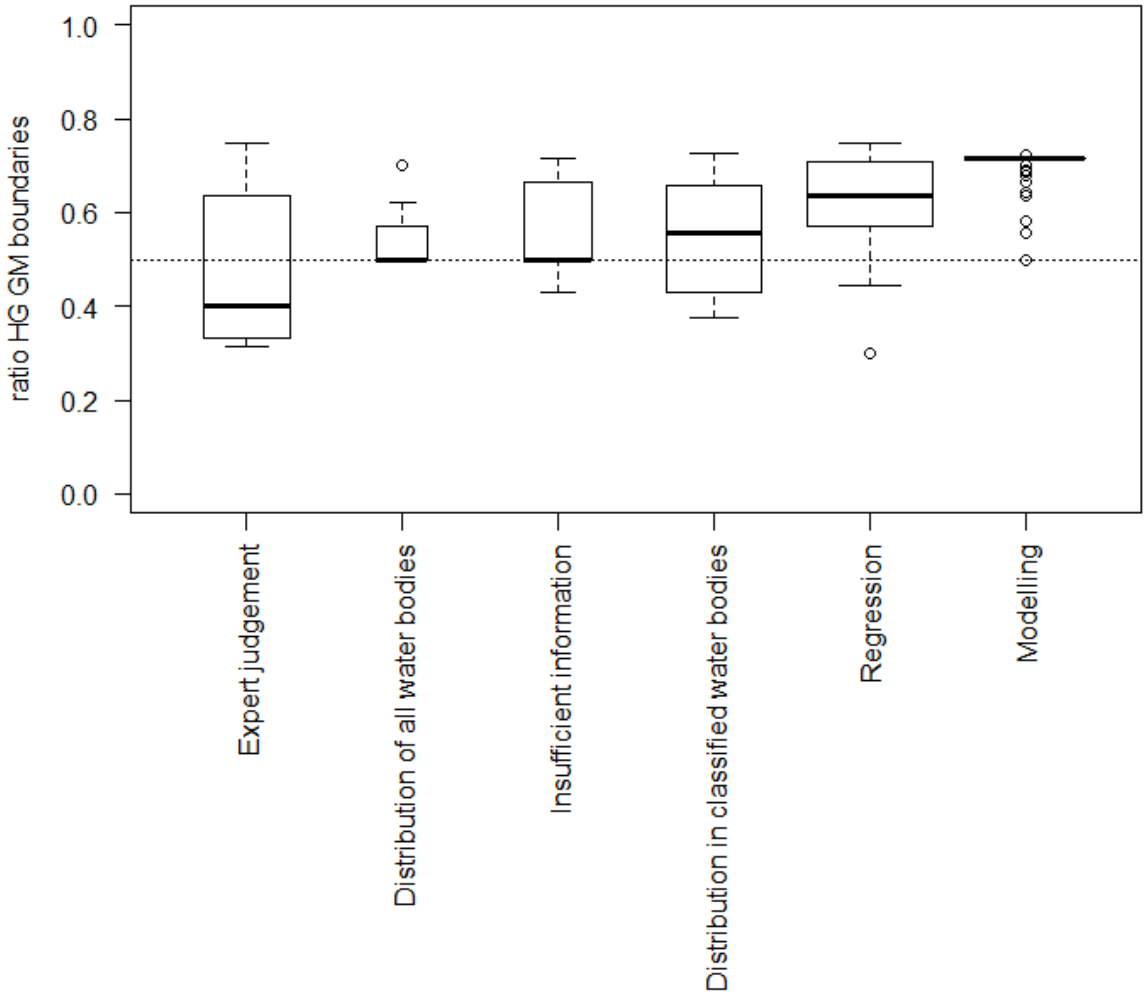

Figure 3.2-9 Range of values of the ratio of high/good to good/moderate TP boundary values for lakes by category of method used to establish boundaries by different Member States

3.3 Comparison of phosphorus boundaries for rivers

3.3.1 Introduction

Member States use a wider range of metrics and parameters to assess phosphorus status in rivers than they do for lakes. The majority use total phosphorus (TP), but two (AT, ES) only report soluble phosphorus (SRP) and two (UK, IE) only total reactive phosphorus (TRP). For the comparison of standards TP has been used, except for the above countries where SRP or TRP values have also been used. In addition five Member States (AT, BE(W), FR, RO, SK), report that they use a 90th percentile summary metric rather than a mean or median value. It is not always clear why these upper statistical summary values are used, they are most useful when high concentrations of a chemical have a particularly strong impact, for example low oxygen levels that result in fish deaths. In some cases (AT) it was because this summary statistic provided the best statistical fit with biological data. However, it is important to make allowances for the use of these upper percentiles as boundaries, as they would have higher values in comparison to a measure of central tendency such as a mean or median. Based on a large UK data set for both TP and TRP it is estimated that on average a 90th percentile would be approximately double the value of a mean, thus the values which use these percentiles could be approximately halved for comparative purposes.

The number of national types and corresponding number of phosphorus boundary values and the range of these boundaries is shown in Table 3.3-1. In comparison to the situation in lakes, the majority of Member States reported fewer phosphorus boundary values, despite having as many or more river types. Nine Member States (BE(Fl), CY, FR, GR, IE, IT, LT, LU, PL) have only a single (national) boundary value applicable to all river types, and 5 (BE(W), EE, ES, NL, PT) only 2 boundary values, but many river types. This lack of variability in boundary values suggests either that rivers do not vary as much in their sensitivity to phosphorus, or that there is insufficient information from which to derive boundary values, as there are fewer published pressure response relationships for rivers than there are for lakes.

The reported boundary values, in addition to being higher than those reported for lakes (see section 3.2 & Figure 3.1-2) were more variable across Europe. The lowest good/moderate boundary values were set by NO (8-50 µgl^{-1}) and the highest by PL, RO and SK (200 – 660 µgl^{-1}), although as RO and SK use 90th percentile metrics the highest equivalent mean boundary value would be more like 400 µgl^{-1}(the 660 µgl^{-1} being equivalent to a mean of c330 µgl^{-1}). It was also noted that the majority of countries that had the smallest national range of good/moderate boundary values set boundaries that were lower than the average for all countries (Figure 3.3-1).

The high/good boundary values, which reflect Member State views of background phosphorus, showed a similarly large range of values across Europe. The lowest were reported by NO, AT, FI and the highest by CY, HU, BG, RO, LT, ES and PL. Many of these high values were also a single value, for example 100 or 200 µgl^{-1}.

These findings suggest that there may be a much less well developed understanding of both natural phosphorus levels in rivers and of the potential impact that this nutrient has on ecological status. Type specific boundary values appear to be less well developed for rivers than for lakes. However, comparisons of reported boundary values have been made using both the intercalibration and broad river typologies.

Country	Number of			Range good/moderate boundary values ($\mu g l^{-1}$)		
	National types	Unique Good/moderate boundary values	Broad Types	Min	Max	Range
AT	12	8	4	15	200	185
BE (Fl)	8	1	3	140	140	0
BE (W)	24	2	8	200	500	300
BG	14	3	7	30	300	270
CY	3	1	2	165	165	0
CZ	21	4	5	50	150	100
CZ_3rd	21	4	5	30	70	40
DE	28	3	10	100	300	200
DK				No values reported		
EE	7	2	3	60	80	20
ES	31	2	Not linked	133	167	33
FI	11	3	4	35	60	25
FR	88	1	14	200	200	0
GR	1	1		200	200	0
HR	28	6	9	60	350	290
HU	25	5	6	150	400	250
IE	12	1	2	35	35	0
IT	59	1	11	100	100	0
LT	5	1	2	140	140	0
LU	6	1	4	100	100	0
LV	6	3	2	65	90	25
NL	12	2	4	110	140	30
NO	22	8	7	8	50	42
PL	25	1	12	400	400	0
PT	13	2	3	100	130	30
RO	19	4	6	220	660	440
SE	40	40	10	14	63	50
SK	36	4	6	200	400	200
Sl				No values reported		
UK	21	19	10	28	100	72

Table 3.3-1 Number of national types, good/moderate boundary values reported by each Member State for rivers and number of broad types that have been linked to the national types.

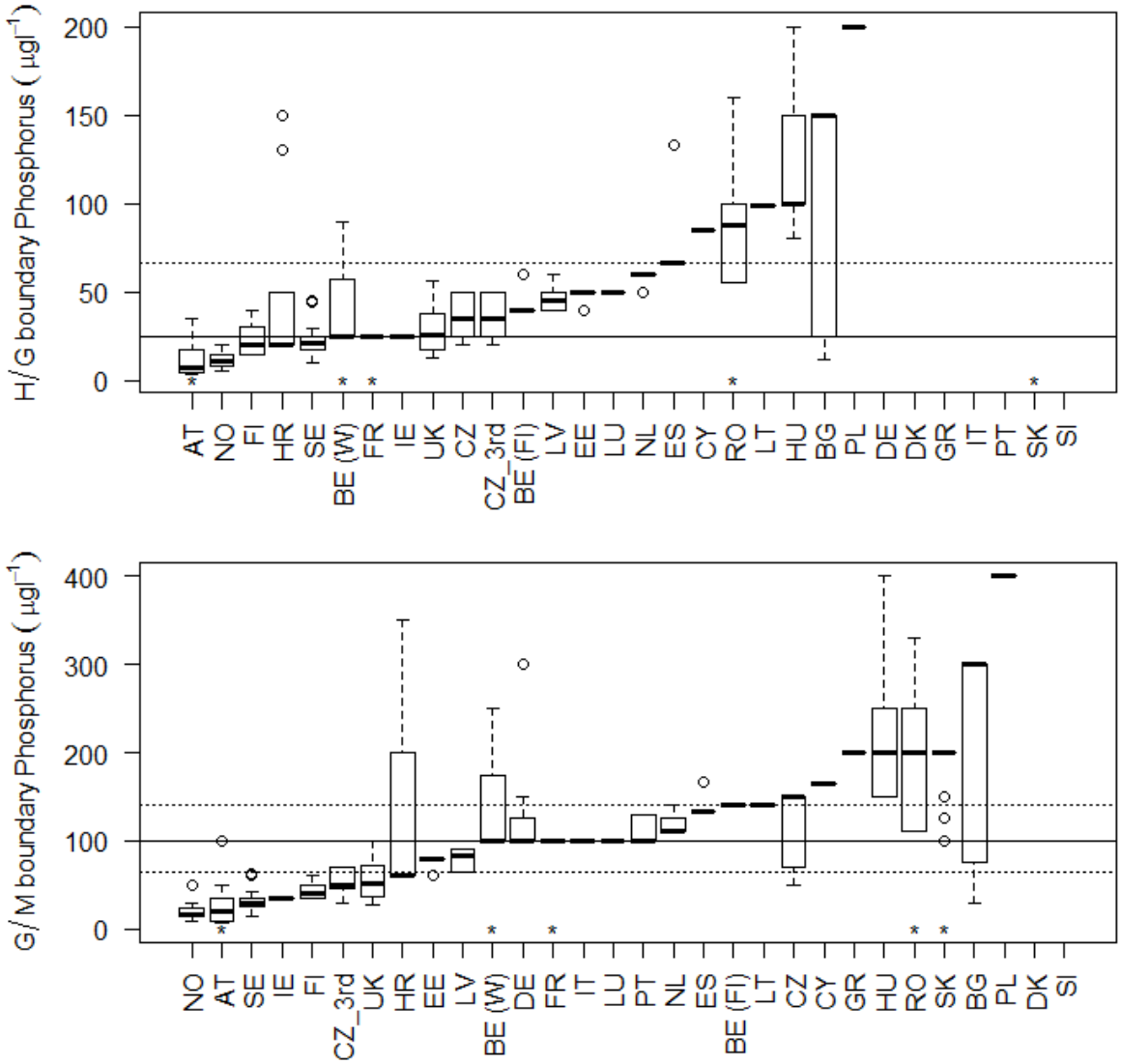

Figure 3.3-1 Range of a) high/good and b) good/moderate boundaries for rivers by country, arranged by median values of boundaries for each country. Lines mark 25th, 50th and 75th percentile values for all countries. (90th percentile metrics were halved and are identified by *)

3.3.2 Comparison of boundaries by river type

3.3.2.1 Comparison by intercalibration type

Seventeen intercalibration types had national boundary values for four or more countries, a higher proportion than for lakes, although these did not include types from the NGIG (Table 3.3-2). Detailed comparisons of national boundaries within those IC types are provided in section 6.2.1 with general observations below.

The lowest boundary values were found in the NGIG types, although too few countries linked national types to the NGIG types to allow useful comparisons to be made (Figure 3.3-2). For the Alpine, large river, Eastern and Central GIG types, good/moderate boundary values typically ranged over at least 100 μgl^{-1} with several examples of boundary values with conveniently round numbers of 100 μgl^{-1}. The highest values reported were from some of the Mediterranean types, and all types from the Eastern Continental GIG.

There was a similar range of values for the high/good boundary, with the numeric value of 50 μgl^{-1} commonly being used in the Alpine and Central river types. As for the good/moderate boundary, the highest values for

high/good were found in some of the Mediterranean and Eastern Continental types, with 200 µgl^{-1} being a relatively common value. Thus the boundary values used fall into three groups, most clearly seen when the ranges are shown by GIG (Figure 3.3-3). Low values in northern GIG, high values in Mediterranean with the other GIGs reporting boundaries between 100 and 200 µgl^{-1}.

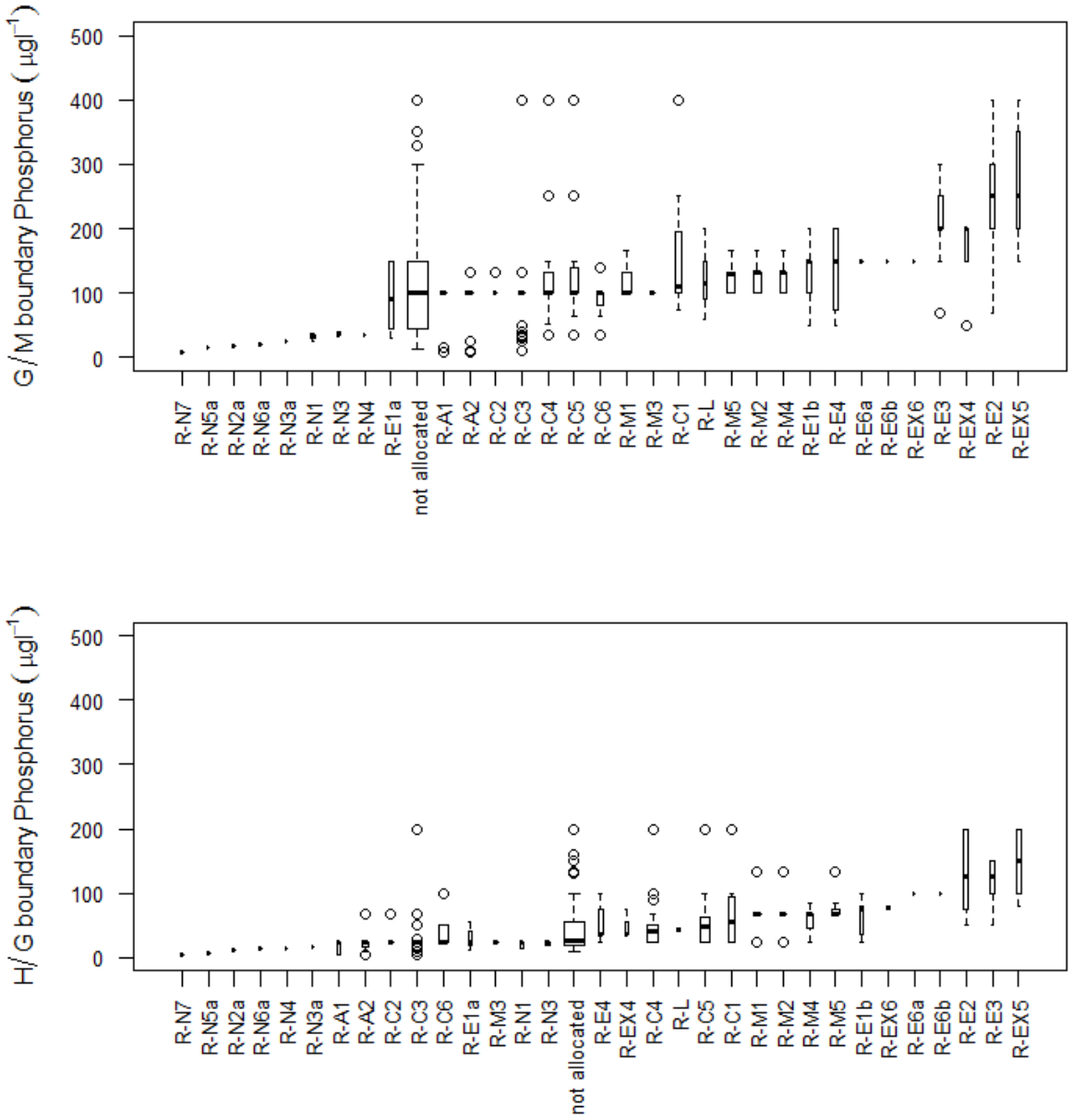

Figure 3.3-2 Range of a) good/moderate and b) high/good river phosphorus boundaries for intercalibration types, (90th percentile values halved)

Type	Countries	National Types	AT	BE (Fl)	BE (W)	BG	CY	CZ	CZ_3rd	DE	EE	ES	FI	FR	GR	HR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SK	UK
not allocated	17	231		3		10		13	12	36		8	7		1	28			9					3	16	1	12	40	16	16
R-A1	3	16	2											3					11											
R-A2	4	25	4									1		10					10											
R-C1	6	16			1									5						1			5		3					1
R-C2	2	5										1		4																
R-C3	7	32	5		5							2		14							2				2					2
R-C4	14	49		4	6			1	1		3	1		17				2		2	2	2	3		3					2
R-C5	12	36			6			1	1		2	1		10				2		2	1	3	4		3					
R-C6	7	26			6						4			6				4		3	1	2								
R-E1a	5	6				1		1	1																		1		2	
R-E1b	6	9				1		1	1								3										1		2	
R-E2	6	9				1		1	1								4										1		1	
R-E3	5	15				1		1	1								7												5	
R-E4	7	10	1			1		2	2								2										1		1	
R-E6a	1	2															2													
R-E6b	1	1															1													
R-EX4	4	7						1	1																		1		4	
R-EX5	3	7															5										1		1	
R-EX6	2	2															1										1			
R-L	4	6		1							1											2							2	
R-M1	4	40										15		4					14							7				
R-M2	4	29										17		3					2							7				
R-M3	1	8												8																
R-M4	4	20					1					11		4					4											
R-M5	4	41					2					18							14							7				
R-N1	3	7											1					4						2						
R-N2a	1	4																						4						
R-N3	2	6											2					4												
R-N3a	1	2																						2						
R-N4	1	1											1																	

R-N5a	1	4																				4						
R-N6a	1	4																				4						
R-N7	1	4																				4						

Table 3.3-2 Number of national river types allocated to each intercalibration type with good/moderate boundary values for phosphorus.

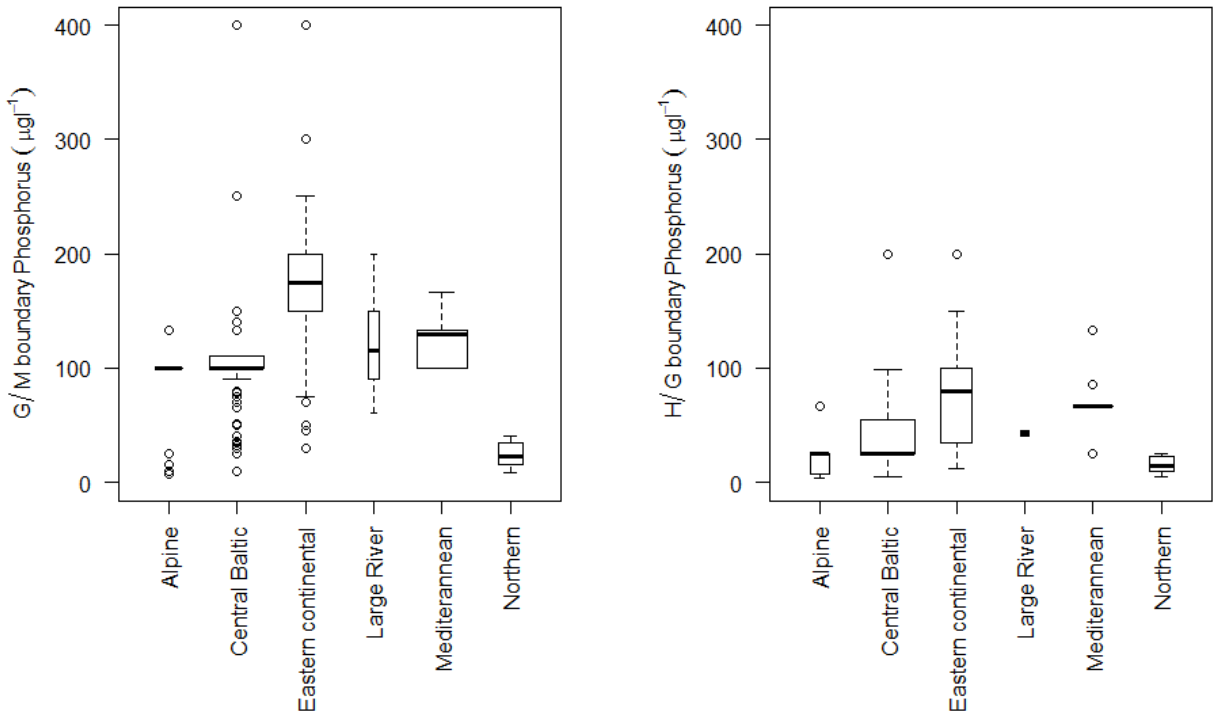

Figure 3.3-3 Range of a) good/moderate and b) high/good river phosphorus boundaries by geographic intercalibration group (90th percentile values halved)

3.3.2.2 Comparison of boundaries by broad type

A summary of the number of countries and good/moderate boundary values in each of the broad river types is given in Table 3.3-3. As for lakes, the majority of broad types have more than four countries in each type and thus provide a reasonable opportunity to make comparisons across Europe.

With a few exceptions the majority of high/good boundary values in each of the broad river types are below 50 μgl^{-1} and the range of values is relatively small (Figure 3.3-4). However many of the types have outlier values, typically at 200 μgl^{-1} which can be attributed to specific countries (ES, HU, RO, PL). In general there is a much less clear gradation of high/good boundary values across the broad types than was noted for lakes, although the calcareous river types had higher values. Mediterranean temporary/intermittent streams (type 20) had particularly high boundary values suggesting that even at reference condition these river types were considered to have high phosphorus concentrations.

The range of good/moderate boundary values for the broad river types is much more variable (Figure 3.3-5). Although the lowest range of boundary values were found in some of the siliceous river types there was a less clear separation between the broad types. The median boundary value was 100 μgl^{-1}, a commonly used value particularly for lowland rivers (types 3, 4, 5).

The overall impression from comparison of broad types is similar to that reached by comparing the intercalibration types: country differences are greater than type differences and the understanding of both background phosphorus concentration and potential different type sensitivity is poor, leading to a wide range of national type specific phosphorus boundaries for rivers.

Broad Type		Number Countries	AT	BE (Fl)	BE (W)	BG	CY	CZ	CZ_3rd	DE	EE	ES	FI	FR	GR	HR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SK	UK
		14		3		2			3	6		75	5		1	5						2			6	10	2		12	2
1	Very large rivers (all Europe)	12		1	1					2	1		2	1		4	6						1		1		1		2	
2	Lowland, siliceous, medium-large	6		2		1							1	6														4		2
3	Lowland, siliceous, very small-small	11		2						1			1	8		1		4					3	5	3			4		2
4	Lowland, calcareous/mixed, medium-large	19			3	5		4	4	5	6			22		2	5		1	6	2	5	5		5		4	3	6	2
5	Lowland, calcareous/mixed, very small-small	20			1			2	2	7	3			5		2	5	12	4	2	1	2	3	1	1		2	4	1	2
6	Lowland, organic & siliceous	6								2			2											3	1			8		3
7	Lowland, organic & calcareous/mixed	3								2														2				7		
8	Mid altitude, siliceous, medium-large	9			3	1				1				6					2		1				1			2		2
9	Mid altitude, siliceous, very small-small	12	5		2	2				2				11			1		7		2			4	3			2		2
10	Mid altitude, calcareous/mixed, medium-large	12	1		7			6	5	5				2		3	4								1		3		9	2
11	Mid altitude, calcareous/mixed, very small-small	11			6			6	6	3						3	4		9						2		3		2	1
12	Mid altitude, organic & siliceous	3			1																			2				4		
13	Mid altitude, organic & calcareous/mixed	2																							1			2		
14	Highland (all Europe), siliceous	7	4			2								4					2					6	1					1
15	Highland (all Europe), calcareous/mixed	8	2			1	1	4	1					5											1				2	
16	Glacial rivers (all Europe)	2												7					5											
17	Mediterranean, lowland, medium-large, perennial	4												3		3			3							8				
18	Mediterranean, mid altitude, medium-large, perenni	3												5		1			4											
19	Mediterranean, very small-small, perennial	4												3		4			11							2				
20	Mediterranean, temporary/intermittent streams	5				1	2												16							2	4			

Table 3.3-3 Number of national river types with reported good/moderate phosphorus boundaries allocated to each broad type by country

Broad Type		National types	R-A1	R-A2	R-C1	R-C2	R-C3	R-C4	R-C5	R-C6	R-E1a	R-E1b	R-E2	R-E3	R-E4	R-E6a	R-E6b	R-EX4
Not allocated		7		1		1	2	1	2									
1	Very large rivers (all Europe)	9							3					3		2	1	
2	Lowland, siliceous, medium-large	7				2		2	3									
3	Lowland, siliceous, very small-small	15			11	2		2										
4	Lowland, calcareous/mixed, medium-large	75						33	20	5			7	10				
5	Lowland, calcareous/mixed, very small-small	28			5			4	2	15			2					
6	Lowland, organic & siliceous	0																
7	Lowland, organic & calcareous/mixed	0																
8	Mid altitude, siliceous, medium-large	10	1	1			5	1	2									
9	Mid altitude, siliceous, very small-small	32	3	3			23					2			1			
10	Mid altitude, calcareous/mixed, medium-large	28		1				5	4		1	1		2	7			7
11	Mid altitude, calcareous/mixed, very small-small	21	4							6	3	6			2			
12	Mid altitude, organic & siliceous	1					1											
13	Mid altitude, organic & calcareous/mixed	1						1										
14	Highland (all Europe), siliceous	10	1	7			1				1							
15	Highland (all Europe), calcareous/mixed	6	5								1							
16	Glacial rivers (all Europe)	12		12														
17	Mediterranean, lowland, medium-large, perennial	0																
18	Mediterranean, mid altitude, medium-large, perenni	0																
19	Mediterranean, very small-small, perennial	0																
20	Mediterranean, temporary/intermittent streams	2	2															

Table 3.3-4 Number of national river types allocated to each broad type by country (continued)

Broad Type		R-EX5	R-EX6	R-L	R-M1	R-M2	R-M3	R-M4	R-M5	R-N1	R-N2a	R-N3	R-N3a	R-N4	R-N5a	R-N6a	R-N7	not allocated
Not allocated				1	12	15	1	5	10									88
1	Very large rivers (all Europe)			8														21
2	Lowland, siliceous, medium-large					1								1				7
3	Lowland, siliceous, very small-small				1					2	3	4						8
4	Lowland, calcareous/mixed, medium-large			1														24
5	Lowland, calcareous/mixed, very small-small	6								5								22
6	Lowland, organic & siliceous											2	2					15
7	Lowland, organic & calcareous/mixed																	11
8	Mid altitude, siliceous, medium-large					2	1											10
9	Mid altitude, siliceous, very small-small														4			7
10	Mid altitude, calcareous/mixed, medium-large		1															31
11	Mid altitude, calcareous/mixed, very small-small	1	1		2													22
12	Mid altitude, organic & siliceous															2		4
13	Mid altitude, organic & calcareous/mixed																	3
14	Highland (all Europe), siliceous				1											2	4	3
15	Highland (all Europe), calcareous/mixed							3										13
16	Glacial rivers (all Europe)																	1
17	Mediterranean, lowland, medium-large, perennial				2	5	3	1	3									3
18	Mediterranean, mid altitude, medium-large, perenni				1		4	4										1
19	Mediterranean, very small-small, perennial				15			1										4
20	Mediterranean, temporary/intermittent streams								18									5

Table 3.3.4 continued. Number of national river types allocated to each broad type by country

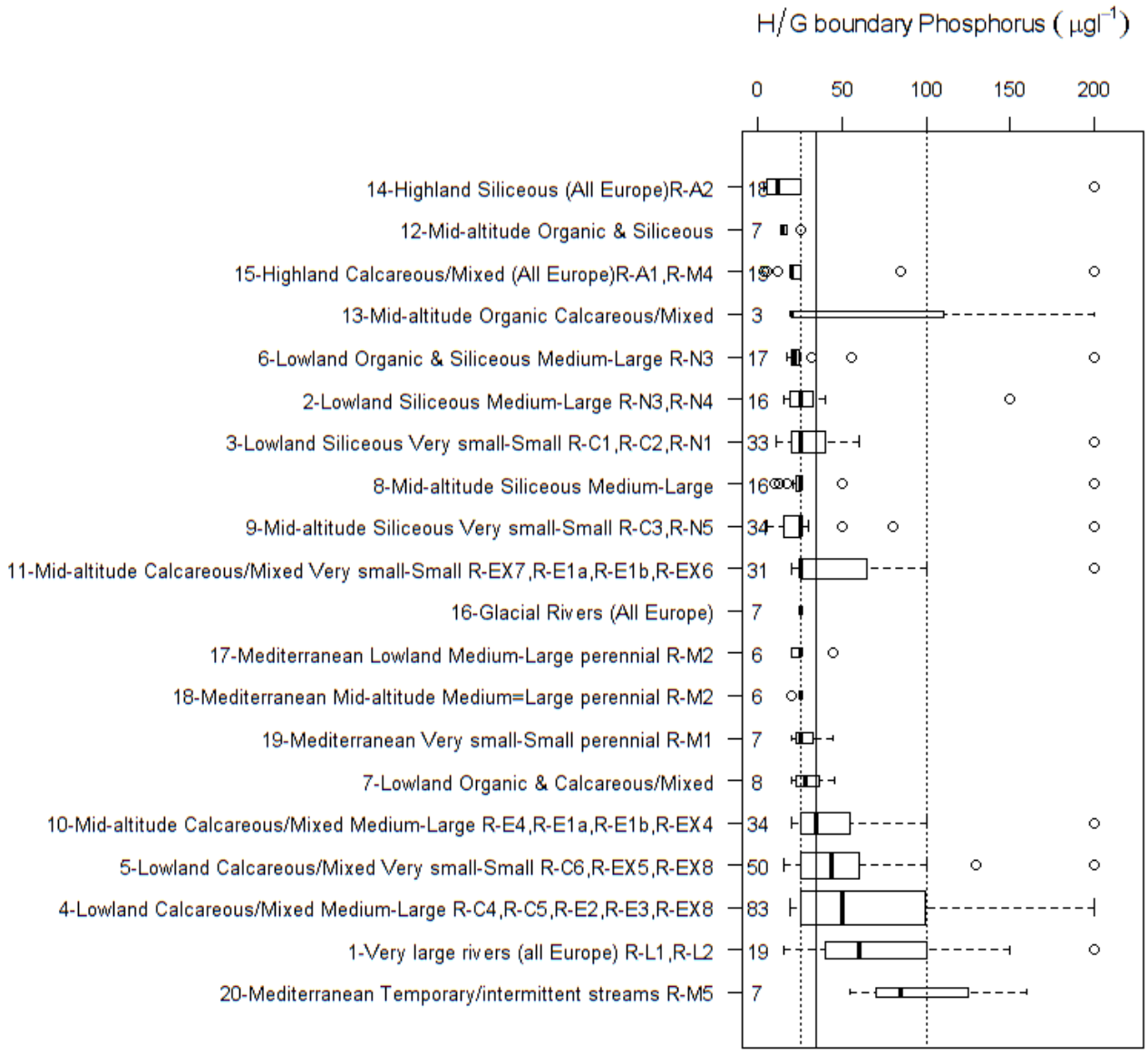

Figure 3.3-4 **Range of reported high/good phosphorus boundary values for rivers grouped by broad types, (90th percentile values halved). Numbers show the number of national types allocated to each broad type. Types ordered by median value of reported boundary, dotted lines show interquartile range for all broad types.**

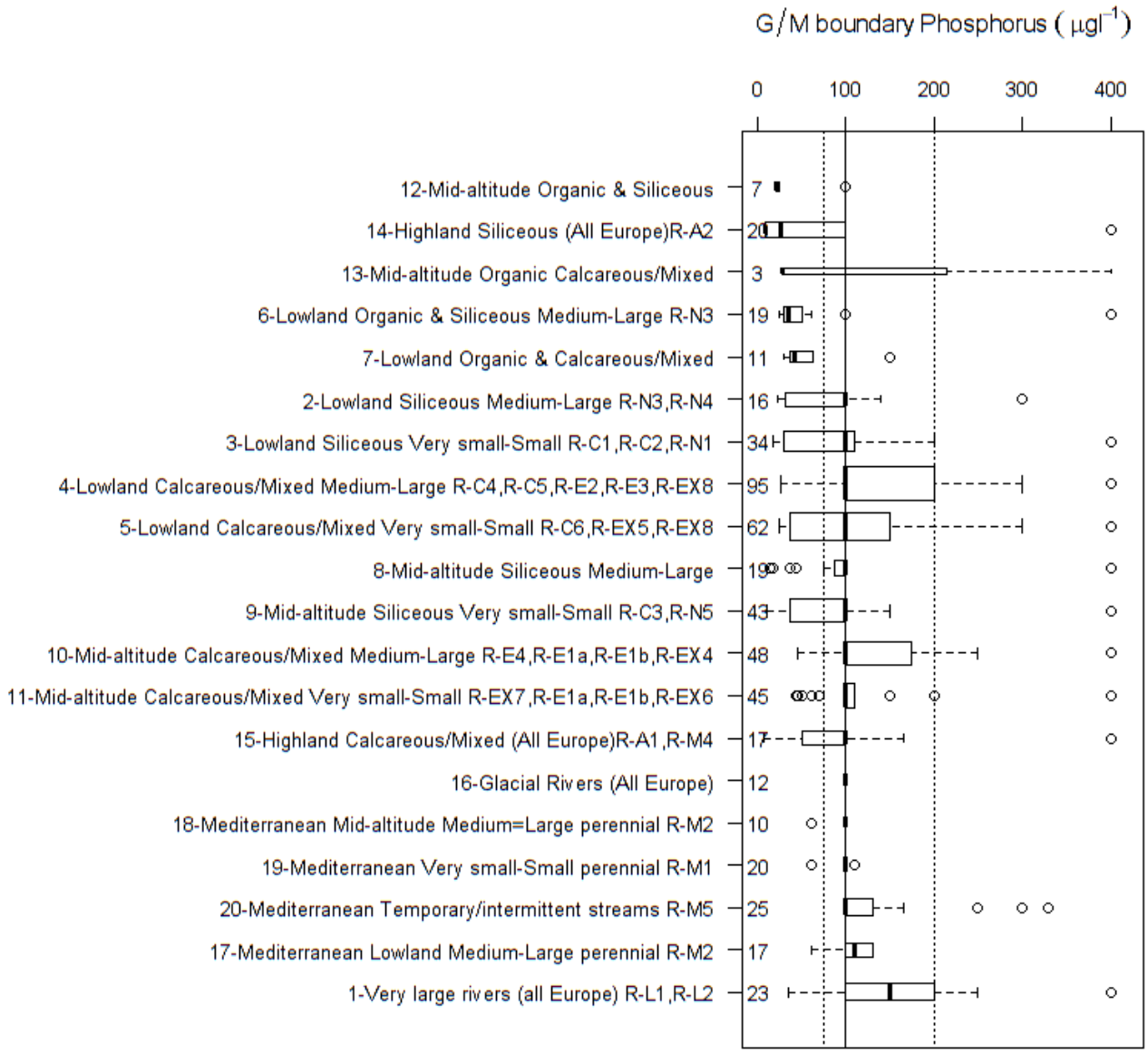

Figure 3.3-5 Range of reported good/moderate phosphorus boundary values for rivers grouped by broad types (90th percentile values halved). Numbers show the number of national types allocated to each broad type. Types ordered by median value of reported boundary, dotted lines show interquartile range for all broad types.

3.3.3 Comparison by country

To compare whether Member States on average tend to set tighter or lower boundaries the same approach as that described for lakes was used (see section 3.2.3). This involved calculating the difference between national and average broad type specific boundary values, and then combining these values as a national average discrepancy.

In comparison to lakes the range of discrepancies was much greater. The majority of Member States set good/moderate boundary values that were >30 μgl^{-1} lower than the average of all countries, and several (IE,

SE, FI, CZ EE. NO, AT, LV, UK) >50 µgl^{-1} tighter (Figure 3.3-6). Two countries (HU and PL) set boundaries that were >50 µgl^{-1} lower, in the case of PL 250 µgl^{-1} lower. It should also be noted that the low values for AT are for SRP and were derived by halving the 90th percentile and so may be less comparable. Similar, although smaller discrepancies were seen for the high/good boundary, although again these were much greater than those for lakes (Figure 3.3-7).

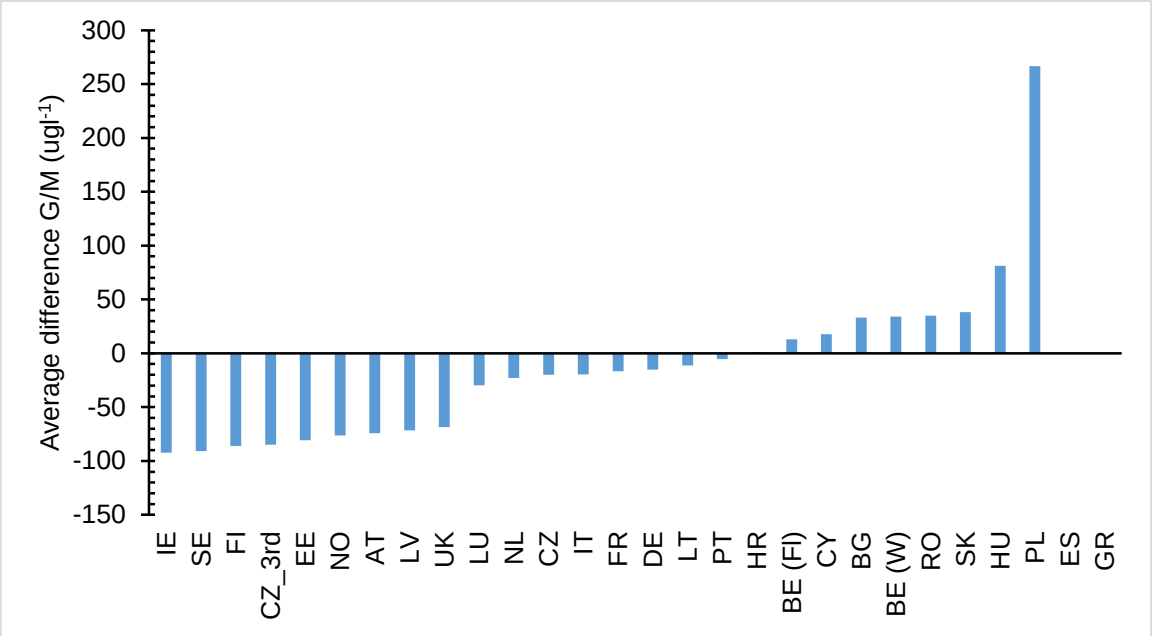

Figure 3.3-6 Average of the discrepancies (µgl^{-1}) between the national and average broad type river phosphorus good/moderate boundary value for all types by country. (90th percentile values halved AT, BE (W), FR, RO, SK)

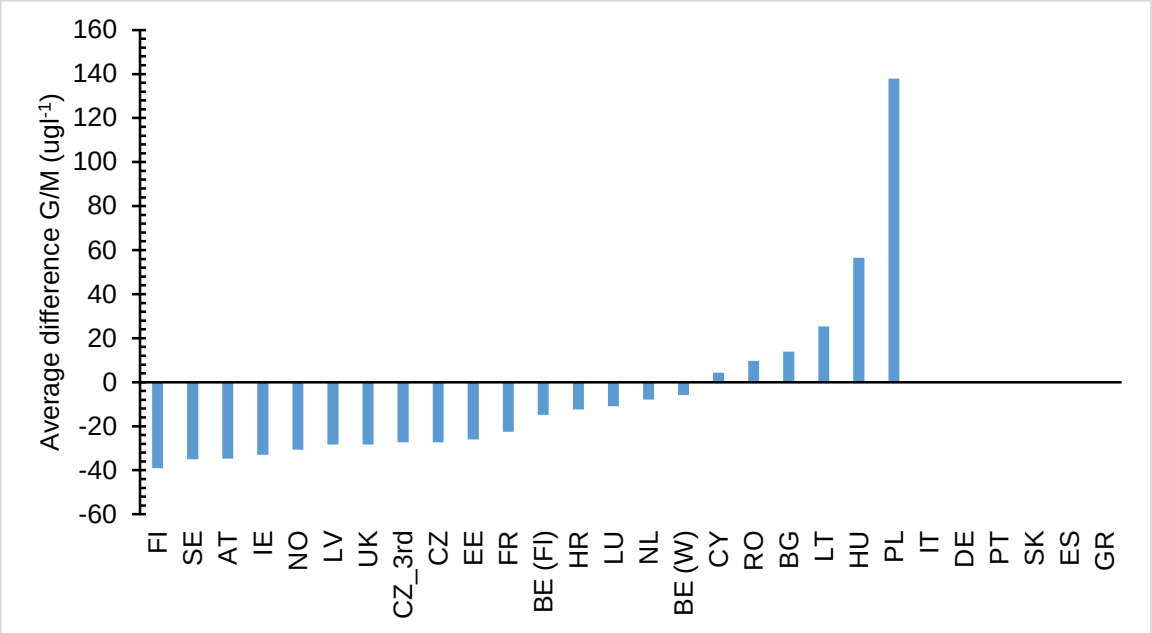

Figure 3.3-7 Average of the discrepancies (µgl^{-1}) between the national and average broad type river phosphorus high/good boundary value for all types by country. (90th percentile values halved AT, BE (W), FR, RO, SK)

3.3.4 Comparison by methods used to set boundaries

Differences in boundary values were also apparent when grouped by the method used to establish the boundary. The lowest good/moderate boundaries were found where countries used modelling and regression methods, slightly higher values when categorical methods of classified water bodies were used and the highest when the distribution of all water bodies were used (Figure 3.3-8). Differences were less clear for the high/good boundary, but again the highest values occurred when the distribution of all water bodies was used (Figure 3.3-9)

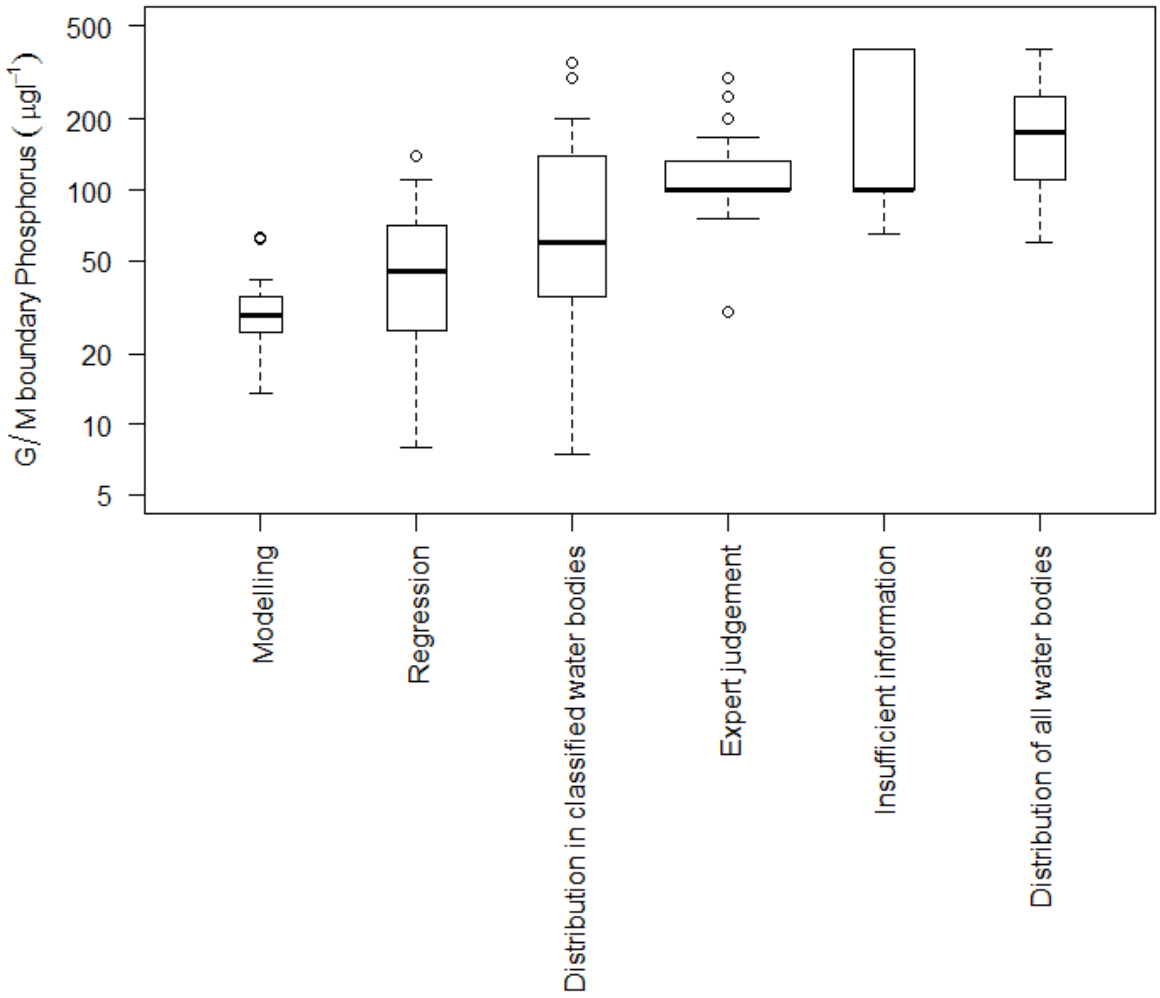

Figure 3.3-8 Range of good/moderate river phosphorus boundary values grouped by category of method used to determine the value. (90th percentile values halved)

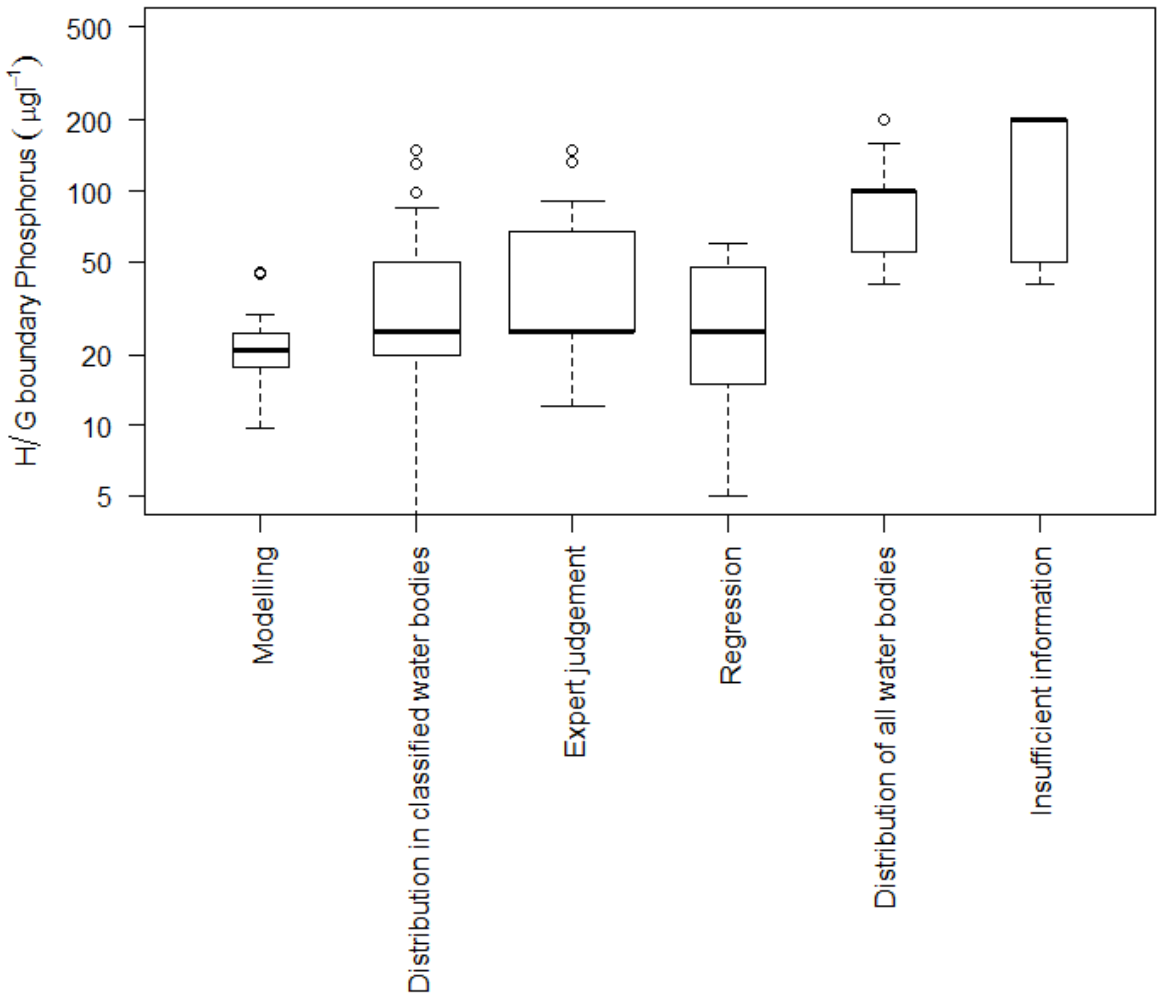

Figure 3.3-9 Range of high/good river phosphorus boundary values grouped by category of method used to determine the value. (90th percentile values halved)

4 Comparison of Nitrogen boundary values

4.1 Range of metrics and boundary values used

Fewer Member States reported nitrogen boundary values than for phosphorus (compare Table 4.1-1 & Table 3.1-1). For lakes, the majority reported total nitrogen (TN), with a few (FR, HR) only reporting nitrate nitrogen (Table 4.1-2). All except FR use a mean value as a summary statistic, FR uses a maximum value. For rivers there is a wider range of summary metrics, and the majority of Member States use nitrate rather than total nitrogen as a quality element. Several Member States use 90th percentile values (AT, BE(Fl & W), FR, RO, SK) rather than mean or median values and CZ (3rd cycle) uses both a median and a maximum value,.

The majority of countries use annual summary statistics for rivers, and growing season summary statistics for lakes. This may reflect the greater ease of sampling rivers throughout the year, and where the 90th percentile summary statistic of nitrate is used on annual data, the value may reflect the winter concentration, which is least influenced by biological uptake, and thus a better indicator of nitrogen load.

Category	Parameter	Period	Not specified	90th percentile	maximum	mean	median
Lakes	Nitrate N	Annual				3	
		Growth Season			1	2	
	Total N	Annual				5	
		Growth Season	1			9	
Rivers	Nitrate N	Annual	1	6	1	8	3
		Growth Season				1	
	Total N	Annual		2		7	1
		Growth Season				3	

Table 4.1-1 Number of countries using different summary metrics and parameters to specify lake and river nitrogen boundary values

Category	Country	Period	Nitrate N	Total N
Lakes	BE (Fl)	Growth Season		mean
	BG	Annual	mean	mean
	DK	Growth Season		mean
	EE	Growth Season		mean
	FI	Growth Season		mean
	FR	Growth Season	maximum	
	GR	Annual		mean
	HR	Growth Season	mean	
	HU	Annual	mean	mean
	LT	Growth Season		mean
	LV	Annual		mean
	NL	Growth Season		mean
	NO	Growth Season		mean
	PL	Growth Season		mean
	PT	Annual	mean	mean
	RO	Growth Season	mean	mean

Table 4.1-2a Summary metrics and parameters used to specify lake boundary values by country

Category	Country	Period	Nitrate N	Total N
Rivers	AT	Annual	90th percentile	
	BE (Fl)	Annual	90th percentile	
		Growth Season		mean
	BE (W)	Annual	90th percentile	
	BG	Annual	mean	mean
	CY	Annual	mean	
	CZ	Annual	median	
	CZ_3rd	Annual	median & maximum	
	EE	Annual		mean
	ES	Annual		
	FI	Annual		mean
	FR	Annual	90th percentile	
	GR	Annual	mean	
	HR	Annual	median	median
	HU	Annual	mean	mean
	IT	Annual	mean	
	LT	Annual		
	LU	Annual	mean	
	LV	Annual		mean
	NL	Growth Season		mean
	NO	Annual		mean
	PL	Growth Season	mean	mean
	PT	Annual	mean	
	RO	Annual	90th percentile	90th percentile
	SK	Annual	90th percentile	90th percentile

Table 4.1-2b Summary metrics and parameters used to specify lake and river nitrogen boundary values by country

As was the case for phosphorus, river nitrogen boundary values were higher than those for lakes (Figure 4.1-1, Figure 4.1-2,). For lakes the good/moderate boundary values typically range from 0.7 - 2.0 mgl^{-1} and for nitrate nitrogen 0.5 – 1.0 mgl^{-1}. For rivers total nitrogen values range from 1.5 - 5.0 mgl^{-1} and nitrate nitrogen from 2.0 – 6.0 mgl^{-1} (Figure 4.1-3), however it is important to remember that several Member States use 90th percentile values for rivers which will be higher than a mean or median value. Based on a large UK data set for nitrate it is estimated that on average a 90th percentile would be approximately double the value of a mean, thus when comparing boundaries the values which use these percentiles could be approximately halved for comparative purposes.

