Overview of common Intercalibration types

ECOSTAT WG 2.A		
Version 5.1	**23 April 2004**	**Final version for finalisation of the intercalibration network spring 2004**
General Comments	This document is an update of Chapters 2 (rivers), 3 (lakes) and 4 (coastal and transitional waters) of the document "*Overview of common Intercalibration types and Guidelines for the Selection of Intercalibration sites*", containing descriptions of the agreed common intercalibration types, as well as the pressures, and quality elements in focus. The document is compiled by *Wouter van de Bund, Ana Cristina Cardoso, Anna-Stiina Heiskanen, Peeter Nõges* (EC-JRC) based on the reports form the expert network meeting. The types proposed in this document will be used in the finalisation of the intercalibration network in the spring of 2004.	

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1 INTRODUCTION

This document is an update of Chapters 2 (rivers), 3 (lakes) and 4 (coastal and transitional waters) of the document "*Overview of common Intercalibration types and Guidelines for the Selection of Intercalibration sites*", containing descriptions of the agreed and revised common intercalibration types, as well as the pressures, and quality elements in focus[1]. The document takes into account the recommendations of the expert networks following their meeting of 11-13 February 2004.

This document will be used as basis for revision of the metadata questionnaire and the internet based web-pages[2] for the submission sites to the final register forming the intercalibration network in 2004.

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[1] *Overview of common intercalibration types and guidelines for the selection of intercalibration sites*". version 2.0, May 19, 2003, and version 3.1, Oct. 9, 2003). Available at http://forum.europa.eu.int/Members/irc/env/wfd/library; / E Working groups/ New WG 2A - Ecological Status

[2] **http://wfd-reporting.jrc.cec.eu.int**

2. COMMON INTERCALIBRATION TYPES FOR RIVERS

Geographical intercalibration groups

For rivers, five geographical intercalibration groups were agreed upon:

- Northern (see chapter 2.1)
- Central European & Baltic (see chapter 2.2)
- Alpine (see chapter 2.3)
- Mediterranean (see chapter 2.4)
- Eastern Continental (see chapter 2.5)

Common intercalibration types

The common river types are characterised broadly by the descriptors of the WFD System A typology: altitude, catchment area and geology (usually, but not necessarily the System A descriptors). Depending on the geographical intercalibration groups, geomorphology, alkalinity, organic material and flow regime were used to further characterise the types in specific regions. In order to accommodate differences in national typology systems and river characteristics, slightly different sets of descriptors were chosen for the different regional intercalibration groups.

Pressures and Quality Elements

The most suitable pressures impacting aquatic flora and fauna in rivers to be considered for intercalibration are:

- organic and/or nutrient loading
- river modification
- acidification

In the tables it is indicated for each of the selected intercalibration types which pressures should be considered in the process of selecting intercalibration sites, and which countries have contributed sites for the selected types so far (based on the first results of the metadata analaysis and additions from the expert groups). Also the biological quality elements most sensitive for those pressures are listed. It is anticipated that most data will be available for these pressures and quality elements.

2.1. Northern Rivers

The Northern Geographical Intercalibration Group (GIG) includes (parts of) Finland, Sweden, Norway, UK and Ireland.

In the Northern GIG, nine common types were identified (Table R-1a), characterised by the following descriptors:

- catchment area following System A typology

- altitude and geomorphology - three classes: lowland (altitude <200m or below highest coastline); mid-altitude (between lowland and highland), and high (above treeline)
- alkalinity was used as a proxy for siliceous/calcareous geology, with two classes: low alkalinity (< 0,2 meq/l) and medium alkalinity (0,2 – 1 meq/l)
- organic/peat content – two water colour classes: low level (< 30 mg Pt/l) and high level (> 30 mgPt/l). The Nordic countries have proposed a threshold of 30 mg Pt/l; Ireland has indicated that this is too low to be applicable to Irish rivers – suggesting a threshold of 150 mg Pt/l. UK has no data or sites for types with > 30 mg Pt/l

Two changes have been made compared with the previous version used for the draft intercalibration register:

- in type R-N2 the upper limit of the catchment area has been changed to 1000 km2
- a new type R-N9 has been added as suggested by Norway.
- two types (R-N6 and R-N8) have been deleted because only Norway could contribute sites for those types

The descriptions of the Northern river types have been modified as agreed during a Nordic GIG meeting held in March, 2004.

Table R-1a Northern rivers: intercalibration types

Type	***River characterisation***	***Catchment area (of stretch)***	***Altitude & geomorphology***	***Alkalinity (meq/l)***	***Organic material (mg Pt/l)***
R-N1	*Small lowland siliceous moderate alkalinity, clear*	10-100 km^2	< 200 m and HC*	0.2 - 1	< 30**
R-N2	*Small-medium lowland siliceous low alkalinity, clear*	10-1000 km^2	< 200 m and HC*	< 0.2	< 30
R-N3	*Smal-medium lowland siliceous low alkalinity, organic (humic)*	10-1000 km^2	< 200 m and HC*	< 0.2	> 30
R-N4	*Medium lowland siliceous moderate alkalinity, clear*	100-1000 km^2	< 200 m and HC*	0.2 - 1	< 30
R-N5	*Small mid-altitude siliceous low alkalinity, clear*	10-100 km^2	Between lowland and highland	< 0.2	< 30
R-N7	*Small highland siliceous low alkalinity, clear*	10-100 km^2	Above treeline	< 0.2	< 30
R-N9	*Small - medium mid-altitude siliceous low alkalinity, organic (humic)*	10-1000 km^2	Between lowland and highland	< 0.2	> 30

* - highest coastline

** - Ireland has indicated that they need a higher threshold of 150 mg Pt/l

Table R-1b Northern rivers: Overview of countries that submitted sites to the common intercalibration types (situation 12 January 2004)

Type	*River characterisation*	*FI*	*SE*	*NO*	*UK*	*IE*
R-N1	*Small lowland siliceous moderate alkalinity, clear*			**X**	**X**	**X**
R-N2	*Smal-mediuml lowland siliceous low alkalinity, clear*			**X**	**X**	
R-N3	*Smal-mediuml lowland siliceous low alkalinity, organic (humic)*	**X**	**X**	**X**		**X**
R-N4	*Medium lowland siliceous moderate alkalinity,clear*			**X**	**X**	
R-N5	*Small mid-altitude siliceous low alkalinity, clear*		**X**	**X**	**X**	
R-N7	*Small highland siliceous low alkalinity, clear*		**X**	**X**		
R-N9	*Small - medium, mid-altitude siliceous low alkalinity organic (humic)*			**(X)**		

Currently, there are 5 types which have sites from more than one country and are, thus, suitable for intercalibration. Another 4 types have sites only submitted by Norway and one type has no sites submitted. At this stage it appears that there are sufficient sites in RN1, R-N3, R-N4, R-N5, and R-N7.
Within the 5 types indicated in 1a (i) the sites almost all fall within the correct type descriptor ranges. The exception being in R-N3, where some sites are actually medium size catchments rather than small (situation to be clarified by Finland and Norway) and in R-N4 where one site from UK is just beyond the medium size range

Table R-1c Northern rivers: pressures and quality elements by type

Type	*River characterisation*	*Organic and nutrient loading*	*Stream modification*	*Acidification*
R-N1	*Small lowland siliceous moderate alkalinity, clear*	**Macroinv. Benthic algae**		
R-N2	*Smal-medium lowland siliceous low alkalinity, clear*	**Macroinv.**		**Fish Macroinv. Benthic algae**
R-N3	*Smal-mediuml lowland siliceous low alkalinity, organic (humic)*	**Macroinv.**		**Fish Macroinv. Benthic algae**
R-N4	*Medium lowland siliceous moderate alkalinity, clear*	**Macroinv.**		
R-N5	*Small mid-altitude siliceous, low alkalinity, clear*			**Fish Macroinv. Benthic algae**
R-N7	*Small highland siliceous, low alkalinity, clear*			**Fish Macroinv.**

R-N9	*Small - medium, mid-altitude siliceous low alkalinity organic (humic)*			

Table R-1c summarises the pressures and quality elements proposed for the intercalibration.
There were no significant confounding pressures for the intercalibration types and no requirement to add other pressures to these types.

2.2. Central/Baltic Rivers

The Central geographical intercalibration group includes (parts of) Sweden, Estonia, Latvia, Lithuania, Denmark, UK, Ireland, the Netherlands, Belgium, Luxembourg, Germany, Austria, France, Spain, Portugal, Italy, Romania, and Poland, Czech Republic, Slovakia and Slovenia. The Baltic countries – Estonia, Lithuania and Latvia – are also included in the Central group, although it is recognised that rivers and lakes in these regions are often quite different from the rest of the Central regions, with very high values for alkalinity and organic matter.
In the Central group, six common types were identified (Table R-3a).
The Central common intercalibration river types are characterised by the following descriptors:

- catchment area, following System A typology
- altitude - two classes: lowland (altitude <200m), mid-altitude (from 200 – 800 m)
- geomorphology – for each of the types a description is given, taking into account substrate and width
- alkalinity was used as a proxy for siliceous/calcareous geology, with three classes – low (< 0,4 meq/l), medium (0,4 – 2 meq/l), and high (>2 meq/l). In the metadata questionnaire numerical values are asked for, allowing to check if different countries use comparable values. It may in some cases require to split up some of the types (especially RC1, RC4 and RC5) to ensure that intercalibration will compare like with like. This needs to be done when the metadatabase is complete – the data now available do not allow to make this analysis yet.

Table R-2a Central rivers: intercalibration types

Type	*River characterisation*	*Catchment area (of stretch)*	*Altitude & geomorphology*	*Alkalinity (meq/l)*
R-C1	*Small lowland siliceous sand*	10-100 km^2	lowland, dominated by sandy substrate (small particle size), 3-8m width (bankfull size)	> 0,4
R-C2	*Small lowland siliceous - rock*	10-100 km^2	lowland, rock material 3-8m width (bankfull size)	< 0,4
R-C3	*Small mid-altitude siliceous*	10-100 km^2	mid-altitude, rock (granite) - gravel substrate, 2-10m width (bankfull size)	< 0,4
R-C4	*Medium lowland mixed*	100-1000 km^2	lowland, sandy to gravel substrate, 8-25m width (bankfull size)	> 0,4
R-C5*	*Large lowland mixed*	1000-10000 km^2	lowland, barbel zone*, variation in velocity, max. altitude in catchment: 800m, >25m width	> 0,4

			(bankfull size)	
R-C6	*Small, lowland, calcareous*	10-300 km^2	lowland, gravel substrate (limestone), width 3-10m (bankfull size)	> 2

*mixed cyprinids, with some salmonids

Table R-2b Central rivers: Overview of countries that submitted sites to the common intercalibration types (situation 12 January 2004)

Type	*River charact*	*EE*	*LV*	*LT*	*SE*	*DK*	*UK*	*IE*	*NL*	*BE* *	*LU* **	*DE*	*AT*	*FR*	*ES*	*IT*	*PL*	*SI*	*CZ*	*SK*
R-C1	*Small lowland*								X	X	X	X					X			
R-C2	*Small lowland*						X	X						X						
R-C3	*Small mid-*						X					X	X	X	X				X	
R-C4[1]	*Medium lowland*	X		X			X	X	X	X		X					X	X	X	
R-C5[2]	*Large lowland*		X	X			X	X		X		X					X	X	X	
R-C6[3]	*Small, lowland*			X	X		X	X		X	X			X			X	X		

[1]Also including the former type R-B3
[2]Also including the former type R-B4
[3]Also including the former type R-B2

Table R-2b summarises the expected contribution of intercalibration sites for the different countries. The six intercalibration types seem allow enough possibility to compare between countries, although some countries have only a single site for some of the types. Sufficient numbers of sites representing the G-M boundary are available for all types. Finding sites representing the H-G boundary will be a problem in some types - especially R-C4 and R-C5.

Table R-2c Central rivers: Indicative overview of pressures and quality elements by type

Type	*River characterisation*	*Organic and nutrient pressure*	*Stream modification*	*Acidification*
R-C1	*Small lowland siliceous - sand*	**Macroinvertebrates Phytobenthos Macrophytes**	**Fish Macroinv.**	
R-C2	*Small lowland siliceous - rock*	**Macroinvertebrates Phytobenthos Macrophytes**		
R-C3	*Small mid-altitude siliceous*	**Mac Macroinvertebrates Phytobenthos Macrophytes**	**Fish Macroinv.**	**Fish Macroinv.**
R-C4	*Medium lowland mixed*	**Macroinvertebrates Phytobenthos Macrophytes**	**Fish Macroinv.**	
R-C5	*Large lowland mixed*	**Macroinvertebrates Phytobenthos Macrophytes**	**Fish Macroinv.**	
R-C6	*Small, lowland calcareous*	**Macroinvertebrates Phytobenthos Macrophytes**		

Table R-2c summarises the pressures and quality elements proposed for the intercalibration

2.3. Alpine Rivers

The Alpine geographical intercalibration group includes (parts of) Germany, Austria, France, Italy, Slovenia, and Spain – not only including the Alps, but also other mountain regions like the Pyrenees.

In the Alpine group, two common types were identified (Table R-4a). Following the expert meeting in February 2004, the types have been slightly changed. Alpine common intercalibration river types are characterised by the following descriptors:

- catchment area
- altitude (site and maximum altitude in the catchment) and geomorphology
- alkalinity was used as a proxy for siliceous/calcareous geology, with two classes – medium to low alkalinity and medium to high alkalinity
- flow regime – nival and nival-glacial flow regime.

Table R-3a Alpine rivers: intercalibration types

Type	*River characterisation*	*Catchment area (of stretch)*	*Altitude & geomorphology***	*Alkalinity*	*Flow regime*
R-A1	*Pre-alpine - Small to medium, high altitude calcareous*	10-1000 km^2	Site: 400-800 m. max. altitude of the catchment <2500 m, boulders/cobble	Medium to high alkalinity	Nival Flow regime
R-A2	*Alpine -Small to medium, high altitude, siliceous*	10-1000 km^2	Site: 500-1000m max. altitude of catchment > 2500m, boulders	medium to low alkalinity	nival-glacial flow regime

*Spanish comment: Because the main difference between R-A1 and R-A2 is the geology, it would be more reasonable to establish a similar altitude for both types: 800-2500 m . In the Pyrenees, many alpine rivers have a max. altitude of catchments over 2000-2500 m. Some of them over 3000 m., but a few of those selected for intercalibration are over 2000-2500 in Spanish face of Pyrenees.

Table R-3b Alpine rivers: Central rivers: Overview of countries that submitted sites to the common intercalibration types (situation 12 January 2004)

Type	*River characterisation*	*DE*	*AT*	*FR*	*IT**	*ES*	*SI*
R-A1	*Pre-alpine - Small to medium, high altitude calcareous*	**X**	**X**	**X**	**X**		**X**
R-A2	*Alpine - Small to medium, high altitude, siliceous*		**X**	**X**	**X**	**X**	

*For Italy, it may be difficult to separate the two alpine types; in that case, mixed geology sites may be acceptable. Number of sites for Italy is indicative at this stage, not officially nominated yet.

Table R-3b summarises the expected contribution of intercalibration sites for the different countries. The results of the metadata analysis indicate that the sites submitted for type R-A1 so far are fitting well into the proposedintercalibration types, allowing a wide comparison. For type R-A2 it has to be checked if sites in the Alps are really comparable to sites in the Pyrenees; probably there will be some differences in physical characteristics (degree of glacial influence) and faunistic contents. For example, in Spain all R-A2 rivers have a nival regime, not glacial. So, probably it will be necessary to check if they are comparable to those with glacial regime in Alps.

Table R-3c Alpine rivers: pressures and quality elements by type

Type	*River characterisation*	*Organic and nutrient pressure*	*Stream modification*[*]	*Acidification*
R-A1	*Pre-alpine - Small to medium, high altitude calcareous*	**Macroinv. Phytobenthos**		
R-A2	*Alpine - Small to medium, high altitude, siliceous*		**Macroinv. Fish**	

[*] Stream modification definition should include mainly hydromorphological alterations: changes in natural hydrological regime by dams (irrigation, hydropower, …) and changes in river bed or channel, or riparian zones (fluvial terraces modified and constraining the river channel, channel modified by rigid structures along the margins, river bed with rigid structures (e.g wells) transverse structures into the channel (e.g weirs), etc…)

Table R-3c summarises the pressures and quality elements proposed for the intercalibration. As it is difficult to find sites that are affected only by organic pollution, it was suggested to include organic/nutrient pressure and stream modification in both types. It would be interesting also to compare important hydrological impacts (e.g. very low discharge below dams) without important alteration of water quality, so as to intercalibrate the boundaries of HMWB designation in this case.

2.4. Mediterranean Rivers

The Mediterranean geographical intercalibration group includes (parts of) Greece, Italy, Spain, Portugal, France, Malta, and Cyprus. Until now, no expert from Malta has been involved in the discussions yet.

In the Mediterranean group, five common types were identified (Table R-5a), covering all of the Mediterranean countries (Table R-5b)

Mediterranean common intercalibration river types are characterised by the following descriptors:

- catchment area following System A typology
- altitude and geomorphology – for each of the classes a specific altitude range is given: lowland < 600 m, mid-altitude from 200 – 800 m, Mediterranean mountains from 400 – 150 m
- catchment geology – only described in very general terms (“mixed” and “non siliceous”), because for Mediterranean rivers the flow characteristics are by far the most important characteristic
- flow regime

Table R-4a Mediterranean rivers: intercalibration types

Type	*River characterisation*	*Catchment area (of stretch)*	*Altitude & geomorphology*	*Catchment geology*	*Flow regime*
R-M1	*Small, mid altitude*	10-100 km^2	200-800 m	Mixed	Highly seasonal

R-M2	*Medium, lowland*	100-1000 km^2	<600 m	Mixed	Highly seasonal
R-M3	*Large, lowland*	1000-10000 km^2	<600 m	Mixed	Highly seasonal
R-M4	*Small/Medium Mediterranean mountains*	10-1000 km^2	400-1500 m	Non siliceous (Mixed)	Seasonal, high sediment transport
R-M5	*Small Mediterranean Temporary*	10-100 km^2	<300 m	Mixed	Temporary

Table R-4b Mediterranean rivers: Overview of countries that submitted sites to the common intercalibration types (situation 12 January 2004)

Type	***River characterisation***	***GR***	***IT***	***ES***	***PT***	***FR***	***SI***	***CY***
R-M1	*Small, mid altitude*	**X**	**X**	**X**	**X**	**X**		
R-M2	*Medium, lowland*	**X**	**X**	**X**	**X**		**X**	
R-M3	*Large, lowland*		**X**	**X**	**X**			
R-M4	*Small/Medium Mediterranean mountains*		**X**	**X**		**X**		**X**
R-M5	*Small Mediterranean temporary*		**X**	**X**	**X**			

Table R-4b summarises summarises the expected contribution of intercalibration sites for the different countries.