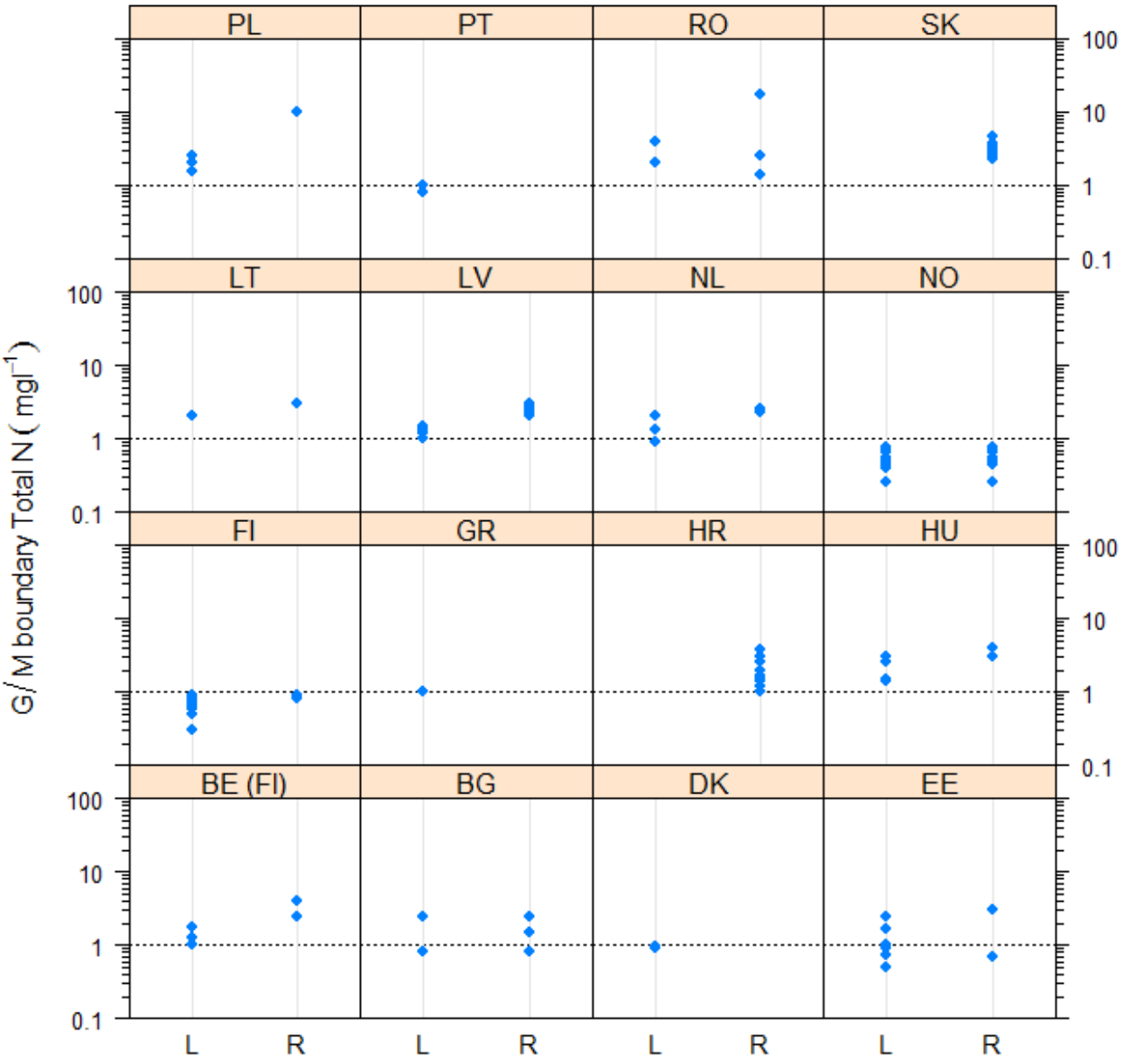

Figure 4.1-1 Comparison of total nitrogen good/moderate boundaries in lakes (L) and rivers (R) by country (river 90th percentile values halved RO, SK)

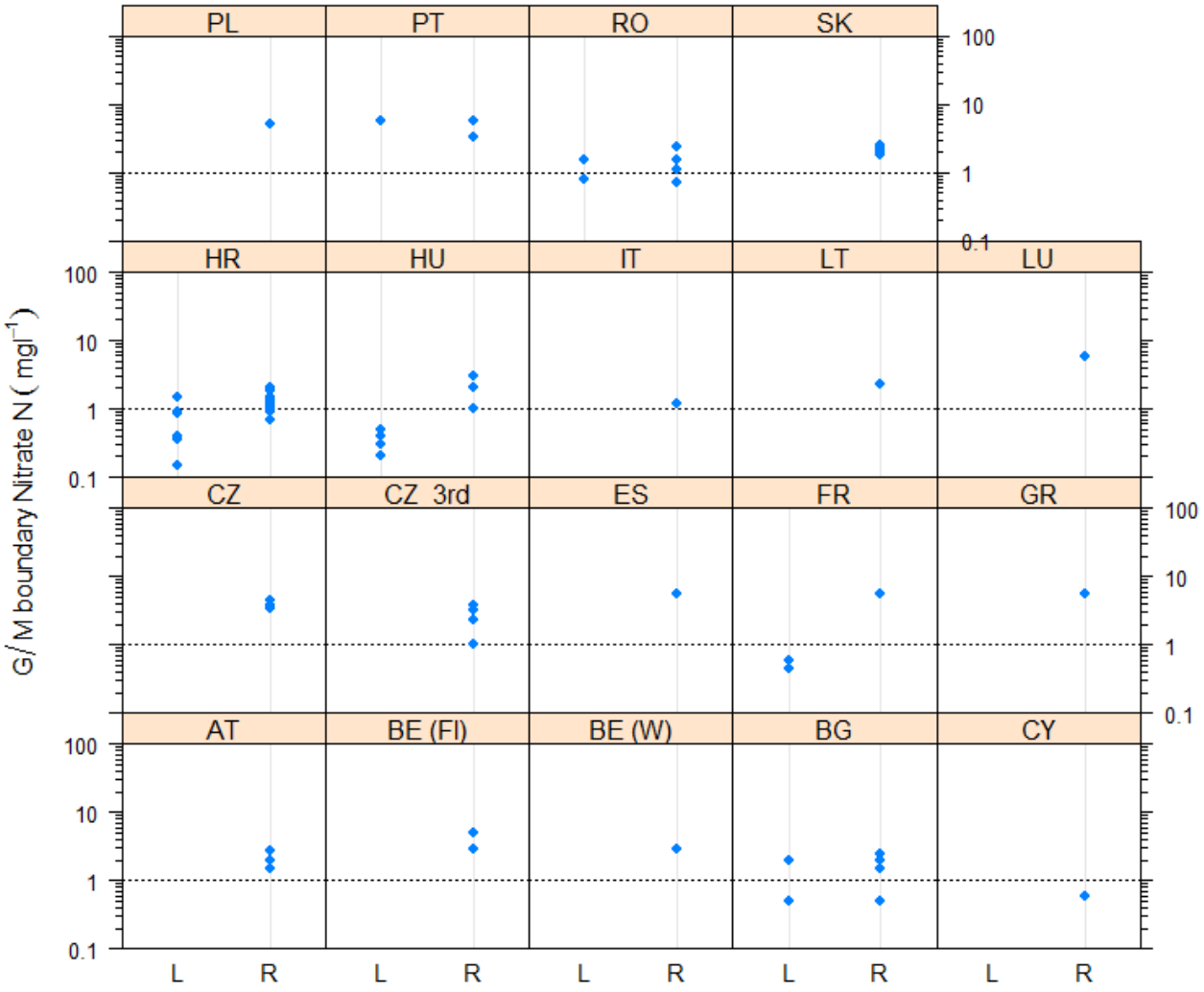

Figure 4.1-2 Comparison of nitrate nitrogen good/moderate boundaries in lakes (L) and rivers (R) by country (maximum (FR lakes) and 90th percentiles rivers AT, BE, FR, RO, SK halved)

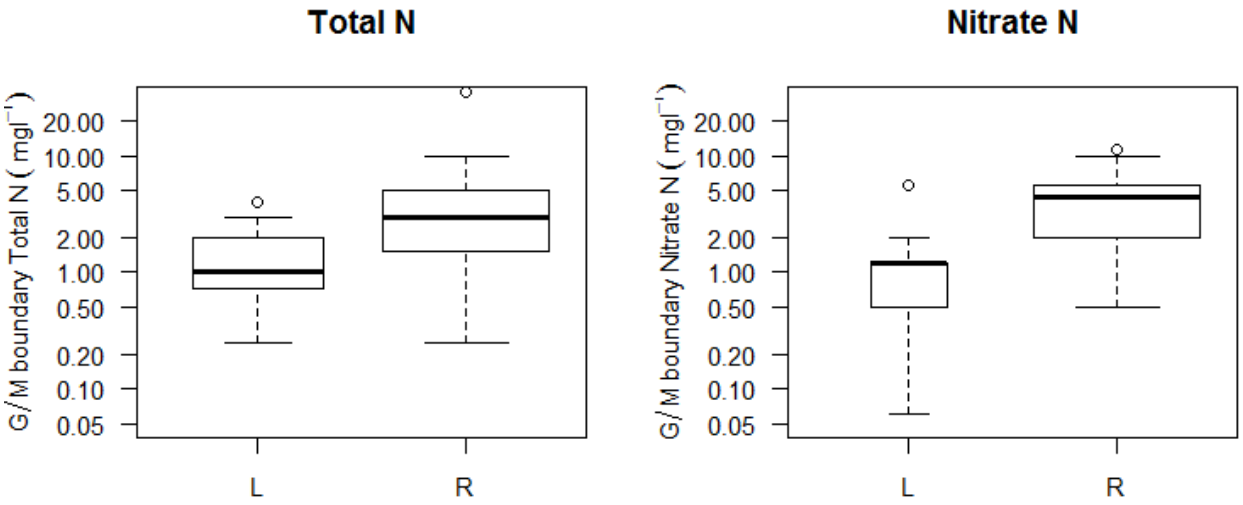

Figure 4.1-3 Range of good/moderate nitrogen boundary values in lakes (L) and rivers (R). Width of bar proportional to number of countries with boundary values.

4.2 Comparison of nitrogen boundaries for lakes

4.2.1 Introduction

Sixteen Member States report boundary values for total nitrogen or nitrate nitrogen (
Table 4.2-1). There were a wide range of values reported, but in comparison to phosphorus there were fewer different national type values, with many Member States having three or fewer different values covering all of their lake types. Hungary and Romania report values higher than the upper quartile of all Member States, and Norway and Finland lower than the lower quartile (Figure 4.2-1). Fewer countries report nitrate nitrogen boundary values, but the range of values is much smaller than for total nitrogen, although Portugal report a higher value of 5.65 mgl^{-1} which was based on the now repealed Drinking Water Directive (80/778/EC) and only applies to reservoirs. (Figure 4.2-2).

There is a similar range of values for the high/good boundary as there is for the good/moderate boundary suggesting that Member States views of reference condition for nitrogen are relatively variable, or that they reflect the different lake types found in each country.

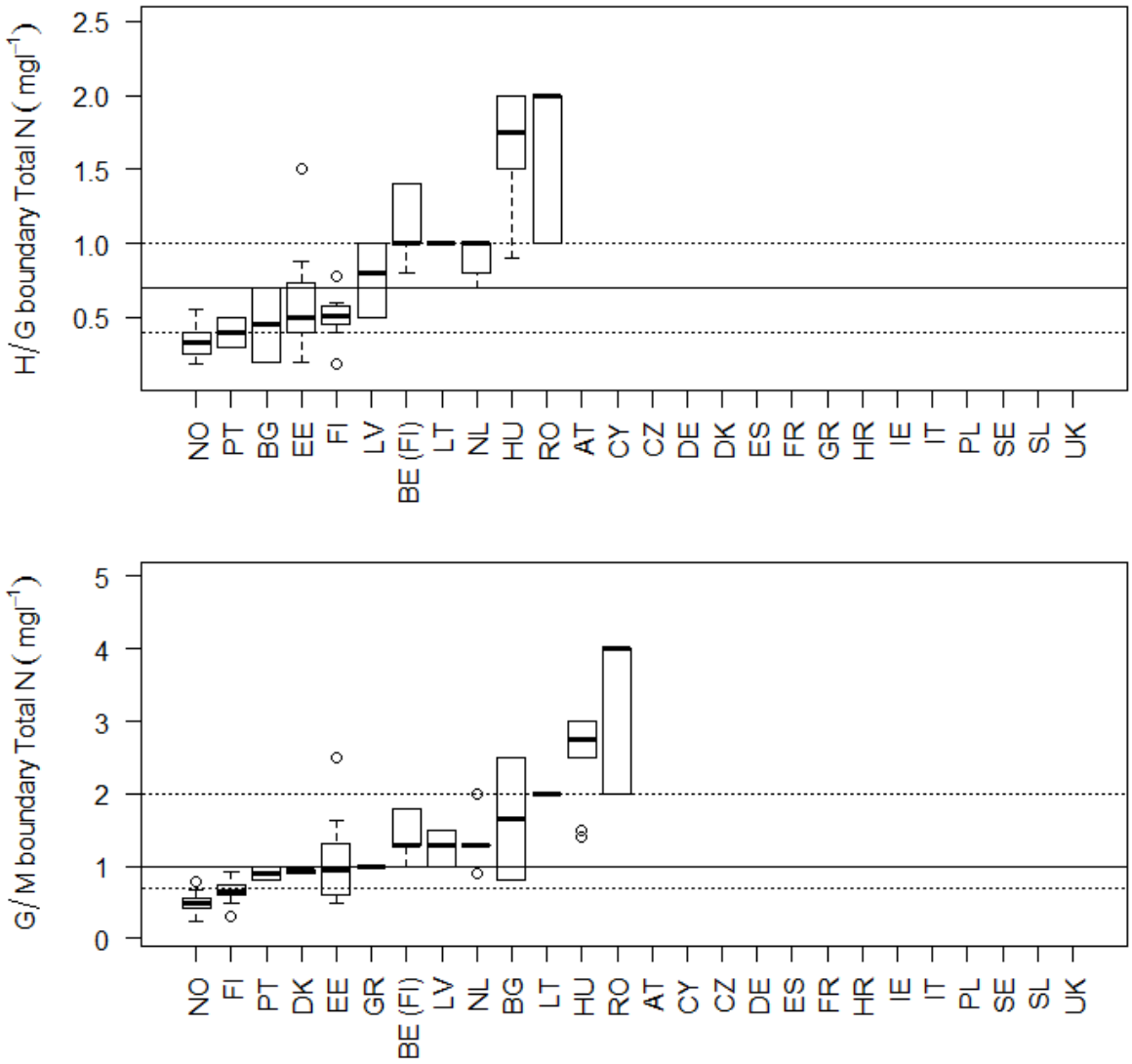

Figure 4.2-1 Range of a) high/good and b) good/moderate total nitrogen boundaries for lakes by country, arranged by median value of boundaries for each country. Lines mark 25th, 50th and 75th percentile values for countries.

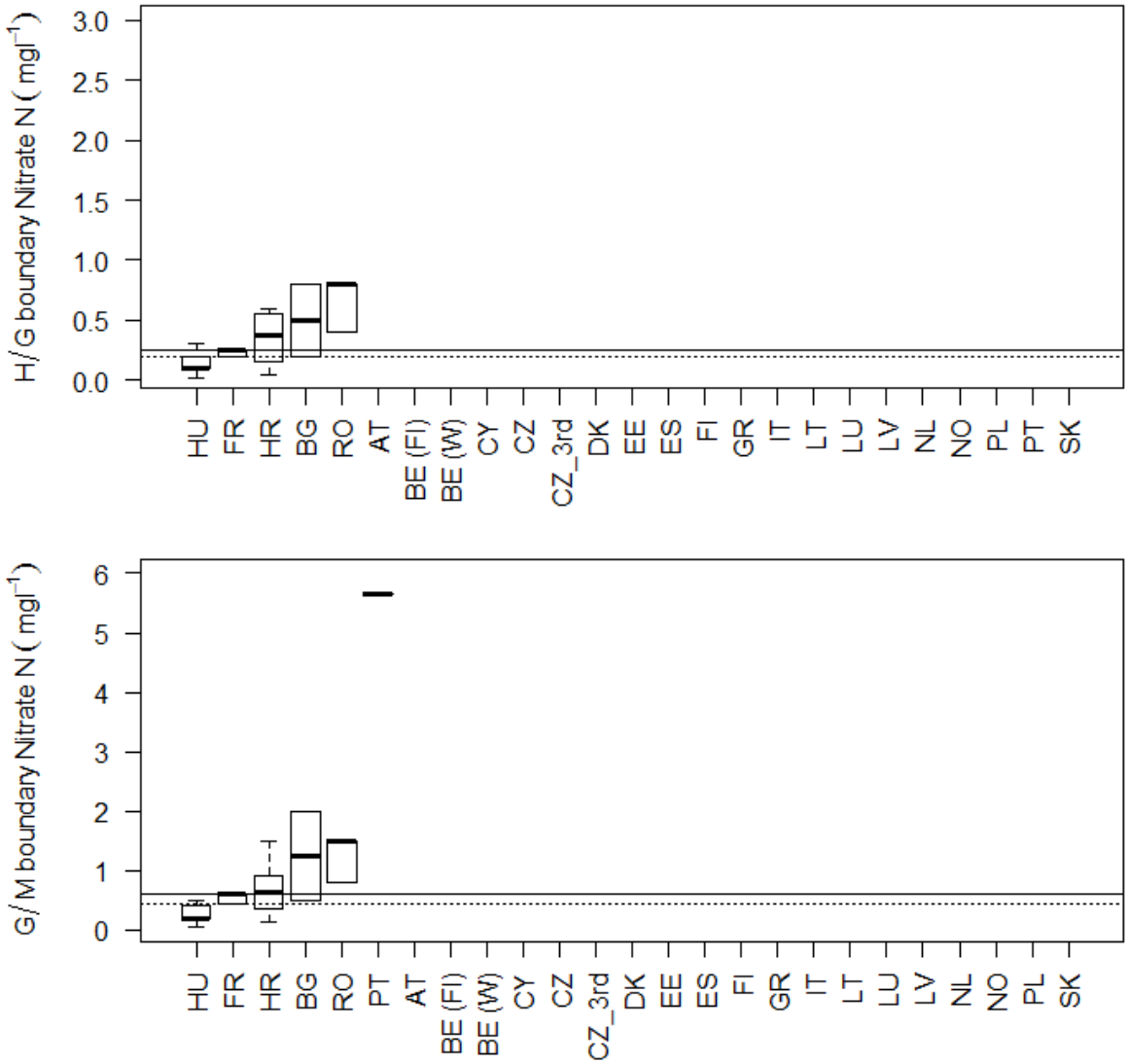

Figure 4.2-2 Range of a) high/good and b) good/moderate nitrate nitrogen boundaries for lakes by country (reservoirs for PT), arranged by median value of boundaries for each country. Lines mark 25th, 50th and 75th percentile values for countries (maximum value for FR was halved for comparison)

Country		Number of			Range good/moderate boundary values (mgl^{-1})			Form of nitrogen
		National types	Broad type	Good/moderate boundary values	Min	Max	Range	
Austria	AT	8	4					
Belgium (Flanders)	BE (Fl)	6	2	3	1	1.8	0.8	TN
Belgium (Wallonia)	BE (W)	No lakes						
Bulgaria	BG	13	5	2	0.5	2	1.5	NO3 N
				2	0.8	2.5	1.7	TN
Cyprus	CY	1	1					
Czech Republic	CZ	9						
Germany	DE	16	3					
Denmark	DK	11	2	2	0.9	0.95	0.05	TN
Estonia	EE	8	4	7	0.5	2.5	2	TN
Spain	ES	39						
Finland	FI	13	3	9	0.3	0.93	0.63	TN
France	FR	33	11	3	0.9	1.2	0.3	NO3 N
Greece	GR	1		1	1	1	0	TN
Croatia (Hravtska)	HR	6	2	6	0.15	1.5	1.35	NO3 N
Hungary	HU	16	4	5	0.06	0.5	0.44	NO3 N
				4	1.4	3	1.6	TN
Ireland	IE	13	4					
Italy	IT	18	9					
Lithuania	LT	3	2	1	2	2	0	TN
Latvia	LV	9	4	4	1	1.5	0.5	TN
Netherlands	NL	19	3	3	0.9	2	1.1	TN
Norway	NO	21	5	8	0.25	0.78	0.53	TN
Poland	PL	13	2	3	1.5	2.5	1	TN
Portugal	PT	5	2	1	5.65	5.65	0	NO3 N
				2	0.8	1	0.2	TN
Romania	RO	17	6	2	0.8	1.5	0.7	NO3 N
				2	2	4	2	TN
Sweden	SE	64	10					
Slovenia	Sl	2	1					
United Kingdom	UK	8	3					

Table 4.2-1 Number of national types, good/moderate boundary values for nitrogen (total nitrogen and nitrate) reported by Member States for lakes and number of broad types that have been linked to national types.

4.2.2 Comparison of boundaries by lake type

To account for differences due to typology lake nitrogen boundary values have been compared by both intercalibration and broad types. The intercalibration typology is likely to provide the most similar lake types, but has fewer countries per type than the broad typology. A full comparison of boundary values is shown in section 6 Appendices and a summary is set out below.

4.2.2.1 Comparison of boundaries by intercalibration type

There were only two intercalibration types (L-CB1 and L-CB2) where more than 3 countries reported boundary values (Table 4.2-2). These showed a relatively narrow range of total nitrogen boundary values (1.0 - 2.0 mgl^{-1}) (Figure 4.2-3 and for detail see Figure 6.1-4 & Figure 6.1-6).

IC Type	Number Countries contributing to type	BE (FI)	BG	DK	EE	FI	FR	GR	HR	HU	LT	LV	NL	NO	PL	PT	RO
L-AL3	1						5										
L-AL4	1						6										
L-CB1	8	2		1	1		9				2	3	2		4		
L-CB2	8	2		1	1		10				1	2	3		4		
L-CB3	3						7					2	1				
L-EC1	1									10							
L-M5/7	3						5	1								2	
L-M8	2						4	1									
L-N1	1													1			
L-N2a	2					2								4			
L-N2b	1													1			
L-N3a	2					3								2			
L-N5	2					1								4			
L-N6a	2					1								4			
L-N7	1													4			
L-N8a	1													1			
not allocated		2	24	9	6	7	15		6	18		2				2	22
Total National Types		6	13	11	8	13	33	1	6	16	3	9	19	21	13	5	17

Table 4.2-2 Number of national lake types with reported nitrogen good/moderate boundary values (total nitrogen or nitrate) by intercalibration type.

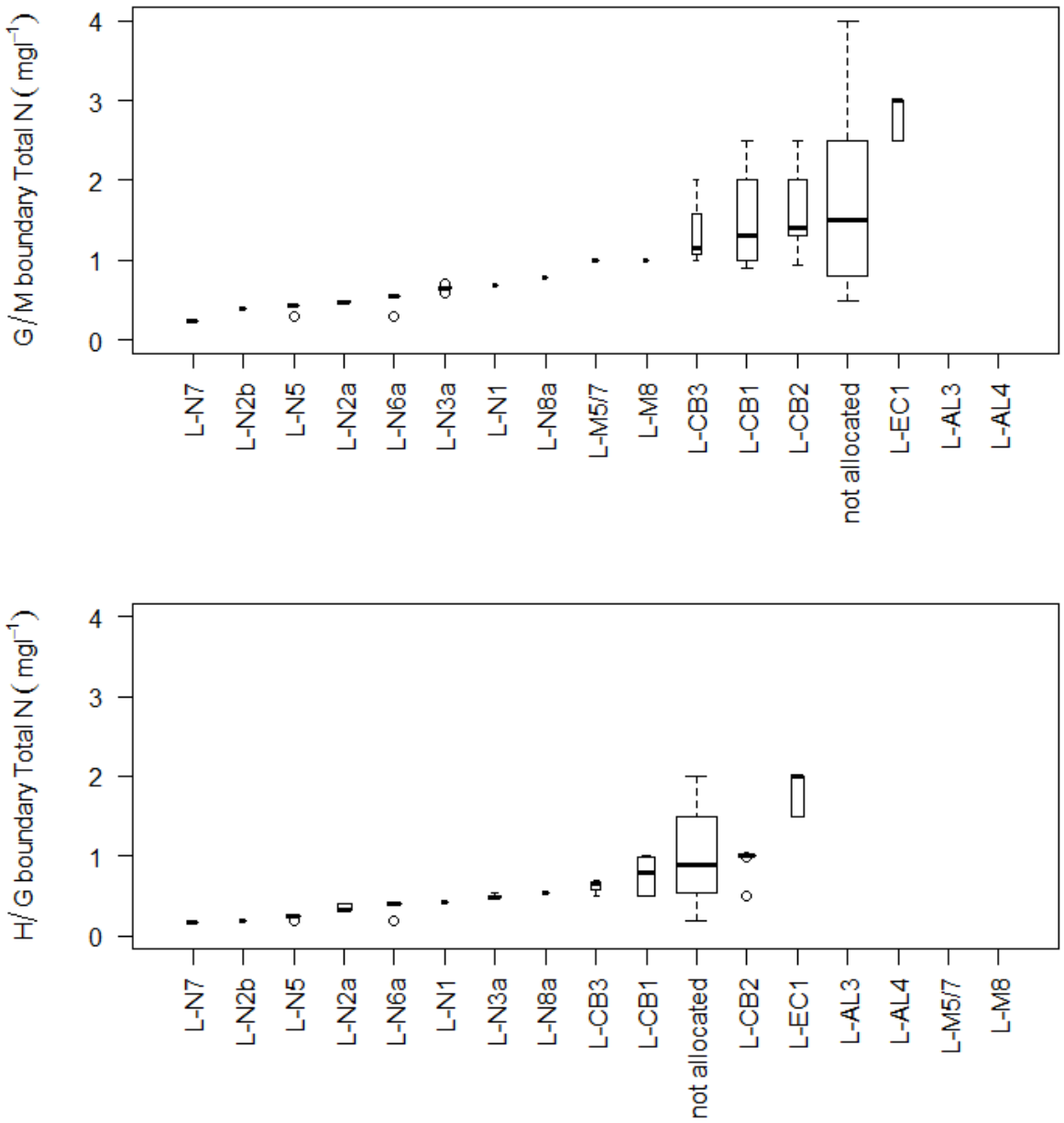

Figure 4.2-3 Range of reported lake total nitrogen boundary values for each intercalibration type, arranged by median national boundary value for the type. Width of bar is proportional to the number of national types linked to intercalibration type.

4.2.2.2 Comparison of boundaries by broad type

Seven broad types had four or more countries with boundaries linked to the broad type (
Table 4.2-3). The lowest boundary values reported were found in the siliceous lake types, typically with good/moderate boundary values below 2.0mgl^{-1} and for broad types 2,9 and 11 (lowland, mid-altitude organic and highland siliceous) most below 1.0 mgl^{-1} (Figure 4.2-4). The highest values were reported for the calcareous lake types, mostly above 1.0 mgl^{-1} but below 3.0 mgl^{-1}. Several types had total nitrogen boundary values that were outliers, e.g. values of 4.0 for broad type 2 and 2.0 for broad type 11, both reported by RO. For further details of national boundaries in each type see Appendix section 6.1.2.

Typically nitrate nitrogen boundary values had a lower range of values (Figure 4.2-5). Siliceous lake types had the lowest values, calcareous types had higher values, but the highest were found in broad type 13 the Mediterannean siliceous lake type which only included 2 countries (PT, FR).

Broad Type Description		Number of countries	Total national types	BE (Fl)	BG	DK	EE	FI	FR	GR	HR	HU	LT	LV	NL	NO	PL	PT	RO
	not allocated	10	41	2	1	7	1	8	14	1		5		1					1
1	Very large & deep (stratified) (all Europe)	2	3		1			2											
2	Lowland, siliceous	4	9				1	1								6			1
3	Lowland, stratified, calcareous / mixed	11	33	2	4	1	4		5			4	2	3	3		3		2
4	Lowland, calcareous / mixed, very shallow (unstratified)	11	23	2	1	3	1		5			2	1	2	2		1		3
5	Lowland, organic & siliceous	4	8					2	1					2		3			
6	Lowland, organic & calcareous / mixed	4	6				1					3		1	1				
7	Mid altitude, siliceous	4	13						5							4		2	2
8	Mid altitude, calcareous / mixed	3	14		2				10		2								
9	Mid altitude, organic & siliceous	1	2													2			
11	Highland, siliceous (all Europe)	4	16		3				5							6			2
13	Mediterranean, small-large, siliceous (including reservoirs)	2	4						2									2	
14	Mediterranean, small-large, calcareous / mixed (including reservoirs)	2	8						4		4								
15	Mediterranean, very small	1	1						1										

Table 4.2-3 Number of national lake types with reported nitrogen good/moderate boundary values (total nitrogen or nitrate) by broad type.

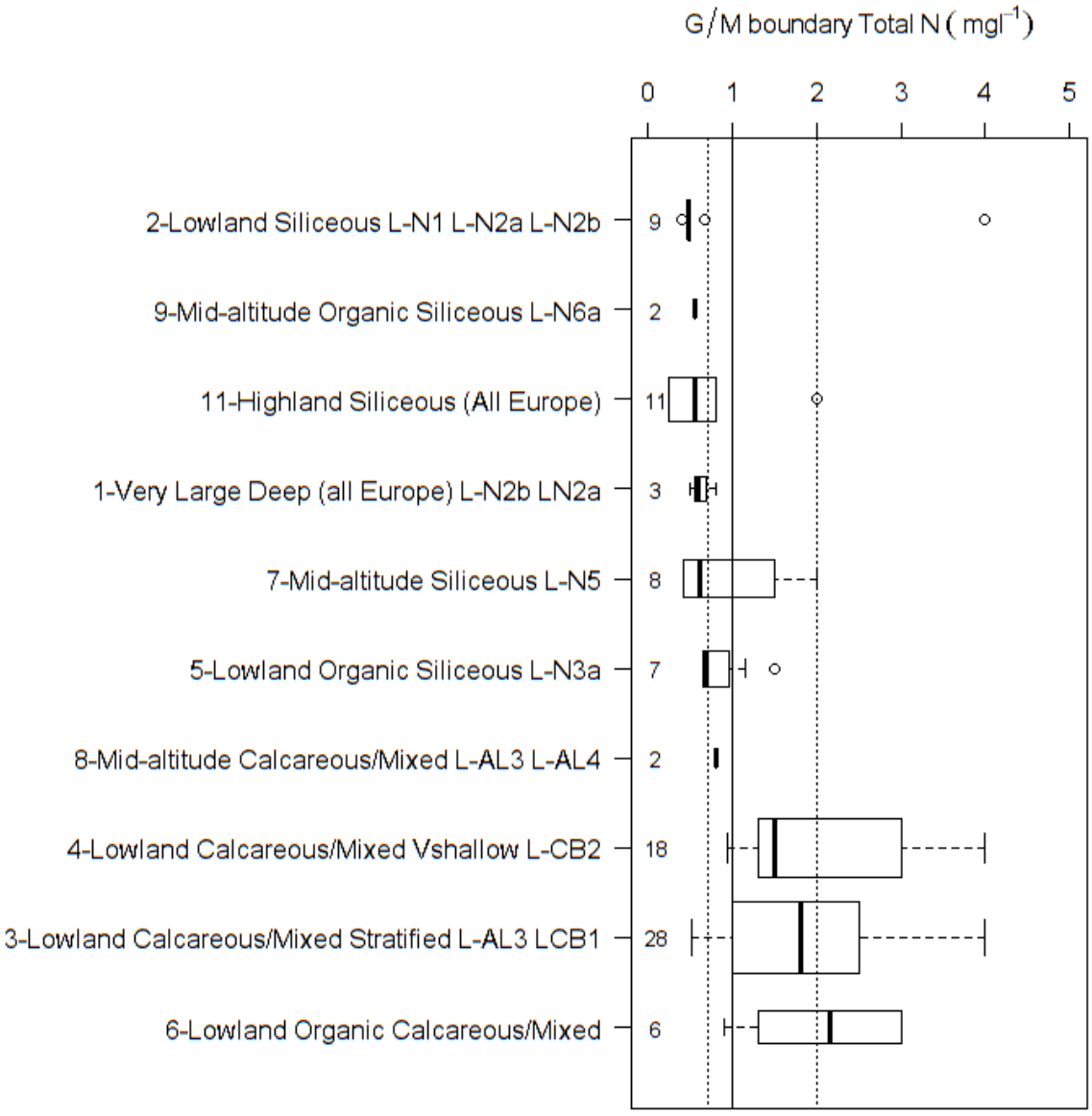

Figure 4.2-4 Range of reported total nitrogen good/moderate boundary values for lakes grouped by broad types. Numbers show the number of national types contributing to the broad type with boundary values. Types ordered by median boundary for broad type. Lines show 25th 50th and 75th percentiles of all reported good/moderate total nitrogen boundary values.

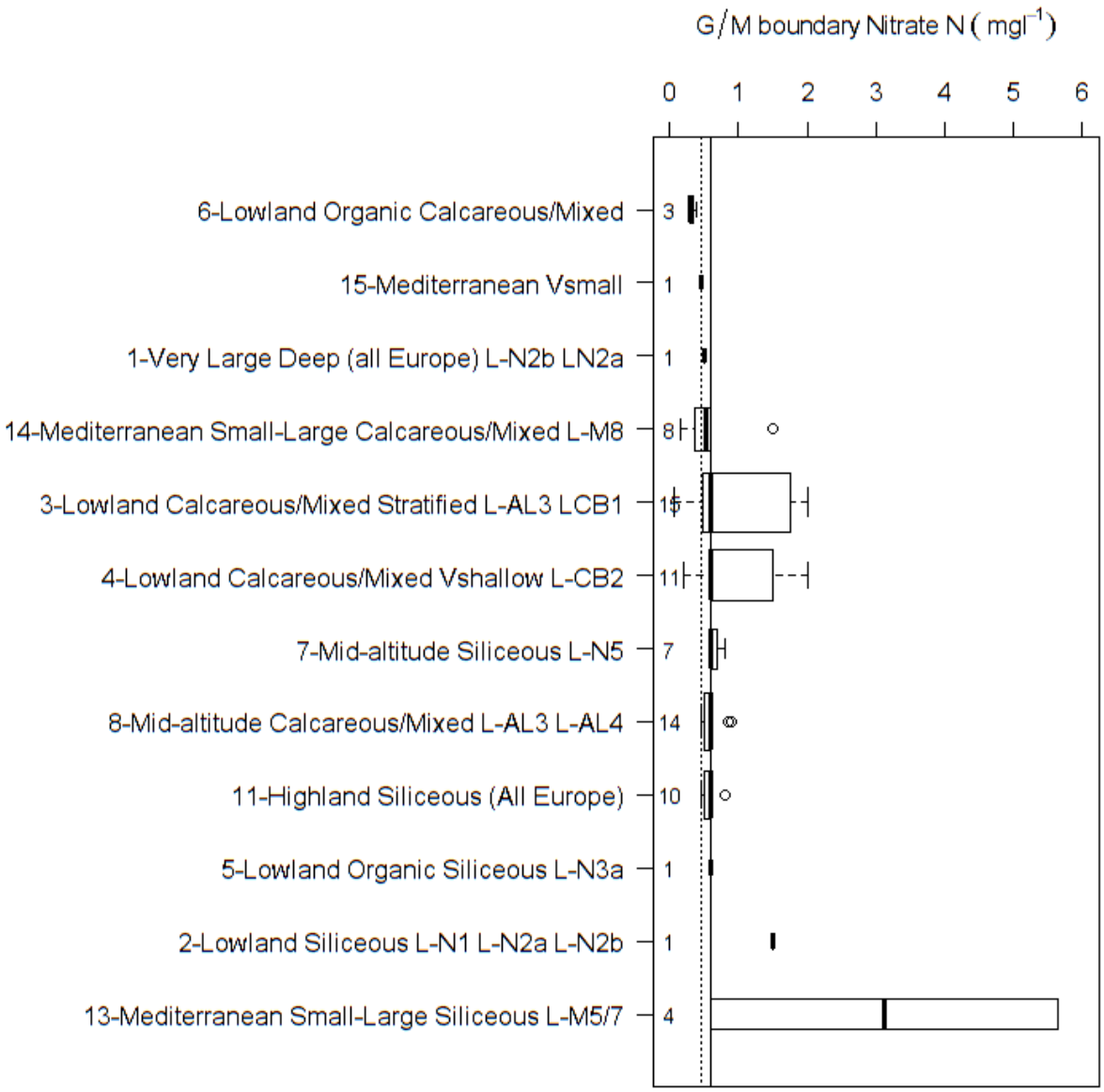

Figure 4.2-5 Range of reported nitrate nitrogen good/moderate boundary values for lakes grouped by broad types. Numbers show the number of national types contributing to the broad type with boundary values. Types ordered by median boundary for broad type. Lines show 25th 50th and 75th percentiles of all reported good/moderate nitrate nitrogen boundary values (maximum value FR halved).

4.2.3 Comparison by country

To compare boundary values by country after taking into account typological differences the same procedure to that described in section 3.2.3 was used. This compares the mean difference between national boundary values and the average for each broad type, for all national types that were linked to broad types. Average differences for nitrogen (total nitrogen or where this was not reported nitrate nitrogen) are shown in Figure 4.2-6. The average difference typically ranges ±0.5mgl^{-1}, the greatest negative differences were found in DK, EE, BE(Fl) and the greatest positive differences in HU and RO. It is however important to note that except for HU these countries contribute to relatively few broad types, and the average comparison is thus derived from relatively few broad lake types and conclusions needed to treated with caution. The difference found for total

phosphorus in lakes (± 20µgl^{-1}) was much lower than the average difference for nitrogen and suggests that the relative range of lake nitrogen boundary values is higher than for phosphorus.

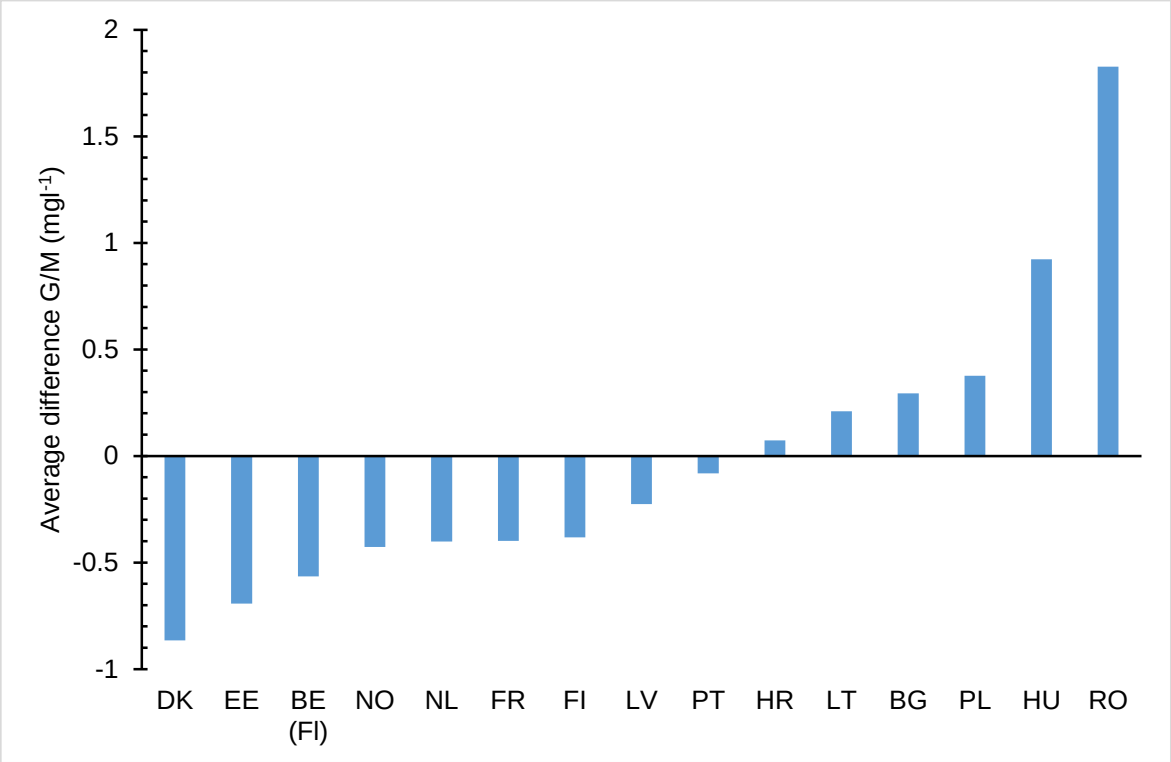

Figure 4.2-6 Average of the discrepancies (mgl^{-1}) between the national and average broad type lake nitrogen (total nitrogen or nitrate nitrogen where total nitrogen not reported) good/moderate boundary values for all types by country. (For FR, only a maximum nitrate value is reported and these values were halved for comparison with other country mean values)

4.2.4 Comparison by method used to set boundaries

The range of nitrogen boundary values reported by Member States using different approaches to the boundary setting method are shown in
Figure 4.2-7. As shown for lake phosphorus, the highest nitrogen boundary values are found when either expert judgement or the distribution of nitrogen concentration in all water bodies are used.

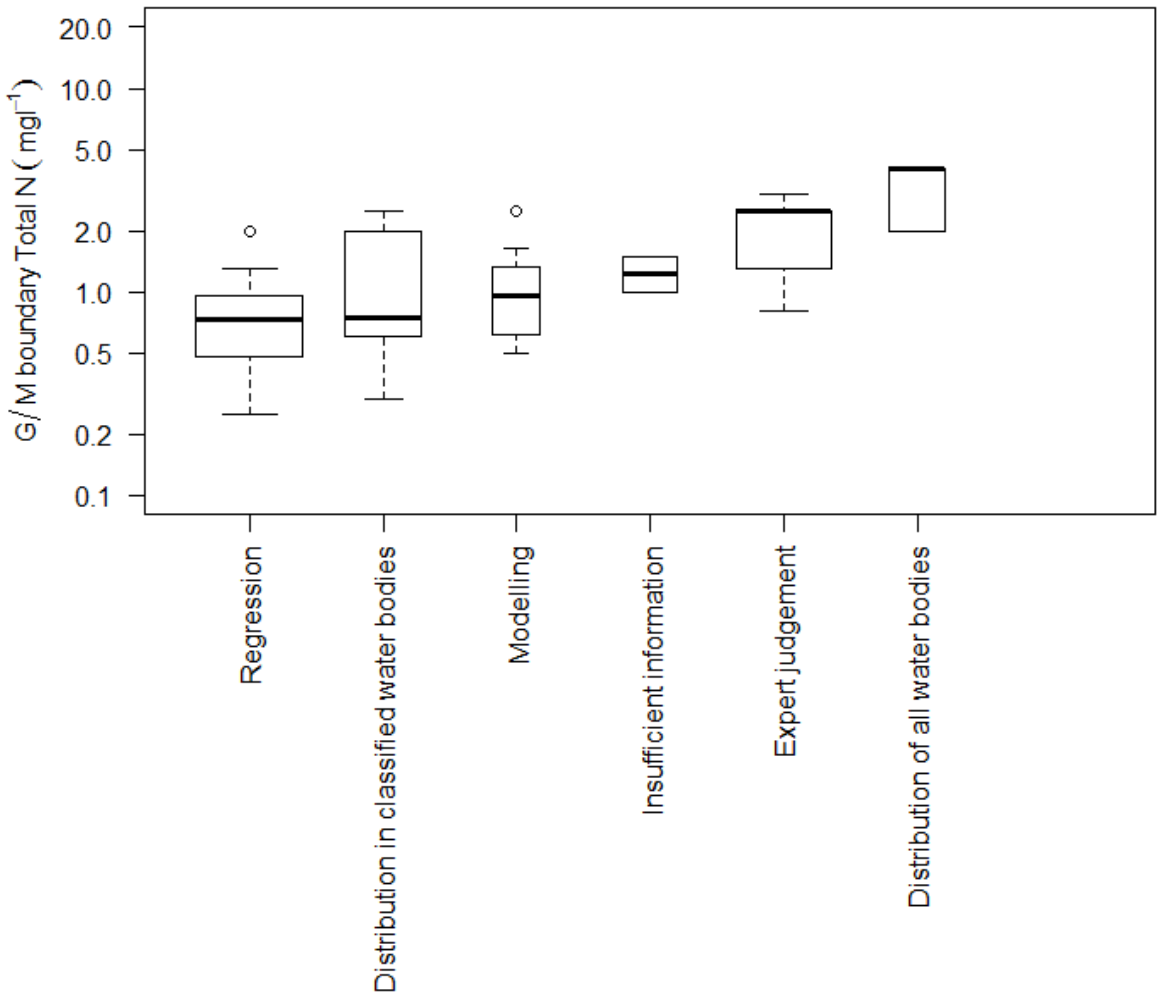

Figure 4.2-7 Range of total nitrogen good/moderate boundary values for lakes by category of method used to establish boundary by different Member States

4.3 Comparison of nitrogen boundaries for rivers

4.3.1 Introduction

Twenty two Member States report nitrogen boundaries for rivers, many more than for lakes (
Table 4.3-1). As explained in section 4.1 the majority of these boundary values are nitrate nitrogen rather than total nitrogen and there is a greater use of 90th percentile summary metrics. As for lakes there are far fewer national nitrogen boundary values than there are national types, with the same numeric boundary value applied to several river types.

The lowest total nitrogen boundary values are found in NO and FI, the highest in BE(Fl) and PL (Figure 4.3-1). The range of nitrate nitrogen values is lower than for total nitrogen, with several countries (BE(WL), ES, GR, LU, PT) using a single standard value of 5.65 mgl^{-1} (25.0 mgl^{-1} as nitrate, the now repealed Drinking Water Directive guide level 80/778/EC), although with different summary metrics.

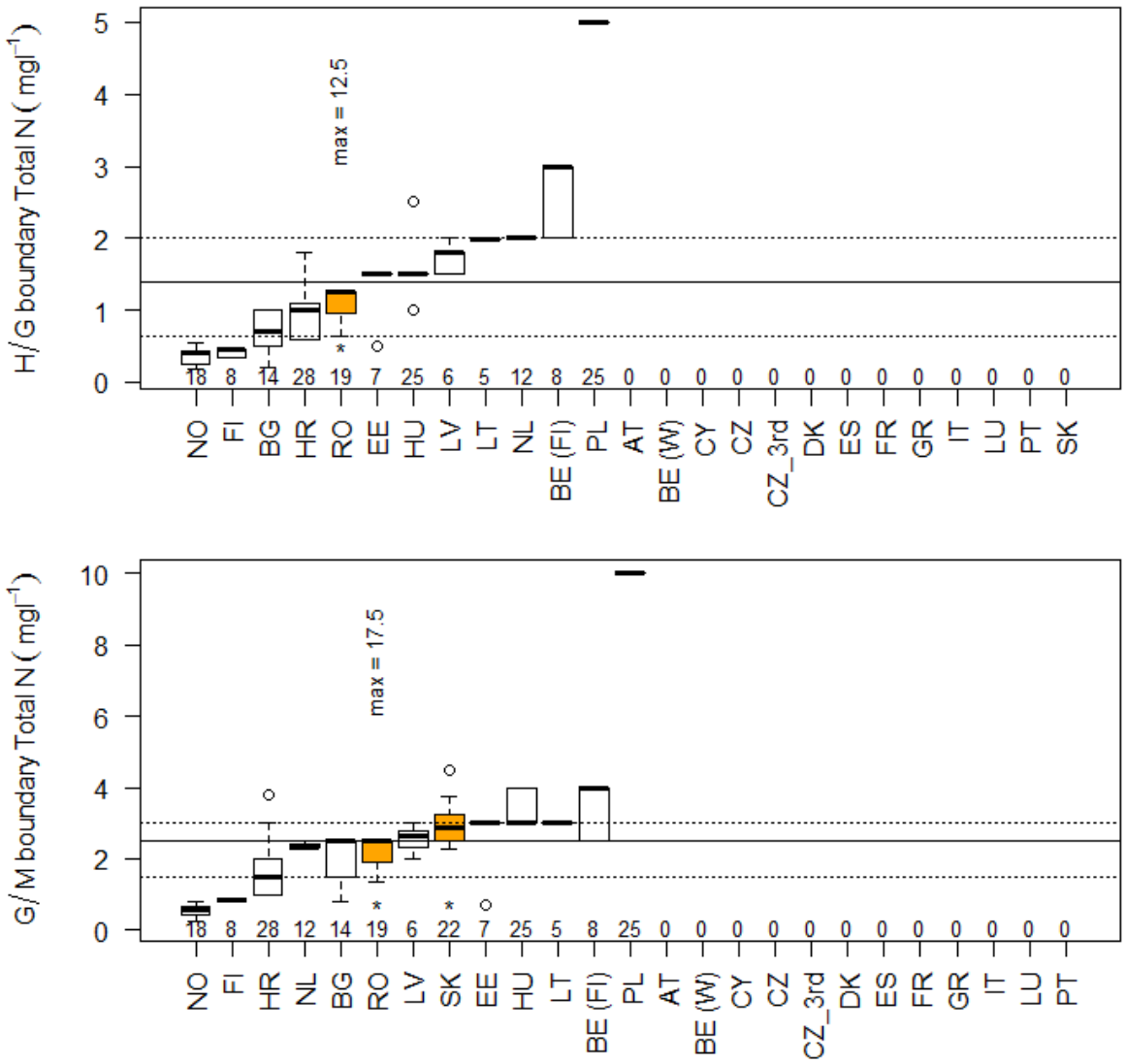

Figure 4.3-1 Range of a) high/good and b)good/moderate total nitrogen boundaries for rivers by country, arranged by median values of boundaries for each country. Lines mark 25th, 50th and 75th percentile values for all countries, numbers are national types with boundary values. (90th percentiles identified by * and orange shading RO, SK)

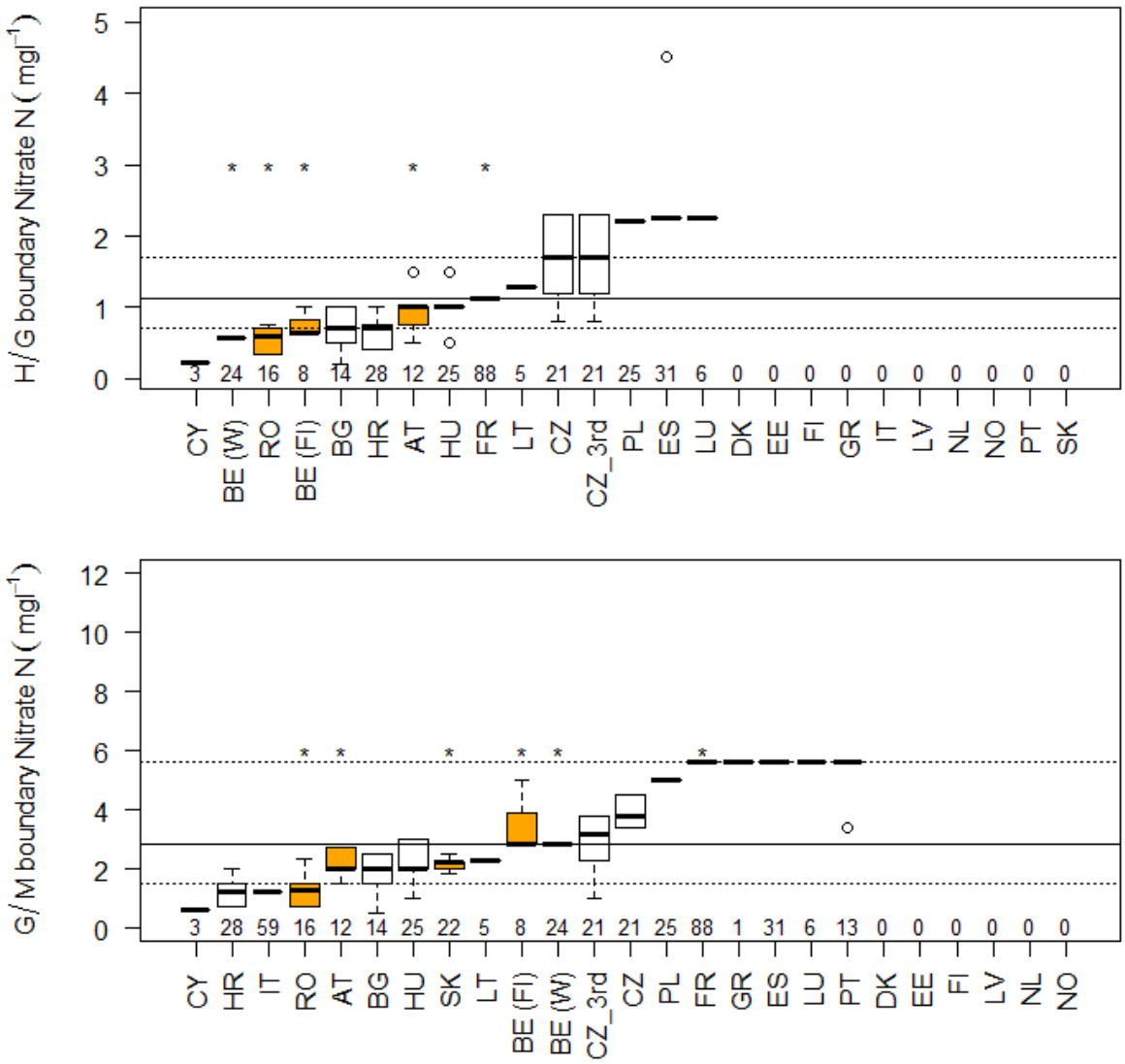

Figure 4.3-2 Range of a) high/good and b)good/moderate nitrate nitrogen boundaries for rivers by country, arranged by median values of boundaries for each country. Lines mark 25th, 50th and 75th percentile values for all countries, numbers are national types with boundary values. (90th percentiles identified by * and orange shading AT, BE, FR, RO, SK)

Country		Number of			Range good/moderate boundary values (mgl^{-1})			Form of nitrogen
		National Types	Broad types	Good/moderate boundary values	Min	Max	Range	
Austria	AT	12	4	3	3	5.5	2.5	NO3 N
Belgium (Flanders)	BE (Fl)	8	3	2	5.65	10	4.35	NO3 N
				2	2.5	4	1.5	TN
Belgium (Wallonia)	BE (W)	24	8	1	5.65	5.65	0	NO3 N
Bulgaria	BG	15	8	4	0.5	2.5	2	NO3 N
				3	0.8	2.5	1.7	TN
Cyprus	CY	3	2	1	0.6	0.6	0	NO3 N
Czech Republic	CZ	21	5	4	3.4	4.5	1.1	NO3 N
Czech Republic (3rd cycle)	CZ_3rd	21	5	7	1	3.8	2.8	NO3 N
Germany	DE	31	11					
Estonia	EE	7	3	2	0.7	3	2.3	TN
Spain	ES	32		1	5.65	5.65	0	NO3 N
Finland	FI	17	6	2	0.8	0.9	0.1	TN
France	FR	141	15	1	11.29	11.29	0	NO3 N
Greece	GR	1		1	5.645	5.645	0	NO3 N
Croatia (Hravtska)	HR	28	9	9	0.7	2	1.3	NO3 N
				10	1	3.8	2.8	TN
Hungary	HU	25	6	3	1	3	2	NO3 N
				2	3	4	1	TN
Ireland	IE	12	2					
Italy	IT	59	11	1	1.2	1.2	0	NO3 N
Lithuania	LT	5	2	1	2.3	2.3	0	NO3 N
				1	3	3	0	TN
Luxembourg	LU	6	4	1	5.65	5.65	0	NO3 N
Latvia	LV	6	2	5	2	3	1	TN
Netherlands	NL	12	4	2	2.3	2.5	0.2	TN
Norway	NO	22	7	7	0.25	0.78	0.53	TN
Poland	PL	25	12	1	5	5	0	NO3 N
				1	10	10	0	TN
Portugal	PT	16	4	2	3.39	5.65	2.26	NO3 N
Romania	RO	21	6	4	1.4	4.7	3.3	NO3 N
				3	2.7	35	32.3	TN
Sweden	SE	40	10					
Slovak Republic	SK	36	6	4	3.7	5	1.3	NO3 N
				7	4.5	9	4.5	TN
United Kingdom	UK	21	10					

Table 4.3-1 Number of national types, good/moderate boundary values for nitrogen (total N and nitrate) reported by Member States for rivers and number of broad types that have been linked to the national types.

4.3.2 Comparison of boundaries by river type

To account for differences due to typology, river nitrogen boundary values have been compared by both intercalibration and broad types. The intercalibration typology is likely to provide the most similar lake types, but has fewer countries per type than the broad typology. A full comparison of boundary values is shown in Section 6 (Appendices), and a summary is set out below.

4.3.2.1 Comparison of boundaries by intercalibration type

There are 17 river intercalibration types which have four or more national nitrogen good/moderate boundary levels (Table 4.3-2). The majority show a relatively wide range of total nitrogen and nitrate nitrogen boundary values (Figure 4.3-3 Figure 4.3-4), the smallest ranges, all below 1 mgl^{-1} were found in the Northern GIG for total nitrogen, while the other GIGs had values generally above 2.0 mgl-1 (Figure 4.3-5). For nitrate ranges were much more variable. Further details on national comparisons can be found in the Appendix section 6.2.1.