All or most countries will introduce changes in the IC sites in the next spring, using the six agreed types. For the moment it is not possible to say what are the final river types for the IC and the countries which will intercalibrate those types.

Cyprus considers the possibility to intercalibrate M4 or M5 but has no available biological data and the possibility to collect data remains uncertain. Portugal and Spain will dis

Table R-4c Mediterranean rivers: pressures and quality elements by type

Type	***River characterisation***	***Organic and nutrient pressure***	***Stream modification***	***Acidification***
R-M1	*Small, mid altitude*	**Macroinvertebrates** **Diatoms***		
R-M2	*Medium, lowland*	**Macroinvertebrates** **Diatoms***	**Fish**	
R-M3	*Large, lowland*	**Macroinvertebrates** **Diatoms*** **Fish***		
R-M4	*Small/Medium Mediterranean mountains*	**Macroinvertebrates** **Diatoms*** **Fish***		
R-M5	*Small Mediterranean Temporary*	**Macroinvertebrates** **Diatoms***		

*These quality elements are considered as relevant – but it is not sure if it will be possible to include them in intercalibration due to lack of data / assessment methods. This will become clear in metadata collection

Table R-4c summarises the pressures and quality elements proposed for the intercalibration.

Biological quality elements

- Invertebrate data are available in all countries.
- For invertebrates, Standard National methods for quality classification are available for some countries (France, Italy), for most stream types. Other countries have data based on standard metrics calculation but not on a standard sampling procedure (Spain).
- Taxonomic resolution - Data can surely be compared at the Family level. For subsets of sites and for some taxonomic groups (e.g. EPT), Genus or Species level might be considered for the intercalibration. In most cases, all available information will be used to interpret the results.
- Temporal sampling strategies - Data from different seasons should be compared separately. One season will be presumably selected as the most suitable for the intercalibration, for each stream type.
- Sample size & sampling approach (e.g. multihabitat proportional, transect, all available habitats, time sample, etc.) - The option of using data collected with the same field approach within a stream type for each country should be considered for the calculation of the common metrics values (see above). I.e. data for intercalibration sites of e.g. type R-M1 within each country should have been obtained by transect approach only OR by all available habitats approach only, etc.
- Phytobenthos (Diatoms only) data might be available for a subset of the sites. It might be possible to perform the intercalibration in some countries (at least France?, Greece?, Italy, Portugal and Spain) for one stream type (to be selected).
- For Diatoms, (Standard) National methods for quality classification are available for few countries (e.g. France and Italy), for few stream types only.
- For Fishes (and Macrophytes) (Standard) National methods for quality classification are not available.
- Availability of supporting information - There is usually a good availability of Physico-Chemical and Pressures data. In some cases, Hydromorphological and Habitat data will be available.
- Needs and possibilities for additional data collection - In particular cases and stream types, e.g. to derive additional information for Diatoms, integrative samples at selected sites might be considered.

Pressures

- The Pressures should initially consider Organic/Nutrient AND Hydromorphology together. The supporting data will be used to interprete the classification. In the proposed IC, Hydromorphological modification should be absent to moderate (not strongly modified sites).
- The Pressures group “Organic and Nutrients” alone (with no Hydromorphological alteration at all) might be considered for a second step of the intercalibration process.
- Intercalibration for Stream modification (Morphology and Hydrology) alone is not suitable at the moment in Mediterranean rivers (nearly no data available). Each

country should check if new data can reasonably be collected before the end of 2004.

- ES: In the Mediterranean basins, there are difficulties to find sites without organic/nutrient pressure (even at a low levels of nutrients); only in heads of mountain river basins organic/nutrient pressure is almost absent. In these cases, IC only for stream modification could be possible.
- The close interconnection between Hydrological alteration (e.g. flow decrease, reduction of flushing flows, unnatural droughts, etc.) and Morphological degradation (e.g. presence of weirs or dams, bank and channel reinforcement and resectioning, change in habitat composition, habitat quality, etc.) is highlighted. In fact, they often originate from common causes (e.g. water abstraction, hydropeaking,) and/or interact each other.
- If the Intercalibration will be performed for Hydromorphological alteration, one single, general kind of alteration (e.g. presence of dams, hydropeaking, important water abstraction, etc.) should be selected, to make the results comparable. The simple comparison of sites belonging to generic "classes" of similar Hydromorphological quality might not be sound with the intercalibration of biological metrics and classification.
- In general terms, the impact of Morphological alteration might result difficult to assess based on available biological data (mainly Invertebrates, not enough data for fishes).
- The impact of Hydrological alteration of rivers is considered central for the Mediterranean area. Nevertheless, it might be difficult to find suitable information, even for hydrological data solely (only Spain seems to own enough data). Sites where BQEs and hydrological alteration were mutually studied are very few. In addition, difficulties may arise due to the interaction with Organic/Nutrient pollution (dilution problems).
- All over the Mediterranean and Alpine region, the confounding effect of natural discharge variability (mainly due to the high dynamicity of rain regime) is often experienced. This is especially important when assessing Hydromorphological alteration. Thus, in highly seasonal or temporary rivers it is substantial to distinguish between natural hydrological disturbance and man-induced alterations.

2.5. Eastern Continental rivers

In the Eastern Continental region, 6 common river types were identified (Table R-6a), aiming to cover at least 3 countries each (Table R-6b).
The Eastern Continental common intercalibration river types are characterised by the following descriptors:

- ecoregion according to Water Framework Directive, Annex XI http://dataservice.eea.eu.int/atlas/viewdata/viewpub.asp?id=499
- catchment area (of stretch) in size classes following System A
- altitude – for each of the classes a specific altitude range is given
- geology (siliceous, calcareous or mixed) – no specific ranges of values are given
- substrate – described in the table

The expected contribution of intercalibration by countries for particular types is indicated in the Table R-6b. Among these sites outliers were identified by JRC concerning the altitude and catchment area. The Eastern Continental GIG Group at the JRC Workshop on WFD intercalibration network discussed all outliers and agreed that the differences from the agreed catchment area were negligible, i.e. the selected catchments are acceptable. As for the altitude outliers, all these sites represent rivers, which by their character comply with the proposed river types. Therefore, the proposed sites were found acceptable. A detailed information on sites nominated for particular quality status borders (good – moderate, high – good) for Eastern Continental intercalibration types is provided in the Table R-6b2.

At the JRC Workshop on WFD intercalibration network a discussion on possible nomination of sites for Eastern Continental GIG was held with Greece (for type R-E5) and Poland (for type R-E1). Both countries agreed to search for suitable sites for the Eastern Continental GIG.

The Eastern Continental GIG Group at the JRC Workshop also introduced phytoplankton (abundance and composition) as a new quality element relevant for types E3 and E6 (Table R-6d)

Table R-6a Eastern Continental rivers: intercalibration types

Type	***River characterisation***	***Ecoregion***	***Catchment area (of stretch)***	***Altitude***	***Geology***	***Substrate***
R-E1	*Carpathians: small to medium, mid-altitude*	*10*	*10-1000 km²*	*500-800 m*	*siliceous*	*gravel and boulder*
R-E2	*Plains: medium-sized, lowland*	*11 and 12*	*100-1000 km²*	*< 200 m*	*mixed*	*sand and silt*
R-E3	*Plains: large and very large, lowland*	*11 and 12*	*>1000 km²*	*< 200 m*	*mixed*	*sand, silt and gravel*
R-E4	*Plains: medium-sized, mid-altitude*	*11 and 12*	*100-1000 km²*	*200-500 m*	*mixed*	*sand and gravel*
R-E5	*Balkans: medium-sized, mid-altitude*	*5, 6 and 7*	*100-1000 km²*	*200-500 m*	*calcareous*	*?*
R-E6	*Danube River: middle and downstream*	*11 and 12*	*>131000 km²*	*< 134 m*	*mixed*	*gravel and sand*

R-E5 is still being checked by BG and HR.

Table R-6b Eastern Continental rivers: Indicative overview of countries that can contribute sites to the common intgercalibration sites

Type	***River characterisation***	***AT***	***CZ***	***SK***	***HU***	***SI***	***BG***	***RO***	***GR***	***(HR)***
R-E1	*Carpathians: small to medium, mid-altitude*			**X**				**X**		
R-E2	*Plains: medium-sized, lowland*			**X**	**X**		**X**	**X**		**X**
R-E3	*Plains: large and very large, lowland*			**X**	**X**	**X**		**X**		**X**
R-E4	*Plains: medium-sized, mid-altitude*	**X**		**X**	**X**		**X**	**X**		**X**
R-E5	*Balkans: medium-sized, mid-altitude*						**X**		**X**	**X**

R-E6	*Danube River: middle and downstream*			**X**	**X**		**X**	**X**		**X**

HU, BG and HR are still checking their data; they will report by mid March 2004.

Table R-6c Eastern Continental rivers: pressures by type

Type	*River characterisation*	*Organic and nutrient pressure*	*Stream modification*	*Acidification*
R-E1	*Carpathians: small to medium, mid-altitude*	**X**	**?**	-
R-E2	*Plains: medium-sized, lowland*	**X**	**X**	-
R-E3	*Plains: large and very large, lowland*	**X**	**X**	-
R-E4	*Plains: medium-sized, mid-altitude*	**X**	**X**	-
R-E5	*Balkans: medium-sized, mid-altitude*	**X**	**X**	-
R-E6	*Danube River: middle and downstream*	**X**	**X**	-

Table R-6d Expected availability of data for river intercalibration for the different quality elements (existing and/or new data)

Country	*macroinvertebrates*	*phytobenthos*	*fish*	*macrophytes*	*phytoplankton*
AT	++ (SP)	++ (SP)	++ (SP)	? (Kohler)	**?**
CZ	++ (SP)	-	+ (SP)	?	**?**
SK	++ (SP)	++ (SP)	+ (SP)	+ (Kohler) (only for E2 and E3)	++
HU	+ (SP)	+	+ (SP)	+	++
SI	++	++	-	-	-
BG	++ (SP or G)	?	? (SP)	-	**?**
RO	++ (SP)	++ (SP)	-	-	++
GR					
(HR)	+ (SP or G)	+ (SP or G)	-	-	**?**

++ = certainly will be provided	? = not sure
+ = not for all sites	- = will certainly not be provided
(SP) = species level	(G) = genera level
(Kohler) = method used for macrophytes	

3. COMMON INTERCALIBRATION TYPES FOR LAKES

A common intercalibration typology for lakes has been agreed by the WG Intercalibration under the WFD CIS in the sequence of the proposals of the rivers, lakes and coastal experts networks.

The analysis of metadata showed that there were few sites submitted per type in all GIGs, and the distribution of the number of sites per quality class boundary was often not sufficient to allow confidence in a intercalibration exercise. Often sites within a type have been submitted by only one country. The typology has now been revised within the different geographic intercalibration groups considering the metadata from the sites selected for the intercalibration register. Several large modifications were proposed to the typology. Mainly types with a small number of sites were merged to achieve a sufficient number of sites per quality class boundary per type needed for intercalibration. With the same purpose Baltic and Central GIG were joint and Romanian reservoirs initially belonging to Eastern Continental GIG were replaced into Mediterranean GIG. Table 1 summarises the number of types evaluated has having potential for intercalibration for each GIG, taking into consideration number of sites, number of countries with sites/type, number of sites per class boundary and pressure (which and if there are confounding pressures).

Table 1. Number of lake types by Geographic Intercalibration Groups remaining in the register after revision by experts in February 2004

GIG	Number of types
Northern/nordic	7
Atlantic	3
Baltic + Central	3
Alpine	2
Mediterranean + Eastern Continental	4

The sites in the metadata represent the Member States views of the class boundaries, and except for the Northern/Nordic GIG it is seen as impossible to achieve a common view within the time of the register. It remains to be evaluated the final significance of the Intercalibration register and to define the process for the intercalibration.

The physico-morphological and chemical factors characterising the common lake types in each GIG are presented in Tables L-1a to L-5a.

In some cases, revisions made in typology have changed also the list of countries participating in geographic intercalibration groups. Countries that have submitted their sites to particular GIGs are shown in updated Tables L-1b to L-5b.

The following pressures are considered to be the most important for lakes and it is expected that most monitoring data available in Europe regard lakes sensitive or impacted by eutrophication or acidification. Thus, it is recommended to confine the intercalibration exercise to the effects - eutrophication and acidification:

- **Nutrient loading:** this is still the most important pressure in most MS. This should be the focal point of the intercalibration, also because most of the available data is on eutrophication indicators (i.e. phytoplankton biomass and species composition) in lakes.

- **Acidification:** although this pressure is declining, acidification effects are still important in parts of Europe. It is therefore proposed to include acidification for relevant types.

Initially, both pressures were proposed to be included in all GIG. Finally, there were sites at which acidification was addressed as a pressure, submitted only to Nordic and Atlantic GIGs.

Ideally data on all biological quality elements are required for intercalibration; however, this may not be possible given the timetable requirements. Thus, it has been suggested to focus the intercalibration exercise will be on the quality elements considered most relevant for the selected pressures:

- **Eutrophication:**
    - **Phytoplankton** (incl. Chl-a): necessary for all lake types and widely used in Member States
    - **Macrophytes**: essential and widely used for very shallow lakes, highly desirable for shallow/deep lakes), include if sufficient data is available
- **Acidification**:
    - **Macroinvertebrates**: necessary for all lake types, widely used in Member States
    - **Fish**: highly relevant; include if sufficient data is available

The analysis of the metadata of intercalibration sites has revealed that data are missing for the agreed elements for many sites/countries. When available, the data is often not comparable and there is need for most countries in all GIG to collect new biological data in a harmonised manner. Pressures and biological quality elements addressed in particular GIGs are presented in Tables L-1c to L-5c.

3.1 Nordic lakes

At the previous expert meeting in September 2003, the Nordic type L-N4 was proposed to be removed because of lacking sites, and the type L-N3 was proposed to be subdivided into two L-N3a and L-N3b differentiated by size. However, the subtype L-N3b did not collect enough sites and at the meeting in February 2004 the experts decided to remove the split. Instead of that the type L-N2 was splitted into two subtypes differing by mean depth in order to accommodate some outliers. At the moment, the deeper subtype contains only one site and needs to be completed.

The descriptions of the Northern river types have been modified as agreed during a Nordic GIG meeting held in March, 2004.

In the Northern GIG, seven common types were identified (Table L-1a), characterised by the following descriptors:

- altitude and geomorphology - two classes: lowland (altitude < 200 m or below the highest coastline) and mid-altitude (between lowland and highland)
- depth – two classes: shallow lakes with the mean depth 3 – 15 m and deep lakes with the mean depth > 15 m
- alkalinity was used as a proxy for geology with two classes: low alkalinity (< 0,2 meq/l) and medium alkalinity (0,2 – 1 meq/l)

level of humic substances – two water colour classes: low level (< 30 mg Pt/l) and high level (> 30 mgPt/l).

Table L-1a. Northern/ Nordic lakes: intercalibration types

Type	*Lake characterisation*	*Altitude & geomorphology*	*Mean depth (m)*	*Geology alkalinity (meq/l)*	*Colour (mg Pt/l)*	*Lake size (km^2)*
L-N1	*Lowland, shallow, siliceous (moderate alkalinity) clear, large*	< 200 m or HC*	3 - 15	0.2 - 1	< 30	> 0.5**
L-N2a	*Lowland, shallow, siliceous (low alkalinity) clear, large*	< 200 m and HC	3 - 15	< 0.2	< 30	> 0.5
L-N2b	*Lowland, deep, siliceous (low alkalinity) clear, large*	< 200 m and HC	> 15	< 0.2	< 30	> 0.5
L-N3	*Lowland, shallow, siliceous (low alkalinit), organic (humic) large*	< 200 m and HC	3 - 15	< 0.2	> 30	> 0.5
L-N5	*Mid-altitude, shallow, siliceous (low alkalinity) clear, large*	Between lowland and highland	3 - 15	< 0.2	< 30	> 0.5***
L-N6	*Mid-altitude, shallow siliceous (low alkalinity), organic (humic) large*	Between lowland and highland	3 - 15	< 0.2	> 30	> 0.5**
L-N8	*Lowland, shallow, siliceous (moderate alkalinity), organic (humic), large*	< 200 m or HC	3 - 15	0.2 - 1	> 30	> 0.5

* highest coastline
**Proposal to focus on the lake size 0.5 to 5 km^2
*** Proposal to focus on the lake size 0.5 to 5 km^2 and 5 to 40 km^2

Table L-1b Northern/ Nordic lakes: geographical intercalibration groups by type as submitted by January 2004

Type	*Lake characterisation*	*FI*	*IE*	*NO*	*SE*	*UK*
L-N1	*Lowland, shallow, siliceous (moderate alkalinity) clear, large*	look for sites to be added	+	+	look for sites to be added	+
L-N2a	*Lowland, shallow, siliceous (low alkalinity) clear, large*		+	+	look for sites to be added	+
L-N2b	*Lowland, deep, siliceous (low alkalinity) clear, large*			+	look for sites to be added	
L-N3	*Lowland, shallow, siliceous (low alkalinit), organic (humic) large*	+		+	+	
L-N5	*Mid-altitude, shallow, siliceous (low alkalinity) clear, large*			+	+	+
L-N6	*Mid-altitude, shallow siliceous (low alkalinity), organic (humic) large*			+	+	