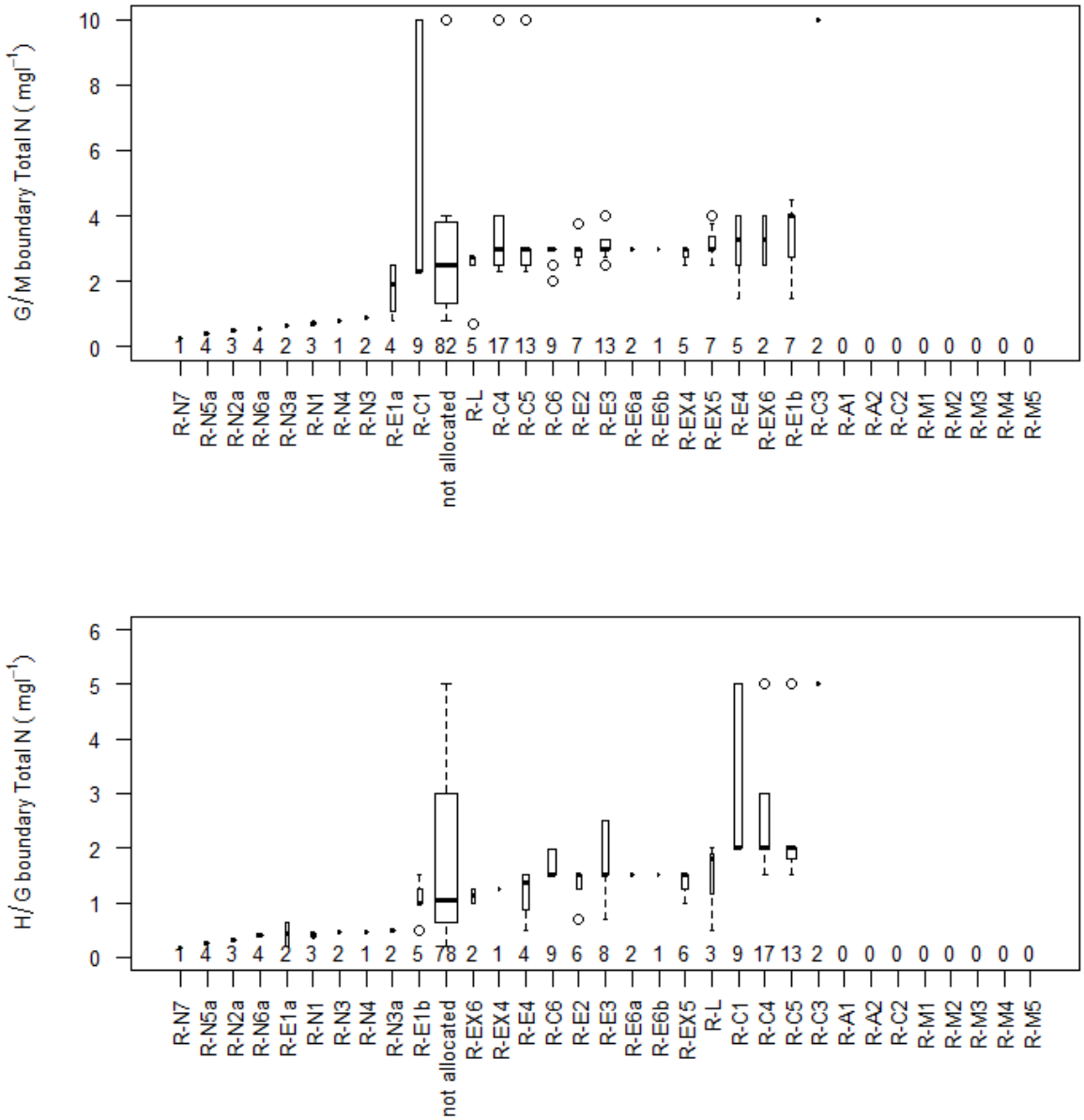

Figure 4.3-3 Range of a)good/moderate, b)high/good boundaries for river total nitrogen by intercalibration type, arranged by median value of intercalibration type, numbers are national types with boundary values in the intercalibration type. (90th percentile values halved RO, SK)

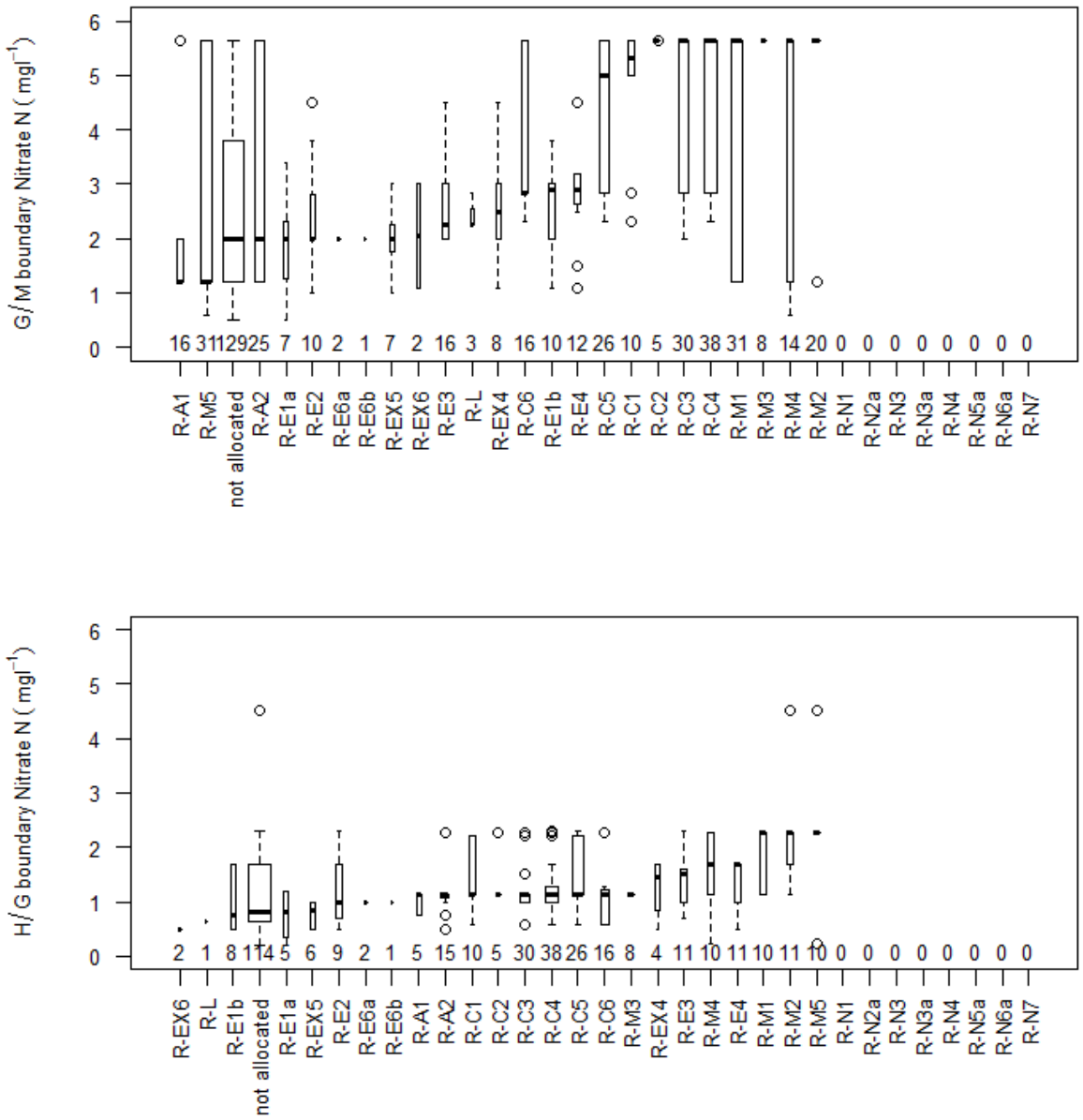

Figure 4.3-4 Range of a)good/moderate, b)high/good boundaries for river nitrate nitrogen by intercalibration type, arranged by median value of intercalibration type, numbers are national types with boundary values in the intercalibration type (90th percentiles halved AT, BE, FR, RO, SK)

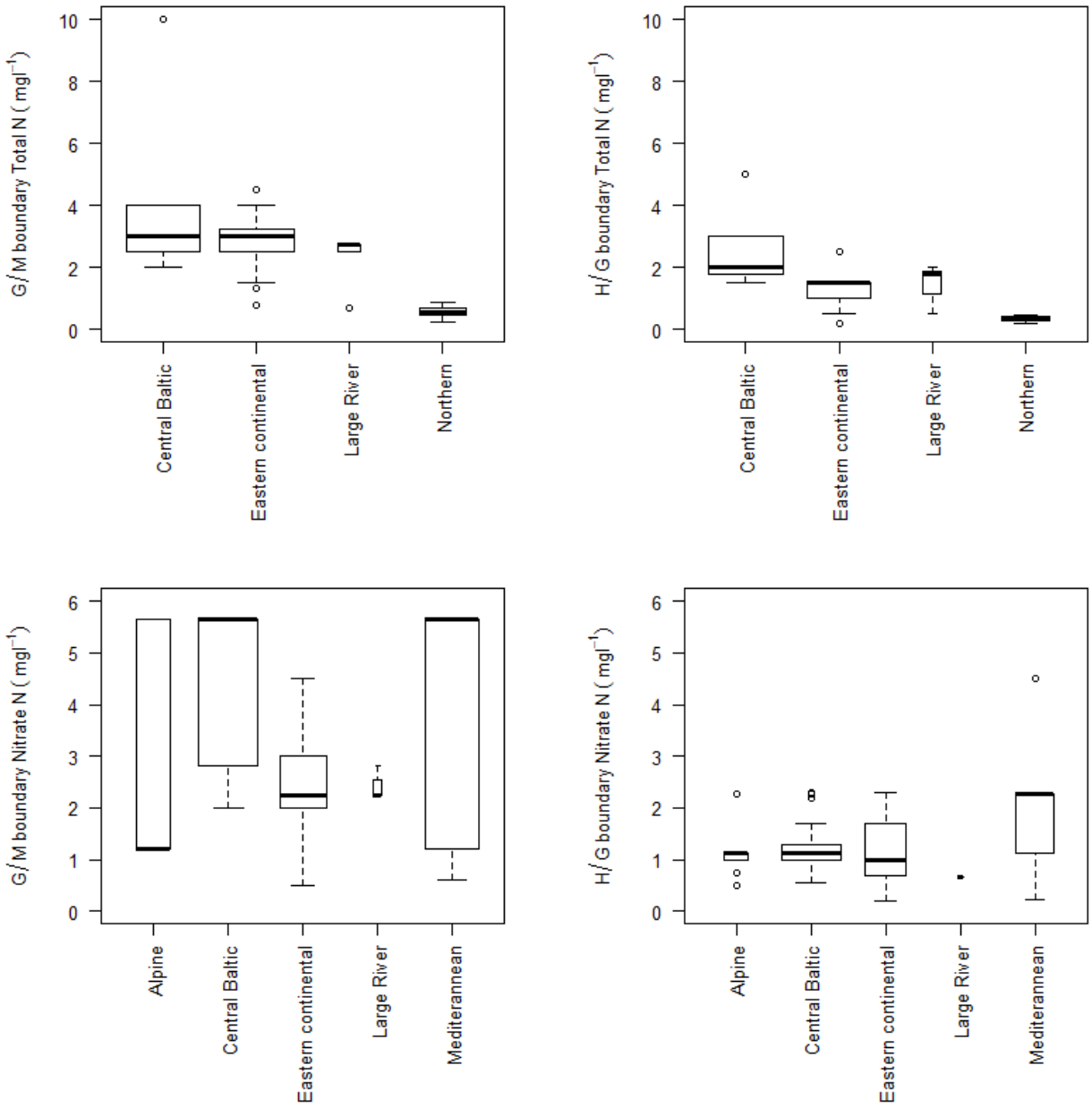

Figure 4.3-5 Range of good/moderate and high/good river total nitrogen and nitrate nitrogen boundaries by geographic intercalibration group. . (90th percentile values halved for total nitrogen RO, SK and for nitrate AT, BE, FR, RO, SK)

Type	Number countries	AT	BE (Fl)	BE (W)	BG	CY	CZ	CZ_3rd	EE	ES	FI	FR	GR	HR	HU	IT	LT	LU	LV	NL	NO	PL	PT	RO	SK
none	14		6		20		13	24		8	4		1	56		9					2	32	1	27	8
R-A1	3	2										3				11									
R-A2	4	4								1		10				10									
R-C1	5			1								5					2			5		6			
R-C2	2									1		4													
R-C3	6	5		5						2		14						2				4			
R-C4	12		8	6			1	2	3	1		17					4	2	2	3		6			
R-C5	11			6			1	2	2	1		10					4	1	2	4		6			
R-C6	6			6					4			6					6	1	2						
R-E1a	5				2		1	2																2	4
R-E1b	6				2		1	2							6									2	4
R-E2	6				2		1	2							8									2	2
R-E3	5				2		1	2							14										10
R-E4	7	1			2		2	4							4									2	2
R-E6a	1														4										
R-E6b	1														2										
R-EX4	4						1	2																2	8
R-EX5	3														10									2	2
R-EX6	2														2									2	
R-L	4		2						1										1						4
R-M1	4									6		4				14							7		
R-M2	4									8		3				2							7		
R-M3	1											8													
R-M4	4					1				5		4				4									
R-M5	4					2				8						14							7		
R-N1	2										1										2				
R-N2a	1																				3				
R-N3	1										2														
R-N3a	1																				2				
R-N4	1										1														
R-N5a	1																				4				
R-N6a	1																				4				
R-N7	1																				1				

Table 4.3-2 Number of national river types allocated to each intercalibration type with good/moderate boundary values for nitrogen (total nitrogen or nitrate nitrogen).

4.3.2.2 Comparison of boundaries by broad type

A comparison by broad type allows more Member State boundary values to be compared, with the majority of types having 4 or more Member States with boundaries linked to the broad type (Table 4.3-3).

The lowest total nitrogen boundary values (for types with > 4 countries) are found in broad types 14 (the highland siliceous rivers) and 6 (lowland organic & siliceous), with higher values in the calcareous river types (Figure 4.3-6). However, there is more variation than for lakes, with a less clear gradation from upland siliceous to lowland calcareous river types. Several types have outlier values (10mgl^{-1}), which can be attributed to one country (PL) and broad type 9 (mid-altitude siliceous) has a very high range of values, attributable to HU & PL (see Figure 6.2-59 for further detail)

The variation of nitrate nitrogen boundaries is much greater (Figure 4.3-7), and there is little indication of any clear link to the broad types. There is also a clear influence of the relatively widespread use of a boundary value of 5.6mgl^{-1} by several Member States, which is probably attributable to the guide line value for drinking water. This suggests that for rivers many countries are probably setting nitrate boundary values linked to the use of river water for potable supply rather than as a supporting element for ecological status.

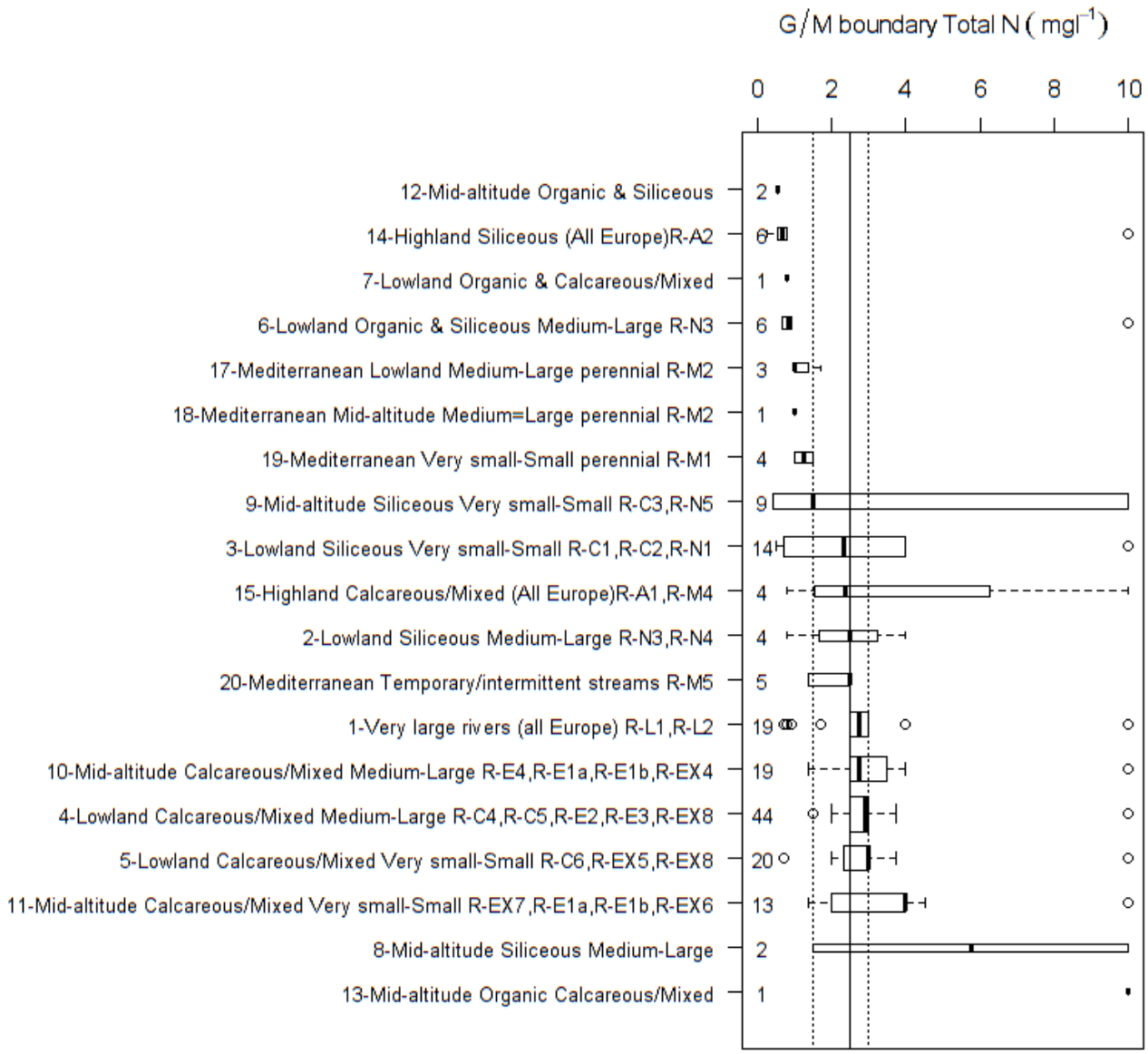

Figure 4.3-6 Range of reported good/moderate total nitrogen boundary values for rivers grouped by broad type. Numbers show the number of national types allocated to each broad type. Types ordered by median value of reported boundary, dotted lines show interquartile range for all broad types. (Values for 90th percentiles (RO, SK) were halved)

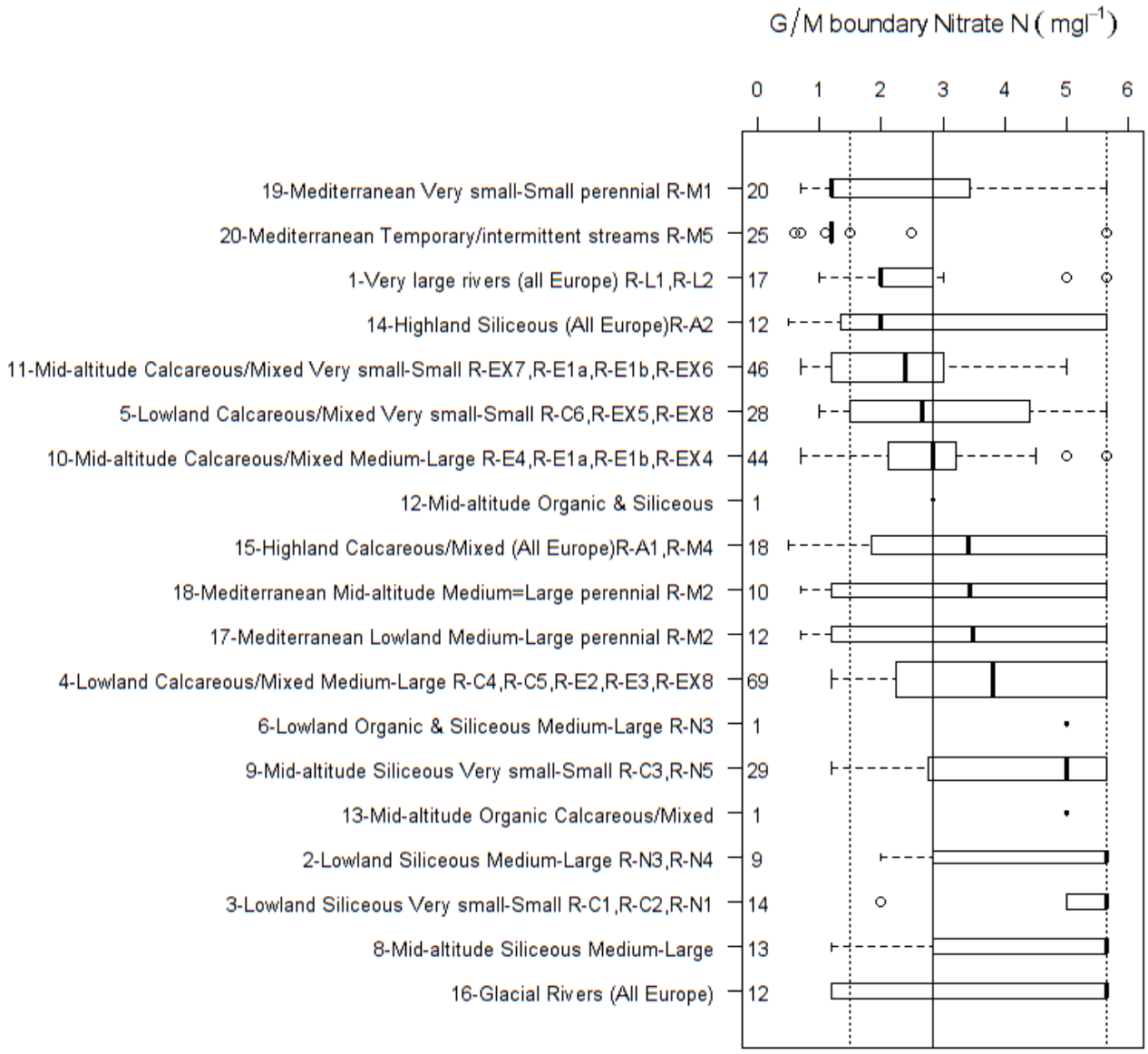

Figure 4.3-7 Range of reported good/moderate nitrate nitrogen boundary values for rivers grouped by broad type. Numbers show the number of national types allocated to each broad type. Types ordered by median value of reported boundary, dotted lines show interquartile range for all broad types. Values for 90th percentiles (AT BE-FL BE-W FR RO SK) were halved

Broad Type		Number of countries	Total national types	AT	BE (Fl)	BE (W)	BG	CY	CZ	CZ_3rd	EE	ES	FI	FR	GR	HR	HU	IT	LT	LU	LV	NL	NO	PL	PT	RO	SK
Not allocated		10	59		3		2					31	2		1	5					1			6	6	2	
1	Very large rivers (all Europe)	11	21		1	1					1		2	1		4	6					1		1		1	2
2	Lowland, siliceous, medium-large	4	10		2		1						1	6													
3	Lowland, siliceous, very small-small	7	22		2								1	8		1						3	4	3			
4	Lowland, calcareous/mixed, medium-large	16	80			3	5		4	4	4			22		2	5	1	4	2	4	5		3		6	6
5	Lowland, calcareous/mixed, very small-small	16	35			1			2	2	2			5		2	5	4	1	1	2	3	1	1		2	1
6	Lowland, organic & siliceous	3	6										2										3	1			
7	Lowland, organic & calcareous/mixed	1	1																				1				
8	Mid altitude, siliceous, medium-large	6	13			3	1							6				1		1				1			
9	Mid altitude, siliceous, very small-small	9	33	5		2	1							11			1	4		2			4	3			
10	Mid altitude, calcareous/mixed, medium-large	10	39	1		7			5	5				2		3	4							1		2	9
11	Mid altitude, calcareous/mixed, very small-small	9	40			6			6	6						3	4	9						2		2	2
12	Mid altitude, organic & siliceous	2	3			1																	2				

13	Mid altitude, organic & calcareous/mixed	1	1																				1			
14	Highland (all Europe), siliceous	6	15	4			2							4				1					3	1			
15	Highland (all Europe), calcareous/mixed	8	20	2			1	1	4	4				5										1			2
16	Glacial rivers (all Europe)	2	12											7				5									
17	Mediterranean, lowland, medium-large, perennial	4	12											3		3		3							3		
18	Mediterranean, mid altitude, medium-large, perenni	3	10											5		1		4									
19	Mediterranean, very small-small, perennial	4	20											3		4		11							2		
20	Mediterranean, temporary/intermittent streams	5	25				1	2										16							2	4	

Table 4.3-3 Number of national river types allocated to each broad type with good/moderate boundary values for nitrogen (total nitrogen or nitrate nitrogen).

4.3.3 Comparison by country

To compare boundary values by country after taking into account typological differences the same procedure to that described in section 3.2.3 was used. This compares the mean difference between national boundary values and the average for each broad type, for all national types that were linked to broad types. Average differences for river nitrogen (total nitrogen or where this was not reported nitrate nitrogen) good/moderate boundaries are shown in Figure 4.3-8. The differences are greater than for lakes with the majority of countries having values of at least ± 1.5mgl^{-1} in comparison to the ± 0.5mgl^{-1} for lakes.

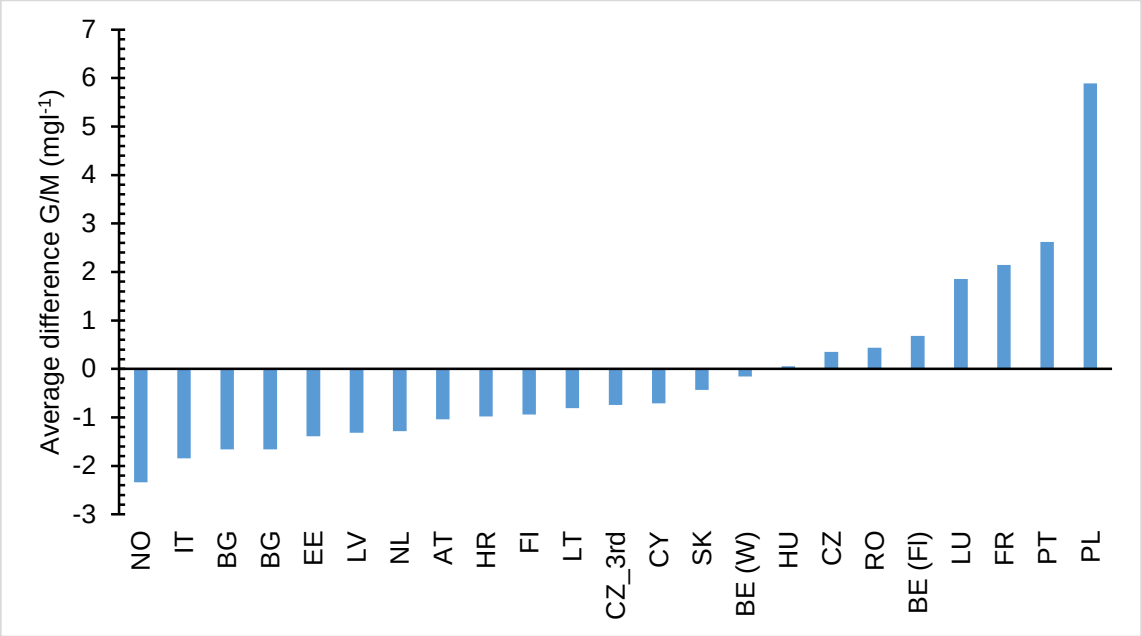

Figure 4.3-8 Average of the discrepancies (mgl^{-1}) between the national and average broad type river nitrogen (total nitrogen or nitrate nitrogen where total nitrogen not reported) good/moderate boundary value for all types by country. 90th percentile values adjusted to match measures of mean and median

4.3.4 Comparison by method used to set boundaries

The range of nitrogen boundary values reported by Member States using different approaches to the boundary setting method are shown in Figure 4.3-9 Figure 4.3-10 . As shown for other metrics, the highest boundary values are found when either expert judgement or the distribution of nitrogen concentration in all water bodies are used, although for nitrogen in rivers the differences due to method were not as significant.

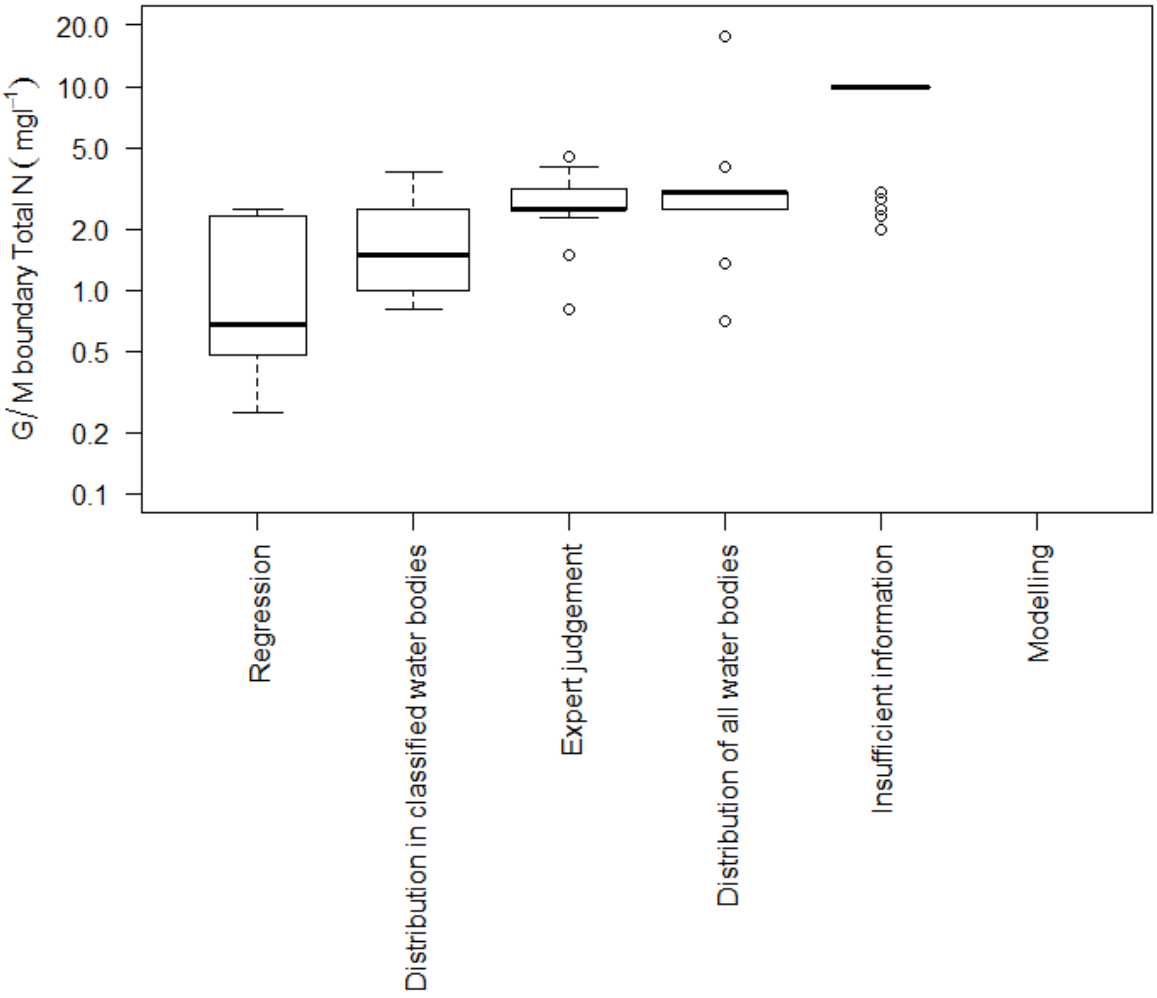

Figure 4.3-9 Range of total nitrogen good/moderate boundary values for rivers by category of method used to establish boundary by different Member States. 90th percentile values adjusted to match measures of mean and median.

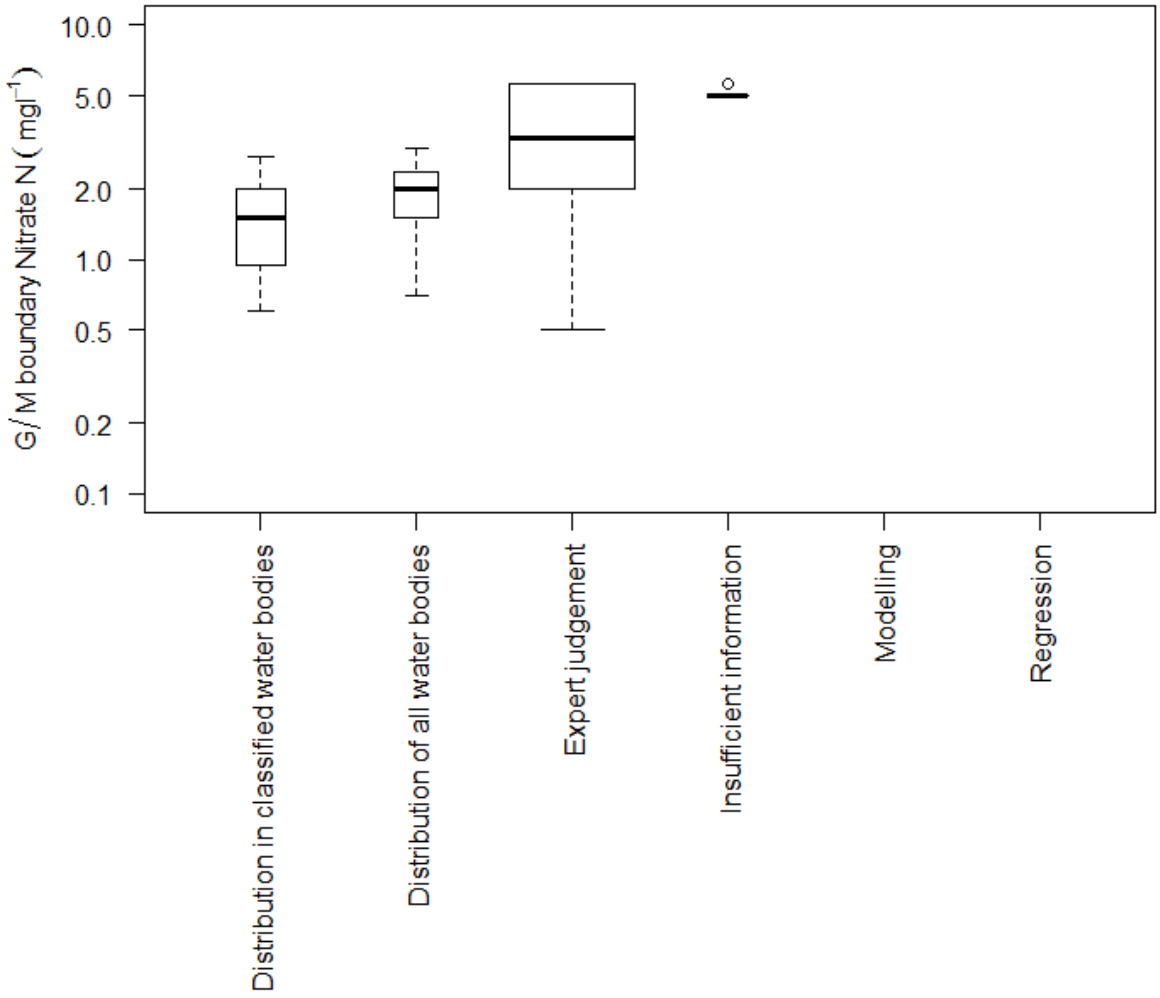

Figure 4.3-10 Range of nitrate nitrogen good/moderate boundary values for rivers by category of method used to establish boundary by different Member States

5 References

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Lyche-Solheim, A., J. Persson, K. Austnes, J. Moe, E. Kampa, U. Stein, J. Feher & P. Kristensen, 2015. Freshwater Ecosystem Assessment: Cross-walk between the Water Framework Directive and Habitats Directive types, status and pressures, ETC/ICM Technical Report 2/2015 available from: http://www3.fgg.uni-lj.si/~/mars/ETC_ICM_Technical_Report_2_2015/. Accessed 12 September 2015

6 Appendices

Note in the following figures boundary values that use 90th or 95th percentiles have been halved to allow for comparison with other summary metrics.

6.1 Detailed comparison of lake boundaries

6.1.1 Lake boundaries by intercalibration type and country

6.1.1.1 L-AL3 Lowland or mid-altitude, deep, moderate to high alkalinity large lakes in Alpine GIG

Broad Type	Country	National type code	Description of type	IC Type
none	DE	4	geschichteter Alpensee	L-AL3
none	FR	A3	Retenue de moyenne montagne, calcaire, profunde (L-AL3,L-AL4)	L-AL3
none	FR	N4	Lac de moyenne montagne, calcaire, profond, à zone littorale (L-AL3, L-AL4)	L-AL3
1	IT	ITAL-3	Large subalpine lakes	L-AL3
2	FR	A5	Retenue de moyenne montagne, non calcaire, profonde	L-AL3
3	IT	ITAL-6	Deep subalpine (0-800) lakes/reservoirs	L-AL3
7	AT	D3	Large Lakes of the Central Alps 600-600m	L-AL3
7	FR	A5	Retenue de moyenne montagne, non calcaire, profonde	L-AL3
7	IT	ITAL-10	Deep silceous Alpine (800-2000m) lakes/reservoirs	L-AL3
8	AT	C1a	Large Carinthian lakes < 600m, Zavg > 15m	L-AL3
8	AT	D1	Large, deep lakes of the Northern Limestone Alps 400-600m	L-AL3
8	AT	D2a+b	Large, shallow to moderately deep lakes of the Limestone Alpine Foothills 600-800 m	L-AL3
8	FR	A3	Retenue de moyenne montagne, calcaire, profunde (L-AL3,L-AL4)	L-AL3
8	IT	ITAL-9	Deep calcareous Alpine (800-2000) lakes/reservoirs	L-AL3
8	Sl	A1	Dep>15m Limestone Area 1-10km2 mid altituded 200-800m >1yr Retention Alps	L-AL3
8	Sl	A2	Dep>15m Limestone Area 1-10km2 mid altituded 200-800m <1yr Retention Alps	L-AL3
11	FR	A5	Retenue de moyenne montagne, non calcaire, profonde	L-AL3
12	AT	E1	Large, deep mountain lakes of the Limestone Alps 800-1200 m	L-AL3

Table 6.1-1 National & broad types for Alpine GIG countries reporting lake intercalibration type L-AL3

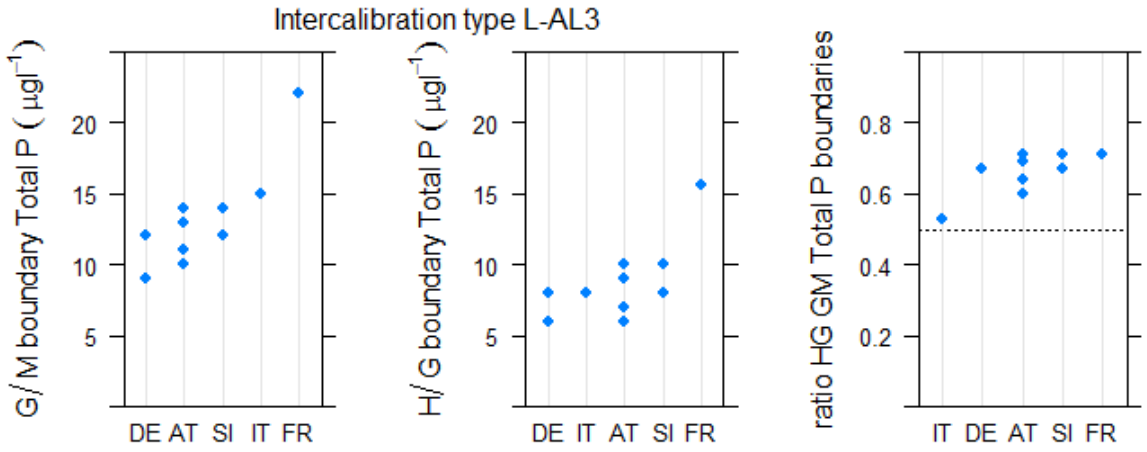

Figure 6.1-1 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for intercalibration types L-AL3

6.1.1.2 L-AL4 Mid-altitude, shallow, moderate to high alkalinity large lakes in Alpine GIG

Broad Type	Country	National type code	Description of type	IC Type
none	FR	A2	Retenue de moyenne montagne, calcaire, peu profonde (L-AL4)	L-AL4
none	FR	A3	Retenue de moyenne montagne, calcaire, profunde (L-AL3,L-AL4)	L-AL4
none	FR	N3	Lac de moyenne montagne, calcaire, peu profunde (L-AL4)	L-AL4
none	FR	N4	Lac de moyenne montagne, calcaire, profond, à zone littorale (L-AL3, L-AL4)	L-AL4
3	IT	ITAL-5	Shallow subalpine lakes/reservoirs	L-AL4
7	IT	ITAL-8	Shallow siliceous Alpine (800-2000 m) lakes/reservoirs	L-AL4
8	AT	B2	Large Alpine foothill lakes	L-AL4
8	AT	C1b	Large Carinthian lakes < 600m, Zavg < 15m	L-AL4
8	DE	2	geschichteter Alpenvorlandsee mit relativ großem Einzugsgebiet	L-AL4
8	DE	3	geschichteter Alpenvorlandsee mit relativ kleinem Einzugsgebiet	L-AL4
12	IT	ITAL-7	Shallow calcareous Alpine (800-2000 m) lakes/reservoirs	L-AL4

Table 6.1-2 National & broad types for Alpine GIG countries reporting lake intercalibration type L-AL4

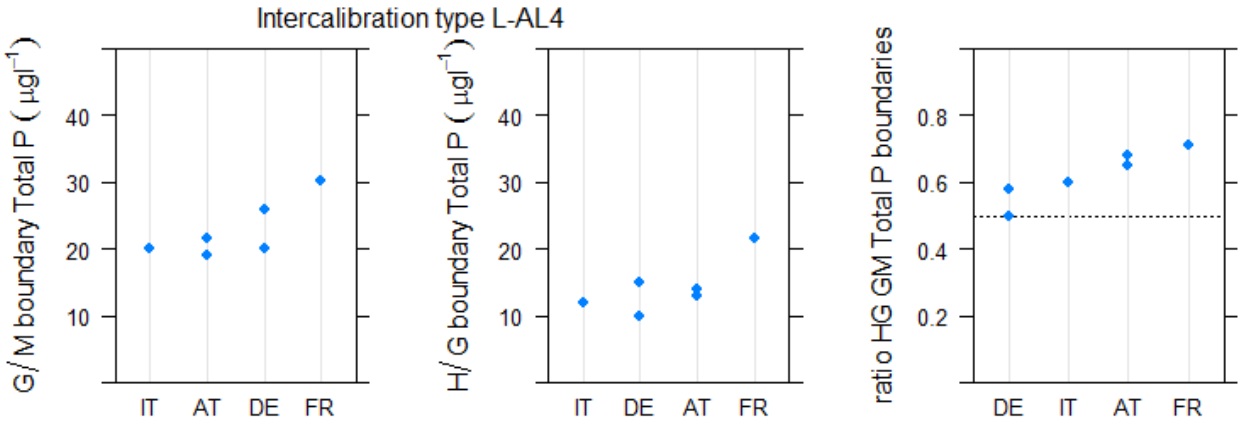

Figure 6.1-2 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for intercalibration types AL4

6.1.1.3 L-CB1 Lowland shallow high alkalinity stratified lakes in Central Baltic GIG

Broad Type	Country	National type code	Description of type	IC Type
3	BE (Fl)	Awe	Groot, diep, eutroof, alkalisch meer	L-CB1
3	BE (Fl)	Awom	Groot, diep, oligotroof tot mesotroof, alkalisch meer	L-CB1
3	DK	10	high alkalinity, clear, fresh, deep	L-CB1
3	EE	3	lowland, < 10 km2; medium alkalinity 80-240 HCO3- mg/L, stratified, mean depth 3-15m	L-CB1
3	IE	11	Altitude m<200, Alkalinity meq l-1 >2, Mean depth m>4, Area km2<0.5	L-CB1
3	IE	12	Altitude m<200, Alkalinity meq l-1 >2, Mean depth m>4, Area km2>0.5	L-CB1
3	LT	LWT2	Medium depth lakes (average depth 3-9 m)	L-CB1
3	LT	LWT3	Deep lakes (average depth more than 9m)	L-CB1
3	LV	L5	Lowland, size > 50 ha, shallow (2-9 m), hardwater (> 165 mkS/cm), oligohumic (< 80 Pt-Co).	L-CB1
3	LV	L9	Lowland, size > 50 ha, deep (> 9 m), hardwater (> 165 mkS/cm), oligohumic (< 80 Pt-Co).	L-CB1
3	NL	M20	Matig grote diepe gebufferde meren	L-CB1
3	NL	M21	Grote diepe gebufferde meren	L-CB1
3	PL	2a	Western Europe Unit (Ni? ?rodkowopolski), stratified, Ca>25 mgCa/l, Schindler's ratio <2	L-CB1
3	PL	4	Jeziora przymorskie, pod wpływem wód słonych	L-CB1/L-CB2
3	PL	5a	Jeziora o wysokiej zawartości wapnia, o małym wypływie zlewni, stratyfikowane	L-CB1/L-CB2
3	PL	5b	Jeziora o wysokiej zawartości wapnia, o małym wypływie zlewni, niestratyfikowane	L-CB1/L-CB2
3	PL	6a	Eastern Europe Unit (Niziny Wschodnioba?tycko-Bia?oruskie), stratified, Ca>25 mgCa/l, Schindler's ratio >2	L-CB1/L-CB2
3	PL	7a	Jeziora o wysokiej zawartości wapnia, stratyfikowane	L-CB1/L-CB2
3	UK	HAS	high alkalinity shallow	L-CB1
6	LV	L6	Lowland, size > 50 ha, shallow (2-9 m), hardwater (> 165 mkS/cm), polyhumic (> 80 Pt-Co).	L-CB1

Table 6.1-3 National & broad types for Central Baltic GIG countries reporting lake intercalibration type L-CB1

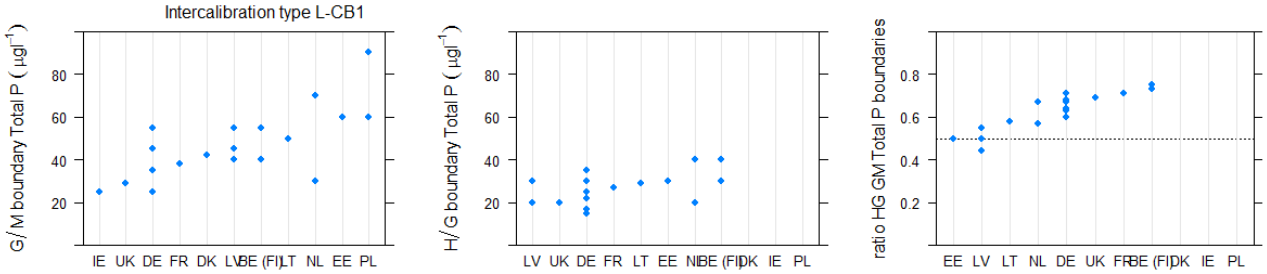

Figure 6.1-3 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for intercalibration type L-CB1, high alkalinity shallow stratified lake types by country (values for DE are median and 75th percentile)

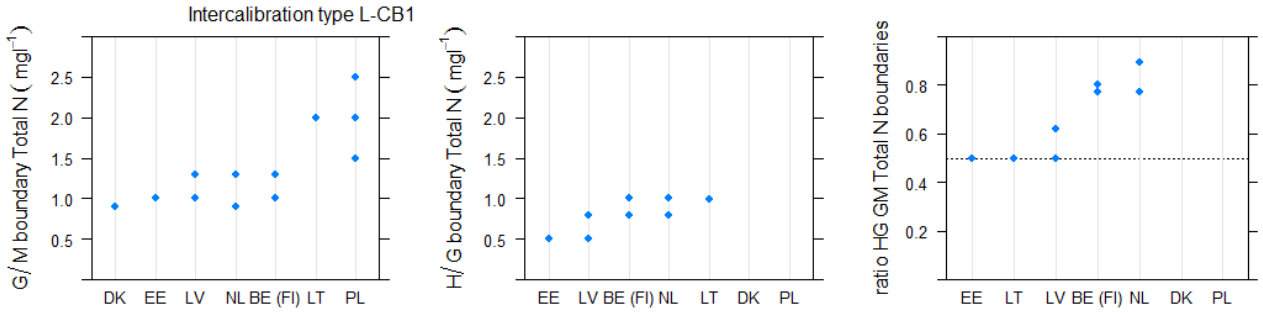

Figure 6.1-4 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total nitrogen boundary values for intercalibration type L-CB1, high alkalinity shallow stratified lake types by country

6.1.1.4 L-CB2 Lowland, very shallow, high alkalinity lakes in Central Baltic GIG

Broad Type	Country	National type code	Description of type	IC Type
none	PL	2b	Jeziora o wysokiej zawartości wapnia, o małym wypływie zlewni, niestratyfikowane	L-CB2
none	PL	4	<200m, calcareous, peat, 10-50ha	L-CB2
none	PL	4	Jeziora przymorskie, pod wpływem wód słonych	L-CB2
none	PL	4	Kalkreicher, geschichteter Alpensee mit relativ kleinem oder großem Einzugsgebiet	L-CB2
none	PL	4	Low alkalinity, deep and large	L-CB2
none	PL	5a	Jeziora o wysokiej zawartości wapnia, o małym wypływie zlewni, stratyfikowane	L-CB2
none	PL	5b	Jeziora o wysokiej zawartości wapnia, o małym wypływie zlewni, niestratyfikowane	L-CB2
none	PL	6b	Jeziora o wysokiej zawartości wapnia, o dużym wypływie zlewni, niestratyfikowane	L-CB2
none	PL	7a	Jeziora o wysokiej zawartości wapnia, stratyfikowane	L-CB2
none	PL	7b	Jeziora o wysokiej zawartości wapnia, niestratyfikowane	L-CB2
3	DE	10	geschichteter Tieflandsee mit relativ großem Einzugsgebiet	L-CB2
3	DE	13	geschichteter Tieflandsee mit relativ kleinem Einzugsgebiet	L-CB2
3	FR	A6a	Retenue de basse altitude, peu profonde, non calcaire (L-CB1,L-CB2)	L-CB2
3	FR	A7a	Retenue de basse altitude, peu profonde, calcaire (L-CB2)	L-CB2
3	PL	2a	Western Europe Unit (Niż Środkowopolski), stratified, Ca>25 mgCa/l, Schindler's ratio <2	L-CB2
3	PL	3a	Western Europe Unit (Niż Środkowopolski), stratified, Ca>25 mgCa/l, Schindler's ratio >2	L-CB2
3	PL	6a	Eastern Europe Unit (Niziny Wschodniobałtycko-Białoruskie), stratified, Ca>25 mgCa/l, Schindler's ratio >2	L-CB2
4	BE (Fl)	Ai	Ionenrijk, alkalisch meer	L-CB2
4	BE (Fl)	Ami	Matig ionenrijk, alkalisch meer	L-CB2
4	DK	9	high alkalinity, clear, fresh, shallow	L-CB2
4	EE	2	lowland, < 10 km2; medium alkalinity 80-240 HCO3- mg/L, not stratified mean depth below 3m	L-CB2
4	FR	A13a	Plan d'eau vidangé à intervalle régulier (L-CB2)	L-CB2
4	FR	A13b	Plan d'eau généralement non vidangé mais à gestion hydraulique contrôlée (L-CB2)	L-CB2
4	FR	A16	Plan d'eau peu profond, obtenu par creusement, en lit majeur d'un cours d'eay, en relation avec la nappe, forme de type L, sand thermocline (L-CB2)	L-CB2
4	FR	A6a	Retenue de basse altitude, peu profonde, non calcaire (L-CB1,L-CB2)	L-CB2
4	FR	A7a	Retenue de basse altitude, peu profonde, calcaire (L-CB2)	L-CB2
4	IE	10	Altitude m<200, Alkalinity meq l-1 >2, Mean depth m<4, Area km2>0.5	L-CB2
4	IE	9	Altitude m<200, Alkalinity meq l-1 >2, Mean depth m<4, Area km2<0.5	L-CB2
4	LT	LWT1	Shallow lakes (average depth less than 3m)	L-CB2
4	LV	L1	Lowland, size > 50 ha, very shallow (< 2 m), hardwater (> 165 mkS/cm), oligohumic (< 80 Pt-Co).	L-CB2
4	LV	L2	Lowland, size > 50 ha, very shallow (< 2 m), hardwater (> 165 mkS/cm), polyhumic (> 80 Pt-Co).	L-CB2

4	NL	M14	Ondiepe gebufferde plassen	L-CB2
4	NL	M23	Grote ondiepe kalkrijke plassen	L-CB2
4	PL	3b	Western Europe Unit (Niż Środkowopolski),polymictic, Ca>25 mgCa/l, Schindler's ratio >2	L-CB2
4	UK	HAVS	high alkalinity very shallow	L-CB2
6	NL	M27	Matig grote ondiepe laagveenplassen	L-CB2
7	FR	A13a	Plan d'eau vidangé à intervalle régulier (L-CB2)	L-CB2
7	FR	A6a	Retenue de basse altitude, peu profonde, non calcaire (L-CB1,L-CB2)	L-CB2
8	FR	A13b	Plan d'eau généralement non vidangé mais à gestion hydraulique contrôlée (L-CB2)	L-CB2

Table 6.1-4 National & broad types for Central Baltic GIG countries reporting lake intercalibration type L-CB2

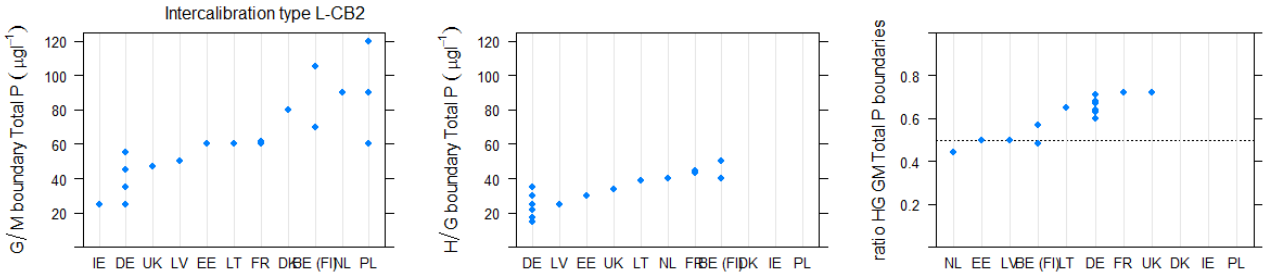

Figure 6.1-5 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for intercalibration type L-CB2, high alkalinity very shallow lakes

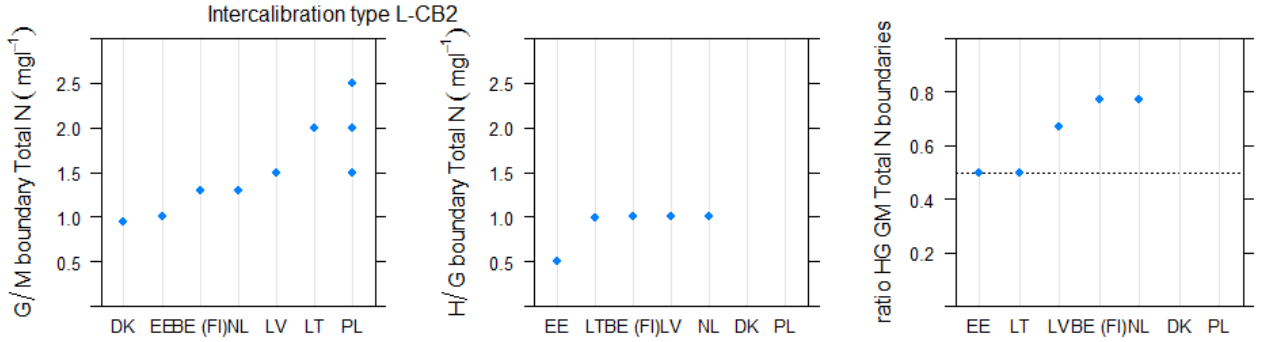

Figure 6.1-6 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total nitrogen boundary values for intercalibration type L-CB2, high alkalinity very shallow lakes

6.1.1.5 L-N2a Lowland, siliceous moderate alkalinity shallow lakes in Northern GIG

Broad Type	Country	National type code	Description of type	IC Type
1	FI	SVh	Large (surface area > 40 km2), clear (colour <30 mg/l Pt)	L-N2a
2	FI	Vh	Medium-size or small (surface area ? 40 km2), clear (colour <30 mg/l Pt), mean depth ?3 m	L-N2a
2	IE	1	Altitude m<200, Alkalinity meq l-1 <0.4, Mean depth m<4, Area km2<0.5	L-N2a
2	IE	2	Altitude m<200, Alkalinity meq l-1 <0.4, Mean depth m<4, Area km2>0.5	L-N2a
2	IE	3	Altitude m<200, Alkalinity meq l-1 <0.4, Mean depth m>4, Area km2<0.5	L-N2a
2	IE	4	Altitude m<200, Alkalinity meq l-1 <0.4, Mean depth m>4, Area km2>0.5	L-N2a
2	NO	1	lowland, shallow (stratified, mean depth 3-15 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N2a
2	NO	2	lowland, shallow (stratified, mean depth 3-15 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N2a
2	NO	4	lowland, shallow (stratified, mean depth 3-15 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N2a
2	NO	5	lowland, shallow (stratified, mean depth 3-15 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N2a
2	UK	LAS	low alkalinity shallow	L-N2a

Table 6.1-5 National & broad types for Northern GIG countries reporting lake intercalibration type L-N2a

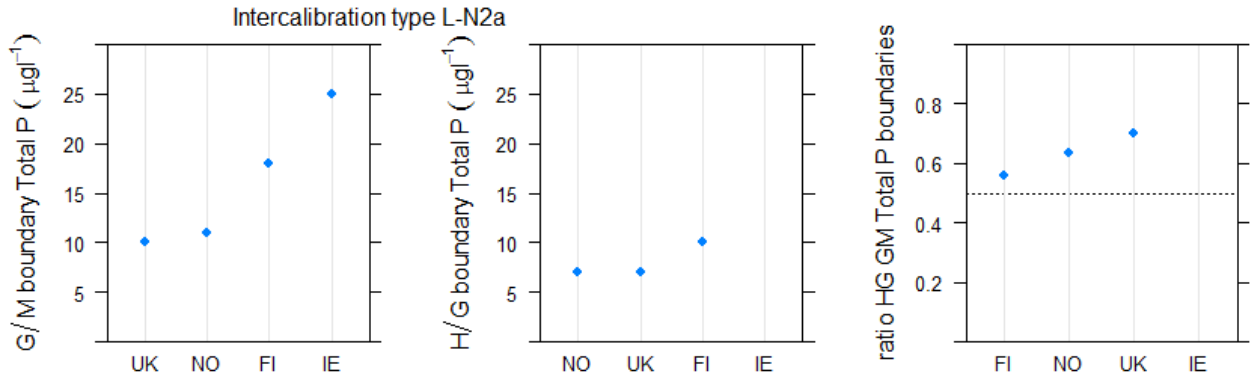

Figure 6.1-7 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for intercalibration type L-N2a lakes

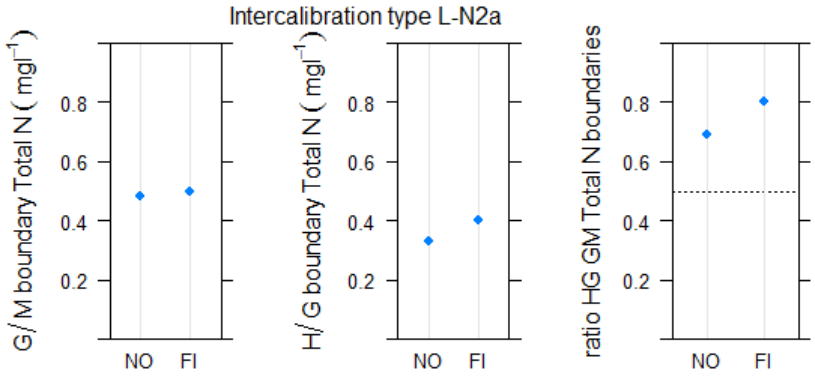

Figure 6.1-8 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total nitrogen boundary values for intercalibration type L-N2a lakes

6.1.2 Lake total phosphorus boundaries by broad type and country

6.1.2.1 Type 1 Very large and deep (stratified) (all Europe) lakes.

Broad Type	Country	National type code	Description of type	IC Type
1	BG	L11	Large, deep reservoirs/artificial lakes (variable; mixed/silicious/calcareous; >10 km2, large; max. depth <120m profundal zone; salinity < 0.5‰)	NA
1	FI	Sh	Large (surface area > 40 km2), humic (colour 30-90 mg/l Pt)	L-N3a
1	FI	SVh	Large (surface area > 40 km2), clear (colour <30 mg/l Pt)	L-N2a
1	FR	A52	Retenue du bouclier guyanais	NA
1	IT	ITAL-3	Large subalpine lakes	L-AL3

Table 6.1-6 National & intercalibration types for countries reporting Broad Type 1 Very large and deep (stratified) (all Europe Lakes)

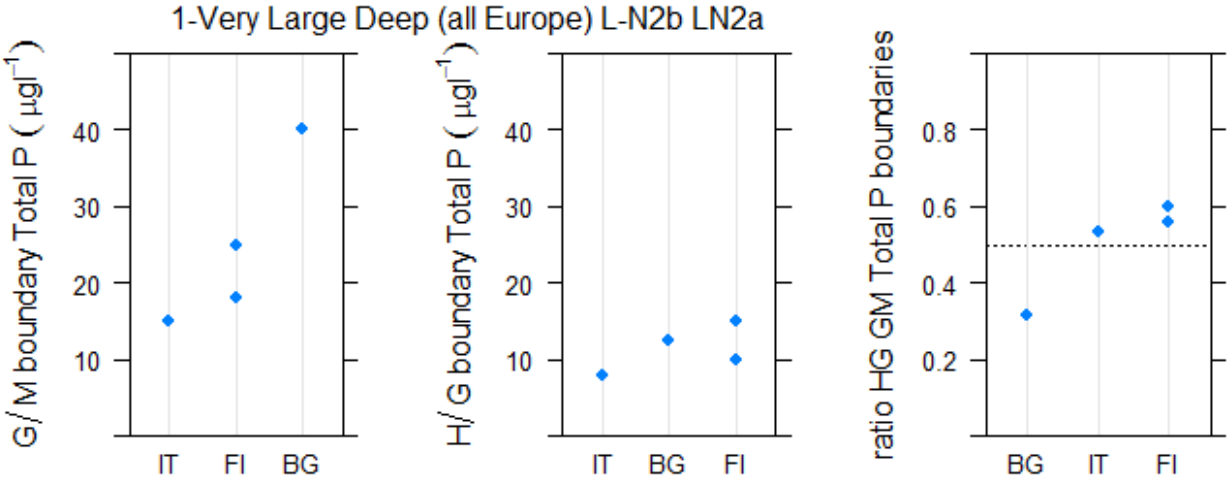

Figure 6.1-9 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for broad type 1, Very large and deep (stratified) (all Europe) lake types by country.