	Lowland, shallow, siliceous (moderate alkalinity), organic (humic), large					
L-N8	*Lowland, shallow, siliceous (moderate alkalinity) clear, large*					

Table L-1c Northern/ Nordic lakes: Pressures and quality elements by type

Type	*Lake characteris ation*	*FI*	*IE*	*NO*	*SE*	*UK*
L-N1	*Lowland, shallow, siliceous (moderate alkalinity) clear, large*	look for sites to be added	2E1+2E2 Phytoplankton, Macrophytes, Invertebrates	1E1+5E2 Phytoplankton, Macrophytes, Invertebrates, fish	look for sites to be added	3E2 Phytoplankton, Macrophytes, fish
L-N2a	*Lowland, shallow, siliceous (low alkalinity) clear, large*		?	2E1 Phytoplankton, Macrophytes, Invertebrates, fish	look for sites to be added	1E1+2E2 Phytoplankton, Macrophytes, fish
L-N2b	*Lowland, deep, siliceous (low alkalinity) clear, large*			2E1 Phytoplankton, Macrophytes, Invertebrates	look for sites to be added	
L-N3	*Lowland, shallow, siliceous (low alkalinit), organic (humic) large*	3E1+2E2 Phytoplankton, Macrophyte, fish		5A2+5E1 3E2 Phytoplankton, Macrophytes, Invertebrates, fish	1A1+2A2 2E1+1E2 Phytoplankton, Macrophytes, Invertebrates, fish	
L-N5	*Mid-altitude, shallow, siliceous (low alkalinity) clear, large*			1A1+5A2 2E1+1E2 Phytoplankton, Macrophytes, Invertebrates, fish	4A1+2A2 2E1 Phytoplankton, Macrophytes, Invertebrates, fish	1A1+2A2 2E1, check remainingsites) Phytoplankton, Macrophytes, fish
L-N6	*Mid-altitude, shallow siliceous (low alkalinity), organic (humic) large*			2A1+6A2 2E1 Phytoplankton, Macrophytes, Invertebrates, fish	3A1+4A2 3E1 Phytoplankton, Macrophytes, Invertebrates, fish	
L-N8	*Lowland, shallow, siliceous (moderate alkalinity), organic (humic), large*					

A1 Acidification is the most important pressure, site classified as at the quality class boundary ‘High-Good ‘
A2 Acidification is the most important pressure, site classified as at the quality class boundary ‘Good-Moderate‘
E1 Eutrophication is the most important pressure, site classified as at the quality class boundary ‘High-Good ‘
E2 Eutrophication is the most important pressure, site classified as at the quality class boundary ‘Good-Moderate‘

3.2 Atlantic lakes

In the Atlantic GIG, three common types were identified (Table L-2), characterised by the following descriptors:

- altitude and depth
- lake size – two classes: small lakes with the lake area < 0,5 km^2 and medium to large lakes with the lake area > 0,5 km^2
- alkalinity and colour were used for geology with two classes: calcareous lakes (alkalinity > 1 meq/l) and peat (humic) lakes with high water color values.

It was decided to eliminate Types L-A4, L-A5 and L-A6 due to lack of sites.

Table L-2 Atlantic lakes: intercalibration types

Type	***Lake characterisati on***	***Altitude & geo-morphology***	***Mean depth (m)***	***Geology alkalinity (meq/l)***	***Lake size (km2)***
L-A1	*Lowland, shallow, calcareous, small*	<200	3-15	Alcalinity >1 meq/l	Small <0.5
L-A2	*Lowland, shallow, calcareous, large*	<200	3-15	Alcalinity >1 meq/l	Medium to large >0.5
L-A3	*Lowland, shallow, peat, small*	<200	3-15	Humic	Small <0.5

Following the decision made at the expert meeting in February 2004, countries involved in the Atlantic GIG will continue selecting additional sites to be included in the above types to ensure a minimum number of 5 waterbodies per quality class boundary per type.
It is not clear if Portugal and Spain have intentions to participate in the intercalibration within this GIG and if the lakes in these countries would be comparable with those of Ireland and UK. Until now no sites from these countries have been submitted to Atlantic GIG.

Table L-2b Atlantic lakes: intercalibration groups by type as submitted by January 2004

Type	***Lake characterisation***	***IE***	***PT***	***ES***	***UK***
L-A1	*Lowland, shallow, calcareous, small*	+			+
L-A2	*Lowland, shallow, calcareous, large*	+			+
L-A3	*Lowland, shallow, peat, small*	+			+

The number of sites for each pressure and pressure magnitude (classification as in the class boundary ‘high-good’ or ‘good-moderate’), as well as the biological quality elements for which data is available per county are presented in table L-2c.
All sites are only impacted by eutrophication and the distribution of sites per class boundary is even but only a small number of sites have been selected.

Phytoplankton data is available for all sites in Ireland and is identified to the species and genus mostly; but only one of the UK sites has data for phytoplankton (phytoplankton abundance and bloom occurrence). Macrophytes data is available in sites from both Ireland and UK and plants are identified to species. Benthic invertebrates data from the Irish sites is available to the species and genus mostly, in the UK invertebrates are identified to the genus. There are no fish data for any of the sites.

Table L-2c Atlantic lakes: pressures and quality elements by type.

Type	***Lake characterisation***	***IE***	***PT***	***ES***	***UK***
L-A1	*Lowland, shallow, calcareous, small*	E1 2 + E2 2 Phytoplankton, Macrophytes, Invertebrates			
L-A2	*Lowland, shallow, calcareous, large*	E1 4 + E2 3 Phytoplankton, Macrophytes, Invertebrates			
L-A3	*Lowland, shallow, peat, small*	A1 2 + A2 2 Phytoplankton, Macrophytes, Invertebrates			E1 2 + E2 2 Macrophytes, Invertebrates

A1 Acidification is the most important pressure, site classified as at the quality class border 'High-Good '
A2 Acidification is the most important pressure, site classified as at the quality class border 'Good-Moderate'
E1 Eutrophication is the most important pressure, site classified as at the quality class border 'High-Good '
E2 Eutrophication is the most important pressure, site classified as at the quality class border 'Good-Moderate'

3.3 Baltic lakes

Experts decided to merge the five Baltic types with the types in the Central GIG. As a result, the Baltic GIG disappeared.

3.4 Central lakes

After merging the Baltic and Central GIG-s for lakes, the typology was revisited and substantially simplified (Table L3): the division between small and large lakes was removed that enabled to pool types L-C1 with L-C2, and L-B2 with L-B4 to form a new type **L-CB1**, L-C5 with L-C6, and L-B3 with L-B5 to form type **L-CB2**. Experts agreed also on the typological parameters of so-called *Lobelia*-lake type **L-CB3**, which creation was agreed at the previous expert meeting in September 2003 and which joined the previous types L-B1, L-C4 and L-C8.

In the Baltic GIG, three common types were identified (Table L-3a), characterised by the following descriptors:

- altitude
- depth - two classes: very shallow lakes with the mean lake depth < 3 m and shallow lakes with the lake depth 3 - 15 m
- lake size – two classes: small lakes with the lake area < 0,5 km^2 and medium to large lakes with the lake area > 0,5 km^2
- alkalinity was used as a proxy for geology with two classes: calcareous lakes with high alkalinity values (> 1 meq/l) and siliceous lakes with low alkalinity values (0,2 – 1 meq/l).

Table L-3a Joint Central+Baltic lakes: intercalibration types

Type	***Lake characterisation***	***Altitude & geo-morphology***	***Mean depth (m)***	***Geology alkalinity (meq/l)***
L-CB1 *(L-C1+L-C2+L-B2+L-B4)*	*Lowland, shallow,* ***stratified****, calcareous*	< 200	3 - 15	> 1
L-CB2 *(L-C5+L-C6+L-B5+ L-B3)*	*Lowland, very shallow, calcareous,*	< 200	< 3	> 1
L-CB3 *(L-C8+L-B1+L-C4)*	*Lowland,shallow , siliceous, vegetation dominated by Lobelia*	< 200	< 15	0.2 - 1

Czech Republic, Denmark, Luxembourg and Slovakia initially planned to join Central GIG have still submitted no sites to these types and were not any more included in Table L-3b.

Table L-3b Joint Central+Baltic lakes: intercalibration groups by types as submitted by January 2004

Type	***Lake characterisation***	***BE***	***FR***	***DE***	***NL***	***PL***	***GB***	***LV***	***LT***	***EE***	***HU***
L-CB1	*Lowland, shallow,* ***stratified****, calcareous*	+		+		+		+	+	+	+
L-CB2	*Lowland, very shallow, calcareous,*	+		+	+	+	+	+		+	+
L-CB3	*Lowland,shallow , siliceous, vegetation dominated by Lobelia*	+	+			+				+	

Table L-3c Joint Central+Baltic lakes: pressures and quality elements by type

Type	***Lake characterisation***	***Eutrophication***
L-CB1	*Lowland, shallow,* ***stratified****, calcareous*	**Phytoplankton**, macrophytes
L-CB2*	*Lowland, very shallow, calcareous,*	**Phytoplankton**, macrophytes

L-CB3	*Lowland,shallow , siliceous, vegetation dominated by Lobelia*	**Phytoplankton**, macrophytes

* **UK has some sites which are lakes created from dammed river systems or from ancient peat digging, both might be considered HMWBs or Artificial WBS, although impacts are considered minor. Netherlands may have hydromorphological modification pressure**

In all previous Baltic and Central types eutrophication was addressed as the main pressure. In Baltic types phytoplankton was the only biological quality element planned to use in intercalibration. In Central GIG in addition to phytoplankton also macrophytes will be used.