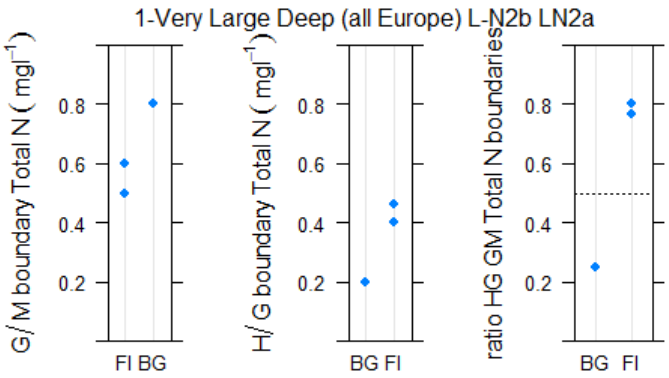

Figure 6.1-10 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total nitrogen boundary values for broad type 1, Very large and deep (stratified) (all Europe) lake types by country

6.1.2.2 Type 2 Lowland siliceous lakes

Broad Type	Country	National type code	Description of type	IC Type
2	EE	5	lowland, < 10 km2; low alkalinity < 80 HCO3- mg/L, bright water, not stratified, mean depth 3-5 m	
2	FI	Vh	Medium-size or small (surface area ? 40 km2), clear (colour <30 mg/l Pt), mean depth ?3 m	L-N2a
2	IE	1	Altitude m<200, Alkalinity meq l-1 <0.4, Mean depth m<4, Area km2<0.5	L-N2a
2	IE	2	Altitude m<200, Alkalinity meq l-1 <0.4, Mean depth m<4, Area km2>0.5	L-N2a
2	IE	3	Altitude m<200, Alkalinity meq l-1 <0.4, Mean depth m>4, Area km2<0.5	L-N2a
2	IE	4	Altitude m<200, Alkalinity meq l-1 <0.4, Mean depth m>4, Area km2>0.5	L-N2a
2	NO	1	lowland, shallow (stratified, mean depth 3-15 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N2a
2	NO	2	lowland, shallow (stratified, mean depth 3-15 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N2a
2	NO	4	lowland, shallow (stratified, mean depth 3-15 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N2a
2	NO	5	lowland, shallow (stratified, mean depth 3-15 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N2a
2	NO	6	lowland, deep (mean depth > 15m), low alkalinty (<0,2 mekv/l), clear (< 30 mg Pt/l)	L-N2b
2	NO	8	lowland, shallow (stratified, mean depth 3-15 m), moderate alkalinity (0,2-1,0 mekv/l), clear (colour <30 mg Pt/l)	L-N1
2	RO	ROLN10	Lac natural in zona de campie, adancime mica, siliciu, suprafata medie	
2	SE	S3DLNN	Dep>4m Alk<1meqL Col<50mgPtL Area>10km2 S3, Coast of Norrland below marine limit (the highest level the sea reached after the ice age)	
2	SE	S3DSNN	Dep>4m Alk<1meqL Col<50mgPtL Area<10km2 S3, Coast of Norrland below marine limit (the highest level the sea reached after the ice age)	
2	SE	S3SLNN	Dep<4m Alk<1meqL Col<50mgPtL Area>10km2 S3, Coast of Norrland below marine limit (the highest level the sea reached after the ice age)	
2	SE	S3SSNN	Dep<4m Alk<1meqL Col<50mgPtL Area<10km2 S3, Coast of Norrland below marine limit (the highest level the sea reached after the ice age)	
2	SE	S4DLNN	Dep>4m Alk<1meqL Col<50mgPtL Area>10km2 S4, Southeast Sweden below 200 masl	
2	SE	S4DSNN	Dep>4m Alk<1meqL Col<50mgPtL Area<10km2 S4, Southeast Sweden below 200 masl	
2	SE	S4SLNN	Dep<4m Alk<1meqL Col<50mgPtL Area>10km2 S4, Southeast Sweden below 200 masl	
2	SE	S4SSNN	Dep<4m Alk<1meqL Col<50mgPtL Area<10km2 S4, Southeast Sweden below 200 masl	
2	SE	S5DLNN	Dep>4m Alk<1meqL Col<50mgPtL Area>10km2 S5, South Sweden below 200 masl	
2	SE	S5DSNN	Dep>4m Alk<1meqL Col<50mgPtL Area<10km2 S5, South Sweden below 200 masl	
2	SE	S5SSNN	Dep<4m Alk<1meqL Col<50mgPtL Area<10km2 S5, South Sweden below 200 masl	
2	SE	S6DLNN	Dep>4m Alk<1meqL Col<50mgPtL Area>10km2 S6, Southwest Sweden below 200 masl	
2	SE	S6DSNN	Dep>4m Alk<1meqL Col<50mgPtL Area<10km2 S6, Southwest Sweden below 200 masl	
2	SE	S6SLNN	Dep<4m Alk<1meqL Col<50mgPtL Area>10km2 S6, Southwest Sweden below 200 masl	
2	SE	S6SSNN	Dep<4m Alk<1meqL Col<50mgPtL Area<10km2 S6, Southwest Sweden below 200 masl	

2	UK	LAD	low alkalinity deep	L-N2b
2	UK	LAS	low alkalinity shallow	L-N2a
2	UK	MAD	moderate alkalinity deep	
2	UK	MAS	moderate alkalinity shallow	L-N1

Table 6.1-7 National & intercalibration types for countries reporting Broad Type 2 Lowland, siliceous lakes.

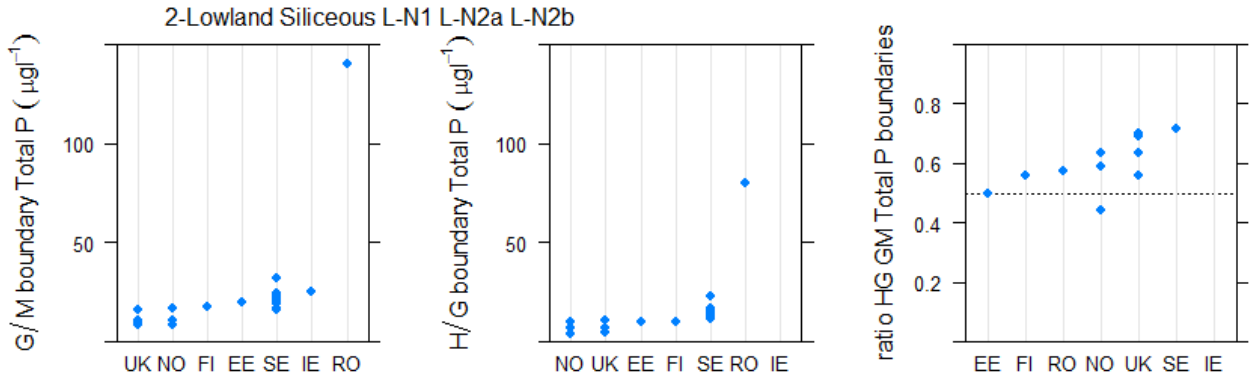

Figure 6.1-11 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for broad type 2, lowland siliceous lake types by country.

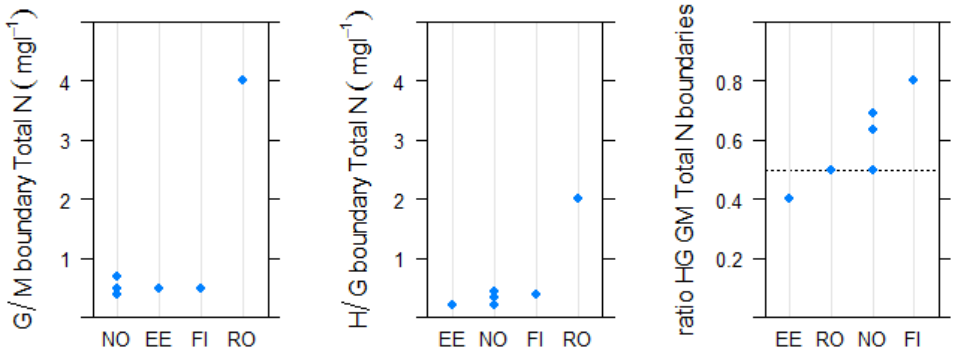

Figure 6.1-12 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total nitrogen boundary values for broad type 2, lowland siliceous lake types by country.

6.1.2.3 Type 3 Lowland stratified, calcareous/mixed

Broad Type	Country	National type code	Description of type	IC Type
3	BE (Fl)	Awe	Groot, diep, eutroof, alkalisch meer	L-CB1
3	BE (Fl)	Awom	Groot, diep, oligotroof tot mesotroof, alkalisch meer	L-CB1
3	BG	L14	Large lowland reservoirs with medium depth in ER 12 (usually <120m variable; mixed/silicious/calcareous; >10 km2, large; max. depth <50m profundal lacks or slightly developed; mesotrophic ; salinity < 0.5‰)	
3	BG	L15	Large lowland reservoirs with medium depth in ER 7 (usually <200m variable; mixed/silicious/calcareous; >10 km2, large; max. depth <50m profundal lacks or slightly developed; mesotrophic ; salinity < 0.5‰)	
3	BG	L16	Small and medium-size lowland reservoirs/ artificial lakes in ER 12 (<120m;mixed/silicious/calcareous;1-10 km2, mediumor 0.5 -1 km2 small; max. depth <50m variable; mesotrophic ; salinity < 0.5‰)	
3	BG	L17	Small and medium-size lowland reservoirs/ artificial lakes in ER 12 (<200m;mixed/silicious/calcareous;1-10 km2, mediumor 0.5 -1 km2 small; max. depth <50m variable; mesotrophic ; salinity < 0.5‰)	
3	DE	10	geschichteter Tieflandsee mit relativ großem Einzugsgebiet	
3	DE	10	geschichteter Tieflandsee mit relativ großem Einzugsgebiet	L-CB1, L-CB2
3	DE	13	geschichteter Tieflandsee mit relativ kleinem Einzugsgebiet	
3	DE	13	geschichteter Tieflandsee mit relativ kleinem Einzugsgebiet	L-CB1, L-CB2
3	DK	10	high alkalinity, clear, fresh, deep	L-CB1
3	EE	1	lowland, < 10 km2; extra calcareous(over 240 HCO3- mg/L), ground water connected	
3	EE	3	lowland, < 10 km2; medium alkalinity 80-240 HCO3- mg/L, stratified, mean depth 3-15m	L-CB1
3	EE	6	lowland, 100-300 km2; medium alkalinity 80-240 HCO3- mg/L, not stratified, mean depth 3-5 m (Võrtsjärv)	
3	EE	7	lowland, over 1000 km2; medium alkalinity 80-240 HCO3- mg/L, not stratified, mean depth 3-5 m	
3	FR	A16	Plan d'eau peu profond, obtenu par creusement, en lit majeur d'un cours d'eau, en relation avec la nappe, forme de type L, sans thermocline	
3	FR	A6a	Retenue de basse altitude, peu profonde, non calcaire	L-CB1 L-CB1
3	FR	A6b	Retenue de basse altitude, profonde, non calcaire	L-CB1
3	FR	A7a	Retenue de basse altitude, peu profonde, calcaire	L-CB2
3	FR	A7b	Retenue de basse altitude, profonde, calcaire	
3	HU	13L	Calcarous-small size-shallow-not overgrown-perennial	L-EC1
3	HU	14L	Calcarous-small size-medium depth-not overgrown-perennial	L-EC1
3	HU	15L	Calcarous-medium size-shallow-not overgrown-perennial	
3	HU	16L	Calcareous-large size-medium depth- not overgrown-perennial	
3	IE	11	Altitude m<200, Alkalinity meq l-1 >2, Mean depth m>4, Area km2<0.5	L-CB1
3	IE	12	Altitude m<200, Alkalinity meq l-1 >2, Mean depth m>4, Area km2>0.5	L-CB1
3	IE	7	Altitude m<200, Alkalinity meq l-1 0.4 - 2, Mean depth m>4, Area km2<0.5	
3	IE	8	Altitude m<200, Alkalinity meq l-1 0.4 -2, Mean depth m>4, Area km2>0.5	
3	IT	ITAL-5	Shallow subalpine lakes/reservoirs	L-AL4
3	IT	ITAL-6	Deep subalpine (0-800) lakes/reservoirs	L-AL3

3	LT	LWT2	Medium depth lakes (average depth 3-9 m)	L-CB1
3	LT	LWT3	Deep lakes (average depth more than 9m)	L-CB1
3	LV	L5	Lowland, size > 50 ha, shallow (2-9 m), hardwater (> 165 mkS/cm), oligohumic (< 80 Pt-Co).	L-CB1
3	LV	L7	Lowland, size > 50 ha, shallow (2-9 m), soft water (< 165 mkS/cm), oligohumic (< 80 Pt-Co).	L-CB3
3	LV	L9	Lowland, size > 50 ha, deep (> 9 m), hardwater (> 165 mkS/cm), oligohumic (< 80 Pt-Co).	L-CB1
3	NL	M12	Kleine Ondiepe zwak gebufferde plassen (vennen)	L-CB3
3	NL	M20	Matig grote diepe gebufferde meren	L-CB1
3	NL	M21	Grote diepe gebufferde meren	L-CB1
3	PL	2a	Western Europe Unit (Ni? ?rodkowopolski), stratified, Ca>25 mgCa/l, Schindler's ratio <2	L-CB1, L-CB2
3	PL	3a	Western Europe Unit (Ni? ?rodkowopolski), stratified, Ca>25 mgCa/l, Schindler's ratio >2	L-CB1, L-CB2
3	PL	6a	Eastern Europe Unit (Niziny Wschodnioba?tycko-Bia?oruskie), stratified, Ca>25 mgCa/l, Schindler's ratio >2	L-CB1
3	RO	ROLN02	Lac natural in zona de campie, adancime foarte mica, siliciu, suprafata medie	
3	RO	ROLN11	Lac natural in zona de campie, adancime mica, calcar, suprafata medie	
3	RO	ROLN14T	Lac natural in zona de campie, adancime foarte mica si mica, siliciu si calcar, terapeutic	
3	SE	S3DSNY	Dep>4m Alk>1meqL Col<50mgPtL Area<10km2 S3, Coast of Norrland below marine limit (the highest level the sea reached after the ice age)	
3	SE	S4DLNY	Dep>4m Alk>1meqL Col<50mgPtL Area>10km2 S4, Southeast Sweden below 200 masl	
3	SE	S4DSNY	Dep>4m Alk>1meqL Col<50mgPtL Area<10km2 S4, Southeast Sweden below 200 masl	
3	SE	S5DLNY	Dep>4m Alk>1meqL Col<50mgPtL Area>10km2 S5, South Sweden below 200 masl	
3	SE	S5DSNY	Dep>4m Alk>1meqL Col<50mgPtL Area<10km2 S5, South Sweden below 200 masl	
3	UK	HAS	high alkalinity shallow	L-CB1

Table 6.1-8 National & intercalibration types for countries reporting Broad Type 3 Lowland, stratified, calcareous/mixed lakes.

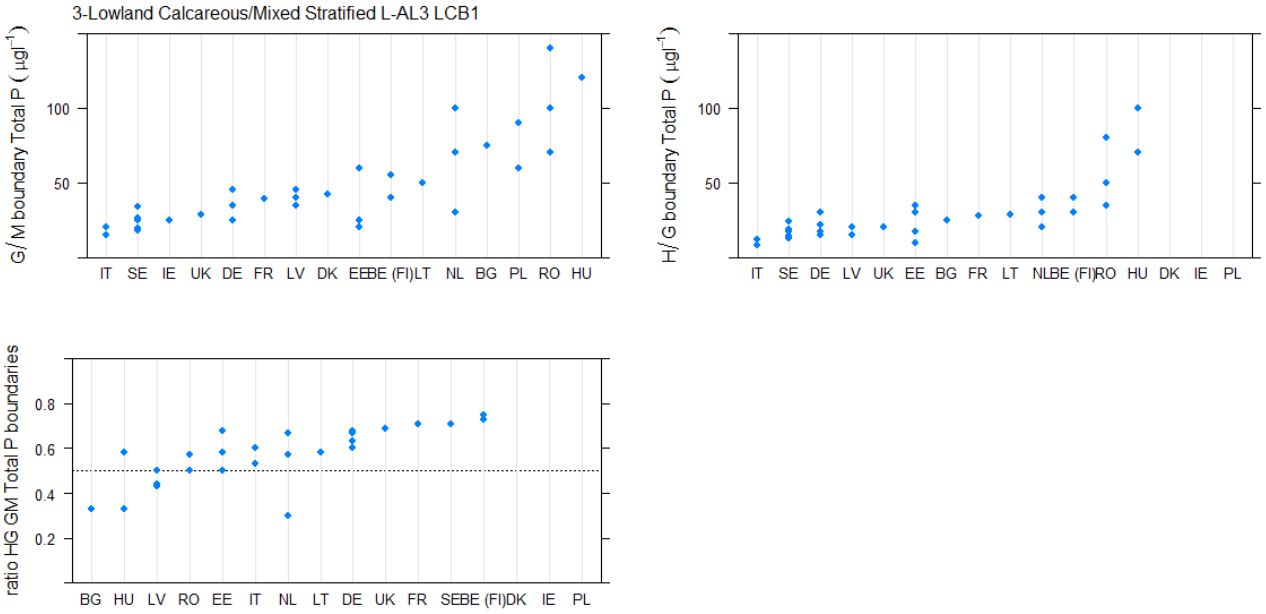

Figure 6.1-13 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for broad type 3, lowland stratified calcareous/mixed lake types by country (values for DE include both median and 75th percentile standards).

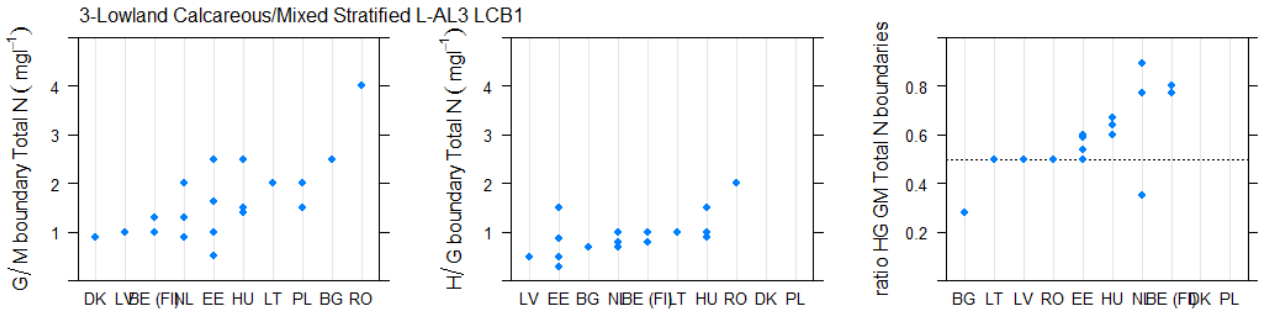

Figure 6.1-14 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total nitrogen boundary values for broad type 3, lowland stratified calcareous/mixed lake types by country.

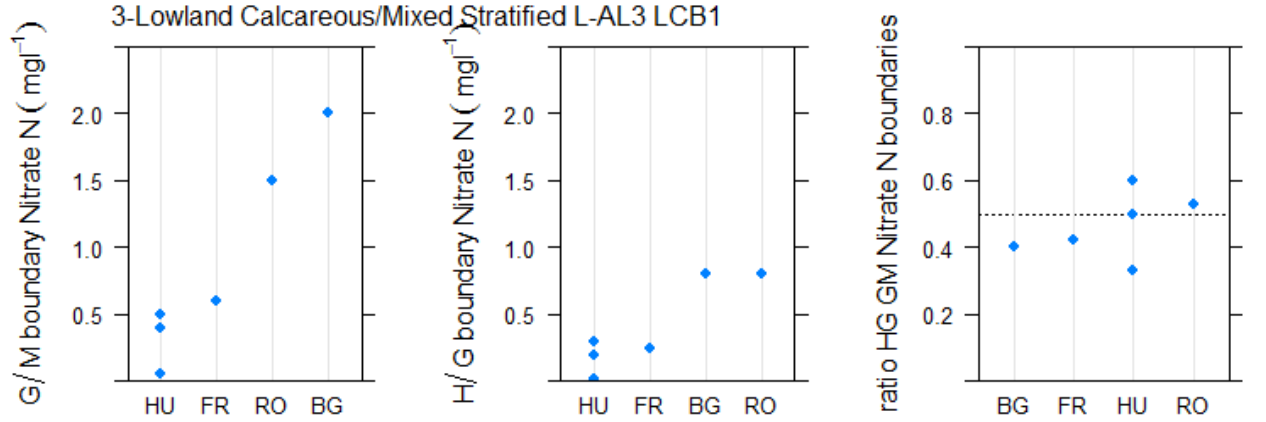

Figure 6.1-15 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good nitrate nitrogen boundary values for broad type 3, lowland stratified calcareous/mixed lake types by country.

6.1.2.4 Type 4 Lowland, calcareous/mixed very shallow lakes

Broad Type	Country	National type code	Description of type	IC Type
4	AT	A1	Lakes of the Pannonian Plain-Specual type Neusiedlersee	other
4	BE (Fl)	Ai	Ionenrijk, alkalisch meer	L-CB2
4	BE (Fl)	Ami	Matig ionenrijk, alkalisch meer	L-CB2
4	BG	L4	Lowland or semi-mountain natural lakes & swamps in ER 12 (variable, semi-mountain and lowlandzones; mixed/silicious/calcareus; <0.5 km2 dominated <5km2(rarely,reservoirs); max. depth <15m; mezotrophic; salinity < 0.5‰)	
4	DK	11	high alkalinity, clear, brackish, shallow	
4	DK	13	high alkalinity, colored, fresh, shallow	
4	DK	9	high alkalinity, clear, fresh, shallow	L-CB2
4	EE	2	lowland, < 10 km2; medium alkalinity 80-240 HCO3- mg/L, not stratified mean depth below 3m	L-CB2
4	FR	A13a	Plan d'eau vidangé à intervalle régulier	L-CB2
4	FR	A13b	Plan d'eau généralement non vidangé mais à gestion hydraulique contrôlée	L-CB2
4	FR	A16	Plan d'eau peu profond, obtenu par creusement, en lit majeur d'un cours d'eay, en relation avec la nappe, forme de type L, sand thermocline	L-CB2
4	FR	A6a	Retenue de basse altitude, peu profonde, non calcaire	L-CB1 L-CB2
4	FR	A7a	Retenue de basse altitude, peu profonde, calcaire	L-CB2
4	HU	10L	Calcarous-small size-shallow-overgrown -intermittant	
4	HU	12L	Calcarous-small size-shallow-overgrown-perennial	L-EC1
4	IE	10	Altitude m<200, Alkalinity meq l-1 >2, Mean depth m<4, Area km2>0.5	L-CB2
4	IE	5	Altitude m<200, Alkalinity meq l-1 0.4 - 2, Mean depth m<4, Area km2<0.5	
4	IE	6	Altitude m<200, Alkalinity meq l-1 0.4 - 2, Mean depth m<4, Area km2>0.5	
4	IE	9	Altitude m<200, Alkalinity meq l-1 >2, Mean depth m<4, Area km2<0.5	L-CB2
4	IT	ITAL-4	Unstratified subalpine lakes/reservoirs	
4	LT	LWT1	Shallow lakes (average depth less than 3m)	L-CB2
4	LV	L1	Lowland, size > 50 ha, very shallow (< 2 m), hardwater (> 165 mkS/cm), oligohumic (< 80 Pt-Co).	L-CB2
4	LV	L2	Lowland, size > 50 ha, very shallow (< 2 m), hardwater (> 165 mkS/cm), polyhumic (> 80 Pt-Co).	L-CB2
4	NL	M14	Ondiepe gebufferde plassen	L-CB2
4	NL	M23	Grote ondiepe kalkrijke plassen	L-CB2
4	PL	3b	Western Europe Unit (Ni? ?rodkowopolski),polymictic, Ca>25 mgCa/l, Schindler's ratio >2	L-CB1, L-CB2
4	RO	ROLN04	Lac natural in zona de campie, adancime foarte mica, calcar, suprafata medie	
4	RO	ROLN05	Lac natural in zona de campie, adancime foarte mica, calcar, suprafata mare	
4	RO	ROLN06	Lac natural in zona de campie, adancime foarte mica, calcar, suprafata foarte mare	

4	SE	S3SSNY	Dep<4m Alk>1meqL Col<50mgPtL Area<10km2 S3, Coast of Norrland below marine limit (the highest level the sea reached after the ice age)	
4	SE	S4SLNY	Dep<4m Alk>1meqL Col<50mgPtL Area>10km2 S4, Southeast Sweden below 200 masl	
4	SE	S4SLYY	Dep<4m Alk>1meqL Col>50mgPtL Area>10km2 S4, Southeast Sweden below 200 masl	
4	SE	S4SSNY	Dep<4m Alk>1meqL Col<50mgPtL Area<10km2 S4, Southeast Sweden below 200 masl	
4	SE	S4SSYY	Dep<4m Alk>1meqL Col>50mgPtL Area<10km2 S4, Southeast Sweden below 200 masl	
4	SE	S5SLNY	Dep<4m Alk>1meqL Col<50mgPtL Area>10km2 S5, South Sweden below 200 masl	
4	SE	S5SSNY	Dep<4m Alk>1meqL Col<50mgPtL Area<10km2 S5, South Sweden below 200 masl	
4	SE	S5SSYY	Dep<4m Alk>1meqL Col>50mgPtL Area<10km2 S5, South Sweden below 200 masl	
4	SE	S6SLYY	Dep<4m Alk>1meqL Col>50mgPtL Area>10km2 S6, Southwest Sweden below 200 masl	
4	SE	S6SSYY	Dep<4m Alk>1meqL Col>50mgPtL Area<10km2 S6, Southwest Sweden below 200 masl	
4	UK	HAVS	high alkalinity very shallow	L-CB2

Table 6.1-9 National & intercalibration types for countries reporting Broad Type 4 Lowland, calcareous/mixed, very shallow (unstratified) lakes.

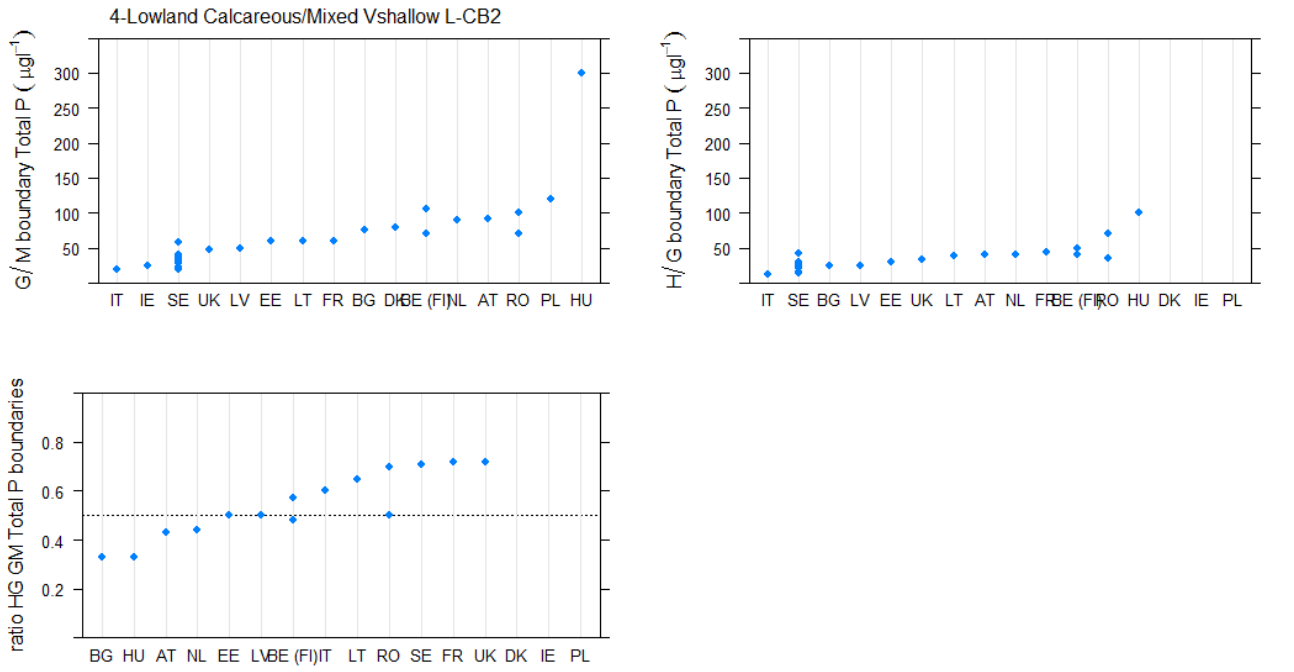

Figure 6.1-16 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for broad type 4, lowland, calcareous/mixed, very shallow (un-stratified) lakes.

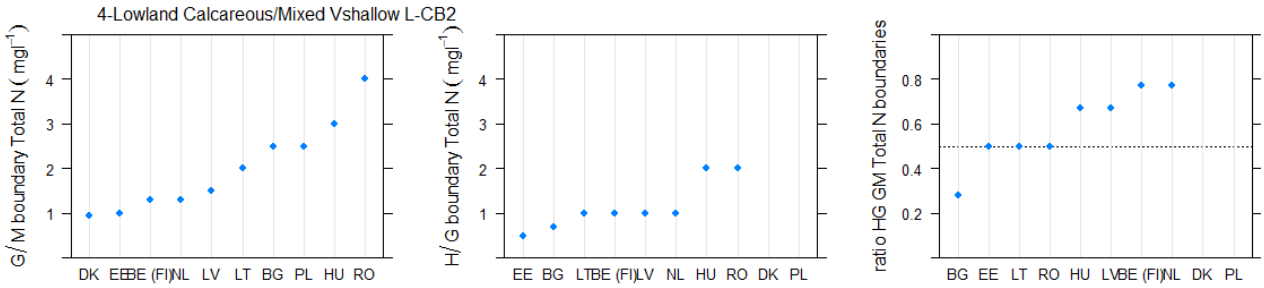

Figure 6.1-17 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total nitrogen boundary values for broad type 4, lowland, calcareous/mixed, very shallow (un-stratified) lakes.

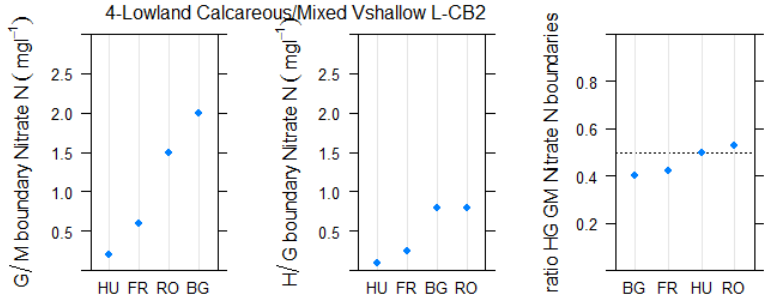

Figure 6.1-18 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good nitrate nitrogen boundary values for broad type 3, lowland stratified calcareous/mixed lake types by country.

6.1.2.5 Type 5 Lowland, organic and siliceous

Broad Type	Country	National type code	Description of type	IC Type
5	FI	Kh	Medium-size (surface area 5- 40 km2), humic (colour 30-90 mg/l Pt), mean depth ?3 m	L-N3a
5	FI	Ph	Small (surface area < 5 km2), humic (colour 30-90 mg/l Pt), mean depth ?3 m	L-N3a
5	FR	N11	Lac de basse altitude en façade méditerranéenne	
5	LV	L4	Lowland, size > 50 ha, very shallow (< 2 m), soft water (< 165 mkS/cm), polyhumic (> 80 Pt-Co).	
5	LV	L8	Lowland, size > 50 ha, shallow (2-9 m), soft water (< 165 mkS/cm), polyhumic (> 80 Pt-Co).	L-CB3
5	NO	3	lowland, shallow (stratified, mean depth 3-15 m), low alkalinity (<0,2 mekv/l), humic (colour 30-90 mg Pt/l)	L-N3a
5	NO	7	lowland, shallow (stratified, mean depth 3-15 m), low alkalinity (<0,2 mekv/l), humic (colour 30-90 mg Pt/l)	L-N3a
5	NO	9	lowland, shallow (stratified, mean depth 3-15 m), moderate alkalinity (0,2-1,0 mekv/l), humic (colour 30-90 mg Pt/l)	L-N8a
5	SE	S3DLYN	Dep>4m Alk<1meqL Col>50mgPtL Area>10km2 S3, Coast of Norrland below marine limit (the highest level the sea reached after the ice age)	
5	SE	S3DSYN	Dep>4m Alk<1meqL Col>50mgPtL Area<10km2 S3, Coast of Norrland below marine limit (the highest level the sea reached after the ice age)	
5	SE	S3SLYN	Dep<4m Alk<1meqL Col>50mgPtL Area>10km2 S3, Coast of Norrland below marine limit (the highest level the sea reached after the ice age)	
5	SE	S3SSYN	Dep<4m Alk<1meqL Col>50mgPtL Area<10km2 S3, Coast of Norrland below marine limit (the highest level the sea reached after the ice age)	
5	SE	S4DLYN	Dep>4m Alk<1meqL Col>50mgPtL Area>10km2 S4, Southeast Sweden below 200 masl	
5	SE	S4DSYN	Dep>4m Alk<1meqL Col>50mgPtL Area<10km2 S4, Southeast Sweden below 200 masl	
5	SE	S4SSYN	Dep<4m Alk<1meqL Col>50mgPtL Area<10km2 S4, Southeast Sweden below 200 masl	
5	SE	S5DLYN	Dep>4m Alk<1meqL Col>50mgPtL Area>10km2 S5, South Sweden below 200 masl	
5	SE	S5DSYN	Dep>4m Alk<1meqL Col>50mgPtL Area<10km2 S5, South Sweden below 200 masl	
5	SE	S5SLYN	Dep<4m Alk<1meqL Col>50mgPtL Area>10km2 S5, South Sweden below 200 masl	
5	SE	S5SSYN	Dep<4m Alk<1meqL Col>50mgPtL Area<10km2 S5, South Sweden below 200 masl	
5	SE	S6DLYN	Dep>4m Alk<1meqL Col>50mgPtL Area>10km2 S6, Southwest Sweden below 200 masl	
5	SE	S6DSYN	Dep>4m Alk<1meqL Col>50mgPtL Area<10km2 S6, Southwest Sweden below 200 masl	
5	SE	S6SLYN	Dep<4m Alk<1meqL Col>50mgPtL Area>10km2 S6, Southwest Sweden below 200 masl	
5	SE	S6SSYN	Dep<4m Alk<1meqL Col>50mgPtL Area<10km2 S6, Southwest Sweden below 200 masl	

Table 6.1-10 National & intercalibration types for countries reporting Broad Type 5, lowland, organic siliceous lakes.

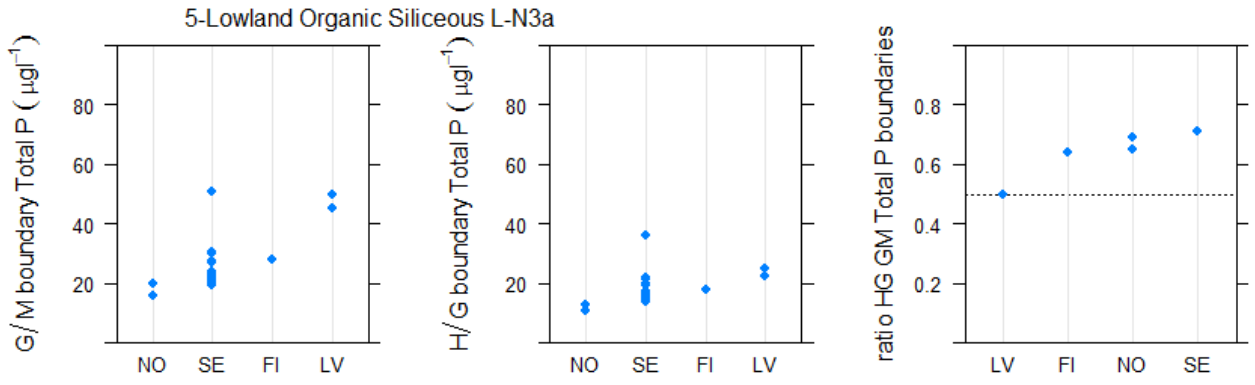

Figure 6.1-19 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for broad type 5, lowland, organic siliceous lakes.

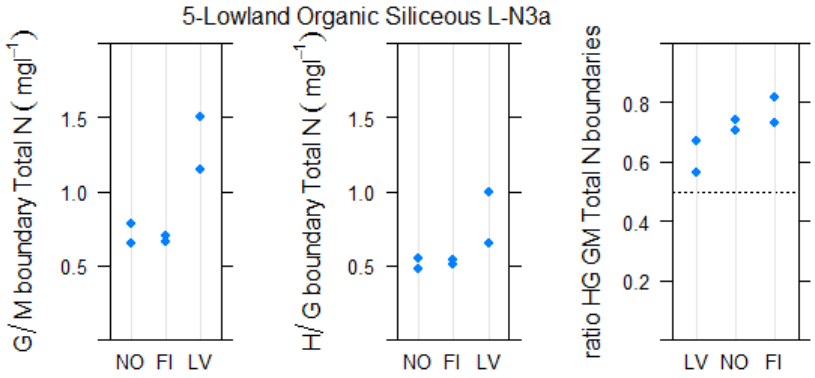

Figure 6.1-20 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total nitrogen boundary values for broad type 5, lowland, organic siliceous lakes.

6.1.2.6 Type 6 Lowland, organic, calcareous/mixed

Broad Type	Country	National type code	Description of type	IC Type
6	EE	4	lowland, < 10 km2; low alkalinity < 80 HCO3- mg/L, brown water, not stratified, mean depth <3m	
6	HU	1L	Organic-small size-shallow-overgrown-intermittent	
6	HU	2L	Organic-small size-shallow-overgrown-perennial	L-EC1
6	HU	3L	Organic-small size-shallow-not overgrown-perennial	L-EC1
6	LV	L6	Lowland, size > 50 ha, shallow (2-9 m), hardwater (> 165 mkS/cm), polyhumic (> 80 Pt-Co).	L-CB1
6	NL	M27	Matig grote ondiepe laagveenplassen	L-CB2
6	RO	ROLN07	Lac natural in zona de campie, adancime foarte mica, turba, suprafata mica	
6	RO	ROLN08	Lac natural in zona de campie, adancime foarte mica, turba, suprafata medie	
6	RO	ROLN09	Lac natural in zona de campie, adancime foarte mica, turba, suprafata mare	
6	RO	ROLN13	Lac natural in zona de campie, adancime mica, turba, suprafata medie	
6	SE	S4DLYY	Dep>4m Alk>1meqL Col>50mgPtL Area>10km2 S4, Southeast Sweden below 200 masl	
6	SE	S4DSYY	Dep>4m Alk>1meqL Col>50mgPtL Area<10km2 S4, Southeast Sweden below 200 masl	
6	SE	S6DSYY	Dep>4m Alk>1meqL Col>50mgPtL Area<10km2 S6, Southwest Sweden below 200 masl	

Table 6.1-11 National & intercalibration types for countries reporting Broad Type 6, lowland, organic calcareous/mixed lakes.

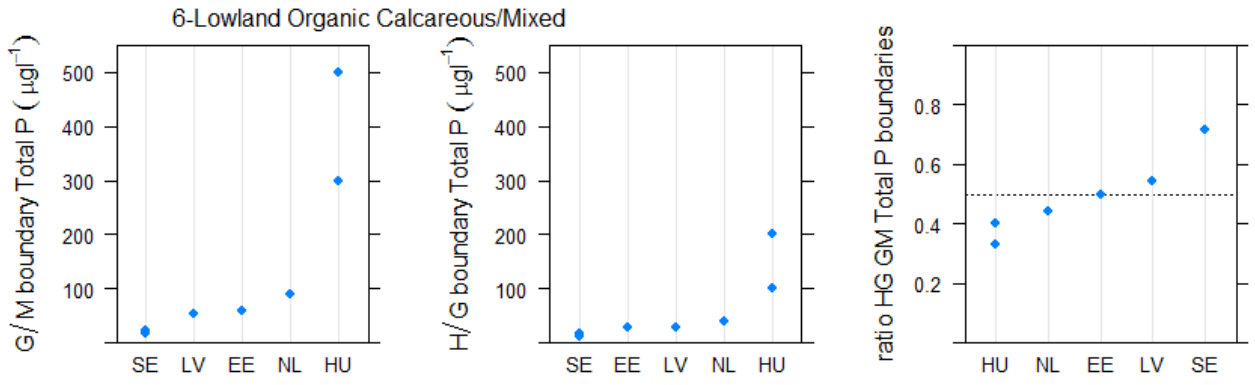

Figure 6.1-21 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for broad Broad Type 6, lowland, organic calcareous/mixed lakes.

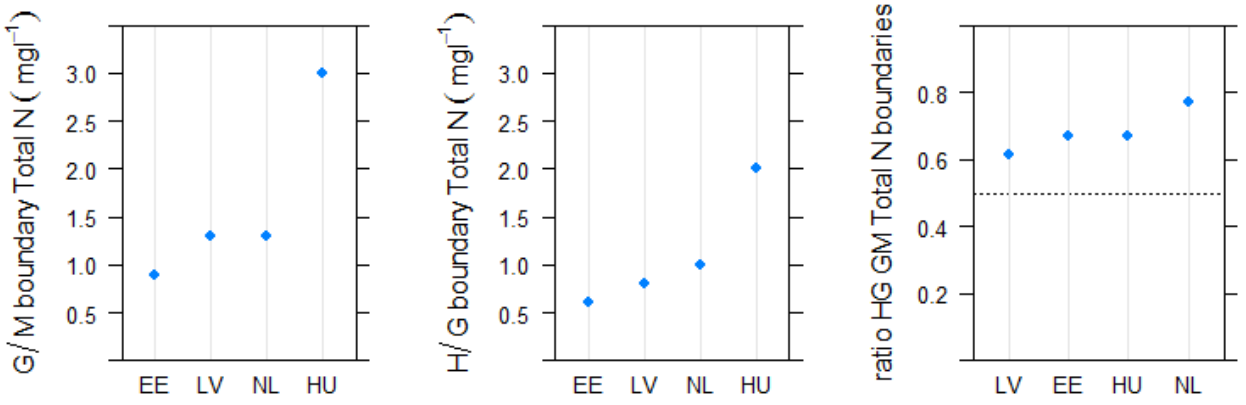

Figure 6.1-22 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total nitrogen boundary values for broad Broad Type 6, lowland, organic calcareous/mixed lakes.

6.1.2.7 Type 7 Mid-altitude, siliceous lakes

Broad Type	Country	National type code	Description of type	IC Type
7	AT	D3	Large Lakes of the Central Alps 600-600m	L-AL3
7	DE	8	geschichteter, calciumarmer Mittelgebirgssee mit relativ großem Einzugsgebiet	
7	DE	9	geschichteter, calciumarmer Mittelgebirgssee mit relativ kleinem Einzugsgebiet	
7	FR	A13a	Plan d'eau vidangé à intervalle régulier	L-CB2
7	FR	A4	Retenue de moyenne montagne, non calcaire, peu profonde	
7	FR	A5	Retenue de moyenne montagne, non calcaire, profonde	
7	FR	A6a	Retenue de basse altitude, peu profonde, non calcaire	L-CB1 L-CB2
7	FR	A6b	Retenue de basse altitude, profonde, non calcaire (L-CB1)	
7	IE	13	Altitude m>200	
7	IT	ITAL-8	Deep silceous Alpine (800-2000m) lakes/reservoirs	L-AL4
7	IT	ITAL-10	Deep silceous Alpine (800-2000m) lakes/reservoirs	L-AL3
7	NO	12	mid-altitude (200-800 masl), shallow or deep (stratified, mean depth > 3 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N5
7	NO	13	mid-altitude (200-800 masl), shallow or deep (stratified, mean depth > 3 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N5
7	NO	15	mid-altitude (200-800 masl), shallow or deep (stratified, mean depth > 3 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N5
7	NO	16	mid-altitude (200-800 masl), shallow or deep (stratified, mean depth > 3 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N5
7	PT	B-L-M/MI/S/PP	Lagoas Pouco Profundas	
7	PT	B-L-M/MI-MP/S/P	Lagoas Profundas	
7	RO	ROLN15	Lac natural in zona de deal si podis, adancime foarte mica, siliciu, suprafata foarte mica	
7	RO	ROLN16	Lac natural in zona de deal si podis, adancime mica, siliciu, suprafata foarte mica	
7	SE	S2DLNN	Dep>4m Alk<1meqL Col<50mgPtL Area>10km2 S2, Inlands of Norrland below tree line	
7	SE	S2DSNN	Dep>4m Alk<1meqL Col<50mgPtL Area<10km2 S2, Inlands of Norrland below tree line	
7	SE	S2SSNN	Dep<4m Alk<1meqL Col<50mgPtL Area<10km2 S2, Inlands of Norrland below tree line	
7	SE	S7DLNN	Dep>4m Alk<1meqL Col<50mgPtL Area>10km2 S7, Highlands of South Sweden above 200 masl	
7	SE	S7DSNN	Dep>4m Alk<1meqL Col<50mgPtL Area<10km2 S7, Highlands of South Sweden above 200 masl	
7	SE	S7SSNN	Dep<4m Alk<1meqL Col<50mgPtL Area<10km2 S7, Highlands of South Sweden above 200 masl	

Table 6.1-12 National & intercalibration types for countries reporting Broad Type 7, Mid-altitude, siliceous lakes

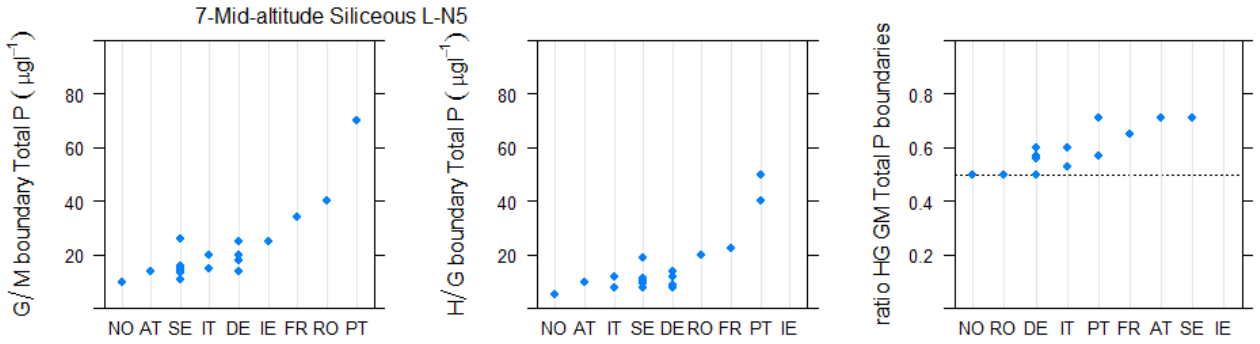

Figure 6.1-23 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for Broad Type Type 7 Mid-altitude, siliceous lakes (values for DE include both median and 75th percentile metrics)

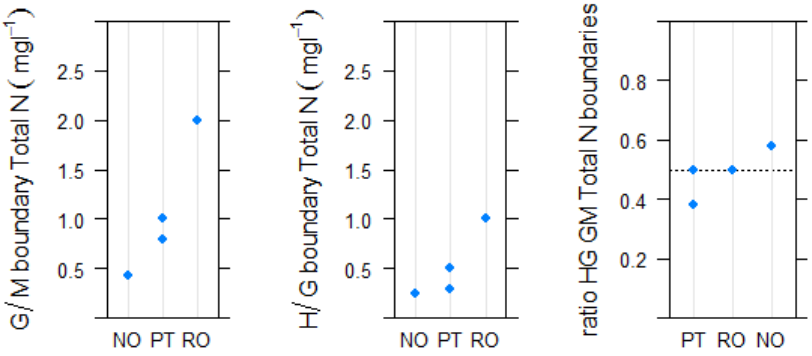

Figure 6.1-24 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for Broad Type Type 7 Mid-altitude, siliceous lakes

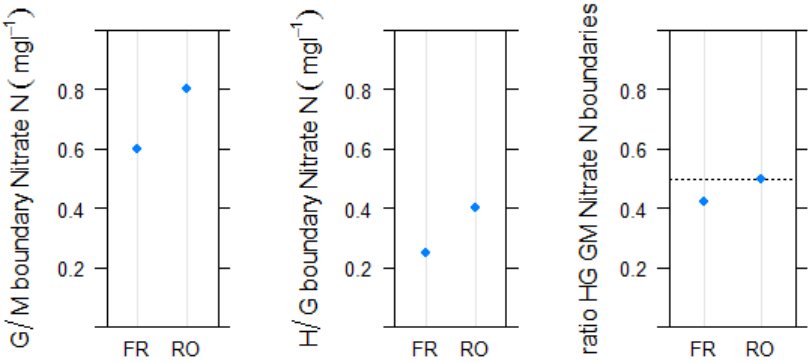

Figure 6.1-25 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good nitrate phosphorus boundary values for Broad Type Type 7 Mid-altitude, siliceous lakes

6.1.2.8 Type 8 Mid-altitude, calcareous/mixed

Broad Type	Country	National type code	Description of type	IC Type
8	AT	B2	Large Alpine foothill lakes	L-AL4
8	AT	C1a	Large Carinthian lakes < 600m, Zavg > 15m	L-AL3
8	AT	C1b	Large Carinthian lakes < 600m, Zavg < 15m	L-AL4
8	AT	D1	Large, deep lakes of the Northern Limestone Alps 400-600m	L-AL3
8	AT	D2a+b	Large, shallow to moderately deep lakes of the Limestone Alpine Foothills 600-800 m	L-AL3
8	BG	L12	Small and medium-size semi-mountain reservoirs/ artificial lakes in ER 12 (>150 (200) m up to mountain zone variable; mixed/silicious/calcareous; 1-10 km2, medium or 0.5 - 1 km2 small; max. depth <80m; usually oligotrophic to mesotrophic ; salinity < 0.5‰	
8	BG	L13	Small and medium-size semi-mountain reservoirs/ artificial lakes in ER 7 (150 (350)-600 (800)m variable; mixed/silicious/calcareous; 1-10 km2, medium or 0.5 -1 km2 small; max. depth <80m; usually oligotrophic to mesotrophic ; salinity < 0.5‰)	
8	DE	2	geschichteter Alpenvorlandsee mit relativ großem Einzugsgebiet	L-AL4
8	DE	3	geschichteter Alpenvorlandsee mit relativ kleinem Einzugsgebiet	L-AL4
8	DE	5	geschichteter, calciumreicher Mittelgebirgssee mit relativ großem Einzugsgebiet	
8	DE	6	polymiktischer, calciumreicher Mittelgebirgssee	
8	DE	7	geschichteter, calciumreicher Mittelgebirgssee mit relativ kleinem Einzugsgebiet	
8	FR	A13a	Plan d'eau vidangé à intervalle régulier	L-CB2
8	FR	A13b	Plan d'eau généralement non vidangé mais à gestion hydraulique contrôlée	L-CB2
8	FR	A2	Retenue de moyenne montagne, calcaire, peu profonde	L-AL4
8	FR	A3	Retenue de moyenne montagne, calcaire, profunde	L-AL3 L-AL4
8	FR	A5	Retenue de moyenne montagne, non calcaire, profonde	L-M5/7
8	FR	A6b	Retenue de basse altitude, profonde, non calcaire	L-CB1
8	FR	A7a	Retenue de basse altitude, peu profonde, calcaire	L-CB1
8	FR	A7b	Retenue de basse altitude, profonde, calcaire	L-CB1 L-CB3
8	FR	N3	Lac de moyenne montagne, calcaire, peu profond	L-AL4
8	FR	N4	Lac de moyenne montagne, calcaire, profond, à zone littorale	L-AL3 L-AL4
8	HR	HR-J_1A	Mountain,oligotrophic, deep, small lakes; carbonate bed	
8	HR	HR-J_1B	Mountain, oligotrophic-mesotrophic, deep, small lakes; carbonate bed	
8	IT	ITAL-7	Shallow calcareous Alpine (800-2000 m) lakes/reservoirs	L-AL4
8	IT	ITAL-9	Deep calcareous Alpine (800-2000) lakes/reservoirs	L-AL3
8	SE	S2DSNY	Dep>4m Alk>1meqL Col<50mgPtL Area<10km2 S2, Inlands of Norrland below tree line	
8	SE	S2SSNY	Dep<4m Alk>1meqL Col<50mgPtL Area<10km2 S2, Inlands of Norrland below tree line	
8	SI	A1	Dep>15m Limestone Area 1-10km2 mid altituded 200-800m >1yr Retention Alps	L-AL3
8	SI	A2	Dep>15m Limestone Area 1-10km2 mid altituded 200-800m <1yr Retention Alps	L-AL3

Table 6.1-13 National & intercalibration types for countries reporting Broad Type 8, mid-altitude, calcareous/mixed

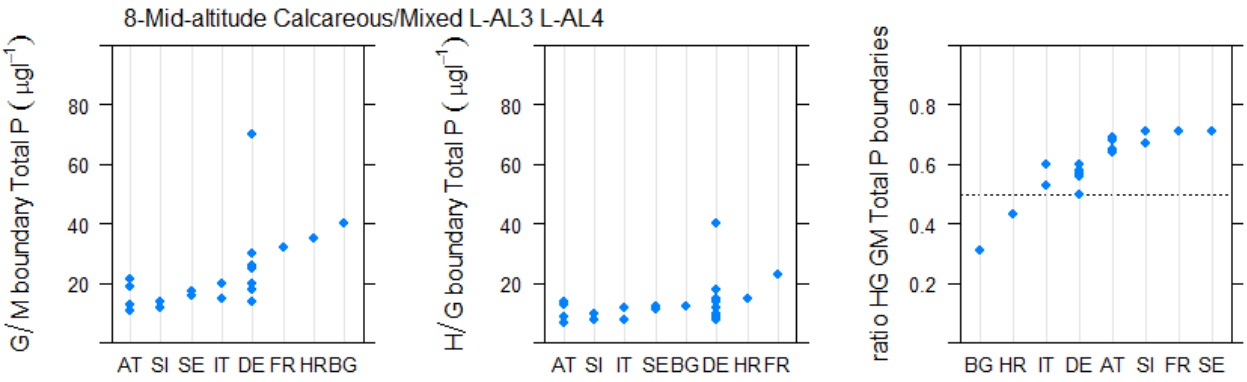

Figure 6.1-26 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for broad type 8, mid-altitude, calcareous/mixed (values for DE include median and 75th percentiles).

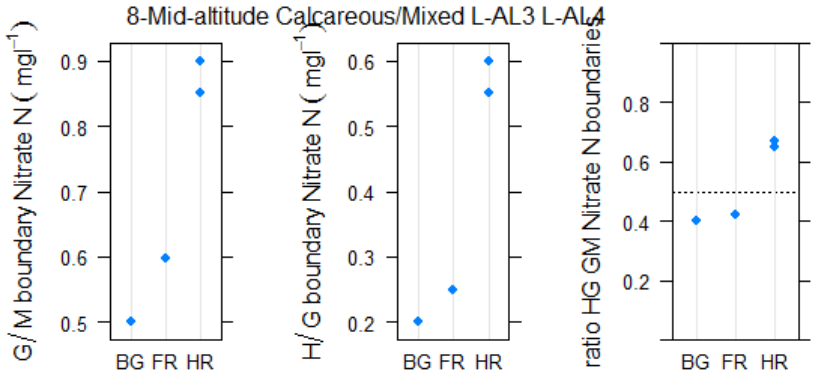

Figure 6.1-27 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good nitrate nitrogen boundary values for broad type 8, mid-altitude, calcareous/mixed.

6.1.2.9 Type 9, Mid-altitude, organic & siliceous lakes

Broad Type	Country	National type code	Description of type	IC Type
9	NO	14	mid-altitude (200-800 masl) or highland (>800 masl), shallow or deep (stratified, mean depth > 3 m), low alkalinity (<0,2 mekv/l), humic (colour 30-90 mg Pt/l)	L-N6a
9	NO	17	mid-altitude (200-800 masl) or highland (>800 masl), shallow or deep (stratified, mean depth > 3 m), low alkalinity (<0,2 mekv/l), humic (colour 30-90 mg Pt/l)	L-N6a
9	SE	S2DLYN	Dep>4m Alk<1meqL Col>50mgPtL Area>10km2 S2, Inlands of Norrland below tree line	
9	SE	S2DSYN	Dep>4m Alk<1meqL Col>50mgPtL Area<10km2 S2, Inlands of Norrland below tree line	
9	SE	S2SSYN	Dep<4m Alk<1meqL Col>50mgPtL Area<10km2 S2, Inlands of Norrland below tree line	
9	SE	S7DLYN	Dep>4m Alk<1meqL Col>50mgPtL Area>10km2 S7, Highlands of South Sweden above 200 masl	
9	SE	S7DSYN	Dep>4m Alk<1meqL Col>50mgPtL Area<10km2 S7, Highlands of South Sweden above 200 masl	
9	SE	S7SSYN	Dep<4m Alk<1meqL Col>50mgPtL Area<10km2 S7, Highlands of South Sweden above 200 masl	

Table 6.1-14 National & intercalibration types for countries reporting Broad Type 9 mid-altitude, organic and siliceous lakes.

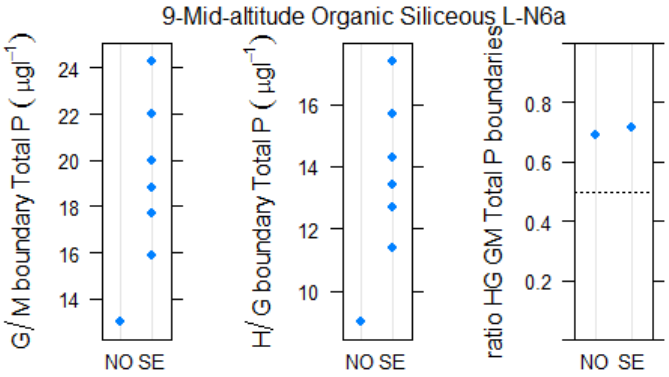

Figure 6.1-28 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good nitrate nitrogen boundary values for broad type 9 mid-altitude, organic and siliceous lakes.

6.1.2.10 Type 10, Mid-altitude, organic & calcareous/mixed lakes

Only one country reporting this lake type

6.1.2.11 Type 11, Highland, siliceous (all Europe) lakes.

Broad Type	Country	National type code	Description of type	IC Type
11	BG	L1	High mountain glacial lakes (ER12/ER7; altitude >2000 m; silicious/mixed; very smal <0.15 km2; max. depth <50 m, ultra-oligotrophic; salinity < 0.5‰)	
11	BG	L2	Mountain lakes in ER12 (mountainous zone - variable; mixed/silicious/calcareus; very smal <0.1 km2; max. depth <15m, <80m reservoirs; oligotrophic; salinity < 0.5‰)	
11	BG	L3	Mountain lakes in ER7 (>(600) 800 m variable ; organic(peat)/mixed/silicious/calcareus; very smal <0.1 km2(naturallakes), <5km2 for HMWB; max. depth <6m lakes, <80mreservoirs; oligotrophic; salinity < 0.5‰)	
11	FR	A1	Retenue de haute montagne	
11	FR	N11	Lac de basse altitude en façade méditerranéenne	
11	FR	N2	Lac de haute montagne à berges dénudées	
11	FR	N5	Lac de moyenne montagne, non calcaire, peu profond	
11	FR	N7	Lac de moyenne montagne, non calcaire, profond et sans zone littorale importante	
11	IT	ITAL-2	Siliceous high mountain lakes and reservoirs subtype <15m depth	
11	IT	ITAL-2	Siliceous high mountain lakes and reservoirs subtype >15m depth	
11	NO	20	highland (> 800 masl), shallow or deep (stratified, mean depth > 3 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N7
11	NO	21	highland (> 800 masl), shallow or deep (stratified, mean depth > 3 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N7
11	NO	22	mid-altitude (200-800 masl) or highland (>800 masl), shallow or deep (stratified, mean depth > 3 m), low alkalinity (<0,2 mekv/l), humic (colour 30-90 mg Pt/l)	L-N6a
11	NO	23	highland (> 800 masl), shallow or deep (stratified, mean depth > 3 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N7
11	NO	24	highland (> 800 masl), shallow or deep (stratified, mean depth > 3 m), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	L-N7
11	NO	25	mid-altitude (200-800 masl) or highland (>800 masl), shallow or deep (stratified, mean depth > 3 m), low alkalinity (<0,2 mekv/l), humic (colour 30-90 mg Pt/l)	L-N6a
11	RO	ROLN17	Lac natural in zona montana, adancime mica, siliciu, suprafata foarte mica	
11	RO	ROLN18	Lac natural in zona montana, adancime foarte mica, siliciu, suprafata foarte mica	
11	SE	S1DSNN	Dep>4m Alk<1meqL Col<50mgPtL Area>10km2 S4, Southeast Sweden above treeline	

Table 6.1-15 National & intercalibration types for countries reporting Broad Type 11, highland, siliceous (all Europe)

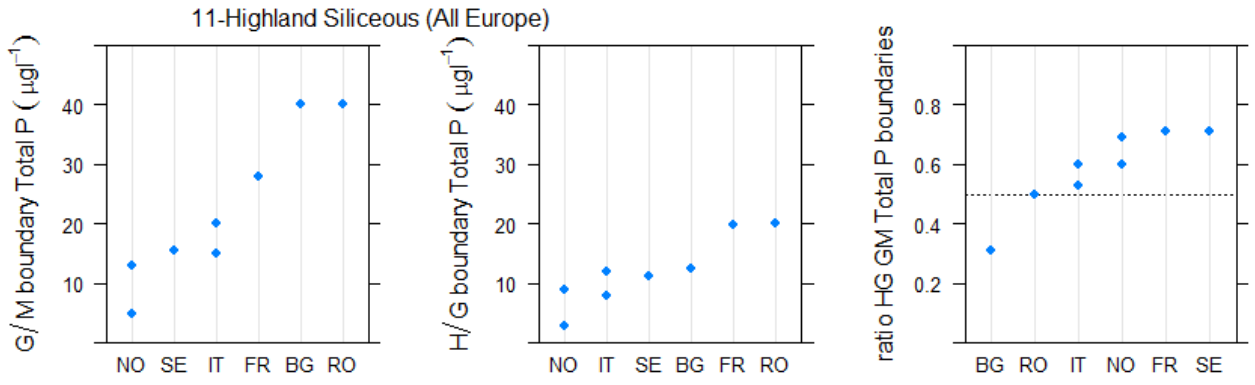

Figure 6.1-29 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for broad type11, highland, siliceous (all Europe)

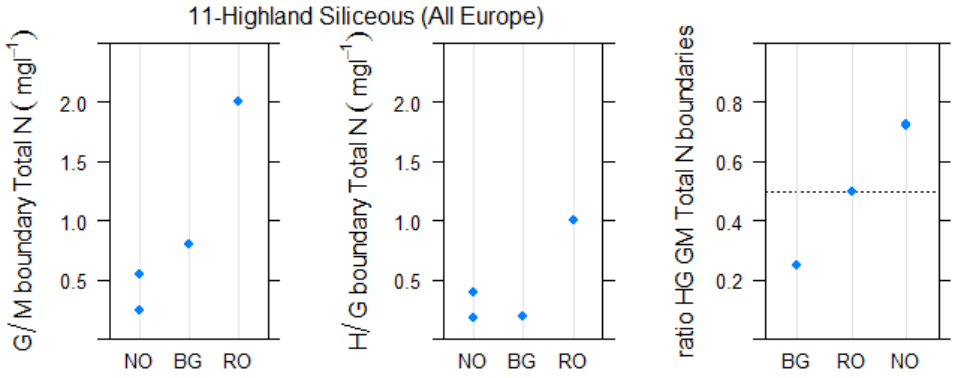

Figure 6.1-30 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total nitrogen boundary values for broad type11, highland, siliceous (all Europe)

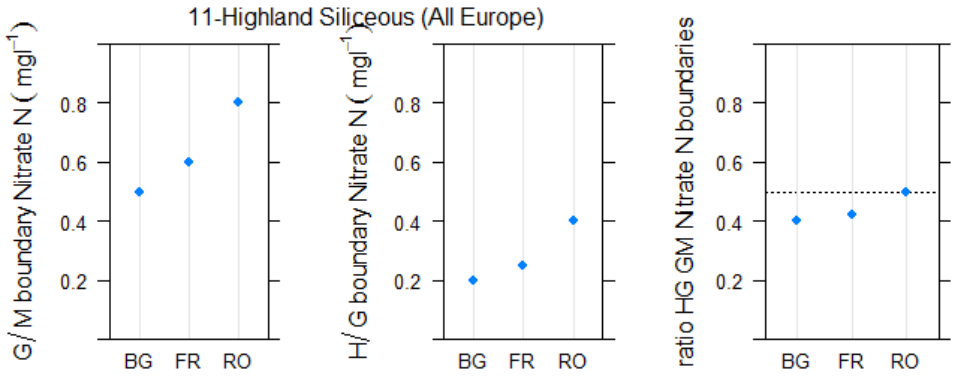

Figure 6.1-31 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good nitrate nitrogen boundary values for broad type11, highland, siliceous (all Europe)

6.1.2.12 Type 12 Highland, calcareous/mixed (all Europe)

Broad Type	Country	National type code	Description of type	IC Type
12	AT	E1	Large, deep mountain lakes of the Limestone Alps 800-1200 m	L-AL3
12	IT	ITAL-1	Calcareous high mountain lakes and reservoirs subtype <15m depth	
12	IT	ITAL-1	Calcareous high mountain lakes and reservoirs subtype >15m depth	

Table 6.1-16 National & intercalibration types for countries reporting Broad Type 12, highland, calcareous/mixed (all Europe)

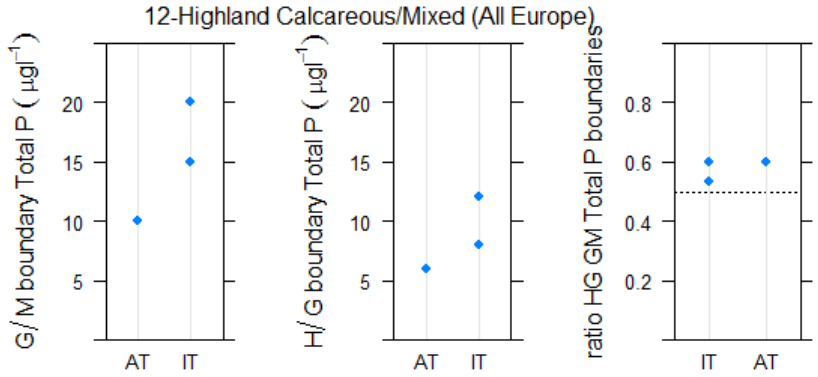

Figure 6.1-32 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good boundary values for broad type12, highland, calcareous/mixed (all Europe)

6.1.2.13 Type 13 Mediterranean, small-large, siliceous (including reservoirs)

Broad Type	Country	National type code	Description of type	IC Type
13	IT	ITME-3	Shallow, siliceous, Mediterranean lakes/reservoirs	
13	IT	ITME-5	Deep, siliceous, Mediterranean lakes/reservoirs	L-M8
13	PT	L_N	Norte	L-M5/7
13	PT	L_S	Sul	L-M5/7

Table 6.1-17 National & intercalibration types for countries reporting Broad Type 13 Mediterranean, small-large, siliceous (including reservoirs)

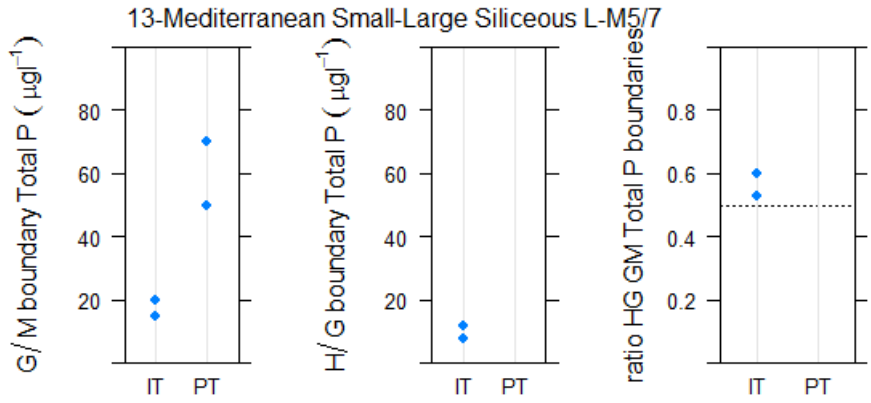

Figure 6.1-33 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for broad type 13 Mediterranean, small-large, siliceous (including reservoirs)

6.1.2.14 Type 14, Mediterranean, small-large, calcareous/mixed (including reservoirs)

Broad Type	Country	National type code	Description of type	IC Type
14	CY	L4	connected deep reservoir (>5m mean depth)	L-M8
14	FR	A3	Retenue de moyenne montagne, calcaire, profonde	L-AL3 L-AL4 L-M8
14	FR	A12	Retenue méditerranéenne de basse altitude sur socle cristallin, profonde	
14	FR	A8	Retenue à marnage très important voire fréquent	
14	FR	N11	Lac de basse altitude en façade méditerranéenne	
14	HR	HR-J_2	Lowland, deep, medium lakes; cryptodepression, carbonate bed	
14	HR	HR-J_3	Lowland, medium deep, small lakes; cryptodepression, carbonate bed	
14	HR	HR-J_4	Lowland, shallow, big lakes; cryptodepression, carbonate bed	
14	HR	HR-J_5	Lowland, medium deep, medium lakes; carbonate bed	
14	IT	ITME-1	Unstratified Mediterranean lakes/reservoirs	
14	IT	ITME-2	Shallow, calcareous, Mediterranean lakes/reservoirs	
14	IT	ITME-4	Deep, calcareous, Mediterranean lakes/reservoirs	L-M8
14	IT	ITME-6	Shallow volcanic lakes	
14	IT	ITME-6	Shallow volcanic lakes	

Table 6.1-18 National & intercalibration types for countries reporting Broad Type 14, Mediterranean, small-large, calcareous/mixed (including reservoirs)

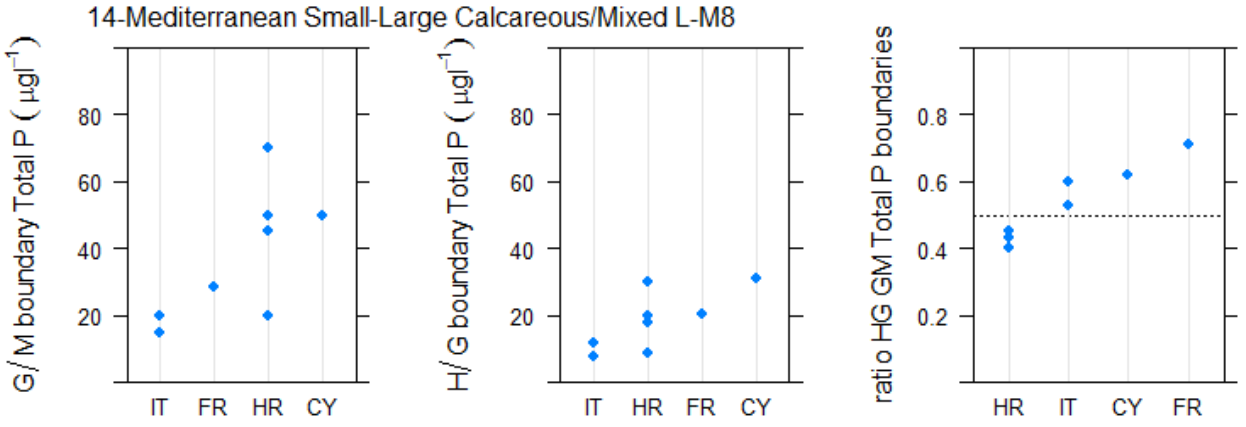

Figure 6.1-34 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good total phosphorus boundary values for broad type 14, Mediterranean, small-large, calcareous/mixed (including reservoirs)

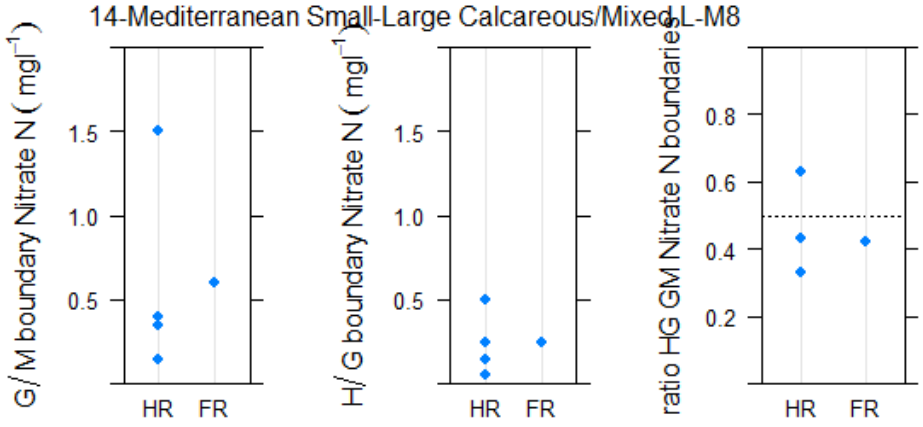

Figure 6.1-35 Range of a) good/moderate, b) high/good, c) ratio of good/moderate to high/good nitrate nitrogen boundary values for broad type 14, Mediterranean, small-large, calcareous/mixed (including reservoirs)

6.1.2.15 Type 15

Only one country, France, reported this type

6.2 Detailed comparison of river boundaries

6.2.1 River boundaries by intercalibration type and country

Comparisons of all intercalibration types with four or more countries contributing to the type are set out in the following section

6.2.1.1 R-A2 Small-medium, high altitude, siliceous rivers, boulders

Broad Type	Country	National type code	Description of type	IC Type
10	FR	GM5/2	Grand ou Moyen cours d'eau du Jura/Pré-Alpes du Nord et exogène des Alpes internes	R-A2
14	AT	2_MZB1,25_PHBot	Bioregion: Unglaciated Central Alps (2); Macroinvertebrate-saprobic reference condition: SI 1,25; Phytobenthos-trophic reference condition: oligotrophic (ot)	R-A2
14	AT	2_MZB1,5_PHBot	Bioregion: Unglaciated Central Alps (2); Macroinvertebrate-saprobic reference condition: SI 1,5; Phytobenthos-trophic reference condition: oligotrophic (ot)	R-A2
14	AT	3_MZB1,5_PHBmt	Bioregion: Ridges and Foothills of the Central Alps (3); Macroinvertebrate- saprobic reference condition: SI 1,5; Phytobenthos-trophic reference condition: mesotrophic (mt)	R-A2
14	AT	3_MZB1,5_PHBom	Bioregion: Ridges and Foothills of the Central Alps (3); Macroinvertebrate- saprobic reference condition: SI 1,5; Phytobenthos-trophic reference condition: oligo-mesotrophic (om)	R-A2
	ES	120	Ríos de serranías béticas húmedas	R-A2
14	FR	MP2	Moyen ou Petit cours d'eau des Alpes internes	R-A2
14	FR	P14/1	Petit cours d'eau des Coteaux aquitains et exogène des Pyrénées	R-A2
16	FR	G1	Grand cours d'eau des Pyrénées	R-A2
16	FR	G2	Grand cours d'eau des Alpes internes	R-A2
16	FR	GM7/2	Grand ou Moyen cours d'eau des Pré-Alpes du Sud et exogène des Alpes internes	R-A2
16	FR	GM5/2	Grand ou Moyen cours d'eau du Jura/Pré-Alpes du Nord et exogène des Alpes internes	R-A2
16	FR	M1	Moyen cours d'eau des Pyrénées	R-A2
16	FR	P1	Petit cours d'eau des Pyrénées	R-A2
16	FR	TP1	Très Petit cours d'eau des Pyrénées	R-A2
16	FR	TP2	Très petit cours d'eau des Alpes internes	R-A2
16	IT	IT01GH1N		R-A2
16	IT	IT01GH2N		R-A2
16	IT	IT01SS1N		R-A2
16	IT	IT01SS2N		R-A2
16	IT	IT04SS2N		R-A2
14	IT	IT03GH1N		R-A2
9	IT	IT03GH6N		R-A2
9	IT	IT03SS1N		R-A2
9	IT	IT03SS2N		R-A2
8	IT	IT03SS3N		R-A2

Table 6.2-1 National & broad types for Alpine GIG countries reporting river intercalibration type R-A2

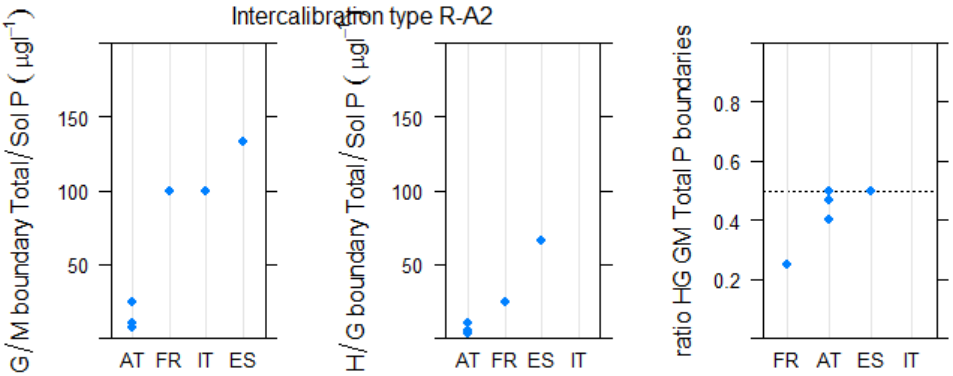

Figure 6.2-1 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-A2

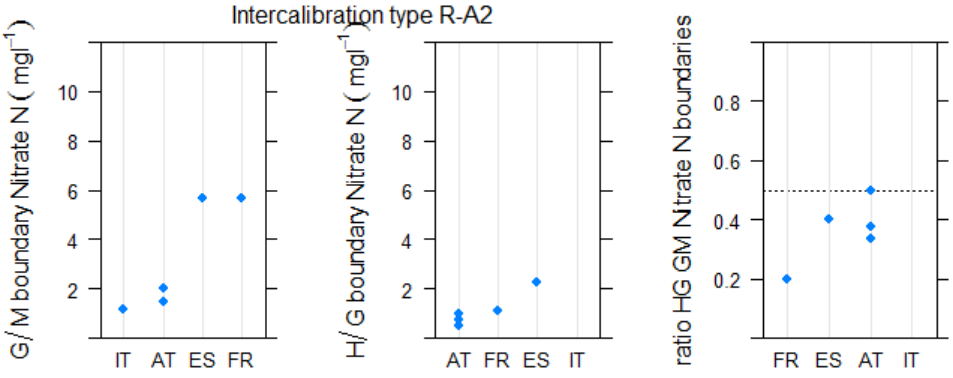

Figure 6.2-2 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-A2

6.2.1.2 R-C1 Small, lowland, siliceous rivers dominated by sand

Broad Type	Country	National type code	Description of type	IC Type
3	FR	P13	Petit cours d'eau des Landes	R-C1
3	FR	P18/4	Petit cours d'eau d'Alsace et exogène des Vosges	R-C1
3	FR	P20	Petit cours d'eau des Dépôts argilo-sableux	R-C1
3	FR	TP13	Très Petit cours d'eau des Landes	R-C1
3	FR	TP20	Très Petit cours d'eau des Dépôts argilo-sableux	R-C1
3	NL	R14	Snelstromende middenloop/benedenloop op zand	R-C1
3	NL	R17	Snelstromende bovenloop op kalkhoudende bodem	R-C1
3	NL	R18	Snelstromende middenloop/benedenloop op kalkhoudende bodem	R-C1
3	PL	17	Potok nizinny piaszczysty	R-C1
3	PL	18	Potok nizinny żwirowy	R-C1
3	PL	26	Cieki w dolinach wielkich rzek nizinnych	R-C1
5	BE (W)	RIV_20		R-C1
5	LT	RWT1	Small rivers (area less than 100 km2)	R-C1
5	NL	R4	Permanente langzaam stromende bovenloop op zand	R-C1
5	NL	R5	Langzaam stromende middenloop/benedenloop op zand	R-C1
5	UK	2	Lowland Calcareous Small	R-C1

Table 6.2-2 National & broad types for Central Baltic GIG countries reporting river intercalibration type R-C1

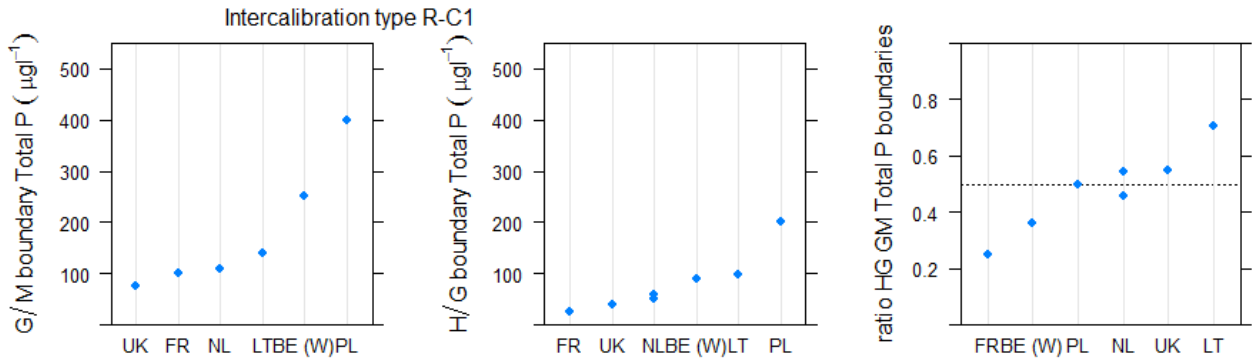

Figure 6.2-3 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-C1

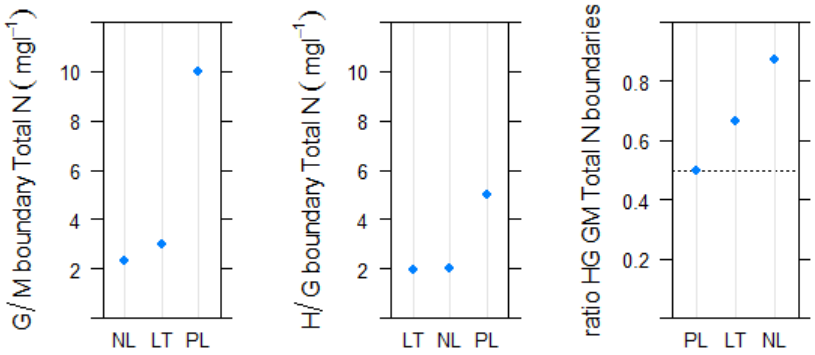

Figure 6.2-4 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good total nitrogen boundary values for intercalibration type R-C1

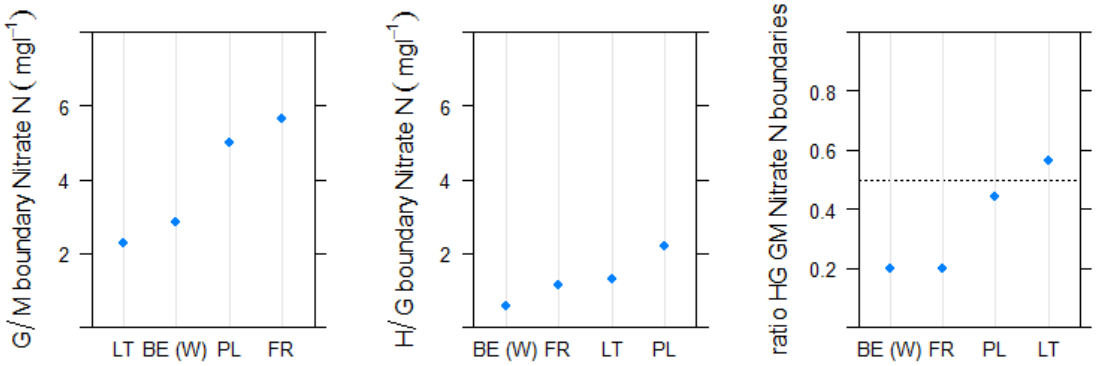

Figure 6.2-5 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-C1

6.2.1.3 R-C3 Small, mid-altitude, siliceous rivers with rock

Broad Type	Country	National type code	Description of type	IC Type
8	BE (W)	RIV_06		R-C3
8	BE (W)	RIV_07		R-C3
8	FR	P21	Petit cours d'eau du Massif central Nord	R-C3
8	FR	P3	Petit cours d'eau du Massif central Sud	R-C3
8	UK	13	Mid-altitude Siliceous Medium	R-C3
9	AT	11_MZB1,75_PHBmt	Bioregion: Bavarian-Austrian Alpine Foothills (11); Macroinvertebrate- saprobic reference condition: SI 1,75; Phytobenthos-trophic reference condition: mesotrophic (mt)	R-C3
9	AT	11_MZB1,75_PHBom	Bioregion: Bavarian-Austrian Alpine Foothills (11); Macroinvertebrate- saprobic reference condition: SI 1,75; Phytobenthos-trophic reference condition: oligo-mesotrophic (om)	R-C3
9	AT	12_MZB1,5_PHBme1	Bioregion: Granite and Gneiss Region of the Bohemian Massif (12); Macroinvertebrate- saprobic reference condition:SI 1,5; Phytobenthos-trophic reference condition: lower half meso-eutrophic (me1)	R-C3
9	AT	12_MZB1,5_PHBmt	Bioregion: Granite and Gneiss Region of the Bohemian Massif (12); Macroinvertebrate- saprobic reference condition:SI 1,5; Phytobenthos-trophic reference condition: mesotrophic (mt)	R-C3
9	AT	12_MZB1,75_PHBme2	Bioregion: Granite and Gneiss Region of the Bohemian Massif (12); Macroinvertebrate- saprobic reference condition: SI 1,75; Phytobenthos-trophic reference condition: meso-eutrophic overall (me2)	R-C3
9	BE (W)	RIV_04		R-C3
9	BE (W)	RIV_05		R-C3
	ES	121	Ríos cántabro-atlánticos silíceos	R-C3
	ES	125	Ríos de montaña húmeda silícea	R-C3
9	FR	M21	Moyen cours d'eau du Massif central Nord	R-C3
9	FR	M22		R-C3
9	FR	M3	Moyen cours d'eau du Massif central Sud	R-C3
9	FR	M4	Moyen cours d'eau des Vosges	R-C3
9	FR	P11/3-21	Petit cours d'eau des Causses aquitains et exogène du Massif central Sud ou du Massif central Nord	R-C3
9	FR	P17/3-21	Petit cours d'eau des Dépressions sédimentaires et exogène du Massif central Sud ou du Massif central Nord	R-C3
9	FR	P22	Petit cours d'eau des Ardennes	R-C3
9	FR	P4	Petit cours d'eau des Vosges	R-C3
9	FR	TP21	Très Petit cours d'eau du Massif central Nord	R-C3
9	FR	TP22	Très Petit cours d'eau des Ardennes	R-C3
9	FR	TP4	Très Petit cours d'eau des Vosges	R-C3
9	LU	1	small high-altitude streams in the Oesling	R-C3
9	LU	2	small mid-altitude streams in the Oesling	R-C3
9	PL	4	Potok wyżynny krzemianowy z substratem gruboziarnistym - zachodni	R-C3
9	PL	5	Potok wyżynny krzemianowy z substratem drobnoziarnistym- zachodni	R-C3
9	UK	10	Mid-altitude Siliceous Small	R-C3
12	BE (W)	RIV_24		R-C3
14	FR	TP3	Très Petit cours d'eau du Massif central Sud	R-C3

Table 6.2-3 National & broad types for Central Baltic GIG countries reporting river intercalibration type R-C3

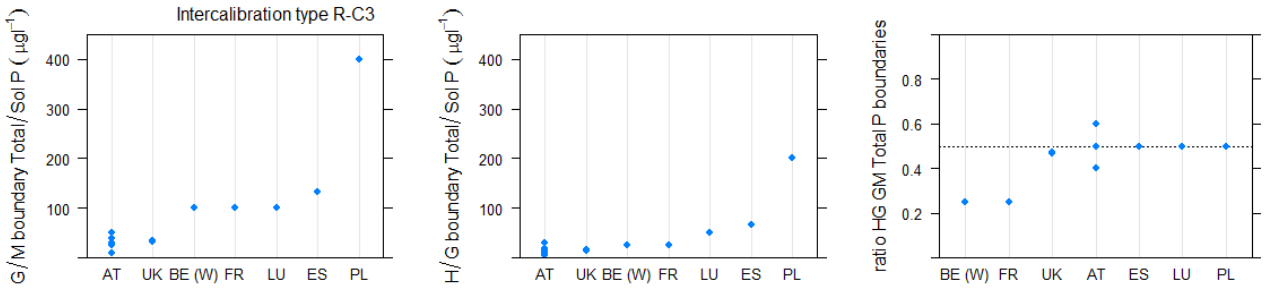

Figure 6.2-6 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-C3

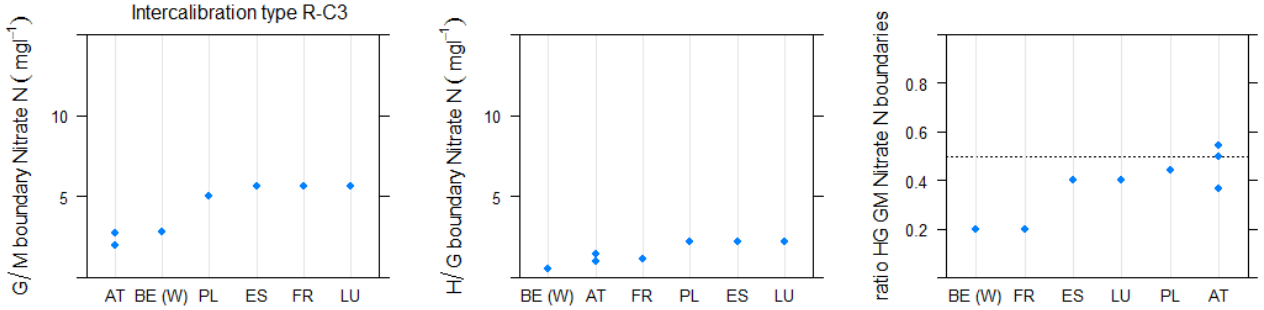

Figure 6.2-7 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-C3

6.2.1.4 R-C4 Medium, lowland mixed rivers with sand/gravel

Broad Type	Country	National type code	Description of type	IC Type
2	BE (Fl)	Rg	Grote rivier	R-C4
2	BE (Fl)	Rk	Kleine rivier	R-C4
3	BE (Fl)	Bg	Grote beek	R-C4
3	BE (Fl)	BgK	Grote beek Kempen	R-C4
4	BE (W)	RIV_21		R-C4
4	BE (W)	RIV_22		R-C4
4	CZ	X-1-1-2	<200m,Crystalinicum, volcanic rock,Strahler 4-6 (smaller rivers)	R-C4
4	CZ_3rd	X-1-1-2	<200m,Crystalinicum, volcanic rock,Strahler 4-6 (smaller rivers)	R-C4
4	EE	2A	Catchment 100-1000 km2, COD-Mn 90% 25 and over mgO/L	R-C4
4	EE	2B	Catchment 100-1000 km2, COD-Mn 90% below 25 mgO/L	R-C4
	ES	131	Pequeños ejes cántabro-atlánticos silíceos	R-C4
4	FR	M10	Moyen cours d'eau des Côtes calcaires Est	R-C4
4	FR	M10/4	Moyen cours d'eau des Côtes calcaires Est et exogène des Vosges	R-C4
4	FR	M11/3-21	Moyen cours d'eau des Causses aquitains et exogène du Massif central Sud ou du Massif central Nord	R-C4
4	FR	M12-A	Moyen cours d'eau Armoricain dans les HER de niveau 2 n°58 ou n°117	R-C4
4	FR	M12-B	Moyen cours d'eau Armoricain dans les HER de niveau 2 n°55, n°59 ou n°118	R-C4
4	FR	M13	Moyen cours d'eau des Landes	R-C4
4	FR	M14/3-11	Moyen cours d'eau des Coteaux aquitains et exogène du Massif central Sud et/ou des Causses aquitains	R-C4
4	FR	M14/3-8	Moyen cours d'eau des Coteaux aquitains et exogène du Massif central Sud et/ou des Cévennes	R-C4
4	FR	M15-17/3-21	Moyen cours d'eau de la Plaine de Saône ou des Dépressions sédimentaires et exogène du Massif central Sud ou du Massif central Nord	R-C4
4	FR	M18/4	Moyen cours d'eau d'Alsace et exogène des Vosges	R-C4
4	FR	M20		R-C4
4	FR	M9	Moyen cours d'eau des Tables calcaires	R-C4
4	FR	M9-10/21	Moyen cours d'eau des Tables calcaires ou des Côtes calcaires Est et exogène du Massif central Nord	R-C4
4	FR	M9-A	Moyen cours d'eau des Tables calcaires dans l'HER de niveau 2 n°57	R-C4
4	FR	MP15	Moyen ou Petit cours d'eau de Plaine de Saône	R-C4
4	FR	MP15/5	Moyen ou Petit cours d'eau de Plaine de Saône et exogène du Jura/Pré-Alpes du Nord	R-C4
4	FR	MP18	Moyen ou Petit cours d'eau d'Alsace	R-C4
4	LT	RWT2	Medium slow flowing rivers (area 100-1000 km2, slope less than 0,7 m/km)	R-C4
4	LT	RWT3	Medium fast flowing rivers (area 100-1000 km2, slope more than 0,7 m/km)	R-C4
4	LU	5	mid-sized and mid-altitude streams in the Gutland	R-C4
4	LV	R3	Lowland (< 300 m a.s.l.), carbonatic bedrock, medium size (100-1000km2), fast-flowing (slope > 1 m/km).	R-C4
4	LV	R4	Lowland (< 300 m a.s.l.), carbonatic bedrock, medium size (100-1000km2), slow-running (slope < 1 m/km).	R-C4

4	NL	R13	Snelstromende bovenloop op zand	R-C4
4	NL	R15	Snelstromend riviertje op kiezelhoudende bodem	R-C4
4	PL	19	Rzeka nizinna piaszczysto- gliniasta	
4	PL	20	Rzeka nizinna żwirowa	
4	UK	5	Lowland Calcareous Medium	R-C4
5	EE	1A	Catchment 10-100 km2, COD-Mn 90% 25 and more mgO/L	R-C4
5	IE	31	Calcareous, low slope	R-C4
5	IE	32	Calcareous, medium slope	R-C4
5	NL	R6	Langzaam stromend riviertje op zand/klei	R-C4
8	LU	3	mid-sized and mid-altitude streams in the Oesling	R-C4
10	BE (W)	RIV_03		R-C4
10	BE (W)	RIV_11		R-C4
10	BE (W)	RIV_15		R-C4
10	BE (W)	RIV_16		R-C4
10	UK	14	Mid-altitude Calcareous Medium	R-C4
13	PL	24	Małe i średnie rzeki na obszarach będących pod wpływem procesów torfotwórczych	R-C4

Table 6.2-4 National & broad types for Central Baltic GIG countries reporting river intercalibration type R-C4

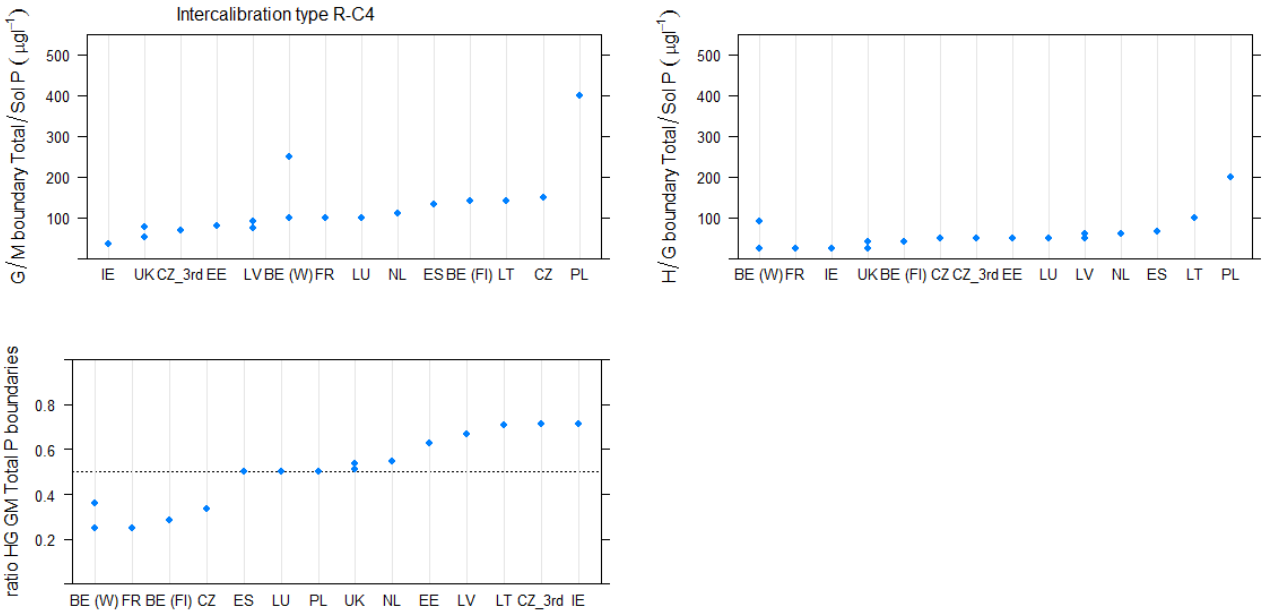

Figure 6.2-8 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-C4

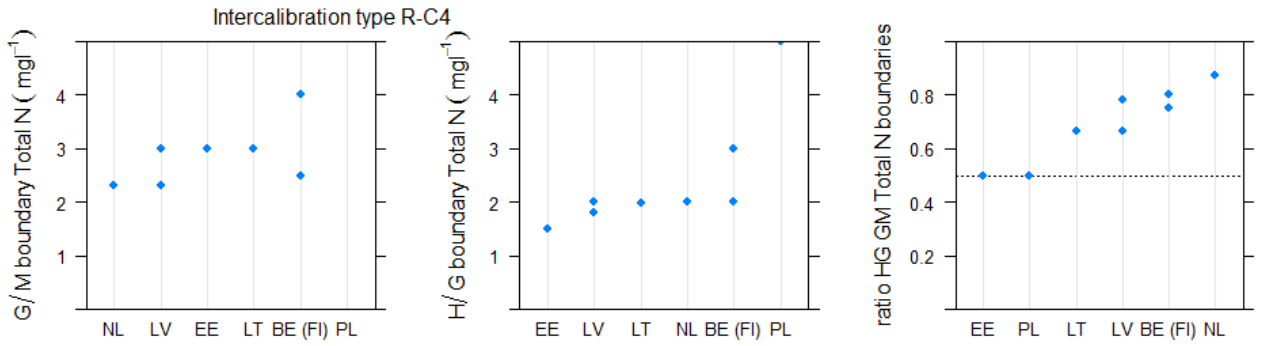

Figure 6.2-9 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good total nitrogen boundary values for intercalibration type R-C4

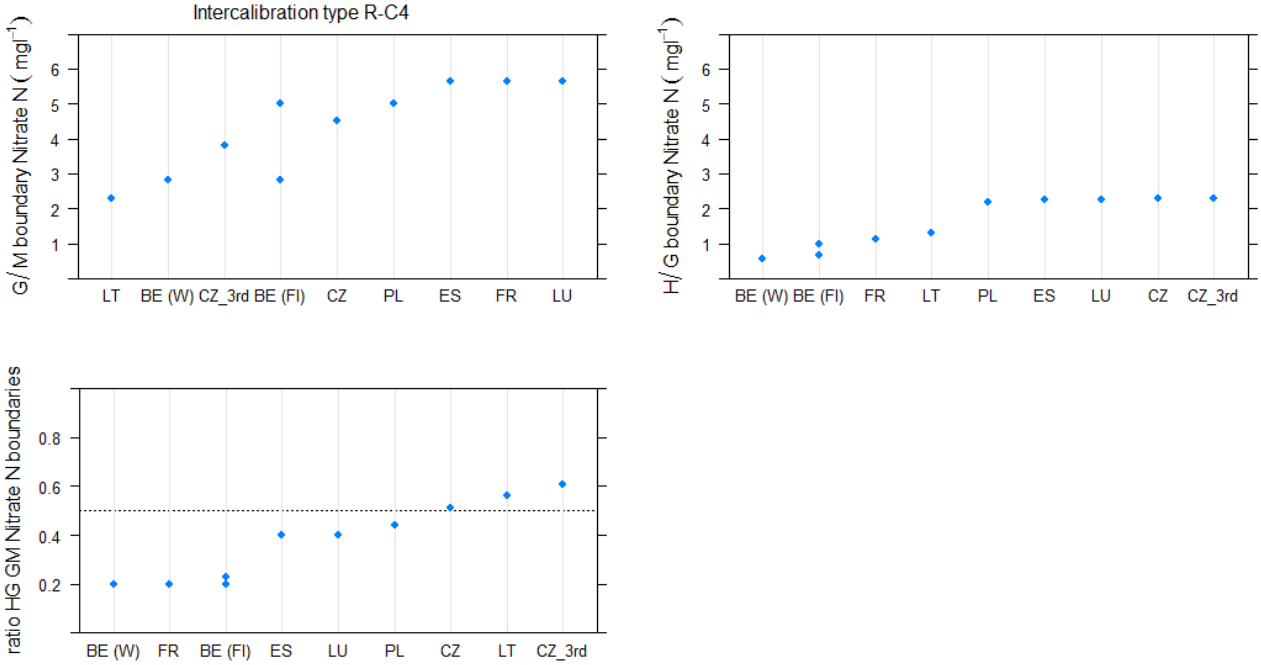

Figure 6.2-10 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-C4

6.2.1.5 R-C5 Large, lowland, mixed rivers

Broad Type	Country	National type code	Description of type	IC Type
1	BE (W)	RIV_19		R-C5
1	FR	TG22/10	Très Grand cours d'eau des Ardennes et exogène des Côtes calcaires Est	R-C5
1	NL	R7	Langzaam stromende rivier/nevengeul op zand/klei	R-C5
2	FR	G12	Grand cours d'eau Armoricain	R-C5
2	FR	G18/4	Grand cours d'eau d'Alsace et exogène des Vosges	R-C5
2	FR	GM20	Grand ou Moyen cours d'eau des Dépôts argilo-sableux	R-C5
4	BE (W)	RIV_23		R-C5
4	CZ	X-1-1-3	<200m,Crystalinicum, volcanic rock,Strahler 7-9 (rivers)	R-C5
4	CZ_3rd	X-1-1-3	<200m,Crystalinicum, volcanic rock,Strahler 7-9 (rivers)	R-C5
4	EE	3A	Catchment 1000-10000 km2, COD-Mn 90% 25 and over mgO/L	R-C5
4	EE	3B	Catchment 1000-10000 km2, COD-Mn 90% below 25 mgO/L	R-C5
4	FR	G9	Grand cours d'eau des Tables calcaires	R-C5
4	FR	G9-10/21	Grand cours d'eau des Tables calcaires ou des Côtes calcaires Est et exogène du Massif central Nord	R-C5
4	FR	GM14	Grand ou Moyen cours d'eau des Coteaux aquitains	R-C5
4	FR	GM20/9	Grand ou Moyen cours d'eau des Dépôts argilo-sableux et exogène des Tables calcaires	R-C5
4	LT	RWT4	Large slow flowing rivers (area more than 1000 km2, slope less than 0,3 m/km)	R-C5
4	LT	RWT5	Large fast flowing rivers (area more than 1000 km2, slope more than 0,3 m/km)	R-C5
4	LU	6	large lowland streams	R-C5
4	LV	R5	Lowland (< 300 m a.s.l.), carbonatic bedrock, large (> 1000 km2), fast-flowing (slope > 1 m/km).	R-C5
4	LV	R6	Lowland (< 300 m a.s.l.), carbonatic bedrock, large (> 1000 km2), slow-running (slope < 1 m/km).	R-C5
4	NL	R12	Langzaam stromende middenloop/benedenloop op veenbodem	R-C5
4	NL	R16	Snelstromende rivier/nevengeul op zandbodem of grind	R-C5
4	NL	R8	Zoet getijdenwater (uitlopers rivier) op zand/klei	R-C5
4	PL	19	Rzeka nizinna piaszczysto- gliniasta	R-C5
4	PL	20	Rzeka nizinna żwirowa	R-C5
4	PL	25	Cieki łączące jeziora	R-C5
5	IE	31	Calcareous, low slope	R-C5
5	IE	32	Calcareous, medium slope	R-C5
8	BE (W)	RIV_08		R-C5
8	FR	G17/3-21	Grand cours d'eau des Dépressions sédimentaires et exogène du Massif central Sud ou du Massif central Nord	R-C5
10	BE (W)	RIV_12		R-C5
10	BE (W)	RIV_17		R-C5
10	BE (W)	RIV_18		R-C5

10	FR	G10	Grand cours d'eau des Côtes calcaires Est	R-C5
	ES	128	Ejes fluviales principales cántabro-atlánticos silíceos	R-C5
	LV	R6	Lowland (< 300 m a.s.l.), carbonatic bedrock, large (> 1000 km2), slow-running (slope < 1 m/km).	R-C5

Table 6.2-5 National & broad types for Central Baltic GIG countries reporting river intercalibration type R-C5

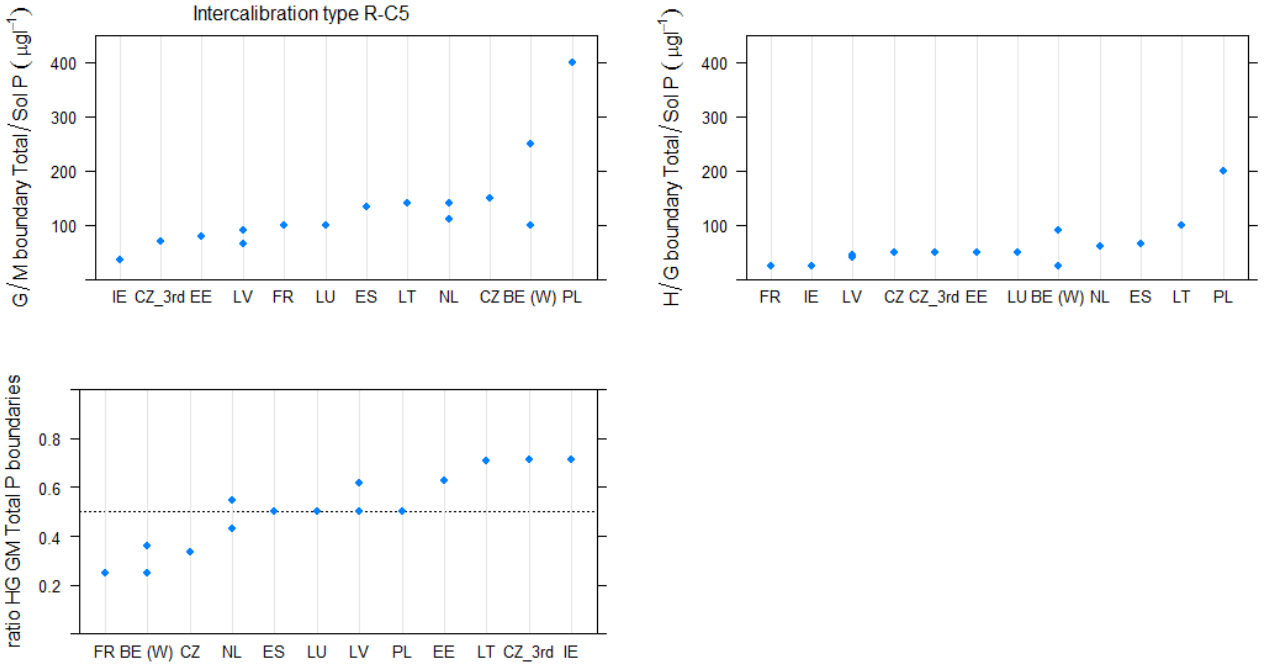

Figure 6.2-11 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-C5

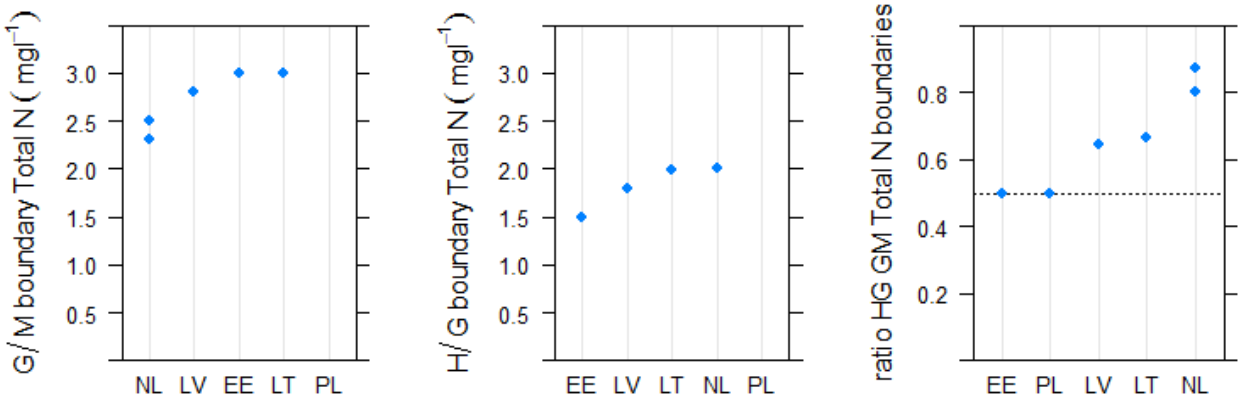

Figure 6.2-12 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good total nitrogen boundary values for intercalibration type R-C5

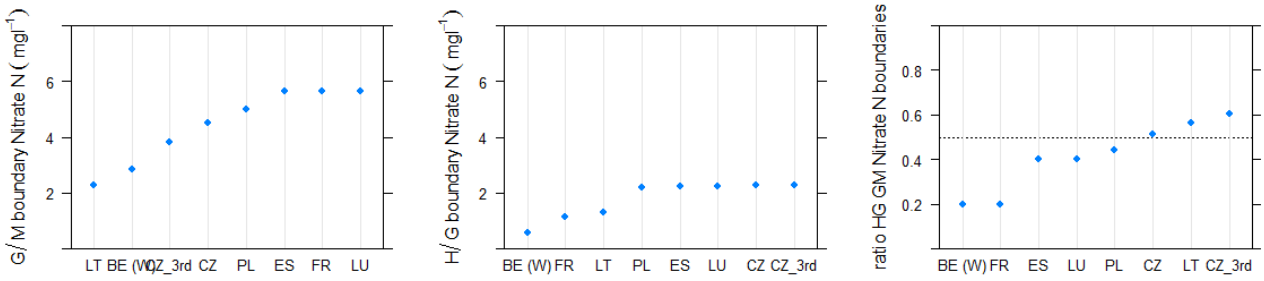

Figure 6.2-13 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-C5

6.2.1.6 R-C6 Small, lowland, calcareous rivers with gravel

Broad Type	Country	National type code	Description of type	IC Type
4	EE	2A	Catchment 100-1000 km2, COD-Mn 90% 25 and over mgO/L	R-C6
4	EE	2B	Catchment 100-1000 km2, COD-Mn 90% below 25 mgO/L	R-C6
4	FR	P9	Petit cours d'eau des Tables calcaires	R-C6
4	LT	RWT2	Medium slow flowing rivers (area 100-1000 km2, slope less than 0,7 m/km)	R-C6
4	LT	RWT3	Medium fast flowing rivers (area 100-1000 km2, slope more than 0,7 m/km)	R-C6
5	EE	1A	Catchment 10-100 km2, COD-Mn 90% 25 and more mgO/L	R-C6
5	EE	1B	Catchment 10-100 km2, COD-Mn 90% below 25 mgO/L	R-C6
5	FR	P9-A	Petit cours d'eau des Tables calcaires dans l'HER de niveau 2 n°57	R-C6
5	FR	TP15	Très Petit cours d'eau de Plaine de Saône	R-C6
5	FR	TP17	Très Petit cours d'eau des Dépressions sédimentaires	R-C6
5	FR	TP18	Très Petit cours d'eau d'Alsace	R-C6
5	FR	TP9	Très Petit cours d'eau des Tables calcaires	R-C6
5	IE	31	Calcareous, low slope	R-C6
5	IE	32	Calcareous, medium slope	R-C6
5	IE	33	Calcareous, high slope	R-C6
5	IE	34	Calcareous, very high slope	R-C6
5	LT	RWT1	Small rivers (area less than 100 km2)	R-C6
5	LU	4	small mid-altitude streams in the Gutland	R-C6
5	LV	R1	Lowland (< 300 m a.s.l.), carbonatic bedrock, small (< 100 km2), fast-flowing (> 1 m/km).	R-C6
5	LV	R2	Lowland (< 300 m a.s.l.), carbonatic bedrock, small (< 100 km2), slow-running (< 1 m/km).	R-C6
11	BE (W)	RIV_01		R-C6
11	BE (W)	RIV_02		R-C6
11	BE (W)	RIV_09		R-C6
11	BE (W)	RIV_10		R-C6
11	BE (W)	RIV_13		R-C6
11	BE (W)	RIV_14		R-C6

Table 6.2-6 National & broad types for Central Baltic GIG countries reporting river intercalibration type R-C6

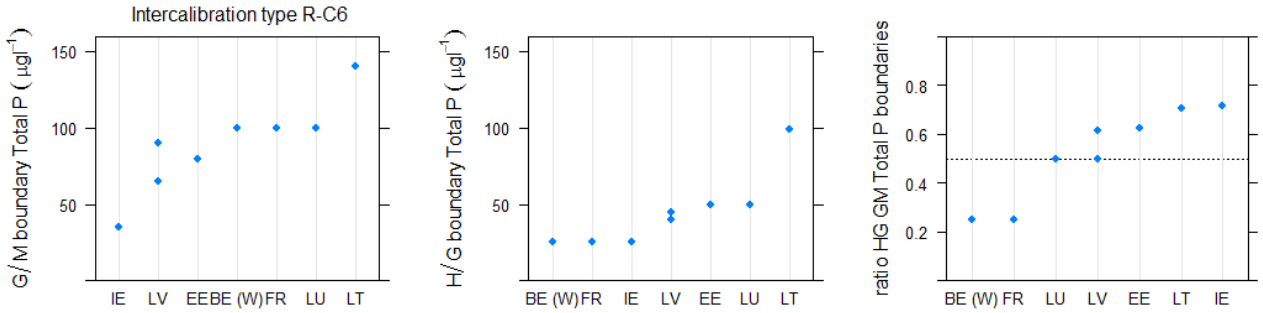

Figure 6.2-14 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-C6

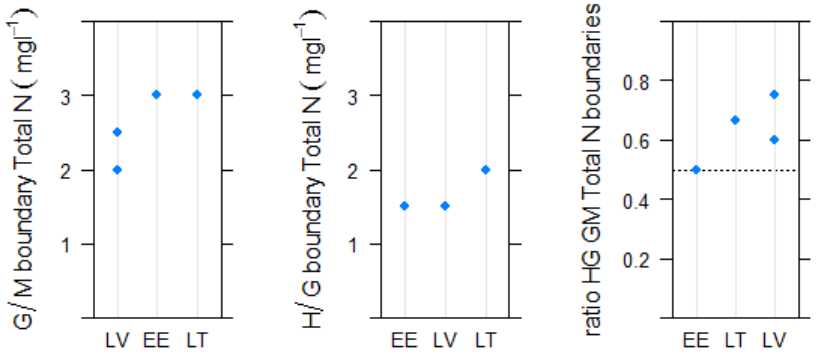

Figure 6.2-15 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good total nitrogen boundary values for intercalibration type R-C6

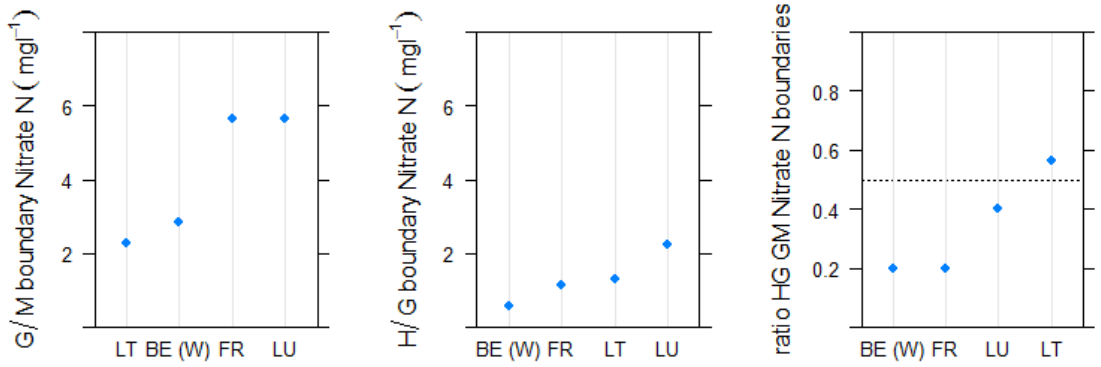

Figure 6.2-16 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-C6

6.2.1.7 R-E1 Carpathians: small-medium, mid-altitude, siliceous rivers with gravel & boulders

Broad Type	Country	National type code	Description of type	IC Type
14	BG	R2	Mountainous rivers (Uplands) in ER12 (mountain zone- sometimes get down; mixed/siliceous/calcareous;size <100 km2, smal rivers; boulders and cobles)	R-E1a
9	BG	R4	Semi mountain rivers (gravel rivers) in ER12 (semi-mountain zone - big variation; mixed/siliceous/calcareous;size <1300 km2,small and medium (rarely large) ; gravels)	R-E1b
11	CZ	X-2-2-1	200-500m,Sandstone, holocene,Strahler 1-3 (brooks)	R-E1b
11	CZ	X-3-1-1	500-800m,Crystalinicum, volcanic rock,Strahler 1-3 (brooks)	R-E1a
11	CZ_3rd	X-2-2-1	200-500m,Sandstone, holocene,Strahler 1-3 (brooks)	R-E1b
11	CZ_3rd	X-3-1-1	500-800m,Crystalinicum, volcanic rock,Strahler 1-3 (brooks)	R-E1a
11	HU	2R	Mountainous – calcerous – coarse – small catchment	R-E1b
11	HU	3R	Mountainous – calcareous – coarse – medium catchment	R-E1b
9	HU	1R	Mountainous - siliceous – coarse – small catchment	R-E1b
11	RO	RO01	Curs de apa situat in zona montana, piemontana sau de podisuri inalte	R-E1a
11	RO	RO04	Curs de apa situat in zona de dealuri sau de podisuri	R-E1b
10	SK	K2S	Stredne veľké toky v nadmorskej výške 200 - 500 m v Karpatoch	R-E1b
10	SK	K3S	Stredne veľké toky v nadmorskej výške 500 - 800 m v Karpatoch	R-E1a
11	SK	K2M	Malé toky v nadmorskej výške 200 - 500 m v Karpatoch	R-E1b
15	SK	K3M	Malé toky v nadmorskej výške 500 - 800 m v Karpatoch	R-E1a

Table 6.2-7 National & broad types for Eastern Continental GIG countries reporting river intercalibration type R-E1