3.5 Eastern Continental lakes

There were 20 sites submitted to the Eastern Continental GIG for lakes: 14 reservoirs from Romania and 6 lake sites from Hungary, three of which were from large Hungarian lakes Fertö and Balaton. As the sharing criterium was not fulfilled (comparable sites were submitted by only one country), Romania proposed to join Mediterranean GIG by adding the reservoirs of the former types L-E2 and L-E3 to L-M7, and those from L-E4 to L-M8.

Experts discussed the possibility to compare Hungarian large lakes with the large shallow lakes from The Netherlands or from Baltic countries (Naardermeer, Veluwemeer, Võrtsjärv, Burtnieks) but had to conclude that big differences in alkalinity and climatic conditions do not allow a proper comparison.

As no sites remained in the Eastern Continental GIG for lakes, this GIG can be deleted from the register.

3.6 Alpine lakes

In former IC papers up to 11 alpine lake types were described. However, most of these types occur only in one country or comprise too few sites per class boundary. Hence, they are skipped from the IC type list.

In lake type L-AL5 (lowland or mid-altitude, deep, large, siliceous, moderate alkalinity), only four Italian lakes were submitted (*Lago Maggiore, Lago di Mergozzo, Lago di Monate, Lago d´Orta*). As no other country submitted sites of this type, it should be removed from register. The geology of the catchment area of the four Italian lakes is siliceous or mixed, and the lakes have moderate alkalinities (0.2–1 meq l^{-1}). They differ in this respect from the calcareous lakes (>1 meq l^{-1}). However, these differences in alkalinity seem not to be too important and do not mirror in the biology (*e.g.* phytoplankton composition in *Lago Maggiore* and *Lago di Garda*). Hence, in order to keep the four Italian lakes in the IC register, they were moved to L-AL3 (types L-AL3 and L-AL5 were merged). It will be decided later in the IC process (after submission of more data and a closer look at the comparability) whether to keep these sites in typ L-AL3 or to skip them. Finally, only two alpine lake types will remain for intercalibration:

In the Alpine GIG, two common types were identified (Table L-4a), characterised by the following descriptors:

- altitude - two classes: lowland to mid-altitude (50 – 800 m) and mid-altitude (200 – 800 m)
- depth - two classes: shallow lakes with the mean lake depth 3 – 15 m and deep lakes with the lake depth >15 m

Table L-4a. Alpine lakes: intercalibration types

Type	*Lake characterisation*	*Altitude & geomorphology*	*Mean depth (m)*	*Geology alkalinity (meq/ l)*	*Lake size (km^2)*
L-AL3	*Lowland or mid-altitude, deep, moderate to high alkalinity (alpine influence), large*	50 - 800	>15	> 1	> 0.5
L-AL4	*Mid-altitude, shallow, moderate to high alkalinity (alpine influence), large*	200 - 800	3 - 15	> 1	> 0.5

Table L-4b Alpine lakes: intercalibration groups by types as submitted by January 2004

Type	*Lake characterisation*	*AT*	*FR*	*DE*	*IT*	*SI*
L-AL3	*Lowland or Mid-altitude, deep calcareous. (alpine influence), large*	+	+	+	+	+
L-AL4	*Mid-altitude, shallow, calcareous. (alp. influence), large*	+	+	+	+	

One consequence of this reduction is that Spain is no longer member of the Alpine lake GIG (Table L-4b).

Several lakes do not exactly meet the criteria. The Alpine GIG has, however, agreed to keep all of them in the IC register, until further information about the lakes is available. Maybe, their biology is comparable to lakes that are compliant with the agreed abiotic criteria and, hence, can be used for intercalibration.

Eutrophication remained the only pressure addressed in Alpine GIG and its impact on phytoplankton and macrophytes will be used in intercalibration (Table L-4c)

Table L-4c Alpine lakes: pressures and quality elements by type

Type	*Lake characterisation*	*Eutrophication*
L-A3	*Lowland or Mid-altitude, deep calcareous. (alpine influence), large*	**Phytoplankton**, macrophytes
L-A4	*Mid-altitude, shallow, calcareous. (alp. influence),*	**Phytoplankton**, macrophytes

	large	

3.7 Mediterranean lakes

Eight of the twelve previously agreed types were removed from the Mediterranean GIG:

- L-M2, L-M3, LM6 and LM9 as no sites were proposed.
- L-M4, L-M10, LM11, and L-M12 did not fulfill the sharing criterium because only Spain could propose sites for these types.

In the Mediterranean GIG, two common types were identified (Table L-5a), characterised by the following descriptors:

- altitude - three classes: lowland (< 200 m), mid-altitude (200 – 800 m) and between lowland and highland (< 800 m)
- depth - two classes: shallow lakes with the mean depth 3 - 15 m and deep lakes with the mean depth >15 m.

There are four types remaining:

- L-M1 Italy and Spain will study their possibilities to submit sites for this type
- L-M5 (Spain and Portugal have submitted sites)
- L-M7 (Spain and Portugal have submitted sites)
- L-M8 (Spain, Italy, Cyprus have submitted sites)

Table L-5a. Mediterranean lakes: intercalibration types

Type	***Lake characterisation***	***Altitude & geomorphology***	***Mean depth (m)***	***Geology alkalinity (meq/l)***	***Lake size (km2)***
L-M1	*Lowland, shallow, calcareous, large*	< 200	3 - 15	>1	> 0.5
L-M5	*Reservoirs, deep, large siliceous, lowland*	< 200	> 15	< 1	> 0.5
L-M7	*Reservoirs, deep, large, siliceous, Mid-altitude.*	200 - 800	> 15	< 1	> 0.5
L-M8	*Reservoirs, deep, large, calcareous, between lowland and highland*	0 - 800	> 15	> 1	> 0.5

Romania proposed to join Mediterranean GIG by adding their reservoirs of the former types L-E2 and L-E3 to L-M7, and those from L-E4 to L-M8.

Table L-5b Mediterranean lakes: geographical intercalibration groups by type as submitted by January 2004

Type	***Lake characterisation***	***CY***	***IT***	***PT***	***ES***	***RO***
L-M1	*Lowland, shallow, calcareous, small*				+	
L-M5	*Reservoirs, deep, large siliceous, lowland*			+	+	
L-M7	*Reservoirs, deep, large, siliceous, Mid-altitude.*		+	+	+	+

L-M8	*Reservoirs, deep large, calcareous, Mid-altitude*	+	+		+	+

Malta, France and UK initially planned to join Mediterranean GIG did not submit any sites to the Mediterranean types.
Eutrophication remained the only pressure addressed in Mediterranean GIG and its impact on phytoplankton and macrophytes will be used in intercalibration (Table L-5c)

Table L-5c Mediterranean lakes: pressures and quality elements by type

Type	***Lake characterisation***	**Eutrophication**
L-M1	*Lowland, shallow, calcareous, small*	**Phytoplankton**, macrophytes
L-M5	*Reservoirs, deep, large siliceous, lowland*	**Phytoplankton**
L-M7	*Reservoirs, deep, large, siliceous, Mid-altitude.*	**Phytoplankton**
L-M8	*Reservoirs, deep large, calcareous, Mid-altitude*	**Phytoplankton**

4. COMMON INTERCALIBRATION TYPES FOR COASTAL AND TRANSITIONAL WATERS

The expert group on Coastal and Transitional Waters (the last meeting of the WFD CIS Working group 2.4. COAST) agreed on the common coastal types for the intercalibration network in their meeting on 27-28 February, 2003, in Lisbon, Portugal. This formed the basis of the selection on coastal and transitional waters intercalibration types. It was recognised that further work will be needed and all countries need to check, if the types proposed here will be distinguished as part of their national typologies.

The COAST expert network met in Oslo, Norway, on 11-12 September, 2003 to discuss and evaluate the selection of sites for the draft register of the Intercalibration network, based on metadata submitted until 25 August 2003 into the web-based JRC metadatabase (www.wfd-reporting.cec.jrc.eu.int). Some modifications of the types were agreed in that meeting. However, as the Member States' submissions of sites continued until 10 November 2003 for the draft register for the intercalibration network, no changes were introduced in the metadata questionnaire.

The more detailed evaluation of the metadata from the sites submitted in the intercalibration network was carried out by JRC-EEWAI based on data submitted until 12 January 2004. The evaluation was presented to the COAST expert network on their meeting in 11-13 February 2004. The expert group agreed on the following recommendations for the further revision and submission of sites for the final intercalibration register:

- Submission of further sites should concentrate on small number of types within each GIG (the revised lists of types for each GIG is presented below)
- The intercalibration guidance recommends that at least 5 sites per type and per class boundary are needed in the intercalibration exercise[3]. It was agreed that each Member State should try to find further sites for the common types, where new sites should be submitted in order to fulfil this criteria.
- However, it was agreed that even if the required number of sites (5 sites per type and per class boundary) would not be reached for all types, some of those types (with low number of sites submitted) could still be maintained, if necessary.