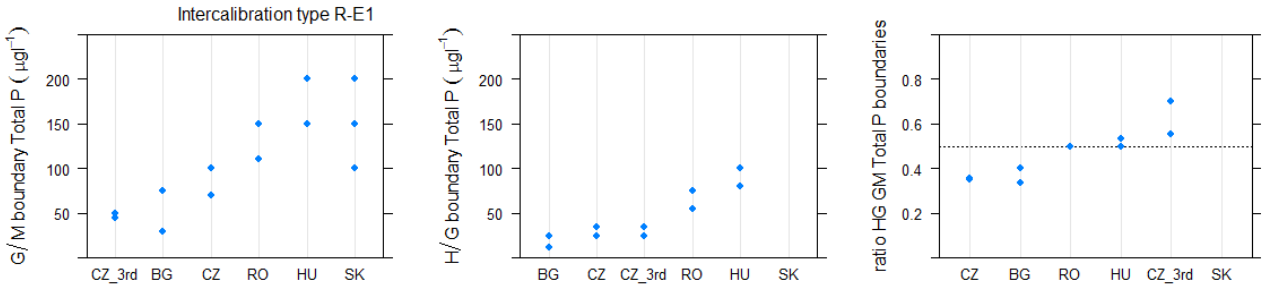

Figure 6.2-17 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-E1

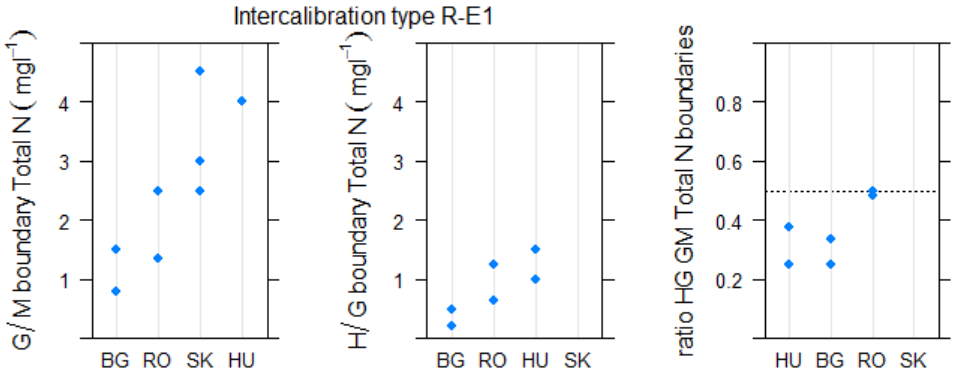

Figure 6.2-18 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good total nitrogen boundary values for intercalibration type R-E1

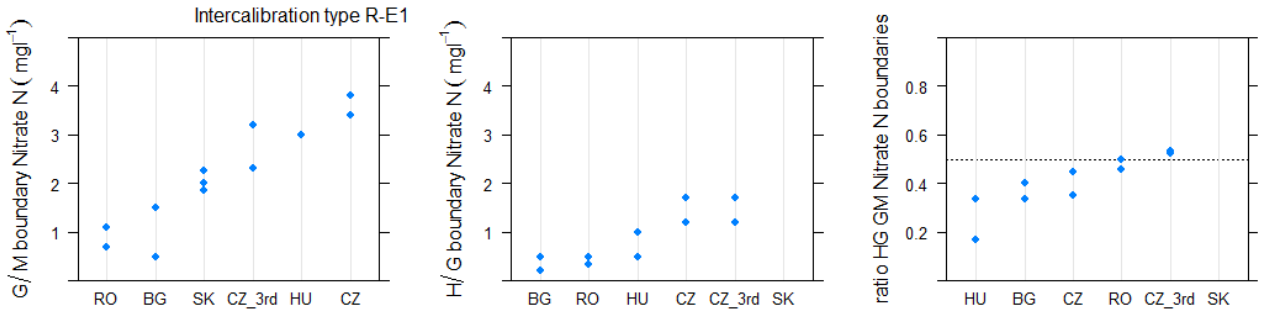

Figure 6.2-19 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-E1

6.2.1.8 R-E2 Plains: medium, lowland mixed rivers with sand & silt

Broad Type	Country	National type code	Description of type	IC Type
4	BG	R8	Medium and small Danube rivers (ER12-1;altitude <100m; calcareous/mixed/siliceous;size variable; sand, silt, clay, loess)	R-E2
4	CZ	X-1-2-2	<200m,Sandstone, holocene,Strahler 4-6 (smaller rivers)	R-E2
4	CZ_3rd	X-1-2-2	<200m,Sandstone, holocene,Strahler 4-6 (smaller rivers)	R-E2
4	HU	12R	Plain – calcareous – coarse – medium catchment	R-E2
4	HU	18R	Plain – calcareous – medium/fine – medium catchment	R-E2
4	HU	22R	Plain – organic – medium catchment	R-E2
4	SK	P1S	Stredne veľké toky v nadmorskej výške do 200 m v Panónskej panve	R-E2
5	HU	17R	Plain – calcareous – medium/fine – medium catchment with little slope	R-E2
5	RO	RO06	Curs de apa situat in zona de campie	R-E2

Table 6.2-8 National & broad types for Eastern Continental GIG countries reporting river intercalibration type R-E2

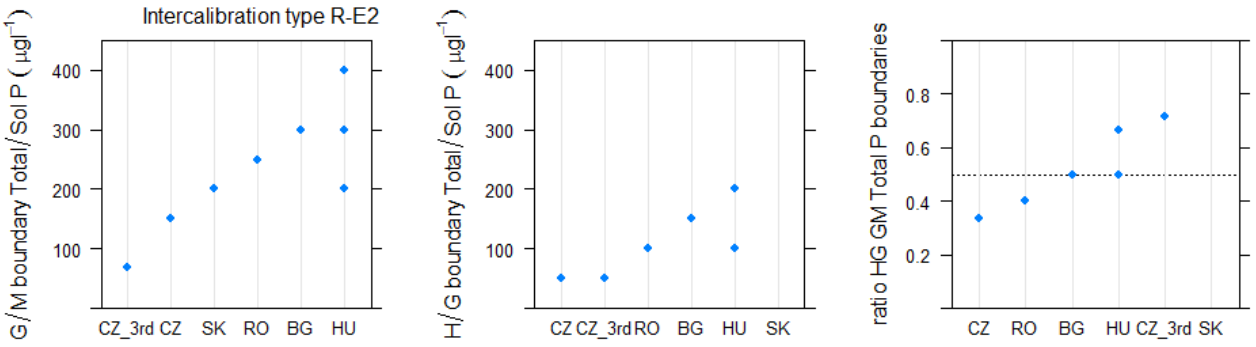

Figure 6.2-20 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-E2

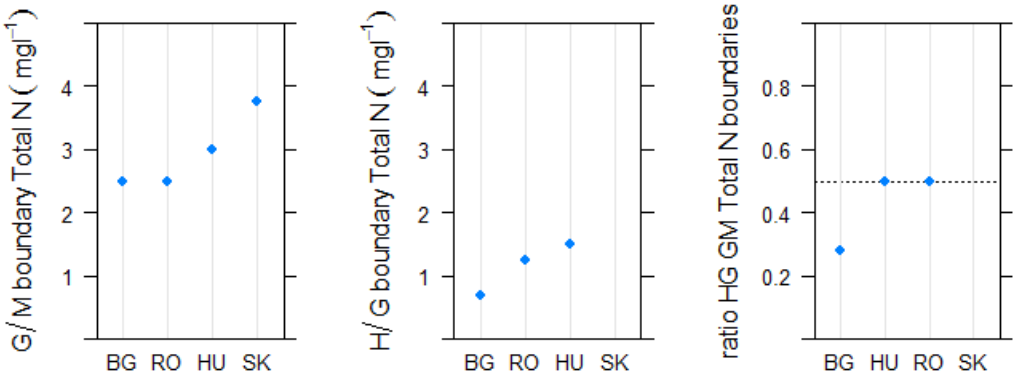

Figure 6.2-21 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good total nitrogen boundary values for intercalibration type R-E2

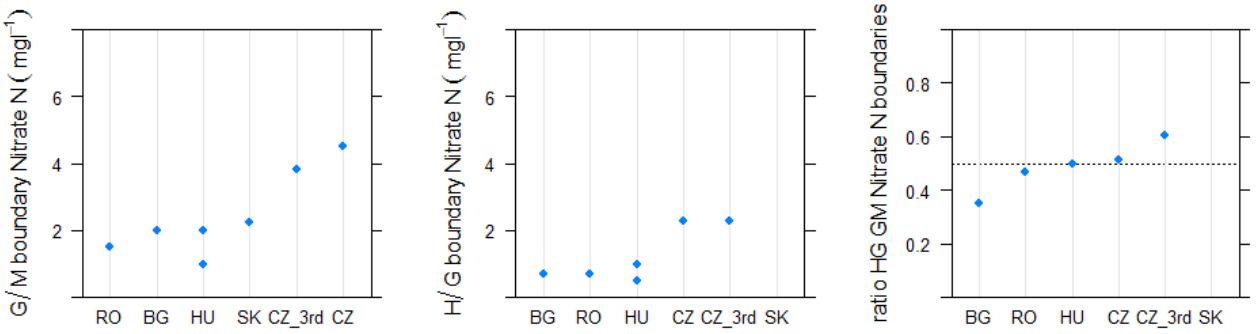

Figure 6.2-22 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-E2

6.2.1.9 R-E3 Plains: large/very large, lowland mixed rivers with sand, silt & gravel

Broad Type	Country	National type code	Description of type	IC Type
1	HU	14R	Plain – calcareous – coarse – very large catchment	R-E3
1	HU	20R	Plain – calcareous – medium/fine – very large catchment	R-E3
1	HU	7R	Hilly – calcareous – coarse – very large catchment	R-E3
4	BG	R7	Large Danube tributaries (ER12-1;altitude <80m; mixed;size >2500 km2, large; sand, silt, clay, loess)	R-E3
4	CZ	X-1-2-3	<200m,Sandstone, holocene,Strahler 7-9 (rivers)	R-E3
4	CZ_3rd	X-1-2-3	<200m,Sandstone, holocene,Strahler 7-9 (rivers)	R-E3
4	HU	13R	Plain – calcareous – coarse – large catchment	R-E3
4	HU	19R	Plain – calcareous – medium/fine – large catchment	R-E3
4	SK	B1(P1V)	Veľké toky v povodí Bodrogu v nadmorskej výške do 200 m v Panónskej panve	R-E3
4	SK	I1(P1V)	Dolná časť toku Ipeľ v nadmorskej výške do 200 m v Panónskej panve	R-E3
4	SK	M1(P1V)	Morava v nadmorskej výške do 200 m v Panónskej panve	R-E3
4	SK	R2(P1V)	Dolná časť toku Hron v nadmorskej výške do 200 m v Panónskej panve	R-E3
4	SK	V3(P1V)	Veľké toky dolnej časti povodia Váhu v nadmorskej výške do 200 m v Panónskej panve	R-E3
10	HU	10R	Hilly – calcareous – medium/fine – large catchment	R-E3
10	HU	6R	Hilly – calcareous – coarse – large catchment	R-E3

Table 6.2-9 National & broad types for Eastern Continental GIG countries reporting river intercalibration type R-E3

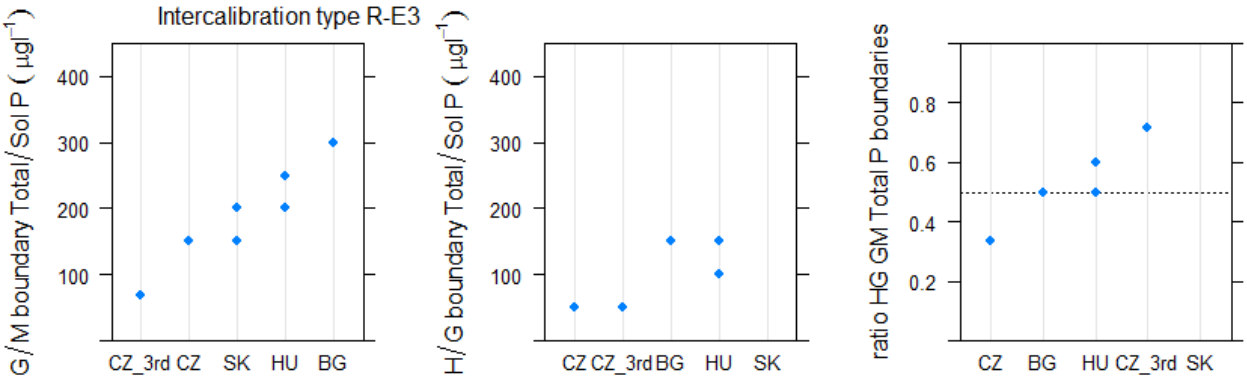

Figure 6.2-23 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-E3

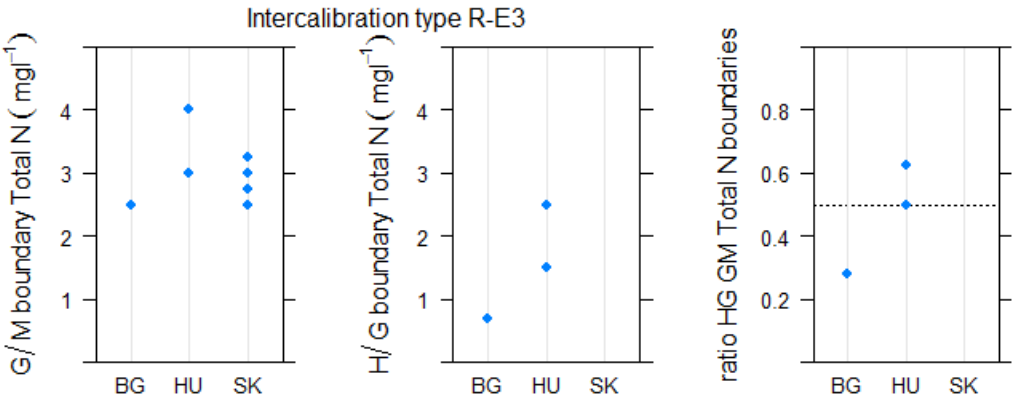

Figure 6.2-24 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good total nitrogen boundary values for intercalibration type R-E3

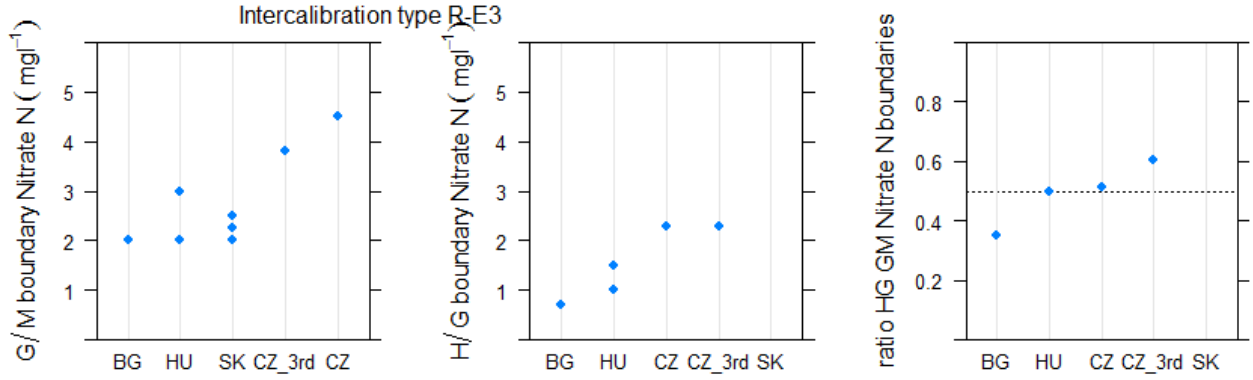

Figure 6.2-25 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-E3

6.2.1.10 R-E4 Plains: medium.mid-altitude, mixed rivers with sand & gravel

Broad Type	Country	National type code	Description of type	ICType
	CZ_3rd	X-2-1-2	200-500m,Crystalinicum, volcanic rock,Strahler 4-6 (smaller rivers)	R-E4
	CZ_3rd	X-2-2-2	200-500m,Sandstone, holocene,Strahler 4-6 (smaller rivers)	R-E4
9	BG	R4	"Semi mountain rivers (gravel rivers) in ER12	
10	AT	13__MZB1,75_PHBme2	Bioregion: Eastern Lowlands and Uplands of the Hungarian Plain (13); Macroinvertebrate- saprobic reference condition: SI 1,75; Phytobenthos-trophic reference condition: meso-eutrophic overall (me2)	R-E4
10	CZ	X-2-1-2	200-500m,Crystalinicum, volcanic rock,Strahler 4-6 (smaller rivers)	R-E4
10	CZ	X-2-2-2	200-500m,Sandstone, holocene,Strahler 4-6 (smaller rivers)	R-E4
10	HU	5R	Hilly – calcareous – coarse – medium catchment	R-E4
10	HU	9R	Hilly – calcareous – medium/fine – medium catchment	R-E4
11	SK	P2M	Malé toky v nadmorskej výške 200 - 500 m v Panónskej panve	R-E4
11	RO	RO04	Curs de apa situat in zona de dealuri sau de podisuri	R-E4

Table 6.2-10 National & broad types for Eastern Continental GIG countries reporting river intercalibration type R-E4

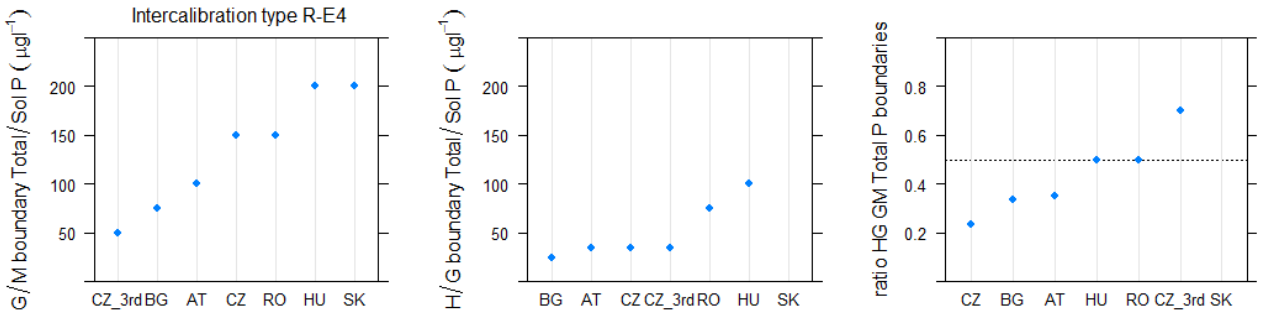

Figure 6.2-26 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-E4

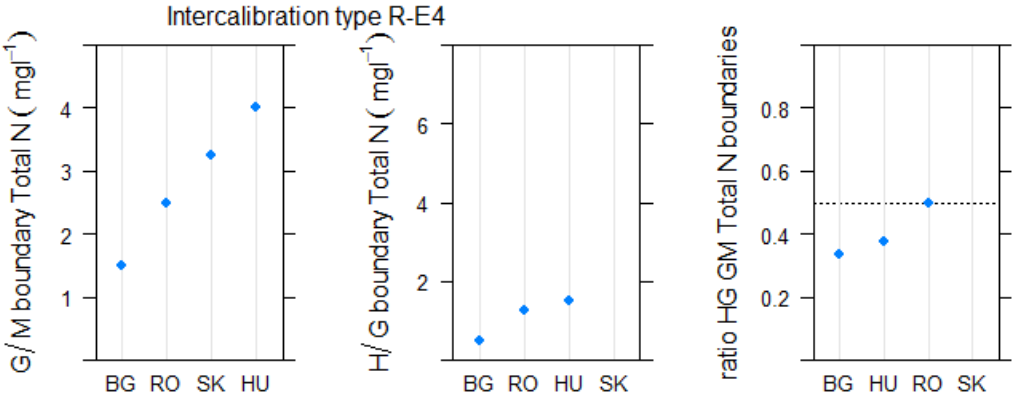

Figure 6.2-27 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good total nitrogen boundary values for intercalibration type R-E4

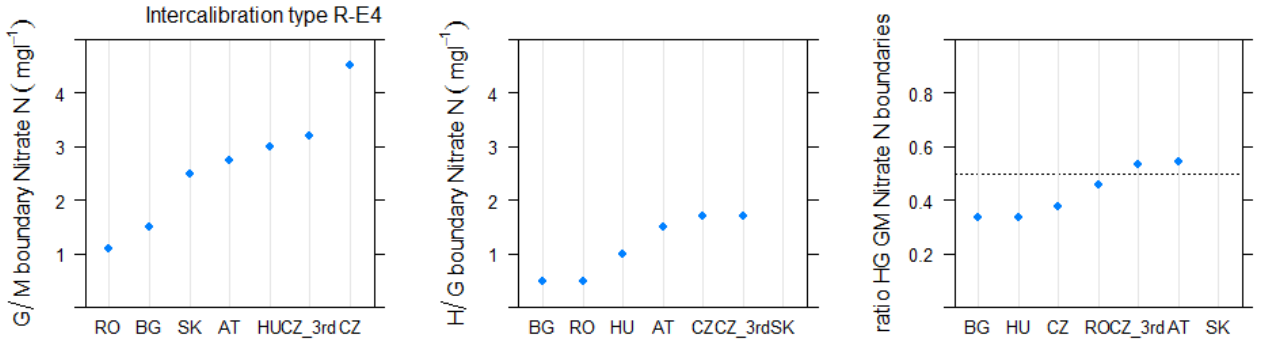

Figure 6.2-28 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-E4

6.2.1.11 R-M1 Small, mid-altitude Mediterranean mixed rivers, highly seasonal flow regime

Broad Type	Country	National type code	Description of type	ICType
	ES	101	Ríos de llanuras silíceas del Tajo y Guadia	R-M1
	ES	108	Ríos de baja montaña mediterránea silícea	R-M1
	ES	109	Ríos mineralizados de baja montaña mediterránea	R-M1
	ES	111	Ríos de montaña mediterránea silícea	R-M1
	ES	112	Ríos de montaña mediterránea calcárea	R-M1
	ES	113	Ríos mediterráneos muy mineralizados	R-M1
14	FR	PTP8-A	Petit ou Très Petit cours d'eau des Cévennes dans l'HER de niveau 2 n°70	R-M1
19	FR	PTP16-A	Petit ou Très Petit cours d'eau de Corse dans l'HER de niveau 2 n°22	R-M1
19	FR	PTP8	Petit ou Très Petit cours d'eau des Cévennes	R-M1
3	FR	PTP16-B	Petit ou Très Petit cours d'eau de Corse dans l'HER de niveau 2 n°88	R-M1
11	IT	IT10SS1N		R-M1
11	IT	IT10SS2N		R-M1
18	IT	IT13AS3N		R-M1
19	IT	IT09SS2T		R-M1
19	IT	IT10SS2T		R-M1
19	IT	IT11SS2N		R-M1
19	IT	IT11SS2T		R-M1
19	IT	IT13SR2T		R-M1
19	IT	IT14SS2T		R-M1
19	IT	IT19SR1N		R-M1
19	IT	IT19SR2N		R-M1
19	IT	IT19SS1N		R-M1
19	IT	IT19SS2N		R-M1
19	IT	IT21SS2T		R-M1
	PT	R_M	Rios Montanhosos do Norte	R-M1
	PT	R_N4	Rios de Transição Norte-Sul	R-M1
	PT	R_S2	Rios Montanhosos do Sul	R-M1
17	PT	R_L	Rios do Litoral Centro	R-M1
17	PT	R_S3	Depósitos Sedimentares do Tejo e Sado	R-M1
19	PT	R_N1P	Rios do Norte de Pequena Dimensão	R-M1
19	PT	R_N3	Rios do Alto Douro de Pequena Dimensão	R-M1

Table 6.2-11 National & broad types for Mediterranean GIG countries reporting river intercalibration type R-M1

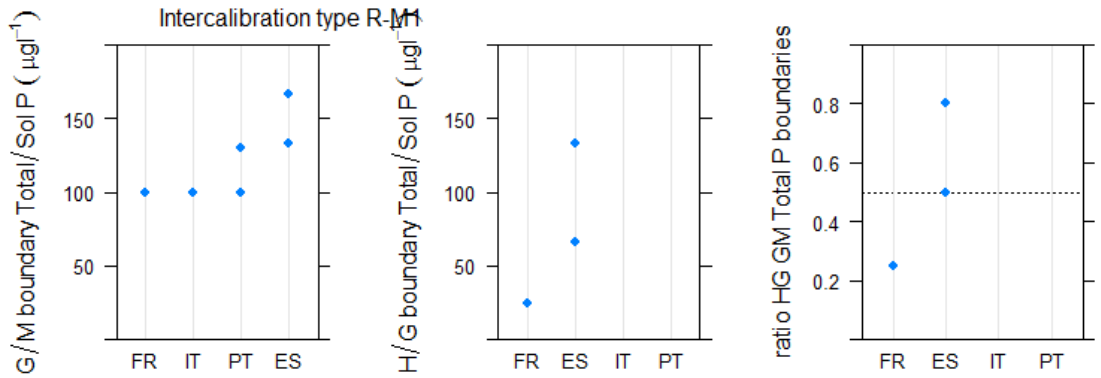

Figure 6.2-29 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-M1

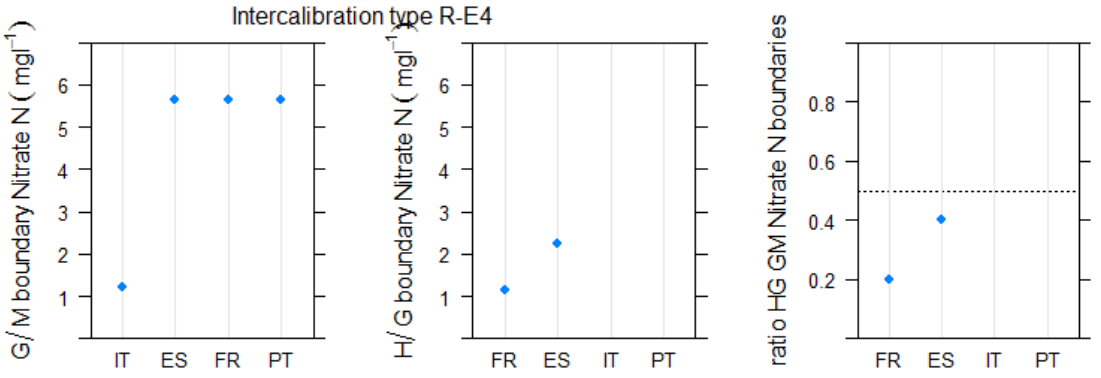

Figure 6.2-30 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-M1

6.2.1.12 R-M2 Medium, Mediterranean mixed streams, highly seasonal flow regime

Broad Type	Country	National type code	Description of type	ICType
	ES	102	Ríos de la depresión del Guadalquivir	R-M2
	ES	106	Ríos silíceos del piedemonte de Sierra More	R-M2
	ES	107	Ríos mineralizados mediterráneos de baja altitud	R-M2
	ES	109	Ríos mineralizados de baja montaña mediterránea	R-M2
	ES	111	Ríos de montaña mediterránea silícea	R-M2
	ES	112	Ríos de montaña mediterránea calcárea	R-M2
	ES	114	Ejes mediterráneos de baja altitud	R-M2
	ES	116	Ejes mediterráneos continentales mineralizados	R-M2
2	FR	M16-B	Moyen cours d'eau de Corse dans l'HER de niveau 2 n°88	R-M2
8	FR	M16-A	Moyen cours d'eau de Corse dans l'HER de niveau 2 n°22	R-M2
8	FR	M8-A	Moyen cours d'eau des Cévennes dans l'HER de niveau 2 n°70	R-M2
17	IT	IT06SS4D		R-M2
17	IT	IT06SS4F		R-M2
	PT	R_N1G	Rios do Norte de Média-Grande Dimensão	R-M2
	PT	R_N2	Rios do Alto Douro de Média-Grande Dimensão	R-M2
	PT	R_N4	Rios de Transição Norte-Sul	R-M2
	PT	R_S2	Rios Montanhosos do Sul	R-M2
17	PT	R_L	Rios do Litoral Centro	R-M2
17	PT	R_S1G	Rios do Sul de Média-Grande Dimensão	R-M2
17	PT	R_S3	Depósitos Sedimentares do Tejo e Sado	R-M2

Table 6.2-12 National & broad types for Mediterranean GIG countries reporting river intercalibration type R-M2

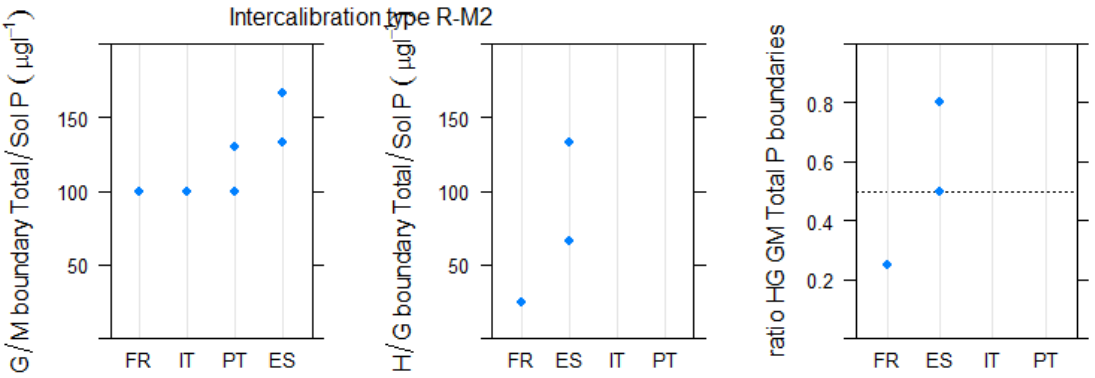

Figure 6.2-31 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-M2

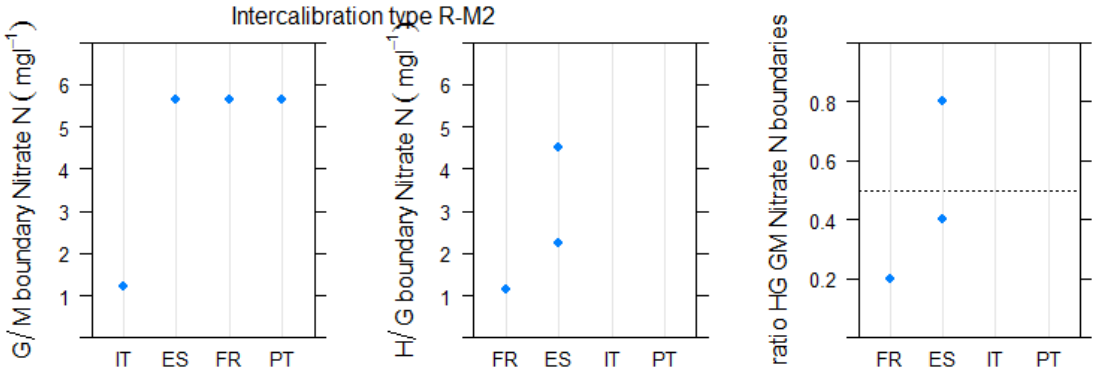

Figure 6.2-32 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-M2

6.2.1.13 R-M4 Small/medium Mediterranean mountain streams

Broad Type	Country	National type code	Description of type	ICType
15	CY	R2	large rain volume with continuous flow	R-M4
	ES	111	Ríos de montaña mediterránea silícea	R-M4
	ES	112	Ríos de montaña mediterránea calcárea	R-M4
	ES	117	Grandes ejes en ambiente mediterráneo	R-M4
	ES	126	Ríos de montaña húmeda calcárea	R-M4
	ES	127	Ríos de alta montaña	R-M4
15	FR	MP6	Moyen ou Petit cours d'eau de Méditerranée	R-M4
15	FR	TP7	Très Petit cours d'eau des Pré-Alpes du Sud	R-M4
18	FR	GMP7	Grand ou Moyen ou Petit cours d'eau des Pré-Alpes du Sud	R-M4
19	FR	TP6	Très Petit cours d'eau de Méditerranée	R-M4
17	IT	IT06SS3T		R-M4
18	IT	IT10SS3N		R-M4
18	IT	IT19SS3N		R-M4
18	IT	IT21SS3T		R-M4

Table 6.2-13 National & broad types for Mediterranean GIG countries reporting river intercalibration type R-M4

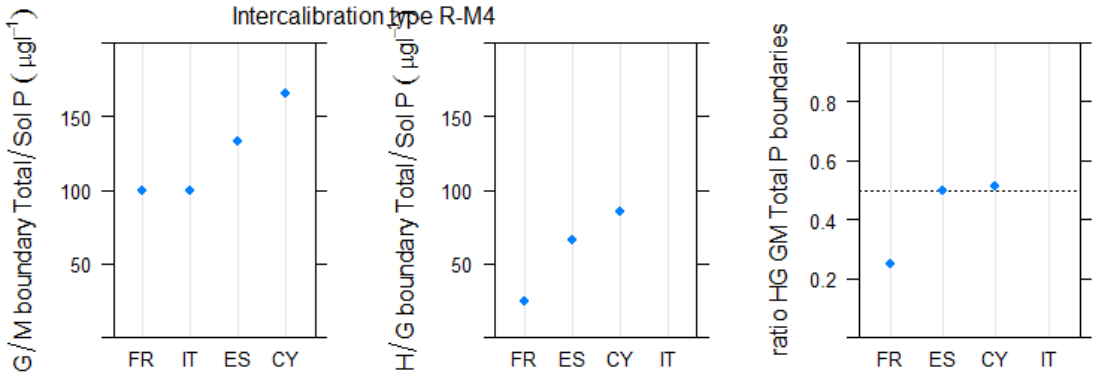

Figure 6.2-33 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good boundary values for intercalibration type R-M4

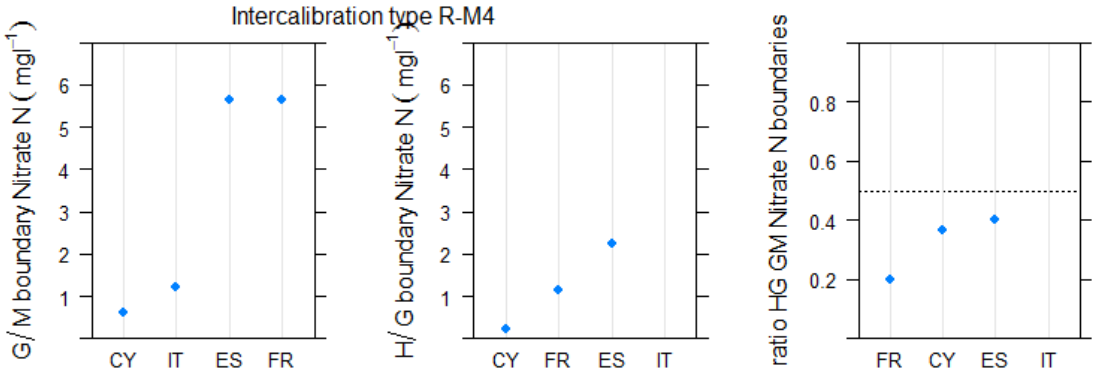

Figure 6.2-34 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-M4

6.2.1.14 R-M5 Mediterranean temporary streams

Broad Type	Country	National type code	Description of type	ICType
20	CY	R1	small rain volume with non-continuous flow	R-M5
20	CY	R3	large rain volume with non-continuous flow	R-M5
	ES	105	Ríos manchegos	R-M5
	ES	106	Ríos silíceos del piedemonte de Sierra More	R-M5
	ES	108	Ríos de baja montaña mediterránea silícea	R-M5
	ES	109	Ríos mineralizados de baja montaña mediterránea	R-M5
	ES	110	Ríos mediterráneos con influencia cárstica	R-M5
	ES	111	Ríos de montaña mediterránea silícea	R-M5
	ES	112	Ríos de montaña mediterránea calcárea	R-M5
	ES	118	Ríos costeros mediterráneos	R-M5
20	IT	IT06IN7D		R-M5
20	IT	IT06IN7N		R-M5
20	IT	IT10EF7N		R-M5
20	IT	IT10IN7N		R-M5
20	IT	IT11EF7N		R-M5
20	IT	IT11IN7N		R-M5
20	IT	IT11IN7T		R-M5
20	IT	IT12IN7N		R-M5
20	IT	IT19EF7N		R-M5
20	IT	IT19IN7N		R-M5
20	IT	IT19IN8N		R-M5
20	IT	IT20IN7N		R-M5
20	IT	IT21EF7T		R-M5
20	IT	IT21IN7T		R-M5
	PT	R_N4	Rios de Transição Norte-Sul	R-M5
	PT	R_S2	Rios Montanhosos do Sul	R-M5
17	PT	R_L	Rios do Litoral Centro	R-M5
17	PT	R_S1G	Rios do Sul de Média-Grande Dimensão	R-M5
17	PT	R_S3	Depósitos Sedimentares do Tejo e Sado	R-M5
20	PT	R_S1P	Rios do Sul de Pequena Dimensão	R-M5
20	PT	R_S4	Calcários do Algarve	R-M5

Table 6.2-14 National & broad types for Mediterranean GIG countries reporting river intercalibration type R-M5

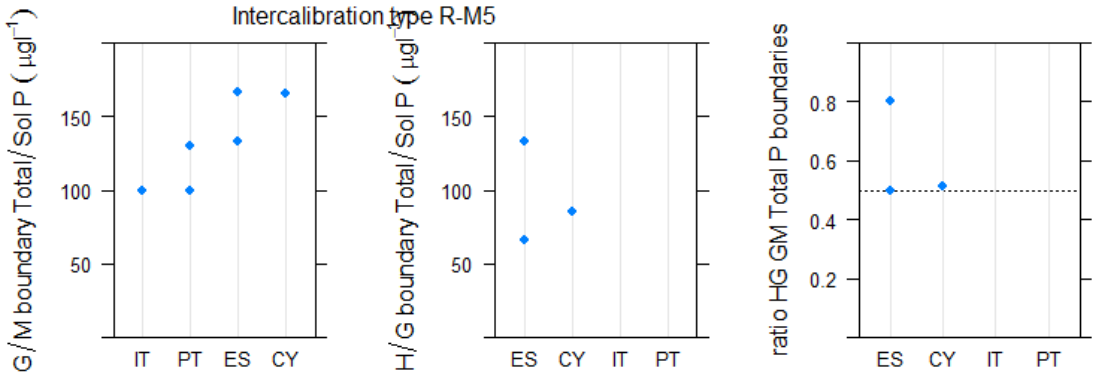

Figure 6.2-35 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good phosphorus boundary values for intercalibration type R-M5

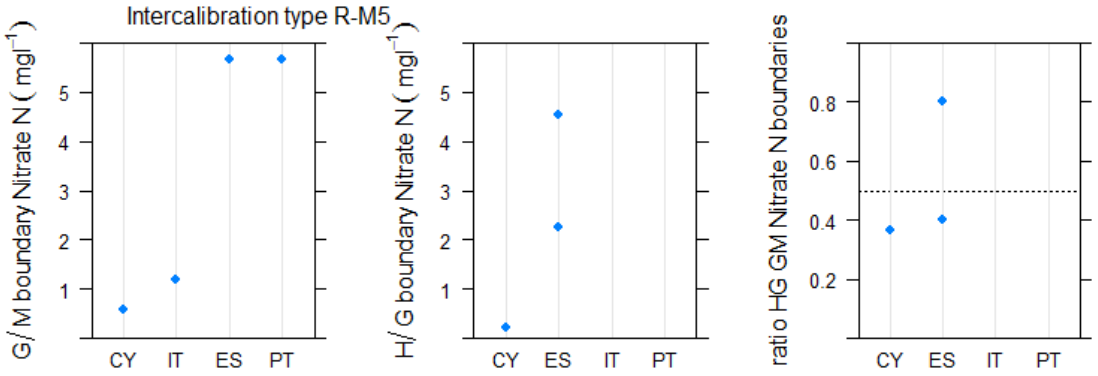

Figure 6.2-36 Range of a)good/moderate, b)high/good, c)ratio of good/moderate to high/good nitrate nitrogen boundary values for intercalibration type R-M5

6.2.2 River phosphorus and nitrogen boundaries by broad type and country

Note that tables only show types where a good moderate boundary was reported

6.2.2.1 Type 1, Very large rivers, all Europe

Broad Type	Country	National type code	Description of type	IC Type
1	BE (Fl)	Rzg	Zeer grote rivier	R-L
1	BE (W)	RIV_19		R-C5
1	DE	10	Kiesgeprägte Ströme	not allocated
1	DE	20	Sandgeprägte Ströme	not allocated
1	EE	4B	Catchment over 10 000 km2, COD-Mn 90% below 25 mgO/L	R-L
1	FI	ESk	Catchment area > 10000 km2 of which peat land <25%,na tural water colour <90 mg/l Pt	not allocated
1	FI	ESt	Catchment area > 10000 km2 of which peat land >25%, natural water colour >90 mg/l Pt	not allocated
1	FR	TG22/10	Très Grand cours d'eau des Ardennes et exogène des Côtes calcaires Est	R-C5
1	HR	HR-R_5A	Lowland very large rivers - source in Diric ecoregion	not allocated
1	HR	HR-R_5B	Lowland very large rivers, siliceous and calcareous bed -lower course of Mura river and medium course of Drava and Sava river	not allocated
1	HR	HR-R_5C	Lowland very large rivers, siliceous bed - lower course of Drava and Sava river	not allocated
1	HR	HR-R_5D	Lowland very large rivers, siliceous bed - Danube river	not allocated
1	HU	14R	Plain – calcareous – coarse – very large catchment	R-E3
1	HU	20R	Plain – calcareous – medium/fine – very large catchment	R-E3
1	HU	23R	Du above Gönyű	R-E6a
1	HU	24R	Du between Gönyű and Baja	R-E6a
1	HU	25R	Du below Baja	R-E6b
1	HU	7R	Hilly – calcareous – coarse – very large catchment	R-E3
1	NL	R7	Langzaam stromende rivier/nevengeul op zand/klei	R-C5
1	PL	21	Wielka rzeka nizinna	not allocated
1	RO	RO15	Delta Dunarii	not allocated
1	SK	D1(P1V)	Dunaj v úseku Devín - Klížská Nemá v nadmorskej výške do 200 m v Panónskej panve	R-L
1	SK	D2(P1V)	Dunaj v úseku Klížská Nemá - št. hranica s HU v nadmorskej výške do 200 m v Panónskej panve	R-L

Table 6.2-15 National & intercalibration types for countries reporting Broad Type 1, very large rivers all Europe

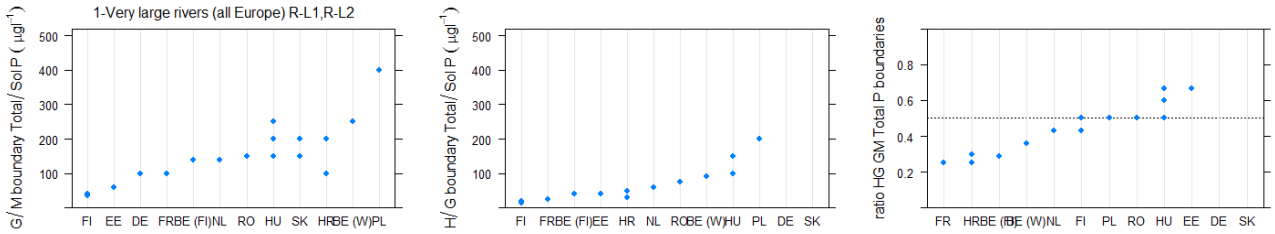

Figure 6.2-37 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 1, very large rivers all Europe. (90th percentile values halved)

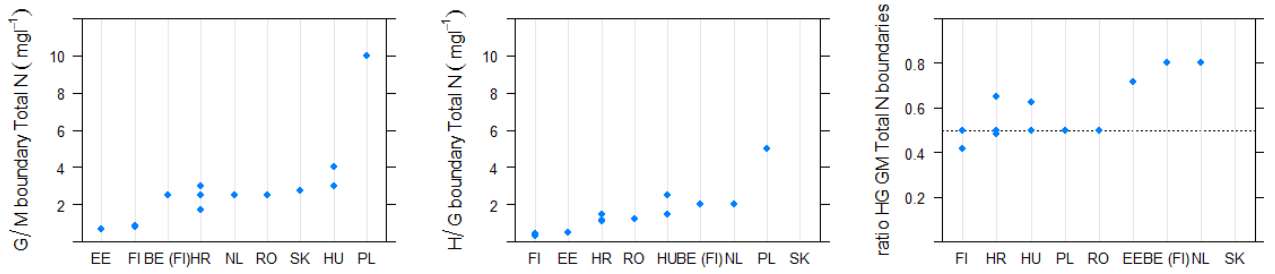

Figure 6.2-38 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 1, very large rivers all Europe.

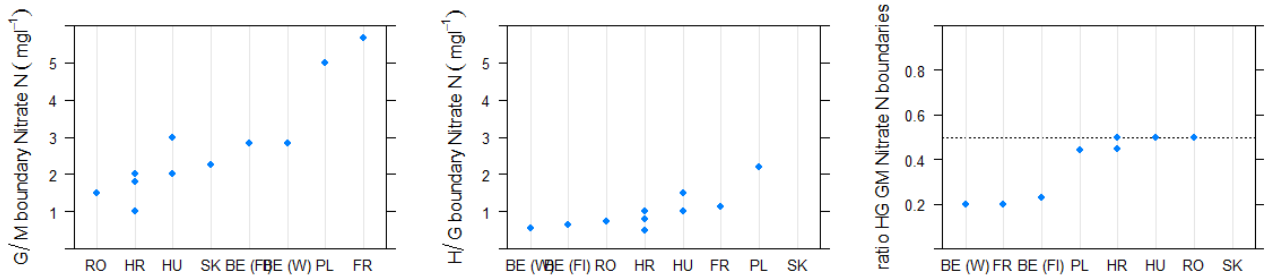

Figure 6.2-39 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 1, very large rivers all Europe.

6.2.2.2 Type 2 Lowland, siliceous, medium-large rivers

Broad Type	Country	National type code	Description of type	IC Type
2	BE (Fl)	Rg	Grote rivier	R-C4
2	BE (Fl)	Rk	Kleine rivier	R-C4
2	BG	R12	Large floodplain rivers (ER7;altitude <150 (200) m variable; mixed/siliceous;size >7000 km2, large and very large; sand)	
2	FI	Kk	Catchment area 100-1000 km2 of which peat land <25%, natural water colour <90 mg/l Pt	R-N4
2	FR	G12	Grand cours d'eau Armoricain	R-C5
2	FR	G18/4	Grand cours d'eau d'Alsace et exogène des Vosges	R-C5
2	FR	GM20	Grand ou Moyen cours d'eau des Dépôts argilo-sableux	R-C5
2	FR	M16-B	Moyen cours d'eau de Corse dans l'HER de niveau 2 n°88	R-M2
2	FR	P12-A	Petit cours d'eau Armoricain dans les HER de niveau 2 n°58 ou n°117	R-C2
2	FR	P12-B	Petit cours d'eau Armoricain dans les HER de niveau 2 n°55, n°59 ou n°118	R-C2
2	SE	V3LNN	lowland silic >100km2 S3, Coast of Norrland	
2	SE	V4LNN	lowland silic >100km2 S4, Southeast Sweden	
2	SE	V5LNN	lowland silic >100km2 S5, South Sweden	
2	SE	V6LNN	lowland silic >100km2 S6, Southwest Sweden	
2	UK	4	Lowland Siliceous Medium	
2	UK	7	Lowland Siliceous Large	

Table 6.2-16 National & intercalibration types for countries reporting Broad Type 2, lowland, siliceous, medium large rivers

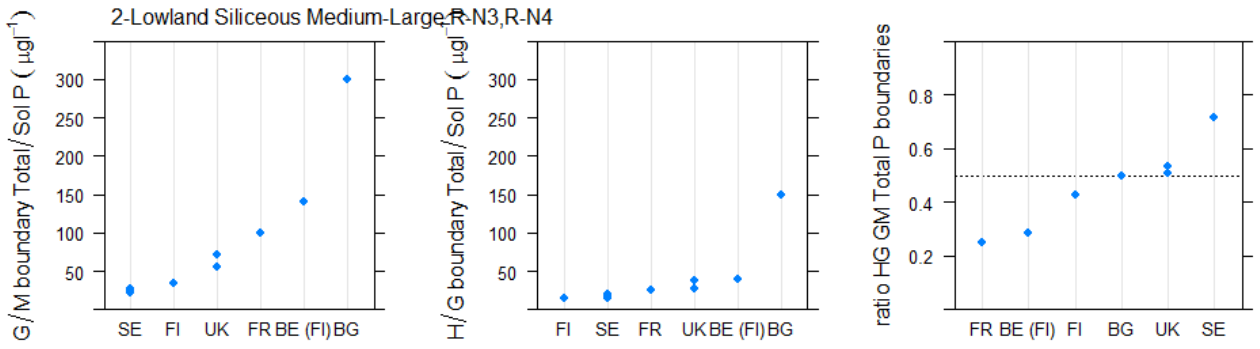

Figure 6.2-40 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 2, lowland, siliceous, medium large rivers (90th percentile values halved)

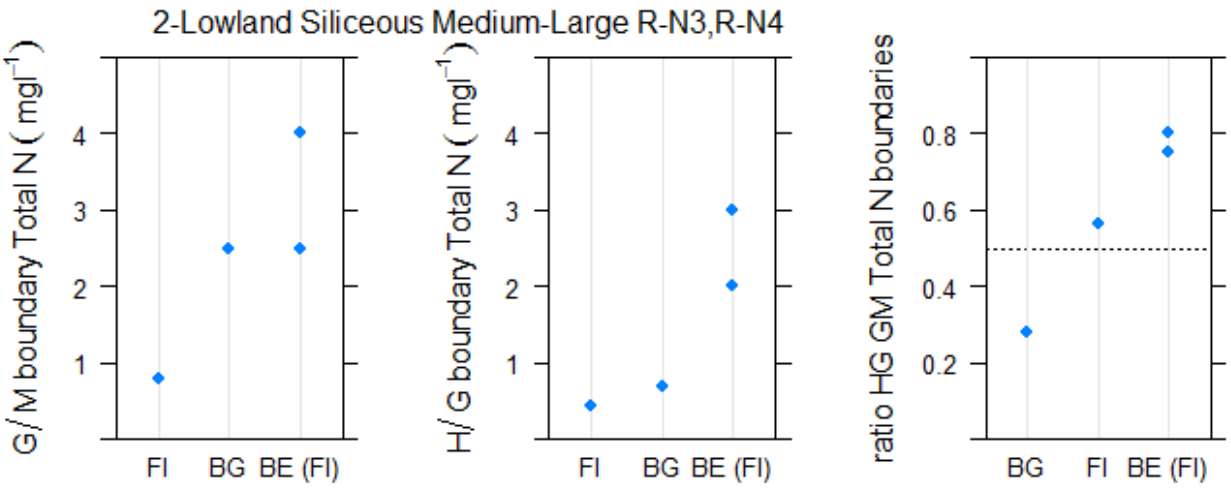

Figure 6.2-41 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 2, lowland, siliceous, medium large rivers

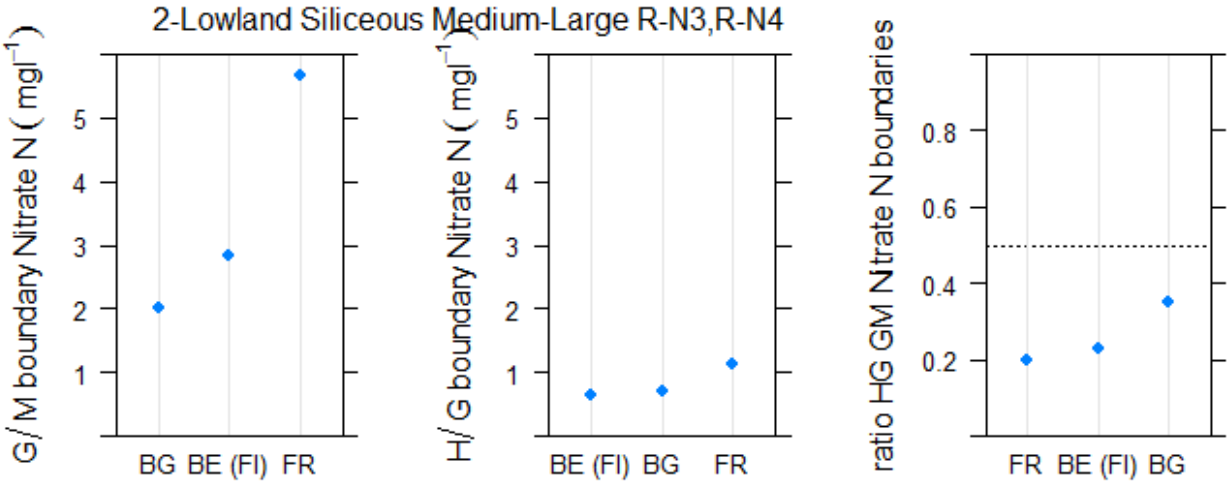

Figure 6.2-42 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 2, lowland, siliceous, medium large rivers

6.2.2.3 Type 3 Lowland, siliceous, very small-small rivers

Broad Type	Country	National type code	Description of type	IC Type
3	BE (Fl)	Bg	Grote beek	R-C4
3	BE (Fl)	BgK	Grote beek Kempen	R-C4
3	DE	19	Kleine Niederungsfließgewässer in Fluss- und Stromtälern	not allocated
3	FI	Pk	Catchment area < 100 km2 of which peat land <25%, natural water colour <90 mg/l Pt	R-N1
3	FR	P13	Petit cours d'eau des Landes	R-C1
3	FR	P18/4	Petit cours d'eau d'Alsace et exogène des Vosges	R-C1
3	FR	P20	Petit cours d'eau des Dépôts argilo-sableux	R-C1
3	FR	PTP16-B	Petit ou Très Petit cours d'eau de Corse dans l'HER de niveau 2 n°88	R-M1
3	FR	TP12-A	Très Petit cours d'eau Armoricain dans les HER de niveau 2 n°58 ou n°117	R-C2
3	FR	TP12-B	Très Petit cours d'eau Armoricain dans les HER de niveau 2 n°55, n°59 ou n°118	R-C2
3	FR	TP13	Très Petit cours d'eau des Landes	R-C1
3	FR	TP20	Très Petit cours d'eau des Dépôts argilo-sableux	R-C1
3	HR	HR-R_3A	Lowland small alluvial rivers with gravel-cobble substrate	not allocated
3	IE	11	Siliceous, low slope	R-N3
3	IE	12	Siliceous, medium slope	R-N3
3	IE	13	Siliceous, high slope	R-N3
3	IE	14	Siliceous, very high slope	R-N3
3	NL	R14	Snelstromende middenloop/benedenloop op zand	R-C1
3	NL	R17	Snelstromende bovenloop op kalkhoudende bodem	R-C1
3	NL	R18	Snelstromende middenloop/benedenloop op kalkhoudende bodem	R-C1
3	NO	1	lowland, low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	R-N2a
3	NO	2	lowland, low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	R-N2a
3	NO	5	lowland, low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	R-N2a
3	NO	7	lowland, moderate alkalinity (0,2-1,0 mekv/l), clear (colour <30 mg Pt/l)	R-N1
3	PL	17	Potok nizinny piaszczysty	R-C1
3	PL	18	Potok nizinny żwirowy	R-C1
3	PL	26	Cieki w dolinach wielkich rzek nizinnych	R-C1
3	SE	V3SNN	lowland silic <100km2 S3, Coast of Norrland	not allocated
3	SE	V4SNN	lowland silic <100km2 S4, Southeast Sweden	not allocated
3	SE	V5SNN	lowland silic <100km2 S5, South Sweden	not allocated
3	SE	V6SNN	lowland silic <100km2 S6, Southwest Sweden	not allocated
3	UK	1	Lowland Siliceous Small	not allocated
3	UK	37	Lowland Siliceous extra-small	not allocated

Table 6.2-17 National & intercalibration types for countries reporting Broad Type3, lowland, siliceous, very small-small rivers

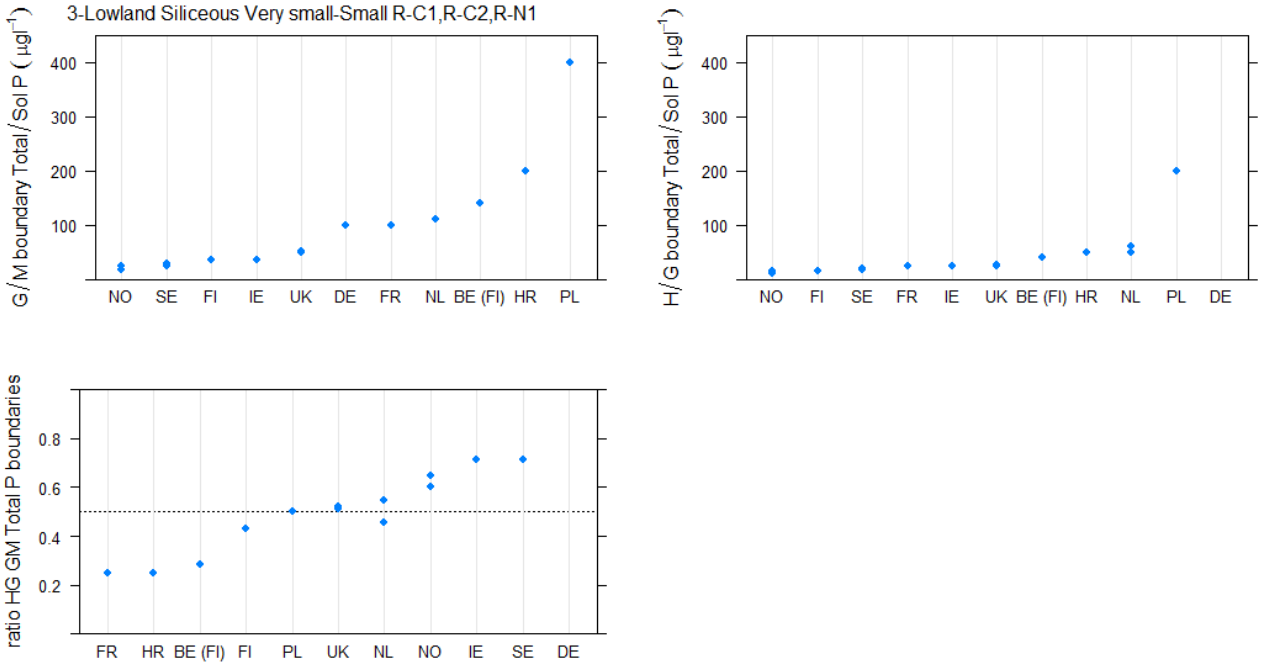

Figure 6.2-43 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 3, lowland, siliceous, very small-small rivers (90th percentile values halved)

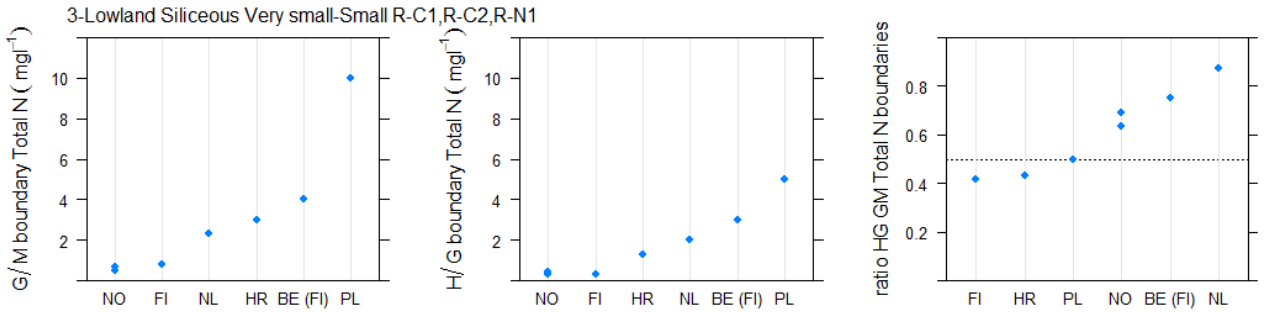

Figure 6.2-44 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 3, lowland, siliceous, very small-small rivers

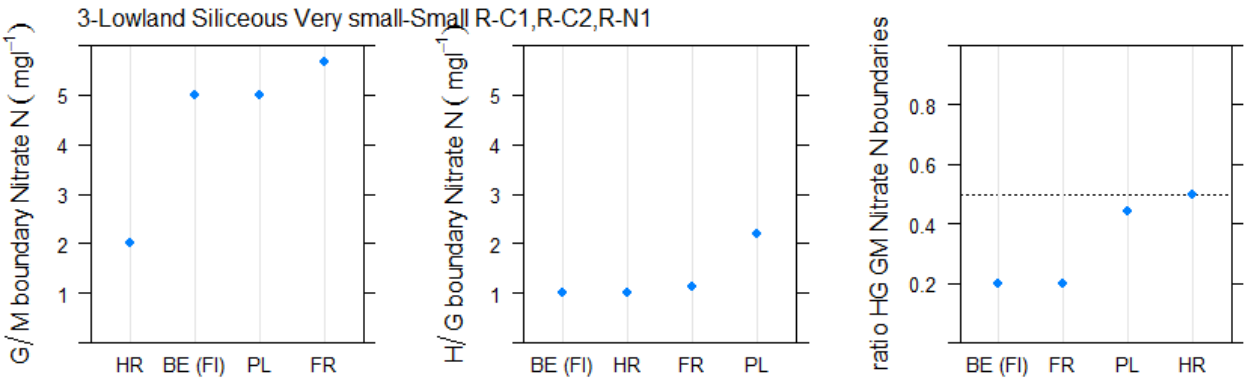

Figure 6.2-45 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 3, lowland, siliceous, very small-small rivers

6.2.2.4 Type 4 Lowland, calcareous/mixed, medium-large rivers

Broad Type	Country	National type code	Description of type	IC Type
4	BE (W)	RIV_21		R-C4
4	BE (W)	RIV_22		R-C4
4	BE (W)	RIV_23		R-C5
4	BG	R10	Large Black Sea rivers (ER12-2;altitude <80m; mixed/siliceous;size >2500 km2, large; sand, silt, clay)	not allocated
4	BG	R11	Small and medium Black Sea rivers (ER12-2;altitude <70m, variable; mixed/siliceous;size <900 km2, small and medium; sand, silt, clay)	not allocated
4	BG	R13	Small and medium floodplain rivers (ER 7;altitude <150 (350) m variable; mixed/siliceous;size <1300 km2, medium and small; sand, silt)	not allocated
4	BG	R7	Large Danube tributaries (ER12-1;altitude <80m; mixed;size >2500 km2, large; sand, silt, clay, loess)	R-E3
4	BG	R8	Medium and small Danube rivers (ER12-1;altitude <100m; calcareous/mixed/siliceous;size variable; sand, silt, clay, loess)	R-E2
4	CZ	X-1-1-2	<200m,Crystalinicum, volcanic rock,Strahler 4-6 (smaller rivers)	R-C4
4	CZ	X-1-1-3	<200m,Crystalinicum, volcanic rock,Strahler 7-9 (rivers)	R-C5
4	CZ	X-1-2-2	<200m,Sandstone, holocene,Strahler 4-6 (smaller rivers)	R-E2
4	CZ	X-1-2-3	<200m,Sandstone, holocene,Strahler 7-9 (rivers)	R-E3
4	CZ_3rd	X-1-1-2	<200m,Crystalinicum, volcanic rock,Strahler 4-6 (smaller rivers)	R-C4
4	CZ_3rd	X-1-1-3	<200m,Crystalinicum, volcanic rock,Strahler 7-9 (rivers)	R-C5
4	CZ_3rd	X-1-2-2	<200m,Sandstone, holocene,Strahler 4-6 (smaller rivers)	R-E2
4	CZ_3rd	X-1-2-3	<200m,Sandstone, holocene,Strahler 7-9 (rivers)	R-E3
4	DE	15	Sand- und lehmgeprägte Tieflandflüsse	not allocated
4	DE	15_g	"Große sand- und lehmgeprägte Tieflandflüsse	
"	not allocated			
4	DE	17	Kiesgeprägte Tieflandflüsse	not allocated
4	EE	2A	Catchment 100-1000 km2, COD-Mn 90% 25 and over mgO/L	R-C4
4	EE	2A	Catchment 100-1000 km2, COD-Mn 90% 25 and over mgO/L	R-C6
4	EE	2B	Catchment 100-1000 km2, COD-Mn 90% below 25 mgO/L	R-C4
4	EE	2B	Catchment 100-1000 km2, COD-Mn 90% below 25 mgO/L	R-C6
4	EE	3A	Catchment 1000-10000 km2, COD-Mn 90% 25 and over mgO/L	R-C5
4	EE	3B	Catchment 1000-10000 km2, COD-Mn 90% below 25 mgO/L	R-C5
4	FR	G9	Grand cours d'eau des Tables calcaires	R-C5
4	FR	G9-10/21	Grand cours d'eau des Tables calcaires ou des Côtes calcaires Est et exogène du Massif central Nord	R-C5
4	FR	GM14	Grand ou Moyen cours d'eau des Coteaux aquitains	R-C5
4	FR	GM20/9	Grand ou Moyen cours d'eau des Dépôts argilo-sableux et exogène des Tables calcaires	R-C5

4	FR	M10	Moyen cours d'eau des Côtes calcaires Est	R-C4
4	FR	M10/4	Moyen cours d'eau des Côtes calcaires Est et exogène des Vosges	R-C4
4	FR	M11/3-21	Moyen cours d'eau des Causses aquitains et exogène du Massif central Sud ou du Massif central Nord	R-C4
4	FR	M12-A	Moyen cours d'eau Armoricain dans les HER de niveau 2 n°58 ou n°117	R-C4
4	FR	M12-B	Moyen cours d'eau Armoricain dans les HER de niveau 2 n°55, n°59 ou n°118	R-C4
4	FR	M13	Moyen cours d'eau des Landes	R-C4
4	FR	M14/3-11	Moyen cours d'eau des Coteaux aquitains et exogène du Massif central Sud et/ou des Causses aquitains	R-C4
4	FR	M14/3-8	Moyen cours d'eau des Coteaux aquitains et exogène du Massif central Sud et/ou des Cévennes	R-C4
4	FR	M15-17/3-21	Moyen cours d'eau de la Plaine de Saône ou des Dépressions sédimentaires et exogène du Massif central Sud ou du Massif central Nord	R-C4
4	FR	M18/4	Moyen cours d'eau d'Alsace et exogène des Vosges	R-C4
4	FR	M20		R-C4
4	FR	M9	Moyen cours d'eau des Tables calcaires	R-C4
4	FR	M9-10/21	Moyen cours d'eau des Tables calcaires ou des Côtes calcaires Est et exogène du Massif central Nord	R-C4
4	FR	M9-A	Moyen cours d'eau des Tables calcaires dans l'HER de niveau 2 n°57	R-C4
4	FR	MP15	Moyen ou Petit cours d'eau de Plaine de Saône	R-C4
4	FR	MP15/5	Moyen ou Petit cours d'eau de Plaine de Saône et exogène du Jura/Pré-Alpes du Nord	R-C4
4	FR	MP18	Moyen ou Petit cours d'eau d'Alsace	R-C4
4	FR	P9	Petit cours d'eau des Tables calcaires	R-C6
4	HR	HR-R_4	Lowland medium and large rivers	not allocated
4	HR	HR-R_8	Lowland medium and large rivers in Diric ecoregion	not allocated
4	HU	12R	Plain – calcareous – coarse – medium catchment	R-E2
4	HU	13R	Plain – calcareous – coarse – large catchment	R-E3
4	HU	18R	Plain – calcareous – medium/fine – medium catchment	R-E2
4	HU	19R	Plain – calcareous – medium/fine – large catchment	R-E3
4	HU	22R	Plain – organic – medium catchment	R-E2
4	IT	IT06SS3F		not allocated
4	LT	RWT2	Medium slow flowing rivers (area 100-1000 km2, slope less than 0,7 m/km)	R-C4
4	LT	RWT2	Medium slow flowing rivers (area 100-1000 km2, slope less than 0,7 m/km)	R-C6
4	LT	RWT3	Medium fast flowing rivers (area 100-1000 km2, slope more than 0,7 m/km)	R-C4
4	LT	RWT3	Medium fast flowing rivers (area 100-1000 km2, slope more than 0,7 m/km)	R-C6
4	LT	RWT4	Large slow flowing rivers (area more than 1000 km2, slope less than 0,3 m/km)	R-C5
4	LT	RWT5	Large fast flowing rivers (area more than 1000 km2, slope more than 0,3 m/km)	R-C5
4	LU	5	mid-sized and mid-altitude streams in the Gutland	R-C4
4	LU	6	large lowland streams	R-C5
4	LV	R3	Lowland (< 300 m a.s.l.), carbonatic bedrock, medium size (100-1000km2), fast-flowing (slope > 1 m/km).	R-C4
4	LV	R4	Lowland (< 300 m a.s.l.), carbonatic bedrock, medium size (100-1000km2), slow-running (slope < 1 m/km).	R-C4
4	LV	R5	Lowland (< 300 m a.s.l.), carbonatic bedrock, large (>	R-C5

			1000 km2), fast-flowing (slope > 1 m/km).	
4	LV	R6	Lowland (< 300 m a.s.l.), carbonatic bedrock, large (> 1000 km2), slow-running (slope < 1 m/km).	R-C5
4	LV	R6	Lowland (< 300 m a.s.l.), carbonatic bedrock, large (> 1000 km2), slow-running (slope < 1 m/km).	R-L
4	NL	R12	Langzaam stromende middenloop/benedenloop op veenbodem	R-C5
4	NL	R13	Snelstromende bovenloop op zand	R-C4
4	NL	R15	Snelstromend riviertje op kiezelhoudende bodem	R-C4
4	NL	R16	Snelstromende rivier/nevengeul op zandbodem of grind	R-C5
4	NL	R8	Zoet getijdenwater (uitlopers rivier) op zand/klei	R-C5
4	PL	19	Rzeka nizinna piaszczysto- gliniasta	R-C4
4	PL	19	Rzeka nizinna piaszczysto- gliniasta	R-C5
4	PL	20	Rzeka nizinna żwirowa	R-C4
4	PL	20	Rzeka nizinna żwirowa	R-C5
4	PL	25	Cieki łączące jeziora	R-C5
4	RO	RO07	Sector de curs de apa situat in zona de campie - ecoregiunea 11	not allocated
4	RO	RO08	Sector de curs de apa situat in zona de campie - ecoregiunea 12	not allocated
4	RO	RO08*	Sector de curs de apa situat in zona de campie (fara fauna piscicola in conditii naturale) - ecoregiunea 12	not allocated
4	RO	RO10	Sector de curs de apa situat in zona de campie - F>3000 km2 - ecoregiunea 11	not allocated
4	RO	RO11	Sector de curs de apa cu zone umede situat in zona de campie -F>3000 km2 - ecoregiunea 11	not allocated
4	RO	RO11*	Sector de curs de apa cu zone umede situat in zona de campie -F>5000 km2 - ecoregiunea 12,16	not allocated
4	SE	V4LNY	lowland calc >100km2 S4, Southeast Sweden	not allocated
4	SE	V5LNY	lowland calc >100km2 S5, South Sweden	not allocated
4	SE	V6LNY	lowland calc >100km2 S6, Southwest Sweden	not allocated
4	SK	B1(P1V)	Veľké toky v povodí Bodrogu v nadmorskej výške do 200 m v Panónskej panve	R-E3
4	SK	I1(P1V)	Dolná časť toku Ipeľ v nadmorskej výške do 200 m v Panónskej panve	R-E3
4	SK	M1(P1V)	Morava v nadmorskej výške do 200 m v Panónskej panve	R-E3
4	SK	P1S	Stredne veľké toky v nadmorskej výške do 200 m v Panónskej panve	R-E2
4	SK	R2(P1V)	Dolná časť toku Hron v nadmorskej výške do 200 m v Panónskej panve	R-E3
4	SK	V3(P1V)	Veľké toky dolnej časti povodia Váhu v nadmorskej výške do 200 m v Panónskej panve	R-E3
4	UK	5	Lowland Calcareous Medium	R-C4
4	UK	8	Lowland Calcareous Large	not allocated

Table 6.2-18 National & intercalibration types for countries reporting Broad Type 4, lowland, calcareous/mixed, medium-large rivers

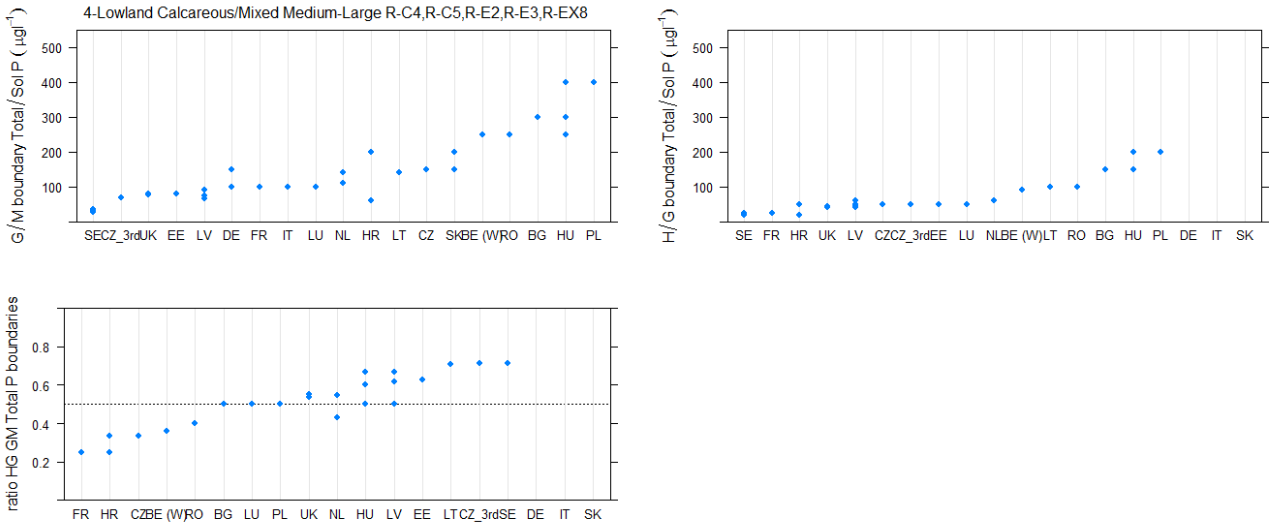

Figure 6.2-46 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 4, lowland, calcareous/mixed, medium-large rivers (90th percentile values halved)

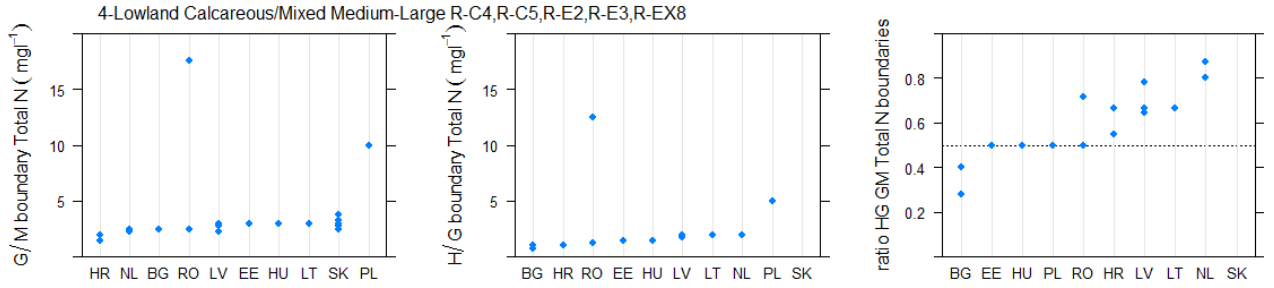

Figure 6.2-47 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 4, lowland, calcareous/mixed, medium-large rivers

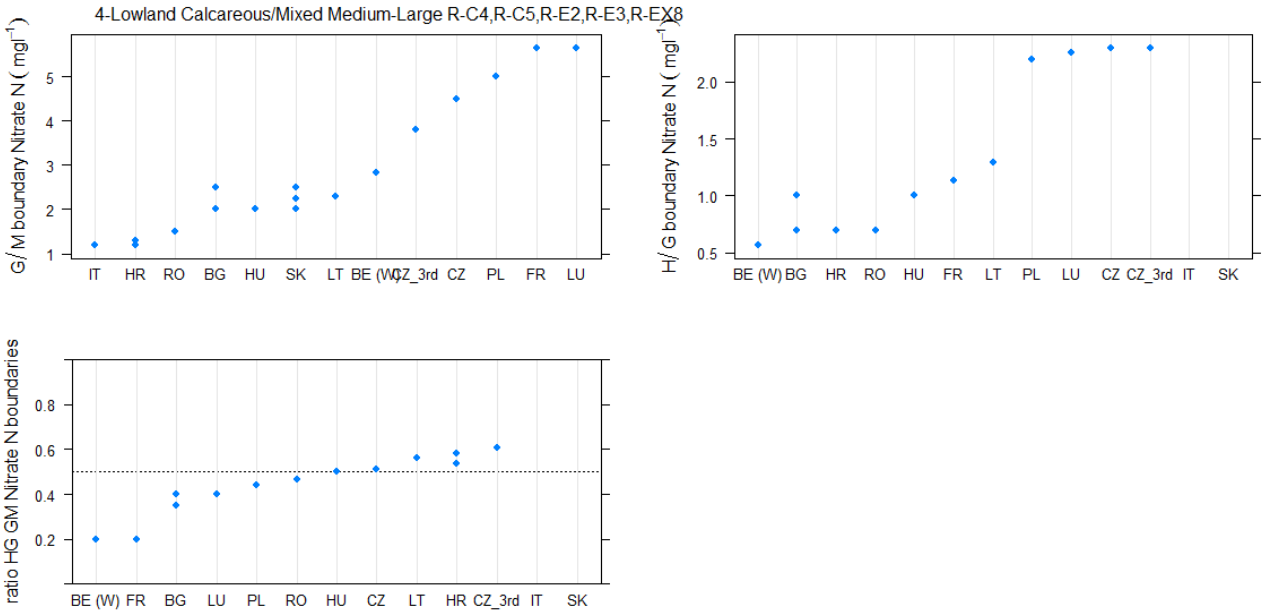

Figure 6.2-48 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 4, lowland, calcareous/mixed, medium-large rivers

6.2.2.5 Type 5 Lowland, calcareous/mixed, very small-small rivers

Broad Type	Country	National type code	Description of type	IC Type
5	BE (W)	RIV_20		R-C1
5	CZ	X-1-1-1	<200m,Crystalinicum, volcanic rock,Strahler 1-3 (brooks)	not allocated
5	CZ	X-1-2-1	<200m,Sandstone, holocene,Strahler 1-3 (brooks)	not allocated
5	CZ_3rd	X-1-1-1	<200m,Crystalinicum, volcanic rock,Strahler 1-3 (brooks)	not allocated
5	CZ_3rd	X-1-2-1	<200m,Sandstone, holocene,Strahler 1-3 (brooks)	not allocated
5	DE	14	Sandgeprägte Tieflandbäche	not allocated
5	DE	16	Kiesgeprägte Tieflandbäche	not allocated
5	DE	18	Lösslehmgeprägte Tieflandbäche	not allocated
5	DE	19	Kleine Niederungsfließgewässer in Fluss- und Stromtälern	not allocated
5	EE	1A	Catchment 10-100 km2, COD-Mn 90% 25 and more mgO/L	R-C4
5	EE	1A	Catchment 10-100 km2, COD-Mn 90% 25 and more mgO/L	R-C6
5	EE	1B	Catchment 10-100 km2, COD-Mn 90% below 25 mgO/L	R-C6
5	FR	P9-A	Petit cours d'eau des Tables calcaires dans l'HER de niveau 2 n°57	R-C6
5	FR	TP15	Très Petit cours d'eau de Plaine de Saône	R-C6
5	FR	TP17	Très Petit cours d'eau des Dépressions sédimentaires	R-C6
5	FR	TP18	Très Petit cours d'eau d'Alsace	R-C6
5	FR	TP9	Très Petit cours d'eau des Tables calcaires	R-C6
5	HR	HR-R_2A	Lowland small rivers with clay-sand substrate	not allocated
5	HR	HR-R_2B	Lowland small rivers with gravel-cobble substrate	not allocated
5	HU	11R	Plain – calcareous – coarse – small catchment	R-EX5
5	HU	15R	Plain – calcareous – medium/fine – small catchment	R-EX5
5	HU	16R	Plain – calcareous – medium/fine – small catchment with little slope	R-EX5
5	HU	17R	Plain – calcareous – medium/fine – medium catchment with little slope	R-E2
5	HU	21R	Plain – organic – small catchment	R-EX5
5	IE	21	Mixed geology, low slope	R-N1
5	IE	22	Mixed geology, medium slope	R-N1
5	IE	23	Mixed geology, high slope	R-N1
5	IE	24	Mixed geology, very high slope	R-N1
5	IE	31	Calcareous, low slope	R-C4
5	IE	31	Calcareous, low slope	R-C5
5	IE	31	Calcareous, low slope	R-C6
5	IE	32	Calcareous, medium slope	R-C4
5	IE	32	Calcareous, medium slope	R-C5

5	IE	32	Calcareous, medium slope	R-C6
5	IE	33	Calcareous, high slope	R-C6
5	IE	34	Calcareous, very high slope	R-C6
5	IT	IT06AS2T		not allocated
5	IT	IT06AS6T		not allocated
5	IT	IT06SR6T		not allocated
5	IT	IT06SS1T		not allocated
5	LT	RWT1	Small rivers (area less than 100 km2)	R-C1
5	LT	RWT1	Small rivers (area less than 100 km2)	R-C6
5	LU	4	small mid-altitude streams in the Gutland	R-C6
5	LV	R1	Lowland (< 300 m a.s.l.), carbonatic bedrock, small (< 100 km2), fast-flowing (> 1 m/km).	R-C6
5	LV	R2	Lowland (< 300 m a.s.l.), carbonatic bedrock, small (< 100 km2), slow-running (< 1 m/km).	R-C6
5	NL	R4	Permanente langzaam stromende bovenloop op zand	R-C1
5	NL	R5	Langzaam stromende middenloop/benedenloop op zand	R-C1
5	NL	R6	Langzaam stromend riviertje op zand/klei	R-C4
5	NO	9	lowland, moderate alkalinity (0,2-1,0 mekv/l), clear (colour <30 mg Pt/l)	R-N1
5	PL	16	Potok nizinny lessowo-gliniasty	not allocated
5	RO	RO06	Curs de apa situat in zona de campie	R-E2
5	RO	RO06	Curs de apa situat in zona de campie	R-EX5
5	RO	RO06*	Curs de apa situat in zona de campie (fara fauna piscicola in conditii naturale)	not allocated
5	SE	V3SNY	lowland calc <100km2 S3, Coast of Norrland	not allocated
5	SE	V4SNY	lowland calc <100km2 S4, Southeast Sweden	not allocated
5	SE	V5SNY	lowland calc <100km2 S5, South Sweden	not allocated
5	SE	V6SNY	lowland calc <100km2 S6, Southwest Sweden	not allocated
5	SK	P1M	Malé toky v nadmorskej výške do 200 m v Panónskej panve	R-EX5
5	UK	2	Lowland Calcareous Small	R-C1
5	UK	40	Lowland Calcareous extra-small	not allocated

Table 6.2-19 National & intercalibration types for countries reporting Broad Type 5, lowland, calcareous/mixed, very small-small rivers

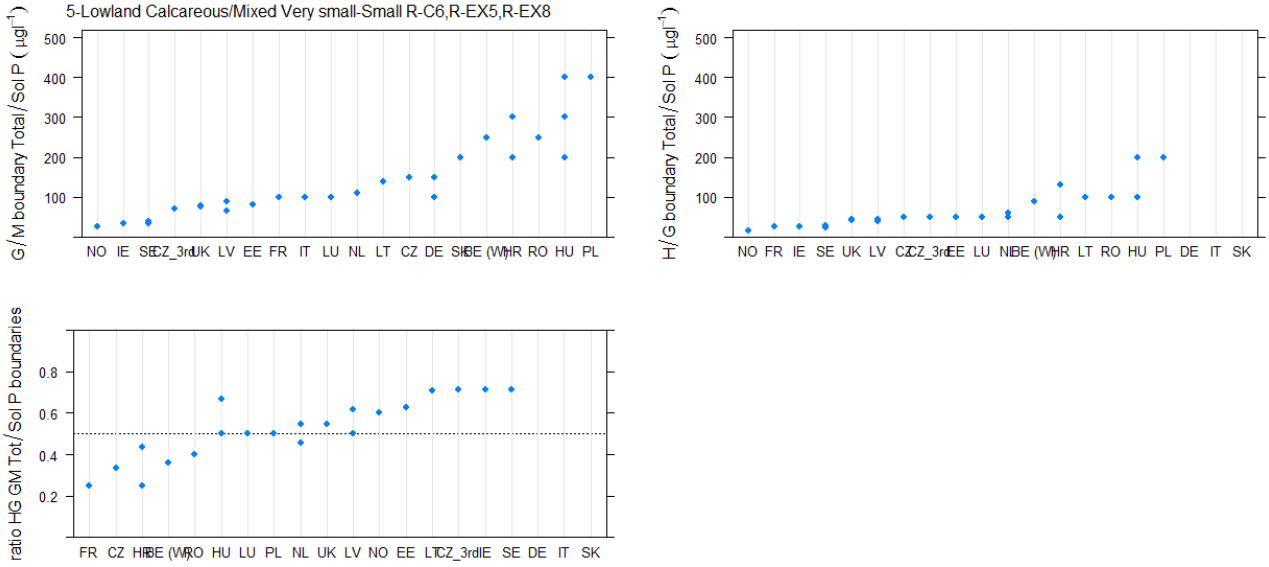

Figure 6.2-49 **Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 5, lowland, calcareous/mixed, very small-small rivers (90th percentile values halved)**

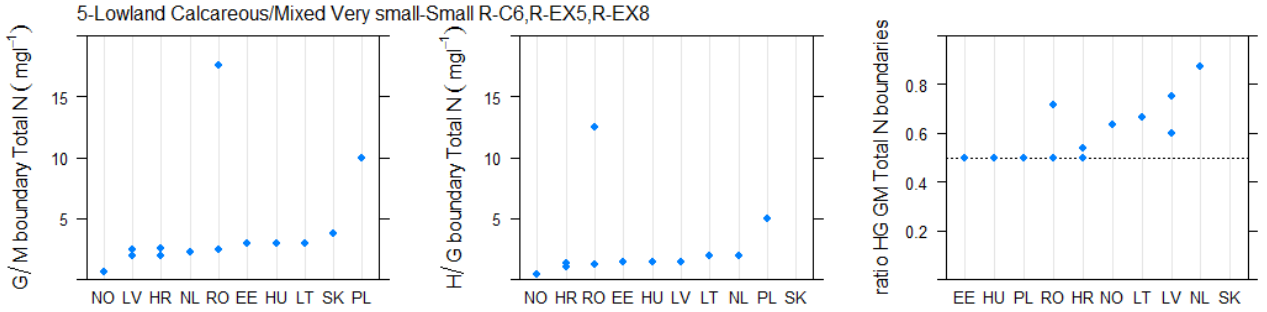

Figure 6.2-50 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 5, lowland, calcareous/mixed, very small-small rivers

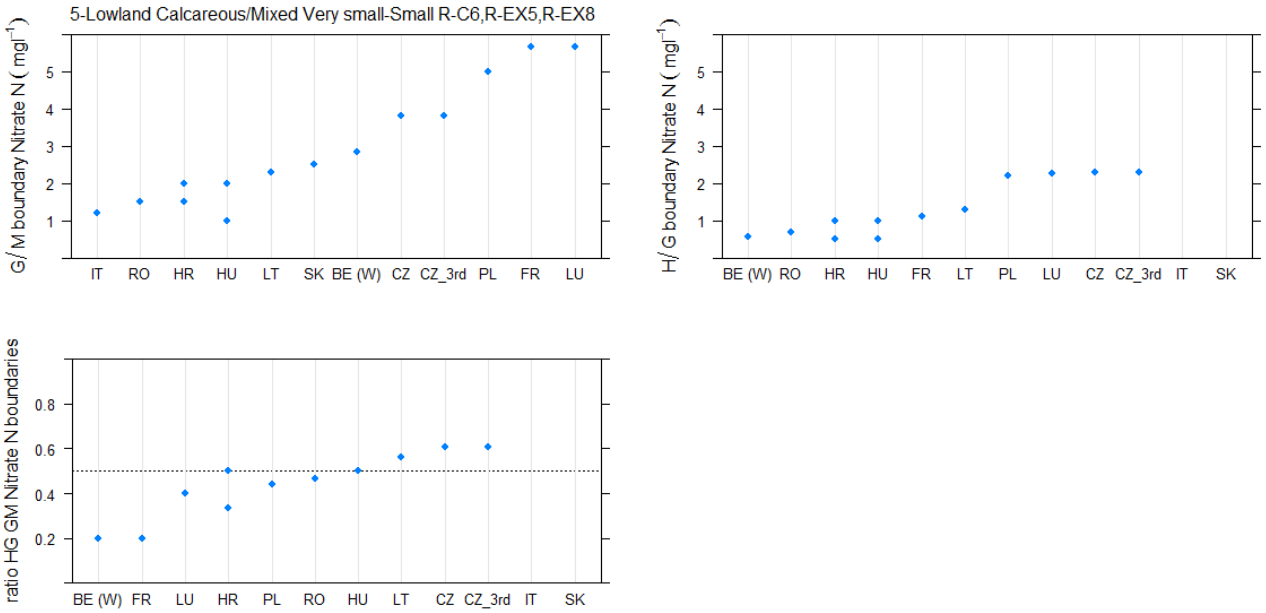

Figure 6.2-51 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good nitrate nitrogen boundary values for rivers in broad type 5, lowland, calcareous/mixed, very small-small rivers

6.2.2.6 Type 6 Lowland, organic & siliceous rivers

Broad Type	Country	National type code	Description of type	IC Type
6	DE	11	Organisch geprägte Bäche	
6	DE	12	Organisch geprägte Flüsse	
6	FI	Kt	Catchment area 100-1000 km2 of which peat land >25%, natural water colour >90 mg/l Pt	R-N3
6	FI	Pt	Catchment area < 100 km2 of which peat land >25%, natural water colour >90 mg/l Pt	R-N3
6	NO	3	lowland, low alkalinity (<0,2 mekv/l), humic (colour 30-90 mg Pt/l)	R-N3a
6	NO	6	lowland, low alkalinity (<0,2 mekv/l), humic (colour 30-90 mg Pt/l)	R-N3a
6	NO	8	lowland, moderate alkalinity (0,2-1,0 mekv/l), humic (colour 30-90 mg Pt/l)	
6	PL	23	Potoki i strumienie na obszarach będących pod wpływem procesów torfotwórczych	
6	SE	V3LYN	lowland silicorganic >100km2 S3, Coast of Norrland	
6	SE	V3SYN	lowland silicorganic <100km2 S3, Coast of Norrland	
6	SE	V4LYN	lowland silicorganic >100km2 S4, Southeast Sweden	
6	SE	V4SYN	lowland silicorganic <100km2 S4, Southeast Sweden	
6	SE	V5LYN	lowland silicorganic >100km2 S5, South Sweden	
6	SE	V5SYN	lowland silicorganic <100km2 S5, South Sweden	
6	SE	V6LYN	lowland silicorganic >100km2 S6, Southwest Sweden	
6	SE	V6SYN	lowland silicorganic <100km2 S6, Southwest Sweden	
6	UK	3	Lowland Organic Small	
6	UK	6	Lowland Organic Medium	
6	UK	9	Lowland Organic Large	

Table 6.2-20 National & intercalibration types for countries reporting Broad Type 6, lowland, organic & siliceous rivers

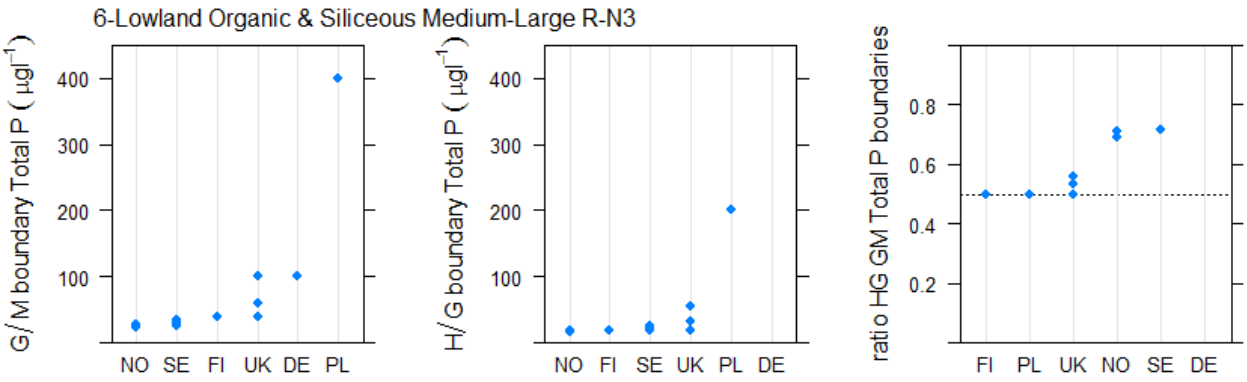

Figure 6.2-52 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 6, lowland, organic & siliceous rivers

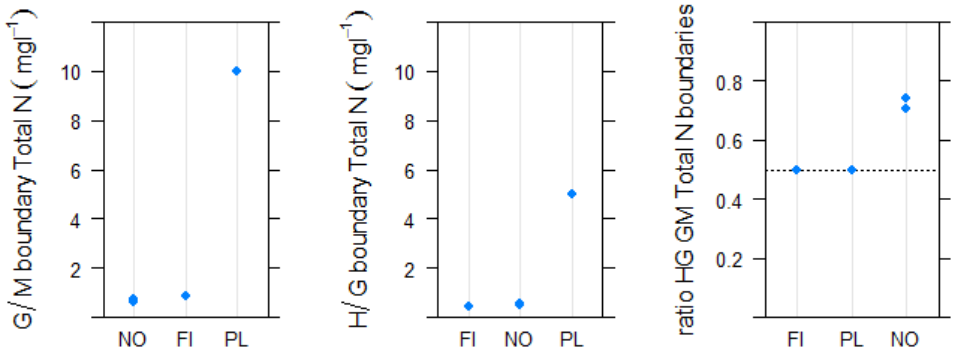

Figure 6.2-53 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 6, lowland, organic & siliceous rivers

6.2.2.7 Type 7 Lowland, organic and calcareous/mixed rivers

Broad Type	Country	National type code	Description of type	IC Type
7	DE	11	Organisch geprägte Bäche	
7	DE	12	Organisch geprägte Flüsse	
7	NO	10	lowland, moderate alkalinity (0,2-1,0 mekv/l), humic (colour 30-90 mg Pt/l)	
7	NO	11	lowland, turbid (susp solids > 10 mg/l)	
7	SE	V3SYY	lowland calcorganic <100km2 S3, Coast of Norrland	
7	SE	V4LYY	lowland calcorganic >100km2 S4, Southeast Sweden	
7	SE	V4SYY	lowland calcorganic <100km2 S4, Southeast Sweden	
7	SE	V5LYY	lowland calcorganic >100km2 S5, South Sweden	
7	SE	V5SYY	lowland calcorganic <100km2 S5, South Sweden	
7	SE	V6LYY	lowland calcorganic >100km2 S6, Southwest Sweden	
7	SE	V6SYY	lowland calcorganic <100km2 S6, Southwest Sweden	

Table 6.2-21 National & intercalibration types for countries reporting Broad Type 7 lowland, organic and calcareous/mixed rivers

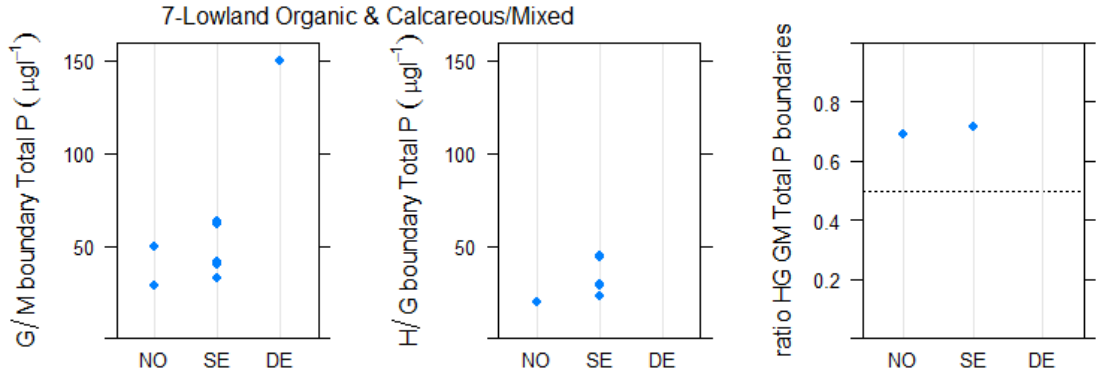

Figure 6.2-54 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 7, lowland, organic & calcareous/mixed rivers.

6.2.2.8 Type 8 Mid-altitude, siliceous, medium-large rivers

Broad Type	Country	National type code	Description of type	IC Type
8	BE (W)	RIV_06		R-C3
8	BE (W)	RIV_07		R-C3
8	BE (W)	RIV_08		R-C5
8	BG	R5	Semi mountain rivers (gravel rivers) in ER7 (semi-mountain zone - big variation; mixed/siliceous/calcareous;size <1300 km2,small and medium (rarely large) ; gravels)	not allocated
8	DE	9	Silikatische, fein- bis grobmaterialreiche Mittelgebirgsflüsse	not allocated
8	FR	G17/3-21	Grand cours d'eau des Dépressions sédimentaires et exogène du Massif central Sud ou du Massif central Nord	R-C5
8	FR	GM8	Grand ou Moyen cours d'eau des Cévennes	R-M3
8	FR	M16-A	Moyen cours d'eau de Corse dans l'HER de niveau 2 n°22	R-M2
8	FR	M8-A	Moyen cours d'eau des Cévennes dans l'HER de niveau 2 n°70	R-M2
8	FR	P21	Petit cours d'eau du Massif central Nord	R-C3
8	FR	P3	Petit cours d'eau du Massif central Sud	R-C3
8	IT	IT03SS3N		R-A1
8	IT	IT03SS3N		R-A2
8	LU	3	mid-sized and mid-altitude streams in the Oesling	R-C4
8	PL	8	Mała rzeka wyżynna krzemianowa - zachodnia	not allocated
8	SE	V2LNN	mid alt silic >100km2 S2, Inlands of Norrland	not allocated
8	SE	V7LNN	mid alt silic >100km2 S7, Highlands of South Sweden	not allocated
8	UK	13	Mid-altitude Siliceous Medium	R-C3
8	UK	16	Mid-altitude Siliceous Large	not allocated

Table 6.2-22 National & intercalibration types for countries reporting Broad Type 8, mid-altitude, siliceous, medium large rivers

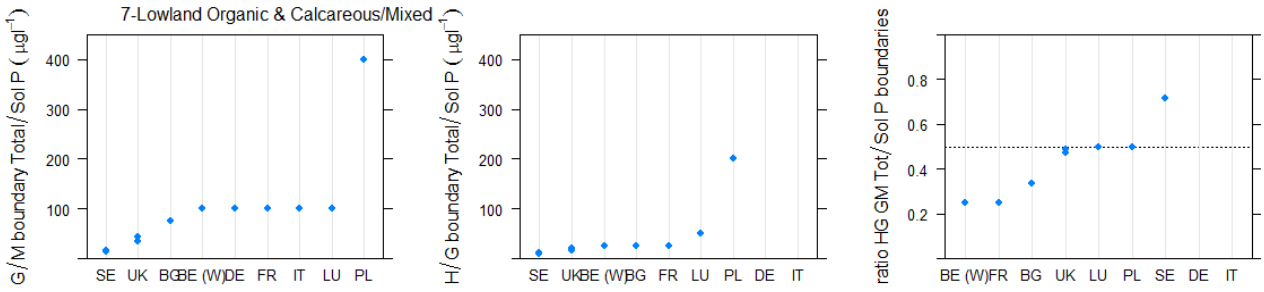

Figure 6.2-55 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 8, mid-altitude, siliceous, medium large rivers (90th percentile values halved)

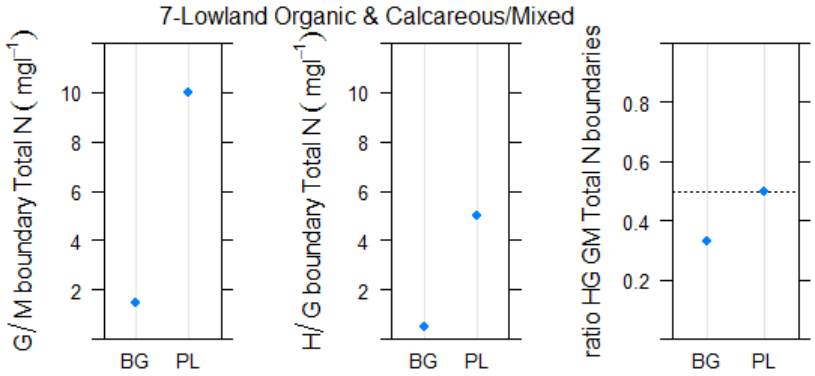

Figure 6.2-56 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 8, mid-altitude, siliceous, medium large rivers

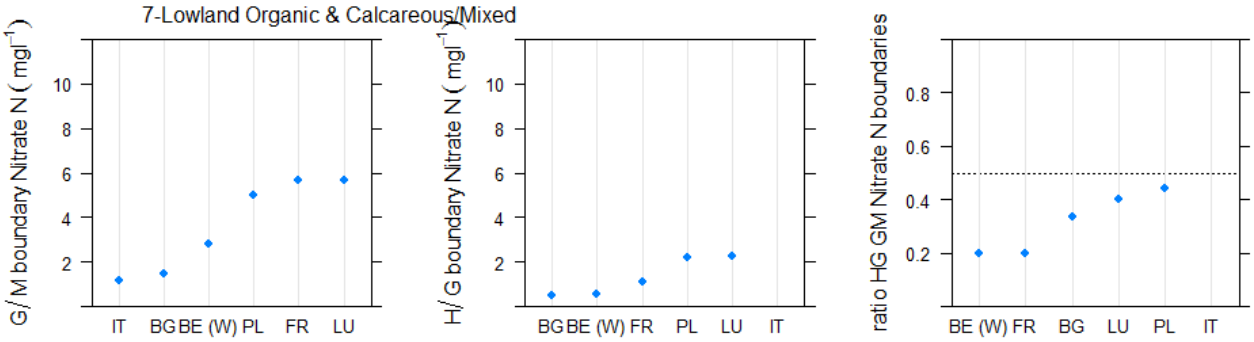

Figure 6.2-57 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 8, mid-altitude, siliceous, medium large rivers

6.2.2.9 Type 9 Mid-altitude, siliceous, very small-small rivers

Broad Type	Country	National type code	Description of type	IC Type
9	BE (W)	RIV_05		R-C3
9	BG	R4	Semi mountain rivers (gravel rivers) in ER12 (semi-mountain zone - big variation; mixed/siliceous/calcareous;size <1300 km2,small and medium (rarely large) ; gravels)	R-E1b
9	BG	R4	Semi mountain rivers (gravel rivers) in ER12 (semi-mountain zone - big variation; mixed/siliceous/calcareous;size <1300 km2,small and medium (rarely large) ; gravels)	R-E4
9	DE	5	Grobmaterialreiche, silikatische Mittelgebirgsbäche	not allocated
9	DE	5.1	Feinmaterialreiche, silikatische Mittelgebirgsbäche	not allocated
9	FR	M21	Moyen cours d'eau du Massif central Nord	R-C3
9	FR	M22		R-C3
9	FR	M3	Moyen cours d'eau du Massif central Sud	R-C3
9	FR	M4	Moyen cours d'eau des Vosges	R-C3
9	FR	P11/3-21	Petit cours d'eau des Causses aquitains et exogène du Massif central Sud ou du Massif central Nord	R-C3
9	FR	P17/3-21	Petit cours d'eau des Dépressions sédimentaires et exogène du Massif central Sud ou du Massif central Nord	R-C3
9	FR	P22	Petit cours d'eau des Ardennes	R-C3
9	FR	P4	Petit cours d'eau des Vosges	R-C3
9	FR	TP21	Très Petit cours d'eau du Massif central Nord	R-C3
9	FR	TP22	Très Petit cours d'eau des Ardennes	R-C3
9	FR	TP4	Très Petit cours d'eau des Vosges	R-C3
9	HU	1R	Mountainous - siliceous – coarse – small catchment	R-E1b
9	IT	IT03GH6N		R-A1
9	IT	IT03GH6N		R-A2
9	IT	IT03SR6N		not allocated
9	IT	IT03SS1N		R-A1
9	IT	IT03SS1N		R-A2
9	IT	IT03SS2N		R-A1
9	IT	IT03SS2N		R-A2
9	LU	1	small high-altitude streams in the Oesling	R-C3
9	LU	2	small mid-altitude streams in the Oesling	R-C3
9	NO	12	mid-altitude (200-800 masl), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	R-N5a
9	NO	13	mid-altitude (200-800 masl), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	R-N5a
9	NO	15	mid-altitude (200-800 masl), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	R-N5a
9	NO	16	mid-altitude (200-800 masl), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	R-N5a

9	PL	12	Potok fliszowy	not allocated
9	PL	4	Potok wyżynny krzemianowy z substratem gruboziarnistym - zachodni	R-C3
9	PL	5	Potok wyżynny krzemianowy z substratem drobnoziarnistym- zachodni	R-C3
9	SE	V2SNN	mid alt silic <100km2 S2, Inlands of Norrland	not allocated
9	SE	V7SNN	mid alt silic <100km2 S7, Highlands of South Sweden	not allocated
9	UK	10	Mid-altitude Siliceous Small	R-C3

Table 6.2-23 National & intercalibration types for countries reporting Broad Type 9, mid-altitude, siliceous, very small-small rivers

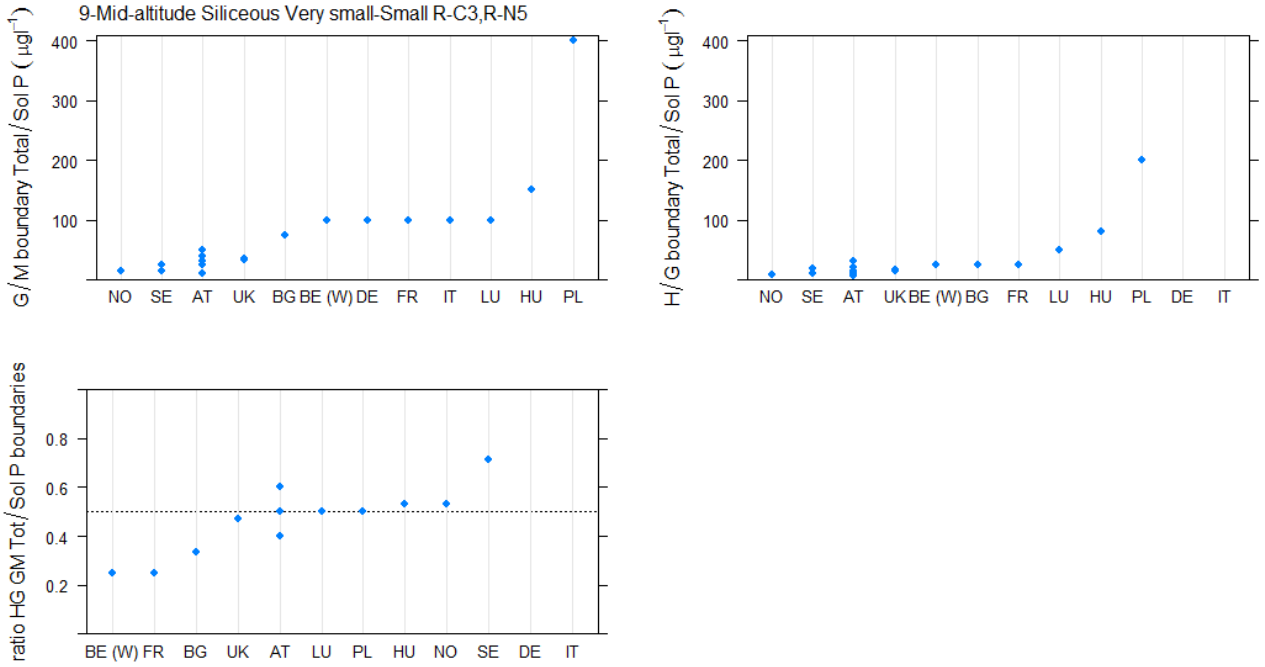

Figure 6.2-58 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 9, mid-altitude, siliceous, very small-small rivers (90th percentile values halved)

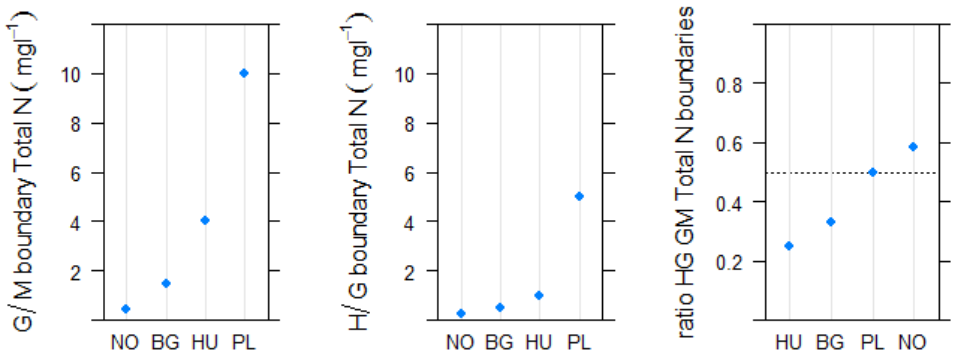

Figure 6.2-59 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 9, mid-altitude, siliceous, very small-small rivers

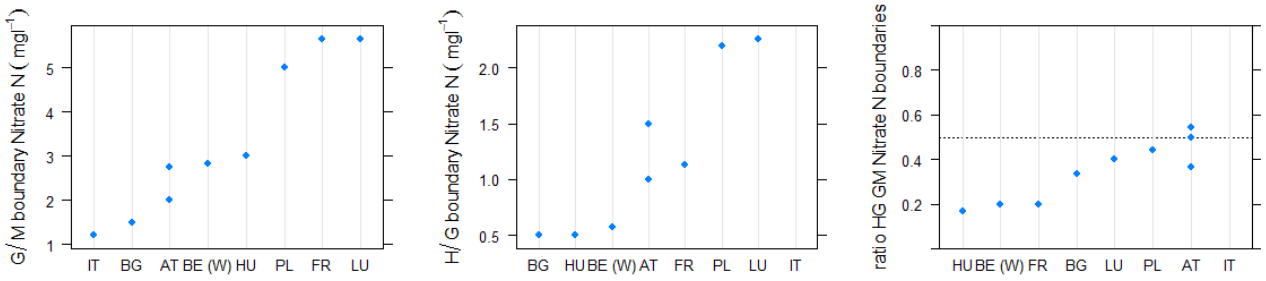

Figure 6.2-60 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 9, mid-altitude, siliceous, very small-small rivers

6.2.2.10 Type 10 Mid-altitude, calcareous/mixed, medium-large rivers

Broad Type	Country	National type code	Description of type	IC Type
10	AT	13__MZB1,75_PHBme2	Bioregion: Eastern Lowlands and Uplands of the Hungarian Plain (13); Macroinvertebrate- saprobic reference condition: SI 1,75; Phytobenthos-trophic reference condition: meso-eutrophic overall (me2)	R-E4
10	BE (W)	RIV_03		R-C4
10	BE (W)	RIV_11		R-C4
10	BE (W)	RIV_12		R-C5
10	BE (W)	RIV_15		R-C4
10	BE (W)	RIV_16		R-C4
10	BE (W)	RIV_17		R-C5
10	BE (W)	RIV_18		R-C5
10	CZ	X-2-1-2	200-500m,Crystalinicum, volcanic rock,Strahler 4-6 (smaller rivers)	R-E4
10	CZ	X-2-1-3	200-500m,Crystalinicum, volcanic rock,Strahler 7-9 (rivers)	not allocated
10	CZ	X-2-2-2	200-500m,Sandstone, holocene,Strahler 4-6 (smaller rivers)	not allocated
10	CZ	X-2-2-2	200-500m,Sandstone, holocene,Strahler 4-6 (smaller rivers)	R-E4
10	CZ	X-2-2-3	200-500m,Sandstone, holocene,Strahler 7-9 (rivers)	R-EX4
10	CZ	X-3-1-3	500-800m,Crystalinicum, volcanic rock,Strahler 7-9 (rivers)	not allocated
10	CZ_3rd	X-2-1-2	200-500m,Crystalinicum, volcanic rock,Strahler 4-6 (smaller rivers)	R-E4
10	CZ_3rd	X-2-1-3	200-500m,Crystalinicum, volcanic rock,Strahler 7-9 (rivers)	not allocated
10	CZ_3rd	X-2-2-2	200-500m,Sandstone, holocene,Strahler 4-6 (smaller rivers)	R-E4
10	CZ_3rd	X-2-2-3	200-500m,Sandstone, holocene,Strahler 7-9 (rivers)	R-EX4
10	CZ_3rd	X-3-1-3	500-800m,Crystalinicum, volcanic rock,Strahler 7-9 (rivers)	not allocated
10	DE	3.2	Kleine Flüsse der Jungmoräne des Alpenvorlandes	not allocated
10	DE	4	Große Flüsse des Alpenvorlandes	not allocated
10	DE	9.1	Karbotische, fein- bis grobmaterialreiche Mittelgebirgsflüsse	not allocated
10	DE	9.1_K	Karbotische, fein- bis grobmaterialreiche Mittelgebirgsflüsse (Keuper)	not allocated
10	DE	9.2	Große Flüsse des Mittelgebirges	not allocated

10	FR	G10	Grand cours d'eau des Côtes calcaires Est	R-C5
10	FR	GM5/2	Grand ou Moyen cours d'eau du Jura/Pré-Alpes du Nord et exogène des Alpes internes	R-A2
10	HR	HR-R_10B	Mountainous medium temporary rivers	not allocated
10	HR	HR-R_7	Mountain and foothill midium and large rivers	not allocated
10	HR	HR-R_9	Mountain and foothill midium rivers of karstic fields	not allocated
10	HU	10R	Hilly – calcareous – medium/fine – large catchment	R-E3
10	HU	5R	Hilly – calcareous – coarse – medium catchment	R-E4
10	HU	6R	Hilly – calcareous – coarse – large catchment	R-E3
10	HU	9R	Hilly – calcareous – medium/fine – medium catchment	R-E4
10	PL	9	Mała rzeka wyżynna węglanowa	not allocated
10	RO	RO02	Sector de curs de apa situat in zona piemontana sau de podisuri inalte	not allocated
10	RO	RO05	Sector de curs de apa situat in zona de dealuri si de podisuri	R-EX4
10	RO	RO05	Sector de curs de apa situat in zona de dealuri si de podisuri	R-EX6
10	SK	H1(K2V)	Stredná časť toku Hornád v nadmorskej výške 200 - 500 m v Karpatoch	R-EX4
10	SK	H2(K2V)	Dolná časť toku Hornád v nadmorskej výške 200 - 500 m v Karpatoch	R-EX4
10	SK	K2S	Stredne veľké toky v nadmorskej výške 200 - 500 m v Karpatoch	R-E1b
10	SK	K3S	Stredne veľké toky v nadmorskej výške 500 - 800 m v Karpatoch	R-E1a
10	SK	P1(K3V)	Stredná časť toku Poprad v nadmorskej výške 500 - 800 m v Karpatoch	not allocated
10	SK	P2(K3V)	Dolná časť toku Poprad v nadmorskej výške 500 - 800 m v Karpatoch	not allocated
10	SK	R1(K2V)	Stredná časť toku Hron v nadmorskej výške 200 - 500 m v Karpatoch	R-EX4
10	SK	V1(K3V)	Veľké toky hornej časti povodia Váhu v nadmorskej výške 500 - 800 m v Karpatoch	not allocated
10	UK	14	Mid-altitude Calcareous Medium	R-C4
10	UK	17	Mid-altitude Calcareous Large	not allocated

Table 6.2-24 National & intercalibration types for countries reporting Broad Type 10, mid-altitude, calcareous/mixed, medium-large rivers (90th percentile values halved)

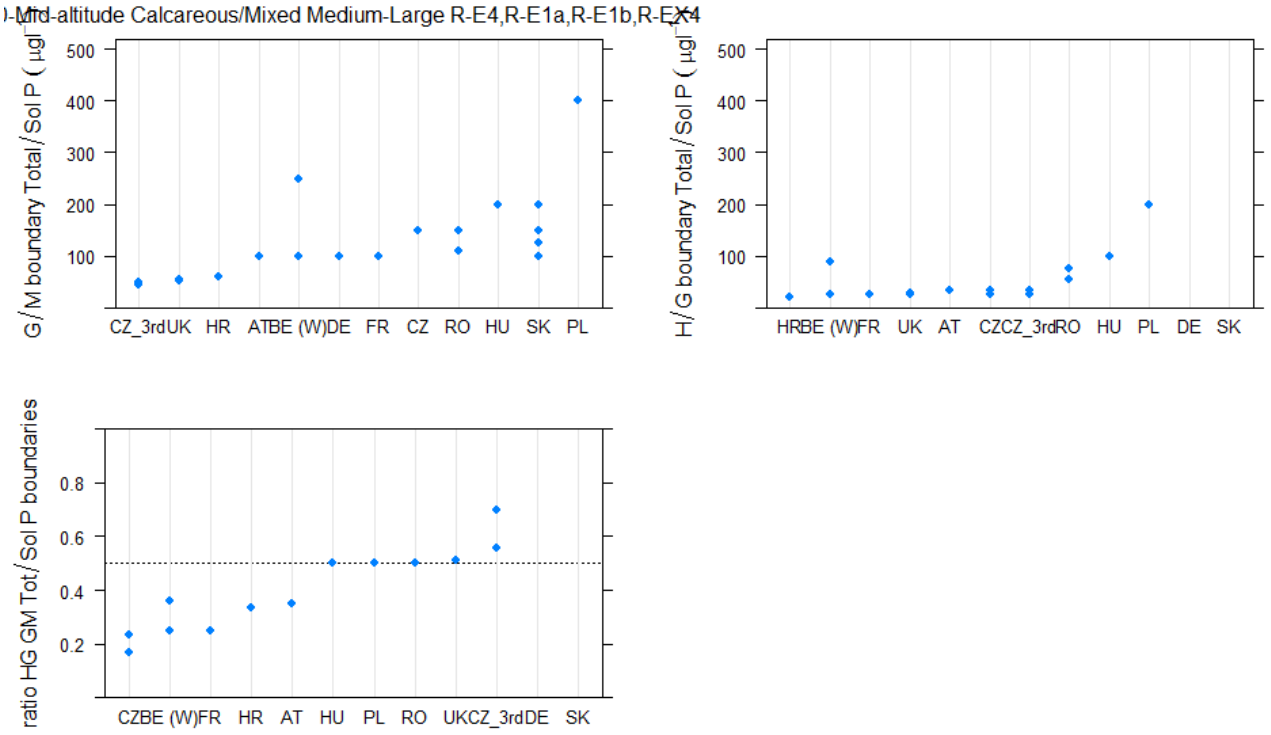

Figure 6.2-61 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 10, mid-altitude, calcareous/mixed, medium-large rivers (90th percentile values halved)