The following summary presents the updated common intercalibration types for the coastal and transitional waters based on the recommendations of the expert meeting in February 11-13, 2004. The metadata questionnaire will be revised accordingly. In the next phase – finalisation of the register for the intercalibration network – sites should be submitted belonging to these common types as presented below for each ecoregions.

[3] *Towards a guidance on establishment of the Intercalibration network and on the process on the Intercalibration exercise.* Water Framework Directive (WFD) Common Implementation Strategy Guidance No. 6. Available at: http://forum.europa.eu.int/Public/irc/env/wfd/library

Geographical Intercalibration Groups (GIG)

The marine area is divided into three different Geographical Intercalibration Groups (GIGs), according to the WFD Annex XI ecoregions and ecoregion complexes, based on salinity and tidal range:

- Baltic Sea (microtidal, oligo – polyhaline)
- Mediterranean Sea (microtidal – euhaline)
- NE Atlantic complex (NE Atlantic, North Sea, Barents Sea, Norwegian Sea)
- Black Sea (microtidal, oligo – polyhaline)

Transitional and coastal types

The common types selected for the intercalibration network should be shared at least by two or more Member States/ Candidate Countries. In the Baltic Sea no common transitional water types have been identified, and therefore intercalibration will be only focus on coastal types. In the NE Atlantic GIG common types were distinguished both for transitional and coastal waters. For the Mediterranean two common transitional water types are now proposed for the intercalibration network.

Pressures

The general consensus across all three GIGs is that it will be extremely difficult to find sites that are only impacted by one pressure. This is due to factors such as transboundary pollution and the large number of pressures that can impact the same water body. Although it may be possible to select sites, which are impacted by one over-riding pressure, there will usually be several other pressures which effect the ecological status.

However, in the selection of intercalibration sites the most widespread / common pressures should be considered. This is because there is generally data available from sites that are impacted by common pressures, and which many Member States and Accession Countries have already monitored for several years using typical indicators to assess the impact of such pressures.

4.1. Black Sea

Along enlargement of the EU, a new ecoregion for the Black Sea coastal and transitional water will be needed. The work on coastal typology is still on-going in the Black Sea countries, and therefore no proposal for the common intercalibration types is yet available. However, it is proposed that a number of undefined Black Sea coastal and transitional water types will be included in the revised of the metadata questionnaire for the final intercalibration register.

4.2. Mediterranean

4.1.1. Mediterranean coastal water types

The following factors are the same for the entire Mediterranean Sea coastal water types:

- salinity > 30 (practical salinity scale)
- tidal range: < 1 m
- current velocity: weak (< 1 knot)
- mixing conditions: partially stratified (seasonally stratified)
- exposure: the majority of sites are moderately exposed[4].
- residence time: not relevant for Mediterranean coastal waters

The main factors used to identify Mediterranean coastal types are:

- depth
- substratum

The proposed coastal water body types for intercalibration in the Mediterranean ecoregion are given in Table CW-1a. There are no changes proposed by the expert group for the current list of common types in the intercalibration metadata questionnaire.

Table CW-1. Proposed coastal water body types for Intercalibration in the Mediterranean Sea.

Type	***Name of Type***	***Substratum***	***Depth***
CW - M1	Rocky shallow coast	rocky	shallow
CW - M2	Rocky deep coast	rocky	deep
CW - M3	Sedimentary shallow coast	sedimentary	shallow
CW - M4	Sedimentary deep coast	sedimentary	deep

In the metadata compilation for the draft register of the intercalibration network sites were submitted into 3 of the 4 types included in the questionnaire. However, none of the types fulfilled the criteria of having sufficient number of sites per type and per classification boundary. Further, most of the types had only sites submitted from one country, and therefore, the criteria of having two or more countries sharing the same type, was not fulfilled either.

[4] According to the definitions of the common European exposure categories presented in the Guidance document No. 5 *'Transitional and Coastal Waters - Typology, Reference conditions, and Classification systems'*. Common Implementation Strategy of the Water Framework Directive, Available at: http://forum.europa.eu.int/Public/irc/env/wfd/library

There should be a considerable effort from all Member States and Candidate Countries in the Mediterranean ecoregion to submit more sites for the finalisation of the intercalibration network.

4.2.2. Mediterranean Transitional Water Types

Transitional types are currently discussed at the network of the Mediterranean transitional waters (Lagunet, www.ecologia.ricerca.unile.it), in contact with the COAST Expert group. Three (3) transitional water types are preliminary proposed for the intercalibration network in the Mediterranean Sea (Table TW-1). There will be possibly some further subdivision or definitions for these types. Therefore the definitions of these types are only preliminary at this stage.

Table TW-1. Preliminary proposal for the definition of the common intercalibration types for the transitional waters in the Mediterranean Sea.

Type	**Description**	**Tidal range**
TW-M5	Running transitional waters: deltas and river mouths	
TW-M6	Lentic transitional waters: Lagoons	>0.5 m
TW-M7	Lentic transitional waters: Coastal ponds	<0.5 m

In the current draft register for the intercalibration network, no sites have yet been identified belonging to the transitional water types in the Mediterranean ecoregions. However, Member States and Candidate Countries should look for potential transitional water intercalibration sites to be submitted during the finalisation of the intercalibration register.

4.2.3. Pressures in focus for the intercalibration of the Mediterranean coastal and transitional waters

The experts have agreed that intercalibration should be based upon a choice of similar sites for the most relevant pressure (e.g. coastal modification, correlation with urbanisation).

However, during the site selection in 2003, difficulties have been encountered in identifying pressures and completing the pressure information for the Mediterranean. There are very few sites where there is only one dominant pressure. Also at present it is not clear how to quantify pressures on coastal and transitional water bodies in the Mediterranean.

4.2.4. Recommendation for the finalisation of the intercalibration network

1. The Mediterranean coastal experts agreed on the recommendation that all Member States and Candidate Countries from the Mediterranean ecoregions should submit more sites for the final intercalibration network.
2. The experts prepared a list of sites that could be potentially included in the network from all Mediterranean countries[5]. There are a number of sites from all

[5] The list of potential intercalibration sites from the Mediterranean GIG is included in the minutes of the COAST experts' meeting on 11-13 February, 2004, available at:

Mediterranean countries that should be submitted to the final register of the intercalibration network by the respective countries.

3. The Mediterranean experts advised further, that instead of removing a type only with few submitted sites from the intercalibration network, a type/boundary combination with 4 sites should be included in the intercalibration network, even if the recommended number (5 sites per type per boundary) of intercalibration sites would not be fulfilled.
4. The Mediterranean experts advised also that Member States and Candidate Countries should look for potential transitional water sites to be submitted in the final intercalibration register.

4.2 Baltic Sea

For the Baltic Sea Ecoregion, seven (7) coastal types for the intercalibration network were identified in the Lisbon meeting. Each type should be common for at least two Member States and/or Candidate Countries. During the metadata compilation in spring-summer 2003, Lithuania and Poland have proposed three (3) new types for the Baltic Sea. The metadata questionnaire[6] included 10 defined types for the Baltic Sea (and 2 undefined types)

In the metadata compilation for the draft register of the intercalibration network, sites were submitted for 8 of the 10 types included in the questionnaire. However, none of the types fulfilled the criteria of having sufficient number of sites per type and per classification boundary. Further, most of the types included sites submitted only from one country, and therefore the criteria of having two or more countries sharing the same type were not fulfilled either.

The Baltic Sea experts agreed to merge some of the intercalibration types and to add one new type in the metadata questionnaire. The revised list of intercalibration types is presented below:

[6] *Metadata Questionnaire for the establishment of the Intercalibration Network*", distributed on May 19, 2003. Available at http://forum.europa.eu.int/Members/irc/env/wfd/library; / E Working groups/ New WG 2A - Ecological Status.

Table CW-2a. Common coastal types identified within the Baltic Sea for finalisation of the register for the intercalibration network.

New Type ID	Types[1] merged/ added	Salinity (PSU)	Depth	Exposure	Ice days/year
CW-B0	New type[2]	Low oligohaline (0.5 - 3)	shallow	sheltered,	> 150
CW-B2	CW-B2	High oligohaline (3 - 6)	shallow	sheltered,	> 150
CW-B3	CW-B3	High oligohaline (3 - 6)	shallow	sheltered,	90 - 150
CW-B12	Former CW-B5 and -B9	Mesohaline (6 - 22)	shallow	sheltered	
CW-B13	Former CW-B6, and -B4 and -B10	Mesohaline (6 - 22)	shallow	exposed,	
CW-B14	Former CW-B7 and -B8	Mesohaline (6 - 22)	shallow lagoons	sheltered	

[1] As described in the document: "*Overview of common intercalibration types and guidelines for the selection of intercalibration sites* ". Version 2.0, distributed on May 19, 2003. Available at http://forum.europa.eu.int/Members/irc/env/wfd/library; / E Working groups/ New WG 2A - Ecological Status
[2] Former type B1 (Baltic- Bothnian Bay: moderately exposed) is omitted.

Countries having type:

- CW-B0 - Sweden, Finland, no sites submitted, countries will try to find new sites
- CW-B2 - Sweden, Finland, insufficient sites at present, countries will try to find additional sites
- CW-B3 - Sweden, Finland (possibly also Estonia). insufficient sites at present, countries should try to find additional sites
- CW-B12 - Poland, Denmark, Sweden, at present only sites at good/moderate boundary been submitted but more to be found
- CW-B13 - Sweden, Estonia (possibly also Lithuania, Latvia and Poland)
- CW-B14 - Germany, Denmark, Poland

4.3.1. Pressures in focus for the intercalibration of the Baltic Sea coastal waters

Nutrient loading (eutrophication), fishing and mariculture were identified as the major pressures to be in focus in the intercalibration process[7] for the Baltic Sea (Table CW-2c).

Table CW-2c. Suggested pressures and quality elements to be in focus in the selection of sites for the new intercalibration types in the Baltic Sea.

New Type ID	Description	*Pressure*
CW – B0	Low oligohaline (salinity 0.5-3) sheltered, shallow, > 150 ice days	Eutrophication
CW - B2	High oligohaline (salinity 3-6), sheltered, shallow, >150 ice days	Eutrophication (Fishing)

[7] As presented in Table CW-2b of the document: "*Overview of common intercalibration types and guidelines for the selection of intercalibration sites* ". Version 2.0, distributed on May 19, 2003. Available at http://forum.europa.eu.int/Members/irc/env/wfd/library; / E Working groups/ New WG 2A - Ecological Status.

CW - B3	High oligohaline (salinity 3 - 6 PSU), sheltered, shallow, 90 -150 ice days/year	Mariculture, Eutrophication
CW – B12	Mesohaline (salinity 6 – 22 PSU), sheltered, shallow	Eutrophication
CW – B13	Mesohaline, exposed, shallow	Eutrophication, fishing
CW –B14	Mesohaline, sheltered, shallow lagoons	Eutrophication, Fishing

4.3.2. Recommendation for the finalisation of the intercalibration network

1. The Baltic Sea experts suggest that in order to improve the chances of finding more sites for the final register of the intercalibration network, countries should be allowed to submit sites which are not necessarily on the high/good or good/moderate boundary, but are considered to be fairly close to the borders, and adding a statement on which side of the boundary the sites are considered to be.
2. The Baltic Sea experts noted that it is difficult to reach required number of sites for some types (5 sites/type / classification border), mainly due to the low number of countries sharing the same type (sometimes only two countries), and also due to difficulties of finding sites provisionally designated to be at the high/good classification border. However, it is still recommended to keep such types in the intercalibration network. In some cases the countries can make bilateral intercalibration, possibly by exchanging data or assessment methods. Further, most of the sites have good data sets, which improves possibilities for intercalibration.
3. Further, it was also recommended to submit intercalibration sites where there is data available only for some (but not all) quality elements.

4.4 NE Atlantic complex

Originally ten (10) coastal water types were proposed within the NE Atlantic ecoregion complex for the intercalibration network[8]. Further, three (3) undefined transitional water types were included in the intercalibration metadata questionnaire[9]. In the COAST expert meeting in Oslo (Sept. 11-12, 2003), two (2) transitional water types were identified for the NE Atlantic ecoregion complex.

According to the analysis of the draft register for the intercalibration network, two (2) coastal types of ten (10) contained the required number of sites to fulfil the criteria of 5 sites per type per classification border. One transitional water type (undefined) had sufficient numbers of sites. However, it was difficult to judge if the type criteria are consistent between the sites submitted for the same type, since only categorical information was requested in the metadata questionnaire.

The NE Atlantic expert group proposed following changes for the common intercalibration types (Table CW-3a):

- Types CW-NEA5 and NEA8 are to be removed
- Types CW-NEA2 and NEA6 are to be merged.
- Only one (1) type for the transitional waters needs to remain in the intercalibration network (see Table TW-2). All countries identifying transitional waters should submit their sites using the type identifier TW-NEA11.

[8] "*Overview of common intercalibration types and guidelines for the selection of intercalibration sites* ". Version 2.0, distributed on May 19, 2003. Available at http://forum.europa.eu.int/Members/irc/env/wfd/library; / E Working groups/ New WG 2A - Ecological Status

[9] *Metadata Questionnaire for the establishment of the Intercalibration Network*", distributed on May 19, 2003. Available at http://forum.europa.eu.int/Members/irc/env/wfd/library; / E Working groups/ New WG 2A - Ecological Status.

Table CW-3a. Common coastal types identified within the NE Atlantic ecoregion complex for intercalibration.

New Type ID	*Type*	*Name*	*Salinit (PSU)*	*Tidal range (m)*	*Depth (m)*	*Current velocity*	*Exposure*	*Mixing*	*Residence time*
CW –NEA1	CW –NEA1	Exposed, euhaline, shallow	Fully saline (> 30)	Mesotidal (1 - 5)	Shallow (< 30)	Medium (1 - 3 knots)	Exposed	Fully mixed	Days
CWNEA26	Former CW – NEA2 and – NEA6	Sheltered, euhaline, shallow	Fully saline (> 30)	Mesotidal (1 - 5)	Shallow (< 30)	low - Medium (<1 - 3 knots)	Sheltered	Fully mixed	Days
CW – NEA3	CW – NEA3	Polyhaline, exposed (Wadden Sea type)	Polyhaline (18 - 30)	Mesotidal (1 - 5)	Shallow (< 30)	Medium (1 - 3 knots)	Exposed	Fully mixed	Days
CW – NEA4	CW – NEA4	Polyhaline, mesotidal, moderately exposed (Wadden Sea type)	Polyhaline (18 - 30)	Mesotidal (1 - 5)	Shallow (< 30)	Medium (1 - 3 knots)	Moderately exposed	Fully mixed	Days
CW – NEA7	CW – NEA7	Deep, low current, sheltered	Fully saline (> 30)	Mesotidal (1 - 5)	Deep (> 30)	low (< 1 knot)	Sheltered	Fully mixed	Days
CW – NEA9	CW – NEA9	Fjord with a shallow sill at the mouth with a very deep maximum depth in the central basin with poor deepwater exchange.	Polyhaline (18 - 30)	Microtidal (< 1)	Deep (> 30)	low (< 1 knot)	Sheltered	Permanetly Stratified	Weeks
CW – NEA10	CW – NEA10	Polyhaline, microtidal exposed, deep (Skaggerak outer arc type)	Polyhaline (18 - 30)	Microtidal (< 1)	Deep (> 30)	low (< 1 knot)	Exposed	Permanently Stratified	Days

Table TW-2. Common transitional water type identified within the NE Atlantic ecoregion complex for intercalibration.

Type	**Name**	Salinity (PSU)	Tidal range (m)	Depth (m)	Current velocity	Exposure	Mixing	Residence time
TW-NEA11	NE Atlantic Transitional waters	Oligo-Euhaline (0 - 35)	Mesotidal (1 – 5)	Shallow (< 30)	Medium	Sheltered or moderately Exposed	Partially- or Permanently Stratified	Days-Weeks

Table CW-3b. Countries sharing the common coastal types identified for intercalibration in the NE Atlantic ecoregion complex.

Type	*Name*	*BE*	*DK*	*FR*	*DE*	*IE*	*NL*	*NO*	*PT*	*ES*	*SE*	*UK*
CW – NEA1	Exposed	**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**
CW – NEA26	Sheltered		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**
CW – NEA3	Polyhaline, exposed				**X**		**X**					
CW – NEA4	Polyhaline, moderately exposed				**X**		**X**					
CW – NEA7	Deep, low current, sheltered							**X**				**X**
CW – NEA9	Fjord with a shallow sill at the mouth.							**X**			**X**	
CW – NEA10	Skagerrak outer arc type							**X**			**X**	

4.3.1. Pressures in focus for the intercalibration of the NE Atlantic ecoregion complex

Nutrient loading (eutrophication) was the main pressure for most of the sites that have been submitted. For these sites information of nutrient concentrations was more common than biological monitoring data. Also a number of sites impacted by toxic substances, and habitat degradation were identified.

4.3.2. Recommendation for the finalisation of the intercalibration network

1. The NE Atlantic expert group was still open for some further changes in the list of common types for the intercalibration network. For instance, French and UK experts would like to propose to add two macrotidal types to the list of types, but did not specify those types yet.
2. Further, the NE Atlantic expert group proposed that the EUNIS habitat classification scheme could be used to ensure similar physical types are selected for comparisons between the broad types identified through the typology process. The most important aspect of this is that valid comparisons are made between the appropriate parts of the biological communities. It was proposed that the intercalibration metadatabase should contain information on the presence of each EUNIS level-3 habitat types within each intercalibration site.
3. The group proposed further to revise which type criteria should be asked in the metadata questionnaire in the finalisation of the intercalibration register, since the current categorical type parameter values asked in the metadata questionnaire cannot be used to evaluate whether the sites within the same type have similar physical conditions.