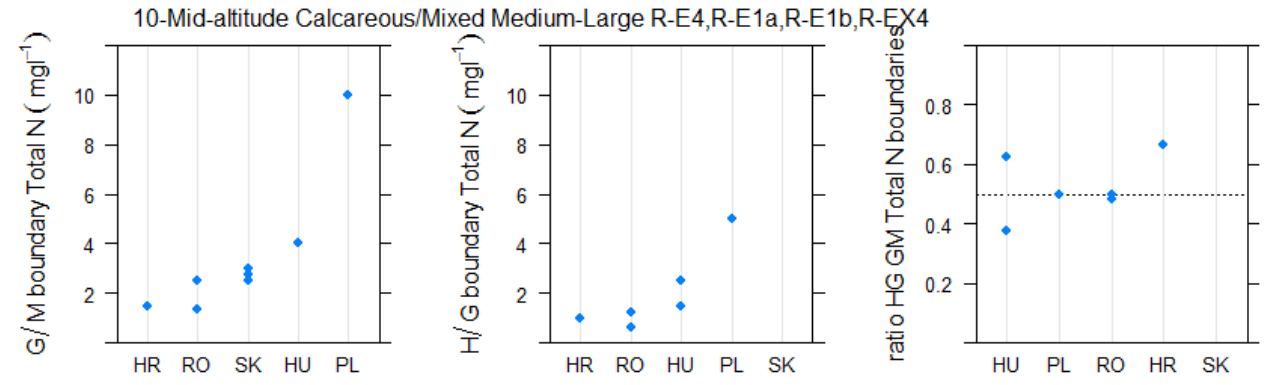

Figure 6.2-62 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 10, mid-altitude, calcareous/mixed, medium-large rivers

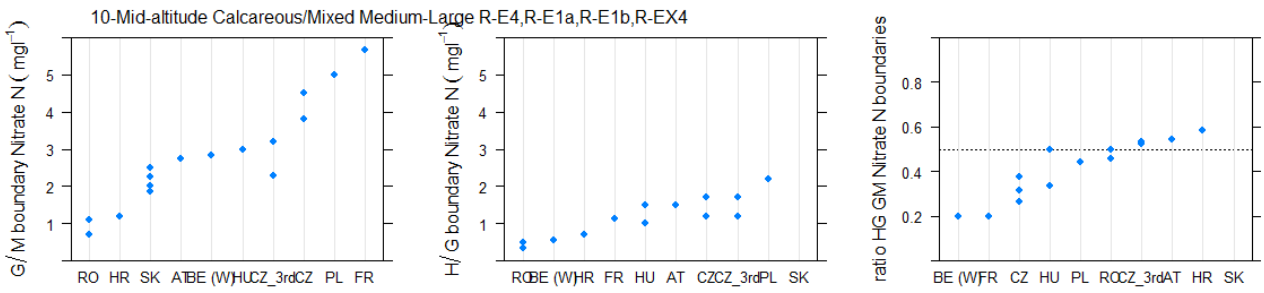

Figure 6.2-63 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 10, mid-altitude, calcareous/mixed, medium-large rivers

6.2.2.11 Type 11 Mid-altitude, calcareous/mixed, very small-small rivers

Broad Type	Country	National type code	Description of type	IC Type
11	BE (W)	RIV_01		R-C6
11	BE (W)	RIV_02		R-C6
11	BE (W)	RIV_09		R-C6
11	BE (W)	RIV_10		R-C6
11	BE (W)	RIV_13		R-C6
11	BE (W)	RIV_14		R-C6
11	CZ	X-2-1-1	200-500m,Crystalinicum, volcanic rock,Strahler 1-3 (brooks)	not allocated
11	CZ	X-2-2-1	200-500m,Sandstone, holocene,Strahler 1-3 (brooks)	R-E1b
11	CZ	X-3-1-1	500-800m,Crystalinicum, volcanic rock,Strahler 1-3 (brooks)	R-E1a
11	CZ	X-3-1-2	500-800m,Crystalinicum, volcanic rock,Strahler 4-6 (smaller rivers)	not allocated
11	CZ	X-3-2-1	500-800m,Sandstone, holocene,Strahler 1-3 (brooks)	not allocated
11	CZ	X-3-2-2	500-800m,Sandstone, holocene,Strahler 4-6 (smaller rivers)	not allocated
11	CZ_3rd	X-2-1-1	200-500m,Crystalinicum, volcanic rock,Strahler 1-3 (brooks)	not allocated
11	CZ_3rd	X-2-2-1	200-500m,Sandstone, holocene,Strahler 1-3 (brooks)	R-E1b
11	CZ_3rd	X-3-1-1	500-800m,Crystalinicum, volcanic rock,Strahler 1-3 (brooks)	R-E1a
11	CZ_3rd	X-3-1-2	500-800m,Crystalinicum, volcanic rock,Strahler 4-6 (smaller rivers)	not allocated
11	CZ_3rd	X-3-2-1	500-800m,Sandstone, holocene,Strahler 1-3 (brooks)	not allocated
11	CZ_3rd	X-3-2-2	500-800m,Sandstone, holocene,Strahler 4-6 (smaller rivers)	not allocated
11	DE	3.1	Bäche der Jungmoräne des Alpenvorlandes	not allocated
11	DE	6	Feinmaterialreiche, karbotische Mittelgebirgsbäche	not allocated
11	DE	7	Grobmaterialreiche, karbotische Mittelgebirgsbäche	not allocated
11	HR	HR-R_1	Mountain and foothill small and midium rivers	not allocated
11	HR	HR-R_10A	Mountain and foothill small temporary rivers	not allocated
11	HR	HR-R_6	Mountain and foothill small rivers	not allocated
11	HU	2R	Mountainous – calcerous – coarse – small catchment	R-E1b
11	HU	3R	Mountainous – calcareous – coarse – medium catchment	R-E1b
11	HU	4R	Hilly – calcareous – coarse – small catchment	R-EX6
11	HU	8R	Hilly – calcareous – medium/fine – small catchment	R-EX5
11	IT	IT02SR6N		not allocated
11	IT	IT02SR6T		not allocated
11	IT	IT02SS1N		R-A1
11	IT	IT02SS1T		R-A1
11	IT	IT02SS2N		R-A1
11	IT	IT02SS2T		R-A1
11	IT	IT06SS2T		not allocated
11	IT	IT10SS1N		R-M1
11	IT	IT10SS2N		R-M1

11	PL	6	Potok wyżynny węglanowy z substratem drobnoziarnistym na lessach i lessopodobnych	not allocated
11	PL	7	Potok wyżynny węglanowy z substratem gruboziarnistymi	not allocated
11	RO	RO01	Curs de apa situat in zona montana, piemontana sau de podisuri inalte	R-E1a
11	RO	RO04	Curs de apa situat in zona de dealuri sau de podisuri	R-E1b
11	RO	RO04	Curs de apa situat in zona de dealuri sau de podisuri	R-E4
11	SK	K2M	Malé toky v nadmorskej výške 200 - 500 m v Karpatoch	R-E1b
11	SK	P2M	Malé toky v nadmorskej výške 200 - 500 m v Panónskej panve	R-E4
11	UK	11	Mid-altitude Calcareous Small	not allocated

Table 6.2-25 National & intercalibration types for countries reporting Broad Type 11, mid-altitude, calcareous/mixed, very small-small rivers (90th percentile values halved)

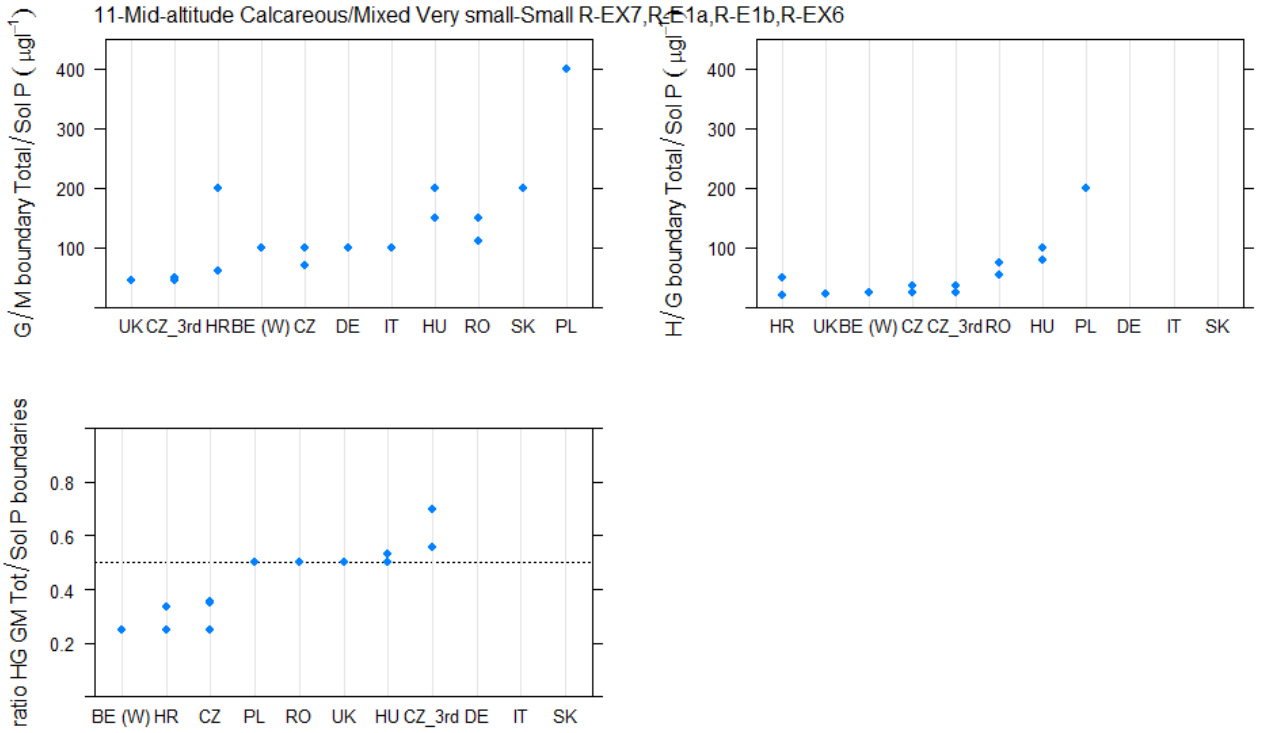

Figure 6.2-64 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 11, mid-altitude, calcareous/mixed, very small-small rivers

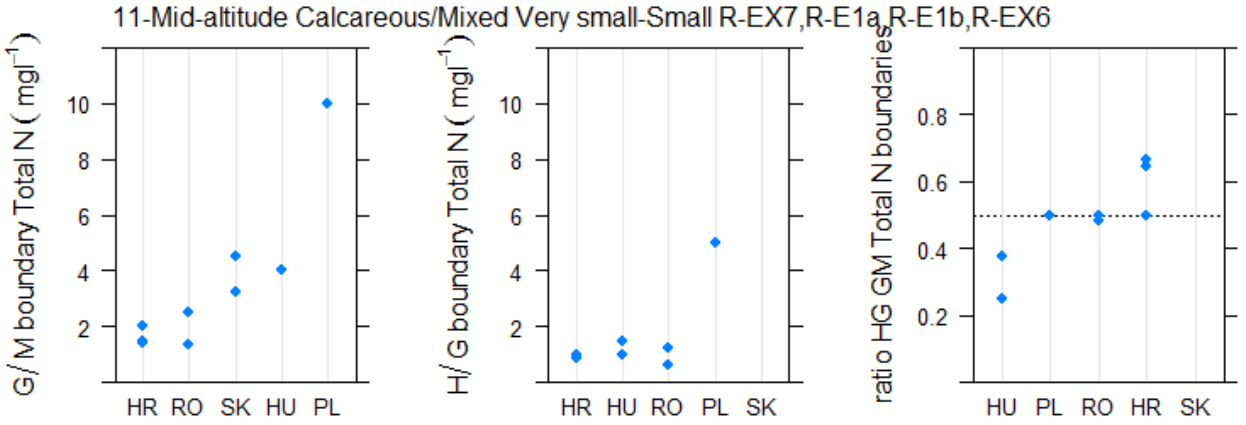

Figure 6.2-65 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 11, mid-altitude, calcareous/mixed, very small-small rivers

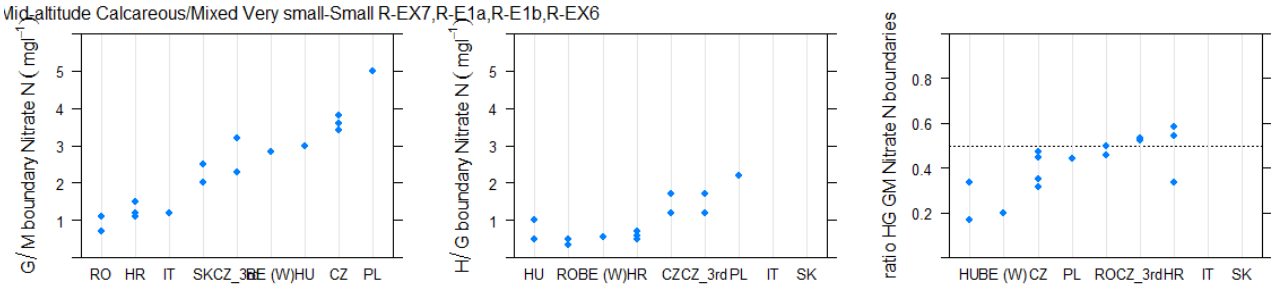

Figure 6.2-66 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 11, mid-altitude, calcareous/mixed, very small-small rivers

6.2.2.12 Type 12 mid-altitude organic and siliceous

Broad Type	Country	National type code	Description of type	IC Type
12	BE (W)	RIV_24		R-C3
12	NO	14	mid-altitude (200-800 masl) or highland (>800 masl), low alkalinity (<0,2 mekv/l), humic (colour 30-90 mg Pt/l)	R-N6a
12	NO	17	mid-altitude (200-800 masl) or highland (>800 masl), low alkalinity (<0,2 mekv/l), humic (colour 30-90 mg Pt/l)	R-N6a
12	SE	V2LYN	mid alt silicorganic >100km2 S2, Inlands of Norrland	
12	SE	V2SYN	mid alt silicorganic <100km2 S2, Inlands of Norrland	
12	SE	V7LYN	mid alt silicorganic >100km2 S7, Highlands of South Sweden	
12	SE	V7SYN	mid alt silicorganic <100km2 S7, Highlands of South Sweden	

Table 6.2-26 National & intercalibration types for countries reporting Broad Type 12

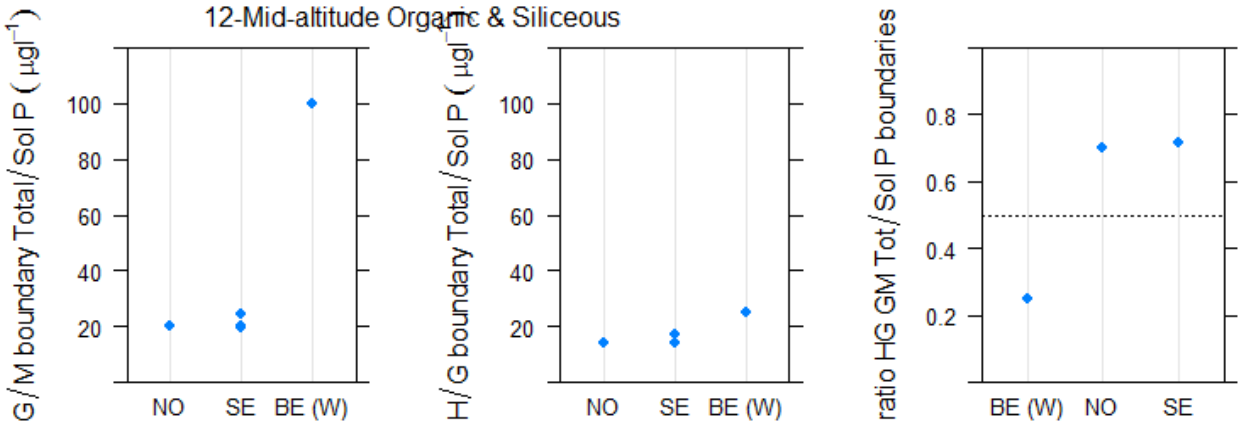

Figure 6.2-67 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 12 mid-altitude organic and siliceous (90th percentile values halved)

6.2.2.13 Type 13 mid-altitude calcareous/mixed

Broad Type	Country	National type code	Description of type	IC Type
13	PL	24	Małe i średnie rzeki na obszarach będących pod wpływem procesów torfotwórczych	R-C4/5
13	SE	V7LYY	mid alt calcorganic >100km2 S7, Highlands of South Sweden	
13	SE	V7SYY	mid alt calcorganic <100km2 S7, Highlands of South Sweden	

Table 6.2-27 National & intercalibration types for countries reporting Broad Type 13 mid-altitude calcareous/mixed

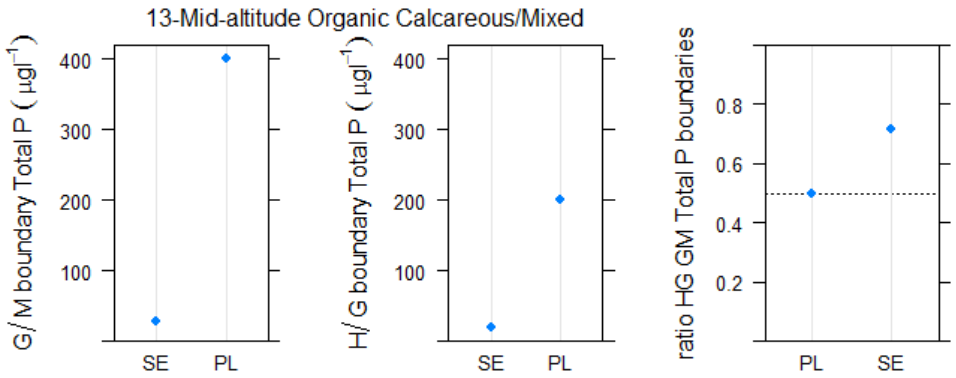

Figure 6.2-68 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 13 mid-altitude calcareous/mixed

6.2.2.14 Type 14 Highland, siliceous, all Europe

Broad Type	Country	National type code	Description of type	IC Type
14	AT	2_MZB1,25_PHBot	Bioregion: Unglaciated Central Alps (2); Macroinvertebrate-saprobic reference condition: SI 1,25; Phytobenthos-trophic reference condition: oligotrophic (ot)	R-A2
14	AT	2_MZB1,5_PHBot	Bioregion: Unglaciated Central Alps (2); Macroinvertebrate-saprobic reference condition: SI 1,5; Phytobenthos-trophic reference condition: oligotrophic (ot)	R-A2
14	AT	3_MZB1,5_PHBmt	Bioregion: Ridges and Foothills of the Central Alps (3); Macroinvertebrate- saprobic reference condition: SI 1,5; Phytobenthos-trophic reference condition: mesotrophic (mt)	R-A2
14	AT	3_MZB1,5_PHBom	Bioregion: Ridges and Foothills of the Central Alps (3); Macroinvertebrate- saprobic reference condition: SI 1,5; Phytobenthos-trophic reference condition: oligo-mesotrophic (om)	R-A2
14	BG	R2	Mountainous rivers (Uplands) in ER12 (mountain zone-sometimes get down; mixed/siliceous/calcareous;size <100 km2, smal rivers; boulders and cobles)	R-E1a
14	BG	R3	Mountainous rivers (Uplands) in ER7 (>(600) 800 m, vary to some extent; mixed/siliceous/calcareous;size <100 km2, smal rivers; boulders and cobles)	not allocated
14	FR	MP2	Moyen ou Petit cours d'eau des Alpes internes	R-A2
14	FR	P14/1	Petit cours d'eau des Coteaux aquitains et exogène des Pyrénées	R-A2
14	FR	PTP8-A	Petit ou Très Petit cours d'eau des Cévennes dans l'HER de niveau 2 n°70	R-M1
14	FR	TP3	Très Petit cours d'eau du Massif central Sud	R-C3
14	IT	IT03GH1N		R-A1
14	IT	IT03GH1N		R-A2
14	NO	20	highland (> 800 masl), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	R-N7
14	NO	21	highland (> 800 masl), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	R-N7
14	NO	22	mid-altitude (200-800 masl) or highland (>800 masl), low alkalinity (<0,2 mekv/l), humic (colour 30-90 mg Pt/l)	R-N6a
14	NO	23	highland (> 800 masl), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	R-N7
14	NO	24	highland (> 800 masl), low alkalinity (<0,2 mekv/l), clear (colour <30 mg Pt/l)	R-N7
14	NO	25	mid-altitude (200-800 masl) or highland (>800 masl), low alkalinity (<0,2 mekv/l), humic (colour 30-90 mg Pt/l)	R-N6a
14	PL	1	Potok tatrzański krzemianowy	not allocated
14	UK	18	High Siliceous Small	not allocated

Table 6.2-28 National & intercalibration types for countries reporting Broad Type 14, highland, siliceous, all Europe rivers

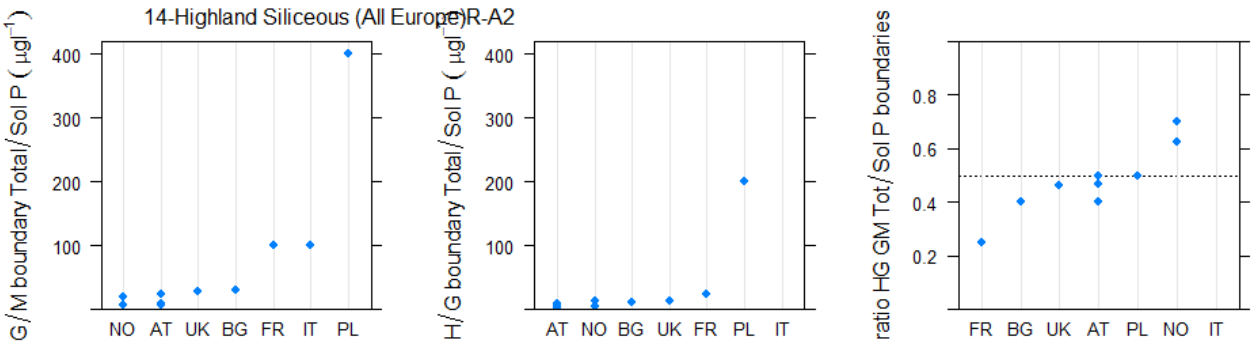

Figure 6.2-69 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 14, highland, siliceous, all Europe rivers (90th percentile values halved)

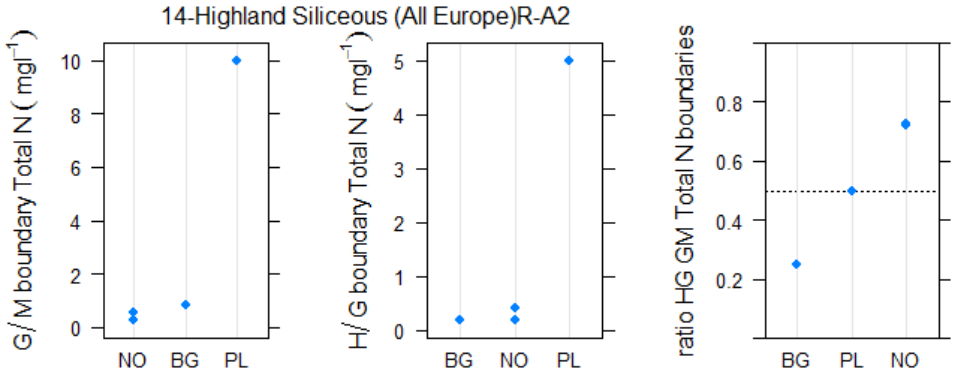

Figure 6.2-70 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 14, highland, siliceous, all Europe rivers

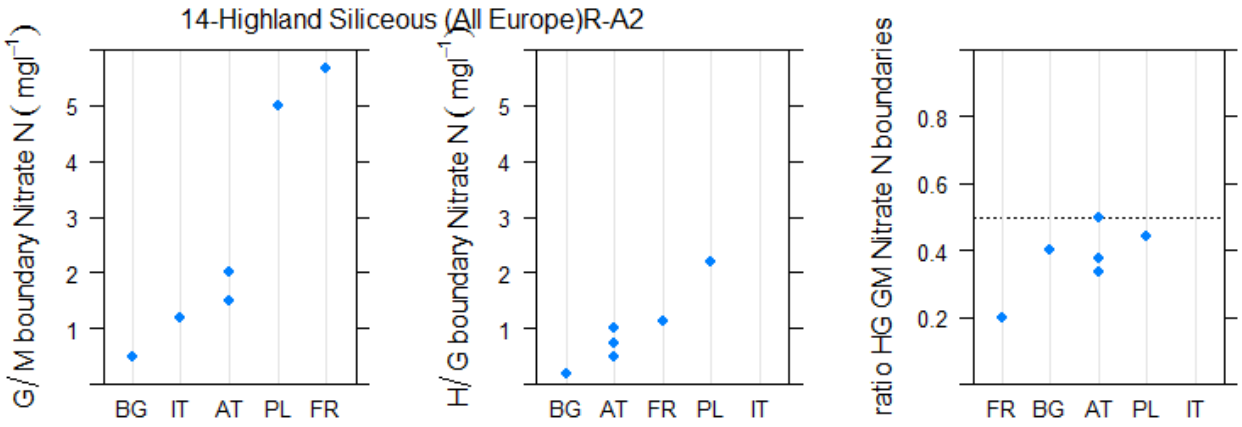

Figure 6.2-71 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 14, highland, siliceous, all Europe rivers

6.2.2.15 Type 15 Highland, calcareous/mixed, all Europe

Broad Type	Country	National type code	Description of type	IC Type
15	AT	5_MZB1,5_PHBom	Bioregion: Limestone Alpine Foothills (5); Macroinvertebrate- saprobic reference condition: SI 1,5; Phytobenthos-trophic reference condition: oligo-mesotrophic (om)	R-A1
15	AT	5_MZB1,5_PHBot	Bioregion: Limestone Alpine Foothills (5); Macroinvertebrate- saprobic reference condition: SI 1,5; Phytobenthos-trophic reference condition: oligotrophic (ot)	R-A1
15	BG	R1	High mountain (Alpine) rivers (ER12/ER7; altitude > 1800 m vary to some extent; mixed/siliceous/calcareous;size <100 km2, streams; bedrock,rocks, boulders)	not allocated
15	CY	R2	large rain volume with continuous flow	R-M4
15	CZ	X-4-1-1	>800m,Crystalinicum, volcanic rock,Strahler 1-3 (brooks)	not allocated
15	CZ	X-4-1-2	>800m,Crystalinicum, volcanic rock,Strahler 4-6 (smaller rivers)	not allocated
15	CZ	X-4-2-1	>800m,Sandstone, holocene,Strahler 1-3 (brooks)	not allocated
15	CZ	X-4-2-2	>800m,Sandstone, holocene,Strahler 4-6 (smaller rivers)	not allocated
15	CZ_3rd	X-4-1-1	>800m,Crystalinicum, volcanic rock,Strahler 1-3 (brooks)	not allocated
15	FR	M5	Moyen cours d'eau du Jura/Pré-Alpes du Nord	R-A1
15	FR	MP6	Moyen ou Petit cours d'eau de Méditerranée	R-M4
15	FR	P5	Petit cours d'eau du Jura/Pré-Alpes du Nord	R-A1
15	FR	TP5	Très Petit cours d'eau du Jura/Pré-Alpes du Nord	R-A1
15	FR	TP7	Très Petit cours d'eau des Pré-Alpes du Sud	R-M4
15	PL	2	Potok tatrzański węglanowy	not allocated
15	SK	K3M	Malé toky v nadmorskej výške 500 - 800 m v Karpatoch	R-E1a
15	SK	K4M	Malé toky v nadmorskej výške nad 800 m v Karpatoch	not allocated

Table 6.2-29 National & intercalibration types for countries reporting Broad Type15, highland, calcareous/mixed, all Europe rivers

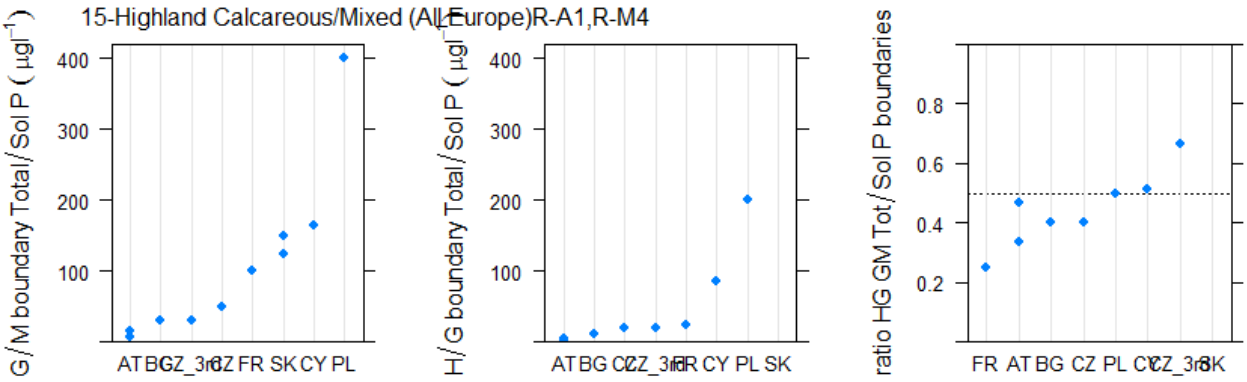

Figure 6.2-72 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 15, highland, calcareous/mixed, all Europe rivers (90th percentile values halved)

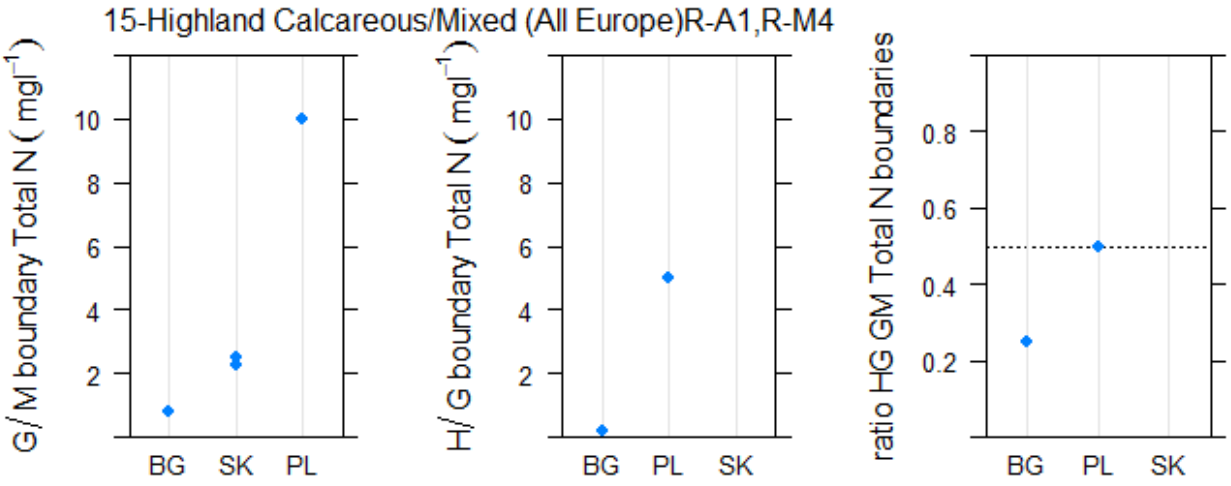

Figure 6.2-73 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 15, highland, calcareous/mixed, all Europe rivers

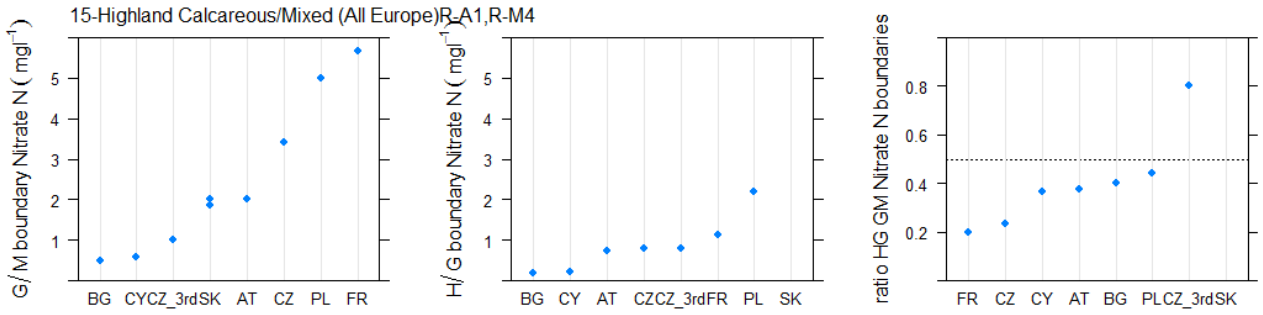

Figure 6.2-74 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 15, highland, calcareous/mixed, all Europe rivers

6.2.2.16 Type l16 Glacial rivers all Europe

Broad Type	Country	National type code	Description of type	IC Type
16	FR	G1	Grand cours d'eau des Pyrénées	R-A2
16	FR	G2	Grand cours d'eau des Alpes internes	R-A2
16	FR	GM7/2	Grand ou Moyen cours d'eau des Pré-Alpes du Sud et exogène des Alpes internes	R-A2
16	FR	M1	Moyen cours d'eau des Pyrénées	R-A2
16	FR	P1	Petit cours d'eau des Pyrénées	R-A2
16	FR	TP1	Très Petit cours d'eau des Pyrénées	R-A2
16	FR	TP2	Très petit cours d'eau des Alpes internes	R-A2
16	IT	IT01GH1N		R-A2
16	IT	IT01GH2N		R-A2
16	IT	IT01SS1N		R-A2
16	IT	IT01SS2N		R-A2
16	IT	IT04SS2N		R-A2

Table 6.2-30 National & intercalibration types for countries reporting Broad Type16

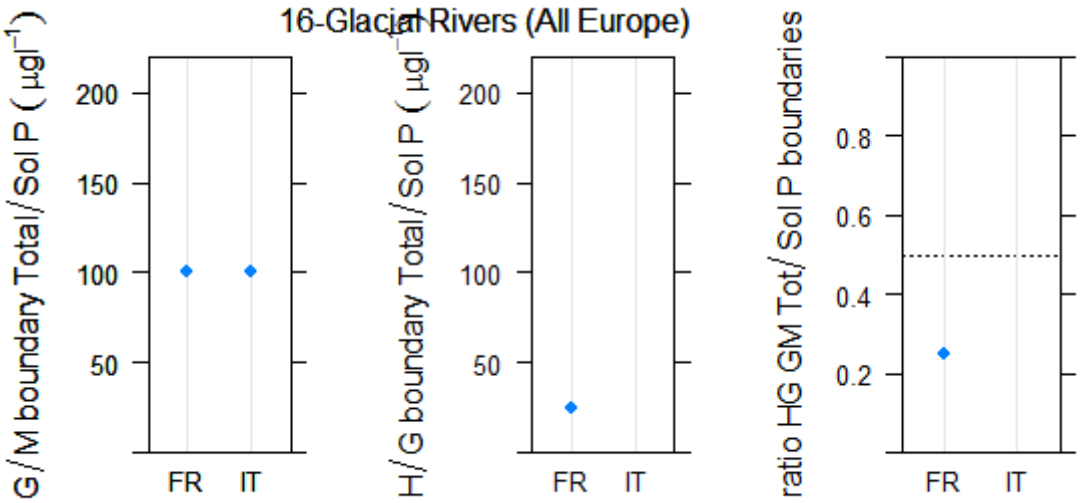

Figure 6.2-75 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 16, glacial rivers, all Europe (90th percentile values halved)

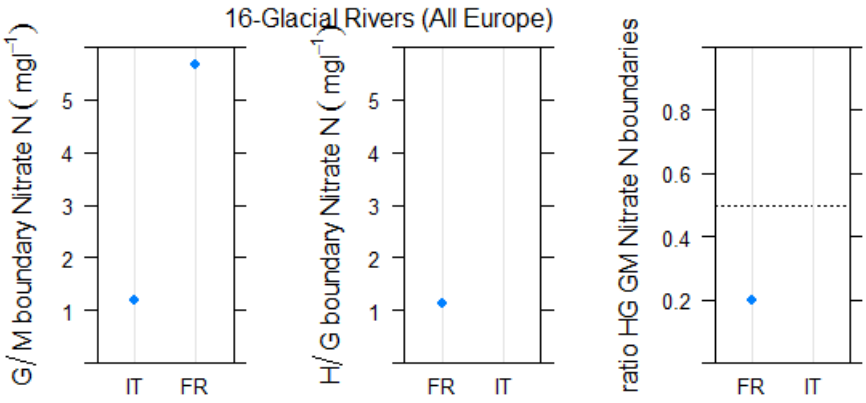

Figure 6.2-76 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 16, glacial rivers, all Europe

6.2.2.17 Type 17 Mediterranean, lowland, medium-large, perennial rivers

Broad Type	Country	National type code	Description of type	IC Type
Broad_Type3	Country	National type code	Descr	IC_Type
17	FR	G16	Grand cours d'eau de Corse	R-M3
17	FR	G6	Grand cours d'eau de Méditerranée	R-M3
17	FR	GM6/1	Grand ou Moyen cours d'eau de Méditerranée et exogène des Pyrénées	R-M3
17	HR	HR-R_13	Lowland medium and large rivers	not allocated
17	HR	HR-R_13A	Lowland large rivers with the barrage pools	not allocated
17	HR	HR-R_18	Lowland medium rivers of Istria	not allocated
17	IT	IT06SS3T		R-M4
17	IT	IT06SS4D		R-M2
17	IT	IT06SS4F		R-M2
17	PT	R_L	Rios do Litoral Centro	R-M1
17	PT	R_L	Rios do Litoral Centro	R-M2
17	PT	R_L	Rios do Litoral Centro	R-M5
17	PT	R_S1G	Rios do Sul de Média-Grande Dimensão	R-M2
17	PT	R_S1G	Rios do Sul de Média-Grande Dimensão	R-M5
17	PT	R_S3	Depósitos Sedimentares do Tejo e Sado	R-M1
17	PT	R_S3	Depósitos Sedimentares do Tejo e Sado	R-M2

Table 6.2-31 National & intercalibration types for countries reporting Broad Type 17, Mediterranean, lowland, medium-large rivers

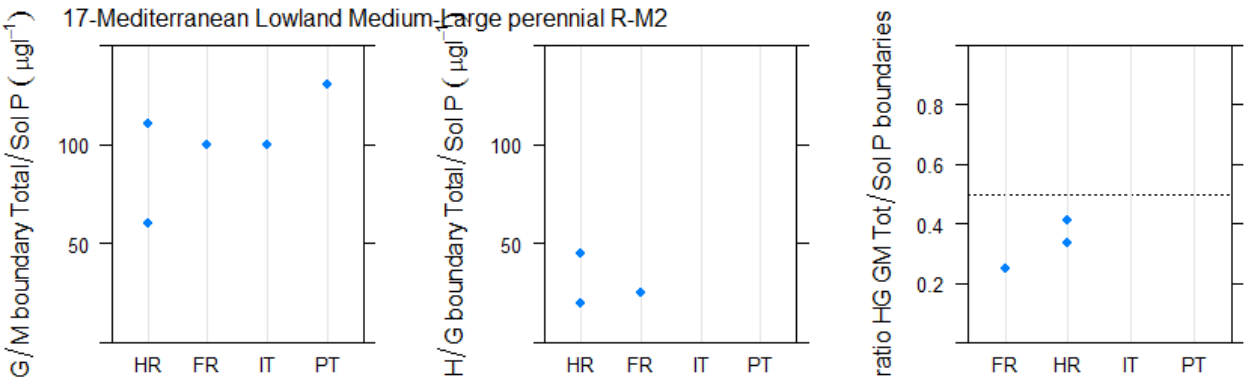

Figure 6.2-77 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 17, Mediterranean, lowland, medium-large rivers (90th percentile values halved)

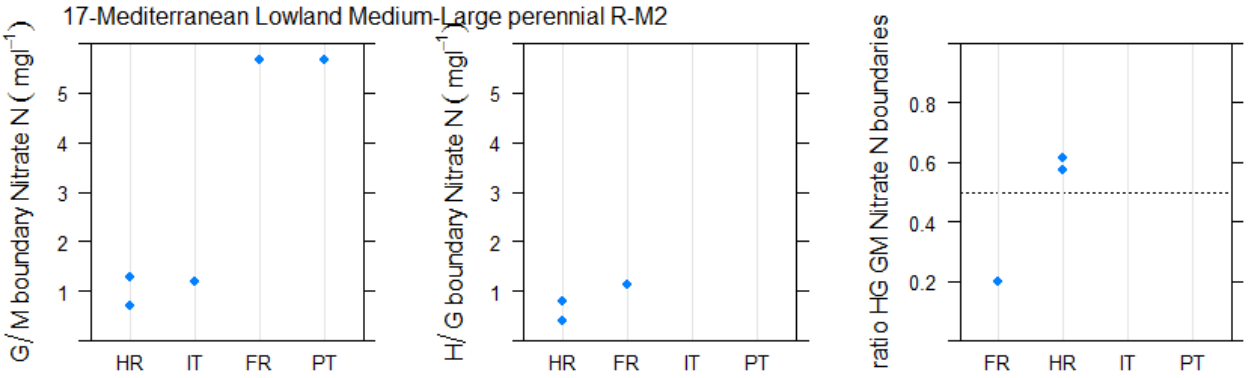

Figure 6.2-78 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 17, Mediterranean, lowland, medium-large rivers

6.2.2.18 Type 18 Mediterranean, mid-altitude, medium/large, perennial rivers

Broad Type	Country	National type code	Description of type	IC Type
18	FR	GM6/2-7	Grand ou Moyen cours d'eau de Méditerranée et exogène des Pré-Alpes du Sud ou des Alpes internes	R-M3
18	FR	GM6/8	Grand ou Moyen cours d'eau de Méditerranée et exogène des Cévennes	R-M3
18	FR	GMP7	Grand ou Moyen ou Petit cours d'eau des Pré-Alpes du Sud	R-M4
18	FR	TG6/1-8	Très Grand cours d'eau de Méditerranée et exogène des Pyrénées ou des Cévennes	R-M3
18	FR	TG6-7/2	Très Grand cours d'eau en Méditerranée ou des Pré-Alpes du Sud et exogène des Alpes internes	R-M3
18	HR	HR-R_12	Foothill midium and large rivers	
18	IT	IT10SS3N		R-M4
18	IT	IT13AS3N		R-M1
18	IT	IT19SS3N		R-M4
18	IT	IT21SS3T		R-M4

Table 6.2-32 National & intercalibration types for countries reporting Broad Type 18 Mediterranean, mid-altitude, medium-large, perennial rivers

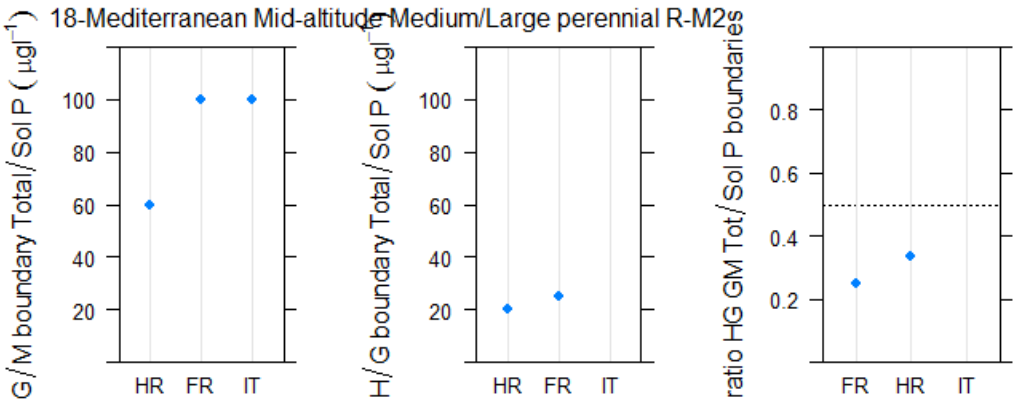

Figure 6.2-79 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 18 mid-altitude medium large perennial rivers (90th percentile values halved)

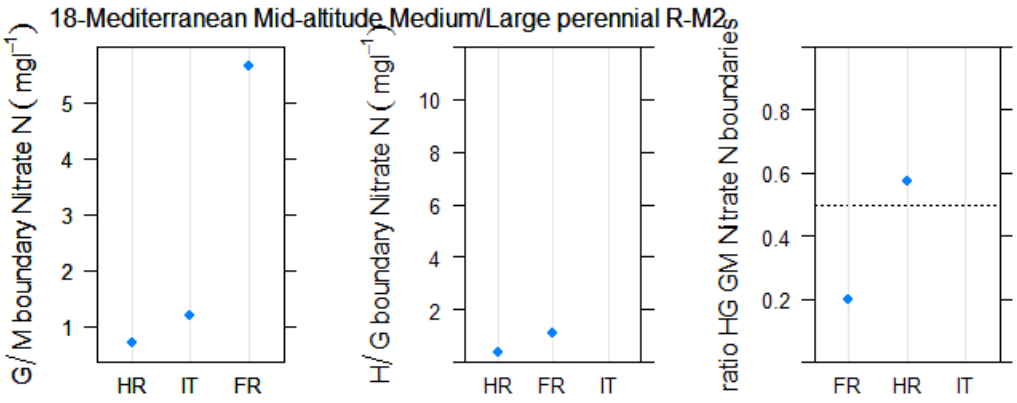

Figure 6.2-80 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate boundary values for rivers in broad type 18 mid-altitude medium large perennial rivers,

6.2.2.19 Type 19 Mediterranean, very small-small, perennial rivers

Broad Type	Country	National type code	Description of type	IC Type
19	FR	PTP16-A	Petit ou Très Petit cours d'eau de Corse dans l'HER de niveau 2 n°22	R-M1
19	FR	PTP8	Petit ou Très Petit cours d'eau des Cévennes	R-M1
19	FR	TP6	Très Petit cours d'eau de Méditerranée	R-M4
19	HR	HR-R_11	Lowland and foothill small rivers	not allocated
19	HR	HR-R_16B	Lowland small temporary rivers	not allocated
19	HR	HR-R_17	Lowland and foothill small rivers of Istria	not allocated
19	HR	HR-R_19	Temporary rivers of Istria	not allocated
19	IT	IT09SS2T		R-M1
19	IT	IT10SS2T		R-M1
19	IT	IT11SS2N		R-M1
19	IT	IT11SS2T		R-M1
19	IT	IT13SR2T		R-M1
19	IT	IT14SS2T		R-M1
19	IT	IT19SR1N		R-M1
19	IT	IT19SR2N		R-M1
19	IT	IT19SS1N		R-M1
19	IT	IT19SS2N		R-M1
19	IT	IT21SS2T		R-M1
19	PT	R_N1P	Rios do Norte de Pequena Dimensão	R-M1
19	PT	R_N3	Rios do Alto Douro de Pequena Dimensão	R-M1

Table 6.2-33 National & intercalibration types for countries reporting Broad Type 19, Mediterranean, very small perennial rivers

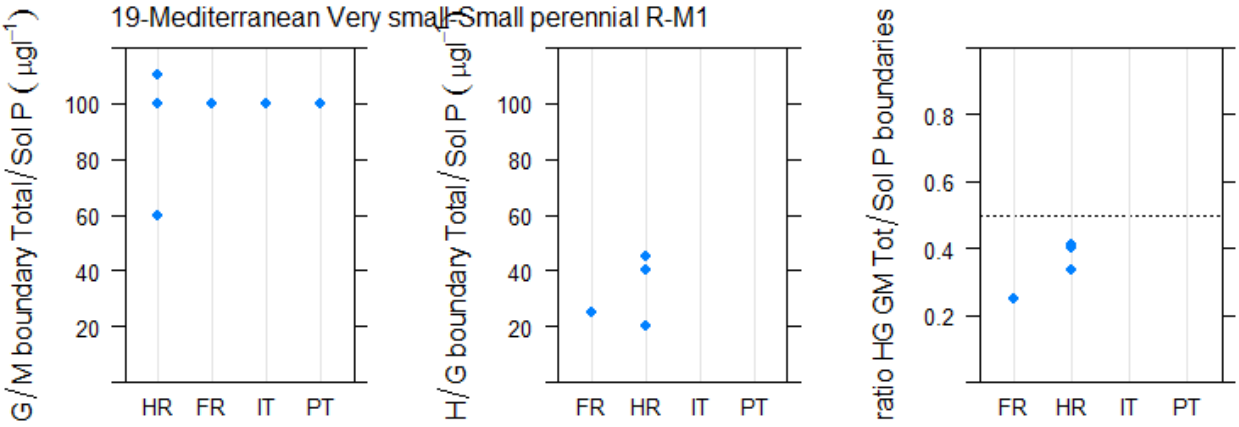

Figure 6.2-81 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 19, Mediterranean, very small perennial rivers (90th percentile values halved)

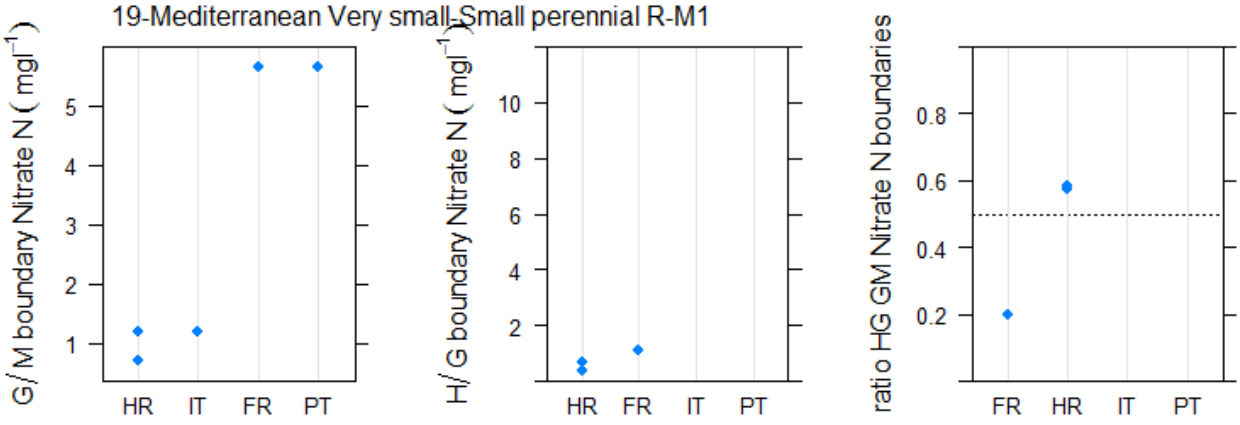

Figure 6.2-82 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 19, Mediterranean, very small perennial rivers

6.2.2.20 Type 20 Mediterranean, temporary/intermittent streams

Broad Type	Country	National type code	Description of type	IC Type
20	BG	R14	Sub-Mediterranean rivers (temporary)(ER 7;altitude <500 (650) m variable; mixed/siliceous/calcareous;size <1100 km2, medium and small; substratum variable)	not allocated
20	CY	R1	small rain volume with non-continuous flow	R-M5
20	CY	R3	large rain volume with non-continuous flow	R-M5
20	IT	IT02IN7N		R-A1
20	IT	IT02IN7T		R-A1
20	IT	IT06IN7D		R-M5
20	IT	IT06IN7N		R-M5
20	IT	IT10EF7N		R-M5
20	IT	IT10IN7N		R-M5
20	IT	IT11EF7N		R-M5
20	IT	IT11IN7N		R-M5
20	IT	IT11IN7T		R-M5
20	IT	IT12IN7N		R-M5
20	IT	IT19EF7N		R-M5
20	IT	IT19IN7N		R-M5
20	IT	IT19IN8N		R-M5
20	IT	IT20IN7N		R-M5
20	IT	IT21EF7T		R-M5
20	IT	IT21IN7T		R-M5
20	PT	R_S1P	Rios do Sul de Pequena Dimensão	R-M5
20	PT	R_S4	Calcários do Algarve	R-M5
20	RO	RO17	Curs de apa nepermanent situat in zona montana	not allocated
20	RO	RO18	Curs de apa nepermanent situat in zona piemontana sau de podisuri inalte	not allocated
20	RO	RO19	Curs de apa nepermanent situat in zona de dealuri si podisuri	not allocated
20	RO	RO20	Curs de apa nepermanent situat in zona de campie	not allocated

Table 6.2-34 National & intercalibration types for countries reporting Broad Type 20, Mediterranean, temporary/intermittent streams

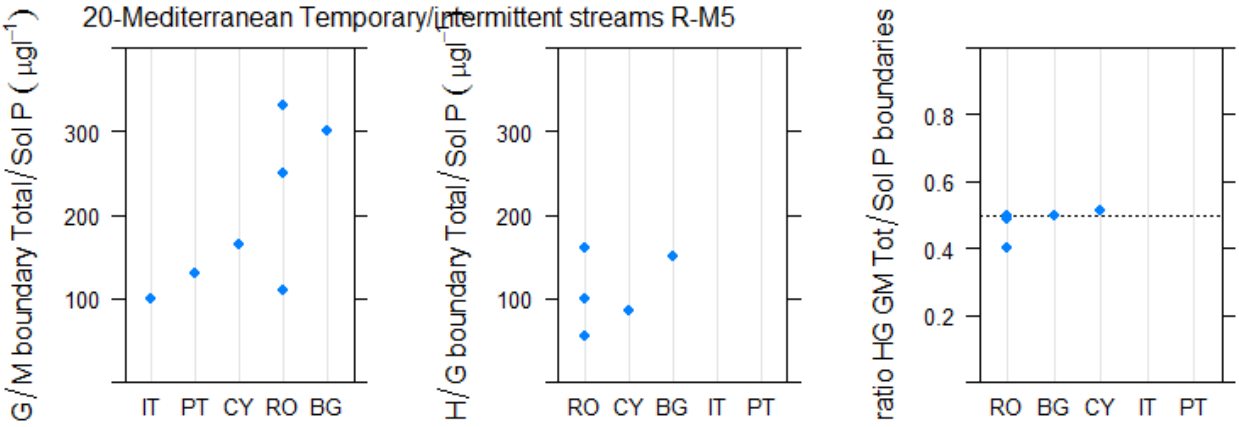

Figure 6.2-83 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national phosphorus boundary values for rivers in broad type 20, Mediterranean, temporary/intermittent streams (90th percentile values halved)

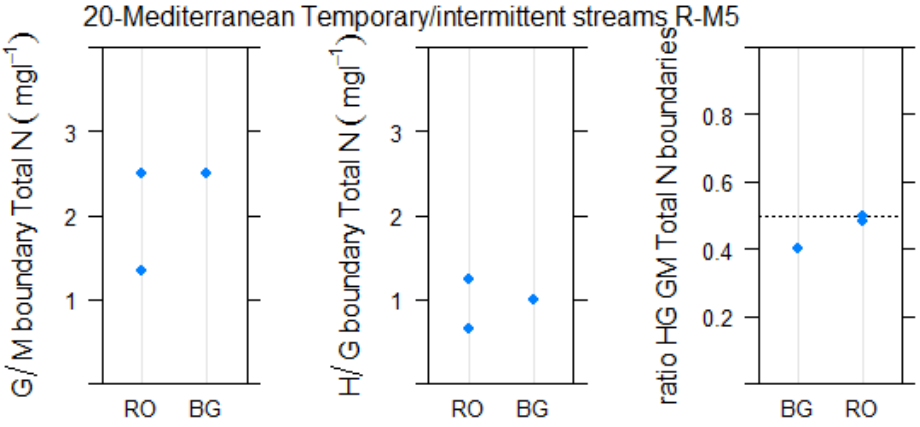

Figure 6.2-84 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national total nitrogen boundary values for rivers in broad type 20, Mediterranean, temporary/intermittent streams

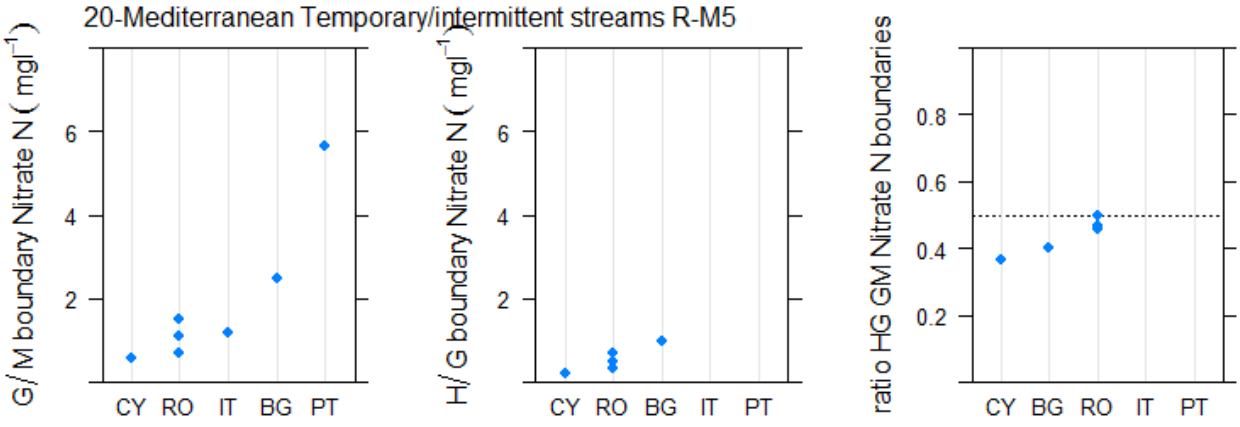

Figure 6.2-85 Range of a) good/moderate, b)high/good, c) ratio of good/moderate to high/good national nitrate nitrogen boundary values for rivers in broad type 20, Mediterranean, temporary/intermittent streams